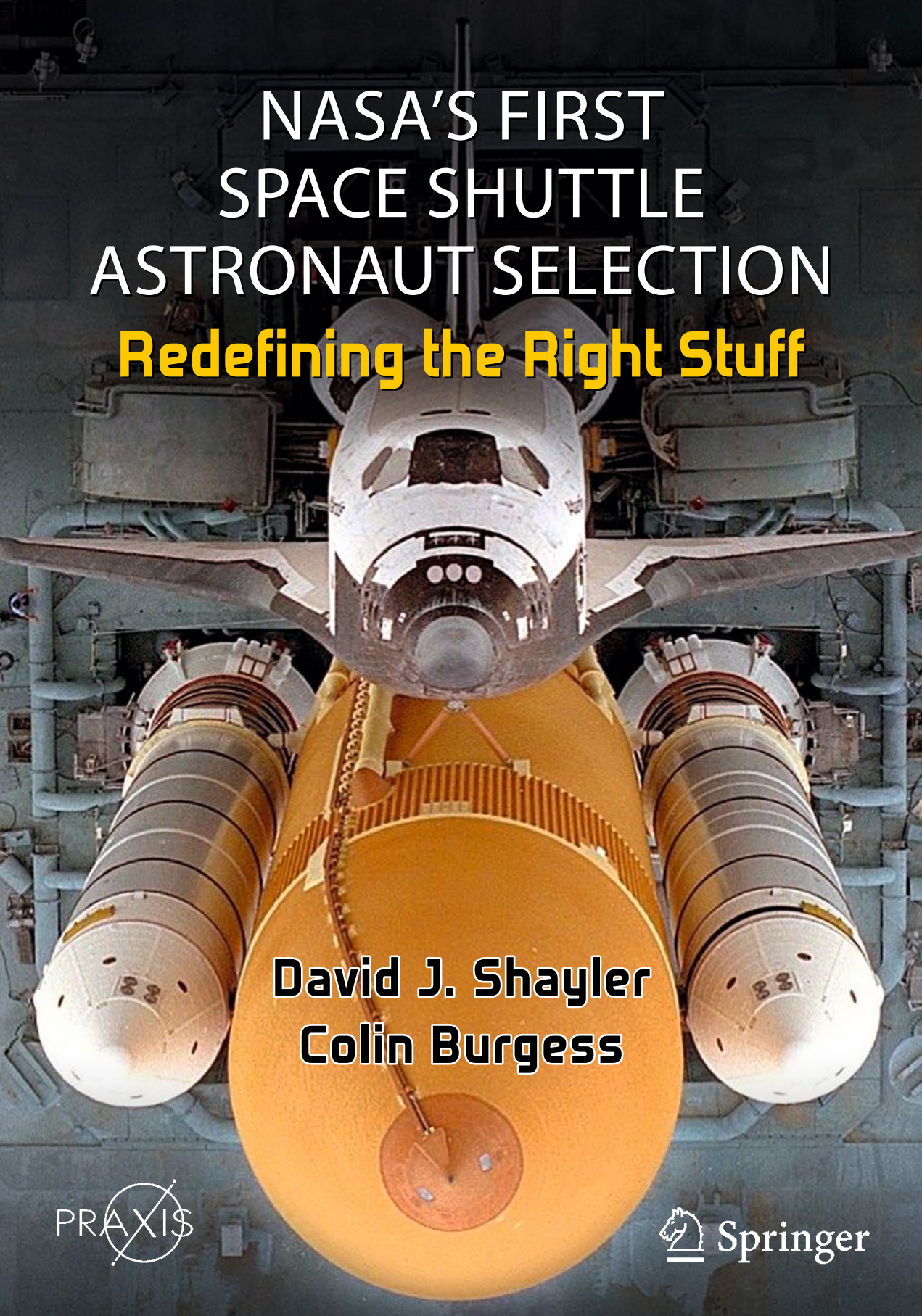
# NASA'S FIRST SPACE SHUTTLE ASTRONAUT SELECTION

## Redefining the Right Stuff



David J. Shayler
Colin Burgess

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**Front:** A stunning bird's-eye view of the Space Shuttle *Atlantis*, with its External Tank and twin Solid Rocket Boosters, during its rollout to Pad 39A at the Kennedy Space Center, Florida, as STS-79 on August 20, 1996. During this mission, John Blaha traded places with TFNG Shannon Lucid at the end of her six-month tour on the Russian Mir space station.

**Back, top left:** The crew of STS-7 on the flight deck of *Challenger*, June 1983. Under the command of Robert 'Crip' Crippen [rear left], the first four members of the TFNG to fly on the Space Shuttle were [l to r] Mission Specialist Sally Ride, the first American woman to fly in space, Pilot Rick Hauck, and Mission Specialists Norman Thagard and John Fabian.

**Back, top right:** Sixteen years later, in July 1999, Mission Specialist Steve Hawley – seen here on the middeck of *Columbia* during his fifth mission, STS-93 – became the last member of the Class of 1978 to fly in space, ending an era of over 100 missions in Earth orbit.

**Back, lower right:** The official emblem for the Class of 1978, designed by Robert McCall.

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# Contents

# Authors' Preface

At first, this book was never going to happen. Previously, either individually or working as co-authors, we had researched and put together four books covering the early NASA astronaut selections involving Groups 1 through to 7 between April 9, 1959 and August 14, 1969. During that time, 73 men were chosen to crew and support America's pioneering manned space missions under the Mercury, Gemini and Apollo programs. As mentioned in our previous work, *The Last of NASA's Original Pilot Astronauts*, several of these astronauts remained active long enough to crew missions in the first decade of Shuttle flight operations between 1981 and 1990.

We knew that 2018 would mark the 40th anniversary of the first astronaut selection of the new Space Shuttle era, and even though we had intended that our previous book on the Group 5 and 7 astronauts would end our collaboration on the subject of astronaut selections, we decided this anniversary should not go unmarked. We therefore determined to research and write the history of NASA's Group 8 astronauts, unofficially known as The Thirty-Five New Guys, or by the acronym TFNG (which is further explained later in this book).

Although there have been biographies and memoirs published on several of the 29 men and six women selected in this 1978 group, in addition to countless magazine and newspaper articles, there has never been a book published which fully details the lives, accomplishments and sometimes tragedies associated with each member of this group. That is all presented here, along with the chronology of the selection process begun in 1976, and the personal recollections of some who were successful in their application – and others who were not.

Unlike previous astronaut intakes, NASA opened the way for women and minorities with this selection process, not only to apply for the position of Pilot astronaut and the new category of Mission Specialist, but actually to be selected. History records that the civilian space agency announced the names of the 35

newly-selected astronaut candidates in January 1978, including four minority selectees and six women. The names of those six women became instantly renowned across the world.

This *will* be the final group selection book we will tackle jointly, but it is a tale which history has dictated should be recorded. We are proud to have compiled and presented this fascinating and truly involving story.

**Colin Burgess**

This new collaborative effort between Dave Shayler and I never started out as part of a series on the selection of NASA's astronauts leading up to the era of the Space Shuttle program. In fact, it had its origins in a friendship going back many years, as well as a shared interest in the history of human space exploration – and in recording that history. I cannot recall who first came up with the idea all those years ago (most likely Dave) of combining our talents, enthusiasm and research in putting together a book on NASA's fourth and sixth astronaut groups, known collectively as the Scientist-Astronauts, but we found we worked well together, even though we happened to live on opposite sides of the globe. The result, published in 2007, was our first co-authored book for Springer-Praxis*, NASA's Scientist-Astronauts*.

That book may have ended our cooperative work on the subject of astronaut groups, were it not for one occasion when I was visiting England and the two of us were sharing a meal in a restaurant. During our conversation, we were discussing the selection of the space agency's very first astronauts for the Mercury program. We agreed that we shared a mutual frustration, in that the names of five candidates for that role had eluded both of us for many years.

Then, in a stroke of remarkably good fortune, I was contacted by former military man, Walter ("Sully") Sullivan, who had acted as the liaison officer for the 32 Mercury astronaut finalists back in 1959 at Wright-Patterson Air Force Base, Ohio. He had read a post on the subject I placed in the collectSPACE.com forum, and kindly offered to assist me if I wanted to write a book about this selection group. Most importantly, he had a complete list of the 32 Mercury finalists. I quickly agreed, and he subsequently sent me the names of the missing five candidates. Sadly he is no longer with us, but with Sully working as a contact liaison and guarantor for me, I managed to locate all of the Mercury candidates or their surviving family members, and the result was the 2011 book, *Selecting the Mercury Seven: The Search for America's First Astronauts.*

Following the publication of this book, I had no plans to put together a follow-on title delving into the selection of the second NASA astronaut group. That is until one propitious day when Dave contacted me in excitement. He said that in his latest search of NASA's treasure trove of historical records he had unearthed documents giving the names of all the finalists for not only the second, but also the third astronaut groups. With his own research for a number of books meaning he

could not even look at this new project, he kindly offered those lists to me, and a whole new (and successful) hunt for these men or their family members began, culminating in a 2013 book on both groups for Springer-Praxis called *Moon Bound: Choosing and Preparing NASA's Lunar Astronauts.*

That same year, with the selection of NASA groups 1, 2, 3, 4 and 6 now covered in books, Dave and I began serious discussions on the possibility of combining resources once again to produce a new book detailing the process of choosing astronauts who became part of the two remaining pre-Shuttle classes: NASA Groups 5 and 7 (the latter also known as the MOL group). A contract was signed and work began, albeit slowly at first as we were both engaged in putting together other contracted books for Springer-Praxis over the next couple of years. Initially, our research and writing on the two groups was sporadic, but it began to pick up steam once those other obligations had been cleared. In 2017 this new book was published, and we felt we had finally recorded, separately and in partnership, the selection of seven groups of amazingly talented and bold men who pioneered America's dynamic space program before the advent of the reusable Space Shuttle.

The lure of writing about the 1978 Group 8 selection inexorably led to an email correspondence on the subject, and once we had agreed to tackle this new book the work began.

I know that we are both proud to have been able to record the stories of these very remarkable men and women, some of whom are no longer with us, and we are grateful to everyone who assisted in putting together this wonderful book, which we hope will be read and enjoyed by many generations to come.

**David J. Shayler**

From the late 1960s, the arrival of a familiar brown envelope – emblazoned with the NASA logo – was eagerly anticipated, answering my latest request and filled with documents or photos from the public affairs departments of the different NASA field centers. In the summer of 1978, I awaited the envelope containing background information and images of the recently selected 35 individuals of the eighth NASA astronaut class. When I finally received the package and looked at the images, I recall thinking how youthful they looked compared to the seasoned veterans chosen in the 1960s. This first intake of NASA astronauts for a decade was certainly a different composition, featuring the first female and minority astronaut candidates chosen by the space agency. Even the phrase 'astronaut candidate' was different. No longer were these new astronauts considered to be fully-fledged 'astronauts' from their first day at NASA. They were going to have to earn that title by completing a training and evaluation program first. For me that did not matter, as they had been named as the next astronaut class by NASA and, in my system, qualified for individual archive folders that expanded over the coming years as their biographical details were researched, assignments recorded and space flights logged.

I had been collecting information about each NASA astronaut group and their members since the 1960s, subsequently expanded to include details on the Soviet cosmonauts and other international space explorers. From the late 1970s, this had led to articles in the publications of the British Interplanetary Society – most notably *Spaceflight* – assisting other authors in their research, and self-publishing a range of titles on the early NASA astronaut groups and the Shuttle program through my company Astro Info Service.

Over the years, I had established contacts at NASA's Johnson Space Flight Center in Houston, and at the NASA History Office in Washington D.C., who had kindly replied to my numerous queries and questions. By the 1980s, I had in my collection a growing number of letters from former and current astronauts which gradually filled the gaps in my research into the structure and workings of the NASA Astronaut Office, the experiences of those lucky few who had flown in space, and the assignments that the astronauts held in between their missions. Aided by a growing network of co-researchers across the globe, including a certain Colin Burgess in Australia, my archive of information on the world's space explorers has continued to expand to this day.

One area in which I was especially interested was researching the extensive support roles the astronauts fulfilled in between missions, and with it the story about what astronauts *really* do when not flying in space. Starting with the first crewed flights of Apollo, and in addition to detailing the astronauts' roles and accomplishments on each space flight, I became intrigued by the roles fulfilled by those who supported the missions, securing that little snippet of detail, obscure piece of information, or item of little-known fact. Simply reporting that an astronaut had 'supported' a mission was not enough for me. I wanted to know what they had supported and what that role involved. By the 1980s, that became more convoluted when trying to piece together the careers of the astronauts during the far more complex Shuttle program. To my mind, understanding the evolution of the astronauts' roles and their assignments is as important as the missions they fly.

While compiling this current title, we were able to access a number of official documents pertaining to the various support assignments across the 135 Shuttle missions. These have been used to track the support roles of both the TFNG and other members of the Astronaut Office. However, there are gaps in the records and I would appreciate any additional information (via the contact details on my website, www.astroinfoservice.co.uk) from readers who may be able to fill in these gaps to document the complete picture of astronaut support roles during the Shuttle program.

For me, a significant change to the system of NASA astronaut selection, training and assignments occurred with the naming of the Class of 1978. These "Thirty-Five New Guys" represented a different era from those chosen a decade earlier. Even the selection process had matured to reflect the changes in the program, the experiences from past selections, and the hopes for the future. With the selection

of the eighth group of astronauts, there were new elements to this process: pilots with a broader range of flying experiences and the introduction of multi-skilled Mission Specialists instead of Scientist-Astronauts. Unlike their scientific predecessors, the Mission Specialists were not required to qualify from an intensive military jet pilot course before continuing with their astronaut career. Even in the late 1970s, the prospect of flying regular, more complex missions in the Shuttle program hinted at a team of astronauts who would almost be earning 'frequent-flyer' status.

By the early 1980s, many of the legendary pioneering NASA astronauts – those who had the so-called '*Right Stuff*' qualities born in the 1950s test-pilot fraternity, as coined by author Tom Wolfe in his 1979 book – had long since retired. They had blazed the trail into space and on to the Moon, and had put the untried Shuttle system through its paces. From now on, a new era of astronauts would take up the mantle and define a new, different era of '*Right Stuff*', as team players in a more bureaucratic NASA and a far more complex program than it had been just decade or so before.

When Colin first suggested a third collaborative venture on the Class of 1978, I was as intrigued by their story as I had been with those from the earlier selections. The TFNG were indeed pioneers in their own right, creating an era that would last longer than that of the original astronauts they had followed. They, in turn, unwittingly molded a new image of a multi-talented crewmember, which would morph again in the new millennium and yet another generation of post-Shuttle NASA astronauts. For me, these 35 individuals of the eighth selection represented the next step, after the Moon, in American space flight history. Almost immediately, the youthful-looking 35 took up the mantle of the 'original 73' astronauts chosen between 1959 and 1969, remolded it to fit a new program and a new NASA, and fulfilled their remit of active participation in the Shuttle program, either in support roles, as crewmembers, or latterly as managers across the 30-year program. This, then, is their story, one which ranks alongside that of their pioneering colleagues, who together earned the right to be known as an *American astronaut*.

# Acknowledgements

**Dave Shayler**
A project such as this requires a significant amount of research, and by the very nature of such research, the assistance of a number of key individuals to guide and aid you in that task.

Prominent for me in this 'support team' over the past four decades have been the various members of the NASA History and Public Affairs Offices at NASA HQ and JSC. Without their help and support, access to the information presented in this and many of my past and upcoming publications would not have been possible. The oral histories of the TFNG within the NASA JSC Oral History Project have been especially useful in writing this book. In addition, the archived documents of former NASA Flight Director Cliff Charlesworth, originally located at JSC when researched by the authors, have also proven to be a valuable asset in detailing the Astronaut Office assignments for each Shuttle mission quoted. Thanks also to Ed Gibson, Group 4 Scientist-Astronaut and Group 8 selection board member, for his generous Foreword.

Considerable assistance for this project has been provided by Group 8 astronauts Hoot Gibson, Steve Hawley and Rhea Seddon. Special mention must also be made of fellow TFNG Mike Coats, Dick Covey, Jeff Hoffman, George "Pinky" Nelson, Norman Thagard and Kathy Sullivan, who were all interviewed over the years – primarily for other writing projects – but whose answers and information provided have also proven valuable for this book.

Special thanks are extended to Michael Cassutt, esteemed author of the trilogy of *Who's Who in Space* compendiums and authoritative biographies on Deke Slayton, Tom Stafford and George Abbey, for his guidance through the challenging and changing history of the NASA Astronaut Office and its various branches. Thanks also go to Bert Vis for his support and suggestions. Special thanks are due to Mario and Susan Runco for sharing with us their memories of their own applications to Group 8.

A special thank you also to Tim Gagnon for permission to replicate his design for the official TFNG 40th anniversary emblem.

Thanks also to the staff and Council of the British Interplanetary Society for access to their library and archive, which has been of immense value in compiling this book. Once again, the extensive resources of our co-author and friend, the late Rex Hall MBE, former President of the BIS, have proven invaluable during our research. We also express our continued thanks to Clive Horwood of Praxis Publishers for his support and encouragement of our numerous book proposals over the past two decades and to the team at Springer Nature, including Maury Solomon and Hannah Kaufman in New York. Appreciation also goes to Jim Wilkie for his skills in turning our cover ideas into the final design. Finally, on the production side, many thanks to my brother Mike Shayler who, during very difficult times, once again applied his professional and dedicated editing and wordsmith skills to turn our original draft into the finished product you see here.

Thanks also to my mother, Jean Shayler, who at 91 continues to be involved in reading each draft page of my latest book project, and to my wife Bel for her continued love, support and understanding in that I will always wish to write just one more book… and maybe another after that… and then another. Also, to our beloved German Shepherd Shado, our wolf in dog's clothing, who still cannot quite work out why I spend so much time away from more serious pursuits such as throwing a ball or running around a field.

To all a very large and appreciative thank you.
Dave Shayler

**Colin Burgess**
I can really only echo Dave Shayler's thanks to and comments on so many people who participated to varying degrees in the research and compilation of this book, which we regard as an important insight into the selection of the first group of astronauts specifically chosen to operate on NASA's fleet of Shuttle Orbiters. From the outset, we have received a great deal of support, not only from those astronauts named by Dave, but from a whole range of people connected in so many ways to the selection of the TFNG group, their training, missions and myriad achievements.

There are so many helpers to whom Dave and I owe our sincere thanks. The mere listing of names can in no way suggest our tremendous feelings of gratitude towards these individuals. Without their interest and cooperation it would have been literally impossible to collect, transcribe, organize or publish the information and stories gathered together in this book. Dave, as chief motivator for this project, has covered much of this territory in listing his acknowledgements, but I have

a few more names to add. Each has added immeasurably to this publication, and both of us are extremely grateful.

For their kind assistance, I would like to thank these good folks who were involved in the selection of the TFNG group, and responded to our queries. Special personal thanks go to Carolyn Huntoon, the first American woman to serve as a Director of the Johnson Space Center (JSC) in Houston, and a member of the Group 8 selection panel. Collective thanks also to a representative few of the unsuccessful candidates for relating their experiences while undergoing the selection process, namely: Frank R. Harnden, Jr., William D. Heacox, Major Gary W. Matthes (USAF, Ret.), Dr. Joseph K. (Ken) Ortega, Dr. Lawrence (Larry) Pinsky, and Wilton T. Sanders. III. Additional information was provided by retired NASA astronaut Jerry Ross and former Payload Specialist Charlie Walker.

I would also like to thank a long-time supporter of our projects, namely Ed Hengeveld, for his assistance in tracking down some lesser-known photographs for use in this book, and for the same reason our appreciation goes to Joachim Becker of Spacefacts.de. The definitive source for many answers to our questions is space forum Collectspace.com, and its founder and chief motivator, Robert Pearlman. Other helpers include Francis French and David Shomper. I thank them for their wisdom and guidance.

As Dave has expressed his love and thanks to his family, so I also shower my wife of more than five decades, Pat, with love and gratitude for putting up with me and my countless hours spent hunched over my laptop, surrounded on our study floor by piles of books, magazines, photographs, scrap books, folders and old, yellowing newspapers.

If I have forgotten anyone, my sincere apologies. You are all champions.

Colin Burgess

# Foreword

On January 16, 1978, NASA announced the selection of 35 new astronauts, the eighth group selected, who chose to call themselves the Thirty-Five New Guys (TFNG). There had been no additions to the Corps since August of 1969. This delay resulted from the long gap between the end of the Apollo-type missions in 1975 and the first Shuttle flight in 1981. But in the late 1970s, the need for highly qualified and motivated professionals became immediate as well as long term. The capabilities of the 35 new guys greatly exceeded requirements and expectations.

I was given the opportunity to be a member of their selection board and thereby got to know them on paper and in person rather quickly. Coming into the Astronaut Office with little previous experience in this type of high-powered, informal operation required some time to adjust. However, every one of the TFNG were hard chargers and there to contribute to the advancement of America in space to the best of their abilities. Any intimidation was quickly replaced with their drive to perform.

It was a diverse group: 15 military pilots and 20 scientists composed of 29 males and NASA's first six females. Other firsts included three African-Americans and one Asian-American. Despite their pride in their diversity, they quickly put their team identity and its contributions above all considerations. In addition, just like the pilots and scientists since the fourth group of astronauts, pilots also contributed to the onboard science and scientists also performed many space operational duties.

Unlike previous groups, except for the Apollo-Soyuz mission with Russia, the TFNG would soon encounter working relationships with many international astronauts and experimenters from Europe, Canada, Mexico, Japan, the Middle East and Russia. Once the International Space Station was in operation, working in an international environment became routine for all astronauts, especially the TFNG.

Over the next two decades, the TFNG contributed a total of 103 individual flights for an average of three flights per member. They performed:

- Retrieval and repair of satellites and other facilities and equipment in orbit
- The first untethered spacewalks 'flying' the MMU
- Spacelab operations
- Shuttle-Russian Mir station dockings
- Russian Mir station operations using Soyuz and Shuttle transportation systems


Skylab 4 Science Pilot Ed Gibson

A brief mention of a few of the TFNG illustrate the capabilities, drive and accomplishments of this group.

During STS-61 commanded by Richard Covey, Jeff Hoffman, partnered by veteran astronaut Story Musgrave, performed three of the five very difficult space walks to restore the designed-in level of visual acuity to the Hubble Space Telescope, which then revolutionized the field of Astronomy.

After earning BSc and MSc degrees in engineering, Norm Thagard flew 163 combat missions in Vietnam as a U.S. Marine Corps aviator, then earned his MD before flying four Shuttle missions as a NASA Mission Specialist. Lastly, he was the first American to fly a mission on the Russian Mir space station and paved the way for six of his fellow countrymen. On his 115-day mission, he also broke the American record for time in space that had lasted for 21 years. Another member of the group, Shannon Lucid, later broke this record with a flight of slightly over six months, also on the Mir space station.

Regrettably, five members of the group paid the ultimate price for their participation. On the morning of January 28, 1986, STS-51L lifted off with ice hanging from the launch gantry. It had been approximately 20 degrees below the stated SRB-lower-temperature limit overnight. Thus, at 73 seconds into the mission, the booster exploded, killing all seven crew members including four members of the TFNG: Dick Scobee (Commander), Judy Resnik, Ellison Onizuka and Ron McNair.

In the selection process, I became quite familiar with Ron McNair's background. As he grew up in poverty, he became skilled in football and interested in science. While earning a degree in a small college, he was given the opportunity to work at MIT in the summers and later was accepted there for graduate school where he earned a PhD. Along the way, he had also become a black belt in karate, which he used to help other children growing up in the same situation that he had. Each time he moved into a new environment, he found a church that had a basement that he could use to gather local youth and teach them the discipline of the sport. He got many young men moving in a constructive direction. He was an admirable black youth from poverty who made all the right decisions.

Additionally, Dave Griggs, who flew on Discovery in April 1985, when he made NASAs first unrehearsed spacewalk to rescue a stranded satellite, died in an aircraft accident on June 17, 1989.

The many significant contributions of the TFNG did not end when their flying days concluded. Many went on to perform exceptionally well in management. For example, Mike Coats became the Director of the Johnson Space Center and Kathy Sullivan went on to become the head of the National Oceanic and Atmospheric Administration. Many others stepped into leadership positions in industry or other government organizations.

Also, although not quantifiable but certainly important and real, the performance and diversity of the TFNG inspired many students in science, technology, engineering and math and many women and minorities to pursue their dreams where they might not have been so inclined without the leadership examples in the TFNG.

The strength and diversity of the numerous ways in which the TFNG have displayed their own unique '*Right Stuff*' has significantly enhanced America's performance in space and science. It flowed directly from the group's 35 individual skill sets, drives and perseverance.

The TFNG are a tough act to follow!

Edward G. Gibson (PhD)
Former NASA Astronaut (Group 4, 1965)
Science Pilot Skylab 4 (November 1973 – February 1974)
Member, Group 8 Selection Board

NASA Astronaut Gold Pin

This book is dedicated with gratitude to the lives and many accomplishments of the Group 8 astronauts who no longer share our days, but will live on in our memories.

Dale A. Gardner
S. David Griggs
Ronald E. McNair
Steven R. Nagel
Ellison S. Onizuka
Judith A. Resnik
Sally K. Ride
Francis R. Scobee
David M. Walker
Donald E. Williams

*A blade of grass is commonplace on Earth; it would be a miracle on Mars.*
*Our descendants on Mars will know the value of a patch of green.*
*And if a blade of grass is priceless, what is the value of a human being?*

Carl Sagan (1934–1996)

# Abbreviations and Acronyms

Informal Military Designations

**USAF**
"FS" stands for Fighter Squadron; "RS" for Reconnaissance Squadron; "BS" for Bomber Squadron

**U.S. Navy**
"V" stands for fixed wing; "F" for fighter wing; "A" for attack; "Q" for electronic; "R" stands for Reserve but can also stand for Reconnaissance; "W" for early Warning; "T" for training; "X" for test and evaluation (as in eXperimental)

**USMC**
Marine air units use the suffix "M" within the U.S. Naval designation coding, such as VMFA for fixed, with AW added for "All Weather" squadrons

| | |
|---|---|
| AB | Air Base |
| AFB | Air Force Base |
| AFTPS | Air Force Test Pilot School (Edwards AFB, California) |
| AFIT | Air Force Institute of Technology (Wright-Patterson AFB, Ohio) |
| AFSC | Air Force Systems Command |
| ATO | Abort To Orbit (abort mode) |
| ALT | Approach and Landing Tests (Space Shuttle) |
| AOA | Abort Once Around (abort mode) |
| ARPS | Aerospace Research Pilot School (Edwards AFB, California) |
| ASCAN | Astronaut Candidate |
| BIS | British Interplanetary Society (London, England) |
| BSc | Bachelor of Science degree |
| BUp | Back Up (crewmember) |

| | |
|---|---|
| CapCom | Capsule Communicator (Mission Control) |
| $C^2$ | Cape Crusader (KSC astronaut support team) |
| CB | Astronaut Office, LBJ Space Center (JSC) mail code |
| CDR | Commander |
| CEIT | Crew Equipment Interface Test |
| CERN/EP | European Organization for Nuclear Research/Experimental Physics Division |
| CfA | Center for Astrophysics (Cambridge, Massachusetts) |
| CO | Commanding Officer (DOD) |
| CU Boulder | University of Colorado (Boulder, Colorado) |
| DOD | Department of Defense |
| DOTF | Deployments and Operations Task Force |
| DSO | Detailed Supplementary Objectives |
| DTO | Detailed Test Objectives |
| DVM | Doctor of Veterinary Medicine |
| EAFB | Edwards Air Force Base (California) |
| EDT | Eastern Daylight Time |
| EMU | Extravehicular Mobility Unit (Shuttle spacesuit) |
| EOM | End Of Mission |
| ER | Emergency Room |
| ESA | European Space Agency |
| EST | Eastern Standard Time |
| ET | External (fuel) Tank (Space Shuttle) |
| EV | EVA astronaut 1, 2, 3 or 4 |
| EVA | Extra-Vehicular Activity (spacewalk) |
| FBI | Federal Bureau of Investigation |
| FBIS | Fellow of the British Interplanetary Society |
| FDF | Flight Data File |
| FCOD | Flight Crew Operations Directorate |
| FPO | Fleet Post Office |
| FRF | Flight Readiness Firing |
| *g* | Gravity force |
| GAS | Get Away Special |
| GET | Ground (Mission) Elapsed Time |
| GSFC | (Dr. Robert H.) Goddard Space Flight Center, Greenbelt, Maryland |
| HF/DF | High Definition/Direction Finding (also known as Huff Duff) |
| HQ | Headquarters |
| HST | Hubble Space Telescope |

| | |
|---|---|
| ISS | International Space Station |
| IUS | Interim Upper Stage |
| IV | IVA astronaut (EVA support crewmember) |
| IVA | Intra-Vehicular Activity |
| JSC | (Lyndon B.) Johnson Space Center (from 1973), Houston, Texas (formerly MSC) |
| KSC | (John F.) Kennedy Space Center (Florida) |
| LANTIRN | Low Altitude Navigation and Targeting Infrared for Night |
| LC | Launch Complex |
| LCDR | Lieutenant Commander |
| LST | Large Space Telescope (renamed Hubble Space Telescope) |
| MAW | Marine Air Wing |
| MCAS | Marine Corps Air Station |
| MCC | Mission Control Center (MSC/JSC, Houston, Texas) |
| MD | Doctor of Medicine |
| MECO | Main Engine Cut-Off |
| MET | Mission (Ground) Elapsed Time |
| MIT | Massachusetts Institute of Technology (Cambridge, Massachusetts) |
| MLP | Mobile Launcher Platform |
| MMU | Manned Maneuvering Unit (Space Shuttle) |
| MOCR | Mission Operations Control Room (MSC/JSC) |
| MOL | Manned Orbiting Laboratory |
| MPS | Main Propulsion System (SSME/SRB/ET) |
| MS | Mission Specialist (Space Shuttle) |
| MSc | Master of Science degree |
| MSC | Manned Spacecraft Center, Houston (Texas); renamed Lyndon B. Johnson Space Center (JSC) in 1973 |
| MSE | Manned Spaceflight Engineer (military Payload Specialists) |
| MSFC | (George C.) Marshall Space Flight Center, Huntsville (Alabama) |
| NAS | Naval Air Station |
| NAS/NRC | National Academy of Sciences/National Research Council |
| NASA | National Aeronautics and Space Administration |
| NATC | Naval Air Training Command |
| NAVELEX | Naval Electronics System Command |
| NBL | Neutral Buoyancy Laboratory (Sonny Carter Facility, Houston) |
| NBS | Neutral Buoyancy Simulator (Marshall Space Flight Center, Huntsville) |
| NORAD | North American Aerospace Defense Command (Colorado Springs, Colorado) |

| | |
|---|---|
| NRC | National Research Council (Washington D.C.) |
| OFT | Orbital Flight Tests |
| OMS | Orbital Maneuvering System (Space Shuttle) |
| OPF | Orbiter Processing Facility |
| OV | Orbital Vehicle (Space Shuttle) |
| PAM | Payload Assist Module (upper stage) |
| PAO | Public Affairs Office/Officer |
| PC | Payload Commander |
| PDRS | Payload Deployment and Retrieval System |
| PhD | Doctorate degree |
| PLT | Pilot |
| PS | Payload Specialist |
| RADM | Rear Admiral |
| RAF | Royal Air Force |
| RCA | Radio Corporation of America |
| RMS | Remote Manipulator System (Space Shuttle) |
| ROTC | Reserve Officer Training Corps |
| RSLS | Redundant Set Launch Sequence (abort mode) |
| RTLS | Return To Launch Site (abort mode) |
| SAIL | Shuttle Avionics Integration Laboratory |
| SAMSO | Space And Military Systems Organization |
| SCA | Shuttle Carrier Aircraft (modified Boeing 747) |
| SL | Spacelab |
| SLS | Spacelab Life Sciences |
| SMM | Shuttle Mir (docking) Mission |
| SMS | Shuttle Mission Simulator |
| SRB | Solid Rocket Booster (Space Shuttle) |
| SRM | Solid Rocket Motor (Space Shuttle) |
| SSME | Space Shuttle Main Engine |
| STA | Shuttle Training Aircraft |
| STS | Space Transportation System (Space Shuttle) |
| TACT | Transonic Aircraft Technology |
| TAL | Transoceanic Abort Landing (abort mode) |
| TDRS(S) | Tracking and Data Relay Satellite (System) |
| TFNG | Thirty-Five New Guys (Group 8 astronaut candidates) |
| TPS | Test Pilot School |
| UCLA | University of California, Los Angeles (California) |
| USA | United Space Alliance or United States Army |

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| USAF | United States Air Force |
| USAFA | United States Air Force Academy (Colorado Springs, Colorado) |
| USC | University of Southern California (California) |
| USGS | United States Geological Survey |
| USMA | United States Military Academy (West Point, New York State) |
| USMC | United States Marine Corps |
| USMCR | United States Marine Corps Reserve |
| USN | United States Navy |
| USNA | United States Naval Academy (Annapolis. Maryland) |
| USSR | Union of Soviet Socialist Republics (1917–1991) now Russia |
| VAB | Vehicle Assembly Building (KSC, Florida) |
| VAFB | Vandenberg Air Force Base (California) |
| WETF | Weightless Environment Training Facility (JSC) |

# Prologue

Some 40 years ago, in the intermediate days of the post-Apollo and pre-Space Shuttle era, the roads south east of Houston, Texas were a lot less congested than one would expect to find today. For 29-year-old Barbara Anne (Tracey) Sauerland MD, this made for an easy 19-mile (31-km) drive to the Johnson Space Center (JSC) from her home in Galveston.

Born in New England, Connecticut, Dr. Sauerland had attended the nearby St. Thomas Aquinas High School, later earning a biology degree in Boston and then a doctorate in Neurochemistry and general practitioner's degree from the University of Texas Medical Branch. By January 1978, she was working in JSC's Space and Life Sciences Directorate, and was a regular, familiar sight to the center's guard, who would promptly smile and wave her through.

Like her then husband, prominent psychiatrist Professor Eberhardt Sauerland MD, Tracey was keen on taking her profession and experience into space, completing an application for the 1978 astronaut selection program by the due date of June 30, 1977. In the previous decade, her husband had applied to become an Apollo-era astronaut, but had not made it through to the final selection. Tracey was determined to go further, and even held out hopes – however remote – of one day becoming the first American woman to venture into space.

As she told one reporter, there was an odd childhood pointer that could work in her favor, namely that she did not get sick in machines – handy enough when being whirled around at 30 rpm by a dizzying device designed to measure motion sickness. "I was the only one of our gang that used to go to the fairground and try everything without a murmur," she said[1].

[1] *Sydney Sun* newspaper, unaccredited article, "Going Up – A Real Bionic Woman," December 9, 1977

By midnight on the due date, a total of 8,079 applications had been received by NASA for consideration, which included 1,544 from women. There were 1,261 pilot applications and 6,818 for the position of Mission Specialist. Eventually, the number of suitably qualified applications was processed down to just 208. To her delight, Tracey Sauerland's name was still on this reduced list.

Beginning with the first 20 in August 1977, the 208 remaining astronaut applicants began arriving at JSC to undertake a week-long series of personal interviews, coupled with physical and psychiatric examinations. The final selection procedure was expected to be completed by November. The following month, the selection board would meet to determine which of the applicants best suited the requirements for future Shuttle pilots as well as the new category of Mission Specialist, with up to 20 to be chosen in each category. Those selected would report for duty at JSC in July 1978. After two years of training and evaluation – and assuming there were no unforeseen problems with any candidate – they would officially be named as NASA astronauts and become eligible for flights on future Space Shuttle missions. The training/evaluation time was later decreased to just one year.

Dr. Tracy Sauerland and (right) trying on an Apollo spacesuit.

Dr. Sauerland was notified that she would be assessed in the third group of applicants, reporting to JSC on Monday, August 29 for her week of individual interviews and physical examinations. All 20 of the applicants in her group held doctorates or medical degrees, or both, and one (Michael Kastello) even had a degree in veterinary science. Eight of their number were women.

On January 16, 1978, NASA Administrator Dr. Robert A. Frosch announced the selection of the 35 candidates who would begin astronaut training with America's space corps later in the year. Included in that number were six women, plus the first three African-Americans, and the first Asian-American (who later became the first person of Japanese ancestry to fly into space).

Collectively, they were introduced to the world in February 1978 as NASA's Group 8 astronauts. However, they also came to be known by the less formal acronym TFNG, which (in polite usage) stood for 'the Thirty-Five New Guys'. Two decades earlier, America's first astronauts had been selected for the Project Mercury series of human space flights, and NASA was now preparing for the upcoming test flights of the spacecraft known as the Shuttle Transportation System (STS), or more simply, the Space Shuttle.

While pilots would still be required to fly the innovative winged vehicle, this group marked a time of operational and cultural changes within the nation's space program, which came with the emergence of a new breed of astronaut known as the Mission Specialist. Among their intended tasks was the operation of critical systems aboard the Shuttle, conducting intricate tests and experiments, and assisting in the deployment of satellites from the Orbiter's capacious payload bay through the manual manipulation of a multi-jointed robotic arm.

In the previous seven all-male astronaut selections, the task of crewing Mercury, Gemini and Apollo spacecraft had fallen to men with previous test-piloting experience, or scientists willing to be trained as jet pilots. Now, for the first time, six of the 35 newly-appointed Astronaut Candidates (Ascans) were women. Minorities were also included.

A breakdown of the Group 8 list demonstrates an end to the archaic and controversial gender and racial barriers that had existed since the space agency named its Group 1 Mercury astronauts back in 1959. Looking at statistics, 15 of those named fell into the Pilot category and 20 were potential Mission Specialists. Furthermore, the group consisted of 14 civilians and 21 military officers.

Pressed as to why there had been no ethnic minorities or women in the astronaut corps until that time, JSC Director Christopher Columbus Kraft boldly stated at a press conference in Washington that there had been few qualified minorities and women when the last group of astronauts had been chosen in August 1967. "The most rewarding thing [about this astronaut group] is that there were large numbers of qualified women and minorities this time around," a diplomatic Kraft said. "We had no problem finding women and minorities who were qualified and highly motivated as to what they wanted to do[2]."

[2] *Washington Post* newspaper, article, "NASA announces selection of 35 Shuttle astronauts", January 17, 1978