Space Cadets

Space flight is still universally acknowledged to be the toughest empirical test that a wristwatch can be subjected to. But what exactly is it that makes a timepiece suitable for use in outer space? And which watches have already been in orbit?

BY WITOLD A. MICHALCZYK

Five words electrified the team at Mission Control: "Houston, we have a problem." This laconic statement triggered the most dramatic rescue in the history of technology. On their way to the moon, the three astronauts aboard Apollo 13 discovered that a leak in their space capsule had crippled the entire power supply. One of the main roles in their successful return to Earth was played by an Omega Speedmaster, which they used to determine when to switch their propulsion system on and off. Probably no other timepiece has ever been called on to pass such a spectacular test. Ever since, many watch fans have agreed that the so-called "Speedy" epitomizes the space watch.

Omega's chronograph was also the first watch on the moon and was standard equipment on the Apollo missions, where it was the sole object that wasn't expressly designed and built for excursions into space. But the Speedmaster wasn't the first watch to leave the Earth's atmosphere. This honor is reserved for the one that Yuri Gagarin wore on his wrist on April 12, 1961, when he became the first man to fly into space. According to most sources, the ur-cosmonaut was wearing a Pobeda brand Shturmanskie watch (*pobeda* means "victory") made by the First Moscow Watch Factory. This small three-handed watch appears in the official picture published by the manufacturer's successors.

Soon after Gagarin's successful expedition, the Soviet government changed the brand's name to "Poljot" ("flight"), which is still used today.

The first watch worn in space by an American was likewise not an Omega. It was probably Breitling's Navitimer Cosmonaute, which Scott Carpenter wore on May 24, 1962 when he flew in the Aurora 7 mission. NASA had already sent three pilots into space before Carpenter, but John Glenn wasn't wearing a wristwatch and no records document whether Alan Shepard and Virgil Grissom wore watches on their wrists.

The Navitimer Cosmonaute was equipped with a 24-hour display. This has a certain logic because terrestrial day and night no longer play a role for astronauts orbiting the Earth. Their cycle of working and sleeping shifts defines the orbiters' "day."

For a long time, no successor followed the Breitling that Scott Carpenter had worn. Breitling didn't return to space until the mid-1990s, when the company equipped Franco-Russian missions between 1996 and 2001 with a special version of the Aerospace. These watches had a special logo, an engraved back, and an extra-long Velcro strap so they could be worn over the thick sleeve of a spacesuit.

The story of how the liaison between Omega and NASA came about has become a standard in the repertory of every teller of horological tales. In the early 1960s, a NASA employee anonymously purchased a number of chronographs. The candidates were made by the era's best-known manufacturers: Elgin, Benrus, Hamilton, Mido, Lucien Piccard, Bulova, Rolex, Longines, Gruen, and Omega. Omega's Speedmaster was the only watch that passed all the tests. Gordon Cooper took both a Bulova Accutron and an Omega Speedmaster on his mission in May 1963, so these two models went one-on-one in a genuine empirical test. Though the Speedmaster performed better than the Accutron (which relied on an electrical tuning-fork movement), NASA afterwards chose Bulova to supply Accutron movements for the timekeepers aboard Apollo missions.

In response to urging by another American watch manufacturer, NASA ran a second series of tests a few years later. In direct comparison

Omega's Speedmaster Professional is the archetypal space watch.

The first watch in space was a Soviet Shturmanskie on Yuri Gagarin's wrist.

Bulova's Accutron was tested in orbit one-on-one against Omega's Speedmaster.

In 1985, Reinhard Furrer's Sinn 142 became the first self-winding watch to enter outer space.

Sinn's current special model of the 142 contains Lemania's self-winding Caliber 5100.

with the Speedmaster, the contender, crafted expressly for the occasion, failed to defeat Omega's "Speedy."

The Speedmaster's big moment came in October 1962, when Wally Schirra wore one while circling the Earth six times aboard the Sigma 7.

We know for certain that the Speedmaster is the first and thus far the only watch model worn on the moon. But it wasn't Neil Armstrong's watch that accompanied him when he left the Eagle and took that momentous "small step for a man." He had had to leave his wristwatch aboard the mother ship because one of its timepieces had failed. Edwin Aldrin lent him his watch, which then accompanied Armstrong onto the lunar surface. Incidentally, Aldrin's watch disappeared shortly after the landing and didn't resurface until a few years ago, when it was located in a private collector's hoard. But the whereabouts of many of the other Speedmasters worn on moon missions are well documented. For example, the models worn by Tom Stafford, Neil Armstrong and Mike Collins can all be seen at the National Air and Space Museum in Washington, D.C. Fred Haise's Speedmaster, which he wore aboard the nearly disastrous Apollo 13 mission, is kept at the Penn-Harris-Madison Planetarium in Mishawaka, Indiana. And the watch that flew into space with

NASA officially permits three watches: The Omega Speedmaster X-33, the Casio G-Shock, and the Timex Ironman (shown here on C. Michael Foale's wrist).

Dick Gordon aboard Apollo 12 is on display at the Omega Museum in Bienne, Switzerland.

By the way, the Speedmaster has another first on its list of credits. It was the first watch to accompany an astronaut outside a space capsule when, on June 3, 1965, Edward H. White opened the hatch of Gemini 4 and left the comparative safety of his spaceship for 22 minutes of extravehicular activity. The timepiece is clearly visible in the official photos of his historic walk in space. Only after White's unprecedented stroll was the manufacturer in Bienne informed about the unique honor that NASA had given its product. When the exciting news reached Omega, the company's top executives instantly realized the Speedmaster had tremendous advertising potential. To this day, the company continues to release special editions recalling the many grueling ordeals that its ticking space cadet passed with flying colors.

The Speedmaster is powered by the hand-wound Caliber 321. The chronographs that NASA originally tested were all hand-wound models. The reason for this was simple: the first self-winding chronograph was presented by Breitling and Heuer in March 1969, when NASA was poised to attempt the first manned landing on the moon. America's space agency wasn't eager to start a new series of watch tests at this point. And why should it have been? After all, the Speedmaster had repeatedly proven its capabilities in outer space, so the Americans intended to abide by the sage advice summarized in the old saying, "Never change a winning team." The Russians didn't have a functional self-winding chronograph either, so for many years no one had any reason to doubt the unwritten commandment: "Thou shalt not wear an automatic watch in space." Many watch technicians were convinced that the absence of

Fortis timepieces have also proven their mettle in extravehicular situations.

Fortis's Official Cosmonauts Chronograph

Breitling provided the watches on four Franco-Russian missions between 1996 and 2001. Claudie Haigneré wore a special Aerospace model in 2001.

Leroy Chao relied on his Rolex GMT Master during ISS Mission 10. This watch is readily recognizable thanks to its bicolor bezel.

gravity would prevent the winding rotor from accomplishing its energy-producing duties.

The error of this assumption was proven by a combined East and West German crew in 1985. On his Spacelab mission, Reinhard Furrer wore a chronograph Model 142 S made by Sinn in Frankfurt. This timepiece was powered by a Lemania Caliber 5100. Furrer had taken his own personal chronograph into space. It was essentially the same as other serially manufactured versions of the 142 S, and its fine performance aboard Spacelab underscored its reputation as a solidly constructed watch containing a reliable movement. The rotor continued to do its job without shirking, so Furrer never had to add power by manually winding the crown. Other astronauts later followed Furrer's lead: Klaus-Dietrich Flade, for example, wore Model 142 S on a MIR mission in 1992.

By this juncture, watch-related restrictions had become considerably less stringent than they had been back in the early days of manned space flight. NASA now has a mover lenient attitude in this matter, allowing its astronauts to carry their own wristwatches along on space flights. According to Peter Peter from Fortis, which has supplied cosmonauts with wristwatches since the 1990s, the conditions aboard the ISS Space Station are more or less the same as those that prevail in an airplane, except for the weightlessness in space. Furthermore, the forces generated during a rocket's liftoff and a capsule's re-entry can be up to six times stronger than Earth's gravity. These are the phases of the flight when a cosmonaut's wristwatch undergoes the severest stress, so during these intervals he is required to wear an official mission watch that has passed tests and proven itself able to function properly under high "G" conditions. The same regulations apply during extravehicular excursions. That's because leaving the protective confines of a space capsule brings a multitude of difficulties. NASA technicians know that the watch on the wrist of an astronaut in EVA must cope with the sudden drop of pressure that occurs when he leaves his pressurized cabin behind and enters the vacuum of outer space. His timepiece must also cope with a temperature change of 100° Celsius each time he turns his wrist and brings his watch into

Sigmund Jähn no doubt wore a wristwatch in 1978, but the identity of the high-flying model was unfortunately never documented.

A Casio G-Shock helped Reinhold Ewald keep track of precious time aboard the MIR '97 mission.

either unfiltered sunlight or total darkness. Finally, a watch that accompanies an astronaut onto the lunar surface must withstand temperature variations ranging from –160° to +120° C. Furthermore, a decline in atmospheric pressure is directly related to the reduction of the boiling point of a liquid oil. This means that fluid lubricants in a mechanical watch movement tend to evaporate rather quickly. That's one reason why watch manufacturers such as Sinn are experimenting with combinations of materials whose surfaces have the lowest possible coefficients of friction, i.e., they glide over each other smoothly and with very little rubbing. This makes it possible to dispense with oils or greases. One result of this research is being incorporated into Sinn's Diapal technology.

The classic mechanical Speedmaster ceded the honor of being NASA's official space watch to the Speedmaster X-33 in 1998. The new titleholder's quartz movement, powered by a long-life battery, ultimately proved itself better suited for the job than its mechanical forebear. The X-33's combined analog-digital display shows both the standard time of day and the immensely important GMT time, which serves as the reference time by which all of a mission's sequences are coordinated. The quartz Speedmaster also has a built-in alarm, a chronograph, and several other functions that are useful outside the Earth's atmosphere. Like its predecessor, the X-33 is now an official piece of equipment for astronauts; but unlike its mechanical ancestor, the X-33 was expressly designed for use on space missions. The electronic Speedmaster cannot claim the glory of the conventional "Speedy," which needed no modifications to withstand the toughest tests. This probably explains why watch fans never granted the X-33 the cult status enjoyed by its forebear.

Along with the Omega Speedmaster X-33, NASA has since lengthened the list of officially permissible space watches to include two other wristwatches: Casio's G-Shock and Timex's Ironman. The latter, which NASA buys for significantly less than 100 euros apiece, could well be the least costly watch that ever went beyond "the wild blue yonder" and into the starry black "beyonder": the cheapest officially permissible watch, that is, because no one keeps records about the comparative prices of astronauts' personal wristwatches. Horological historians do know, however, that several Rolex, Seiko and Citizen models have experienced the weightlessness of outer space.

In addition to the mechanical Speedmaster and the electronic Speedmaster X-33, at least one other Omega wristwatch has also been in orbit. Russian cosmonaut Alexander Leonov wore an Omega Flightmaster, which is a variation of the Speedmaster Mark II with additional GMT function, during the Apollo-Soyuz rendezvous in 1975.

Patek Philippe's Nautilus spent more than 15 days in orbit aboard the unmanned Photon 8 space capsule.

Not counting Leonov's Omega, at least seven other Speedmaster models accompanied cosmonauts aboard Soyuz missions, including several expeditions flown during the USSR era. Prior to the opening of the Iron Curtain, only rudimentary records were kept about the identities of the other timepieces that went into space with Soviet bloc cosmonauts. The benefits of advertising space-related watches in communist countries were considerably less than in capitalist ones. This explains why no one knows which

Omega's Speedmaster X-33 is one of NASA's three official watches, and Russian crews also like to wear this model, which appears here on the wrist of Vladimir N. Deschurow (left) aboard the ISS.

watch was worn by Sigmund Jähn, the first German in outer space, when he flew aboard the Soviet Soyuz 31 mission in 1978. The official photos unfortunately offer no clues, and the cosmonaut himself hasn't divulged any details.

Horological historians know about a few specially made chronographs with Poljot calibers, e.g., the one Alexander Poleschuk wore when he walked in space during the MIR 13 mission in 1993. A French YA watch accompanied this cosmonaut, too. The Kosmonavigator was another specially made item: powered by a Vostok Caliber 2424, this watch had a 24-hour scale on its dial. The evolution of this model can be traced to problems aboard a Soyuz flight in 1985, when cosmonauts lamented the lack of an unambiguously legible timekeeper.

The situation changed drastically (and not solely for watch aficionados) when the Iron Curtain began to fray and the frontier between East and West became more permeable. Fortis, the watchmaking company in Grenchen, Switzerland, has closely collaborated since the 1990s with Rosaviacosmos, the Russian space agency. The Fortis Official Cosmonauts Chronograph has flown on numerous missions. This collaboration began early in the 1990s, when the Russian space agency invited Fortis's Peter Peter to visit Star City, the training and research center on the outskirts of Moscow. Peter and his hosts drew up a list of specs that the Swiss visitor took back to Grenchen, where he and his team of engineers began designing a watch that would fit the bill. After comprehensive tests, the Fortis Official Cosmonauts Chronograph was added to the official list of cosmonauts' equipment. When the international Euromir mission lifted off in 1994, its crewmembers each received a Fortis Cosmonauts Set, which included the aforementioned watch and a variety of spare parts. When the watch left the Earth far below, it became the first self-winding chronograph to enter outer space.

Cosmonauts Talgat Mussabayev and Yuri Malenchenko wore their Fortis watches for more than 11 hours in free space outside the confines of their mother ship while they were executing extravehicular tasks to prepare for a coupling maneuver with the space shuttle Atlantis. These timepieces had no problems coping with temperatures between –150° to +180° C. Participating astronaut Ulf Merbold confirmed to Fortis that the Valjoux 7750 inside his watch never once needed manual winding during the 30-day mission.

In the meantime, several Fortis models have kept time on the wrists of crews aboard the MIR and ISS space stations. A special edition of the B-42 Official Cosmonauts Chronograph recently joined the package of equipment furnished to the twelfth crew aboard the ISS. This same crew also enjoyed an appropriately extraterrestrial celebration of the tenth anniversary of Fortis's first venture into outer space. The brand's out-

standing record of space travel makes it second only to Omega, the manufacturer with the most experience in the cosmos of space watches.

Fortis's ongoing collaboration with astronauts and cosmonauts continues to bring about better versions of space-suitable watches. Yuri Bogorodski, the man responsible for Star City's foreign and commercial relations, explains: "Cosmonauts fill out a questionnaire after they return to Earth. I evaluate their feedback and then collaborate with Fortis to implement the desired improvements," which have thus far resulted in several modifications. The size of the watches has been increased to achieve better legibility, the straps have been lengthened, and the pins for the strap lugs have been reinforced. A lighter titanium bracelet has also been developed because every extra gram of weight on board costs money.

In addition to these efforts, Fortis is also the chief industrial partner in a project involving commercial data transmission to any desired receiver. Among its other benefits, the Global Transmission Services or "GTS" system will be able to send a UTC-based time signal to radio timepieces, thus ensuring global coordination of local times. There will also be personal-paging and theft-protection services based on this technology. The system isn't yet mature enough for serial production to begin, but experiments conducted so far promise a wide array of exciting applications.

Like their American colleagues, Russian cosmonauts are now permitted to take their personal wristwatches into space. East and West, both space agencies now apply the same regulations to this aspect of their missions. For example, Yuri Shargin relied on his private Shturmanskie chronograph from the Yuri Gagarin edition in 2004. Only after his return to Earth was a confirmation sent to Volmax, informing the watch's manufacturer about the serial number of Shargin's watch and other data from the flight.

Russians were also the first to catapult genuine luxury into outer space. The unmanned Foton 8 space probe blasted off from Plesetsk spaceport in northern Russia on October 8, 1992. Inside this high-flying capsule was a Patek Philippe men's Nautilus wristwatch. The Swiss movement inside the elegant gold case was still hale and hearty 15 days later, when the capsule returned to the Kazak steppe. This timepiece, which is very likely the most expensive watch ever to leave our Blue Planet's protective atmosphere, can be admired today at the Patek Philippe museum in Geneva.

Yuri Shargin took his Shturmanskie Chronograph into space in 2004.

Breitling's Navitimer is believed to have become the first watch worn in space by an American (1962).

Incidentally, many an astronaut straps more than one watch to his wrist while he's on duty in space. Why? First of all, the official mission time for the ISS is GMT, but the time of "day" aboard the Space Shuttle is the time used in Houston, where ground control is located. Furthermore, many astronauts want to know a third time: that in their hometown, so that they can choose an appropriate moment to make a personal phone call. To keep all these different times in view, some astronauts wear as many as three wristwatches simultaneously. This doubling (or tripling) has enabled a large number of watch manufacturers to advertise the fact that one or another of their models has flown in geocentric orbit. The conditions aboard modern spaceships differ in only a few minor respects from those that prevail on *terra firma,* so this unconventional work site doesn't pose any insuperable difficulties for the majority of better-quality timepieces. This applies both to quartz and mechanical watches. Of course, conditions outside a space capsule are considerably more difficult, and very few manufacturers build watches that can survive there. Thus far, none but mechanically powered models have successfully accompanied astronauts during extravehicular sessions ■