Wheels Stop

Rick Houston

2013

Follow this and additional works at: http://digitalcommons.unl.edu/unpresssamples

Houston, Rick, "Wheels Stop" (2013). University of Nebraska Press -- Sample Books and Chapters. 236.
http://digitalcommons.unl.edu/unpresssamples/236

This Article is brought to you for free and open access by the University of Nebraska Press at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in University of Nebraska Press -- Sample Books and Chapters by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
Wheels Stop
Outward Odyssey
A People’s History of Spaceflight

Series editor
Colin Burgess
To the memory of the crews of STS-51L and STS-107

To the memory of my mother and father, Betty J. and Sidney L. Houston

In honor of the thousands of men and women who worked to make the Space Shuttle an American treasure
Contents

List of Illustrations ............. ix
Foreword ................... xi
Acknowledgments .............. xiv
Introduction ................ xix
1. Back in the Game .......... 1
2. Cloak and Dagger,
   Science on Orbit ........... 29
3. Hubble Huggers .......... 92
4. Sleeping with the Enemy .... 136
5. A Home on Orbit .......... 174
6. “The Debris Was Talking to Me” 200
7. “We Came Home” .......... 243
8. A Kick in the Pants ....... 273
9. The End of an Era ......... 308
10. A Magnificent Machine .. 341
    Epilogue ........................ 369
    Sources ........................ 389
    Index .......................... 403
Illustrations

1. Jerry Ross ..................................... xii
2. Rick Houston strapped into the commander's seat of *Atlantis* .................................. xvi
3. Doug Hurley and Rick Houston .................. xx
4. Rick Hauck .................................... 13
5. The astronauts of *sts-26* pose in their finest Wild Wild West attire ................... 19
6. Rick Hauck, Dick Covey, Mike Lounge, Dave Hilmers, and George “Pinky” Nelson ...... 25
7. Guy Gardner, Bill Shepherd, Mike Mullane, and Jerry Ross inspect *Atlantis*’s badly damaged underside .......... 32
8. *sts-49* spacewalkers conduct the first and only three-person EVA ................................... 51
9. Jerry Ross during the flight of *sts-37* ............... 57
10. John Glenn coaxes President Bill Clinton ............ 86
11. The Chandra X-ray Observatory .................. 90
12. Jeff Hoffman works in the payload of *Endeavour* as Story Musgrave draws close to Hubble .......... 108
13. Jean-François Clervoy ............................ 120
14. John Grunsfeld says good-bye to his on-orbit friend .... 134
15. *Atlantis* docked with *Mir* .......................... 149
16. A module used to dock with *Mir* about to be berthed in *Atlantis*'s payload bay

17. Pam Melroy, Koichi Wakata, and Bill McArthur

18. Jim Wetherbee

19. Jim Reilly

20. Godspeed the crew of *STS-107*

21. Rick Husband

22. Les Hanks and Pat Marsh work with a piece of debris

23. Eileen Collins does a pre-flight check

24. The crew on board the *ISS* was able to examine *Discovery*'s exterior very closely

25. Steve Robinson removing stray pieces of gap filler

26. Mike Fossum

27. Scott Parazynski looks on as Pam Melroy reads a proclamation

28. Barry Wilmore and Charlie Hobaugh

29. Chris Ferguson, Rex Walheim, Doug Hurley, and Sandy Magnus

30. The crew of *STS-135*

31. The four astronauts who flew the final Space Shuttle mission are welcomed back home

32. Concept art for NASA’s proposed Heavy Lift Launch Vehicle

33. David Hilmers checks a Nepalese woman for signs of leprosy

34. Scott Parazynski
Foreword

All these years later, I can still close my eyes and be right back on the end of that robotic arm, suspended high above Atlantis’s payload bay and 160 nautical miles above the surface of the earth. The view is one of immeasurable beauty.

It was 8 April 1991, and my STS-37 crewmate Jerome “Jay” Apt and I were on our second and last extravehicular activity (EVA), or spacewalk, of the flight. The rest of the crew was working with Jay, and I had a few moments to myself. We were on a night pass, and as I leaned back, I turned off my helmet-mounted lights and peered into the deep black vastness of space.

All of a sudden, a strange sensation washed over me. In that instant I was one with the universe, doing exactly what God had designed me to do. The sensation was unexpected but it was one of peace, comforting and reassuring. Although I was in one of the most hostile environments to which mankind has ever been exposed, I knew I was exactly where I was supposed to be, doing precisely what I was supposed to be doing. Spacewalking is incredibly complicated, but it just came naturally to me. An engineering background, growing up as a farm boy in Crown Point, Indiana, and my innate mechanical aptitude came together, pieces of an intricate jigsaw puzzle that somehow managed to fit together perfectly for me as an EVA astronaut.

Named to the astronaut office in May 1980, I had no way of knowing that I would one day become the first person to be launched into space seven times. From 1984 when I began training for my first mission, STS-61B, I was in training for a flight about half of the next eighteen years. The process of getting ready to fly in space was rigorous, but I lived for it.

As an astronaut, I had the job I had always wanted. I did not see myself moving up the management ladder. Over the course of my career at NASA, I was offered several management positions. I turned them down, telling whoever would listen that as long as I could fly, that is what I wanted to
do. Executives and headhunters from the private sector came to me with some pretty attractive job proposals as well, but I wanted to fly in space. I took to spaceflight like a duck to water.

As time passed, I learned to recognize the telltale signs when some of my astronaut friends were nearing the end of their space-flying careers. While training for their upcoming flights, I would hear them complain about having to go to this class or that class or to a simulator training session. They would even complain about “having to do” one of the coolest things astronauts get to do on earth, a space-suited EVA training run in the Neutral Buoyancy Lab (NBL) water tank. Sometimes they didn’t even want to do another of our most cherished things, to go flying in a T-38. If an astronaut couldn’t get excited about getting ready to fly in space, I knew it was going to be his or her last mission.

Fortunately for me, I never got to that point. Ever. I was like a kid in a candy shop on my seventh flight, STS-110 in April 2002, just like I had been on my first. I loved the training and I loved to fly. I looked forward to the training opportunities, even though I had done most of them many times
over. From the first flight to the last, I enjoyed every minute of training, because training meant I was getting ready to fly!

Between my flights I worked on developing shuttle eva tools and procedures, evaluating International Space Station (iss) eva hardware and tasks, and developing iss assembly procedures. The eva work was almost as challenging as training for a flight. While serving as the astronaut office eva and robotics branch chief, I worked sixty or more hours a week. I brought my computer and paperwork home and worked until it was time to go to bed and got right back up to do it all again the next day. I spent many Saturdays at work, but that is what it took to get the job done. I was glad to be the one doing it.

I have been asked how I would like my career to be remembered. That is an easy question for me to answer. I would like to be remembered as a person who had a dream as a young kid and was allowed to pursue and achieve it. I had more fun than it is probably legal to have. I loved every aspect of what I got to do. I loved the people I got to do it with. I loved the challenges of the flights. I loved seeing the earth from space.

The beauty of the earth from space is not describable. If I had one wish, it would be that everyone could have the chance to see Earth from on orbit. If they did, I believe people would view themselves, the earth, and those around them in a totally different way. They would be much kinder to one another, and they would try to protect this incredible planet that we all live on.

My seventh trip to orbit gave me sole possession of the world record for most spaceflights for less than two months. Then my friend, colleague, and 1980 NASA Group 9 astronaut classmate Franklin R. Chang Diaz tied the mark as a mission specialist on STS-111. Our very first flights—STS-61B and STS-61C—had also been separated by only a few weeks way back in late 1985 and early 1986. For the rest of our careers, I would fly and Franklin would fly soon thereafter. I would fly, he would fly. I would fly, he would fly. Only once, when NASA had some long delays in getting my STS-88 flight off the ground, did Franklin’s sixth flight launch before mine. We kept tabs on each other and would occasionally tease the other about getting way too old to fly any more. But Franklin and I were both eager to fly an eighth mission and then some.

With STS-88, the first ISS construction flight, I broke the U.S. records for most spacewalks and for the most time spent outside on spacewalks. I increased both records on my final flight, but with the mountain of EVAs required to
build the ISS, it was only a matter of time before my EVA records would be surpassed. Michael E. Lopez-Alegria broke both records during his long duration stay on the ISS. It is my hope that all spaceflight records will continue to be broken. New records will mean that human beings are pushing further into space. That is what we ought to be doing, but I do not see it happening anytime soon the way things currently are.

That is my story. But what about the Space Shuttle? The shuttle was a great flying machine, and we will probably never again have the capabilities the shuttle gave us. It was by far the most advanced vehicle ever flown into space. The shuttle was man’s first attempt to make flying into space more routine and cheaper. Neither goal was achieved, but the shuttle experience headed us in the right direction. However, the shuttle did greatly increase the number of countries directly involved in the exploration of space, sending their citizens and experiments into orbit. From a human perspective, perhaps that is one of the more important things the shuttle accomplished.

I firmly believe that it was time to end the Space Shuttle program. Statistics say that if we continued to fly the shuttle, there was a fairly high probability of losing another vehicle and crew. I believe those stats. It seemed every couple of flights we would find something new that surprised us and caused new concerns.

I agreed with what the Bush administration planned to do, to stop flying the shuttle and to focus NASA’s energies, people, and money on going to the moon and beyond. As long as we continued to fly the shuttle, NASA did not have the resources to go beyond low-Earth orbit. It was time to move on, but unfortunately, we did not move quickly enough. NASA got too many redirections, too much help, and here we are, mired in indecision.

In this book, author Rick Houston does a great job of pulling together a number of diverse sources, including flight controllers, shuttle workers, and many of my astronaut colleagues to fashion a compelling narrative of what it was like to be involved in the Space Shuttle program from the aftermath of the Challenger tragedy through wheel stop of STS-135. Believe me when I say that it was an amazing journey, and now with Rick’s help, you can come along for the ride.

Jerry Ross

STS-61B, STS-27, STS-37, STS-55, STS-74, STS-88, STS-110

Author, Spacewalker (Purdue University Press, 2013)
Acknowledgments

This book changed my life, and thankfully, I am a lesser man for it.

Research led me to Johnson Space Center in June 2010. There, I was shown around by astronaut Douglas G. Hurley. The highlight was to be a run in jsc’s motion-base simulator, but when I attempted to strap in, the left lap belt of my seat on the flight deck would not latch because of my oversized belly. I tried harder, sucking in my gut. That small voice that had always taunted me began to laugh. Although we continued with the one belt undone, it was far and away the most embarrassing moment of my life.

I got back home to North Carolina and headed to the walking track behind our local YMCA. After participating in four 5k events, I enrolled in a class at the Y to learn how to actually train for one. I will always be thankful for the encouragement of instructors Crystal Joyner, Julie Winters, Wendy Hayden, and Jennifer Helton and the exhausted camaraderie of Team Attila, my fellow running newbies Mandy Marxen, Leslie Gough, Brandy Whitaker, Mary Hitchcock, and Debbie Ours. They all pushed me much, much farther than I ever could have gone on my own.

Twenty-one months after the embarrassment of my run in the motion-base simulator, I was able to have my photo taken in the commander’s seat of Atlantis at Kennedy Space Center. I get emotional even typing these words, but this time, the safety harnesses fit. Words cannot fully express my gratitude to former astronaut Jon McBride, Brian Emond of NASA public affairs, and shuttle technician Jay Beason for providing me with an experience I shall never forget—and to my buddy Gary Milgrom for acting as my photographer for the shoot.

Mixed in along the way to my weight loss was the continued research and writing of this book. NASA public affairs officer Gayle Frere helped line up several interviews with current astronauts, while Andy Turnage of the Association of Space Explorers was more than gracious in forwarding many interview requests to retired space travelers.
Astronauts and others involved in the human spaceflight program have been almost universally accommodating. Many reviewed their portions of the manuscript and answered follow-up e-mails. I would even go so far as to now consider at least a handful of them friends.

Late in 1999, I stumbled across a new website called collectspace.com. Incredibly, there were hundreds, if not thousands, of space geeks out there who were just like me. The site’s creator, Robert Z. Pearlman, was and is our benevolent and all-knowing king. Had it not been for collectspace, this book would not be happening—at least not with me as its author.

Years later, I came across a post from none other than Colin Burgess on the collectSPACE message boards. He was in need of authors for an upcoming University of Nebraska Press project called Footprints in the Dust, a book that was to detail the lunar missions of the late 1960s and early ’70s. Not long afterward, I had my assignment. I was to handle the lead chapter, on the historic flight of Apollo 11.

My favorite Australian must have liked what he read, because he offered me a shot at writing the book you now hold in your hands. Thank you, Colin, the best friend I have ever known whom I have never actually met face-to-face. Thanks also go to Rob Taylor, Sara Springsteen, and Courtney

---

2. Nearly two years after not being able to fully secure the seat belts of the motion-base simulator in Houston, author Rick Houston strapped into the commander’s seat of Atlantis. Ninety-five pounds lighter this time, the harnesses fit! Author’s collection/Gary Milgrom/Atlanta Pixel Photo.
Ochsner of the University of Nebraska Press for their patience with me. Colleen Romick Clark, who had the unenviable task of serving as copyeditor, whipped the manuscript into shape.

This book would never have happened without the support of many other people. First and foremost, I want to express thanks to my Lord and Savior, Jesus Christ. He has carried me through the darkest times of my life. Also, three families took me in as one of their own as I walked my life’s valleys. My best friend, Joe Estep, his mom, Sandi, and sister Jennifer are the kind of people you want on your side when you are in a tight spot, and they have been for me. Willard, Judy, Joe, and LeeAnn Knight—LeeAnn is now LeeAnn Burton—gave me room and board when I needed it the most. James, Lib, Jamie, and Amy Reynolds—Amy is now Amy Bottomley—were with me as I chased a dream. Words cannot fully express how much I love and care for each one of these special people in my life.

The very same and even more goes for my immediate family. I have a son from my first marriage, Richard, who is a young adult now. He graduated second in a high school class of more than six hundred students, leading me to the inevitable conclusion that such intelligence evidently skipped a generation in my case. There is absolutely nothing in this world that he cannot accomplish once he sets his mind to it.

My twin sons, Adam and Jesse, are constant sources of amazement and inspiration. Being Jesse and Adam’s parent has always been a team effort with the love of my life, my wife, Jeanie. A simple text, phone call, or touch of her hand on a bad day makes everything so much better. I love Jeanie, Richard, Jesse, and Adam with every ounce of my being. They are my reasons for being.

I need to also mention the following: Chris Bergin of nasaSpaceflight.com; Dick Conway; Duane Cross (sorry, Hoss, but this is my book—the Yankees stink!!!); Jo deJournette; Michael, Missy, Kaleb, and Haley Dickerson; Joy and Kent Doub; Matt Erickson; Gray Garrison (thanks for making my dreams of driving the pace car come true!); David and Melissa Gentry; Tad and Jodi Geschickter; Dick and Linda Gordon; the entire Graham clan—Jim, Una, Tammy, Heather, Philip, Carolyn, David, Kristie, Jason, and Angie; Artie, Cindy, Chase, and Bryce Greer; Cheryl Gundy of the Space Telescope Science Institute; Pierre, Carol, and Kary Hamel; Bill Harwood of CBS News; Mark and Renee Hayes (Mark, have I ever mentioned how
much I would dearly love to own the hood off Richard Petty’s car that now hangs in your garage?!?); Suzanne Heffner; Ed Hengeveld; Charlene Hubbard and her son Dusty; Gene and Emma Hubbard; Jim Hunter; Norman Jameson; Donald and Frances Johnson; Jonathan, Angie, and Kendra King; Jimmy, Penny, Patrick, and Jessica Lancaster; Whitney Levens; Christian Lomax; the entire Maplewood Baptist Church family; Joe Menzer; Deborah Evans Price; Dennis Punch; Denver Rakes and his sister Lauren; Tom and Jean Reavis, the very best parents-in-law for which a man could ever ask; Steve Richards (I figure if you’re in the acknowledgments, it can only help in my quest to pry Aunt Bea’s radio from your possession); Charles and Nancy Scott; Morgan and Cindy Shepherd; Walter Shore, for putting in my hands the very earliest hard copy of this manuscript; Briana Smith; Chuck, Michelle, Ian, and Mattie Tavano; Ike, Linda, and Nathan “Scooter” Trivette; Rodney, Ginger, Nathan, and Anna Wagoner (thank you so much for taking the boys off my hands in my moments of manuscript desperation!); Steve Waid; Todd Wilkerson; Leslie Wilkinson; Deb Williams; Anna Wood and her son Tyler, the only person I know who knows more about Star Wars than I do; and Cory and Shannon Yost.
Introduction

For as long as I can remember, I have been fascinated by the concept of human beings willingly strapping themselves to the pointy end of a rocket to be blasted off into the vastness of space. This was the highest form of adventure, and on top of that, astronauts looked so incredibly cool in their spacesuits. Just imagine being a little kid and watching the Apollo moonwalkers doing their thing on the lunar surface. They had a dune buggy and everything!

I do not know that I fully comprehended exactly what it was that they were doing—that they were on the moon, of all places, exploring, conducting experiments and looking like they were having the time of their lives. Best of all, it seemed that every other word they said was “Houston.” In my young mind, these spacemen were talking to me, because that was my last name. I was hooked, big time. There could be no greater job in the world than to be an honest-to-goodness, superhero, Buck Rogers astronaut. Sadly, NASA never had much use for overweight astronauts with not an ounce of technical or scientific ability. I always felt that I could have been used as ballast, if nothing else.

Doug Hurley became an avid NASCAR fan when his cousin, Nan, married Greg Zipadelli, one of the sport’s most prominent crew chiefs. I wrote a story on Doug’s interest for NASCAR.com several years ago, and we kept in touch via e-mail.

During my tour of JSC, Doug and I spent some time on one of the three shuttle mock-ups in Building 9. He had to run back to his office while Debbie Vi-Vi Nguyen, my NASA public affairs escort, took a call on her cell down on the mid-deck. Me, I was up on the flight deck, all by myself for several glorious minutes. I could flip all the switches I wanted and twist any knob to which I could possibly get. I was not actually in micro-gravity, working the robotic arm as my crewmates scurried about outside servicing...
the Hubble Space Telescope, but in my mind’s eye I was. I sat in the commander’s seat, pushing the rudder pedals this way and that with my feet and taking the control stick as I imagined myself aiming for the runway to end another heroic shuttle mission. This was every space geek’s dream, but the best was yet to come.

One of my favorite quotes in this book came from Charles J. Camarda. Charlie was just shy of his forty-fourth birthday when he was selected as an astronaut, my age now as I write this. When he flew for the first and only time on STS-114, he had worked at NASA as an engineer or astronaut for more than thirty years. He described his reaction to the launch almost exactly as I had always imaged mine would be. “You’re gonna have to ask Wendy Lawrence,” he began. “She was sitting right next to me, and what Wendy Lawrence says is that I was just laughing and grabbing her hand and shaking her the whole time we were going up.” Can you not just picture him—or better yet, yourself—on such a thrilling and dynamic ride? There, in the simulator that afternoon, I was about to get an inkling of what Charlie and Doug had experienced on their flights. We were flat on our backs, ready to rock and roll.
“Once you hit T-zero, you’re going someplace as soon as they light the boosters,” Doug said over a comm loop that on DVD playback sounded just like we were actually on the launch pad, seconds away from lighting the candle.

I could not wait and asked where the clock was located.

“Twenty-eight seconds,” Doug responded, pointing to the instrument panel.

I let out a huge sigh, trying to contain my nervous anticipation. Knowing what I felt like then, I cannot begin to imagine what the actual moments before liftoff must have felt like.

“At ten seconds, the navigation system will initialize,” Doug continued. “You’ll see the gyro spin. Stand by for engines. “There’s the engine start.”

All around me, the cabin began to shake. “Three at 100 percent.”

This was really happening, and then the imaginary Solid Rocket Boosters (SRBs) lit.

“There’s T-zero. Here we go!”

All heck broke loose. Something grabbed my seat and started to rock it this way and that. If the start of main engines had been something, ignition of the SRBs added an entirely new dimension to the ride. “Wow . . . ,” I said, again with the less-than-stellar commentary. And then, I actually giggled.

Doug continued making his calls: “One-oh-two, one-oh-two, auto, auto . . . and Houston, Endeavour. Roll program. There you go. We’re rolling.”

“One-oh-two” referred to an operational sequence mode. It went from 101 at the start of main engines, to 102 at the start of the SRBs, then on to 103 when the twin boosters separated, and finally to 104 after main engine cutoff. “Auto, auto” meant that we were on autopilot. Doug in an instant had checked for both in two separate locations—on the display in front of us and on the eyebrow panel just above the windows. On ascent, “one-oh-two, one-oh-two” and “auto, auto” are important milestones. It meant that performance on this particular run was nominal for the time being—there were no surprises. I had not screwed anything up too badly. I had not touched anything. After clearing the tower and rolling, I felt my most important innards bounce off my esophagus.
“We’re off to the races, already at 6,000 feet, going 320 knots, Mach 7.”

Again, I could figure nothing more eloquent to say than “Wow.” Other than that, I was completely speechless, taking it all in, everything that was happening around me.

Doug, ever the professional, flipped a page on the checklist on the instrument panel in front of him. “The next thing you’re going to be looking for is for the engines to throttle back going through maximum aerodynamic pressure. There they go. So you’re at 70 percent of rated thrust.”

He quickly described that moment from STS-127. “When the engines go back to 104, it felt like we lit the afterburner,” Doug said. “It was incredible. I mean, it just—bam.”

Doug then said something that hit me like a ton of bricks.

“This is where they would say, ‘Go at throttle up.’ Roger, go with throttle up.”

I could not help but think of Challenger, and a cold chill overtook me for a moment. This was not playtime; this was not the best amusement-park ride ever. This was serious business, and when Doug and his real astronaut colleagues did this sim for real, they were training for situations in which their lives would be on the line, their behinds hanging far over the ragged edge. We continued through the separation of the SRBs, the light flashing in the cabin and Doug noting that the actual event was even more spectacular than that.

The ride smoothed out, but as the acceleration to orbital velocity continued, I felt pressed back in my couch. I saw a gauge that told me that we were at three gs. I realized it probably was not the actual force being applied to my body, but I also knew that I could barely lift my head. Finally, eight and a half minutes after lifting off from the pad came main engine cutoff—MECO. If this had been an actual flight, my crewmates would have been congratulating me on “officially” becoming a flown astronaut.

Over the course of the next ninety minutes, I was an astronaut, training for the upcoming flight of STS-173 (73 was my jersey number as a member of the DuPont Senior High School Bulldog football team, in case you are wondering). Doug took me through another ascent and a total of five landings at both ends of the Shuttle Landing Facility at KSC, at night and at Edwards Air Force Base in California. It took one, maybe two, of those landing attempts to realize fully that as a shuttle pilot, I was a far better journalist.
“Pull the nose up!” Doug ordered, a tone of amusement in his voice. “Stay right. Stay on center line. Come back to the right, there. Pull it up. Pull it up. Keep pulling! There you go. Keep pulling . . . I’ve gotta arm the gear."

If this had been the real deal, rescue vehicles would have already been dispatched to pick up the pieces of the shuttle that I was about to leave scattered in the general vicinity of the runway.

“Pull it up. Pull it up. Pull it up! Hold it right there. Now . . . just land the thing. A little more nose up. Nose up! Nose up . . . Okay, hold it there. Don’t go too high . . . don’t go too high!”

The sound of tires screeching on touchdown shot through the flight deck. We bounced.

“Shewwwwwwww . . . ,” Doug exhaled, laughing as he did so. “We landed.”

And then we landed again. The bounce had taken us what seemed like a half a mile or more down the runway, and to be quite honest, I’m not so sure we did not plop down a third time. This was much harder than it looked on television. On another attempt, I all but brought us down on a dusty dirt road in the backwoods of Georgia. I gave up and took up two other crucial tasks—deploy the landing gear at three hundred feet and the drag chute as we slowed. Those required the touches of a couple of buttons. Easy. That, I could do very well. I now consider myself a landing gear and drag chute deploying professional. I am afraid, however, that I took advantage of Doug’s hospitality. After each of the landings, he asked, “Want to do another one?” Come on, what in the world was I supposed to say? No? You have got to be kidding.

The best part of the run, however, was the conversations between Doug and me as we waited for the test conductor to reset everything for yet another go. There we were, in the motion-base simulator on the grounds of Johnson Space Center, talking NASCAR. Unbelievably, it turned out that the test conductor, Daniel K. Nelson, himself had actually driven races on dirt tracks in the Midwest.

I have participated in the Dale Jarrett Racing Adventure driving school at Talladega Superspeedway in Alabama, reaching a speed of nearly 178 miles an hour on the backstretch. I have served as the pace-car driver prior to a Busch Series event at Florida’s Homestead-Miami Speedway, and I
have been the real-deal pace car driver during several races at the legendary Bowman Gray Stadium short track. I have tracked down foul balls at two Major League Baseball games and four Minor League contests. I have shaken hands with Neil Armstrong and spent an amazing NASCAR weekend in Phoenix, Arizona, as host to Gemini 11 and Apollo 12 toast of the town Dick Gordon. Over the course of a career that has allowed me to do many cool things, that afternoon alongside Doug Hurley in the simulator at JSC ranks very near the top of my professional life’s most memorable moments.

I had just had a small glimpse into the life of an astronaut, and as a result, I came away with an even more profound respect and appreciation for those who worked in the shuttle program. It also focused my resolve to put together the kind of book that would honor their professionalism, the one that you now hold in your hands. Not everyone will ever get the chance to do a simulator run alongside an astronaut, but it’s my hope that Wheels Stop will be the next best thing.

Somewhere along the way while putting this book together, a wonderful thing happened. The people who dedicated their lives to the Space Shuttle program evolved from flawless superheroes into actual human beings, with frustrations and emotions just like the rest of us. Maybe it was the conversation I had with at least one NASA insider who wound up shedding a tear during our interview. It might have been when I asked one astronaut about STS-107. I did not say another word for a solid forty-five minutes, while his thoughts tumbled out one right after another. Maybe it was becoming acquainted with Milt Heflin and exchanging what is now hundreds of e-mails, many times if for no other reason than to just shoot the breeze.

In this book, I have tried my dead-level best to honor the efforts of the people who worked on the Space Shuttle program. If you are looking for a highly detailed account of its engineering and scientific achievements, this is a book that will most likely be disappointing to you. Instead, the goal here has been to tell what the people who worked in and around NASA during the shuttle era were able to experience. This is their story. Enjoy!
Wheels Stop
The Space Shuttle *Discovery* sat expectantly on Launch Complex 39, pad B, at Kennedy Space Center, ready for a seventh flight into the heavens. The winged spacecraft, with her five-man crew tucked inside, was like a Kentucky Derby favorite corralled into the starting gate, snorting and pawing at the ground, anxious to get started. The orbiter was not the only one anticipating the chance to get this day under way.

Frederick H. Hauck—the commander of this mission, designated STS-26—had been the first of the crew to enter the maw of the beast and strap in. To his right at the controls of *Discovery* was pilot Richard O. Covey. Also on the upper flight deck were mission specialists David C. Hilmers and John M. Lounge. Hilmers was seated directly behind the center control console with Lounge to his immediate right, close enough for the two of them to touch and with Lounge looking squarely at the back of Covey’s couch. George D. Nelson, the only STS-26 crew member without a background in military aviation, was down on the mid-deck by himself, seated right next to the hatch. Rick, Dick, Dave, Mike, and Pinky were ready to shake, rattle, and roll their way into orbit. Each was a spaceflight veteran, having flown at least one previous shuttle mission.

On this particular morning, going to all that trouble had seemed an exercise in futility. The crew of STS-26 had made the eight-mile trip from the Operations and Checkout Building to the launch pad not really expecting to fly. An upper-level wind shear had been detected, and if it had persisted, the takeoff would have been scrubbed. Even while stepping out of the crew van at the pad and looking up at *Discovery*, this monstrosity that seemed very nearly alive, they were skeptical. Once they were settled in, the weather delay remained. Then fuses in the cooling system of the new partial-pressure launch and reentry suits worn by Covey and Lounge had
to be replaced, and this did not help matters in the least. Surely, this was going to be a no-go.

Maybe not. The upper-level winds calmed to within acceptable limits, and one by one, controllers were polled during the T-minus nine-minute hold.

Go.
Go.
Go.

The journey was on after all. As the countdown came out of its cautionary hold, the cockpit became a beehive of activity. This was it. Just then, Covey spotted something through the windows on his side of the cabin. “Uh-oh,” Covey quipped, not thinking. Hauck shot back, “Covey, what’s wrong?!!” Covey, whose first flight launched in the rain, had seen what he thought to be a shower spreading over the waters of the nearby Atlantic Ocean. Hauck’s reaction was swift. “Dick,” Hauck admonished his pilot, “do not use the words ‘uh-oh’ again as long as we’re flying this machine together.” Covey remembers the rebuke very well: “Rick let me know that was not anything he ever wanted to hear from me again.”

The phrase “Uh-oh,” attributed to pilot Michael J. Smith in mission transcripts, was the last discernible utterance of the doomed crew of the Space Shuttle Challenger, which was destroyed seventy-three seconds after launch on 28 January 1986. After a difficult thirty-two months of speculation and introspection, STS-26 was to be the first shuttle flight since that terrible morning.

NASA had never before dealt with anything like the loss of Challenger and its crew of seven—five men and two women—assigned to mission STS-51L.

American astronauts had died in the line of duty, of course. Virgil I. “Gus” Grissom, Edward H. White II, and Roger B. Chaffee were killed during training for Apollo 1, but they were on the ground when the fire that claimed their lives broke out, well out of sight of the press and public. A generation would pass before audio recordings of those terrifying moments were released, and even then, the event was left mostly up to the imagination. The claim remained intact—dented maybe but still intact: NASA had never lost an astronaut during an actual spaceflight. Several other would-
be spacefarers died in various aircraft and automobile accidents, but when it came down to it, those were the kinds of tragedies that could have be-fallen anyone.

NASA came to be seen as the agency that could handle any complication through the superheroic problem-solving teamwork of its astronauts, flight controllers, engineers, and other assorted employees and contractors. The Mercury program famously experienced what could have been disastrous problems on the flights of John H. Glenn Jr., M. Scott Carpenter, and L. Gordon Cooper Jr., and a fourth astronaut, Grissom, nearly drowned when his spacecraft sank soon after safely splashing down in the Atlantic Ocean. Neil A. Armstrong and David R. Scott tumbled end over end on Gemini 8 before miraculously regaining control. Twin lightning strikes hammered the launch of Apollo 12, followed months later by the epic tale of Apollo 13. Returning from the Apollo-Soyuz Test Project, the American crew of Thomas P. Stafford, Donald K. “Deke” Slayton, and Vance D. Brand endured near fatal levels of nitrogen tetroxide as their spacecraft neared splashdown. Brand briefly lost consciousness, while Slayton became nauseous. All three men were hospitalized for two weeks for observation. In the Challenger debacle, the agency would in a very real sense become a victim of its successful close calls. Coming so close to death only to avoid it at the very last second seemed to be the rule at NASA, rather than a miraculous exception.

The Soviet Union had not been so fortunate. Vladimir Komarov died 24 April 1967 when his Soyuz 1 spacecraft smashed into a field in Orenburg Oblast after suffering a number of failures, the last and ultimately most catastrophic of which was a tangled parachute. A little more than four years later, on 30 June 1971, the crew of Soyuz 11 perished when a faulty valve opened and depressurized the capsule after undocking from the Salyut 1 space station. Killed within seconds were cosmonauts Vladislav Volkov, Georgi Dobrovolsky, and Viktor Patsayev. These losses, though, were sustained behind the veil of the Iron Curtain that separated the Soviet Union from most of the rest of the world. Many of the details concerning both mishaps came through Western intelligence sources, and those that did not came at a frozen snail’s pace, if at all. Komarov’s death was not announced by the Soviet news agency TASS until more than seven hours after the accident, in the form of a terse one-sentence statement. Other releases provided a few more details, but not many. Another monumental mishap took place on 3
July 1969, when an unmanned Soviet N1 rocket exploded with the force of a small nuclear bomb, utterly obliterating the Baikonur launch complex. It took American satellite imagery for the West to know anything of the event. *Challenger* could not possibly have endured a more public fate. Tens of thousands of spectators had gathered on the central Florida coast that cold January morning to watch as commander Francis R. Scobee, Mike Smith, and mission specialists Ellison S. Onizuka, Judith A. Resnik, and Ronald E. McNair, along with payload specialist Gregory B. Jarvis and teacher observer S. Christa McAuliffe, began their journey into space. McAuliffe, a New Hampshire high school instructor, won out over thousands of Teacher in Space candidates and planned to conduct two live lessons during the flight. If images of the accident itself are the most nightmarish, footage of McAuliffe’s parents, Ed and Grace Corrigan, in a KSC viewing stand and students at McAuliffe’s Concord High School are very nearly as troubling. It would have been difficult for the public to handle had the images been shown just once, but they were shown over and over and over again by countless media outlets. The footage hammered home the incredible loss. It had indeed been “obviously a major malfunction,” as reported by public affairs officer Steve Nesbitt in the first few moments after the shuttle’s breakup. A quarter of a century later, amateur videos of the accident popped up here and there on the Internet, and one, licensed by the *Huffington Post*, features the almost giddy excitement of Steven and Hope Virostek, a Rhode Island couple who had retired to Titusville, Florida, just a few miles from KSC. Their joy for McAuliffe—*C’mon, Chris! Go Chris, go! Beautiful!*—turned to stark and unabashed horror in the seconds after vehicle breakup. Just when viewers thought they had seen every angle and experienced every emotion, this video closes with Hope Virostek’s brokenhearted rendering of the Roman Catholic Church’s Eternal Rest prayer—“May their souls, and the souls of all the faithful departed through the mercy of God, rest in peace.”

Unimaginably, evidence suggests that at least some of the crew survived the initial breakup of the orbiter. Off-nominal switches on his side of the instrument panel indicated Smith tried to somehow regain control of the inextricably out-of-control spacecraft, while three of the four recovered personal egress air packs containing an emergency supply of breathing air showed signs of being activated. A crew-survivability analysis conducted by Skylab 2 astronaut Joseph P. Kerwin, serving as a biomedical specialist at
Johnson Space Center in Houston, was released six months after the tragedy. Commissioned by Richard H. “Dick” Truly, the commander of STS-8, who was serving at the time as NASA’s associate administrator for space flight, the study concluded that:

The cause of death of the Challenger astronauts could not be positively determined.

The forces to which the crew was exposed during orbiter breakup were probably not sufficient to cause death or serious injury.

Finally, the crew possibly, but not certainly, lost consciousness in the seconds following orbiter breakup due to in-flight loss of crew module pressure.

The report continued, outlining the final moments of the STS-51L crew:

“After vehicle breakup, the crew compartment continued its upward trajectory, peaking at an altitude of 65,000 feet approximately 25 seconds after breakup. It then descended striking the ocean surface about two minutes and forty-five seconds after breakup at a velocity of about 207 miles per hour. The forces imposed by this impact approximated 200 gs, far in excess of the structural limits of the crew compartment or crew survivability levels.”

If that was the horrifying end result, by what means had the accident taken place? A report released 6 June 1986 by the Presidential Commission on the Space Shuttle Challenger Accident—better known as the Rogers Commission, after Chairman William P. Rogers—found that the failure of a rubberized O-ring seal in the right SRB allowed pressurized gases and white-hot flame to “blow by” the device, making contact with and burning through metal struts holding the huge External Tank in place. The failure had, in effect, lit the fuse on a 1.6 million-pound bomb.

Looking even deeper into the incident, it became maddeningly clear that the accident might very well have been avoided at any of a number of different points. The night before the fateful launch, temperatures on the central Florida coast dipped into the low twenties. Ice covered many parts of the pad, and when drains were opened, they, too, froze and caused overflows. Winds spread the water still further, exacerbating the icing problem. At launch, the air temperature stood at thirty-six degrees, more than fifteen degrees colder than any previous send-off. Still, management pressed
forward with plans to send the flight on its way. Six times already, the mission had been delayed for one reason or another.

Officials of Morton Thiokol—makers of the srb—recommended on the night of 27 January 1986 that the launch of sts-51l be scrubbed once more due to their concerns over the weather’s impact on the structural integrity of its hardware. This was not a flip-of-the-coin close call, either. As far back as July 1985, Morton Thiokol mechanical engineer Roger M. Boisjoly had expressed in a memo serious concerns over the design of the srb s. More warning memos followed, with little to no effect. Boisjoly and Allan McDonald, Morton Thiokol’s liaison for the srb project at ksc, vehemently argued against launching due to the inclement weather conditions. “I expressed deep concern about launching at low temperature,” Boisjoly told the Rogers Commission. “At that point in time, I was asked to quantify my concerns and I said I couldn’t. I couldn’t quantify it. I had no data to quantify it, but I did say I knew that it was away from goodness in the current database.” Reliable data existed for launches that took place at or above fifty-three degrees—anything else was a crapshoot.

Nineteen years and one day separated the Apollo 1 and Challenger tragedies, and “go fever” had helped doom both crews. During the Apollo program, the rush was to meet President John F. Kennedy’s mandate of “landing a man on the moon and returning him safely to the earth” by the end of the 1960s. The successes of nasa’s Mercury and Gemini programs turned out to be both blessing and curse, in that the momentum they created bore down on the agency with an almost unstoppable force. There was no time to stop and evaluate how things were going, because the moon was waiting. During five years of shuttle flights leading up to the destruction of Challenger, a similar rush to the launch pad developed. This time, the problem was not getting to the lunar surface and back. Instead, there was a schedule to be kept. The shuttle flew nine times in 1985, with at least eleven more missions scheduled for 1986. There were commercial payloads to be launched and repaired, and money to be made doing it. Indeed, the Rogers Commission found that “the relentless pressure to increase the flight rate” was a major cause of the mishap.

Overnight, a harsh new climate took hold. Said Hauck, whose father, Philip, was himself a navy man who survived the Japanese attack on Pearl Harbor just eight months after the birth of his son:
The Challenger explosion crushed all of us who worked in the astronaut office. Beyond the unfathomable loss of our friends and the horrific pain inflicted on their families, our own professional world was disintegrating. When would we fly again? Would we fly again? It didn’t occur to me that this was an avoidable accident. Every bit of my experience at NASA since I arrived in mid-1978 bespoke professionalism and caution. I’d never seen a more dedicated group in my aviation career. By this time, I had flown two missions on the shuttle, and I always knew I was putting my life at risk when I launched. But deep down inside, I knew NASA had the formula for success. I was wrong.

Compounding the problem was the intense scrutiny NASA was under following the accident—some of it justified and some of it entirely ignorant and mean-spirited. One publication, the most vile of supermarket tabloids, went so far as to fabricate a transcript of the Challenger crew’s last moments. For nearly thirty years, the agency had been treated for the most part with kid gloves. That was no longer the case. The gloves were now off. “I wasn’t prepared for the public pillorying NASA received at the hands of the press, Congress, and the public,” Hauck said. “It was as if they were jilted lovers. We were all the bad guys. In some ways it reminded me of the atmosphere surrounding my return from flying combat in Vietnam—being the object of pent-up anger and frustration. Those were tough days.”

The future STS-26 commander was not alone in his concern for the future of the program. Serving as capsule communicator (CapCom) at the time of the accident, it was Covey who had the haunting “Go with throttle up” exchange with Scobee moments before the orbiter broke up. After catching a glimpse of the bulbous cloud of debris beginning to form on a monitor to his left, Covey’s eyes widened and his jaw dropped, the very definition of a shocked expression. Just five months before, Covey had spent a week in space as the pilot of STS-51I. This did not require the analysis of a spaceflight veteran or expert controller. The pictures said it all: something had just gone very, very wrong. The mood around Johnson Space Center was unlike anything the agency had ever experienced, remembered Covey:

Everybody was reacting basically to two things. One was the fact that they had lost a Space Shuttle and lost a crew, and two, the Rogers Commission was extremely critical, and in many cases rightfully so, about the way the decision-making processes and culture had evolved. So those two things together are hard
for any institution to accept, because this was still largely a workforce that had come through the Apollo era into the shuttle era, and had been immensely successful in dealing with the issues that had come through both those programs to that point. So to be told that the culture was broken was hard to deal with, and that’s because culture doesn’t change overnight. A lot of people didn’t believe this was an accurate description of the situation and environment that existed within the agency, particularly at the Johnson Space Center.

Covey flew before Challenger and after, and the difference was telling. “The general difference was a loss of innocence,” Covey said. “We all knew the risks associated with flying the shuttle, but when we lost Challenger, we hadn’t really realized that risk in any way. There was more of a sense of, ‘Hey, the risk is real. We need to learn how to deal with that risk in a little bit different way when we go and fly.’”

Lounge, who flew with Covey on STS-51I, went one step further in admitting, “I think we were pretty naïve before Challenger. We knew that it was a complex system and there were a lot of ways it could fail. But it was kind of academic, right? It was the typical fighter-pilot attitude, ‘It can’t happen to me. It happens to those other guys, but it will never happen to me.’ And then we saw that tragedy unfold on national television. Suddenly, it was a very real thing that could actually happen.”

Each member of what would become the STS-26 flight crew had a deeply personal connection to most if not all of the Challenger astronauts. Hauck, Covey, and Nelson were selected to the astronaut corps in 1978, and four of their classmates—Scobee, McNair, Onizuka, and Resnik—were on board Challenger when it broke up. Lounge and Hilmers joined the astronaut corps two years later, along with Smith. Covey and Onizuka were in the same test-pilot class, and Covey had also flown the chase plane for an early shuttle landing with McNair as his backseater. Nelson flew with Scobee on STS-41C in April 1984.

Ironically, Nelson’s first spaceflight had been on board Challenger during the STS-41C mission and his second, STS-61C, landed just twelve days before the accident. The orbiter that carried Nelson on his second flight was Columbia, which would meet her own sad end seventeen years later. Unlike the four men who would one day be his STS-26 crewmates, Nelson had never been an aviator in the navy or marines, or a pilot in the army or air
force. He was an astronomer. That did not matter after Challenger. There was little difference in how pilot astronauts and mission specialists handled the loss. “You take those kinds of things at two levels,” Nelson said. “One is the professional level—you hate to see the program fail like that. Then, we’re all human beings, so at a personal level, we all mourned over the loss of our friends. We had to deal with those loss issues in the same way that everybody does when they lose someone in an accident. It was a terrible loss. I still miss those guys.”

There might have been a more outspoken astronaut in NASA’s history than Story Musgrave, but if there was, it was almost certainly behind closed doors well out of earshot of the public. Musgrave flew twice before the loss of the STS-51L crew, both times on board Challenger, and when he described the agency as “schizophrenic” before the accident, he did so without flinching. From top to bottom, from the highest branches of the United States government through the agency itself, Musgrave saw the accident as the result of an “organizational failure” prior to the accident:

_They had to kill someone. They weren’t going to wake up until they killed somebody, and that’s all there was to that. They thought they were creating a bus. It was very difficult coming out of the huge success of project management in the sixties. Kennedy said, “Go,” and we did it. We’ve won the race to the moon, let’s all go home. So NASA was placed in the very difficult position of having to justify spaceflight. They became very defensive, and they wanted to become very practical. The money’s coming from Congress. Wherever the money comes from, NASA’s going to try to keep those people happy._

Although the shuttle was the most complex machine ever constructed, Musgrave remembered NASA telling Congress that the odds of an accident were 1 in 100,000. In other words, he said, the shuttle would fly every day for 273 years without anything of any substance going wrong. “That alone is proof that they were out of touch with what they were doing,” Musgrave insisted. “They got to believe their own message, and so they thought the shuttle could not have an accident.”

And, of course, there was the decision to launch itself, the 800-pound gorilla in the room. Details on what got NASA to that point would come out in the subsequent investigation into the Challenger debacle, but launch-
ing in inclement conditions was the most obvious causal effect, the tip of the iceberg, if you will. “We knew about the cold weather,” Musgrave continued. “We had the plot of O-rings in cold weather. Micromanagement caused the problem, because people from headquarters got involved in the decision process. They never should have. That should have been left up to launch control to make those decisions.”

It was only after the accident laid bare so many diverse issues that the culture in and around NASA began to change. Musgrave flew twice before the disaster and four times after—and in so doing, became the only person to venture into space on board all five shuttle orbiters. “One hundred percent, the entire organization changed,” he said. “They had to wake up. They woke up with Challenger and then they came to acknowledge what they’d actually produced. It was just a total change at all levels.”

There were thousands of NASA and contractor employees across the country who had nothing to do with the decision to launch Challenger. Still, they felt the loss very, very deeply.

One such person was Tom Overton, who had worked at NASA for twenty years when Challenger went down. Growing up in Des Moines, Iowa, in the 1950s, he watched in fascination as German rocket designer Werner von Braun discussed the potential of spaceflight on Disney television programs such as Man in Space, Man and the Moon, and Mars and Beyond. Even back then, an abiding passion for spaceflight was taking hold.

Overton could not possibly have known then that he would one day lunch with his hero, von Braun, during the heady days of Apollo. After spending four years in California as a draftsman with Douglas Aircraft Company, Overton was asked if he would be willing to move to Florida to work with NASA in developing the Saturn S-IVB stage. The assignment was originally planned to last eighteen months, but more than four decades later, he was still living in Titusville, Florida, with his wife, the former Sharon Muehlenthaler, who also worked on the Apollo program for a couple of years as an employee of IBM. By the last Apollo flight, Overton was a salaried engineer and helped manage the switch-over of the Vehicle Assembly Building (VAB), launch pads, and Mobile Launcher Platform to accommodate the Space Shuttle as well as construction of the Orbiter Processing Facility (OPF). His concentration was in the VAB, where he worked on the lift-
ing sling that attached to the shuttle and rotated it to the vertical position, where it was then mated to the srb/External Tank stack.

If that wasn’t enough, for the first four flights of the Space Shuttle, Overton acted as a forward observer. The job meant that during launch preparations and the event itself, he was in a bunker maybe 2,500 feet or so from the pad. He would eventually oversee scheduling the shuttle workflow through the OPFS and on to the launch pad. Almost from the day he started at NASA, Overton also served as an escort for a wide range of guests who visited KSC for tours, launches, and landings. That job brought him into contact with celebrities and dignitaries such as aviation legend Charles Lindbergh, actor Jimmy Stewart, pro football Hall of Famer Johnny Unitas, Jimmy Carter, Hillary Clinton, George H. W. Bush, and Laura Bush.

Overton spent part of the morning of the disaster with Christa McAuliffe’s parents and members of her son Scott’s fourth-grade class. He was standing next to Barbara R. Morgan, McAuliffe’s backup, at the turn basin a stone’s throw from the VAB and press site when the accident took place. Overton, who missed seeing only a handful of shuttle launches in his forty-five-year career at NASA, knew immediately that there was no hope for the crew:

*My first comment was, “Oh, my God . . . we have lost them.” Barbara looked at me and said, “What do you mean?” I said, “They are gone. We have lost them.” Then, she realized what I was saying. I remember looking back at Christa McAuliffe’s mother and father, and they were like, “What happened here? Are we going to see the parachutes pretty soon?” It was like they were expecting NASA to take care of every contingency and that somehow they would come through this thing safe and sound. I’ll be honest with you. I absolutely did not even sleep that night. I was tossing and turning and feeling like, “Did we contribute to this? How did this happen? Am I a murderer?” Weird things go through your mind. It was very, very traumatic. I had gone through something similar with the Apollo 1 fire, but I was little bit more removed from that. When you have family right there staring up at it and it blows up in front of you, it was actually more traumatic for me than the Columbia landing because you see it right there in front of your eyes.*

Once the shock and depression wore off, Overton felt a certain consensus taking shape within the agency. First was the need to identify, exactly,
went wrong. Once that happened, whatever went wrong needed to be fixed. Within a week to ten days, the focus landed primarily on recovered pieces of the srb that had a hole burned in the side. Remarkably, a manifest was built for a Return to Flight mission within just six months of the accident. Then, the process lengthened to a year . . . then fourteen months . . . then two years and counting. That wasn’t necessarily a bad thing, according to Overton. “We started saying, ‘I hope these guys that are designing this thing not only fix this, but they fix everything that could possibly go wrong. We do not ever, ever want to experience anything like this again,’” he said. “In fact, that is kind of what happened. We had one major problem, and we fixed ten things since we had the time.”

This is how much the climate in the NASA community changed in the aftermath of Challenger: Prior to the mishap, record processing time for a vehicle was twenty-five days, from landing to rollout to the launch pad in preparation for the next flight. Afterward, it went to ninety days. In the last stages of the Space Shuttle program, it took approximately 120 days to roll an orbiter in and out the doors of the opf—not due to a reduction of manpower, necessarily, but due to the work involved in getting the spacecraft qualified for spaceflight.

Before the loss of his friends on board Challenger, Hauck had been deep in training for sts-61f, his second flight as commander, with Lounge and Hilmers his mission specialists and Roy D. Bridges his pilot. The risky mission’s primary goal was to launch the Ulysses interplanetary probe from the shuttle’s payload bay by means of the thin-skinned, pressure-stabilized upper-stage Centaur rocket. To make the ride uphill, plans called for the shuttle’s three main engines to be throttled up to an unprecedented 109 percent of rated thrust.

Consider the implications if the flight had been somehow aborted, forcing it to make a return-to-launch-site or transatlantic emergency landing. The shuttle would have had a cargo bay full of the Centaur’s liquid oxygen and liquid hydrogen, which in turn meant that it would have to be dumped in the midst of the crisis. After landing, any leftovers would continue to be pumped out either side of the spacecraft. To make matters even more interesting, a second Shuttle-Centaur mission (sts-61g), led by David M. Walker, would have been launched just four days later to head the Galileo probe to
Jupiter. It was, at the very best, a touchy proposition, so much so that John W. Young, the Apollo 16 moonwalker who served at the time as the chief of the astronaut office, dubbed both STS-61F and 61G as “Death Star” missions.

So dire was the situation that after one frustrating meeting in early January 1986, Hauck said that he told his crew, “NASA is doing business different from the way it has in the past. Safety is being compromised, and if any of you want to take yourself off this flight, I will support you.” Just a few weeks before the launch of Challenger, and with the benefit of hindsight, Hauck’s move can very clearly be viewed as a chilling reminder of the culture in place in and around NASA. “Of any mission, I think that was probably the most frightening one,” Hilmers admitted. “If any accident was going to happen, that was one that was waiting to be set up. It was after Challenger that we realized, ‘Man, what were we thinking to try to do
that mission?” Yet to take Hauck up on his offer and back out was simply unthinkable. “It was a rhetorical question because he knew that no one was going to back out,” Hilmers continued. “You say you’re going to do something, so you do it. I think all of us would probably rather have died than back out.”

The Shuttle-Centaur project was scrapped almost immediately after the accident, but Hauck, Lounge, and Hilmers weren’t left in the lurch for long. Hauck was told in the summer of 1986 by Truly and George W. S. Abbey, the pragmatic director of the flight crew operations directorate, that he would have command of the first post-Challenger mission. Lounge and Hilmers were all but given for the crew, and Hauck remembers Abbey asking for his input on a pilot. Bridges had moved into command of a test-flight wing at Edwards Air Force Base, and because Covey had worked with the proposed flight as its ascent CapCom, he seemed a good choice to fill the slot. Although Nelson had taken a leave from NASA to move to the University of Washington, he rounded out the crew. And through it all, none of them could say anything for a good six months or so. In the interim Hauck was temporarily transferred to Washington DC to serve as NASA’s associate administrator for external relations.

NASA administrator James C. Fletcher wanted someone with flight experience on the shuttle, with credibility beyond that of a mere political appointee, to help put out fires in a number of different areas. Hauck seemed a good fit for the role, but it was clear he would rather fly the shuttle than fly a desk. “After Dr. Fletcher met with the astronaut office as a group, his aide asked me if I would meet with him at his motel room,” Hauck recalled. “That’s where I first met him face to face, and that’s where he asked me if I would come up and do this. I told him that I would hate to give up my opportunity to fly and that I hoped he would permit me to do that. He said he would.” Rather than the two years originally proposed by Fletcher, Hauck got an assignment that lasted about five months.

The fact that Covey was the first to fly two missions as a shuttle pilot, rather than one in the right seat before moving up to command of a flight, did not seem to matter to the graduate of the United States Air Force Academy. Covey was the last member of his class to fly. After that, he could deal with just about anything. He was not being singled out as a flier who needed the practice; it was simply the way the chips fell.
After *Challenger*, the remaining shuttle fleet was grounded, so Nelson headed to the astronomy department at the University of Washington in Seattle. “I’m a kind of restless guy and don’t like sitting around not doing much,” he commented. “So I decided that I would go off and do some science, just to stay busy.”

Before he left, Nelson got the ball rolling on a formal family support plan that outlined how NASA looked after the families of astronauts during a mission—as well as what to do in the event of a *Challenger*-like disaster. “It’s still being used,” Nelson said. “It’s expensive. It costs NASA money, but it seems like if you’re going to spend half a billion dollars launching the Space Shuttle, you ought to do something for the crew’s family.” Shortly after taking part in a practice countdown in December 1986, Nelson got a call naming him to the next flight. He remembers it as being “completely out of the blue.”

The crew of STS-26 was officially announced on 9 January 1987, and the news was met with consternation, if not an outright fury, in some corners of the astronaut office. Certainly, some of the sentiment could probably be traced back to jealousies that are inherent in any such highly competitive atmosphere. The astronaut office had always teemed with the fighter-jock mentality of always—*always*—wanting to be first. That kind of almost pathological fire dated all the way back to the earliest days of America’s manned spaceflight program, and it continued to exist throughout the final days of the shuttle program. Alan B. Shepard Jr. made the country’s first suborbital hop into space, leaving six disappointed astronauts in his wake. After that came NASA’s first orbital flight . . . then the space agency’s first *Gemini* flight . . . first spacewalk . . . and, a few years later, the ultimate plum—the first moonwalk. Even after it was determined that Apollo 11 would make the first moon landing attempt, the issue of who would be first out of the lunar module *Eagle* was not settled until after Buzz Aldrin made a well-documented run at the assignment.

There had always been a certain sense of frustration with the crew selection process itself. Was it based on nothing more than a flip of the coin? Politics? Schmoozing the right people? Surely, it did not come down to ability alone, did it? Maybe, maybe not. Astronaut Mike Mullane insisted years later the factors at work were “the fierce competitiveness that is in the DNA of most military pilots (and backseaters!) and the insane secrecy surround-
ing astronaut crew selection.” He went on to elaborate: “Had our management been open about that process, it would have gone a long way toward mitigating our discontent at not being selected for a particular mission. In spite of our competitiveness, we were all mature enough to understand we can’t all be first. But the void left by management’s secrecy resulted in speculations that office politics, favoritism, etc., were key factors in the crew selection. That speculation made it hard to swallow being a runner-up.”

Mullane admitted in his 2006 book *Riding Rockets: The Outrageous Tales of a Space Shuttle Astronaut* that some in the astronaut office were “livid” over Nelson’s selection, in particular:

While Pinky was well liked, he had taken a sabbatical to the University of Washington after Challenger. The rest of us had stuck around to do the dog work and be brutalized by [John] Young in the process. In our minds Pinky hadn’t paid the dues to have received such a prize as the first post-Challenger mission. It was also a sore point that his last mission had been the flight prior to Challenger, so he had the additional plum of having back-to-back missions. Norm Thagard was certain Abbey had picked Nelson just to show the rest of us how unfair and capricious he could be.

There were basically two schools of thought when it came to Abbey—one camp loved him and the other absolutely did not. James D. Wetherbee—a man who commanded five shuttle missions, the most in the history of the program—was wholly insistent that Abbey was a driving force in saving NASA following the Challenger mishap. “He was taking such critical and great actions after the Challenger accident,” Wetherbee began. “I learned and I watched him, and that helped me seventeen years later after Columbia. I saw the way he recovered that organization not only immediately after the accident, taking the right actions, doing the right things, but then over the many years after that.”

Asked about the criticism leveled at Abbey, Wetherbee responded with a still more impassioned defense of his mentor:

The guy was phenomenal. He was unbelievably valuable to human spaceflight. His principles were so high, with his wisdom, if you didn’t understand that, I suspect it’s a human tendency to react and think that he was wrong. Everything George did was to help human spaceflight be successful, and those who didn’t...
understand that or misunderstood George, I don’t spend a lot of time worrying about them because they just flat didn’t get it in my opinion. George cared deeply about people. I think that was something a lot of people didn’t understand, was how much he did care about people and families. I saw this behind the scenes. I was working with him for many, many years as his deputy and saw the kinds of things he did quietly, with no thought of wanting the publicity, the thanks or the rewards. He just did it quietly to take care of people because it was the right thing to do.

For his part, Nelson said that whatever ill sentiment that might have existed toward him was not overt. “I’m sure there were rumblings about it and people trying to understand why I was George’s pet or whatever,” he admitted. “It wasn’t a tense or stressful situation. My rationalization is that I was already trained up and that I was an EVA expert, which was the one thing they were missing on that crew. I’m sure everyone was disappointed not to be on that crew, but I never felt like anyone held me accountable or was mad at me for it.” With two spacewalks already to Nelson’s credit, both he and Lounge trained for any contingency EVAs that might be needed during their upcoming flight. None were.

As it was, STS-26 was dubbed in some corners as the “Quiche Mission” because of what some perceived as a relatively sparse flight plan. It nevertheless received intense interest from the media because, by gosh, these were superheroes who calmly and fearlessly faced down danger. The only things missing were their costumes and capes. Artists painted pictures. The New York Times did an entire insert on the flight, while CBS News anchor Dan Rather did interviews for the program 48 Hours. President Ronald Reagan addressed NASA employees on 22 September 1988, one week before the flight. “I still look back at that,” Covey said. “I look at the words he said, and it was extraordinary. Presidents coming to JSC just didn’t ever happen, and he’d come for that. . . . He’s coming back basically to get the troops fired up and to show the support of the nation and his support for the things they’ve been doing.”

There were many practical perks to being a prime crew for so long. “You get everything,” Covey continued. “When we wanted to go fly the Shuttle Training Aircraft on these days and these times, yes, we got it. We want the simulator, we got it. We want to go do this, yes, we got it. So we got every-
thing we wanted. The other astronauts suffer from that, to a large degree. They don’t get priority. Then, the next crew is only a month or so behind you, and so they’re only prime crew for a month. We were prime crew for eighteen months, two years or something. It was ridiculous.”

Others in the astronaut corps noticed the ruckus being raised over the Return to Flight mission and teased the STS-26 crew about it. During a reception in honor of Apollo-era astronauts, Mullane and STS-27 crewmate William M. Shepherd mocked the crew by inhaling helium and then introducing themselves to the guests of honor, saying, “Hi there, I’m Rick Hauck, commander of STS-26. Would you like my autograph?” Hauck and Covey were introduced at another formal affair in rock star–like fashion, complete with spotlights and a smoke machine. Following a meeting between the two crews the next day, STS-27 commander Robert L. “Hoot” Gibson was asked if he had anything to discuss. At the prompt, Mullane and Shepherd set off fire extinguishers, while Jerry Ross cued the song “I’m Proud to Be an American” as Gibson and pilot Guy S. Gardner rose dramatically from their seats wearing clip-on bowties.

Years later, Hilmers recalled such attention:

I knew that other members of the astronaut office probably were a little bit—I don’t know if they didn’t like it or whatever, but we had a lot of what I thought was good-natured fun poked at us. That was fine with me. I didn’t have any problem with it. I tried not to make a big deal out of what I was doing. What I wanted to do was try to be the best crew member I possibly could be. The rest of it was just kind of stuff I had to do, as far as publicity, press conferences and things like that. There probably was more attention placed on us than there should have been. The next mission, STS-27, was a secret Department of Defense mission. From that standpoint and also being the second one after Challenger, I think that they felt like they were playing second fiddle, whereas they had a very important mission to do as well. That was kind of unfortunate. I don’t know what I could have done differently to tone down the publicity or to damp down any resentment that might have been there from other astronauts.

Office politics aside, it would take nearly twenty-one more months following the crew announcement for NASA to fly again. Truly oversaw the Return to Flight program, and he gave the upcoming flight’s commander an open invitation to sit in on meetings throughout the comeback process.
Hauck served mainly as an observer, but he nevertheless was encouraged to express his thoughts on how things were going. He spoke right up during a meeting in which an upcoming SRB test was being discussed. “There were some people that did not want to do the test, because they were afraid that if it blew up, that it could be the end of the program,” Hauck said. “I remember saying, ‘I’d rather have it blow up on the test stand than with me sitting on it.’ In fact, the test did go forward.”

STS-26 would forever be linked to Challenger—its mission patch honored the crew’s fallen colleagues with seven stars in the shape of the Big Dipper. It also featured the red vector symbol from the NASA “meatball” logo, indicating a desire to build on the agency’s traditional strengths, as well as a sunrise representing its new beginnings. The symbolism notwithstanding, the crew looked forward to getting on with the business of manned spaceflight. “Our biggest fear was not about launching,” Lounge said. “It was about not launching. We really wanted to finally get off the ground.” Hauck tried to soothe his family’s fears by telling them that STS-26 would be the safest mission NASA had ever launched. Hauck felt the agency knew
most everything that was to be known about the vehicle, and from what he observed, no stone was being left unturned while digging into the smallest detail of every system of the spacecraft. Still, he could not bring himself to guarantee that he was coming home. As hard as hundreds of thousands of people could try, the shuttle was never, ever going to be completely safe.

Meanwhile, *Discovery* bounced back and forth like a ping-pong ball following the loss of its sister craft. Between April and October of 1986, the orbiter was moved between the VAB and OPF no fewer than seven times. She was powered down in February 1987 and did not reenergize again for nearly six months. Officially designated OV-103, the craft moved back into OPF bay 1 on 30 October 1987, after which workers made more than two hundred modifications and outfitted its payload bay for the Tracking and Data Relay Satellite that would be released during the flight of STS-26. Finally, *Discovery* was rolled to the VAB on 21 June 1988 for mating to its SRB/External Tank stack in preparation for the flight. Thirteen days later, on Independence Day in America, the craft at long last made its way to the launch pad. Not since August 1985—when she flew Covey, Lounge, and the rest of the STS-51I crew—had *Discovery* been in space.

Once launch day for STS-26 finally did arrive on 29 September 1988, for all the quiet professionalism they had shown in the nearly three years since Challenger, it would have been nearly impossible for the flight’s astronauts not to pause for even a moment of reflection. Hilmers waited on the launch platform gantry as the rest of his crewmates boarded Discovery, which allowed him time to consider the dichotomy of the situation. “It was a beautiful day, and I remember watching the birds go by and just looking out at the tranquil scene,” Hilmers said. “It’s always kind of amazing to me that in just an hour or two after getting in, this would be one big blast zone. This peaceful scene turning into all the fire and smoke was always kind of a big contrast in my mind.” Once he settled into place on the flight deck, Hilmers had even more time to think. He reviewed his responsibilities during the launch phase, how it would all take place—and yes, about what could happen:

*I don’t think it’s a sense of fear. I think it’s more of a sense of respect for what could go on and the fact that for quite a bit of that launch time, there’s not much that you can do to change anything, particularly during the first couple*
of minutes. Maybe I went back a little bit and thought in my mind about the changes that had been made, trying to give myself some reassurance that we really thought of everything. Of course, you think of your own mortality, too, and those that are waiting for you. Also, there’s a realization that there’s millions of people watching and praying for us. You could sense them.

Covey dealt with the dangers of aviation in general and spaceflight in particular long before he got to the launch pad that morning. That was the way it was supposed to work, because if he had not reconciled himself with those kinds of doubts, his shaking knees would not have carried him to the pad. Covey put it this way:

*If you’re going to do something that’s dangerous, then you have already rationalized the danger to something that you can accept, and you feel confident in your ability to respond to those things to keep something bad from becoming worse. If you didn’t feel that, then you would never go to the launch pad. You’d be too scared, because it’s frightening enough. So we had long gone through this mantra, and believed it, that this was the safest shuttle flight that’s ever going to fly. So, my recollection is, as with every launch, I’m more worried about doing something that makes me or the crew look bad than I am about the absolute dangers we’re facing. You know, it’s one of those things. I can die, okay, but I don’t want to screw up and then die.*

On Hilmers’s first flight, STS-51J in October 1985, the crew had worn blue jumpsuits that today seem antiquated at best. When he began to feel uncomfortable, Hilmers simply undid his safety restraints and sat up on the back of the seat. Once it was time to fly, he scooted down and strapped himself back in. That was not possible in these new bright-orange partial pressure suits.

Some shuttle crews liked to keep the mood light while waiting out the countdown, while others were all business. STS-26 tended to be more serious, if for no other reason than the sheer volume of all that was riding on the flight. Covey, though, did not seem to be letting anything weigh him down—no, not Covey, who actually took a quick nap right before systems checks started really kicking in. “I don’t think I’ve been on a flight where I didn’t go to sleep on the launch pad for some period of time,” Covey said. “It may be five minutes, ten minutes, but you have to relax. I don’t miss
anything critical. They talk to me, I wake up. But I know that I can sleep on the launch pad, and I attribute that to the fact that it is such a high-adrenaline type of thing that if you really can relax, then your body just kind of goes really quick.”

Down on the mid-deck, Nelson was not asleep—in instead, he was by himself with nothing to do. He had one instrument to monitor, a basic altimeter. His only assigned job was one he absolutely, positively did not want to perform: if the launch had been somehow aborted and the crew had to bail out, it would have been up to Nelson to blow the hatch, deploy an escape pole that had been added since Challenger, and then help everyone out the door. Given the alternative, he was just fine sitting there, patiently waiting.

After a delay of one hour and thirty-eight minutes due to the suit repairs and the upper-level wind conditions, STS-26 launched at precisely 11:37 a.m. Eastern Daylight Time, two years, eight months, twenty-three hours, and fifty-nine minutes after Challenger left the very same pad. The flight was absolutely problem-free for all of seven to ten seconds, at which point an alert message popped up on a computer screen. Hauck described the situation as “not an immediate problem, but anything abnormal that soon after liftoff elevated my heart rate.” The alert read “Fuel Cell pH,” meaning that the acid/base ratio in one of the three power plants that generated Discovery’s electricity was slightly out of balance. It soon corrected itself and mission control told the crew not to worry about it.

On a flight deck that was already thousands of feet up and climbing, there was no series of blaring alarms sounding in the cabin. But even in the midst of the frenzied launch phase, it did not take much for Hauck or anyone else on board to spot the alert message. “Believe me,” Hauck said rather wryly. “Anything that shows up anywhere that you are not expecting—you notice!”

Added Hilmers, “The first kind of thought was, ‘Oh, my goodness, what’s going on? Are we going to have another Challenger-type problem?’ I remember how difficult it was to even get the checklist out and then secondly, being able to read it with all the vibration that was going on.” Yet another problem took place a couple minutes into the flight when the flash evaporator subsystem failed due to some frozen coolant. Although that malfunction led to warm cabin temperatures in the mid-eighties for the first couple of days of the flight, neither glitch was life-threatening. It was nothing like Challenger.

Hauck once flew off the deck of the USS Enterprise with fellow naval avi-
ator John O. Creighton, who now served as the ascent CapCom for STS-26. When Creighton announced that Discovery was about to throttle up from 65 to 104 percent of main-engine thrust, Hauck replied with a quick “Rog-
er, go” seventy-six seconds into the flight. Most every Space Shuttle com-
mander before and most afterward replied, “Roger, go with throttle up.”
Those had been Scobee’s last discernible words, but Hauck would later in-
sist his shortened reply had nothing to do with the Challenger tragedy. On
the flip side of that coin, Covey would remember his fallen comrades each
and every time the call was made on subsequent flights. “I go back to Chal-
lenger every time I hear ‘go with throttle up,’” he remarked. “Certainly, we
were very conscious of passing that point during the ascent of STS-26. We
didn’t say anything, but we certainly all were thinking about it.”

Exactly 124.8 seconds after liftoff, and with Discovery traveling 4,127 feet
per second at an altitude of 151,816 feet, the twin SRBs were freed from the
sides of the External Tank. “SRB Sep” provided a momentary relief as the
mission punched through the Challenger threshold, but there was still plen-
ty of time for things to go very seriously wrong. “Up until the Challenger
accident, the acknowledged highest-risk components in the Space Shuttle
were the Space Shuttle main engines,” Hauck said. “They’re so complex, so
much energy being generated, such tight tolerances. Yes, I was glad when
we got off the SRBs, but we still had over six minutes of Space Shuttle main
engine operation that had always been acknowledged as one of the bigger
risks.” Seated right behind Covey during the ascent, Lounge was keeping
track of critical launch events on a kneeboard. He would keep the check-
list page as a memento, a tangible reminder of his one launch that seemed
to take forever:

The launch off the launch pad and into orbit was, most nominally, an eight-
and-a-half-minute event, where the engines are accelerating faster and faster and
faster. My first flight, that went by in just a blur—the solids ignited and then,
suddenly, we’re in space. After the Challenger accident and all the training we
did and understanding what really could go wrong, the next time I launched
on 26, that eight and a half minutes seemed like it took about an hour. Every
second, every incremental Mach number, just slowly crept by. My third flight,
which was a couple years later on STS-35, that eight and a half minutes seemed
like eight and a half minutes.
One of the last items on Lounge’s launch checklist was main engine cut-off (MEO), which took place 513.42 seconds into the flight. *Discovery* was thundering along more than sixty-eight miles up at nearly five miles per second—or a little more than 17,639 mph. Seventeen seconds later, the External Tank separated. *STS-26* had arrived, safe and sound, in space. When Hilmers asked Hauck for permission to celebrate, it was granted—for all of twenty seconds or so. “We just let off these big whoops, cries of relief,” Hilmers said. “We just kind of really let it out at that moment. I had this feeling of, ‘I made it. We did it.’ Even though the mission wasn’t over, even though we had a whole bunch to do, we succeeded in one of our big objectives.”

While each man had differing responsibilities, each would grant that the basic mission of *STS-26* was relatively simple—it was a test flight in which the most important goal was to launch, fly, and return safely. Officially, the flight’s primary payload was the five-thousand-pound NASA Tracking and Data Relay Satellite-3 (*TDRS-3*), designed to enhance the agency’s communications between the ground and orbiting spacecraft. A little more than six hours into the flight, before even the first sleep cycle, *TDRS-3* was deployed by Lounge with Hilmers’s assistance. If the mood inside *Discovery* lightened after reaching orbit, it loosened even more after the satellite was released into space. After all that had happened since *Challenger*, after everything that America’s human spaceflight program had been through, for all the changes that had been made, no one could have faulted the *STS-26* crew for letting its hair down, so to speak, and relaxing a little bit.

The good humor was personified in the wake-up calls made by comedian Robin Williams, who mimicked a signature line from his recently released movie *Good Morning, Vietnam* by bellowing instead, “Gooooooood morning, *Discovery***!” Hauck wasn’t expecting the celebrity to be involved, and he would later wind up with a tape of Williams’s outtakes while recording the messages. They were even funnier, if more than likely somewhat R-rated. There were also wake-up calls parodying the theme song from the television show *Green Acres* as well as the Beach Boys; finally, just before beginning preparations for its de-orbit burn and reentry, the crew decked itself out in Hawaiian shirts nearly as loud as the launch had been.

After donning the shirts, shorts, and sunglasses, Hilmers took to “swimming” through the weightlessness of the mid-deck, while Covey “surfed” on Nelson’s back. In the midst of the levity, though, there was a determined
intent. Return to Flight had been a project entailing far more than just the five men on orbit at long last. Dick Truly helped get NASA on its feet again, and so had William P. Rogers, Roger Boisjoly, Tom Overton, Joe Kerwin, Mike Mullane, Story Musgrave, and thousands of others. The outlandish attire worn by the STS-26 crew honored workers in the OPF who had celebrated their casual-dress days with what they called their “Loud and Proud” shirts. “Spaceflight is serious business,” Covey said. “Return to Flight was even more serious. But, in the end, there were a whole lot of people who were devoting their life and their efforts to safely return us to flight. There’s different ways you can recognize that. A lot of those things were important to do to get past the idea, ‘You can’t go to space now and enjoy it.’ We could.”

Even a rough-and-tough career naval aviator like Hauck knew that it was vital to let off a little steam. He ended up keeping his loud-and-proud shirt as a reminder of the flight, just like Lounge’s checklist. “I think psychologically, human beings need to get some relief from tension,” Hauck began. “You’ve got to have fun, but you have got to earn your fun and earning your fun means getting the primary objectives completed. You don’t want to be

6. The shirts brought to orbit by the crew of STS-26 were loud and proud, and they were in honor of workers in the Orbiter Processing Facility. Commander Rick Hauck is in the middle, and clockwise from bottom right are pilot Dick Covey, Mike Lounge, Dave Hilmers, and George “Pinky” Nelson. Courtesy NASA, via NASASpaceflight.com LB Forum.
perceived as screwing around and then wind up screwing up your primary objectives. That would be worse than death.”

The flight would not have been complete without some sort of tribute to the Challenger crew, and Hilmers went to Hauck with the idea. Rather than ad-libbing a few remarks on the spur of the moment, Hilmers put a few thoughts to paper before the flight. Each crew member worked with him on the script, and on the fourth and final day of the flight, they honored their friends and co-workers. With a camera pointed out one of Discovery’s window at the earth below, Hilmers began: “We’d like to take just a few moments today to share with you some of the sights that we’ve been so privileged to view over the past several days. As we watch along with you, many emotions well up in our hearts—joy, for America’s return to space; gratitude, for our nation’s support through difficult times; thanksgiving, for the safety of our crew; reverence, for those whose sacrifice made our journey possible.”

Lounge then took over: “Gazing outside, we can understand why mankind has looked towards the heavens with awe and wonder since the dawn of human existence. We can comprehend why our countrymen have been driven to explore the vast expanse of space. And we are convinced that this is the road to the future—the road that Americans must travel if we are to maintain the dream of our constitution, to ‘secure the blessings of liberty to ourselves and our posterity.’”

Covey was next: “As we, the crew of Discovery, witness this earthly splendor from America’s spacecraft, less than two hundred miles separates us from the remainder of mankind. In a fraction of a second, our words reach your ears. But lest we ever forget that these few miles represent a great gulf, that to ascend to this seemingly tranquil sea will always be fraught with danger, let us remember the Challenger crew whose voyage was so tragically short. With them, we shared a common purpose. With them, we shared a common goal.”

Nelson spoke next: “At this moment, our place in the heavens makes us feel closer to them than ever before. Those on the Challenger who had flown before and seen these sights, they would know the meaning of our thoughts. Those who had gone to view them for the first time, they would know why we’ve set forth. They were our fellow sojourners. They were our friends.”
Finally, Hauck concluded the brief memorial: “Today, up here where the blue sky turns to black, we can say at long last to Dick, Mike, Judy, to Ron and El, and to Christa and Greg, ‘Dear friends, we have resumed the journey that we promised to continue for you. Dear friends, your loss has meant that we could confidently begin anew. Dear friends, your spirit and your dream are still alive in our hearts.’”

Covey, Hilmers, and Lounge all returned to space on subsequent shuttle missions, but Hauck and Nelson would never again “explore the vast expanse of space,” giving them even more reason to pause and soak everything in.

At age forty-seven, Hauck had already been on three “wonderful” flights and he simply was not looking forward to getting back in line for another two-year training cycle. He would savor every moment possible while on orbit. “I loved looking out the window,” Hauck admitted. “I loved floating. I loved that camaraderie, and I knew that I would miss it. But all things have to come to an end someday.” During a post-flight press conference, Hauck was asked about the possibility of retirement, leaving him really no other choice than to go ahead and make the announcement. The next day, host Jane Pauley asked him on NBC’s Today show about his decision not to fly again. “We were on all the talk shows,” Hauck remembered. “I remember Jane Pauley said, ‘I hear that you’ve decided you’re going to be looking for a job, Captain Hauck.’ I thought, ‘Isn’t that wonderful to be able to tell however many viewers there are on national TV that I’m on the job market?’ You can’t get better advertising than that.”

When asked if knowing he was more than likely not going to fly again had an impact on his experience of STS-26, Nelson wavered:

That's a good question. My first response would be I don't think so, but thinking back on it, maybe it did. I tried to pay particular attention to things during the flight. One of the things I learned from Story Musgrave was to make a checklist, a list of things you wanted to notice, to try and look out for, just to maximize the personal experience of being in space. So I had a really nice list of that kind of thing. Whether I did it because it was going to be my last flight or whether I just really liked the idea from Story, it was probably a mixture of those.

Hauck brought Discovery to a stop on runway 17 at Edwards Air Force Base in California on 3 October 1988, four days, one hour, and eleven sec-
onds after she had left Earth. After hauling an American flag with them out of the spacecraft, the crew was surprised to be met at the bottom of the steps by George H. W. Bush, then just a month away from being elected president of the United States.

The astronauts of sts-26 were back home again, having safely returned from a journey that put NASA right back where it belonged. In space.