Omega Speedmaster - A TIME CAPSULE WORLD MOOK MONO Special Edition Edited & Written by Kesaharu Imai Published by WORLD PHOTO PRESS

A TIME CAPSULE—Omega Speedr~raster
Front Cover:
A TIME CAPSULE—Omega Speedmaster
The story of the first watch in outer space. Edited & written by Kesaharu Imai.
P2
As we make the transition into the twenty-first century, the Omega Speedmaster, small enough to fit in
the palm of the hand, is in itself a time capsule of the twentieth
century.
P3
Foreword, The setting sun on a late autumn afternoon set scene for a visit from Mr Imai when he came
to my office at the Van Nuys airport located in a suburb of Los
Angeles. The creaking of the ffont stair5, as he entered the building, was reminicient of the erie awakening cry of a space craft preparing for laumch. I began my first
Space Flight aboard Mercury-Atlas 9 thirty-three years ago! In looking back to those days, Mr Imai
and I talked enthusiastically about the Omega Speedmaster, which
served as a reliable personal tool throughout my mission duration completing 22 5 orbits around the
earth! An impression of the universe was beyond my expectation
and imagination. As a glimpse of limitdessness followed by an awe-inspiring view of the eatth are indeed
indescribable. Being overwhelmed by an unprecedented
experience I was not myself for some time till I noted the positive movement of ht e second hand on the
Speedmaster, which in fact recorded such data as elapsed flight
time and fuel consumption. "The development of science and technology today is undoubtedly the result
of human wisdom which I believe stemmed from the
passionate but romantic pursuit of scientists and engineers, said Me Imai. I agreed. Eventually we had
an enjoyable conversation and I was very impressed by his
profound knowledge of space and timepieces. The Omega Speedmaster that I carried on my wrist during
the Mercury-Atlas 9 flight is now in the possession of Mr.
Imai. This timepiece evoked many memories of Space Flight. We both coincidentally murmured, "My
True Days." Last but not least, I take pleasure in congratulating
Mr. Imai for his successful completion of "The Omega Speedmaster - A Time Capsule of the Twentieth
Century," which I firmly believe to be of interest to a wide
audience.
L. Gordon Cooper
Colonel USAF (Retired)
P5
When I look up at the night sky, I think of the vastness of space. Outer space, with all its mysteties, is a
world far beyond the reach of humankind. As children, I

imagine we all fantasized about what is out there in the universe. As an adult, I nearly stopped stargazing altogether, and spent my days far removed from the mystic aHraction of the stars in the night sky. I was tied down to reality, completely engrossed in my work, and had become used to the way things were. Then I went to Seoul on an assignment, and at newspaper company there, a black-and-white television showed the moment of a spacecrafl landing on the moon. That image brought outer space back to me, from so far away. It was no longer some scene from an imaginaty world. It was real - it was the moon, and that image was etched into my memory.

Humankind has finally entered the realm of outer space, and we have succeeded in sening foot on the world other than earth. And I lived through the era when it all came true. Even though my feeling of awe was mine along, it was a long time before I could control my excitement. My eyes were glued to the television as I watched the astronaut slowly moving around on the moon's surface. That was when I saw the astronaut. In his cumbersome spacesuit look down at his wristwatch. The ordinariness of the act left a deep impression on me. Of course, just because someone is on the moon it does not mean that he no longer needs to look at his watch. It was just a maner-of-course, yet a gratifying act. Since then, I have been on a joumey to grasp completely the Omega Speedmaster worn by those astronauts, ajourney which has taken some 10 years. Editor's Note

In producing this work, the editor received assistance from countless people, including Kiyoko Semba in supervising the translation of reference materials, from Hitoshi Hirama in checking the accuracy of technical discussions concerning watches, and from Kazuo Tsuboi, Toshiaki Honda, Tadashi Noda, and Tomoko Kayama, who provided valuable advice conceming materials and the overall composition. The editor herewith expresses his sincere appreciation for all their efforts on his behal£

P10 Chapter 1 -- The Venture into space

The joumey into space began for the United States on May 5, 196i, with the launch of Freedom 7 that carried the first American into space for just 14 minutes and 28 seconds. Now, as the twentieth century comes to an end, we stand on the verge of fulfilling what was once a mere promise of the future. Plans for space activities are no longer dreams or idle talk; now they are measurable and executable, with a reliable track record.

When, in the £uture, people look back on our times, what will command their attention?
P12
We have continuously worked beside the astronauts to create "time". Only the watches haven't changed.
It is strange that the astronauts use the same watches in space that we use on earth. Does this mean space is not the ultimate "hostile environment" we thought it was?
If we knew why it is not "hostile environment," would we then be able to share space?
P14
The hardware for flying into space was ready, but what about flight crews? The answer was simple: military test pilots. If you asked them whether they could fly something, they would always say, "Sure!" They were the natural choice. Who to select was the hard part. By the time orbital craR were able to fly at the required speed and height, the first astronauts had already been selected. The National Aeronautics and Space Administration (NASA) was looking for unmarried male pilots who were less than 40 years of age, less than 5R. 11 inches tall, and in excellent physical condition. Candidates were expected to have graduated from college, or an equivalent engineering training program, have at least 1,500 hours flying time, and be certified jet pilots.
A height restriction was set because the spacecraR interior designed in 1958 for the Mercury project was too cramped for a taller person. The Mercury capsule was only 6 R 3 inches wide at its widest point The body weight limitation was 176 lb Some 508 pilots met selection criteria A review of candidates' military records and health histories narrowed the number to 110.
Of thesel 10, some 69 candidates were able to attend an infommation seminar in Washington about the Mercury project. ARer hearing the presentation, candidates were asked to confirm their interest in applying. Those with continued interest were then given written tests, interviewed, and given medical examinations. This narrowed the number down to 36, and four of these later withdrew
The 32 remaining candidates were sent to the Lovelace Clinic in Albuquerque, New Mexico, for more medical tests. Ultimately, the so-called Original Seven - the first contingent of American astronauts - were chosen.
Their names were announced on April 2, 1959. From that day, the astronauts underwent constant training for the Mercury project mission to put a man into orbit, study his capabilities and responses while in space, and retum him safely to earth.

Three years aRer the Original Seven were chosen, another astronaut selection was made. This team was called the "Next Nine." The 14 astronauts chosen in the next round rated no nickname.

For the Gemini and Apollo projects, the age limit was lowered to 35, and the height restriction was eased to 6 fl.. Both civilians and military personnel could apply. However, they had to have experience flying high-perfommance aircraR.

In additiontoskilledpilotswith long flighthours, by 1964, the spaceprogrunsooghtspecialisBwithadvanceddegrees in natural sciencesormedicine. I;Juno 1965, NASA announced is first six scientist astronauB Although flying experience was not a selection criterion for them, two were already jet piloB, and the other four did not require basic flight instruction.

Air Force piloB did not want to hand over flying to anyone else, and everyone had expected astronauB to come ffom the Air Force. The Air Force set up is own Aeronautics and Space Research Pilot Training School at Edwards Air Force Base to pursue iB own mamned space project. Along with WrightPatterson, Edwards had the Air Force's best test pilots - plus Chuck Yeager. In October 1947, Yeager became the first person to travel faster than sound, breaking the sound barrier in the X-l. He also heldthe AirForce speed record of Mach2.4, set inthe X-IA in December 1953. In 1962, hewas narned head ofthe Aeronautics and Space Research Pilot Training School, just as the Next Nine were being chosen.

Aerospace development advanced in the civilian sector. President Eisenhower had decided that NASA should be headed by a civilian. Defense Secretary Robert McNamara decided to end the Air Force's X-20 project. ARer that, the Air Force put energy into getting iB piloB into the astronaut program. Apparently hoping that all astronauB would be Air Force piloB, Yeager's Pilot Training School was tumed into a virtual NASA astronaut prep school.

Enthusiasm for astronauB cooled aRer the Original Seven, and though it warmed again aRer Apollo 11 1anded on the moon, it never matched the stardom accorded the Original Seven. With the advent of the Space Shuttle, travel between earth and space no longer seems unusual. Few people know who is in orbit at any particular time unless they are particularly interested in scientific experimenB being conducted in space. Space travel has become almost routine. Space travel has led to specific, direct benefits in our improved quality of life. Ours is an era when space is part of regular reality. The spectacular growth in telecommunications and weather forecasting owe a tremendous debt to progress in aerospace.

NASA named the first flight qualified Shuttle orbiter, OV-102, Columbia, a name as evocative for Americans as the Stars and Stripes flag. A single-masted sailing ship active in the era of exploration bore this name, as did the first ship the U.S. Navy built to sail around the world. The command module of Apollo 11, which became famous as the first lunar landing mission, was also named Columbia. Afler Columbia came the Challenger, Discovery, Atlantis, and Endeavour. The Challenger exploded 73 seconds aRer liRoffon January 28, 1986, taking the lives of its seven crew members. "if we are going to die, we at least want to be recognized," Gus Grissom said. "It is worth facing the danger just to put on the space suit." These words came just aRer the Gemini 3 completed its flight, and foreshadowed Grissom's death in Apollo 1.

On the pad, the Saturn V rocket with its Apollo spacecraR appeared enommous and powerful, and its launch generated a fearful force. By the time this seemingly invincible crafl retumed to earth, it was floating in the South Pacific, its charred skin peeling. The two images are worlds apart, but both stand as a time capsule of the twentieth century.

Each time the drogue chute opens as a Shuttle rolls to a stop on Edwards Air Force Base's landing strip,
the images of the Apollo eerily arise -- a reminder that times
are changing.

The all-consuming explosion of power and flames at the Cape Kennedy launch pad shakes the earth and
sends a crafl into space. The astronauts' faces evince neither
excitement nor sentiment, even as they turn a new page in history.
P18
Bom in a Small Swiss Village, Omega Marks the History of Time.
The Speedmaster --- the one and only watch to travel to the moon. Yet Omega did nothing special to
make watches with this loRy reputation. Their regular
watchmaking techniques produced this timepiece that was chosen to fly with the astronauts to the moon.
The source of their pride is the strength of their Swiss
watchmaking tradition.
P21 .
On its way to Mars, the Mariner 10 probe approached Mercury and sent back 18 closeup photographs of
the planet. Interplanetary exploration also provides a chance to
explore new ideas.
P22
The temm "chronograph ;' refers to a timepiece that includes timer functions for recording a time interval without affecting functions for keeping regular time.
Chronographs come in tabletop and wall models and as wristwatches, but all perform the same functions. Also known as "multifunction timepieces" chronographs have
twice as many parts as a conventional movement and require complex technology to assemble them into
an apparatus tiny enough to fit on the wrist. Omega
manufactured the first chronograph movement- the 19 - line CHRO --- in 1898, a wall clock with a
built-in 30-minute timer. A generation or so later, in 1929, the 39
CHRO was brought out. This timepiece was welcomed by those in aircrafr navigation, where accurate
timekeeping is essential, because of its small size It was used by
Amelia Earhart on her equatorial flight, and on the 24 seaplanes led by General Italo Balbo that participated in the first round-trip Rome-Chicago flight. The 28.9
CHRO was manufactured in 1932. As its name suggests, intensive efforts had gone into comprehensive
miniaturization. By reducing the movement to a diameter of
28.9 mm, chronographs finally came offthe wall and onto the wrist. The chronograph's functions are
related to speed. The movements that from the heart of the Omega
Speedmaster are based on the 27 CHRO C12 caliber (Cal.) 321 model, which came out in 1942. The
creator of this 27-mm-diameter machine, which came with 30
minute and 12-hour lapse timers, was the work of master watchmaker Albert Piguet, who worked for
Omega. Resistant to shock and magnetic fields was raised to
18,000 beats per hour. This led directly to the first Speedmaster model in 1957, reference No. CK 2915, which included the Cal.321 movement. "Today there is no self
winding chronograph watch. If you put in an adequate chronograph movement, it makes the watch too
large ar d heavy for practical use as a wristwatch." These words

appeared in a 1957 pamphlet on the first model Speedmaster. Made by Albert Piguet, the Speedmaster
was refered to even within Omega as the "ultimate time
machine." Nevertheless. Speedmaster did not rest on its laurels. It underwent i ts first generational
change with the Cal.861 in 1968. The seif-winding Cal.1040 came out
in 1971. becoming the .Speedmaster Professional Mark 111. In 1973, Omega marked its 125th anniversary by annou繼ing the Speedmaster 125, an of ficially certified
chronograph that offered far greater precision than any ordinary watch. In sum, the manual-winding
movement line inciudes Cal.321, 861, 863, 864, 866, and 867; the
seif-winding movement line includes the 1040, 1041, 1045, 1140, 1150, 1160, and 1155. Adding quartz movements brings the total to 17. Chronographs sold under the
Speedmaster name include those with stainless steel and titanium cases, and gold, platinum, and diamond decorated models. Whatever the mood, the heart of the watch
is a machine born of speed. This is why Omega watches are known proudly as "the chronograph that flies
into space."
P25
TOP-Albert Piguet created the 27 CHRO C12, the heart of the Speedmaster. Claude Bailod designed in its
sense of distinctiveness, and Georges Hartmann created the
phototype giving the Speedmaster its concrete form. Desire Faivre designed the precision tools used to
manufacture the Speedmaster. The manufacture of the
Speedmaster began at the Omega watch plant in January 1957; the watch went on sale in 1958. Four
years later, the Speedmaster entered its space saga.
BOTTOM-This is the movement of the first Omega Speedmaster chronograph. In 1998, Omega will
celebrate the 150~ anniversary of its founding in the small Swiss
town of La Chaux-de-Fonds. The Cal.321, debuted in 1957, was used in the first Speedmaster model,
representing the culmination of a succession of movements,
beginning with the 39 CHRO in 1929, the 28.9 CHRO in 1932, the 33.3 CHRO in 1933, and the 27CHRO C12 in 1942. The watch is eminently useful, with its ability
to mark time in l/5~-second increments and record total elapsed time, include keeping time remaining
in sports events, timing photographic exposure and development,
plant production, car navigation, parking meter operation, and long-distance telephone metering. Thus,
the Speedmaster entered the market due to its chronographic
adaptability to a wide variety of daily

Space remains the ultimate hostile J environment, a place where survival is constantly threatened.
Scientists served as the astronauts'tailors, fashioning space suits that
protected them and provided needed function5. Irtside the thin shells of their ships, astronauts wore the
"protective armor" of their space suits. These suits I look surreal,
but someday will be considered strange due to their quaintness. Enduring exertion and hardship, and by

expending tremendous ingenuity, the astronauts have laid the
groundwork for this coming era.
P28
The historic Apollo 11 moon landing -- mankind's first step on the moon - was the climax of space
program efforts. The "impossible" became possible, and then publ ic
interest waned. Even so, preparations moved on for yet another space showcase to delight the mass
media the Apollo-Soyuz Test proJect In July 1975, American and
Soviet spacecrafl were to dock in space for the first time This dream originated in al 962 protocol between the Soviet Academy of Sciences and NASA. Thirteen years
later, on July 15, 1975, a Soyuz spacecraft was launched from the Baikonur Cosmodrome; seven hours
after, an Apollo spacecraft flew in eager pursuit. The two

cosmonaut Soviet team consisted of commander Alexei Leonov and Valeriy Kubasov. The three-astronaut Apollo crew consisted of Commander Thomas Stafford, Donald Slayton, and Vance Brand. Slayton was one of NASA's Original Seven, and he had been slated to fly on the second manned mission, but was taken offthe

project. This, his first chance in space, came 16 years afler photographers' flashbulbs highlighted his face at the April 1959 press conference at New York's WaldorfAstoria Hotel when his selection was announced. Of all the factors that drove the space program, Slayton was admired for his unceasing enthusiasm and effort.

P29
The seeds of the dream the Americans and Soviets sowed in the 1960s have led to the flowering of the
space age.
P30
On July 15, 1975, Soyuz 19 is launched from the Baikonur Cosmodrome. Apollo is launched in pursuit.
From opposite sides of the docking hatch appear two men, each
wearing the same watch - the Speedmaster.
P31
Speedmaster - the NASA qualified watch in space.
Gemini, Apollo, Soyuz. A Speedmaster from the space program bears only these great names. The
program required enormous expenditures of resources and facilities.
The nation placed space as top priority for a very long time. Despite the dangers of space travel, certain
challenges remained that could not be met without actually
going there. The astronauts, who strove to make space travel safer and more predictable, were definitely pioneer rather than subjects of an experiment. Ongoing,
methodicaL effort eventually yielded results in space not possible on earth. The docking between the
American and Soviet crafts and the two days spent together in the
narrow confines of the two spacecraft opened up new vistas.
P32
After his flight into space in a Mercury capsule, the chimpanzee Ham gets an apple as a reward, and
appears satisfied. The worth of an apple is different, of course,

when the adventurer is unaware of the danger. In pursuing an adventure fully aware of the dangers
involved, humans demonstrate courage and the spirit to advance
without looking back.
P34
The flight certification exam given by NASA to "test" candidaies' endurance and reliability was no piece
of cake. Only the Speedmaster went on running, to the end, as
the timepiece of choioe. The Speedmaster managed to keep up with the pace.
P35
Powerful magnetic fields, shock, vibration, extreme heat, and cold -- these are onLy some of the harsh
condition wristwatches mUst endure. The goal is to improve
chances for survival in an unexplored environment.
P36
The prototype for heat insulation testing has returned to the Swiss city of Bienne, as if all the harsh
trails have been forgotten. The Omega Speedmaster that won flight
certification from NASA now rests on the far side of the glass display case at the Omega Museum.
P37
SPEEDMASTER GO~G THROUGH ENVIRONMENTAL TEST CONDITIONS
How did the Speedmaster win flight certification to withstand the unknown reaches of space? The
Speedmaster was exposed for over 48 hours to a pure oxygen

atmosphere with arelative humidity of 98%, with temperaturesvarying fromanear-boiling93C to a frigid -18C. It underwentteststo simulate avariety of expected conditions in outer space, including shock, acceleration, high and low pressure, vibration, and noise. Logs of its accuracy still remain from those tests. These are extreme conditions for watches for nommal use on earth. The hands would bend, moisture would form within the case, the crystal would break, the winding crown would not move, the stopwatch would not work, and the chronograph functions would be lost.

P39
A cyclone causes tremendous damage on earth, yet it has its own breathtaking beauty. That is why the
reality of the moon revealed by the Apollo project leaves such a
powerful impression.
P41
Although American manned space flight began with the Mercury program orbital flights, it was during
the flight of Gemini 4 that Edward White became the first
American to walk in space. Project Gemini was followed by Project Apollo, and in 1969 Apollo 11 made
the first lunar surface landing. Apollo 15 took along the so
called "moon buggy," and the crew drove it 28 km across the lunar surface. TV pictures of the astronauts hopping around on the moon were extremely entertaining.

They scarcely looked as though they were in a dangerous environment doing important work. Even the task of gathering rock specimens looked enjoyaole. The space suits made for the astronauts consisted of 22 layers of fabric and cost $27,000 each. The space program entailed

dangers that could take a multitude of fomms and prove life-threatening. We need only think back to Apollo 13, which had to call off its scheduled moon landing and urgently retum to earth. Apollo 11 gave us a commemorative watch, but it was on Apollo 13 that the Omega watch really proved itself Perhaps the outcome would have been different if the astronauts had not been wearing Speedmaster watches. P45

In 1903, Orville and Wilbur Wright achieved the first powered, sustained, and controlled airplane flight. The glider precedes the airplane as does the balloon, which dates back to at least 1783. The first balloon crew sent aloft in that year by the Montgolfier brothers in France consisted of a sheep, a rooster, and a duck. Later in the

same year, Jean-Francois Piltre de Rozier and Francois Laurent flew in a Montgolfier balloon, the first persons to experience manned flight. Until then, it was believed that life could not be sustained in the air; hence, this flight had great significance. Most people no longer fear the idea of being airbome, but it took yet another century

to progress frorn the balloon to the airplane. Attempts to master the skies came to a climax with the flight of the Wright Brothers. From then on, it was just another 66 years before man flew to the moon. The space program aroused fears similar to those as did the prospect of balloon flights. Surveyor and other unmanned craft were carefully disinfected to prevent bacteria and other terrestrial microbes from being transported to the moon and affecting data collected there. Similarly, astronauts retuming ffom the moon were forced to spend 21 days isolated in quarantine. Beginning with the crew of Apollo 14, these procedures were streamlined or elimioated. It became apparent that quarantine was an unnecessary measure. The viability of the space program rested on NASA's ability to think of and prepare for worst-case scenarios. Everything the astronauts wore during a flight, from helmets, gloves, chronographs, work suits wom inside the spacecraft, underwear, not to mention their extravehicular activity suits, had to be "flight-qualified by NASA for all manned space missions," which meant they were designed to meet all imaginable situations that

might occur in the forbidding conditions of outer space. Above an altitude of 63,000 feet, space suits must be wom to prevent body fluids ffom boiling away. Space suits used for the Shuttle are pressurized at 4.3 psi, and circulate 100% oxygen. When astronauts leave the spacecraft for periods of extravehicular activity, they must sometimes spend several hours in a pure oxygen environment. Occasionally this causes them to get the "bends~ when nitrogen bubbles fomm in the blood, as also

happens to divers or others who have been in a compressed atmosphere. When the space station opens, suits are pressurized at 8.3 psi, and the length of time astronauts spend in pure oxygen is either shortened or eliminated entirely. Also, space suits must be strong enough to protect astronauts from small-particle meteorites. On earth,

dhe g posphem serves as a filer dhat mitigggs fihe inense rms of sunlight, but in outer space here is m
such filler Surf=es emed low=d fihe s m nse to 12fiC, wh~le
the temperature in the shade drops as low as -156C. To protect against intense sunlight and extreme
temperature changes, while still allowing astronauts to carry out
activities with relative ease, windows in space craft and space suit helmets are covered with a thin
layer of gold. Gold is easy to process, is highly reflective, and blocks

ultraviolet rays and other dangerous radiation. The Apollo program lunar landing modules were also
covered with gold-colored foil based on a precise calculation of the
amount of surface exposed to solar radiation. Flight-qualified items were developed based on scientific
research, and confommed to the principles of crisis management.
Commercial products that emerged from this concept at NASA became known as "spin-offs," and these
products are now a routine part of everyday life. Bar codes are
now used to read product prices at the supemmarket, and they can be printed on envelopes in place of
postal codes. Faced with the necessity to keep track of its
inventories of the millions of components used in spacecraft, NASA developed bar coding. This coding
system made it possible to deliver any component when it was
needed, where it was needed, and in the required number. A range of medical devices now in use,
including heart pacemakers, remote monitoring equipment used in
intensive care wards, and portable medical instruments used in ambulances, were first developed for
use on spacecraft Smoke detectors, which are now required by
building standards, were developed in the early 1970s for use in the Skylab orbiting laboratory. Shock-
absorbing sports shoes are based on technology first developed
for the boots wom by astronauts for moon walks. Some tennis rackets, eyeglasses, and underwire
brassieres make use of shape memory alloys that cam be bent, but
retum to their original shape. Beta fiber, a fire-resistant material developed for use in early
spacecraft cabins filled with pure oxygen, is now used in protective wear for
firefighters. More than 30,000 commercial products, including finished goods and materials, have
"NASA roots." In the era of the space shuttle, NASA has pursued
joint research with private-sector R&D companies. An increasing number of such products is being
used in the fleld of cancer treatment and development of medicines
for use in space. Finally, the one remaining uncertain factor is the human one. It will never be possible
to eliminate this uncertainty entirely, because without humans
there are no projects to pursue and no dreams to fulfill.
P46
TOP--"TO MARK MAN'S CONQUEST OF SPACE "
L. Gordon Cooper, in Mercury-Atlas 9 Faith 7 became the sixth American to ffy into space. The very
first gold Speedmaster issued to commemorate the success of
Apollo 11 was given to President Nixon, and the second to Vice President Agnew. Cooper was originally
to have received Speedmaster No. 8, but received No. 7
instead. The reason was that Virgil "Gus" Grissom, who was to have No. 7, was killed when a fire swept
through the command module of Apollo I. The words "to mark
man's conquest of space with time, through time, on time" are engraved on the back. Cooper used the

watch so much that the gold surface lost its sheen, and bore
innumerable chips and scratches.
BOTTOM--The gold model Speedmaster produced in 1969 to commemorate the Apollo 11 1unar landing.
Ref. NoM45.022, Cal.861. Numbered watches 1-39 were
given to the U.S. president, vice president, and to the astronauts.
P48
The goal of landing on the moon was already part of NASA's plans even before manned space flight got
under way with Project Mercury. The process began with the
flight of the unmanned Pioneer moon probes, which photographed the lunar surface. NASA needed
detailed infommation on the moon's surface, but the first probe only
approached to within 16 km of the surface. The Pioneer series was followed by the unmanned Ranger
series, the seventh and eighth of which transmitted back pictures
of the Sea of Knowledge and the Sea of Tranquillity. Once scientists saw the lunar land fomms and knew
the moon had areas that were suitable for landing on, the next
step was to actually land a craft on the moon. Until it was known whether the moon's surface was hard
or soft, it was impossible to deve[op a lunar landing craft. There
was a limit to the data that could be obtained from photographs, and more specific numerical data was
needed. Scientists were worried that if the surface could not
support the weight of the lander, it would sink below the surface and be lost. The Soviets were sending
probes of their own, and it looked like a race was on to see who
wouLd "touch" the moon first. America launched the Pioneer probe, but things did not go well. The
Soviet Union launched its Luna probe, and it succeeded in being the
first to ;'touch" the moon. From the perspective of the 1950s, the Soviet Union had succeeded in sending
a 1,030-kg object to the moon, whereas the Amencans had
only managed to get a 6-kg object there. So, the U.S. was detemmined to land a man on the moon before
the Soviet Union.
P49
The next step was

P66
In the twentieth century, astronauts flew to the moon and set foot on its surface. What a sense of excitement and pride this brought!
P68
"That is one smaLI step for a man, one giant leap for mankind." With those words, Neil Armstrong
became the f~rst person to set foot on another celestial body. For that
one moment, he had the remarkable experience of being, as one individual human being, all of humankind. No matter how distant the memory of the event becomes,
Apollo 11 undeniably altered the course of history. The achievements of the Omega Speedmaster acquire
still greater significance with the passage oftime, as though

connecting aLI of us with the mystery and chaLlenge of "space."
• P71
The Columbia, after retuming ffom its history making voyage to the moon, now greets visitors to the
Smithsonian Air and Space Museum in Washington, DC. It served
as the command module for the Apollo 11 mission and carried the Eagle to the moon producing the
success of the first lunar landing.
P73
With the whole world watching, on July 20, 1969, the Apollo 11 1unar landing craR, the Eagle, separated from the command module and began its descent. People
worldwide listened in on the exchanges between the controllers on the ground at the noisy Mission
Control Center in Houston and Neil Armstrong in the Lunar Module.
Thev listened regardless whether they could understand or not. It was a moment when all the possibilities of the twentieth century came to fruition in this thrilling
adventure. The enthusiasm cooled off quickly aRer reaching iS peak, but the scientific experiments
were fundamentaLly unrelated to the glitter of the mission. Even
today, when the research results from the Pioneer, Ranger, and Surveyor missions that led to the Apollo moon landing are no longer in the spotlight, the resuLts remain
in the archives of NASA, waiting for verification sometime when needed, their intrinsic value unchanged.
The scientific researeh may one day be valued more than the adventure
P75
Countless tests and training sought to eliminate all ambiguity and error. The Space program's viability
rested on NASA's shoulders. If anything was overlooked, this
puzzle would fail apart. What was indispensable to completing tbis complex task was the spirit of
professionalism.
P77
Apollo 13 was launched on April 11, 1970, at 19:13 GMT (2:13 PM Eastem Standard Time). A total of
55 hours, 55 minutes, and 20 seconds had elapsed since the craft
leR the earth when the voice of command module pilot John Swigert swept into mission control in
Houston when the words, ;'Okay, Houston, we've had a problem
here." That was the start of it all. Eight seconds later, the mission communicator Charles Duke responded, "This is Houston. Say again please." "Houston, we've had a
problem. We've had a main B bus undervolt." Mission commander James Lovell described the situation.
The temperature dropped in oxygen tank No. 2, and 59
seconds aRer the temperature drop started, s sensor indicated a fault. Their hope that it was merely a
failure ofthe monitoring device was dashed when, as lunar landing
module pilot Fred Haise described it, at 55 hours, 56 minutes, 10 seconds into the mission: " There
was the sound of a fairly large explosion, after which waming lights
started flashing. From that I remembered, I thought that there had been an amp spike in main B." The
name of the command module on Apollo 13 was Odyssey. A

possibility was found to retum to earth by circling the moon and going into a free retum orbit, during
which time the crew would use the lunar lander Aquarius as a
lifeboat. The idea was to reduce electric power consumption on the command module as much as
possible. Then just past 24 hours before spalshdown, yet another
problem arose. Unless they altered the flight trajectory, the atmospheric reentry angle would be too
shallow, and the command module would simply skip out into
space. Power had been shut down to the guidance computer, as it was not functioning. The crew could
have to manually adjust the attitude along all X, Y and Z axes.
They would have to ignite the engine at 1 00/O thrust, and shut off after exactly 14 seconds. The problem was the timing. If the time between startup and shutdown was
not exactly 14 seconds, the craRt would not be in the correct horizontal and vertical attitude. Swigert
was designated the timekeepor, and Lovell and Haise focused all
their mental energies on the commands from Swigert to "start" and "stop". The timepiece used to track
the 14 seconds was an Omega Speedmaster in Swigert's hand.
Accurate timing would detemmine whether they would make it back to earth or not. The answer as to
how reliable it was as a chronograph had to wait until the three
giant parachutes appeared before splashdown. People held their breath from the time the heat of reentry cut off radio communication until the parachutes opened. On
April 17, at 1:07:44 PM Eastern Standard Time, the Odyssey splashed down just four miles from the
aircraR carrier USS Iwo Jima. The Speedmaster had done its job.
One of the watches purchased from manned spaceflight was a Speedmaster watch, serial no. CF 55034.
The watch was subjected to rigorous testing. The watch in that
exact form,

Shori Pants \Y orn Inside tbe Shuttle: Except for H~o weigh~ess conditions, in eveV other way the
enviro=~ent inside the Shu~e is just like on eanh, so short pants
are OK.
Shuttle Heat Isolating Tile: Insulating tiles protect the Shutde from the 1,260-degree heat of atmospheric reentry. As light as styrene foam.
P83
It has been said if astronauts were ordered to wear a different watch, they would take a Speedmaster
along as "insurance." That is how much confidence they have in it.
Manually wound wristwatches may seem old fashioned, but even in the era of the Space Shutbe they
command the greatest confidence. Space travelers of the twenty
first century will probably be using the very same watch.
P84
The Kennedy Space Center shrouded in fog. The Launch platform surrounding the Challenger rises
surrealistically above it.
STA-099, OV-99, Challenger - 10 flights, 987 orbits. 69 days in space.

The l l~h flight record of the Challenger stops at 73 second mark
P86 Chapter 2 - HEADING INTO SPACE
"All engines running, ignition sequence startP' The rocket starts to move slowly, as if to pull ffee of its
ice cocoon. "Lift off, lift off." The voice of the controller
resonates and with that, the tension that filled the air is released all at once. Omega Speedmasters have
been a part of more than 100 NASA space missions, reliving
these moments again and again. When humans stepped on the surface of the moon for the first time,
Speedmaster was right there with them. To this day, the rapid
progress of technology has not outpaced Speedmaster in the least. Speedmaster continues to make
journeys into outer space.
P88
19~7 The First Omega Speedmaster

The Omega Speedmaster was created in 1957 as a watch "for the man who demands split-second timing." CK2915 was the reference number given to this memorable first model.

The l/Sth seconds, minute, and hour markings are in white on a black dial. No numerals, just bars. This alone made this much more than a watch for keeping time in daily life; the design conveyed clearly that it was made for tracking real speed. In addition, counters are located at the 3 o'clock, 6 o'-clock, and 9 o'clock positions. These are, respectively, a 30-minute timer, 12-hour timer, and a standard second timer. These timers are linked with the central second hand to display elapsed time.

Tachometer figures are engraved on the bezel. The movement is protected by a triple-shield case to enable it to withstand high pressure. This type of watch case was originally developed for the Seamaster, and according to Omega Ltd. records, this is why the Speedmaster is considered a member of the Seamaster family.

To enable this heavy-duty case to withstand high pressure and water, the Omega technology team added an O-ring. Because of its elasticity, this O-ring is resistant to corrosion and temperature charlges, and resists deformation even when subjected to strong forces over long periods. High temperatures will not affect it either. The properties of O-rings have been well proven through use in submarine hatches and aircraft fuel tanks.

Beginning with the second model, which went on sale in 1959 with reference number CK2998, Speedmaster watches added O-ring gaskets at the push buttons used to operate the chronograph. Protected by this sealed case is the movement known as the 27 CHRO C12, or simply the Cal.321.

The number 27 indicates that the diameter is 27mm, CHRO is an abbreviation of "chronograph", and C
12 indicates that the watch has a 12-hour counter. In other
words, this model was fitted with an elapsed-time dial. This was the smallest chronograph movement in
a wristwatch at the time. The design was created by master
watchmaker Albert Piguet, who worked for Lemania Co., a movement manufacturing company that
participated in the SSIH group (curreotly the SMH group), of which

Ome~a was a core member. Piguet created the movement in 1942. The movement did not become the
Speedmaster right away, however. Style is also necessary for
something to become a superior instrument -- a masterpiece. This is doubly so if the watch is to boast
the professional technology of a chronograph. Omega took 15
years to produce this watch.
hliddle right -- Omega prepared the tools necessary for assembling the Speedmaster and the Speedmaster production line began operations in Omega's plant in
lanuary, 1957. It went on sale the following year. Ever since, the Speedmaster has continued to evolve.
Et has gone through various generations, with changes in the
design of the dial, the shape of the case, and the change in movement from manual winding to selfwinding, quartz, and tuning fork. This does not mean, however, that
when a new movement was developed, the old models were discontinued. Rather, the Speedmaster family
was simply enlarged. Numerous commemorative models
were also produced, because of the strong ties between Speedmaster and America's space program.
Upper picture -- The first Speedmaster model is almost impossible to obtain today. Its most distinctive
feature is the triangular point of the hour hand. This is the same
as the hour hand on the Seamaster diver's watch. The airtight integrity of the case is maintained by the
O-ring. A fine groove is cut into the exterior edge of the case, and
the O-ring is inserted into the groove. The skill of the technology is also exhibited in the movement,
which at the time was the smallest size ever for a hand-wound
chronograph - 27mm. This Speedmaster is a vivid exhibition of the Omega technical team's skill. This
first model is characterized by the lug and the left-right
symmetry of the case. Later models have a projection to act as a guard to the winding knob.
Bottom left -- The orivinal owner's manual that came with the first model. The tachometer engraved in
the bezel is there because this is a watch that not only tells the
time, but can also keep track of elapsed time in seconds.
Bottom right -- When this model was first sold, it came with a pamphlet -- separate from the owner's
manual -- that explained what a chronograph is. Since there was
much conh~sion between chronographs and chronometers, this pamphiet explained the differences.
P90

4.fter Albert Piguet creat&d the heart of the Speedmaster, Claude Baillod became the designer who would impart the Speedmaster with its unique character, and Georges Hartmann created the prototype that gave the Speedmastcr its actual form. It was Desire Faivre that designed the precision machinery necessary for production. Production of the Speedmaster began in January 1957 in Omega's watch plant, and the watches were available in stores in 1958. Beginning the week of July 18 of that year, the Omega sales division launched a special promotional campaign that sought to double the number of chronographs sold. To Omega, the enbre world became a potential Speedmaster market. The campaign, called the "Chronograph Booster," kicked off in Canada. The first advertisement was a half-page ad in Life Magazine, followed by ads in well-

known magazines such as the Life international edition, Life Spanish edition, the Time Atlantic edition, the Time Pacific Edition, and the Time Latin America edition. The Speedmaster name was continuously promoted to the world.

In August, a pamphlet that explained the chronograph functions was included with each chronograph, and the Speedmaster -- the main chronograph product -- was used in the iLlustrations. Apart from promoting its products to aircraR pilots, navigators, engineers, radiologists, scientific researchers, business executives, and sports car drivers, Omega suggested uses for a chronograph in everyday life, such as sporting event spectators checking whether the elapsed time of a match has been measured accurately, confirming the time leR on a parking meter, and timing long-distance phone calls. Very few people understood the difference between a watch or chronometer, which are used for telling the time of day, and a chronograph, which is used for measuring elapsed time. There was considerable confusion in people's minds between a chronometer and a chronograph

A chronometer is rated to a greater degree of accuracy than a conventional watch. If it is to be called a chronometer, it must undergo an examination to verify its accuracy.

As an aside, there are timers which can measure time in 115th of a second,1/lOth of a second, or 100th of a second.

These however, are not devices for telling the time of day, but are only a tool for measuring the duration of a given event, and no more. A chronograph is a special type of watch that combines the functions of telling time with those of a timer. A chronograph requires about twice as many components as a standard watch, and is also known as a "complicated watch " When the Speedmaster was first sold, wristwatch-type chronographs were already available, but none were selfwinding.

The reason for this was that, given the technology that was available at the time, even if chronograph mechanisms were added to a self-winding watch, the watch would become so thick as to be impractical for wearing. In terms ofthe Speedmaster movement, the Cal.861 was created following the Cai.321, and like its predecessor, the 861 too had a manual winding movement. These manual-winding movements attracted interest because oftheir ability to operate continuously for about 36 hours when fully wound. Additionally, the model depicted in the photo on the right-hand page is water resistant to six atmospheres. Shock-protection and antimagnetic resistance were achieved in 1945, three years aRer the 27 CHRO 012, which was itself the core of the Cal .321 movement. The first self-winding Speedmaster

movement was the Cal.1040, launched in 1971, and known as the Speedmaster Mark 111. It has a date window and is characterized by its styling -- the lugs cannot be

seen where the strap attaches to the watch, similar to the Flightmaster.

In the late nineteenth century, when the pocketwatch was the mainstream, Omega was the first company to embark on wristwatch manufacturing. The chronograph movement for the 19 CHRO pocketwatch was completed in 1929. This was followed in 1932 by the 28.9 CHRO and by the 33.3 CHRO in 1933. Through accumulated

know-how and technology, it became possible to make this complicated instrument small enough to strap onto one's wrist.

The year in which Speedmaster was created, 1957, was also the year the eyes of the worid were focused on the Soviet Union~s successful launch of Sputnik, the first artificial satellite. The United States followed suit, attempting to launch their own satellite The results were disappointing. the three-stage Vanguard rocket fauled to leave the launch pad, toppled, and exploded This was on December 6, 1957, and it ended the year on a somber note Research on a rocket that could land on the moon

however, continued on the far off Eniwetok, a coral atoll in the Pacific Ocean As its name Project Farside suggested, the joumey appeared to be a long one. Time
passed without anyone realizing that the Speedmaster watch would one day play an important part in
NASA's space program
Right—Advertising for the "Chronograph Booster' campaign, which sought to make the Speedmaster
name known throughout the world, was launched in 1958. The
North American market was selected as the first target, with the initial advertisements featured in
LIFE Magazine The Canadian market in particular had long
supported Omega watches. When Omega began selling wristwatches in the late nineteenth century,
Canadian soldiers serving in the Beer War attracted early attention
and played a role in the proliferation of the wristwatch An owner's manual with illustrations was
produced in Canada, and considerable effort was put into sales
activities in the country. LIFE Magazine later ran an exclusive article on the first seven astronauts,
leading to increased circulation. Speedmaster advertisements would
also become a regular part of LIFE Magazine,
P91
Europe enjoys a tradition of automobile racing as a sport, such as Fommula 1. Fritz von Opel of Germany had a craze for gliders and sports cars, and incorporated
rockets to machines for propulsion in the pursuit of speed. In 1928 he set a record in Berlin of 200km/hr. The Speedmaster is perfectly suited for a situation in which
one expects intense and extreme thrills, and where time is reckoned in split seconds. In fact, the Speedmaster is valued not only for use with cars, but also for aircraft
navivation, by scientists conducting experiments in research labs, and by engineers. It is useful to
those that require accurate and reliable time measurements in the real
world. Capable of measuring in 1/5th second increments, this chronograph. complete with tachometer,
gives you your money's worth.
P92
1958:The Space Program - Making a Peaceful Contribution to Mankind
On October 1, I9S8, the National Aeronautics and Space Administration (NASA) was officially created
under Administrator T. Keith Glenann. Just one week later,
Project Mercury, with the objectives of "sending a human into orbit, investigating his capabilities and
reactions in outer space, and retuming him safely to earth," was
approved. As a preliminary stage, a squirrel monkey was chosen for conducting experiments. This type
of monkey is commonly used for medical experiments, and was

chosen by NASA because it would be possible to collect data, through implanted electrodes, on how the
environment of space affects the body. The launch, using the
Jupiter, a medium-range ballistic missile, was conducted at Cape Canaveral, Florida. The first monkey
placed in the conical capsule at the head of the missile was
known as Old Reliable. He was followed the next year by Able and Baker. A monkey named Sam flew in an
Atlas rocket (nicknamed Little Joe) to an altitude of 55
mile where he experienced weightlessness.

The Speedmaster was featured in an article in the May, 1958 issue ofthe Horological Journal, a trade publication for the clock and watch industry. The mechanism of the self-winding chronograph had no excess components and was quite durable, attracting attention as soon as it was launched on the market. It was highly praised as a watch that required no special explanations, but could simply be picked up and used by just about anyone.

Ham, a chimpanzee, was shown off at the Cape Canaveral press center. Ham was scheduled to fly as an astronaut in a Mercury Redstone MR at a speed of 5,000 miles/hr in 1961. The suborbital flight was completed without a hitch.

On May 27, l9S9, a rhesus monkey known as Able and a squirrel monkey named Baker were sent up in a medium-range Jupiter rocket. The rocket also carried fruits not for the monkeys, but for an experiment to determine the effects of space on plants.

Able being removed from the life support capsule by a medical technician following flight completion. Her eyes are wide open and she seems to have a somewhat relieved expression on her face. Able died during surgery to remove electrodes to test the effects of weightlessness.
1959:

The Soviet Union referred to its space travelers as cosmonauts, while the U.S. called them astronauts.
The astronauts that were to make the United States' first manned
space flights were seleced on April 2, 1959. Pilots from all of the military services -- Army, Navy, Air Force, and Marines -- were possible candidates. What NASA
wanted were jet pilots under 40 years old who held a college degree in science or similar credentials,
had graduated from test pilot school, and had at least 1500 hours'
fl ight time. Added to this was the requirement that they be no more than 5 feet I I inches tall. The
reason for this was that the space capsules were small, and a man any
larger than this wouldn't fit. From more than 500 candidates, just seven men were selected: M. Scott
Carpenter (Navy), L. Gordon Cooper (Air Force), Virgil "Gus"
Grissom (Air Force), Donald K. "Deke" Slayton (Air Force), John Glenn, Jr. (Marines), Waiter M. Schirra (Navy), and Alan B. Shepard, Jr. (Navy). They became
known as the "Original Seven." In 1962, a second screening, this time for the Gemini and Apollo programs, took place, and nine persons were selected from
approximately 200 candidates. In 1963, 14 astronaut trainees were selected from more than 300 candidates. In 1964, the scientific aspects of the qualifications were
emphasized and six "scicatist astronauts" were selected. An additional 19 scientist astronauts were

added in April, 1966, and 11 more in 1967. To give priority to the Vanguard program, the manned orbital spaceflight project being promoted by the Air Force was ended in 1969, and the seven Air Force astronauts were transferred to NASA. As NASA pushed forward with training of the Original Seven, the Soviet Union had already launched Luna 2. This would be the first man-made object to impact with the moon. Later, Luna 3 would succeed in photographing the previously unseen far side of the moon.

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Right -- Ham, inside a Mercury Redstone launched from Cape Canaveral. His frantic expression was photographed with a 16mm automatic camera located in the capsule.

Left -- Baker, posing with a model of a U.S. Army Jupiter medium-range ballistic missile. Baker was used as an animal astronaut to collect data during the preliminary stages of the Mercury program. NASA was extremely cautious and consistently repeated these experiments. This meticulous planning and testing continued unchanged through the Gemini program, the Apollo program, and all of the later space exploration programs.

Although this may at times seem excessive, or even absurd, one must not make light of precious lives and the risk of these missions. The Omega Speedmaster also underwent rigorous quality tests, in line with NASA's strict policies.

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Test pilot Captain Joe Engle is greeted by his family after setting an altitude record of 53.4 miles. The North American X-15, in service from 1959 to 1967,flew at extreme altitudes, reaching the limits of the atmosphere at the fringes of outer Space.

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The Beginning of the Supersonic Era; The Aircraft That Glirnpsed Outer Space

Second World War hero Chuck Yeager broke the sound barrier in 1947. The X-l he flew in was a rocket plane manufactured by Bell under contract to the Air Force. In contract to the X-1 series, the Navy conducted experiments using jet aircraft manufactured by Douglas Corp. In 1959, a North American X-15 was released from the underside of a B-29 and achieved free flight. By the time the project was completed in 1967, the X-15 reached a maximum speed of Mach 6.7 and flew beyond the ionosphere to the outer ffinges of earth's atmosphere. Here were pilots crossing the very borders of outer space in their aircraft. The U.S. military recognizes all pilots who fly at an altitude of 80km or higher as astronauts. With the introduction ofthe North American F-100 Super Saber, horizontal supersonic flight became areality.

Supersonic aircraft were used as fighter planes in the Vietnam War. Research on supersonic test planes during the 1940s and 50s was to later contribute to the design of the Space Shuttle.

Top left first--The Bell X-1 SuperSonic has a rocket engine. On October 14, 1947, Chuck Yeager broke the sound barrier, reaching a speed of Mach 1.06, in a plane he
named Glamorous after his wife. The flight was made at Muroc Air Force Base in Califomia.
Top leftsecond—ABell X-2 SuperSonic undergoing inspection atEdwards AirForce Base afterflight(l955). Itwas launched from the underside of a modified B-29.
Below is the Eockheed X-7, an unmanned experimental ramjet.

Bottom left -- Air Force Captain Chuck Yeager made the magnificent accomplishment of being the f rst to break the sound barrier. His record and his beloved A-2 flight jacket remind us of the era of the last heroes of the air, before the world shiftcd into the space age. Second column from right—From top: the Northrop X-21A, a larninar flow-contrcl aircraft made in 1963.

The North American X-10. The design is characterized by the delta wings and tail.
The Douglas X-3 Flying Stiletto. This was the first turbojet aircraR in the X series.
The North American X-15.
The Bell X-5, followed by the X-24B. Both are experimental rocket aircraft.
First column from right - From top: Ryan Aeronautical X-13 "Vertijet." It takes offand lands vertically.
The Lockheed X-17 was as tall as a four-story building. This photo was taken at Cape Canaveral in
1955.
The Northrop X-4 Star Performer. This aircraft was piloted by Charles Tucker, who made repeated
flights to determine the flight characteristics of subsonic flight.

Attention was focused on the tail, which had only a vertical stabilizer and a rudder. The North American F-100 Super Saber. P96 1961-The Start of the Mercury Program; The Speedmaster Goes into Space

•5 Mav 1961 Mercury- Redstone 3 Freedom 7 Alan B. Shepard, Jr. 21 July 1961 Mercury-Redstone 4 Liberty Bell 1 Virgil 1. Grissom

•20 February 1962 Mercury-Atlas 6 Friendship 7 John H. Glenn, Ir. 24 May 1962 Mercury-Atlas 7 Aurora 7 M. Scott Carpenter 3 October 1962 Mercury-Atlas 8 Sigma 7 Waiter M. Schirra Jr.

• 15-16 May 1963 Mercury-Atlas 9 Faith 7 L Gordon Cooper

The Soviet Union launched Vostok I ("vostok" meaning "east") on April 12. The first human to fly in
outer space was 27-year-old cosmonaut Yuri Gagarin. He was
in space for one hour 48 minutes and orbited the earth once. Upon hearing this news, President Kennedy spent nnuch of the following week in conferences at the White
House. deliberating on how the U.S. could make up ground lost to the Soviet Union. To determine if the
proposed plan was feasible and acceptable to the people,
Kennedy sent a five-point memo to Vice President Johnson, who was chairman of the space committee.
America's chagrin is expressed through the directness of the
questions.
I. Do we have a chance of beating the Soviets by putting a laboratory in space, or by a trip round the
moon, or by a rocket to land on the moon, or by a rocket to go to

the moon and back with a man. Is there any other space program which promises dramatic results in
which we could win?
2. How much additional would it cost?
3. Are we working 24 hours a day on existing programs. If not, why not? If not, will you make recommendations to me as to how work can be speeded up?
4. In building large boosters should we put our emphasis on nuclear, chemical or liquid fuel, or a combination of these?
5. Are we making maximum efforts? Are we achieving necessary results?

On May 5, about one month after Vostok 1, Alan B. Shepard, Jr. became America's first astronaut. The flight Shepard took in the Freedom 7 capsule lasted a mere 15 minutes 22 seconds. The Mercury program had moved from the drawing board to the launch pad, but the U.S. was still behind in the space race.

The president received the answers to his questions. The conclusion reached by the space committee was that the U.S. would land a man on the moon in 1966 or 1967. This was considered a necessary project if the U.S. was to take the lead in outer space. After receiving these proposals, Kennedy made his famous State of the Union Address of May 25:

"First, l believe that this nation should commit itself to achieYing the goal, before this decade is out, of landing a man on the moon and returning him safely to the earthY'

In terms of budget, the Apollo program reached its peak in 1965. The number of specialists involved in the project reached 500,000. This number of people all working on a single project is quite a feat, especially given that among those 500,000, those that would actually go to the moon could almost be counted on the fingers of both hands; there were only a dozen of them. People worked enthusiastically day and night precisely because the space program was highly significant to America at this time, and because it gave people something to aspire to. Following Shepard in May, Gus Grissom flew in the Liberty Bell 7.

The purpose of Project Mercury was to determine if the astronauts could operate the capsule manualIy under weightless conditions. When six astronauts had given ample demonstration that this was possible, the Project Gemini, which involved a two-person capsule, began. A plan was then created for extravehicular activity, as well as a plan for dockinv two spacecrafl together. Next was the Apollo program, which had not only extravehicular activity as its ob~ective, but also sought the title of "mankind's first" by landmg on the surface of the moon and conducting surveys there.

This was the most ambitious plan yet. The year 1961, when America began space exp]oration, was also an important year for Omega, although no one at the time knew this, least of all Omega.

Speedmaster's relationship with outer space began when NASA's flight equipment buyer went to Corrigan's watch shop in Texas to purchase a chronograph. This was in 1961. At that time, the NASA flight equipment buyer purchased five chronographs, all of different brands, including the Omega Speedmaster. The intended use for the chronographs was not made clear. What brought the NASA equipment buyer to a jeweler's on a Texas street comer was most likely none other than President Kennedy's speech.

The Mercury astronauts wore wristwatches as backups to the capsule clock. What make of watch was used, however. was lefl to each astronaut. The first astronaut to use a Speedmaster

was Waiter Schirra, who new into space in Sigma 7. L. Gordon Cooper flew with two watches -- a Speedmaster and a Bulova Accutron Astronaut.

The Gemini and Apollo astronauts were to engage in extravehicular activit,v. The selection of a watch that could be used even outside the space capsule could not be leR to the astronauts. It was essential to find a chronograph that could measure elapsed time in split-seconds and was tough enough to stand up to outer space. A seltwinding watch was acceptable, but it had to have a movement that was capable of manual winding, because the rotor that winds a self-winding watch would not rotate suff~ciently in space.

The Omega Speedmaster had finally made its way to NASA. This did not mean, however, that it would also find its way directly to outer space. It was some time before it was confirrned that the Speedmaster had the qualifications to ny in outer space. There were a number of hurdles to overcome.

It was discovered that one of the Original Seven, DonaLd K. Slayton, had an irregular heartbeat, so he
was dropped from Project Mercury. He had, however, logged
6,250 hours of flight time, of which 4,075 was in jet aircraft. He was not the type of man to give up so
easily. He continued to believe in the possibilities, and continued
the flight training. His name is listed among the crew of the 1975 Apollo- Soyuz test project. His name
was not included in any of the flight crew rolls in the long period
prior to that, but numerous documents with his signature have been preserved in the NASA archives.
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Left—"While written records on the history of the purchase of the first Omega Speedmaster watch by
NASA are sketchy, personal interviews indicate that it was
purchased from Corrigan's Jewelr,v located in Houston. Corrigan's opened in Texas in 1914 just afler
the outbmak of the First World War. It is believed that NASA
person msponsible for buying crew equipment for space flight purchased the first Omega Speedmaster
from this store, no NASA records can definitely confirm such a
purchase. Corrigan's present manager, l~fr. Hayden Kaye and a8sistant manager Mr. Reuben A. Guerrero have both heard this story before and believe it is true."
Right—'Mr. Leon Davis (circled in the photograph) was manager of the Corrigan's store in the 1 960's.
It is thought that he was the one who actually assisted the NASA
representative in the purchase of the Omega Speedmaster. Them was another Corrigan's store located
near the Johnson Space Center (Manned SpacecraR Center then)
at that time and Mr. Davis was also in charge of that location. Corrigan's has since moved to a iocation in
the heart ofthe city of Houston"
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1962—NASA's Troubles Begin; Timing in Seconds Becomes Key
Left top pieture -- The Speedmaster watch that left the Omega production line on November 15, 1961
was worn on Waiter Schirra's wrist on October 3, 1962 when he

orbited the earth six times. This is the second Speedmaster model. The hands wem changed to alpha
hands. The heart of the chronograph, the caliber, is the same 321.

The reference number is CK2998. Following its birth in 1957, the Speedmaster, which was made to
thrive in a high-speed world, finally found the ultimate working
conditions it was made for.
Left middle picture - Afler orbiting the earth six times in the Mercury-Atlas 8 Sigma 7 spacecrafl, Waiter Schina splashed down in the sea off Midway and was lifled
onto the deck of a waiting U.S. warship. Schina exited the spacecraft by blasting open the escape hatch.
Center picture—NASA used the Omega Speedmaster found in the window of a high-class jewelry store in
Texas. When he went into outer space, the Speedmaster
that astronaut Schirra wore was exac'dy as it was when bought from the Texas street comer shop. After
the watch lefl Switzerland in 1961, it came back to the Omega
Museum via outer space, a witness to the space program.
Bottom picture—Sigma 7 splashed down about 480km northeast of the Midway Islands as the USS
Kearsarge waited. A motorized whaleboat pulled up alongside the
capsule, and frogmen attached a helicopter hoist to the capsule The capsule was then transported to the
deck ofthe Kearsarge, and the astronaut exited the capsule by
detonating explosives installed in the hatch, thus once again breathing the air of earth

In May 1962, M. Scott Carpenter flew in space, followed by Waiter Schina in October, finishing the year with three people having orbited the earth. Compared to the previous ballistic flights, which lasted minutes, these flights lasted hours, making a major leap forward. In May of the following year, L. Gordon Cooper became the sixth astronaut to travel in outer space, and this concluded the Mercury program of manned flight experiments. Cooper, the last Mercury astronaut, was in outer space for 34 hours -- more than a day.

At the same time, the tasks that the astronauts had to perfomn in the spacecrafl became more numerous and complicated: observe the sunrise on each orbit around the earth; pilot the spacecraft while navigating, using the tenminator line between day and night or the stars as guides; take out a Hasselblad camera and photograph the earth through the window, while sitting in the cramped capsule; create a record of observations of the night sky.

Balloons attached to the spacecrafl were painted different colors to determine the reflective properties of each color. To carry out a space rendezvous, which was planned for the near future, it was necessary to determine which colors had the highest visibility in outer space. The astronauss also conducted scientific experimens such as observing the capillary effect of liquids under zero gravity.

As flight times increased in length, so too did the number of problems increase. During Carpenter's flight, a failure in the altitude control jet occurred which wasted precious fuel. As a result of this failure, Carpenter had to switch offthe spacecraft navigation system to save energy for his return.

There were also problems with the automatic attitude control system, and immediately prior to reentering the atmosphere Carpenter had to adjust the spacecraft's attitude using the horizontal line of his spacecrafl's viewport as a level. The procedures for prior verification, however, did not anticipate these sors of circumstances.

NASA would never go through an actual procedure without preparation. Standard operating procedure was to conduct repeated tess on the ground, and go for the real thing only afler procedures were established. During the Apollo 13 incident, the same procedure was used to adjust the spacecrafl attitude as Carpenter used in his Mercury mission. Cmdr. Jim Lovell was thus able to use the procedure that Scott Carpenter had previously discovered and verified.

During Schirra's flight, a problem occurred with the spacesuit. An "adhesive valve" containing coolant dried cut, and the temperature began to rise. If the suit's temperature had continued to rise, the mission would have had to be cut short. As Schirra was waiting for the launch on October 3, 1962, President Kennedy was making a speech, saying that "The United States is in the lead in outer space.

Thirty hours into Gordon Cooper's mission, the altimeter stopped working. The cause was a short circuit. Cooper recollecS that the resulting power failure, "Rendered all relays and automated sequences useless. The Omega watch became even more important since all of these functions, sta~ting with retro fire, had to be done manuaily -- exactly on time. "

These men, all of whom had test pilot experience, were the picture of calm and composure when conffonted by a problem. Their only words at times like this were, "Something has gone slightly wrong," a perfect example of the kind of understatement common among test pilos

- Unable to leave their pressurized capsules, it seemed as if there would be no end to problems
requiring immediate solutions by the astronauts and the Omega

Speedmaster in outer space. P99 Left- A great number of people invested a lot of work and technological ability in the launching of the Mercury-Atlas 8. As preparations for the launch continued Walter Schirra, who was selected as the fiflh astronaut, chose the Greek leuer Sigma as the name of the spacecraft he was to ride in. This symbol signifies the sum of everything, the grand total. This was an appropriate name for a spaceflight that was the sum total of the efforts of numerous people who got no mention. Right - The tasks given to Schirra were to determine the operability of the Mercury spacecrafl, and to ascertain, from a technological standpoint, the extent that hurnans and machines can exhibit their potential in outer space. To achieve these ends, flight procedures and emergency training were repeated over and over in a dummy capsule, in preparation for the real thing. The result of these efforts was a 9 hour, 13 minute, 11 second Right of six orbits on October 3, 1962. When debriefed, Schirra stated that it was a "textbook flight." P100 1963 Flight Experience Steadily Accumulated; Confidence in Omega Increases Top -- Under the Mercury program of manned space ffights, six persons made flighs, and the program approached its completion date. Chief among these flighs, the MercuryAtlas 9 mission by L. Gordon Cooper showed that astronaus could handle long periods in space. As the length of a mission increased, however,~so did the potential for problems to occur. The importance of the wristwatch became apparent when problems occurred in the Mercury electrical system. The time for the Omega Speedmaster to break out of is backup role was near. Center -- L. Gordon Cooper, who rode on the Mercury-Atlas 9 Faith 7, went into space wearing two wristwatches. One was a hand-wound Omega Speedmaster chronograph and the other was a Bulova Accutron Astronaut with a 24-hour bezel. Bottom -- Faith 7, which made the lastMercury flight, set aflightrecord of 34 hours 19 minutes and 49 seconds on May 15 and

16,1963. Cooper, in the last Mercury mission, completed 22 orbits to evaluate the effecs of one day in space. P101

The Mercury capsule is extremely small. AstronauS can enter it only by holding onto a support bar and forcing their bodies in. The capsule is so small, in fact, that during the astronaut selection, a height limitation of 5 feet 11 inches was imposed. The silver space suis that tbe astronauts wore were a modified version of pressure suis developed by the U.S. Navy for ultra-high altitude jet fl ighs. The suits were made of nylon with several layers of aluminum coating on the exterior; the interiors were made of neoprene rubber. The suis were not comfortable, but since there was no room to move around in the capsule, there were no complains. Under the Gemini program, research was conducted, focusing on ease of movement and making reference to research on flight suis conducted by the U.S. Air Force.

L. Gordon Cooper's letter, which starts, "This stainless steel Omega Speedmaster was worn by me on my
flight in Mercury 9 on 15, 16 May 1963." Cooper kept his
treasured Speedmaster in a Bulova watch box for safekeeping.
P102
1964 Chronograph Procurement Starts; A Watch Required for Space
Center -- A procurement order for astronaut-use chronographs addressed to John E. fones ofthe Procurement and Contracs Division. The letter direcs the division to
purchase 12 chronographs, as well as 12 adJustable watch straps manufactured by the J.B. Champion
Company. The deadline was October 21, 1964. The tess to
deterrnine if the watches met the qualifications for space flight began on that day. The rigorous tess
proved to be survival matches for the watches, as it was diff~cult for
them to maintain even their basic time-telling functions.
Right -- Within the NASA organization is the Flight Crew Operations Directorate. This directorate was
responsible for many aspecs of the mission, including the
purchasing of equipment to be used by the individual astronauts. Working as deputy director was Donald
Slayton, one of the initially selected astronauts.

By the time Project Mercury was completed the previous year, the Gemini and Apollo programs had already received the go-ahead. President Kennedy had declared that a man would be sent to the moon before the decade was out. For NASA, which had been told that it should be possible in 1966 or 1967, there was no time to waste. One of Slayton's tasks was to procure chronographs for the astronaus to use. In a letter dated Sept. 21, I964, Slayton wrote: "A requirement exists for a highly durable and accurate chronograph ... for accomplishing time-critical operational and experimental tasks." He indicated that it~was important that the chronographs that meet NASA evaluation criteria would be selected from producSs on the market and that it be easy to obtain the required number quickly, so in principle, "offthe-shelf items"

were to be tested under conditions similar to those of the actual Gemini environment. The race to become ~e watch that obtained NAS4~ flight certification to go into space began here.

Bottom right-One-man Two-man Three-man capsule: I.5ton capsule: 3.5ton capsule: 38ton

The rockeS used to launch spacecrafl got their start ffom the ballistic missile development conducted at

the end of the Second World War. The capsule that the
astronauS ride in is located at the head of the rocket. The Mercury capsule was qulte small at just 3m in
height, and even the Apollo capsule, which accommodated
three people, was only 3.6m high.
P103
Gemini I was launched in April 1964, but this portion of the spacecraR is an unmanned "flight mock-
up." The purpose of this first flight was to check the structure and
comfort of the spacecraR, and to determine the power of the Titan 11, the rocket that would carry
Gemini into orbit. Gemini 11 was also unmanned. There were 10
manned fighS, starting with Gemini 111 on March 23, 1965, and continuing until the Gemini Xll mission ffom November I I to 15, 1966. The exterior appearance of
the spacecraf was very similar to the Mercury, as can be seen ffom the two capsules in the photograph
below. The Gemini, however, had a service module that was not
present on the Mercury. The white, skirt-like portion seen on the flight mock-up in the center photo is
the service module. Furthermore, the Gemini did not have an
emergency escape tower as the Mercury did, because there were plans for docking experimenS. In an
emergency, the astronauSs would use an ejection seat. The upper
left photo is of a mock-up designed to test this function. Several other mock-ups were also manufactured, and numerous tests were conducted repeatedly
P104
1964 Start of Gemini and Apollo Programs A Watch Reliable Even in Outer Space

The U.S. space programs began at a very slow pace. They picked up speed, however, once it was established that even in weightless conditions astronauS could operate a spacecraR in outer space similarly to an aircraR. The second and third groups of astronauS had already been selected, and all were undergoing daily training.

Development of the spacecraft, and the rockets that launched them, was also making progress. One notable task yet to be completed was selection of the chronographs the astronauS would use. Donald K. Slayton, head of the Flight Crew Operations Directorate, took action to select the chronographs.

For fighS in the Gemini program, the astronauS would not remain inside the spacecraR, but would "space walk" ouside the craft. In the search for a chronograph that would withstand an environment that had never been experienced before, the watches were subjected to rigorous testing. NASA records on the selection process for the chronograph reveals the path the Speedmaster took on its joumey to become the offcial watch for wearing in outer space.

Attached to a letter Slayton wrote concerning chronographs for the flight crew was a list of chronograph manufacturing companies from whom quotations would be requested. Included in the list were Elgin, Benrus, Hamilton, Mido, Luchin Piccard, Omega, Bulova, Rolex, Longines, and Gruen. Of these, only three were selected for the comparative evaluation testing: Longines'Omega, and Rolex.

P105
. Watches in the Qualification Tests

Maker Part No.
Longines CF55032
Omega CF55033
Rolex CF55034

Top -- According to the Specification Guidelines for the chronographs for which estimates were requested, an error of +-5 seconds in 24 hours was unacceptable, and an error of a white or black dial was acceptable. The watch case had to be made of stainless steel with satin finish, and the watch had to have a chronograph seconds timer with 12-hour and 30-minute elapsed time dials. The movement could be electric, manual-winding, of self-winding, but a watch that could not also be wound by hand was unacceptable. This last specification was to be expected of a chronograph that would be used in a zero-gravity environment as the self-winding rotor operates on a pendulum principle that can only work in gravity. The worksheet contains provisions conceming the various test environments. The members of the Gemini III mission flight crew would be issued one of the chronographs that passed these tesS. Bottom - The first flight in the Gemini prograrn was scheduled for March 23, 1965. The crew was Gus Grissom and John Young. The chronograph to be used by the crew was categorized as type one, which also included crew articles such as cameras, and a request was made by the SpacecraR Operations Branch to conduct evaluations of equipment based on comparative quality tests. The tests were to be completed by January 31. Item 11 on the Project Work Sheet Listed the item numbers for three wrist watches: CFiS032 (Longines), CF55033 (Omega), and CF55034 (Rolex). There were 12 items in the list, including a Hasselblad camera. They were all tested under the same conditions, but the chronographs were tested to harsher tests, including saLt water spray and soaking tests. The tesS were so severe that Bulova later complained that they were meaningless. P106 1965 Rigorous NASA Watch Environment Tests

1. High Temperature

The intemal temperature ofthe chamber shall be raised to 160"F +- 4% and kept at a temperature for 48 +.1, -O hours. The chamber pressure shaLI be maiotained at 5.5 +-.4 psia. anu the relative humidity shall not be more than 15% during this time. The iemperature shall then be returned to that of standard room conditions and the test item shall be operated and inspected. The test shall be repeated with these two conditions changed. temperature 200"F +- 4"F and time,.5 +.1, -O hours. The item shall again be operated and inspected. 2. Low Temperature

The chamber temperature shall be brought down to O"F +- 4"F and maintained at that temperature for a period of 4 +.1, -O hours. The temperature shall then be brought up to standard conditions and operated and inspected. 3. Temperature-Pressure

The chamber pressure shall be a maximum of 1.47x 10-5 psia and the temperature shall be raised to 160"F + 4"F. The chamber temperature shall then be lowered to O"F - 4"F in 45 +5, -O minutes and raised again to 1600F + 4"F in 45 +5, -O minutes to constitute one cycle. Fifteen more cycles shall be completed. The pressure and temperature shalL then be retumed to room conditions and the item operated and inspected. 4. Relative Humidity

The test chamber shall be vented to the atmosphere to prevent the buildup of pressure. Prior to starting of the test period, the chamber temperature shall be between 68"F and 100"F with uncontrolled humidity. During the first two hour period, the temperature shall be gradually raised to 160"F - 40F. This temperature shall be maintained during the next six hour period. The velocity of the air throughout the test area shall not exceed 150 feet per minute. During the following 16 hour + i, -O period, the temperature in the chamber shaLI be gradually reduced to a temperature between 680F and 100"F. This shall constitute one cycle. The relative humidity

throughout the cycle shall be 95% +5, -O steam or distilled water having a ph value between 6.5 and 7.5 at 77"F ~ 4"F shall be used to obtain the desired humidity. The cycleshall be repeated asuff~cientnumberoftimes to extend the total time ofthe testto 240 hours +.1, -O (10 cycles). Atthe conclusion ofthe240 hourperiod, the equipment shall be retumed to standard conditions. Moisture shaLI be removed by air blast, and the item shall be operated and inspected. Note: the watches, Part Nos. CF55032, CF55033, and CF55034, shall be removed from the humidity chamber every 24 hours during the ambient temperature phase of the cycle for this test. Testing in accordance with the enclosed written instructions should be perfommed during this time. 5. Oxygen Atmosphere

The test item shall be placed in an atmosphere of L00% +0,-10 oxygen. The ambient pressure shall be maintained at 5.5 ~ .4 psia. The equipment shall not be operational throughout the 48 +.1, -O hour duration of the test. Perfommance outside specification tolerance, visible burring, creation of toxic gases, obnoxious odors, or dererioration of se~s or lubricanm during bhe test shall constitum hdlure to pms this test, During dhis test the ambient temperature sh dl be mainb ined at 1 60'F f 4~F

6. Shock

All shock tests shall be 48 g's + 2 g's and of 11 +i millisecond duration. Tbe equipment shall be landing impact shocks, one in each of six directions. Longitudinal and lateral shocks shall not act simultaneously. 7. Acceleration

Equipment shall be subjected to the test determined to be most stringent of those applicable to the equipment. Equipment shall be tested in each axis separately unless specified otherwise. The equipment shall be accelerated along axis parallel to the longitudinal spacecraft axis, increasing linearly from I g to 7.25 g + .5 g in 333 seconds ~ 5 seconds. The equipmentshall be acceleratedwith al5.7 g +.5 g resultantacceleration (15 g longitudinal and4.5 g lateral) for30+ 2 seconds in each direction along each axis ofthe two lateral axes at the 16.7" ~ .3" resultant angle. Operation during test is not required. When the axis parallel to the longitudinal spacecraft axis is not defined, equipment shall be subjected to the maximum prescribed acceleration along each of the three mutually perpendicular axes. 8. Decompression

The equipment shall be placed in a charnber and the pressure reduced to a maximum of I.47 x105 psia. The charnber shall be raised to a temperature of 160"F ~ 4"F andkeptatthattemperature for 1.5 +.1, O hours, and withthe chambertemperature at200"F f4"F for.5 +.1, O hours with zero flow through the cold plates when used during the .5 +.1, -O hour test. Temperatures are average test chamber wall temperatures. The equipment shall be operated and inspected after the final test. 9. High Pressure

Devices under test are placed at a pressure of 23.5 + 5% psia for at least one hour. Items must not become crushed, distorted, or have cracked seals. Any damage that may occur must not hinder proper operation, reduce service life, or degrade ease of use. This high-pressure testing is to be followed by another process to check the items are operating properly. 10.Vibration

In the vibration test, devices are subjected to sinusoidal vibrations and random vibrations for examination purposes. If, after the test is completed, a given device does not function properly, or if mechanical or structural defects are identified, it is considered as having failed the test l l.Acoustic noise test

Test duration is 30 minutes. The watch is exposed to acoustic noise for about 10 minutes in the three

vertical directions to which it is most vulnerable to such noise.
Bottom -- The J B. Champion watch bracelets, which Donald K. Slayton requested be procured with the
chronographs, contain the IB logo on the clasp. The cost for 12
braceles was 5120. Later, a request was made to make them longer so they could be put on easily over
the astronauts' space suits.
This Omega Speedmaster was given item number CF55033 and subjected to tests in the environment
that NASA anticipated it would encounter in outer space Afler
subjection to dozens of hours of rigorous tests. the watch did run slower and faster at times. But never
stopped.
P107
As perSlayton's request, the chronographs arrived atthe Houston FlightCrew Operations by October21.
Ofthe 10 companies originally proposed, testingwas
narrowed down to Longines, Omega, and Rolex watches. Using various equipment to simulate the outer
space environment, the watches were subjected to thorough
testing. The test categories were high temperature, low temperature, temperature-pressure, relative
humidity, 3xygen atmosphere, shock, acceleration, 3ecompression,
high pressure. vibration, and acoustic noise. Detailed data was collected on how the watches would be
affected in these environments. Chamber capable of simulating
the temperature environment at altitudes up to 360,000 feet (108km), between -100"F to t500~F (-73"C to +280"0) (top left). Pressure chamber with a pressures range
up to 1.6 atmospheres (top right). The watches were checked before and after each test and 48 hours
after tests to check for slow or fast running. The conditions for
winding the watches were also determined. Tests were temminated if the watch stopped and would not
restart, if the crystal cracked, or if the winding or push button
stems broke. For watches that failed the tests, the chance to go into space were forever lost.
P108
1965 The Watch that Endured all NASA's Tests
•23 March 1965 Gemini 111 Virgil I. Grissom, John W. Young
March 23, 1965, 09:24 hours, Eastem Standard Time. Gemini 111, with two astronauts, was launched
from launch pad 19 into clear skies. The spacecraft was scheduled
to orbit the earth at altitudes ranging from 160krn to 224km. A rendezvous, docking, and a space walk
were planned for this mission, the first that involved two
astronauts.
3-7 lune 1965 Gemini IV James A. McDivitt, Edward H. White 11

A letter, dated March I, 1965, and entitled "FIight crew chronographs," arrived at the Spacecrafl Operations Branch. It discussed the results of the operational and environmental tests for selecting a chronograph for use in the Gemini program, which Slayton had requested the previous September.

The launch of Gemini III with Virgil 1. Grissom and John W. Young was scheduled for March 23, just three weeks later. Including the backup crew member, the three-member Gemini crew, had already been supplied with Omega Speedmasters. ARer reading the report knowing how severe and how long the tests were run, it seems mere luck that even one watch made it through the tests. The Omega Speedmaster "gained 21 minutes during the Decompression Test and lost 15 minutes during the Acceleration Test. The luminescence on the dial was lost during the testing." The Rolex, however, "stopped running on two occasions during the relative humidity test and subsequently failed during the high temperature test, when the sweep second hand warped and pressed against the other hands. No further tests were run with the Rolex chronographsJ' Concerning the Longines Wittnauer, "the crystal warped and disengaged during the high temperature test. The same fault occurred on a second Longines Wittnauer during the decompression test. No fiurther tests were run with the Longines Wittnauer chronographs." It was only the Omega Speedmaster that could boast "at the conclusion of all testing the Omega chronograph perfommed satisfactorily." The results of the astronaut-use evaluations also unanimously found the Omega chronograph to be superior because of its better precision, Ieliability, legibility, and ease of use.

A number of improvements to the Speedmaster were suggested to improve its usefulness as flight equipment, including replacing the fixed outer dial (bezel) with a rotatable dial calibrated with 24hour increments and the addition of luminous markings to the elapsed time dials. None of these improvements, however, was implemented.

The test results were delivered just in time for the Gemini Ill launching. An order was immediately
issued to purchase five Omega chronographs on the open market.
Including these five, NASA owned a total of eight Speedmasters at this time.
P109
The frrstAmerican space walk took place during the Gemini IV mission. Connecting Edward H. White to
the spacecraft was a 7.5m, gold-coated lifeline. The helmet
also had a visor covered with a very thin gold film. As objects in outer space are subjects directly to the
powerful light and ultraviolet rays of the sun, gold foil is used to
block their harrnful effects. The temperature of an object exposed to the sun rises to 120"C, but in the
shade the temperature immediately drops below zero. Astronaut
White donned a space suit especially made for walking in space and spent 22 minutes outside the
spaceship in an environment unimaginable on earth. The Omega
Speedmaster on his left wrist kept time during the period, fully exposed to the severe outer-space
environment.
Pl I0
1516S Letter of Acceptance Delivered to Speedmaster
•21-29 August 1965
Gemini V L, Gordon Cooper, Jr., Charles Conrad, Jr.,
The Gemini V mission lasted seven days, 22 hours, 55 minutes and 14 seconds, and orbited the earth
120 times. The USS Lake Champlain was used as the first
recovery ship. In preparation for future rendezvous flights, the astronauts conducted experiments
using a fuel cell as a power source.

15-16 December 1965 Gemini Vl Waiter M. Schirra, Jr., Thomas P, Stafford
In this one-dav, 51-minute, 24-second flight, Gemini Vl rendezvoused with the previously launched
Gemini Vll. During their five-hour rendezvous, the first ever in
space, the spacecraft were separated by a distance of between 30cm and 90m.
•4-18 December 1965
Gemini Vll Frank Bem an, James A Lovell, Jr |

The Gemini Vll mission was 13 days, 18 hours, 35 minutes, and I second long, seKing a record for the longest mission to date. It estabEished that humans can work and spend time in outer space. Playing the part of the Agena target vehicle, Gemini Vll rendezvoused with Gemini Vl.

Virgil 1. Grissom and John W. Young cf the Gemini 111 mission in March 1965 had already wom NASA's Omega Speedmasters. There were, however, no watches for astronauts James A. McDiveK and Edward H. White, scheduled for the Gemini IV flight in June. Astronaut White was scheduled to be the first American to take a space walk, a decision made just nine days before launch. Research and preparations had progressed, but no one had anticipated a space walk during the Gemini IV flight. The decision to make the space walk was made suddenly, for in March, Alexei A. Leonov of the Soviet Union took the title of "first human to walk in outer space," and the United States wanted desperately to close the space gap with the Soviet Union.

As a result of tests to the chronographs, some improvements were scheduled, including changing the
outer dial to a rotatable bezel with 24-hour increments and adding
luminous markings to the elapsed time dials. Because these problems did not interfere with the basic
functioning of the watches, NASA recommended that with "the
present need for flight chronographs for the crew, it is recommended that the standard Omega be
adopted an as an interim flight chronograph. With Gemini IV,
Astronaut White would walk in space and the Speedmaster would leave a spacecraft for the first time,
doing very different tasks performed in the pressurized Mercury
capsules, such as timing photograph exposures and timing the manual separation of fuel tanks. In the
vacuum of outer space, temperature differentials of more than
1 00"C would be experienced. Although the Speedmaster had endured the simulation tests, it had never
perfommed in an outer space environment. Approaching Hawaii
at an altitude of 216 km, astronaut Edward White left the spacecraft. In his hand was a hand-held gas
rocket, a jet propulsion device that ejects oxygen to control
aKitude and move about in outer space. The time White spent in outer space was 22 minutes, about 10
minutes longer than the 12 minutes and 10 seconds Alexei
Leonov of the Soviet Union spent on his space walk. The Speedmaster made it through this ordeal without
any diff~culty. There were no problems, even when exposed
to the direct rays of the sun, unfiltered by the earth's atmosphere. Before this mission, the performance of the Omega Speedmaster had been recognized, but it did not
have the status of being selected off`ciaEly by NASA as personal flight equipment. The formal notification of the decision was received on lune I, 1965, just a few days

prior to Gemini IV's launch. Thus, the letter publicly conferred NASA's flight qualification authorization even before the Speedmaster experienced the environment of outer space.

Center below picture -- Gordon Cooper's Speedmaster used on the Gemini V flight, now on display at the U.S. Air and Space Museum. One of the main purposes of the Gemini V mission, which lasted about eight days, was to simulate the time it would take to fly around the moon and back to earth. Under the Gemini program, NASA was conducting experiments and collecting data in stages in pursuit of a moon landing: a space walk on Gemini IV; a rendezvous by Gemini Vl and Vll; and later a docking of two spacecraft. Careful steps were thus taken one at a time to lay the foundations for the Apollo project. Improvements and enhancements were made continuously to the spacecraft and the space suits, but one thing that was not changed was the Speedmaster. It has maintained its form through those programs to the present day.

P111

1966 With GFE Status, the Speedmaster Performs Extravehicular Activities

• 16 March 1966
Gemini VIII Neil A. Armstrong, David R. Scott

•3-6 June 1966
Gemini IX Thomas P. Stafford, Eugene A. Cernan

• 18-21 JuEy 1966
Gemini X lohn W. Young, Michael Collins

•12-15 Sept., 1966
Gemini XE Charles Conrad, Jr., Richard F. Gordon, Jr. ;

•11-15Nov., 1566
Gemini XEI James A. Lovell, Jr., Edwin E. Aldrin, Jr.

•27Januaryl967
Apollo I Virgil 1. Grissom, Edward H. White, Roger B. Chaffee (All died in command module fire)

A photo of Gemini Vll shot from the hatch of Gemini Vl during rendezvous on Decemberl 5, 1965. The two spacecraft maintained their relative positions while orbiting the earth at an aEtitude of 256km in a procedure called a "stationkeeping maneuver." At their closest, they were only 30cm apart. This photo was taken with a Hasselbtad camera usin~ Kodak SQ217, ASA64 film

"The following is a report of the results of the quatity tests perfommed on the Omega wrist watch as Govemment Fumished Equipment (GFE). The report indicates that the quality required for space flight was met and the Omega wrist watch was selected as a spacecraR watch for the Gemini program. The originat document was signed by Richard C. Henry and sent to Charles W. Matthews, deputy head of the technology development department, on May 27, 1965. It was received by the head of the Gemini project, and stamped received on June 1, 1965. As simple as that, the Qmega Speedmaster was off~ciatly adopted by NASA. The search for the chronograph that would fly in outer space, spurred by President Kennedy's 1961 speech, was finally completed on this day, four years later.

The Speedmaster went into space as offficial GFE beginning with Gemini IV in June 1965. Gemini V was
launched in August, followed by the Gemini Vl and V11
rendezvous, a major hurdle in the program, in December. The Gemini Vlll flight took place in the
spring of 1966, when it docked with the Agena Target Adapter in
outer space. During the Gemini IX mission in June 1966, astronaut Ceman conducted extravehicular
activities for two hours, and in the following month, during the
Gemini X mission, astronaut Collins leR the spacecraR and recovered experimental equipment from the
Agena Target Adapter. Astronaut Gordon set a record aboard
Gemini Xl, spending two hours and 33 minutes outside the spacecraR climbing astride its head as the
craR made two orbits. And on the final Gemini mission, Gemini
Xll. Suzz Aldrin spent five hours and 30 minutes outside the spacecraR. The Gemini program. pashing to
set new records, thus ended on a triumphant note.
P1 12
1968
11-22 October 1968
Apollo 7 Waiter M. Schirra, Jr., Donn F Eisele, R. Waiter Cunningham
•21-27 Oecember 1963
Apollo 8 Frank Bemman, James A. Lovell, Jr., William A. Anders
1969
•3-1} March 1969
Apollo 9 James A. McDivitt, David R. Scott, Russell L. Schweickart
18-26 May 1969
Apollo 10 Thomas P. Stafford, John W. Young, Eugene A. Ceman
Overcoming the Tragedy of Apollo I and Starting the Countdown to the Moon

When the Gemini Xll mission ended successfully in November 1966, the Gemini program was declared completed. The new year of 1967 was to bring the Apollo prograrn, which was to tand 12 humans on the moon. The program, however, got offto a tragic start. On January 27, 1967, Apollo 204, the project's first manned mission, also known as Apollo I, was training on the launch pad at the Kennedy Space Center. Less than one month before the scheduled February 21 launch, training was in the finat stages. Suddenly, the command module was engulfed in flames.

On this day, the three-member flight crew had entered the Apollo I spacecraR at I :00 p.m. The members of the crew were Virgil 1. "Gus" Grissom, the second American in outer space; Air Force Lieutenant Colonel Edward H. White, who made the first space walk on Gemini IV; and Navy Lieutenant Commander Roger B. Chaffee, a rookie to space flight. Gus Grissom first noticed a slight problem. When he received oxygen from the spacecraft, he thought he ~noticed a sour odor." The other two members of the crew confimmed this, but the test continued. Next, the master alarm sounded repeatedly, waming that the flow of oxygen was too high. ARer a consuttation with the spacecraa control system director, it was thought that this was because the three members of the crew were moving about in the command module Third, a bothet omt pmblem t mse The communicE tions systom w = not wort ing properly It •as miti~iy thoaght that only t pmmt nicE tions betwet n Grissom

and the control room were not functioning, but communications between the launch pad 34 operation and checkout building and the blockhouse were also experiencing diff~culties.

As a result the countdown was suspended at 5:40 PM. The countdown was restarted at 6:31 when suddenly, the volume of oxygen flowing to the space suits increased greatly. It is believed that one of the members of the crew moved slightly. Four seconds later a voice that sounds like Chaffee said over the intercom, "There's a fire. I smell something buming." White's more desperate voice was heard two seconds later: "There's a fire in the cockpit."

Et was all over in 15 seconds, with the three crew members still inside. The command module, filled with pure oxygen, raged with fire, and there was no possibility of escape.

It took 90 seconds just to open the hatch. NASA Administrator Webb established an accident investigation committee, which undertook a thorough investigation of the fire's cause. The results of the investigation, which recreated the conditions when the fire broke out, suggested that the source of the fire was in the vicinity of an electrical wire in front of Grissom's seat. This location, on the left side of the cabin, could be seen clearly from where Chaffee was seated. It is believed that this is why Chaffee sounded the first alarm. Gus Grissom made the following statement upon retuming from the Gemini 111 mission. "Even if we die, I want people to recognize something. The conquest of space is worth taking that risk."

There is always the potential for danger, anywhere. Being in outer space, an unknown territory, is clearly more dangerous than being on earth, and space holds unknown perils. Grissom, White, and Chaffee, died without leaving the earth. Outer space is not the only place where danger is found. Right upper picture -- This Speedmaster uses a cal.32 I movement, the same as the first model. The Omega symbol on the dial is a metal attachment, known as an "upright." The Speedmaster watches of this period switched to a left/right asymmetrical case to protect the winding knob and the push buttons. Right bottom picture -- The Speedmaster pictured above differs by only one year. The Omega symbol is printed on the dial and engraved on the back "The First Watch Worn on the Moon," in recognition of the successful Apollo 11 moon landing. A sea horse design is also engraved in relief on this model. P1 13

Human Error. Humans make mistakes. Just as humans cannot be eliminated from the project, all errors cannot be prevented before they occur. All that can be done is to exert the greatest efforts to reduce errors infinitely close to zero.

"To the greatest extent possible, we must focus our resources and efforts onto the space program. We should advance boldly, but at the same time we must pay meticulous care to the safety ofthose involved in space flight." It was time to reexamine the space program principles established by President Kennedy.

Following the Apollo I incident, the command module hatch was changed to a gas-driven device requiring just seven seconds to open. It was also decided to use fireresistant materials for all equipment in the spacecraft, including flight manuals. The space suits, which directly protect the bodies of the astronauts, were changed to a glass fiber material Icnown as betacloth. This is a fireproof fiber that shuts out fire and does not expand even when subiected to high temperatures. When betacloth is cut to the size of space suits, however, it is susceptible to friction damage. Accordingly, it is protected by a Teflon process applied directly to the fibers. The bags that carry the astronauts' equipment were also made of this fiber, as were the Apollo program emblems, name tags, and so on aff'xed to the space suits.

PBI polymer fiber was used for the safety belts and harnesses in the command module and the lunar module. Like betacloth, this fiber is also heat resistant, and it is highly durable. It was later used in the cords used to attach equipment to the lunar rover and in Skylab, and for sleeping

bags and clothing for use in the spacecraft. A11 cloth was replaced with fireproof material, and highly fire-resistant materials were used to cover all wiring. Previously, when the spacecraft was on the launching pad, 100% oxygen was circulated through the cabin, but this was changed to a mixture of 60°~/o oxygen and 40% nitrogen. Those in charge of the space program learned that to achieve one's dreams, one must first appreciate reality.

Facing that reality began with the tragic death of the three astronauts, the worst possible kind of accident. It impressed on everyone in the project the fact that to be a successful adventurer, one must first be a thorough reallst. There is no way to travel to the moon other than accumulating knowledge and experience. We can only rely on human capabilities.

The blueprint that President Kennedy created for space exploration came to be a very specific, attainable objective through the Mercury and Gemini programs. And as the programs moved forward, the U.S. emphasis on assuming and keeping the leading position in space exploration gradually became a thing of the past. In place of that single-minded emphasis, persons involved in the space program came to realize the splendor of aiming for a goal, realizing that goal, and continuously making efforts afterward. For most of those participating in the Apollo program, the issue of upstaging the Soviet Union had become a minor consideration. They now understood the value of believing in human capabilities and of working toward a goal. The significance of going to the moon and the true nature of the space program became apparent to them. Just as a small stream flows into a major river, which eventually flows into the sea, the work ofthe many persons throughout the U.S. participatiog in the Apollo program was geared toward reaching the final number in the liftoff countdown. From the time of the Apollo project to the present day with the Space Shuttle, the countdowntoward liftoffhas always had an airofbeing conducted likeasolemn ritual.

Three days before launch. The director continues to call out the countdown. It is confimmed that the launch team is in place.

Two days before launch. As liquid oxygen and hydrogen are pumped into the fuel tanks, all personnel leave the vicinity of the launch pad. Once the work is completed, they return to their jobsites. Then operation of the flight control, navigation, and communications systems begins.

One day before launch. The iocation of switches in the cockpit is confirmed. An oxygen sample is taken ffom the crew area. Communications with the Johnson Space Center's Mission Control Center in Houston are established. The many personnel working around the launch tower are ordered away from the area in groups.

Day of launch. A thick wall of ice encases the towering rocket. The rocket, which uses liquid hydrogen and liquid oxygen as fuel, vents white smoke as if it were breathing. The smoke, which is extremely cold (-253"F), does not rise, but flows downward like a waterfall.

T minus 5 hours and 20 minutes. The countdown is halted at this point. This interruption is programmed into the schedule prior to launch. During the interruption, an ice inspection team climbs to the launch pad and checks the extemal tanks for any abnormalities. It is making sure the ice has not become too thick. Also, the flight crew arrives at the check-out building at this time. They have a meal and receive a weather briefing.

T minus 3 hours. The countdown is resumed. The members of the crew have donned their equipment and leave the check-out building to head for the launch pad. After passing through the white room where all impurities are blown off their spacesuits, they make their final preparations and then board the spacecraft.

The work of confirming communications between the cabin and the ground then begins, and final checks are conducted during the next two hours.

T minus 10 seconds. The final countdown to launch. A voice says ,'Main engine start.~ Half a second later, the flight computer goes into operation, opens a valve, and issues the order for liquid hydrogen and oxygen to flow into the main engine turbo pump.

From T minus 6.6 seconds to T minus zero. The engines ignite quickly. The launch procedure, advanced by controls from computers, takes place in second intervals. At T minus 3 seconds, engine thrust reaches 90% and the ignition sequence starts And then the countdown reaches zero. According to current Space Shuttle launch procedures, the mission elapsed timer is reset to zero at the instant the rocket launches and a new upward count is started.

During the Apollo program, NASA provided each crew member with one Omega Speedmaster. Some astronauts wore one watch set to mission elapsed time and another set to Greenwich Mean Time (GMT).

When the end of the booster engine falls completely free from the launch pad tower, at approximately T
plus 7 seconds, the Florida control team is relieved of its
responsibility. At this point, overall control is passed to Houston. All communications with the crew in
the cabin is conducted through the Houston "Capsule
Communicator" (CapCom). The Johnson Space Center flight control teams have worked in shiRs at the
control center for more than 100 manned space missions, from
the June 1965 Gemini IV mission right up to the present. From small difficulties to serious problems,
trouble in outer space is by no means unusual. The more serious
problems test the abilities of the ground crew.
P114
The climax ofthe space program was the moment Apollo 11 1anded on the moon. Neil Armstrong put his
footprint on the moon's surface on July 20, 1969 at 8:56 PM
EST, saying, "That's one small step for man, one giant leap for mankind."
P1 15

Following eight years of concerted effort and an infusion of $20 billion, the Eagle, carrying Neil Armstrong and Edwin Aldrin, landed gently on the moon on July 20, 1969. All around the world people were glued to their television sets, watching images broadcast ffom the moon. Without a doubt, the space program had reached a climax. On July 20, 1969, fourdays, six hours, 46 minutes, and 38 seconds aRer iaunch from the Kennedy Space Center, Apollo 111anded in the SeaofTranquility. Neil A. Armstrong and Edwin E. Aldrin,

Jr. then left the Lunar Module and set the U.S. flag on the moon's surface. After collecLing moon rock s_ples and setting up scientific measuring equipmenS they retumed to the Lunar Module. In total, they spent two hours and 47 minutes moving about the moon's surface. During that same time, Michael Collins continued his flighL orbiting the moon 30 times in the Columbia command module. Later, after docking with Eagle, the command module retumed to earth wiLh Lhe three astronauLs. In 1969, before the tuming of yet another decade, humans traveled to the moon and retumed safely to earth. President Kennedy's promise was certainly fulfilled by the

three members of the Apollo I I crew. These three history-making men were greeted by President Richard M. Nixon on the deck of the aircraft carrier HomeL He did noL however, shake their hands. Because there was the risk of harmful bacteria being carried back from the moon, the astronauLs had to remain in an isolation chamber togeLher with the rock samples they carried back with them.

P1 17 :

The Omega Speedrnaster - Making Historv Throughout the US Space Program An Astounding Watch for Outstanding Astronauts

Charles Conrad was acrew member on the Gemini 5 and 11 and Apollo 12 fligḧLs Omega created the
first gold Speedmaster to commemorate the successful moon
landing byNeil Amlstrong. Words in recognitionoftheefforts of eachofthe astronauLs andaserial number,from I to 1014, are inscribedonthe back. Ofthese
watches, 39 were presented to participanLs in the space program. Number I was presented to President
Agnew. Conrad's watch is number 12. The movement used in the
Apollo 11 commemorative model is a manual-winding cal.861. The inside of Lhe cover is inscribed
with reference number 145,022 and 69 - the year of manufacture.
After 1969, 20~ and 25~ anniversary commemorative models were also sold to mark the Apollo I I
achievement. There were three different versions of the 1994 2Sh
anniversary model, production of which was limited to 1,250, 250 and 25 uniLs, respectively. The
case and the movement differ for each version. The 25-unit limited is
handmade.
Right top -- The figure shows the inscription for the Apollo commemorative model. President Nixon,
Vice President Agnew, the original seven astronauLs, and the
astronauLs of Gemini and Apollo were presented with Speedmasters. Their names were engraved on the
watches.
Left bottom -- Since 1957, when the Speedmaster was created, a sea horse has been engraved on the
case back. When the Speedmaster was selected by NASA as the
offcial chronograph for astronauts, a number of variations of the words and makings engraved on the
case back were used to commemorate these historic flights.
Commemorative models always have a serial number. Shown are instructions about the engravings
Omega gave the company that manufactured the watch case. Basic
markings include dimensions, but the words were engraved by hand.
Right bottom -- The sea horse marking found on all Speedmaster models. Originally, it was engraved
with simple lines, but from 1973 it has been a stamped relief of
an illustration known as No. 2026.
P1 18
1969
16-24 July 1969

Apollo 11 Neil A. Armstrong, Michael Collins, Edwin E. Aldrin, Jr.
14-24 November 1969
Apoilo 12 Charles Conrad, Jr., Richard F. Gordon, Jr., Alan L. Bean, Jr.

The Omega Speedmaster Mark II. First sold in 1969, the year of the Apollo 11 moon landing. It was also produced in 1972 and 1974. All Mark 11 models feature a manual-winding cal.861 movement. Its main characteristics are red chronograph hands, a case incorporating hidden lugs, and a tachymetre scale on the outside of the dial. What Challenges Will We Overcome Tomorrow? Space Program Prospects

According to the long-temm space program presented to the American people, excited by the success of the Apollo 11 mission, "A, s a focus for the development of new capability, we recommend the United States accept the long-range option or goal of manned planetary exploration with a manned Mars mission before the end of this century as the first target.t' All the world's eyes were focused on Apollo with a sense of accomplishment, and The Space Task Group was already warming to the idea of a manned probe to Mars within 15 years. For the space program, Apollo was no more than one milestone, yet it was the stage that finally established a foothold in outer space. With the moon landing, however, the public suddenly became critical of the space program, which had consumed an enommous budget. Unlike the time when President Kennedy promised the American people the success of the Apollo program, now, 10 years later, no one was exhibiting such strong leadership in this field.

The Space Task Group, which was aware of this, could not find a strong enough rationale to promote with confidence the possibility of a manned Mars mission. Although it gave the specific objective of 15 years, the extent of specific planning was that research conducted while keeping in mind a manned mission to Mars would contribute to the current space program.

To help achieve this objective was the construction of low-cost, multi-purpose, long-life, highly reliable spacecraft and space station modules with a wide range of uses and capability for repeat use.

The benefits that space exploration will bring to humankind is an issue that will be debated 6r ages to come. The answer differs depending on whether it is viewed from a long-temm perspective or from more current issues. Large numbers of technicians are involved in rocket launchings, flight control, and mission operation. Such highly trained and educated personnel became the forces behind the space program, and the technologies they created becarne the driving force for much of the second half of the twentieth century. The exploitation and use of earth resources, communications technology, satellite navigation, and information gathering for national security have aEI benefited directly, thus resulting in wide-ranging and varied repercussions such as intemational cooperation in space exploration that transcends national frameworks. The overall influence has been strong enough to change our everyday lives. And at the head of the space program are the astronauts, the men and women who sit in the tips of the rockets. Many astronauts had previously been test pilots. They risked their lives by flying in prototype airplanes. or in jet aircraft aff xed with the letter X to symbolize experimental aircrafl that flew faster than the speed of sound to test their limits. While the pilots are ab[e to think calmly and make accurare judgments about how close to the limit they can go, their adventuresome spirit always wins out. Although these pilots, today's astronauts, are aware that the new seat they sit in may be their last, each believes that in the end fate will smile on him or her.

Even when their work place is in outer space, their vital pioneering spirit remains. It was they who

tested and confirmed the complex technologies that currently support the space program. Astronauts play the leading role in this era when what was thought impossible yesterday is reality today. Moreover, while the Speedmaster chronographs were in outer space, they withstood greater temperature changes than the astronauts. The 154 components of each chronograph participated as individual parts of an overall system. And they cost only $165.

PI I9

As pilot ofthe Apollo 8 command module, lames Lovell was orbiting the moon on Christmas Eve in 1968. This Apollo mission, however, did not include the lunar module, but only the command module and the equipment module. Lovell later became captain of the Apollo 13 mission, which was scheduled to orbit the moon and then land on its surface. The command module pilot was John L. Swigert, and the other member of the crew, the lunar module pilot, was Fred W. Haise. In fact, Swigert was chosen to replace Thomas Mattingly (lower right photo) at the last moment The backup crew member, Charies Duke, became ill with Gemman measles, and only Mattingly was not immune. Because it would be a serious problem if he got sick during the flight to the moon, Mattingly was dropped from the crew.

Before each training session, it is important for the crew to synchronize their watches. NASA always provided each crew member with one Omega Speedmaster. Some astronauts aEso wore an additionaE watch. They used one to measure the elapsed mission time, and set the other at GMT. The three members of the crew comprise one team. During their period of preparations, the members train to perfomm their tasks through teamwork. Preparations continued without the slightest thought that one small wrist watch might play a significant role.

P120

LeR -- Under instructions from NASA Headquarters in Washington D.C., two Bulova wrist chronographs were purchased for testing purchases because they were being considered for use as flight chronographs. Upon receipt ofthe watches by the Manned Spacecrafl Center (MSC), movement accuracy checks were conducted on them using a Bulova Vibrograph B-200 watch rate recorder. One watch did not pass the accuracy checks and was thus deemed unacceptable for environmental testing. The other passed the requirements of all environments except humidity and acceEeration. It stopped operating during each of three consecutive humidity cycles, thus fkiling ~ meet tho specified requimments |

Center top—Bulova Watch Co. made appeals to high-ranking off~cials in NASA to include Bulova in •e current Apol o and Skylab programs. Although the respome was courteous, stating that the Bulova chronograph "has many desirable features," the true meaning of the letter was that NASA will continue to use Omega chronographs because the Bulova watches offered "no significant advantages over those currently in use." Center bottom -- NASA Administrator James Webb's memo laid the groundwork conceming a hearing on the watch issue. The memo is an excellent example of a document written by a bureaucrat. While carefully avoiding any personal

responsibility, he suggests to a Mr. Callaghan that Bulova's attomey, a former assistant secretary of defense, be asked to act as a witness in the hearing.

Bulova continue its push in approaching high-ranking NASA oEtcials to have its chronographs accepted
into the space program. A memorandum was written by the
assistant executive secretary of NASA to an associate administrator of manned space ffight to review
again our selection of the Omega watch as the standard astronaut
flight time piece." The tone of the memorandum clearly conveys a lack of enthusiasm for reviewing the
Omega selection, saying the review should be to detemmine if
there is any new infommation that would indicate a need for reconsidering the selection of Omega.
Right top—Bulova made a presentation of their capabilities to NASA as the Mercury Program was
moving ahead Bulova used the influence of its chaimman, General
Omar N Bradley, a famous hero of the Second World War, to meet with High-ranking NASA offcials A
review of the NASA program was given to the Bulova
executives in the moming, followed by lunch, and then a presentation by Bulova of its capabilities.
Right bottom -- Bulova Watch moved in various ways to try to reverse the decision made to use Omega
chronographs. But the issue had already been decided, and
there was no time to prepare and conduct a new qualification program. NASA sent a polite but fimm
letter to Bulova explaining there would be no change in
chronographs "at this time" and inviting Bulova to participate in a new procurement program planned
for fiscal 1970.
P12 1
1 970

11-17April 1970 Apollo 13 James A. Lovell, Jr., Fred W. Haise, Jr., John L. Swigert, Jr. The Canceled Mission Crisis Erupts on Apollo 13

Apollo 13 lifted offon April 11, 1970, at 2:13 PM EST. Two days later on April 13, after 55 hours, 52 minutes, and 58 seconds of the mission had elapsed, an order came from ground control to Swigert: "13, we've got one more item for you when you get a chance. We'd like you to stir up the cryo tanks.~ Swigert answered "Okay."

This was when Apollo 13's tribulations began. As Swigert finished the required task, the master aLarm
indicator started to flash. Voltage in the main bus B dropped,
and the alarm stopped after six seconds. Other than a failure of the instruments, this could mean only
that the No. 2 ultra-low temperature oxygen tank had lost pressure
and that a panel had come loose. The flow of oxygen to fuel cells I and 3 dropped for seven seconds and
then went to zero. Fifty-five hours, 55 minutes, and 20 seconds

after launch Swigert's voice was heard on the ground: "Okay, Houston, we've had a problem here." "This
is Houston. Say again please." This time Captain Lovell
answered. "Houston, we've had a problem. We've had a main B bus undervolt." Haise spoke. "Okay. Right
now, Houston, the voltage is looking good. And we had a
pretty large bang associated with the caution and waming there." The words "large bang" completely
quashed any hopes of an instrument failure. Eugene F. Kranz,
~dight director on the ground at the time of the accident, said to everyone at the control center, "Let's
everybody keep cool," and they tumed their attention to solving the
problem.
To conserve power until reentry, all electricity in the command module was tumed offand the lunar
module was used as a life boat. The lunar module had an engine,
used to land on the moon, as well as oxygen, water, and electricity. It was, however, designed for two
persons. With three persons, not only was it crowded but the
capacity of the cabin air purifiers was taxed by the carbon dioxide build-up due to breathing. The
purifiers frorn the command module had a different shape and could
not be connected. Using cardboard from the flight manual, plastic bags, and adhesive tape, the astronauts got through this part of the crisis.

Then another instance of the inability to use NASA's cutting-edge technoLogy arose. The automatic attitude control mechanism did not work. If reentry is not made at the right attitude and angle, the spacecrafl could either bounce offthe earth's atmosphere and fly back into space or be incinerated from excessive friction with the atmosphere. It was necessary to maneuver the spacecraR manually, making use of the pilot's intuition and skills. The key was to accurately time the engine bum for adjustina the attitude. In a procedure that required split-second accuracy, human intuition could not be relied upon.

In that situation, with the required engine burn being exactly 14 seconds, Swigert operated his Omega
chronograph and according to his signals, Captain Lovell started
and stopped the engines right on time. The Speedmaster's timing was accurate. Following the expected
radio blackout, Apoilo 13 appeared above the Pacific Ocean, the
parachute opened, and the spacecraft landed safely in the water. The USS Iwo Jima recovered it.
Left bonom -- Apollo 13 was 56 hours into its journey when, without waming, there was an expEosion
so strong that an exterior panel of the craR was completely
blown off. This meant that the planned moon landing would have to be canceled. But more than that,
there was the fear that the mission would become an endless
spaceflight. The three-crew members were plunged into a serious crisis, and the world prayed for
their safe return. The Soviet Union even sent a message that it would
spare no effort in providing assistance. With only a limited amount of water, oxygen, and fuel, the crew
managed to maintain the hope of retuming to earth by using the

iunar module as a lifeboat. Haise suffered from uremia due to the cold and shortage of water ain the
spacecraR, and Lovell lost more than 6kg during the flight.
P122
1971
•31 January 26 July - 7
- 9 February 1971 August 1971
Apollo 14 Apollo 15
Alan B. Shepard . . David R. Scott ..
Stuart A. Roosa James }3. Irwin
Edgar D. Mitchell Alfred M. Worden
Left middle -- Of the three balloons at the top of the command module, the two larger ones have a
diameter of Im and the smaller one has a diameter of 0.6m. When
the command module splashes down, even if the sea is rough and the module capsizes, it will still shifl
immediately to stable attitude I. The balloons, which serve to
upright the command module, inflate and maintain the module in stable position 2, and the astronauts
have only to wait for the frogmen who will perfomm the recovery
work.
Right middle -- Ten years aRer flying in Freedom 7 of the Mercury Program - America's first Space
Program - it was Alan Shepard's tum to stand on the moon. The
photos show that the Speedmaster is strapped on the same way, both on the moon and on earth.
Right bottom -- The Speedmaster that Alan Shepard, captain ofthe Apollo 14 mission, wore on the
moon. The year of manufacture was 1966-67. This watch was
supplied from the initial purchase of watches aRer NASA decided to offrcially adopt the Speedmaster.
Under the Mercury Program, Shepard made a successful
suborbital flight to become the first American in space.

The number SEB12100039-002 is engraved on the back cover of Shepard's watch, indicating that the watch is off~cial NASA equipment. The sea horse Eogo, always found on the back of Speedmasters, is also engraved. This was switched to a relief engraving on later modeis. Beginning with Apollo 14, NASA procured a large number of new types of Speedmasters. P123
Brilliant Achievements of Speedmaster Spurs Rivals

"Just do it!" Just as the slogan on the Mercury capsule says, the Space Program, which the U.S. worked on for 24 hours a day, reached a climax with Apollo 11. The command module Columbia, which carried the three astronauts on their successful moon-landing mission, splashed down in the Pacific Ocean to the southwest of Hawaii.

The mission flight time, from launch to splash down, was 195 hours and 18 minutes. President Richard M. Nixon was waiting on the deck of the U.S. aircraR carrier Homet to greet the astronauts.

The success of Apollo 11 made a deep impression not only on Americans but on people around the world. But Americans felt their pride had been restored, and felt a deep sense of accomplishment. As the astronauts made repeated space flights, they created new records and their names oRen appeared at the top of the news. Magazines presented feature articles on them

and they were a center of attention. In a reaE sense, the astronauts were seeking an answer to the question of just how far

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humans can go, searching for the limits of human ability on behalf of all those who could not do so themselves. They were the heroes of the day. Their successes were also honors for the Omega Speedmaster, and Omega used this point effectively.

In 1969, the year that Apollo 12 reached the moon, Omega produced an Apollo I i commemorative Speedmaster model. Engraved on the back cover of the watch was "Omega Speedmaster Apollo 11 1969 First Watch Wom on the Moon " The Apollo 12 mission to the moon, taunched in November 1969, was also successfully completed. A total of 31 hours and 31 minutes was spent conducting various activities on the moon's surface. And then came the Apollo 13 mission. Originally, the three members of the Apollo 14 crew were to be the Apollo 13 flight crew.

The captain was Alan B. Shepard, Jr, who in 1961 had been the first American in space on the MercuryRedstone 3 flight aboard Freedom 7. Shepard developed an ear problem, which negatively affected his sense of balance, one of the most important of a pilot s senses. As a result, he was removed from flight status after the Mercury flight, although he remained in the space program working on the ground From 1963 to 1969 he worked as a director in the Astronaut Off'ce. He retumed to flight status in 1975, after having surgery perfommed to correct his ear problem, and was pemmitted to participate in the Apollo flight program. Because of Shepherd's long, nine-year absence from space flight, Slayton, the head of flight crew operations, decided that Shepherd should have a long training period. As a result, Captain Loveli's team, which had been scheduled for Apollo 14, was moved up one mission The new Apollo 13 crew also experienced changes in the members immediately prior to launch and a series of unusual occurrences For NASA, Apollo 13 ended with the canceled moon flight Although the lunar mission was a &ilure, the problems confronted by Apollo 13 left behind data valuable to NASA. It also led to reigniting the interest of the general public who had started to believe that space flights will always be successful and safe. In fact, unti] the accident occurred aboard the spacecraft, there was no network television coverage of the Apollo 13 mission, despite only 10 months having passed since Neil Ammstrong and Buzz Aldrin s moon walk kept the world's peoples glued to their television sets. At any rate, the Speedmaster piayed a direct role in Apollo 13's safe retum to earth, thus adding another dramatic episode to its brilliant history.

The Speedmaster was the only astronaut chronograph included on the NASA "qualified product list." This list is "created by the govemment for use in procuring products according to the listed specifications." Products included in this list are not created for use by NASA and inclusion does not indicate support by NASA for the products. Inclusion in the list merely means a product is recognized as having the "quality based on the necessary product conditions that are defined by the most recent specifications.

Of cousse, there is a limit to such advertising and public relations activities. There are rules which prohibit "in advertising and publicity language that implies the product is the only one of its type recognized for its superior quality, or that the production line used to manufacture the product has been approved by the govemment, or that NASA endorses in any way the product, the company that manufactures it, or the production line, or any diagram which has the same effect." Accordingly, Omega requested Trio Advertising of New York to create a list of what it could and could not do. First of all, Omega could not mention the names of individual astronauts. Also, it could not use the language "off~cial watch," but it could say that, "Omega

watches are standard-issue to Gemini astronauts in the NASA programs." As well, it was pemmissible to say that, "Omega was there (or on the scene) when American aseronauts orbited around the world at more than 17,000mph." Omega could also state that, "Omega was the first watch wom in space by an American astronaut." lf used in an advertisement, only one watch could be shown, and if the main title made direct reference to the astronauts, the type of watch actually used - in other words, the black dial Speedmaster chronograph - had to be shown. But when the advertisement treated general topics and made only minimal reference to the astronauts, the watch type used did not have to be shown.

There were also limitations imposed on the use of NASA photographs. The Trio Advertising report said, "We may use a drawing but not a photo of an astronaut floating in space, provided the astronaut is not identified. Make no statement in publicity releases or ads that implies Omega was tendorsed'or given special preference."

It is well known that Bulova madevarious appeals toNASA forconsideration. Butwho would have expected thatthe Speedmaster's help in saving Apollo 13 would create serious probiems for it afler Apollo 13's retum? ARer 1971, Bulova's sales offensive intensified.

Omega prepared itself for the possibility that one day the Bulova Accutron would become the standard issue astronaut wristwatch. P124 1972

16-27 Apri] 1972
Apolio 16 lohn W. Young, Thomas K. Mattingly 11, Charles M. Duke, Jr.
Right bottom -- The Buy American Act seeks to have products procured by the U.S. govemment be U.S.
made to the greatest extent possible. The NASA officials
checked Bulova records to detemmine the place of origin of even the raw materials used in its watch
components. Using the law as a shield, Bulova pushed the senator
into action, but, in 6ct, the company did not understand the fundarnentals of the law's content. Bulova
thought that because it was an Arnerican company, it was to be
expected that NASA would use its products. But Bulova did not have a chronograph production line
within the continental U.S. The movements for the 16
chronographs Bulova presented to NASA were purchased through its subsidiary in Switzerland, Universal Geneva. Upon checking the Bulova records, NASA off~cials
concluded in their report that if R&D costs were included, Bulova would meet the criteria for the Buy
American Act.
P125
Left top -- In response to a request to switch from Omega to Bulova products, this menno suggests that
there is a possibility for using Bulova watches in the Skylab
program.
Left middle -- In principle, watches used in space flight are to be retumed to the govemment. A proposal was made to Administrator James C. Fletcher that astronauts
be allowed to keep the watches afler retirement.
Center top -- Despite the actions by higher offcials to have Bulova watches considered for use in the
Skylab program, onsite offtcials responded that the Speedmaster
shouid continue to be used.

Center middle -- Pressured by Senator Buckley, the NASA deputy administrator who wanted to somehow get the Bulova time pieces into consideration for use as
astro~'aut watches succeeded in starting a completely new competitive procurement.
Right top -- During an inventory taken of the watches used by the astronauts in outer space, it was
discovered that the watch Buzz Aldrin wore on the moon had been
lost or stolen.
Right middle -- Donald K. Slayton, selected as one of the original astronauts, was chaimman of the Pilot
Operational Equipment Configuration Control Panel. As
preparations for Skylab progressed, a proposal to add short bands to the watches was disapproved.
Right bottom -- This is the cover of the Handbook of Pilot Operational Equipment for Manned Space
Flight. The chronographs for use in the Apollo and Skylab
programs were recorded under SEB12100039-02 and the watch bands under number SEB12100030-
202 with photographs. The watch is a Speedmaster procured from
Norman Morris Co. in New York.
P126

The Omega Speedmaster Mark II. In 1972. an 18k yellow gold Mark 11 was put on sale The movement was the manual-winding 861, the same as was used in the original Mark 11 in 1969. The case, also the same as the 1969 model, has a sofl line with hid den lugs. The water resistance of this Mark 11, however, was changed from 12 atmospheres to six atmospheres.

The Omega Speedmaster Mark III used the cal.1040 chronograph movement, the first self-winding
Speedmaster, as indicated by the word "Automatic" appearing on
the dial. Although selfwinding Speedmasters appeared f equently afler this, time pieces with the Mark
111 name appeared only in 1971 and 1972. There are two
variations of the dial opening: a round type and a television type. This model has a date indicator and an
aircraft-type chronograph hand.
Pl27
Speedmaster on the Moon with Apollo A Watch Made by Professionals, Used by Professionals
Apollo 11 Sea of Tranquility
Apollo 12 Ocean of Stomms
Apollo 14 Fra Mauro
Apollo 15 Hadley-Apennine Region
Apollo 16 Descartes Highlands
Apollo 17 Taurus-Littrow

These are the landing sites ofthe Apollo missions. Twelve astronauts from six missions landed on the moon's surfacc, collected rock samples, _d set up scientific measuring devices. The Apollo program ended on December 19, 1972.

With the exception of the Apollo 13 mission, all oftbe Apollo moon flights, from Apollo 11 to Apollo 16, successfully landed on the moon. Apollo 11 23"5'E, 0"6'N Apollo 12 23"4'W, 3"3'S Apollo 13 Lunar

landing unsuccessful Apollo 14 17"48'W, 3"66'S Apollo 15 3"65'E, 26"12'N Apollo 16 15"5'E, 9no's Apollo 17 30"77'E, 20"16'N

The Omega Speedmaster was on every Apollo mission and accompanied the 12 astronauts to the surface of the moon The Speedmaster was adopted officially by NASA as the astronaut flight chronograph by a letter dated May 27, 1965 Beginning the next year, 1966, the word "Professional" was added to the Speedmaster dial. That this was a chronograph for use by professionals was established by the offcial adoption by NASA The 27 CHRO C12 movement Cal.321, used from the very first Speedmaster model, was changed and the Cal.861, which uses the shuttle Cal 21600A/h, was created. The second-generation, manual-winding Cal.861 was created in 1968.

The Cal.861 was also incorporated in the Speedmaster Professional Mark 11, water resistant to 12 atrnospheres. In 1972, the Apollo prograrn ended with Apollo 17. The space program, which had received the strong support of President Kennedy and had essentially been given a blank check, was ready to move to the next stage.

In that same year, Omega launched the Speedmaster Professional Mark 111. The Mark 111 was first manufactured in the previous year, 1971. This watch utilized the first self-winding movement made for a Speedmaster.

A chronograph is a timepiece with a stopwatch function as we[l as a time function. In 1957, the year the Speedmaster was created, the technology for incorporating chronograph functions into a wristwatch, which required about twice as many components as a conventional watch, was still relatively undeveloped. Miniaturization of the precision technology had already been achieved by Omega with the creation of the Cal .1040 used in the Mark 111.

For the chronographs used by the astronauts, a manual-winding movement was suffcient, as a self-winding movement cannot work without gravity, which perhaps explains the delay in the appearance of a self-winding Speedmaster.

After the Mark-ill, Omega advanced production of a number of different Speedmasters in the 1970s. A television-type dial Speedmaster was created, and a soft-line type also appeared to avoid the edge ofthe chronograph getting caught in clothes. This was done by integrating the lugs, through which the strap passes, into the case.

Watches are not limited to round shapes, and square Speedmasters were also made. The Speedmaster 120m, a diver's watch, was created around this time. Since this is a diver's watch, the tachymetre markings on the bezel range from 0 to 60. In 1973, 125 years aRer the establishment of Omega, a commemorative Speedmaster model was produced. This watch is self-winding and meets the precision standards of a chronometer. The Speedsonic ROOHz model, which also meets the chronometer standards, uses the Cal.1255 movement. This is a tuning-fork movement manufactured under license from Bulova, Omega's rival. Engraved inside the back cover is "Movement patented by Bulova." The Speedmaster Professional Mark 111 has four hands, including the aircrafl-type chronograph hand. The Speedmaster Automatic, produced in 1974, has a 24-hour dial intended for pilots. This was one of the improvements requested by the astronauts during the first watch selection process conducted by NASA.

P128

Right top -- This is a copy of part of a facsimile transmission from the Manned Spacecraft Center to the NASA Headquarter Deputy administrator. NASA had enough

chronographs, i.e., 80 Omega Speedmasters, to cover the Apollo 17 mission, the Skylab Program, the Apollo-Soyuz Test Program, and the Shuttle prograrn.
Center -- A decision was made to conduct new procurement procedures for the Apollo 17 chronographs. If the Bulova watches met the requirements, then domestic
products would be chosen in accordance with the government policy of"buying American products.t'Things looked good for Bulova.
Center bottom—Compared to the 1964 procurement candidate list, numerous brands appear for the first time including Breitling, Girard-Perregaux, Heuer, and Seiko.
These chronograph makers appeared to be strong rivals to the Omega Speedmaster.
Right middle -- The requested specifications ofthe final contract item indicated only that 30-minute and 12-hour cumulative time indicators, a central elapsed time
hand, and the standard time hands were necessary. Except for these requirements, any watch design was accepted. Precision was also required.
Center Fold
Left, Full page—
Speedmaster
Ref: CK2915-1
Ser: 35997102
Cal: 321
Manufactured: 1957
The first Speedmaster model with its unique hands. It is so rare that the Omega Museum does not have one, and is featured here for the first time Push buttons are 4mm
less and the bezel is Imm smaller in diameter than current models.
I" Column
Speedmaster
Ref CK2998-2
Ser: 17302512
Cal: 321
Manufactured: 1959
A rare Speedmaster with the Mark 11 dial. The "Professional" inscription was first used in 1966, so the original dial may have been changed. The fluorescent dolphin
hands are unique to the Mark 11.
Speedmaster
Ref: CK2998-6
Ser: 18645821
Cal: 321
Manufactured: 1959
A typical second model. The wedge-shaped point of the chronograph seconds hand is fluorescent, and the remainder has a different design from ourtent models. There
is no'Professional" inscription or winding knob guard, and the Omega symbol is raised.
Speedmaster
Ref CK2998-4
Ser: 18645893
Cal: 321
Manufactured: 1959
A second model, but without a fluorescent pointer on the chronograph seconds hand. Based on serial numbers, this watch was manufactured after the watch shown
above, but the reference shows it was manufactured first. In this year, the design of the seconds hand was changed.

Spoedmeter

Ref: ST105003
Ser: 22069020
Cal: 321
Manufactured: 1964
The third model created after the reference was changed in 1962 The hands are straight and white as on
todays models, and the push button diameter was enlarged by
Imm. This model has no winding knob guard.
Speedmaster
Ref ST105012
Ser: 24652609
Cal: 321
Manufactured: 1966
The fourth model created after the reference was changed in 1965. This model has a winding knob guard
amd a graceful curve that extends to the lug portion. The
"Professional" inscription was used beginning with this model.
2~ Column
Speedmaster
Ref ST145012
Ser: 25008681
Cal: 321
Manufactured: 1967
The fifth model created after the reference was changed in 1966. There is little difference from the fourth model, but 1966 was significant as it was the year that Omega
Ltd. first learned that a Speedmaster had been worn in outer space.
Speedmaster
Ref BA145022
Ser: 28080611
Cal: 861
Manufactured: 1969
This is one of just 1,024 of these watches sold in 1969. Of those, 39had the name of the U.S. president,
vice president, and astronauts engraved on them and were
presented as gifts. This watch is number 12, presented to Charles Conrad.
Speedmaster
Ref ST145022
Ser: 29116439
Cal: 861
Manufactured: 1969
This watch is a prototype made in 1972 incorporating heat reflective design needed when used on the moon's surface. There were no problems with a black diai,
however, so was not adopted. The 90-minute and 12-hour elapsed timers have 'aircraft wing" hands.
Flightmaster
Ref ST145013
Ser: 29133967
Cal: 910
Manufactured: 1969
An early Flightmaster model. The difference from the later model is the 24-hour timer where the second timer is usually placed. The Flightmaster with a Greenwich

Mean Time (GMT) function was made for pilots and flight controllers.
Speedmaster
Ref: ST145022
Ser: 30994745
Cai: 861
Manufactured: 1969
An exceptional Speedmaster model. The w inding knob and pin holding down the face are made of gold. Gold is ideal for the pin as expansion and contraction are
mhflmal during temperature changes. They were probably added aRer manufacture.
3r~ Column
Speedmaster
Ref ST145022
Ser: 31617539
Cal: 861
Manutactured: 1969
In 1968 the movement was changed to the Cal.861 and the reference to ST1145022. In addition, the Omega symbol was changed from raised to printed. This is
basically the same as today's models.
Speedmaster
MARK 11
Ref ST145014
Ser: 31614914
Cal: 861
Manufactured: 1969
The Mark II comes with a variety of dials, but this one has the same dial and hands as the Speedmaster. The diameters of the winding knob and push buttons are also the
same as on the Speedmaster, but the crystal is made of mineral glass.

Speedmaster MARK 11 Ref 5T145014

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Ser: 32214801
Cal: 861
Manufactured: 1969
The face of this Mark II is so popular it is called the "Mark II face." The hands of the timers are all orange, as is the Omega symbol.
Speedmaster
MARK 11

Ref MD145034
Ser: 32839928
Cal: 861
Manufactured: 1970
This Mark II model has 20-micron gold plating The gold index markings and Omega symbol are raised The markers of each inner dial is also different ffom stainless
steel models.
Speedmaster
MARK III
Ref ST176002
Ser: 34255402
Cal: 1040
Manufactured: 1971
The case of this Mark III is similar to the Flightmaster design. This is the first Speedmaster model with a date indicator. There are variations in the dials, and the colors
of the hands are coordinated with the variations.
4th Column
Speedmaster
Mark III
Ref ST176005
Ser:
CalM040
Manufactured: 1972
This Mark III model has a case design reminiscent of an old television picture tube. The movement is the same as the standard Mark III. But this pictured one is not a
genuine Omega product. It is forced to put a round dial into a square case.
Speedmaster 125
Ref: ST3780801
Ser: 36252140
Cal: 1041
Manufactured: 1973
Only 2,000 Speedmaster 125 watches were made to commemorate the 125th anniversary of Omega Ltd.
This is the first chronometer chronograph among the Omega
chronographs. The Omega symbol and other markings are raised.
Speedmaster
MARK III
Ref: ST 176002
Ser: 36256191
Cak 1040
Manufactured: 1973
This Mark III model has the same chronograph hands as the standard Speedmaster. In the center is an "aircraft" hand for the 60-minute dial chronograph, and below the
standard 60-second timer is a 24-hour indicator disc with a triangular pointer.

Speedmaster MARK III Ref ST 176002 Ser: 36261237

Cal: 1040 . .~.
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Manu&cturedM 973 This Mark III does not have the word 'Professional" on the dial. Instead, the word 'Automatic~ is at the 12 o'clock position instead ofthe 9o'clock position. The movement, functions, and other features are identical to the standard Mark III.

Speedmaster
MARK IV
Ref. ST176009
Ser: 362668353
Cal: 1040
Manufactured: 1973
The Mark IV was first sold in 1973. The movement functions, and other features are identical to the Mark III. The case shape is similar to the Mark II, but the crystal
bezel is different.
5th Column
Speedsonic
Ref MD 1880002
Ser: 38412515
Cal: 1255
Manufactured: i973
The Speedsonic was first sold in 1973. It is a tuning fo* watch, exceptionai even among Speedmasters. The MD reference indicates a gold-plated model. The stainless
steel model uses a SD reference.

Speodsonic

Ref STIB80002
Ser: 38413677
Cal: 1255
Manufactured: 1973
The stainless steel Speedsonic model. There are numerous variations in the Speedsonic dial and case. This watch, a chronometer, has a gray-blue dial with fluorescent
bars.
Speedsonic
Ref ST1880002
Ser: 3& 116234
Cai: 1255
Manufactured: 1973
The movement of the Speedsonic is not an Omega Ltd original, but was manufactured under license ffom
the Bulova Co. Tuning fork watches were manufactured for
only a short period until the quartz watch appeared.
Speedsonic
Ref: ST3880800
Ser: 38418038
Cal: 1255
Manut'actured: 1973
This Speedsonic has an unusually shaped case. The case is intended for use only with a bracelet and cannot be used with a leather strap. The initial reference number
"3 " is the bracelet specification, while a " I " is the leather strap specification.
Speedmaster
Ref: ST376804
Ser: 47387066
Cal: 1045

Manufactured: 1974
This is a Speedmaster automatic manufactured in 1974. This model too has variations in the case - this is the bracelet mcdel. The differences between this model and
the Mark III and Mark IV are its 24-hour timer and a day indicator.
6'h Column
Speedmaster
Ref ST145022
Ser: 39181247
Cal: 861
Manufactured: 1975
Only 500 of this model were sold to commemorate the 1975 docking between the Soviet Soyuz and the U.S. Apollo spacecraft. The Apollo-Soyuz emblem is at the
12 o'ciock position, with Ist "Omega" inscribed below.
Flightmaster
Ref ST145036
Ser 39929367
Cal: 911
Manufactured: 1975
This is a later Flightmastermodel with acal.911 instead of a cal.910 movement. The chronograph hands are a uniforn, yellow. The Flightrnaster is distinguished by the
color variations of these hands.
Flightmaster
ReF: ST145036
Ser: 39930011
Cal 911
Manutactured: 1975
The top winding knob is for rotating the inner bezel, and the lower one is for setting the blue 24-hour timer hand. In this way. tne time can be set for rwo different
locations.

Speedmaster Ref ST3760805 Ser: 39943667 Cal: 1045 Manufactured: 1975 Avariation ofthe SpeedmasterAutomatic. The reference number, 3760805, indicates abraceletspecification, whiie 1760014 indicates the leatherstrap specification. Both reference numbers are inscribed on the inside of the back cover.

Speedmaster Ref ST1760012 Ser: 4E921360 Cal: 1045 Manufactured: 1975 This model is also a SpeedmasterAutomatic. The cal.l045 movement number is specified by OmegaLtd. It is aversion ofthe Lemania 5100 movement improved by Omega 7~ Column Speedmaster Ref: ST1860004 Ser: Cal: 1620

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Manufactured: 1977
Although unlike any conventional Speedmaster, the dial clearly says "Speed~naster Professional." This watch is not simply a quartz watch, but a quartz digital watch.
Speedmaster
Ref: ST3860809
Ser:
Cal: 1620
Manufactured: 1977
There are a number of variations of the digital quartz, one of which is seen here For unknown reasons, this model does not have the word "Professional," and
"Speedmaster" is inscribed in red.
Speedmaster

Ref: ST145022
Ser:
Cal
Manufactured: 1978
A watch created by Omega in 1978. The workings do not contain a movement - it is only a mockup model. It is not known whether it was for photography or display
purposes, but it is very rare for a mockup model to enter circulation.
Speedmaster
Ref ST3450808
Ser:
Cal: 863
Manufactured: 1980
This model was created in 1980 in commemoration of the I 0th anniversary of the Apollo 11 moon landing in 1969. This is the first Speedmaster to use a transparent
back made of sapphire crystal.
Speedmaster
Ref BC1450039
Ser:
Cal: 863
Manufactured: 1980
This is a white-gold version of the Apollo 11 10~ anniversary model. The BC of the reference number indicates white gold. This model also has a transparent back
made of sapphire crystal.
8th Column
Speedmaster
Ref BA3450802
Ser:
Cal: 863
Manufactured: 1980
This watch is a yeilow gold version of the model created to commemorate the 10th anniversary of the Apollo 11 moon landing. Since the transparent back allows the
movement to be seen, the 861 movement was improved and was called the cal.863 for this model.
Speedmaster
Ref ST1450040
Ser: 44121091
Cal: 861
Manufactured: 1982
This is a German Speedmaster model sold only on the German market The word "Professionalt' does not appear. The case and face are completely original, and it
utilizes a sapphire crystal.
Speedmaster
Ref ST3760806
Ser:
Cal. 1045
Manufactured: 1984
This is an automatic version of the German model, also sold only on the German market. The diai indicates it is a Mark V, but there are no Mark V models other than
this German model.

Speedmaster

- Ref DD145022

Ser: 45447397 Cal: 861 Manufactured: 1984 A two-tone Speedmaster model. The dial and bezel are gold, the hands are black, and the dial markers is raised. Otherwise, it is identical to the standard model. The DD of the reference number indicates a two-tone model.

Speedmaster
Ref ST3450809
Ser:
Cal: 866
Manufactured: 1985
This moon phase Speedmaster was limited to 2,000 units. The movement is an improved cal .861. The moon phase and date indicator are at the 12 o'clock position, and
can be advanced by the upper left button.

gth Column

Speedmaser l

Ref 8T3760822 Ser: Cal: 1045 Manufactured: 1987 This is a Speedmaster automatic first sold in 1987. The cal l 045 movement is the same as in earlier models, but it is the first automatic to be installed in a case the same shape as that used for the standard Speedmaster.

Speedmaster
Ref ST145022
Ser: 48294036
Cal: 861
Manufactured: 1989
The American version of the Apollo 11 moon landing 20th anniversary commemorative model soEd in 1989. Production was limited to 2,000 units. The following
inscription is engraved on the lefl side: 000112000 APOLLO X1 1969. The 0001 is the serial number.
Speedmaster
Ref ST145022
Ser:
Cal: 861
Manufactured: 1989
This is also an Apollo I I moon landing 20th anniversary commemorative model. The inscription however'says only "APOLLO X1 1969." This model was sold in
countries outside of the U.S amd Germany. Production was not limited to a particular number.
Speedmaster
Ref ST1750032
Ser: 50686801
Cal: 1140
Manufactured: 1989
This Speedmaster Automatic was first sold in 1989. There are numerous variations, including a two-tone model and a model with a gold case, as well as models with
gold, white, and black dials.

Speedmaster Ref ST1750043 Ser: 64269291

Cal: 1155 .

Manufactured: 1991 A Speedmaster Automatic first placed on sale in 1991. Like the watch shown previously, its has a small size (39mm) case. The back cover is not the screw-in type. The

dial does not contain the word "PrDfessional," and it comes in numerous color variations. ,,

10th Column
Speedmaster
Ref BA1750037
Ser:
Cal: 1160
Manufactured: 1991
This Speedmaster. featurin, a moon phase and perpetual calendar, went on sale in 1992 to commemorate the 700th anniversary of the foundation of Switzerland
Although this watch was not a limited edition, very few were manu&ctured for the Japanese marlcet.
Speedmaster
Ref ST1450022
Ser:
Cal 851
Manufactured 1991
This model was made to commemorate the 90 days that the Mir cosmonauts spent in space from December 1990 to March 1991 as a part of the space station project. It
is very rare as only 10 units were manufactured.
Speedmaster
Ref BA1480052
Ser:
Cal: 864
Manufactured: 1992
A chronometer model manufactured to mark the 50th anniversary of the f~rst hand-wound movement made in 1942 that became the basis for the Speedmaster. Only 250
units of this 18k yellow gold limited edition were made.
Speedmaster
Ref BA1450053
Ser:
Cal 867
Manufactured: 1992
This model also commemorates the 50th anniversary of the creation of the hand-wound movement and uses a skeleton design to allow the movement to be seen clearly.
The case is 18k yellow gold. Only 50 units were manufactured.

Speedmaster Ref BA3450052 Ser: Cal: 863

. - - ~ - : ~ Manufactured: 1992 This is also a model commemora'dng the 50'b year since the creation of the hand-wound movement. This 18k yellow gold model also had an 18k gold bracelet. There is

also a leather strap model. A total of just 999 of both models was sold.
I l'h Column
Speedmaster
Ref ST3450062
Ser:
Cal: 861
Manufactured: 1994
This model was sold in 994 to commemorate the 25th anniversary of the Apollo I I moon landing
APOLLO X1 1969-1994~ is engraved on the leR side ofthe case

- and the back cover is engraved with "Limited Edition." This model was sold as a limited edition of 2,500 units.

Speedmaster
Ref BC3480062
Ser:
Cal: 864
Manufactured: 1994
This rnodel was also sold to commemorate the 25'h anniversary of the Apollo I I moon landing. It is in white gold. The back cover is made of transparent sapphire
crystal. The cal.864 movement is a version of the 861. This edition was limited to 500 units.
Speedmaster
Ref ST1450022
Ser:
Cal: 861
Manufactured: 1995
This model was manufactured to commemorate the 365 days from luly 1993 to July 1994 that Mir cosmonauts spent in space. Apart from the inscription on the back
cover, this is the same as the standard Speedmaster. Production was limited to 28 units.
Speedmaster
Ref ST151012
Ser:
Cal: 1141
Manufactured: 1996
This Speedmaster Racing was first sold in 1996. It was created to commemorate the conclusion of an advertising contract between Formula I driver Michael
Schumacher and Omega. It has a leather strap the same color as the dial.
Speedmaster
Ref ST151061
Ser:
Cal: 1141
Manufactured: 1996
This is a red Speedmaster Racing Model. The exterior portion of the dial evokes an image of a checkered racing flag. The chronograph hands are yellow on the red
model, and red on the yellow model.
12'b Column
Speedmaster
Ref
Ser:
Cal: 1152
Manufactured: 1997
This and the following models were announced at the 1996 Baser Fair and are scheduled to go on sale in 1997. All the chronograph hands are a uniform red color. On
the dial is a fine, wedge-shaped indentation, and the Omega symbol is raised.
Speedmaster
Ref
Ser:
Cal: 1151
Manufactured: 1997
A month and day indicator is located with the 30-minute timer, and an aircraft hand indicating the date is in the center. A 24-hour timer is located where the second
hand is normally found.
Speedmaster
Ref
Ser:

Cal: 1151
Manufactured: 1997
The chronograph hands are all red, while the date indicator hand is yellow, giving the watch a colorful and easy-to-see appearance.
Speedmaster
Ref:
Ser:
Cal: 1152
Manufactured: 1997
The Arabian numerals on the bright'white dial are impressive. The watch also has a fine, wedge-shaped indentation.

With the 6mt Speedmaster model. 6his visual camog is completo Aldhough other 5m edmaster v uiadom exisC bhe 60 Speedm~ter variaions sho m cover ~l the b~uic models. Edited by Kiyoko Semba Hitoshi Hirama .

P129
Center Top - The issue of selecting chronographs for astronaut use became so entangled that it gave way
to suspicion that someone was working to make sure that
Bulova watches were not used. Frank Borman, who flew on Gemini and Apollo 8, and David Scott, who flew on Gemini 8 and Apollo 9 and 15. were said to have
expressed their opinion that the Bulova timepiece were superior to the Omegas but had been muzled It was later discovered that this statement was without
foundation.
Left Middle - The Omega-Bulova problem was conveyed to the White House, and an inquiry was made inti the facts. The result was that no statement had made that
supported the products of a particu[ar watch company, and the matter was dropped The idea behind this
was that it would have been good for publicity if NASA had
endorsed one brand over the other.
Left Bottom - At the time of selection of a watch 6r the Gemini program, there was not even one domestic US made chronograph that was suitable. Now any number
of durable watches were available. So retesting was conducted. The answer this time, however, was still the Omega.
Right -- Yuri Gagarin, the Soviet cosmonaut and the first human in outer space, wore a Russian wristwatch. It was a standard watch, not a chronograph. When the U.S.
Project Mercury began. Scott Carpenter wore his own Breitling Navigator on the Aurora 7. Walter Schirra wore an Omega Speedmaster on the Sigma 7, while Gordon
Cooper wore two watches on the Faith 7: an Omega Speedmaster on his leR wrist and a Bulova Accutron on his right.

The Mercury program was concluded in May 1963; the next program, Gernini, began in March 1965. During the period between the two programs of almosttwo years, the process of selecting a watch that could withstand space flight and outer space was conducted.

Astronauts have continued to use the Speedmaster as government fumished equipment to the present day. The Speedmaster is a small mechanism for telling time. The ability of this wristwatch, commonly used in everyday life, to go into outer space without any special modifications, is part of the Speedmaster appeal. Behind this is another interesting story, and it was certainly not something the Speedmaster had sought after. Although the Speedmaster was at the center of the controversy, there was in fact very little that could be done. It was always in a position of waiting and seeing, although eventually, the Speedmaster would convince others of its superior ability. For Omega, rivals that

appeared on earth were perhaps more difficult to fight than the rigors of outer space. In the end, however, the Speedmaster was able to continue flying in outer space because of its performance, ease of use, and sturdy manufacture ~ basic requirements for watch making. This is the reason it has continued to be govemment fumished equipment.

The foundation of the Speedmaster is none other than the perfommance of the chronograph, the framework of which was created by Omega master watchmaker Albert
Piguet. And those that supported the Speedmaster were its friends -- the astronauts -- who continued to challenge space and face its dangers. It was reassuring for the
Speedmaster to receive their support.
P130
1 972
Left -- Bulovawatches were finally tested by NASA. Only 16 ofthese watches were manufactured and if the watches passed the tests,there was apossibility thatthey
would be used on Apollo 17. Even if the Bulova watches passed, however, the astronauts wanted to bring
along their reliable Omega Speedmasters as "insurance.
Formidable Watch Competition for Outer Space Flight Use

Although the Omega Speedmaster was offcially given flight qualifications by NASA in 1965, this status was not guaranteed to continue. A number of Omega's watch making rivals were seeking such status, the most formidable being Bulova. Bulova is an American watch company established in New York in 1875. The founder's son, the company's second president, died just before the U.S. space program moved into the action phase in the 1960s. The next to take Bulova's helm was former General of the U.S. A~my Omar N. Bradley.

Bradley moved up from head of the R&D department to chairman. His first decision as chaimman was to make Harry Henshell president. Bradley had been a five-star Army general fighting on the front lines in Europe during the Second World War, and Henshell had been a colonel under his direct command. In other words, these two had led the largest organization in the U.S. Army. Bradley and Henshell, who both understood fully the importance of the space program and had close connections with the U.S. State Department, felt that they wanted the astronauts to wear Bulova watches. It was thus natural for them to engage in an aggressive strategy to depose the Speedmaster.

Bradley hired Marx ~ eva former assistant secretary of defense, as the company's attorney, and Leva appeared at hearings and committee meetings heid by Congress. His goal was to use his ccnnections and experience with the Army to procure a decision favorable to Bulova. A contract was concluded to use a Bulova Accutron as the cabin timer for the Gemini Program. Bulova, however, missed the opportunity for wristwatches. Even with the start of the Apollo Program, Bulova worked to get the decision to use Omega chronographs overturned. NASA sent letters tuming down Bulova, stating that the matter had already been decided and there was no time to conduct testing again. NASA's attitude toward Bulova's attack was polite, but there was no ambiguity and its intent was conveyed clearly. NASA indicated that the next procurement would take place in 1970, and Buiova was invited to participate at that time.

Bulova then proposed to supply newly developed timepieces free of charge, and it wanted NASA to replace the one it was currently using with these. But if different wrist watches were used in manned space flight, it could add an unclear element. This had to be avoided. and the Bulova timepieces had no significant advantages over the Omega, so Bulova - groposal was rejected. The reason for the rejection was that "the Omega watches are suffcient and perform accurately, so there is no reason to makc a change and a changc wi,; require a iarge volume of paperwork. Bradley decided that the superior position of Omega was unshakable, so he stopped making appeals to the divisions that ran the selection and testing of wristwatches.

NASA thought that the matter had been concluded, but this was not so. Bulova had changed its strategy
and began making appeals to Congress. NASA's budget
required Congressional approval and any approach from Congress could not be ignored.
P131
Top Left -- Environment tests were conducted on chronographs on September 22, 1972, to determine if they were appropriate for space flight. The participating Omega
chronograph was the Speedmaster. Two Bulova wrist chronographs were also purchased for testing purposes. The movement of the Bulova watches were purchased
through its subsidiary in Switzerland, Universal Geneva
Top Right - The Manned Spacecraft Center (MSC) conducted movement accuracy checks using a Bulova Vibrograph B-200 watch rate recorder. One watch was
deemed unacceptable for environment testing. The other passed the requirements except for humidity and acceleration. It stopped operating during each of three
consecutive humidity cycles, thus failing to meet the specified requirements.
Left center- During the acceleration test, the test watches were subject to 20G +-2G of acceleration along each perpendicular axis. The diagram indicates the method
of placing the watch and the axis oF applied force.
Left lower center- Flaws and their observed causes are recorded for each test item of their environment test for each chronograph. The performance limited of the
Bulova watch quickly became apparent.
Right center- Paragraph 4.2.7, the vibration test, establishes a procedure from steps (a) to tn). For each step, the inspectors record the hours, minutes, and seconds.
The Bulova chronograph cleared the vibration test except for one step.
Bottom - In paragraph 4.2.5, the humidity test, the Bulova did not have acceptable test results. In particular, during the second and third tests, an abnormality occurred
in the chronograph function and it stopped. The path to the Bulova watch becoming an astronaut chronograph was now closed.

The chronograph environment tests used equipment such as a variable temperature chamber, a pressurizer, and a vibration generator. Detailed data for test items, including the manufacturer, model number, serial number, range, and accuracy, had to be recorded.

P132 .

1972 Final Apollo ?~!ission omeea Flies to the Moon with Apollu 17

The conclusion of the Apollo program was nearing, and talk about the Skylab and Space Shuttle prograrns were beginning to be heard. General Bradley, having determined that it would be impossible to overturn the support for Omega, switched to a strategy of obtaining support from the highest levels in the U.S. goverr.unent. Senator Jacob Javits, Senator Stewart Symington, Senator Jarnes Buckley, and Congressman John Wydler sent a letter to NASA asking about the matter of the watches the astronauts were using.

The watch issue was also taken up in Congress. Congress asked why the space program, undertaken by the nation, did not use a domestically produced watch. Inquiries were also made to NASA from the White House, which had been asked for an answer to that question. The repercussions felt throughout NASA were much greater than one would expect fronn a problem concerning a small wristwatch Responding to the questions from Congress was the job of the administrator and deputy administrator, but the upper echelons began to vacillate Deputy Administrator Low was relieved when he was somehow able to convince the lower divisions to begin the process for procuring new astronaut timepieces He wrote to Administrator Fletcher, As soon as the proper form for the initial solicitation has been detemmined, it will

be possible to respond to Senator Buckley's letter in a positive way." Hence, Bulova's strategy had made one step toward success.

The ticket to outer space then depended on actual performarice NASA sent notifications to 17 watchmakers including Bulova, Omega, Brertling, Rolex, and Seiko. Companies that wished to bid would have their products undergo environment testing, and the watches that passed the tests would be placed on the qualified product list (QPL). Placement on the list signiftes only that the products are recognized as being of the quality to meet the conditions required by the specifications. This is the recognition Bulova wanted. Finally, Bulova products were to undergo testing "The test items are high temperature, vacuum, low temperature, humidity, oxygen atmosphere, acceleration, vibration, and others, the same tests that Omega underwent in the past. During the humidity test, the Bulova watch stopped three times, and it stopped again during the acceleration test. According to the criteria, it must be concluded that the Bulova chronograph is not appropriate for tbe Apollo 17 mission." With this result, the testing of Bulova products ended.

Administrator Fletcher made an offcial report to Senator Buckley and the White House. With this conclusion of the Bulova problem, the burden on his shoulders was
removed. Apollo 17 was launched, with the Omega Speedmaster, on December 7, 1972, and tetumed to earth on December I9. As ofthis writing, that was the last time
man visited the moon.
Picture - Astronaut Thomas Staftord flew in Gemini Vl in 1965, Gemini IX, Apollo 10, and in ApollolSoyaz, the joint flight experiment between the U.S. and Soviet
Union in July I975. After retiring from NASA, Stafford becarne a director at Omega
Bottom Left to right - A report from NASA Administrator James Fletcher to Senator Buckley conceming astronaut chronographs. The Bulova chronograph submitted
in accordance with the Buy American Act had unsatisfactory test results. A similar letter was sent to the White House.

Bulova requested a detailed explanation conceming the test results reported by Administrator Fletcher. Donald Slayton, director of Flight Crew Operation, and Colonel Thomas Stafford, former astronaut and deputy director of that department, were in charge of this issue.

Apollo 17 was the last Apollo space mission and was the flight that Bulova wanted to participate in at any cost This is the congratulatory telex sent to NASA from the vice president of Bulova the day after Apollo 17 returned safely to earth. At the end of the letter, he emphasized the strong bonds between Bulova and NASA since 1959. P133 7-19December, 1972,Apollo 17 Eugene A. Cemen Ronald E. Evens Harrison H. Schmitt

Left top picture -- The three members of the Apollo 17 crew in front of the lunar rover prior to launching. On December 7, 1972, Apollo 17 was launched with the last
persons, as of this writing, to set foot on the moon. At present, there are no plans to rewrite that record.
Left middle picture -- Astronaut Ronald E. Evans, Apollo 17 command module. Launching is a "dress rehearsal" which all equipment is wom for inspection.
Left bottom picture -- Omega model number 6129 purchased from the Norman Morris Co. in New York for use as the Apoilo and Skylab chronograph. Usually, only
the item code number, PIN-SEB 12100039-002 and not the name of the user was engraved in the back. This watch, however, is manually engraved with "This watch
was worn by Ron Evans on Apollo 17," and the date. Engraved on the side is "REE," Ronald E. Evans' initials.
P134-135
Picture -- A limited edition of 500 units were made of this model to commemorate the Apollo-Soyuz Test Project in 1975. An embiem for this joint experiment is

printed at the 12 o'clock position instead of Speedmaster and Professional.
Battle Between Omega and Bulova, Unexpected Facts Brought to Light

What brought about the decision to make new acquisitions of ehronographs for Apollo 17 was none other than General Bradley's appeals. The test results indicated that the watch's performance did not meet the standards, and it was thought that 8ulova's future path into NASA had been closed. There is no more apparent reason than the failure to meet the standards. It would not have been strange to think that the Bulova problem had thus been taken care of But the actuality was different General Bradley, although a retired general, was not about to withdraw afterjust one defeat. He was more sophisticated than the NASA offcials when it came to lobbying activities.

During the 1970s, thanks to Bulova's activities, NASA made it possible to obtain infomnation about its technical specifications, the procurement provisions manual, . . and qualified products. It was confimmed that compared to the environment tests conducted in the 1960s, the chronograph conditions required in outer space in the 1970s had not changed at all and contained the same, strict standards. Bulova also raised the Buy American Act. ~ ~ ~

Off~cially, "Buy American" was contained in the Buy American Act in accordance with U.S. Law Article 41 Paragraph 10 (a) to (d). The very reason that Bulova was able to get Senators to act was because of this Buy American law. The intent of the law was to have the U.S. government purchase U.S. products. But what is an U.S. product? Domestic products are defined as follows: "if at least 51% of the cost arises from components manufactured in the U.S. or produced in the U.S., then the product shall be considered as U.S, made."

If a specified product is deterrnined not to be a U.S. product in accordance with these provisions, the price specified to the government is to be increased by 6% at the time of verification of the origin of the product. To the extent that the price is increased, then product price competitiveness is decreased by that amount.

Bulova initially infommed NASA that "at least 90% of the components of its products are U.S. made, and less than 10% are foreign made." NASA sent four employees, directors of procurement, legal affairs, and technology and an auditor, to Bulova in Woodside, New York to confirm this.

Bulova did not expect that a team of specialists would visit them to conduct such a thorough investigation. Furthermore, conceming the Buy American Act, "Bulova did not understand the law fully, and the team spent considerable time explaining it and answering their questions." The team inspected each facility and discovered the

- following points:

(1) Although the company certainly has production capacity, this is only for production of products that go on the general market and devices with clock functions, and that eapacity is not used for production of chronographs. (2) The movement used in the astronaut use chronographs obtained from Bulova were purchased in their entirety from Bulova's 100% subsidiary in Switzerland, Universal Geneva, located in Bienne. Other components, however, including the case, crystal, and dial are manufactured by the Bulova Watch Co. (USA) or are purchased from other companies. According to Bulova, Universal Geneva purchases fully assembled movements manufactured by various companies in Switzerland and uses other parts to create completed products and includes the Bulova chronograph brand name. It exports these fulEy assembled units to the Bulova Watch Co. (USA). Next, Bulova uses this movement, a stainless steel back cover, and a Swiss-made O-ring gasket as a base and adds to this base a new case, dial, and other components that it manufactures or purchases to manufacture the astronaut chronographs. It was found that the 16 chronographs were handmade and that Bulova did not have a production line to manufacture more of them.

Bulova's initial claim that 90% of the componenB were U.S. made was false. The proeesses to manufaeture the components for the 16 watches as well as the development costs for the tools, however, arose in the U.S. If the S13,000 dollars in research and development costs are added to the total costs and apportioned among the units, then the Bulova timepieces met the conditions of the Buy American Act and Bulova's claim was recognized. This is a rather flexible interpretation of the act.

Omega, too, was not just sitting around passively taking on the attacks by Bulova. On paper, the Speedmaster also 4ual;fles as U.S. made. Omega used chronograph cases manufactured by the Star Watch Case Co. in Ludington, Michigan, and the crystals were sent from Switzerland to Star Watch, where they were mounted on the cases. The assembled cases and crystals were then sent to the Hamilton Watch Co. in Lancaster, Pennsylvania, where they underwent inspection. After inspection they were sent to Switzerland, where the movenient was installed and the Speedmaster was completed. The reason that the components went back and forth between the U.S. and Switzerland was that it was necessary for Omega to have manufacturing costs in the U S This was Omega's desperate measure to clear the Buy American Act, and perhaps Omega's and Bulova's efforts were evenly matched strategies.

General Bradley, who had made a frontal attack and withdrew, would now attack from the rear This is how the question of where the astronaut's watches ended up came about.

Gl goods, however, are govemment property and there is an obligation to return them after use Bradley, who had many years of experience in the Am~y, understood fully the regulations. And based on this understanding he asked the question about where the watches were.

In a panic, NASA made a suney of the locations of the watches Since 1964, NASA had purchased a total of 97 chronographs. When making purchases, NASA had requested only Omega Speedmasters. These chronographs were used on all the manned space missions beginning with Gemini 3 Of the 97 watches, 17 could no longer be used or had been lost. In 1972, there was an inventory of 20 unused units at the flight center The remaining 60 units had already been used or had undergone repairs to bring them up to specifications.

Meanwhile, in a memorandum dated June 14, 1972, Administrator for Manned Space Flight James Fletcher received a memorandum from his associate administrator. which contained the wording, "We should consider an arrangement wherein we loan the astronaut, for the duration of his life, a watch he has worn during the flight.'' If Fletcher had acted on that suggestion, a need would have already emerged to replenish the watches. P134 Bottom left to right- General Gl goods indicates all items distributed by the govemment. There is an obligation to retum such fumished equipment to the govemment. The astronauts were supposed to retum their Omega Speedmasters after use, but in this Letter William A. Anders from Apollo 8 explains why he cannot return the watch.

The letter, addressed to Senator Symington, explains the circumstances of the selection of the Omega Speedmaster as the astronaut chronograph that the crew can use to 'perform short interval timing" such as photographic exposures, for conducting separation of empty fuel cells and for extravehicular activity, and can be procured at Low cost.

The process of selecting an astronaut chronograph for the Space Shuttle program was started. Fifty-six chronographs were to be procured from bids. Required was a one-year no-charge warranty with the option of extending the warranty for the same service for an additional year. Companies that wished to submit bids must have their cbronographs undergo environmental testing. The deadline for submissions was at June 21, 1978. P135 Bottom left to right- The Chronograph case used by Omega was manufactured by Star Watch Co., an US company, and the assembled case and crystal were sent to Hamilton Watch Co. in Lancaster, Pennsylvania, to undergo inspection. It was then sent to Switzerland

where the movement was installed. Representative Wydler made an issue out of this, asking whether this still satisfies the Buy American Act.

Bulova emphasized that the Bulova chronograph had cleared every test but that the Omega chronograph failed during the vibration test and that Bulova has its
research, development, and manufacturing facilities in the US, unlike Omega, and therefore can respond quickLy to modifications and improvements. Bulova wanted
NASA's approval so badly that it went to extreme limits, pointing out that the specifications themselves were so flawed as to render them unreasonable.
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Top left -- The Apollo-Soyuz Test Project was hailed as a victory for technology and politics. The U.S. and the Soviet Union, the two super-powers of the east and
west, embarked on a joint mission in outer space. The cosmonauts in Soyuz 19 and the astronauts in Apollo 18 passed through the docking hatch to shake hands.
Stafford and Slayton make a toast with Vodka tubes filled with borscht. •

Vance Brand, pilot of the Apollo 18 command module, wears an Omega Speedmaster on his right wrist while holding a flight manual. The Speedmaster, standard issue for the American astronauts, was aLso used as a chronograph by Soviet cosmonauts starting this test project. Top right -- AleKsel Leonov, during training at Star City in the out-skirts of Moscow in preparation for the Apollo-Soyuz joint experiment, is holding two commemorative medals cut in haLf The other two halves are being held by the American side. The astronauts and cosmonauts combined the medaL halves in outer space to make two complete medals and brought one back each to their respective countries. The chronograph on Leonov's wrist is the Omega Flightmaster. Bottom left -- Soyuz's civilian engineer VaLeri Kubasov signs the document establishing the successful conclusion of the Apollo-Soyuz experiment. The following names were also included: Captain Aleksei Leonov, Thomas P. Stafford, Vance D. Brand, and Donald K. Slayton.

In 1975, when the hatch linking the American and Soviet spaceships was opened, Stafford and Leonov both recognized each other's familiar faces &om theirjoint training sessions. The first step to their meeting in space was a handshake in July 1962 between NASA and the USSR Science Academy. Bottom right -- American astronaut Stafford, wearing a brown and white "Snoopy hat," and Leonov of the Soviet Union successfully completed the Apollo-Soyuz docking and spent two days visiting each other. Both the U.S. and Soviet Union used Omega Speedmaster chronographs during this project. P138 1981

12-14 April 1981, STS-I John W. Young Robert L. Crippen

ge of the Shuttle - Fruits of Labor Achieved in the T`ventieth Centun

On August 9, 1972, even as the last Apo'lc mission stiLI remained to be launched, Rock~vell Co. was approved by NASA to construct the Space Shuttle orbiter. On ~vlarch 27, 1975, the manufacture of the rear airframe of Columbia was started. Four years later, on March 24, the completed white body of Columbia was delivered to the Kennedy Space Center. It was still another two years before it actually took off as STS- I -- the first Space Shutde -- leaving launch pad A at launch tower 39 on April 12, 1981. The captain was veteran astronaut John W. Young, who made the first Gemini flight. The pilotwas Robert L. Crippen.

The two-person crew retumed to earth two days, 6 hours, 20 minutes, and 53 seconds after launch. Young applied Columbia's brakes on runway 23 at Edwards Air Force Base -- not a splash down, but a landing. Beginning with the Space Shudle, spacecraft that retum to earth from outer space will retum by Land not by sea. From this first mission until November 1996, Columbia made a total of 21 flights. The second Shuttle, Challenger, which was lost in an explosion, made 1 I flights; Discovery 21 flights; Atlantis 17 flights; andEndeavour 11 flights, atotal of 80 missions. The 81stmission, made byDiscovery,was in

February 1997. Control of Space ShuttLe missions is handled by the flight controllers at the Johnson Space Center in Houston.

The flight manager -- the team leader -- has overall responsibility for the operation and safety of the mission and makes all decisions. His call sign is "Flight." In charge of communications with the Shutfle crew is "CapCom." An abbreviation for "capsule communicator," it remains from the days when the Mercury spacecraft were called capsules. The holder of the call sign "Fido~ prepares the maneuvering plans and works with "Guidance" to supervise the Shutfle's flight path. This team, which also includes a doctor, an engineer who processes the infommation received from the on-board computers, an engineer who monitors the engines and tbe solid rocket fuel boosters, persons in charge of the flight guidance equipment and the communications equipment, and others, comprises about 30 specialisB The team works in eight-hour shifB, 24 hours a day, until the Space Shuttle retums to earth.

The mission control center is located on the second floor of the square building No. 30. The large screens that cover the front wall of each of the flight control rooms look different from those in ordinary flight control rooms. These screens show the orbiter's position in real time as well as the video images of the crew's condition, the earth, and extravehicular activities. On a separate display, the elapsed mission time and the time remaining until completion of the current task are shown. During the mission, the one element that links the crew and the staff team controllers is time. The complex system of coordinating a space flight consists of many individual systems that, while fulfilling their own roles, are coordinated closely with one another, and drive the mission as if it were an autonomous living creature. From the time of lift-off to when the Shuttle glides back toward the runway at the Kennedy Space Center, the entire time of this mission is streamlined into one time frame.

The space project is alive. It moves and changes daily in such a way that "you can never clearly know what new possibilities tomorrow will bring," said a member of dhe space progimm smffwho worked on dho Apollo pm~ect Some possibilities include sending an unm mned space pmbe to vwious pl mc s in the solm syslem, sendin

humans to tht moon, sending humans to land on Mars, and creating space _ions to orbit around dhe earth. In addition developing new materi ds, researching new medicines, and cultivating planB are scientific experimenB that can be conducted in outer space without the influence of gravity, and the results have been beneficial.

In the future, humans Will ride a Space Shut'de to travel back and forth between this and other planets, just as we do today when travelling to other countries by air. These projects and experimenB have already been achieved or are awaiting implementation. The Mars Pathfinder, an U.S. unmanned probe landed on Mars on July 4, I997.

A man walked on the moon for the first time in I 969. The rocks he brought back at that time gave clues about the origins of the moon, and further increased our knowledge about the beginnings of the earth. The view of the sunrise on earth from the monochrome world of the moon taught us that we live on a fortunate planet that has the almost miraculous benefits of water and an atmosphere That view made us realize how fragile and delicate the environrnent that sustains our life on earth is. The discoveries are not limited to science alone The fact that we have gained a perspective to view earth from the ouBide has influenced our thoughB and the ways in which we consider society.

The progress of technology through the space programs has been extremely rapid Today, the computers owned by individuals are far more advanced than the machines the U.S. govemment used to mobilize the space prograrn several decades ago Using the power of the technology that has influenced various aspects of our daily lives, what will we pass on to the next century? From Daguerre, bom in France in the late eighteenth century, who invented photographic technology, we gained the means to record images. The equipment to record sound was completed with America's Edison, who developed the phonograph.

Since the last century, when the ability to store images and sound was achieved, recorded infommation has increased our power to recall infommation many fold. Today, such infommation, including images, sound, and text, has been replaced by the digits 0 and I. The fact that information can be converted into numerical combinations allowed it to be spread instantly throughout the world, and it became a nomm to share infommation simultaneously in different places.

As we enter the transition stage into a new century, we ask ourselves what it is that we must pass on to future generations. In the distant future, when humans no longer travel to outer space, but in fact live in outer space, what will people think when they see Neil Armstrong of Apollo 11, wearing a clumsy space suit and climbing down the ladder of the lunar lander? We hope the energy that was exerted in the ordeal to enter outer space and the human spirit of adventure to embark into an unknown world will be conveyed to future generations, no matter how far into the future it may be. The adventurers of our time are precisely the messengers who tell the people of the future where they came from. Will the people of the future who notice in past images that the twentieth-century astronauts in outer space all have in common a small, black article on their wrists, have a puzzled expression on their faces? Or will they immediately recognize that it is a watch? And furtherrnore, will they already know that it is a chronograph with the name Speedmaster? In the Speedmaster, are engraved the detemmination of those persons who impacted an era and a spirit of challenge that was undaunted by the mysteries of the unknown world. The Speedmaster is an essential tool and a testimony for conveying the spirit of the adventurers of our era to those in the future. P140 Chapter 3 - SPEEDhlASTER ANATOMY

The Speedmaster project began at Omega's main facility in the Swiss city of Bienne. The basic 27 CHRO C 12 movement, first developed in I942, was further refined
and incorporated into the Cal.321, the heart of this accurate and stable chronograph. The Speedmaster production line started operation at the beginning of 1957. The
very first model, with a small dial set into its black face, iea Bienne for the world marketplace the next year without anyone imagining that one day the Speedmaster
would leave the earth and land on the moon. The Speedmaster won the world's attention for the role it played as part of the success of the Apollo 11 moon landing in
1969. Subsequently, the astronaut-approved Speedmaster took the path of constant refinement and innovation.
P142
The Omega Speedmaster Family
The Speedmaster Family continues to include a number of manually-wound movements used in a multitude of variations for a wiae range of purposes.
Cal.321 (Manual Winding)
FIRST GENERATION

The movement chosen for the renowned first model of the Speedmaster was the Cal.321, which already had a solid reputation as part of the Seamaster series. Omega launched the 27 CHRO C12 project jointly with Lemania in 1942, which led to the development ofthe new Cal.321 movement. The "27" in the project name referred to the movement diameter of 27mm. "CHRO" is an abbreviation for chronograph, while "C 12" refers to a 12-hour timepiece. Omega was then using chronograph movements of three different diameters: 28.9mrn, 33.3mm, and 39mm. The company needed, however, a new 12-hour chronograph movement that was smaller and designed specifically for use in a wristwatch.

At the time of its introduction, the 27mm diarneter I P-hour chronograph movement was the world's smallest, and even today it remains one of the smallest available, It combined revolutionary new shock resistant and antimagnetic features.

Year Reference Model Name

1957	CK2915
	Speedmaster First Model
1959	CK2998
	Speedmaster
1962	105.002
	Speedmaster
1963	105.012
	Speedmaster
1963	105.003
	Speedmaster
1966:	145.003
	Speedmaster
1966	145.011
	Speedmaster Professional

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Cal.861 (Manual Winding) SECOND GENERATION

In an effort to achieve still greater time-keeping precision, Omega adopted the high-oscillation Cal.861 movement. Nct only was the oscillation frequency per hour increased from 18,000 to 21,000, butthe numberofcomponentpartswas reduced, thus making repairs and adjustments simpler. The adoption ofthe Cal.861 was partly

- because of changes in Omega's production system. To accommodate higher production runs, Omega needed a movement that required fewer production processes and

retains its precision with the use of mass-produced parts. The highly sophisticated Cal.861 is still in use today, having undergone only very minor changes.

The advances compared with the Cal.321 are obvious. Development of the mechanism gave it more complex functions, yet the structure remained simple. The wheel pillar was omitted, and time was set simply by twisting the stem, even to make very slight adjustments. The number of chronograph element components were also significantly reduced.

Year Reference Model Name

1968	145.022
	Speedmaster Professional
1969	145.014
	Speedmaster Professional Mark II
1969	145.022
	Speedmaster Professional Apollo I I Commemorative Model
1970	145.0022
	Speedmaster Professional
1972	145.0034
	Speedmaster Professional Mark II
1972.,,	145.0014
	Speedmaster Professional Mark II
1974	145.0037
	Speedmaster Professional Mark 11
1975	145.022
	Speedmaster Professional Apollo-Soyuz Commemorative Model

1982 345 0303
Sm odm"ler Pmfessiona4 Ce m m Limited Edition Mmdsl
l

1987 345.0802
Speedmaster Professional
1987 345.0022
Speedmaster Professional
1989 145.022
Speedmaster Professional Apollo 11 20th Anniversary Commemorative Model
1991 145.0022
Speedmaster Protessional German Limited Edition Mir Model
1994 345.0022
Speedmaster Professional Apollo 11 25th Anniversary Commemorative Model

1994 , 145.0022
Speedmaster Professional Apollo 11 25th Anniversary Commemorative Model
1995 145.0022
Speedmaster Professional Apollo 13 25th Anniversary Commemorative Model
1995 345.0022
Speedmaster Professional Mir model
1995 145.0022
Speedmaster Professional Mir model

P144 Cal.1040 (Self Winding) THIRD GENERATION

The Cal.1040 was the first self-winding movement used in the Speedmaster family There are two main problems with self-winding movements in a chronograph. First is thickness, not only of the movement itself but also of the rotor Second is that space for the gears that transmits the motive force from the winding rotor to the mainspring cannot be secured because it interferes with the chronograph movement The Cal.1040 did not solve the problem of thickness, but it adroitly circumvents the problem of space for the gears.

The case design, however, leaves the thickness of the movement hardly noticeable In the center of the rotor element are the bearings that reduce friction and resistance. As a result of the addition of the self-winding movement, the inner-dial placement has changed.

Year Reference Model Name

1971 176.0002
Speedmaster Professional Mark III
1972 176.0005
Speedmaster Professional Mark III
1972 176.0004
Speedmaster 120m
1973 176.0009
Speedmaster Professional Mark IV

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Cal.1041 (Self-Winding Chronograph) Fourth Generation Left -- The word "chronometer" is proudly written on the dial. The watch's design conveys a sense of seriousness appropriate to the commemoration of the 125 anniversary of the Omega Company's founding. Top -- The Cal.1041 represents the first chronometer movement used in the Speedmaster family. Omega fine-tuned the

design of the Cal.1040 as part of the company's 125tb anniversary celebrations, and sold 2,000 units as a limited edition. To qualify the Cal.1041 as a chronometer, it was necessary to reevaluate each and every part, andthe watches were assembled notby machine but byskilled craftsmen. As a result, the Cal.1041 is atotally different movementffomthe Cal.1040.Nevertheless, because the Cal .1040 served as such an excellent foundation, the Cal .1041 was easily able to obtain certification as a chronometer. RightMiddle -- At frstglance, the differences between Cal.1041 and Cal.1040 are far from obvious. On close inspection, itcan be seenthatthe design of every part has been "fine- tuned." Adjustment is also important, but by itseif, it is not enough to qualify a movement as a chronograph. Bottom -- The movement is stamped with a notation ascertaining adjustment in five-positions and temperature differential adjustrnent. This stamping does not appear on the Cal.1040. Year Reference Model Name

1973 378.0801
Speedmaster 125: Omega 125th Founding Anniversary Commemorative Model

P146

Cal.1255 (Tuning Fork Chronometer) FIFTH GENERATION

The Cal.1255 movement makes use of the vibrations of a tuning fork. Tuning forks have been little used since the emergence of quartz, but some members of the Speedmaster tamily made use of this technique. This movement was developed not by Omega, but rather by Bulova, which supplied it to Omega. This is why the movement is stamped with ''Licensed Bulova.~ The two companies were in a close race to get their products adopted by NASA, and this perhaps has something to do w ith the history of this timepiece. The Speedmaster remained the choice of NASA, as it still is today. Right middle -- Both the tuning fork and quartz methods employ button-sized batteries as power sources. When the watch is close to the ear, the high-pitched sound of the tuning fork vibrating in the watch is apparent. The second hand moves in a smooth, sweep-second type of movement.

N" ir Reference Model Name

1973 388.0800
Speedsonic
IQ~; 188.0002
Speedsonic
IY~5 388.0800
Speedsonic Chronometer
19.5 188.0801
Speedsonic Chronometer
1975 188.0002
Speedsonic Chronometer

P147

Cai.1045 (SelfWinding) SIXTH GENERATION

Omegauses its own in-house numbering systemto referto calibernumbers of its timepieces. The Cal.1045 movement is the same as Lemania's Cal.5100. In the center is a 60 minute, 12 hour movement that can also display the date and the day of the week along with the time in 24-hour format. This movement is still in production today and its reputation for refinement and sophistication has led a variety of makers to adopt it as the movement in their chronographs. Omega fine-tunes the movements it is supplied with and stamps the Omega name and logo on the case. Right middle -- This movement is characterized by four separate hands in the center, including a 60-minute hand shaped like an airplane wing. This requires a wide clearance between the dial and the cover. The watch makes use of many plastic parts. which facilitates maintenance and reduces weight.

Year Reference Model Name

I g74	176.0017 Speedmaster Automatic
1974	376.0804 Speedmaster Automatic
1974	176.0016 Speedmaster Automatic
1974	176.0014 Speedmaster Automatic
1974	176.0012 Speedmaster Auto matic
1974	176.0015 Speedmaster Automatic
1974	376.0805 Speed master Automatic
1915	176 0dl2 Speedmmtor M~uk IV
::	~-
1984	376.0806 Speedmaster Ma~k V
1987	376.0822 Speedmaster Automatic

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Cal.1620 (Quartz) SEVENTH GENERATION

The Cal.1620 represents the first quartz movement IA the Speedmaster family Compared with today's digital quartz movements, it offers only rather simple functions, but it is more than suffficient to prevent erroneous operation, and is very easy to use Then, quartz movements had much greater power consumption than

- today's movements, and required thick, large-capacity button-type batteries This movement solved the problem by using two button batteries instead of one. Because

digital watches do not need moving parts, the watch is maintenance ffee except for changing the batteries, although if the watch is broken it is impossible to replace the parts, so it becomes essentialy unrepairable. Right top -- Digital watches have no moving parts, and therefore no jewels, either This is why No Jewel is stamped on the movement. Although the movement in the illustration completely fills the interior of the case, technical advances now make it possible for the movement to provide the same functions in less than half the size. Year Reference Model Name

1977	386.0809 Speedmaster Quartz
1977	186.0009 Speedmaster Quartz
1977	186.0801 Speedmaster Quartz
1977	186.0005 Speedmaster Quartz

1977	186;0004
	Speedmaster Quartz
1977	386.0805
	Speedmaster Quartz

Right bottom -- On the lower part of the diaJ appears the word "Speedmaster" along with the word "Professional." It is unusual for a non-manually wound Speedmaster watch to use the term "Professional." P149 Cal.863 (Manual Winding) EIGHTH GENERATION

The Cal.863 is a refinement of the Cal.861, with added gold plating and decorative "Geneva Wave" finish. The movement, which uses a transparent skeletal rear cover to show its interior, was used in the limited edition model.

Year Reference Model Name

1980	345.0808
	Speedmaster Professional Special Model
1987	345.0808
	Speedmaster Professional
1991	145.0808
	Speedmaster Professional
1992	145.0052
	Speed master 27 CH RO C12 50th Anniversary Special Edition
1992	345.0052
	Speedmaster 27 CHRO C12 50th Anniversary Specia Edition
1995	145.0052
	Speedmaster Mir Special Model
1995	345.0052
	Speedmaster Mir Special Model

Cal.861L (Manual Winding) N1NTH GENERATION

The Cal.861L also represents a refinement ofthe Cal.861, with rhodium plating applied. Rhodium has a bright silver sheen and high malleability. Needless to say, a transparent skeletal rear cover was used in the limited edition model.

Year Reterence Model Name

1980	145.0039
	Speedmaster Professional Special Model
1980	345.0802
	Speedmaster Professional Special Model
1985	445.0802
	Speedmaster Professional
1987	445.0802
	Speedmaster Professional
1987	345.0802
	Speedmaster Professional

Cal.1660 (Quartz) TENTH GENERATION

The Cal.1660 is an analog/digital movementwith a 1/100~ second LCD display atthe 12 o'clock position. In the center is achronograph second hand and an hour hand' while the inner dial is equipped with a 12-hour hand and a 24-hour display.

Year Reference Model Narne

1982	386.0815 Speedmaster Prototype
1984	386.0815 Speedmaster

Cal.866 (Manual Winding. Moon Phase) ELEVENTH GENERATION

- The Cal.866 movement is a Cal.861 movement with minor changes, an addition of a date and moon phase indicator at the 12 o'clock position. This movement was

manufactured and sold as a limited edition, with only 2,000 units produced. Year Reference Model Name

1985	345.0809 Speedmaster
1986	345.0810 Speedmaster

P150

Cal.1140 (Self Winding) TWELFTH GENERATION

The Cal.1140 combines a 12-hour indicator with self winder in a small-diameter movement. This movement adopted a different approach to providing self-winding features in a chronograph. Normally, this involves attaching a rotor to the chronograph, but since this model adds chronograph functions to a self-winding movement, the self-winding element and the chronograph elements are separated in two. As a result, the chronograph functions are concentrated on the dial side, and none are visible ffom the backside.

Year Reference Model Name

1988	375.0032 Speedmaster Automatic
1988	175.0033 Speedmaster Automatic

1988 475 0032. Speedm~uter Automatic

1988	375.0033 Speedmaster Automatic
1989	175.0032 Speedmaster Autgmatic

The inner-diaE arrangement resembles that of the Professional models, but upon close examination, it can be seen that the 30-minute counter and the second hand are reversed from their usual positions. Since both the self-winding element and the chronograph require a jewel, the watch uses 46 jewels, double the usuaE amount.

Cal.1150 (Self Winding) THERTEENTH GENERATION

The Cal.1150 adds to the self-winding mechanism date, month, and day of the week displays, aEong with a moon phase indicator. A model without moon phase indicator is also available.

Year Reference Model Name

1990	175.0034 Speedmaster Classic
1990	375.0034 Speedmaster Classic
1991	175.0044 Speedmaster Classic
1991	375.0038 Speedmaster Classic
1991	175.0038 Speedmaster Classic
1992	375.0044 Speedmaster CEassic
1993	175.0054 Speedmaster Automatic Date
1993	375.0054 Speedmaster Automatic Date

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Cal.1160 (Selfwinding) FOURTEENTH GENERATION

The Cal.1160 movementincludesan innerdial withtwo ormorehands, aswell asamoon phase indicator. The hourhand 12 o'clockpositionhas adateindicator, the 30 minute hand 9 o'clock position a month indicator, and the 12 hour hand 6 o'clock position features a day of the week indicator. Made by the Kelek Company.

Year Reterence Model Name

1991	175.0037 Speedmaster PerpetuaE Calendar

CaE.1155 (Self Winding) FIFTEENTH GENERATION

Developing a new movement takes a long time and enormous amount of investment. The development of this movement, with inner diaEs at the 3 o'clock,6 o'clock, and 9 o'clock positions, was particularly difficult. Thus, Omega's approach was to take a movement supplied by another maker and add its own improvements in line with the value of the timepiece. Omega disassembled the parts and refined each one before reassembling them, making their performance a product of the company that didthe reassembly, namely, Omega. This Cal.1155 movement is arefinementby Omegaofthe Cal.7750 movement fromthe ETACompany. Alongwith Lemania's Cal.5100, theCal.7750 represents oneofthe mostwidely used movements,onewith asolid reputationforhigh cost-performance.

Year Reference Model Name

1991	375.0043 Speedmaster Automatic Date
1991	175.0043 Speedmaster Automatic Date

Since its inception in 1957, the Speedmaster has continued to progress through an increasing number of variations of style and model. Progress becomes apparent when examining chronologicaEly arranged catalog data. The Omega Speedmaster Family

IYear /Calibre
IRef No. Model
1942 27 CFEROC12
Various Pre-Speedmaster
This was Omega's leading chronograph mechanism prior to the inception of the Speedmaster. The maker was Albert Piguet, a master
watchmaker for Lemania who belonged to the SSEH Group. which consisted mainly of Omega. This mechanism served as the
foundation for the later Omega Speedmaster family.
1945 27 CHROC 12
Various Pre-Speedmaster
PC AM This model had shock-resistant and anti-magnetic properties addedro thc 27 CHRO C12.
C12 Equipped with 12-hour counter
PC: Equipped with shock-absorbing feature
AM: Equipped with anti-magnetic features
1957 321,Manual
CK2915 Speedmaster(FirstModel)
Winding, Ist
Generation The first model in the Omega Speedmaster family. The image of a sea horse and the word "Speedmaster" were stamped on the rear
cover. Watch case diameter: 39mm.
1959 321, Manual
CK2998 Speedmaster
Winding, Ist
Generation Steel watch case diameter expanded from 39 to 40mm. O-ring gasket inserted around push-button. c
1962 321, Manual
ST105.002 Speedmaster
Winding, Ist
Generation Same as CK2998 but new reference. New reference number for 105 series introduced. 105 series changed to 145 series in 1966.
Column 1: 1: Stainless steel
Column 2: 0: Manual winding
Column 3: 5: No date
1963 321, Manual
ST105.012 Speedmaster
Winding, Ist
Generation Watch case diameter: 42mm. Equipped with an extended stem guard, making the watch asymmetrical. The edge of the lug is
smoothed

1963 321, Manual
ST105.003 Speedmaster
Winding, 1st
Generation New reference of ex-105.002.
1966 321, Manual
ST145.003 Speedmaster

Winding, lst
Generation 105 series underwent reference number change to 145 series. This model features only a new reference number for the previous
ST105.003. O or 4 in column 2 of the reference number indicates manual winding.
P153
/Year ICalibre
/Ref No. /Model
1966 321, Manual
ST145.012 Speedmaster Professional

Winding, lst
Generation New reference number assigned to ST105.012 (lefl-right asymmetrical watch case). After the off~cial adoption by NASA, the name
"Professional" first appeared on the watch face.
1967 321, Manual
STI 45.003 Speedmaster

Winding, lst
Generation Telemeter bezel. Watch case diameter: 40mm. Hand size: 19mm. 17 jewels. Anti-magnetic.
1968 861, Manual
ST145.022 Speedmaster Professional

Winding, 2nd
Generation New calibre introduced to replace the 32 B First model change. Shuttle (and cam) calibre 21600 AJh, ffat dial, and Omega symbol
mark included.
1969 861, Manual
ST145.014 Speedmaster Professional Mark II

Winding, 2nd
Generation Water resistant to 12 atmospheres. Reference number changed in 1972 to 145.0034.
1969 861, Manual
ST145.014 Speedmaster Professional Mark II

Winding, 2nd
Generation Water resistant to 12 atmospheres.
1969 861, Manual
ST145.014 Speedmaster Professional

Winding, 2nd
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres. 17 jewels. Anti-magnetic. Same type as the Mark II, but the Mark II
label had not yet been applied when this model came on the market. Thereafter, the Mark II label was used as a type name to
differentiate the current Speedmaster ffom its predecessors.
1969 861, Manual
BA145.022 Speedmaster Professional Apollo XI Commemorative Edition

Winding, 2nd
Generation First 18K gold watch. Back engraved "Omega Speedmaster Apollo XI 1969. The First watch Worn on the Moon. " Serial numbers
range ffom I to 1014, with the frst 39 serial numbers given to President Richard Nixon (No. 1), Vice-President Spiro Agnew (No. 2),
and the active members of the astronaut program. The watches were engraved "To mark man's conquest
of space with time, through
time, on time."
1970 861, Manual
ST145.0022 Speedmaster

Winding, 2nd

Generation New reference number applied to 145.022. The 105 series was converted to the 145 series in 1966, and with this numbering, the
branch number changes ffom three digits to four.
1971 1040,Self
ST176.0002 Speedmaster Professional Mark III
Winding, 3rd
Generation First self-winder calibre. Includes date display. First reference number in the 178 self-winder series. Watch case conceals lug, as with
the Flightmaster.
1972 1040, Self
ST176.0005 Speedmaster Professional Mark III
Winding, 3rd
Generation Equipped with TV-style dial, date display, aircrafl chronograph hand. Square type watch case conceals lug.
1972 1040, Self
MD176.0005 Speedmaster Professional Mark III
Winding, 3rd
Generation Equipped with TV-style dial, date display, aircraft chronograph hand. Square type watch case conceals the lug.
1972 1040, Self
STI 76.0004 Speedmaster 120m
Winding, 3rd
Generation Diver's chronograph, water resistant to 12 atmospheres.
1972 1040, Self
ST176.0004 Automatic Speedmaster
Winding, 3rd
Generation Watch case diameter: 38mm. Water resistant to 12 atmospheres. Bezel has 0-60 index. Diver's chronograph with four hands.
1972 861,Manual
MD145.0034 SpeedmasterProfessionalMarkll
Winding, 2nd
Generation Water resistant to 6 atmospheres.New reference number assigned to 1969 145.014:Branch number changed to four digits. The
previous nwdel was w~er msist mt to 12 apposphoros, so 6he specs wore lowered tp 6 ahnospheres.

1972 861,Manud
ST1450034 Speedmwt:rPa'6ssion~Markll
l
Winding, 2nd
Generation Water resistant to 6 atmospheres.
1972 861, Manual
BA145.0014 Speedmaster Professional Mark 11
Winding, 2nd
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres.
1973 1040, Self
ST176.0009 Speedmaster ProfessionaL Mark lV
Winding, 3rd
Generation Includes date display.
1973 1041, Self
ST378.0801 Speedmaster 125, Omega 125th Anniversary Special Edition
Winding
Chronometer,
4th Generation Dial displays "Speedmaster Automatic 125" to commemorate the 125th anniversary

of Omega's founding. Limited edition, 2,000 units
produced. First member of the Speedmaster family certified as a chronometer.
P154
/year /Calibre
/Re£ No.
I\!Lodel
1973 1255, Tuning
ST388.0800
Speedsonic B00 Hz

Fork
Chronometer,
5th Generation Speedsonic f300 Hz tuning fork used. Inner side of back engraved "Movement licensed Bulova & Pat't indicating that the tuning fork
patent was licensed from Bulova. Includes bracelet with "shrimp shell" design.
1973 1255,Tuning
STI 88.0002 Speedsonicf300 Hz

Fork
Chronometer
5th Generation Speedsonic f300 Hz tuning fork used. Inner side of back engraved "Movement licensed Bulova & Pat" indicating that the tuning fork
patent was licensed from Bulova.
1973 861,ManuaL
ST145.022 SpeedmasterCommemorativeEdition

Winding, 2nd
Generation Back engraved "Speedmaster commemorative medal." Made of stainless steel. Since the model i6 a commemorative edition, it uses the
861 -calibre movement that was used in the second Speedmaster model. The branch number reverts to three digits as in the originaL
numbering scheme.
1974 1040, Self-
ST176.0009 Speedmaster Professional Mark IV

Winding, 3rd
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres. Two small dials. Four hands with aircraft type chronograph hand.
1974 1041, Self
ST378.0801 Speedmaster 1251 Omega 125th Founding Anniversary
Commemorative Special Edition, 2000 Units
Winding
Chronometer
4th Generation Watch case size: 42 x 52mm. Water resistant to 6 atmospheres. Two smaLI dials (normal second hand plus 12-hour totaLizer). Four
hamds with aircraft type chronograph hand.
1974 IC45, Self
MD176.0017 Speedmaster Automatic

Winding, 6th
Generation Equipped with 24-hour display. Round watch case with round faceMade of stainless steel.
1974 1045, Se,f
ST376.3804 Speedmaster Automatic

Winding, 6th
Generation Equipped with 24-hour display. Beveled barrel-style watch case with arched square face. Bracelet version has reference number
176.0015.

1974 1045, Self
ST176.00 SpeedmasterAutomatic
Winding, 6th
Generation Equipped with 24-hour display. Round watch case with round face.
1974 1045, Self
ST176.0016 SpeedmasterAutomatic
Winding, 6th
Generation Equipped with 24-hour display. BeveLed barrel-style watch case with arched square face.
1974 1045, Self
ST176.0014 SpeedmasterAutomatic
Winding, 6th
Generation Equipped with 24-hour display. Barrel-shaped watch case with arched square face.
1974 1045, Self
ST176.0012 SpeedmasterAutomatic
Winding, 6th
Generation Equipped with date, day of week, 24-hour display. Barrel-shaped watch case.
1974 1045,Self
ST176.00L5 SpeedmasterAutomatic
Winding, 6th
Generatlon Equipped with 24-hout display Bevoled banel-shapod wa~h case with cohed squaro bce
l

1974 1 45, Self
ST376 08d5 SpeeOaser Autom~ic
l
Winding, 6th
Generation Equipped with 24-hour display. Barrel-shaped watch case with arched square face. Bracelet version has reference number 176.0014.
1974 861, Manual
ST145.0037 SpeedmasterProfessional Mark II
Winding, 2nd
Generation Uses automatic trigger that can start and stop the chronograph remotely.
1975 1041,Self
ST378.0801 Speedmaster 125, Omega 125th Founding Anniversary Commemorative Special Edition, 2C00 Units
Winding
Chronometer
4th Generation Watch case size: 42 x 52mm. Water resistant to 6 atmospheres. Two small dials (normal second hand plus 12-hour totalizer). Four
hands with aircraft type chronograph hand.
1975 1045, Self
STI 76.0016 Speedmaster
Winding, 6th
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres. Three small dials (normal second hand plus IP-hour totalizer and 24
hour display). Four hands with aircraft type chronograph hand.
1975 1045, Self
ST176.0012 Speedmaster Professional Mark IV
Winding, 6th
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres. Three small dials (normal second hand plus I P-hour totalizer and 24
hour display). Four hands with aircraft-type chronograph hand. ''Mark IV,' does not appear on the dial.

1975 1045, Self
ST376.0804 Speedmaster
Winding, 6th
Generation Watch case diameter: 43mm. Water resistant to 6 atmospheres. Three small dials (normal second hand plus 12-hour totalizer and 24
hour display). Four hands with aircraft type chronograph hand.
P1S5
Near /Calibre
/ Ref No.
JModel
1975 1255, Tuning
ST388.0800
Speedsonic B00 Hz Chronometer
Fork
Chronometer,

5th Generation Frequency of 300Hz per second. Electronic chronograph/chronometer with tuning fork resonator. Water resistant to 6 atmospheres.
Watch case diameter: 46mm. Equipped with shrimp shell style bracelet. Rear cover imprinted with indication the movement is
produced under license from Bulova.
1975 1255, Tuning
ST188.0001 Speedsonic f300 Hz Chronometer
Fork
Chronometer,
5th Generation Frequency of 300Hz per second. Electronic chronograph/chronometer with tuning fork resonator. Water resistant to 6 atmospheres.
Watch case diameter: 46mm.
1975 1255, Tuning
ST188.0002 Speedsonic B00 Hz Chronometer
Fork
Chronometer,
5th Generation Frequency of 300~1z per second. Electronic chronograph/chronometer with tuning fork resonator. Water resistant to 6 atmospheres.
Watch case diameter: 43mm.
1975 861, Manual
ST;48.022 Speedmaster Professional Apollo-Soyuz Commemorative Edition
Winding, 2nd
Generation Watch commemorating the Apollo-Soyuz mission July 15-21, 1975, during which Apollo 18 docked with Soyuz 19 while in orbit.
Astronauts Stafford,13rand, and Slayton exchanged spacecrafl visits with Cosmonauts Leonov and Kubasov. Limited edition with 500
units produced.
1977 1620, Quartz,
ST386.0809 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case with specially produced components, made of stainless steel.
1977 1620, Quartz,
MD186.0009 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case, made of gold.
1977 1620, Quartz,
ST186.0009 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case, made of stainless

steel.

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1977 1620, Quartz,
MD186.001 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case, made of gold.
1977 1620, Quartz,
ST186.001 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case, made of stainless steel.
1977 1620,Quartz,
MD386 0809 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Arched square watch case with specially produced components, made of gold.
1977 1620,Quartz,
ST186.0005 SpeedmasterQuartz
7th Generation Quartz watch with LCD digital display. Banal-shaped watch case with arched square face, made of stainless steel.

1977 1620, Quartz,
MD186.0004 Speedmaster Professional Quartz
7th Generation Quartz watch with LCD digitai display. Round. Made of gold.
1977 1620, Quartz,
ST186.00D4 Speedmaster Professional Quartz
7th Generation Quartz watch with LCD digital display. Round. Made of stainless steel.
1977 1620, Quartz,
MD386.0805 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Barrel-shaped watch case with arched square face. Bracelet band. Made of gold.
1977 1620, Quartz,
ST386.0805 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Barrel-shaped watch case with arched square face. Bracelet band. Made of stainless steel.
1977 1620, Quartz,
MD186.0005 Speedmaster Quartz
7th Generation Quartz watch with LCD digital display. Barrel-shaped watch case with arched square face, made of gold.
1978 1045, Self
ST376.0805 Speedmaster
Winding, 6th
Generation TV-shaped watch case, 39.9 x 43mm in size. Water resistant to 6 atmospheres. Three small dials (normal second hand plus IP-hour
totalizer and 24-hour display). Four hands with aircraft type chronograph hand.
1978 1045, Self
ST176.0012 Speedmaster Professional Mark IV
Winding, 6th
Generation Watch case diameter: 45mm. Water resistant to 6 atmospheres. Three small dials (normal second hand plus IP-hour totalizer and 24
hour display). Four hands with aircraft type chronograph hand. "Mark IV" does not appear on the dial.

/Year /Caiibre
/ Ref No. /Model

1978 1620, Quartz,
ST186.0004 Speedmaster Professional Quartz
7th Generation Frequency of 32,768Mz per second. Quartz electronic LCD chronograph. Water resistant to 3 atmospheres. Watch case diameter:
36.5mm.
1978 861, Manual
ST145.0022 Speedmaster Professional
Winding, 2nd
&eneration Watch case diarneter: 42mm. Water resistant to 3 atmospheres. Starting in 1978, the watch case is engraved "Flight qualified by
NASA for ail manned space missions - The first watch on the moon."
1979 1620,Quartz,
ST186.0004 Speedmaster Professional Quartz .
7th Generation Frequency of 32,768Hz per second. Quartz electronic LCD chronograph. Water resistant to 3 atrnospheres. Watch case diameter:
36.5mm.
1980 1620, Quartz,
ST386.0809 SpeedmasterQuartz
7th Generation Watch case size: 33.5 x 35.2mm. Frequency of 32,768Hz per second. Quartz electronic LCD chronograph. Water resistant to 3
atmospheres. Square watch case, 33.5 x 35.2mm. Regular model includes registered Swiss cross trademark.
1980 1620,Quartz.
ST186.0010 SpeedmasterQuartz
7th Generation Frequency of 32,768Hz per second. Quartz electronic LCD chronograph. Water resistant to 3 atmospheres. Square watch case, 33.5 x
35.2mm.
1980 861L.Manual
BA145.0039 SpeedmasterProfessionalSpecialVersion
Winding, 8th
Generation Rhodium-plated mechanism with "Geneva Wave" pattern. Yellow gold version. Back made of transparent sapphire crystal.
1980 861L, Manual
BA145.0039 SpeedmasterProfessional Special Version
Winding, 9th
Gene.ation Rhodium-plated mechanism with "Geneva Wave" pattem. Yellow gold version. Back made of transparent sapphire crystal.
1980 861L, Manual
BA345.0802 Speedmaster Professional Special Version
Winding, 9th
Generation Rhodium-plated mechanism with "Geneva Wave" pattern. Yellow gold version. Bracelet attached. Back made of transparent sapphire
crystal.
1980 861L, Manual
BA345.0802 Speedmaster Professionai Special Version
s
Winding, 9th
Generation Rhodium-plated mechanism with "Geneva Wave" pattern. Yellow gold version. Bracelet attached. Back made of transparent sapphire
crystal.
1980 863, Manual
ST345.0808 Speedmaster Professional Special Version
Winding, 8th

Generation Pink gold used in the mechanism with ~Geneva Wave" pattern. Back made of transparent sapphire crystal.

I982 1660, Quartz
TA386.0815 Speedmaster
(Digital
Analog)

Prototype Equippedwith l/lOOth second LCDatthe 12 o'clockposition. Made of acombinationoftitaniumandgold. Onlyprototype produced,
never released on the market.

1982 1660, Quartz
T1386.0815 Speedmaster
(Digit~-

An~og)

Prototype Equipped with l/lOOth second LCD at tne 12 otciock position. Only prototype produced, never released on the markeL

1982 861, Manual
ST345.0803 Speedmaster Special Gemman Version
Winding, 2nd

Generation Special design for the German market. Watch case uses flowing soR-line design for the push button and stem. Satin-finished.

1982 881,Manual
DL345.0803 SpeedmasterSpecialGermanVersion
Winding, 2nd

Generation Special design for the German market. Equipped with gold bezel. Watch case uses flowing soft-line design for the push button and
stem. Satin-flnished.

1983 861, Manual
ST345.0803 Speedmaster
Winding 2nd

Generation Asymmetrical watch case 45mm in diameter. Water resistant. Sapphire crystal. Model for the Gennan market.

1984 1045,Self
ST376.0806 SpeedmasterProfessionalMarkV
Winding, 6th

Generation Special design for the Gemnan market Date, day of the week,24-hour dispiays. Watch case uses flowing soft-line design for the push
button and stem. Satin-finished.

1984 16601 Quartz
TA386.0815 Speedmaster
(Digital
Analog), 10th

Generation Watch case diameter: 44mm. Titanium quartz. Three small dials (normal second hand plus IP-hour totaEizer and 24-hour display).
Fourhands with aircrafttype chronograph hand. Equipped with l/lOOth second LCD atthe 12 o'clockposition. Waterresistant.

1985 1045, Self ST376.0806 SpeedmasterMarkV
Winding, 6th

Generation Asymmetrical watch case 44 x 45mm. Water resistant. Three smalidials (normal second hand plus 12-hour totalizer and 24-hour
display). Four hands with aircraft type chronograph hand. Mark V model for the German market

Near	/Calibre /Ref No. /Model
1985	1045, Self ST176.0012 Speedmaster Mark IV
Winding, 6th d Generafion	Watch case diameter: 45mm. Water resistant to 6 atmospheres. Three small dials (normal second hand plus 12-hour totalizer and 24 hour display). Four hands with aircraft type chronograph hand. "Mark IV" does not appear on the dial.
1985	861, Manual STI45.0022 Speedmaster Professional
Winding, 2nd Generation	Watch case diameter: 42mm. Water resistant to 3 atmospheres. By 1985 there ware four Speedmaster hazels available; tachometer, decimal, telemeter, and pulse meter. Back engraved "Flight qualified by NASA for all manned space missions - The first watch wom on the moon.
1985	861L, Manual BA445.0802 Speedmaster Professional
Winding, 9th Generation	Bezel is inlaid with 60 (I.0 CT.) diamonds. Back made of transparent sapphire crystal.
1985	866, Manual ST345.0809 Speedmaster
Winding, Moon Phase, 11th Generation	Made of stainless steel, equipped with moon phase indicator. Limited edition, only 2,000 units produced.
1986	866, Manual T1345.0810 Speedmaster
Winding, Moon Phase, 11th Generation	Made of titanium, equipped with moon phase indicator. Watch case uses flowing soR-line design for the push button and winding crown. Satin-finished. Limited edition, only 2,000 units produced.
1986	866, Manual TA345.0810 Speedmaster
Winding, Moon Phase, 11th • Generation	Made of titanium and gold, equipped with moon phase indicator. Watch case uses flowing soft-line design for the push button and stem. Satin-finished. Limited edition, only 2,000 units produced.
1987	1045, Self ST376.0822 Speedmaster Automatic
Winding, 6th Generation	Equipped with date, day of the week, 24-hour displays. Classic-style watch case.
1987	861, Manual BA345.0802 Speedmaster Professional
Winding, 2nd Generation	Watch case diameter: 30.8mm. Water resistant to 3 atmospheres. Back engraved "The first watch worn on the moon, Apollo X1 1969. Back made of transparent sapphire crystal.

1987 861, Manual
ST345.0022 Speedmaster Professional
Winding, 2nd

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Generation Model with steel bracelet assigned new reference number 145.0022.
1987 8611-, Manual
BA145.0039 Speedmaster Professional
Winding, 9th
Generation Watch case diameter: 42mm. Water resistant to 3 atmospheres. Back engraved ~The first watch wom on the moon, Apollo Xl." Back
made of transparent sapphire crystah
1987 861L, Manual
BA445.0802 Speedmaster Professional
- Winding, 9th
Generation Watch case diameter: 30.8mm. The bezel is inlaid with 60 (1.0 CT.) diamonds. Water resistant to 3 atmospheres. Back engraved "The
first watch worn on the moon, with Apollo Xl." Wording "Apollo Xl, 1969" did not appear. Some medals engraved "Speedmaster:
The first watch wom on the moon.''
1987 861L, Manual
BA345.0802 SpeedmasterProfessional
Winding, 9th
Generation Watch case diarneter: 30.8mm. Water resistant to 3 atmospheres. Back engraved "The first watch wom on the moon, with Apollo X13'
Back made of transparent sapphire crystal.
1987 863, Manual
ST345.0808 Speedmaster Professional
Winding. 8th
Generation Watch case diameter: 42mm. Water resistant to 3 atmospheres. Back engraved "The first watch wom on the moon, Apollo Xl." Back
made of transparent sapphire crystal.
1987 866, Manual
ST345.0809 Speedmaster Professional
Winding,
Moon Phase,
11th Watch case diameter: 42mm. Water resistant to 3 atmospheres. Speedmaster Professional name location is unusual. Four small
Generation dials plus moon phase indicator.
1988 1140, Self
ST375.0032 Speedmaster Automatic
Winding, 12th
Generation Steal bracelet version of reference number 175.0032.
1988 1140,Self
BA175.0033 SpeedmasterAutomatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Mirror finished black tachymeter pius yellow gold bezel, and made of 9K ;
red gold. Back made of transparent sapphire crystal.
1988 1140, Self
DA375.0032 Speedmaster Automatic
Winding, 12th

Generation Steel bracelet version of reference number 175.0032, but also equipped with yellow gold bezel.
1988 1140, Self
BA475.0032 Speedmaster Automatic
Winding, 12th
Generation Same as reference number 175.0032, but watch case and bracelet are made of 18K gold, and the bezel is inlaid with 60 (1.0 CT)
diamonds. Back made of transparent sapphire crystal.

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P158
lYear /Calibre
/Ref No.
/Model
1988 1140, Self
BA375.0032
Speedmaster Automatic
Winding, 12di

Generation Steel bracelet version of reference number 175.0032, but made of 18K gold, with a back of transparent sapphire crystal.
1988 1140, Self
BG175.0033 SpeedmasterAutomatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Mirror finished black tachymeter plus yellow gold bezel, made of 18k
yellow gold. Back made of transparent sapphire crystal.
1988 1140, Self
DA175.0032 Speedmaster Automatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm, Equipped with black tachymeter and leather strap, plus yellow gold bezel.
1988 1140, Self
ST175.0032 Speedmaster Automatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Equipped with olack tachymeter and leather strap.
1988 1140, Self
BA175.0032 Speedmaster Automatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Equipped with black tachymeter and leather strap, but made of 18K yellow
gold. Back made of transparent sapphire crystal.
1988 1140, Self
DA175.0033 Speedmaster Automatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Mirror finished black tachymeter plus yellow gold bezel, and red gold
plated.

1988 1140, Self
DG175.0033 SpeedmasterAutomatic
Winding, 12th
Generation Watch case reduced in diameter to original model's 39mm. Mirror finished black tachymeter, plus yellow gold bezel.
1989 1140,Self
BA375.0033 SpeedmasterAutomatic
Winding, 12th
Generation Small diameter 39mm case, rnade of 18K gold with yellow gold bezel. Comes with 18k gold bracelet.
1989 1140, Self
DA375.0033 Speedmaster Automatic
Winding, 12th
Generation Small diameter 39mm case made of stainless steel with yellow gold bezel. Comes with bracelet.
1989 861, Manual
ST145.022 Speedmaster Professional Apollo X1 20'h Anniversary Edition
Winding,2nd
Generation Special version made to commemorate the 20th anniversary of man's first lunar landing. Three versions were made, differing by the
engraving on the back:
-OOU250: Apollo X1 1969-1989 (for Gemmany)
-0001/2000: ApolloX11969 (for USA)
-Apollo X1 1969 (for other countries), about 4,000 units.
1990 1150, Self
BA175.0 Speedmaster Classic (dial marked "Omega~)
Winding, 13th
Generation The watch is called the Speedmaster Classic, but the dial reads simply "Omega " Equipped with moon phase indicator and date, day of
the week, month, and 24-hour time display dials. The watch is made of gold, and comes with a leather strap.
1990 1150, Self
DA375.0034 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation The watch is called the Speedmaster Classic, but the dial reads simply "Omega." Equipped with moon phase indicator and date, day of
the week, month, and 24-hour time display dials. The watch is equipped with a two-tone combination bracelet and a gold bezel.
1990 1150, Self
DA175.0034 Speedmaster Classic (dial marked "Omega~)
Winding, 13th
• Generation
The watch is called the Speedmaster Classic, but the dial reads simply "Omega" Equipped with rnoon phase indicator and date, day of
the week, month, and 24-hour time display dials. Equipped with gold bezel and leather strap.
1990 1150, Self
BA375.0034 Speedmaster Classic (dial marked "Omega~)
Winding, 13th
Generation The watch is called the Speedmaster Classic, but the dial reads simply "Omega" Equipped with moon phase indicator and date, day of
the week, month, and 24-hour time display dials. The watch is made of gold, and comes with a gold bracelet.

1991 1140, Self
STI 75.0032 Speedmaster
Winding, 13th
Generation Watch case diameter: 35.5mm. Water resistant to 3 atmospheres.
ST: stainless steel.
1991 1150,Self
ST175.0044 SpeedmasterClassic
Winding, 13th
Gener~ion Equipped widh moon ph re india~tor Cre dirmeter: 37mm. Wnrer ~sisomi ro 3
hmospheres

-:

1991 1150, Self
BA375.0038 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Made of y'ellow gold, sapphire crystal version of reference number 375.0034.
Provisional watch case adopted, later replaced by
375.0044.
1991 1150,Self
BA175.0038 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Made of yellow gold, sapphire crystal version with reference number 375.0034.
Provisional watch case adopted, later replaced by
375.0044.
P159

Near /Calibre
/Ref No.
/Model
1991 E 155,Self
ST375.0043
Speedmaster Automatic Date
Winding, 15th
Generation Compact case diameter of 39mm. Equipped with date display. Made Of stainless steel, comes
With bracelet.
1991 1155,Self
DA375.0043 SpeedmasterAutomaticDate
Winding, 15th
Generation Compact case diameter of 39mm. Equipped With date display. Made of stainless steel, comes
with bracelet, but also has yellow gold
bezel.
1991 1155,Self
BA375.0043 SpeedmasterAutomaticDate
Winding, 15th
Generation Compact case diameter of 39mm. Equipped with date display. Made of 18K gold, rear cover
made of transparent sapphire crystal.
Comes with bracelet.
1991 1155,Self
ST175.0043 SpeedmasterAutomaticDate
Winding, 15th
Generation Compact case diameter of 39mm. Equipped with date display. Made of stainless steel, comes
with leather strap.

1991 1155,Self
DA175.0043 SpeedmasterAutomaticDate
Winding, 15th
Generation Compact case diameter of 39mm. Equipped with date display. Made of stainless steel, comes with bracelet, but also has yellow gold
bezel.
1991 1155,Self
BA175.0043 SpeedmasterAutomaticDate
b
Winding, 15th
Generation Compact case diameter of 39mm. Equipped with date display. Made of stainless steel, comes with leather strap, but is in 18K gold.
1991 1160,Self
BA175.0037 Omega Perpetual Calendar, Japan Special Edition
Winding, 14tth
Generation Equipped with moon phase indicator. Special version for the Japanese market, only 50 units produced. Back engraved "Omega,
maison fondee en 1848 Speedmaster Perpetual - 1291; 1991 Schweiz-Suisse-Svizzera." Uses calibre made by the Kelek Company.
1991 720.Self
DA566.0285 Speed Classic
Winding, Non
Chronograph Watch case diameter: 26mm. Ordinary d-hand watch with date display. Water resistant to 3 atmospheres.
1991 720, Self
BA666.0285 Speed Classic
Winding, Non
Chronograph Watch case diameter 26mm. Ordinary 9-hand watch. Water resistant to 3 atmospheres. Bezel iniaid with 60 diamonds. Hand-madc
crocodile leather wristband.
',SI 721.S-lf
BA666.0286 SpeedClassicMoonPhase
Winding, Non
Chronograph Watch case diameter: 26mm. Ordinary 9-hand watch. Water resistant to 3 atmospheres. Bezel inlaid with 60 diamonds. Comes with
18K yellow gold bracelet.
1991 721, Self
DA566.0286 Speed Classic Moon Phase
Winding, Non
Chronograph Watch case diameter: 26rnm. Uses third hand for date display. Water resistant to 3 atmospheres. Silver dial on periphery, and
champagne in the center. Plain white color diaE also available.
1991 861,Manual
ST145.0022 Speedmaster MIR Special Edition for the Gemman Market
Winding,2nd -
Generation Special MIR commemorative version for the German market, onEy ten units produced. Back engraved "90 days flight qualified -
Spacelab-MIR - Dec, 80-Mar. 91 - The first watch worn on the moon." The first of the ten watches produced was given to Gemnan
Foreign Minister Hans Dietrich Genscher.
1991 863, Self
ST145.0808 Speedmaster Professional
Winding, 8th

Generation Watch case diameter: 42mm. Transparent back. Deluxe. Original moon watch. 17 jewels. Back engraved i'The first watch wom on the
moon: Apollo Xl."
1992 1110,Self
BA166.0295 SpeedClassic
Winding, Non
Chro=gn~ph Nonchmnogmph Ordinary3-h=dwt~ch Watchc=edimmeter:35mm Wamrresist=tt 3atmosphems

t~32 115ttScit
DAt750044 Speedm=erClwsic(didmwted~Omega")
Winding, 13th
Generation Reference number 175.0038 with provisional case, here adopts final case.
1992 1150, Self
BA175.0044 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Reference number 175.0034 made of gold with sapphire crystal.
J
1992 1150, Self
BA375.0044 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Reference number 375.0038 yellow gold model with provisional case, here adopts final case.
1992 1150, Self
BG375.0044 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Same watch as above, but comes with pink gold bezel and two-tone bracelet. Special version for the Japanese market
P160
/Year /Calibre
IRef No. /Model
1992 1150, Self
D6375.0644 Speedmaster Professional, Japan Special Edition
Winding, 13th
Generation Same watch as above, but made of pink gold and with a pink gold bracelet. Special version for the Japanese market.
lg92 1150, Self
BG175.0044 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Same as reference number 375.0034, but made of pink gold and sapphire crystal. Comes with leather strap. Special version for the
3apanese market.
I992 1150, Self
BA375.0044 Speedmaster Classic (dial marked "Omega")
Winding, 13th
Generation Reference number 375.0034 made of gold and uses sapphire crystal.
1992 1150,Self
DG175.0044 SpeedmasterClassic(dialmarked"Omega")
Winding, 13th
Generation Same watch as above, but has pink gold bezel and leather strap. Special version for the Japanese market

- 1992
1155, Self
DA1 75.0043 Speedmaster
Winding, 15th
Generation Watch case diameter: 37mm. Water resistant to 3 atrnospheres.
1992 720, Self
BA566.029S Speed Classic
Winding, Non
Chronograph Watch case diameter: 26mm. Ordinary g-hand watch. Water resistant to 3 atmospheres. Dial available in two colors. Champagne and
white. Comes with crocodile hand-sewn leather wristband.
1992 863, Manual
BA145.0052 Speedmaster 50th Anniversary Edition ofthe 27 CHRO C12, 9gg
Unit Limited Edition
Winding, 8th
Generation Special version to commemorate the 50th anniversary ofthe inception ofthe 27 CHRO C12 movement, which was used in the first
model of the Omega Speedmaster. Comes with leather strap. Serial numbers from I to 999 imprinted on the watches. Yellow gold gilt
movement with "Geneva Wave" pattem.
1992 863, Manual
BA345.0052 Speedmaster 50th Anniversary Edition ofthe 27 CHRO C12, 999
Unit Limited Edition
Winding, 8th
Generation Special version to commemorate the 50th anniversary ofthe inception ofthe 27 CHRO C12 movement, which was used in the first
- - model of the Omega Speedmaster. Comes with bracelet. Serial numbers from I to 999 imprinted on the watches. Yellow gold gilt
movement with ''Geneva Wave" pattern.
1992 864, Manual
BA348.0052 Speedmaster 50Lh Anniversary Edition ofthe 27 CHRO C12, 250
Unit Limited Edition
Winding, 16th
Generation Special version to commemorate the 50th anniversary of the inception of the 27 CHRO C 12 movement, which was used in the first
model of the Omega Speedmaster. Certified as chronometer, has transparent back of sapphire crystal. Comes with bracelet. Serial
numbers from I to 250 ilYprinted on the watches. Movement is yellow gold gilL
1992 864, Manual
BA148.0052 Speedmaster 50th Anniversary Edition of Lhe 27 CHRO C12, 250
Unit Limited Edition
Winding, 16th
Generation Special version to commemorate the SOLh anniversary of the inception of the 27 CHRO C 12 movement, which was used in the first
model of the Omega Speedmaster. Certified as chronometer, has transparent back of sapphire crystal. Comes with leather strap. Serial
numbers from I to 250 imprinted on the watches. Movement is yellow gold gilt.
1992 867, Manual
BA145.0053 Speedmaster 50th Anniversary Edition of the 27 CHRO C 12, 50
Unit Limited Edition
Winding, 17th
Generation Special version to commemorate the 50th anniversary of the inception of the 27 CHRO C 12 movement, which was used in the first

model of the Omega Speedmaster. Movement is yellow gold gilt. A skeleton version hand-made by Armin Strom. Serial numbers fom
I to 50 are imprinted on Lhe watches. Comes with leather strap. Movement is yellow gold gilt.
1993 1150,Self
ST175.0054 SpeedmasterAutomaticDate
Winding, 13th
Generation Equipped widh date, dy of the w mP, a:d month displays Comes with le dher s~ap. Made of st duless sb:ch l

1993 1150,Self
BA1750054 SpeedmasterAutomaticDae
l
Winding, 13th
Generation Equippedwith date, day ofthe week, and month displays. Comes with leather strap. Made of 18K gold.
1993 1150,Self
BA375.0054 SpeedmasterAutomaticDate
Winding, 13th
Generation Equipped with date, day of the week, and month displays. Comes with bracelet. Made of 18K gold.

a

1993 1150,Self
DA375.0054 SpeedmasterAutomaticDate
Winding, 13th
Generation Equipped with date, day of the week, and month displays. Bracelet has yellow gold bezel.
1993 1150, Self
ST375.0054 Speedmaster Automatic Date
Winding, 13th
Generation Equipped with date, day of the week, and month displays. Comes with bracelet. Made of stainless steek
19g3 1150,Self
DA175.0054 SpeedmasterAutomaticDate
Winding, 13th
Generation Equipped with date, day of the week, and month displays. Leather strap and yellow gold bezel.
1994 861, Manual
ST345.0022 Speedmaster Professional Apollo XI Special Edition, 1,250 Unit
Limited Edition
Winding, 2nd
Generation Special version made to commemorate the 25th anniversary of man's first lunar landing. Case middle engraved "Apollo XI: 1969
1994." Comes with bracelet. Made of stainless steel. Limited edition, only 1,250 units produced.
P161
Near /Calibre
/Ref No. /Model
1994 861, Manual
ST145.0022 Speedmaster Professionai Apollo XI Special Edition, 1,250 Unit
Limited Edition
Winding, 2nd
Generation Special version made to commemorate the 25th anniversary of man's first lunar landing. Case middle engraved "Apollo XI: 1969

1994. Comes with leather strap. Made of stainless steel. Limited edition, only 1,250 units produced.
1994 864, Manual
BC348.0062 Speedmaster Professional Apollo XI Special Edition, 250 Unit Limited Edition
Winding, 16th
Generation Special version made to commemorate the 25th anniversary of man's first lunar landing. Case middle engraved ~Apollo Xl: 1969
1994. However, this watch is made of white gold, and is certified as a chronometer. The back is made of transparent sapphire crystal.
Rhodium-plated movement. Comes with a bracelet. Limited edition, only 250 units produced.
1994 864, Manual
BC148.0062 Speedmaster Professional Apollo XI Special Edition, 250 Unit Limited Edition
Winding, 16th
Generation Special version made to commemorae the 25th anniversary of man's first lunar landing. Case middle engraved: "Apollo XI: 1969
1994. The watch is made of white gold, and is certified as a chronometer. The back is made of transparent sapphire crystal. Rhodium
plated movement. Comas with a leather strap. Limited edition, only 250 units produced.
1994 867, Manual
BT148.0063 Speedmaster Professional Apollo XI Special Edition, 250 Unit Limited Edition
Winding, 17th
Generation Special version made to commemorate the 25th anniversary of man's first lunar landing. Case middle engraved "Apollo Xl: 1969
1994. This watch is a platinum skeleton version hand-made by Armin Strom. Serial numbers from I to 25 are imprinted on the
watches. Comes with leather strap. Rhodium-plated movement.
1994 867, Manual
BT345.0063 Speedmaster Professional Apollo XI Special Edition, 250 Unit Limited Edition
\hinding, 17th
Generation Special version made to commemorate the 25th anniversary of man's first lunar landing. Case middle engraved: "Apollo Xl: 1869
1994. Th,:s ,;atch :s a platinum skeleton version hand-made by Armin Strom. Seri~ numbers fron. I to 25 are imprinted On thc
watcnes. Comes with braceieL khodium-plated movement.
1995 1140, Self
DA175.0032 Speedmaster
Winding, 12th '
Generation Watch case diameter: 35.5mm. Water resistant to 3 atmospheres.
1995 1150, Self
BA175.0044 Speedmaster
Winding, 13th
&eneration Watch case diameter: 37mm. Water resistant to 3 atmospheres. Includes month, day, and day of the week displays. Four hands.
1995 1150,Self
ST175.0054 Speedmaster
-.
Winding, 13th
Generation Watch case diameter: 37mm. Water resistant to 3 atmospheres. Includes month, day, and day of the week displays. Four hands.

1995 1150, Self
BA175.0044 Speedmaster Classic
Winding, 13~
&eneration Equipped with moon phase indicator. Watch case diameter: 37mm. Water resistant to 3 atmospheres.
1995 1155, Self
DA175.0043 Speedmaster
Winding, 15th
Generation Watch case diameter: 37mm. Water resistant to 3 atmospheres.

1995 1155, Self
DA175.0043
Speedmaster

': :
Winding, lSth
Generation Watch case diameter: 37mm. Water resistant to 3 atmospheres.
1995 881, Manual
ST345.0022 Speedmaster Professional Apollo 13 25~ Anniversary Commemorative Edition, 999 Unit Limited Edition
Winding, 2nd
Generation Special version commemorating the 25th anniversary of Apollo 13. Dial contains an emblem of the Apollo 13 mission. Back engraved
"Flight qualified by NASA for all manned space missions - The first watch worn on the moon. Apollo 13 limited series 1/999 H
Limited edition, only 999 units produced.
1995 861, Manual
ST145.0022 Speedmaster Professional
Winding, 2nd
Generation Back engraved "Flight qualified by NASA for all manned space missions - The first watch worn on the moon.~ Original moon watch.
1995 863, Manual
ST145.0808 Speedmaster Professional
Winding 8th
Generation Watch case diameter: 42mm. Transparent back. Deluxe. Original moon watch. 17 jewels.
1995 861, Manual
ST145.0022 Speedmaster MIR Special Edition, Second Series, 35 Unit Limited Edition
Winding, 2nd
Generation Second series produced to commemorate the rendezvous between the Atlantis and the MIR from June 29 to July 3, 1995. Twenty
eight units made of stainless steel, 7 units made of gold, total of 35 units. Back engraved "365 days on board space station MIR - July
1993-July 1994 - The first watch worn on the moon 1/28.~ However, 10 of the 28 stainless steal watches have leather straps.
Referencenumberbecomes 145.0022.105.1.
1995 881, Manual
ST345.0022 Speedmaster MIR Special Edition, Second Series, 35 Unit Limited Edition
Winding, 2nd
Generation Same as the above. However, 18 of 28 stainless steel watches have stainless steel bracelets. Reference number becomes 345.0022.105.

1995 863, Manual
BA145.0052 Speedmaster MIR Special Edition, Second Series, 35 Unit Limited Edition
Winding, 8th
GenerationSame as the above. However, 5 of 7 gold watches have yellow gold bezels and leather straps. Reference number becomes
145.0052.035.A.
1995 863, Manual
BA345.0052 Speedmaster MIR Special Edition, Second Series, 35 Unit Limited Edition
Winding, 8th
Generation Same as the above. However, 2 of 7 gold watches have yellow gold bezels and bracelets. Reference number becomes 345.0052.035.
PI62

Explanation of Omega Speedmaster Reference Numbers Reference numbers may be broadly divided into two types. The first is information listed in sequential order, and the second where references are classified with visual materials so the reader can readily discem the characteristics of the timepiece. Rolex uses the first method, with its references listed in production order. Omega employs the latter method, which makes it possible to discern more information from the reference numbers.

The two aLphabet letters at the head of the reference indicate the watch case material. This makes it possible to easily reference new types of materials as they emerge, such as titanium.

Abbreviations for watch case materials:
BA: Yellow gold
BC White gold
BG: Pink gold
BT: Platinum
DA: Yellow gold combination
DD: Gold combination
DG: Pink gold combination
DL: Gold combination
MD: Gold plated
ST: Stainless steel
TA: Titanium and yellow gold combination
Tl: Titanium
TL: Titanium and pink gold combination
P163
The first position indicates strap/bezel material type.
1: Leather strap (men's)
2: Leather strap/diamond decorated bezel (men's)
3: Bracelet (men's)
4: Braceletidiamond decorated bezel (men's)
5: Leather strap (ladies')
6: Leather strapidiamond decorated bezel (ladies')
The first position indicates the material and the presence or absence of diamonds on the bezel, differentiated by men's and ladies' watches. The reference number is very
convenient for parts supply operations.

The second position indicates mechanism type. O: Manual winding chronograph 4: Manual winding chronograph 6: Selfwindingchronograph 7: Non-chronograph 8: Quartz or tuning fork chronograph

The second m sinon ;ndic~t is mech rism t pe Since this ~s Spm dm wber d~ in most c wes it indicmms a ch mnog~h ~po of m toh =ism Howm or, m n~hmnogrmph
timepieces are also differentiated by manual and self-winding types.
The third column indicates supplemental tunction type.
5: No date
6: Date
8: Chronometer
The third position indicates the presence or absence of date display, chronometer grade, and other supplemental functions. Chronometers are always listed as N8"
whether they have a date display or not. e
P164
Changes in Dials, Hands, and Logos
Reference numbers changed in response to major changes in case format and mechanism type. The Speedmaster family, however, underwent changes that are not
reflected in the reference numbering scheme. Changes in the dial and the hands improved legibility, while changes in push bunons and crown improved ease of
operation. There is no particular significance to changes in logos and character styles, but those chamges help identify the year of production.
Changes in Watch Hands
When a watch is looked at, immediate attention is on the hands. Thus, when watchmakers seek to improve legibility, they normally start with the design of the hands.
The Speedmaster family underwent some changes in the early days, but there have been no changes at all since 1965. The hands on the CK2915 are truly easy to see,
but the counter hands are somewhat obscured, and this is a disadvantage. The hands on a chronograph must be readily visible, but they should not be too conspicuous.
P165
Top - Chronograph hands play an important role in improving legibility. In the early period, luminous material for hands was not available, but beginning with the
ST105.003, a diamond-shaped luminous element was added near the tip ofthe second hand. Without iL NASA would probably not have adopted the Speedmaster for
the space program.
Bottam -- At first the counter hands were dolphin-shaped like the larger watch hands. Omega, however, soon switched to the type of hand still in use today. To reduce
the burden on the mechanism, counter hands should be as light as possible.
P166
Top -- Omega switched frorn a raised metal logo to a simple stamped logo, mainly due to cost considerations. Virtually no maker other than Omega was using metal for
logo marks.
Bottom -- At f~rst glance, the letter style used on the watch face seems not to have changed at all. But a
close exarnination of the letter "S" on the early logo, and the ''r"
on the late logo shows that some change has occurred. The "S" has become gradually thinner, while part of the ''r" drops lower. In the early logo, the "S" was rounder
and part of the "r" does not drop.
P167
Top -- Omega used a 4mm diameter push button up until the second model, the same push button it was
already using in the Seamaster chronograph. The addition of an
O-ring for greater ease of use resulted in the increase in diameter.
Bottom -- Omega started by using the same small-diameter winding crown as in the Seamaster chronograph, but here, too, the addition of an O-ring resulted in an
increased diameter to 7mm. Later, Omega installed a guard integral with the case, which reduced the diameter slightly, to 6.5mm

P168
Changes in Cases
There have been two major changes in the cases. The first change was the shift from the 39mm diameter of the first model to a 40mm diameter for the second model. `.

Next came the shift to a 42mm diameter, which came with the installation of a stem guard inside the case. The first change represented virtually no change in shape, but

the second change resulted in the Speedmaster's distinctive asymmetrical appearance. The bezel changed
from the 39mm diameter stainless steel type, used in the first
model, to the 40mm diameter recessed type used in the second model and thereafter.
P169
Top -- Changes in the "Professional" Appellation
The Speedmaster family did not make use of the appellation "Professional" from its inception, but only after Omega learned of NASA's decision to adopt the
Speedmaster as its off~cial timepiece.
Bottom - Changes in Luminous Dial Markers
There were also subtle changes in the dial markers. In the early days, the luminous bar on the face covered the l/Sth second markings, but it was shortened to make a
more accurate reading possible.
P170
Manufacturing the Speedmaster
External Parts
The extemal parts for the Speedmasie~ tamily are all manutactured at Omega's own production facilities. While many might take this for granted, it is not at ail unusua!
for watch cases to be made in countries where labor costs are lower to reduce production costs. Some makers buy movements from movement makers, put the
movements inside cases made overseas, and put their logos on the dial. The merit of in-house production, despite its higher cost. is that greater precision can be
achieved. The very life of a wristwatch depends on the precision manufacturing offered by high-precision machine tools. Also, if a manufacturer can provide an
integrated production process, from manufacturing to assembly, it reduces the amount of inconsistency from one item to another. Omega uses only the most highly
trained craftsmen in all of its production processes. This is the reason why the off-the-shelf Speedmaster was able to pass NASA's banery of tests. Omega takes it for
granted that this is the only way to make a high-quality timepiece.
First row from top -- Press used to form the first unfinished case shape from an ingot.
Highly sophisticated technology is used on each ingot, which is pressed with a different die nine separate times to achieve near final shape, using a maximum of 200
tons.
2nd row -- After pressing, each case is inspected carefully. It is the craftsman's eye that detennines whether a case passes or fails.
Screw cuning of the rear cover requires ten or more processes because of the heat created. lets of cooling oil are used during the cuning process.
3rd row -- Finished cases are measured by micrometer. Measuring back diameter (right), stem hole depth (left).
Extracted ingots pass through many pressing stages to gradually become watch cases. The tool at the top
of the photograph is a press die.
4th row -- Cases at different stages of polishing. In the final stage the case is polished to achieve a "mirror finish" without any blemish.
S'h row ~Minute finishing of each case is performed only by highly skilled craftsmen.

A CAD system allows the properties of materials to determine optimal case shape and thickness.
P171
Left -- Omega's very first wristwatch chronograph, which features a strap loop inserted on a pocket watch chronograph.
Right 1" row -- The town of L'Orient, in the Joux Valley, where the Lemania company is located. Lemania supplies the movements for Omega watches. Originally,
Lemania made finished watches, but now mainly supplies mechanical chronograph movements to other companies.
2~4 row -- Push bunon anachment operations. A push button includes a tube, a shafl, and a spring. From lefl: tube insertion into the spring; tube insertion into the case;
screwing the shafl into the button.
3~. row -- Applying t e bezel to tho c=e under a mic tscope (leR), aR mt ment olthe c yst d (right)

4tb row -- Water resistance testing on the finished case. Omega also tests for leakage with helium. Final polishing of crystal to remove possible blemishes received during final assembly. Special film is then applied to the case to prevent any darnage after polishing.
The watch is shipped with the film in place.
P172
The Movement
Left bottom -- Developing a chronograph movement takes a lot of time and requires enormous capital investment, leading to higher retail prices. Hence, to supply less
expensive watches of the highest possible precision, Omega obtains chronograph movements from Lemania Unlike many makers that merely insert a supplied
movement inside a case, Omega disassembles each movement supplied and re-polishes every part to increase precision. Some feel that very first movement used in the
~ Speedmasterfamily, the CAL.321, was the very best HeretheCAL.861 is examined, which omitsthe wheel pillar, although in every otherway, itisaworthy
- successor to the CAL.32 1.

Right 1~ row -- Movement assembly is carried out in separate operations by many operators to gain greater expertise.
e Chronograph lever polishing. This is perforrned by hand by highly expert craftsmen as a high level of precision is required.
2~0 row - Movement base plate piercing. This process demands a high level of precision.
Parts assembly onto base plate. Operators become highly skilled within a short time if they are assigned only to this task.
3r~ row -- Attachment of lever to movement. The lever transmits the push button motion to the movement.
Anaching chronograph hands to axis. Normally, hands and axis are already attached by the hand maker.
Base plate hole polishing. Highly sophisticated technology is needed because of the very high precision required.
4th row -- Parls punching operation (left). Parts are punched out from a metal belt. Polishing of punched parts (right). Punching by machine and polishing by craftsmen
is the most common method used.
5th row -- Attaching chronograph hands (leR). Normally done by machine. For the Speedmaster family, Omega uses an operator to tap the hands down. Balance
assembly operation (right) to engage the balance with the gears via the anchor. No further adjustment is done at this point.
Dies are required for every punched part process.
P173
A CAL.861 after disassembly to component level. There are morethan 100 parts in achronograph movement, yettogetherthey are able to keep accurate trackoftime.
P184

Chapter 4 - Astronauts and their watches

Over 36 years have passed since the start of Project Mercury in 1961, America's first joumey into the unknown of spaceSince then, there have been dramatic
changes in the types of rockets, spacecrafl, space suites, and living environment for astronauts. Yet there is one implement used by astronauts that has not changed at all
despite these breathtaking technological changes - the Omega Speedmaster. Even today, when the Space
Shut'de provides a level of comfort comparable to that of
passenger airliners, astronauts on space walks have their Speedmaster watches, an indispensable component of their space suits that keep track of far more than just the
time.
P187
WALTER SCHIRRA
The Omega Speedmaster was first selected by NASA as standard issue for all astronauts during Project Gemini. During Project Mercury that preceded it, astronauts
never went outside their cramped space capsules. As a resuLt, astronauts were free to wear any watch they chose. Walter Schirra had been told of the usefuLness of
chronographs by his pilot colleagues at PanAm. They told him how Omega Speedmaster's dial and hand design were easy to read and the watch's ease of operation
made it especially reliable during emergencies. Even before it underwent NASA environmental testing, the Speedmaster already enjoyed a solid reputation among
astronauts as each second was so important to them in their lives. Faith in the Speedmaster remained unshaken even afler competitor's tried to get into the race after the

- Speedmaster's success in the space program.

Right - Life magazine ran exclusive features on astronauts during the 1 960s, and WaLter Schirra appeared on the cover as one of the members of the Mercury Program.
Schirra at home (lefl).
Middle - Schirra ffew on Sigma 7, Gemini Vl, and Apollo 7, launched not long afler the Apollo I tragedy. Schirra is one of the few to own a gold Speedmaster.
Bottom - Switzerland, home of the Speedmaster and where Schirra's family originated. He was invited to Switzerland by the Federation of the Swiss Watch industry.
PanAm had a training facility near the Kennedy Space Center, and it was there that Schirra heard about the Speedmaster's strong reputation from his pilot colleagues.
P188
The gold Speedmaster stamped Leroy Gordon Cooper, Astronaut. The pride of having been part of the Original Seven is expressed in the phrase "No. 7."
P189
GORDON COOPER
Project Mercury was initiated in 1958 in an effort to overtake the Soviet Union, which had grabbed the early lead in space. The seven men chosen to become the first
group of American astronauts came to be known as the Original Seven, and one of those was Gordon Cooper. He flew into space in Faith 7, and as the program ended
in success in 1963, the baton was passed on to Project Gemini. Cooper flew into space a second time in Gemini V, with Charles Conrad as his co-pilot. All astronauts in
the early days of the space program were either test or jet pilot with at least 1,500 hours of flying time in jet aircrafl. A love of speed was a characteristic common to a!l
these men. No other astronaut, however, had the same experience as Gordon Cooper of having raced a sports car in the Indianapoliis-500. It was perhaps because Cooper
had experienced the allure of sheer speed that he was able to become one of the highly competitive screening test. Even today his passion for flight and speed lives on in

the space program.
Right top - Speedmaster equipped with an expandable wristband. This was replaced by a black velcro band.
As a man taken with the allure of speed, Cooper put everything into racing in the Indianapolis 500 and breaking the sound barrier in jets.
Right middle - Faith 7 was the last Project Mercury flight. Cooper was given a triumphal welcome down Fifth Avenue in New York City, as were all the returning astronauts during fhe 1960s.
Right boftom - NASA trained astronauts before they went into space. The Original Seven underwent desert survival training using protective clothing against the sun's rays. Gordon Cooper is one of the men in this photograph.
P191
THO1VIAS STAFFORD
Thomas Stafford had already logged two spaces missions in the Gemini program, and was chosen for the Apollo 10 mission to orbit the moon. Although he is not among the 12 persons who have landed on the moon, he made history in the Apollo-Soyuz Test Project launched on July 15, I975. With all technical diffculties overcome, such as the need to accommodate the different pressurization methods, the American craft, Apollo 18 with Stafford, Donald Slayton, and Vance Brand, successfully docked in space with the Soviet Soyuz 19 crewed by Alexei Leonov and Valeriy Kubasov, and the crews were able to meet. Afler he ended his duties as an astronaut offce and was promoted to Air Force lieutenant general. Upon leaving NASA, Stafford joined the Omega Speedmaster.
Right top - The Speedmaster watch worn by Thomas Stafford during his Gemini and ApolEo missions is now in the Omega Museum in Switzerland. The back is also engraved with a NASA standard issue SEB number.
Left middle - Aner retiring from NASA, Stafford was appointed Chairman of Omega America, where his schedule was just as busy as in the astronaut corps.
Right middle - Although Apollo 10, crewed by Thomas Stafford, John Young, and Eugene Cernan, came within just eight miles of the lunar surface, fhe glory of the lunar landing went to Apollo 11. The success of their flight laid the groundwork for the eventual lunar landing. Stafford and Ceman had previously worked together on the Gemini IX A mission.

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Bottom - To commemorate the success of the Apollo 11 moon landing, Omega presented Speedmaster watches to the president of the United States and all the program's astronauts, one of which bears the name of Thomas Stafford, who wears it proudly as a memento of his astronaut career.
P192
CHARLES CONRAD
Charles Conrad's first space flight was with Gordon Cooper in Gemini 5. His second fligh£ was in Gemini 11, and in the Apollo 12 mission, he landed on the lunar surface. Afler the end of the Apollo program in 1973, NASA quickly initiated Project Skylab, designed to demonstrate that men could work and live in space. The gold Speedmaster watch presented by Omega to Charles Conrad to commemorate the achievement of Apollo 11 is stamped with his flight record and "No. 12." Conrad says that every time he looks at his watch, it remains him of everything he experienced since he was named as an astronaut - from survival training to practicing witb the experimental tools he would later use during the lunar EVAs - all of which he says seemed as though it happened only yesterday.

Center top - When Charles Conrad was asked for his autograph, he wrote See you on the moon. Along with his Speedmaster, he experienced the greatest adventure
of his time.
Center bottom - From the time he was selected as an astronaut, Conrad always wore his standard issue Speedmaster from training to when he landed on the moon.
P193
DONALD K SLAYTON
Although one of the Original Seven astronauts, it took 16 years for Donald Slayton s name to appear on a
flight log when he flew on the joint American-Soviet
Apollo-Soyuz mission. Slayton never gave up on his dream of going into space. During that time, as the director of Flight Crew Operations, not only was he responsible
for all training and selection of astronauts, but also the selection of crew equipment. He was in charge when the Speedmaster was frst adopted by NASA, and despite
repeated requests by Bulova to reassess the decision, Slayton never altered timepiece perfommance standards used for space flight. This is part of the reason why the
Speedmaster continues in use by NASA even today.
Donald Slayton's Speedmaster watch. Both the crystal and the back show the marks of the many training
sessions it and its owner endured in preparation to go into
space.
P195
LAEXEI A. LEONOV
The joint space flight project agreement between the U.S. and the U.S.S.R. came to fruition on July 18, 1975 when Apollo 18 docked with Soyuz 19. The American
crew of Thomas P. Stafford, Donald K. Slayton, and Vance Brand, and the Soviet crew of Alexei Leonov and Valeriy Kubasov opened the hatch, and the two flight
commanders, Thomas Stafford and Alexei Leonov, exchanged a fimm handshake. On Stafford's wrist was an Omega Speedmaster, while Leonov was wearing an
Omega Flightmaster.
Center top - Alexei Leonov at the time he was in training at the Soviet Star City space center near Moscow for the U.S.-Soviet docking mission. On his wrist he is
wearing an Omega Flightmaster.
Omega Flightmaster chronograph marketed around 1975, developed specifically for pilots. With the Speedmaster, it is one of Omega's most popular products. It was
wom by Soviet cosmonauts and is today used on all Russian space missions.
ALEXANDR POLISHCHUK
Standard issue Speedmaster used on the January 26, 1993 TM-16 Soyuz mission to the Mir space station. To put a watch on the outside of the space suit, it is equipped
with an expandable rubber wristband instead of a velcro band.
P196
MIKHAILOVICH STREKALOV
Cosmonaut Strekalov undertook six space missions in the 1980s and 1990s. He wore the Omega watch on the 1990 Soyuz TM-10 mission to the Mir space station.
YU. V. RO`IANENKO
The Speedmaster watch presented by Thomas Stafford to Romanenko in 1974 for serving as a backup crew member for the Apollo-Soyuz mission.
P197
ALEXEI GUBAREV
The Russian-made Sekonda chronograph. Before the Speedmaster was adopted as standard issue, most Soviet and Russian cosmonauts wore a Sekonda or Poijot
chronograph. This watch was wom by Gubarev on the Soyuz 28 mission in March 1978. It equipped with an elastic rubber wristband and has a valjoux mechanism with

19 jewels.
P198
Chapter 5 - Omega Company History
Ever since Louis Brandt adopted the final letter of the Creek alphabet as the fmm's name, the Omega Company has continually embraced the leading time-keeping
technology of the day. Even with contemporary technology at such an advanced level, time as kept by the
movement of gears remains alive. The Omega Speedmaster,
"the f rst watch wom on the moon," stands as proof of this. Omega's quest for the ultimate in timekeeping started from its workshop in a small valley town in
Switzerland. Vv here will its trail of progress lead as we approach a new millennium? It may not be long, perhaps, before the Speedmaster becomes merely another
turning point in the long history of the Omega Company.
P2Qn
From watch workshop to watch company - The foundation laid by Louis Brandt and sons
ln 1998, the Omega Company will celebrate the 1 50th anniversary of its founding. The company began in lune 1848 when the 23-yearmid Louis Brandt

As the end of the nineteenth century came, the company had grown into the largest watchmaker in Switzerland, with some 600 employees. Moreover, the O—ega
name had come to refer to more than just the watch mechanism. In 1903, the company changed its name
to Louis Brandt et Frere = 0mega Watch Company. In 1947,
the company was renamed Omega Louis Brandt et Frere. Finally, in l982, the name was changed to the Omega Company.
P202
Leading the era in watch manufacturing
April 1903 saw the death of Louis Paul, followed in October that same year by the death of Cesar. Thus, as the twentieth century began, the business was left for the
first time in the hands of the grandchildren of the founder, Louis Brandt The two sons of Louis Paul, Paul Emile and Adrian, themselves had sons Gustave and Emest,
who respectively took charge of and developed the watch manufacturing and sales divisions.
In the era of the pocket watch, both Louis Paul and Cesar had recognized the future potential of developing and selling a wrist-watch equipped with a minute repeater
Such a watch was made in 1892, and was one of the earliest wristwatches. To make a wristwatch that could withstand shock, up, down, left and right movement, and
would continue to work despite being exposed to direct temperature changes, represented a major challenge Nevertheless, by 1900 the company had brought out the
very first production models in its wristwatch series.
Successive generations of the Brandt family successfully carried forward Omega s achievements The First World War demonstrated the practicality of airplanes, and
after the war ended many countries vied to set records for long-distance flight. Omega provided a 28 9mm wristwatch-style chronograph to the Italian pilot who flew
round trip from Rome to Chicago. This not only helped make chronographs small and durable enough to be worn on the wrist, but it also laid the groundwork for the
future emergence of the Speedmaster.
From the beginning, the Swiss watchmaking industry was oriented toward export sales. Paul Emile, who had graduated from Comell University in the United States,
displayed outstanding abilities in the sales division. He led Omega's move to expand its sales network not only across Europe, but also into America. At the end of the
First World War, however, the world economy went into depression. Thus, in 1925 Omega decided to enter into a cooperative agreement with the Tissot Company. The
Tissot brand had been strong in Russia, but afler the Russian Revolution in October 1917, the company

lost its largest market. Hence, the Omega-Tissot brands offered
a relatively inexpensive watch, and served to expand overseas sales routes into Brazil and elsewhere.
The 1929 stock market crash in the United States plunged the entire world economy into severe economic depression. To overcome its effects, Swiss watch makers
worked together to make their manufacturing and distribution more efficient. Omega expanded the scope
of its previous cooperative arrangement with Tissot, and in
1930 it organized an industry organization called SSIH together with the movement maker Lemania (which lefl the group in 1981). Another industry organization,
ASVAG, had been formed primarily by Longines. Later, SSIH and ASUAG combined to form a cooperative enterprise known as SMH, which today constitutes the
leading entity in the Swiss watch industry. The SMH Group encompasses a number of leading Swiss watch makers, including Longines, Rado, Blancpain, Mido,
Hamilton, Certina, and Swatch, along with watch component makers and electronic component makers.
By the late 1930s, the world economy began to recover, yet, at the same time, Europe began to drifl toward the Second World War.
The First World War proved the usefulness and practicality of wristwatches, and by the late 1930s wristwatches had become indispensable items, particularly for
fighter pilots. Orders came in from the United States and France, which had a large number of aircraft, but sales were especially strong in England, which had been
buying Omega watches in large quantities ever since the First World War. Between 1939 and 1945, over half of all the watches purchased by United Kingdom's
Ministry of Defense were made by Omega, amounting to more than 110,000 watches. These Omega watches, stamped with the military "broad arrow" mark, are still
common.
The main model sold to the military was the 30mm caliber watch, which led to the development after the war of an automatic movement with improved water
resistance and shock resistance. Improvements were also made in all the outside components, including the stem, the back and the crystal. Research was conducted into
how to better protect components that are sensitive to water, by using screw-in backs and surrounding them with O-rings and packing material. By the 1950s,
development was already under way on what would result in Omega's mainstay divers' watch, the Seamaster.
P204
Omega - The "Official NVatch"
Around the tum of the twentieth century, when modem railroad networks had only just emerged, the phrase "railroad approved" became a synonym for timepiece
precision. Designation as the offcial watch for a railroad system boosted sales and enhanced prestige. Omega watches were offcially adopted by the railroads of
Russia, Australia and other British colonies, the United States, and a number of countries in Asia.

mmendoos tcchnic d leadership md . tively pushed fot Omega w engr obse~v gory spom ored prectsion conUgs d He _ly undemtood a~e sigmifimmm for thc Omcgc brand label of producing chronometer-cLa$$ precision models. He also conceived the idea of making water-resistant watches and led the company into the field of selfwinding wristwatches. The various models that emerged ffom this strategy have done much to establish the prestige of the Omega name. P208 From Seamaster to Speedmaster

Jaccques Mayol, who setthe world depth record forskin diving of 101 meters offthe island of Elbe in 1987, was wearing a Seamaster 120 on his wrist atthetime. When a diver is under water, a single second can feel quite different than on land, and this is why a diver has to have a watch that tells time objectively, Mayol explained. If so, then even when the diver encounters some danger, just the knowledge that you have a watch that tells the time exactly helps keep you from panicking and helps you respond coolly to the situation Hearing these words from the man who is known as the dolphin man" because of his aquatic ability, reminds us how high the expectations are for a diver's watch.

The Seamaster 300 of 1955 featured all the key elements of the series, including the core performance of the Cal.28 SC-501 self-winding movement. Omega developed three unique technologies to improve the watch's water-resistant structure, which are critical for reliability It used a special double joint structure, called naiad, to attain water resistance to 20 atmospheres. Other performance features included a click-set time indicator ring, a highly readable dial and fluorescent display that can be seen at depths where natural light cannot penetrate The watch also includes a thick dome crystal, a steel bracelet, an easy-to-use buckle. Omega was determined to make a divers' watch that offered a water resistant structure that was also dust, heat, and shock resistant, to ensure the watch was totally dependable under water.

To enhance the Seamaster 300's water resistance, Omega developed the naiad high-pressure resistant double joint. A Naiad was a nymph of Creek mythology that inhabited rivers and lakes. It is also the name of a type of mollusc that can close its mouth very tightly. It was thus a perfect name for the protective double joint seal structure, the weakest point in tetms of water resistance in a watch. The naiad is designed so that its sealing power actually increases with depth. Thus, the structure can protect the precision movement to a depth of 660 feet. Extemal pressure exerted on the watch tends to push the watch from side to side, while at the same time the airtightness of the watch case tends to exert contrary pressure. The perfect airtightness offered by the naiad double joint seal expands the range of usability of the watch.

The second structural feature developed for the Seamaster was the use of O-rings for sealing. O-rings are used for submarine hatches and jet fiuel tanks. Omega developed an O-ring made of synthetic rnaterial especially resistant to humidity and corrosion, pliable but not prone to distortion, even when subjected to strong forces over long periods. To achieve ideal airtightness, it was essential for the O-ring to fit the groove in the case exactly.

The O-rings were also processed to withstand water pressure up to 6 atmospheres and resist deterioration even when exposed to extreme changes in temperature. Omega thus achieved a level of water resistance that made the watch usable in all weather conditions.

The third structural feature consisted of improvements to the crystal. This was accomplished by integrating high-strength glass with a metaL tension ring to provide protection at the very

weakest point on the watch. Omega used special armored glass, for the crystal, which is virtually unbreakable, and was recessed deeply into the case and reinforced by a metal tension ring. Water pressure on the crystal makes it bind even more tightly to the watch, without deformation. Extraordinary strength is required to keep a watch in a completeLy sealed condition. This watch repels dust and water, and aLso inhibits the formation of moisture due to temperature changes.

P210 Speedmaster - The Tough Chronograph

Omega developed the sealing structures that wcre incorporated into the Seamaster in the 1950s. They became the basis for the heavy-duty watches Omega produced thereafter. The Speedmaster also employed the san.e tripartite sealing technique, tuming it into atough sports watch. Moreover, the Speedmaster served both as a rugged watch as well as a chronograph.

Watches have a wide variety of roles to fulfill and many contexts in which to demonstrate their reliability, including outer space, with its harsh conditions found ;

nowhere on earth. Even in space, it was proven that the Speedmaster kept accurate track of time utterly unaffected by the difflcult conditions to which it was exposed. More significantly, the watches used in space were not specially developed for space flight, but rather were ordinary watches made "for the rest of us."

When Wally Schirra rode into space in Sigma 7 as part of Project Mercury on October 10, 1962, he was wearing a Speedmaster watch that came offthe assembly line on November 15, 1961. It was the second model of the Speedmaster, which first went into production in 1959. It featured an O-ring on the push buttons and hands and tachymeter of a different design from the first model.

NASA imposed very severe standards for a watch to pass as "flight qualified," and it was well known how diff~cult it was to possess the "right stuff~ to endure the test program. Nevertheless, the watch that was chosen for the astronauts was an Omega Speedmaster that came right offthe shelves of Corrigan's watch store in Houston, and was in a sense. an ordinary watch. There was some element of serendipity in NASA's choice. If the store had been out of stock of Speedmasters, NASA of ficials would have left empty-handed. However, in the process of making the Speedmaster, Omega left no room for chance. The Speedmaster was not a product line that simply suddenly appeared. It represented an inevitable extension of all the timepieces Omega had ever made.

The Speedmaster embodied all the skill. perseverance, and intuitive sense of Omega's master watch craftsmen. All of these elements can be summed up in the word "tradition," and y et the Speedmaster contains elements that delight both the maker and the user, as well as an appeal that comes only from tradition. This is what gives the Speedmaster "the right stu~' to become "the watch for the rest of us."

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