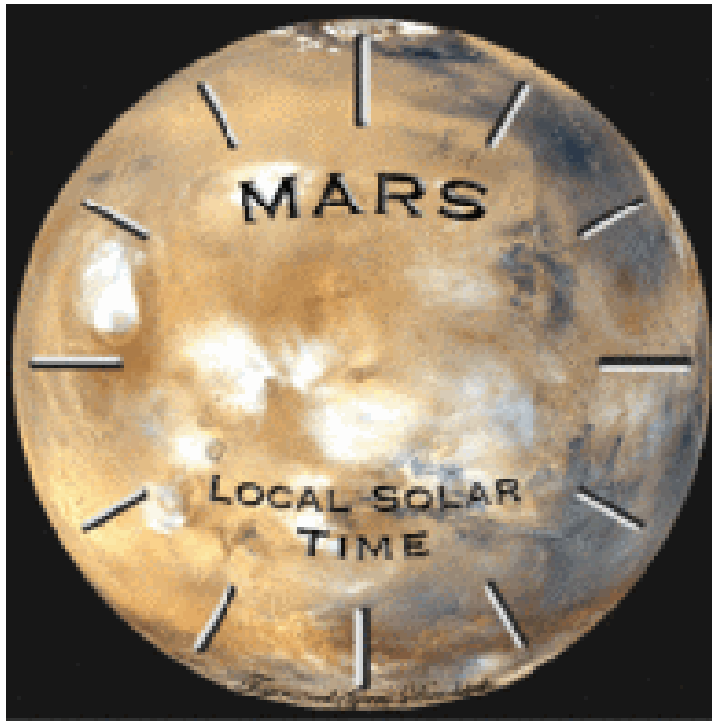


WHAT TIME IS IT ON MARS?



Mars Watch Face

Because Mars spins on its axis on an average of 39 minutes more slowly than the Earth does, the length of the Mars day is 39 minutes longer than an Earth day.

1. In one Earth week, how many minutes slower would time be on Mars?

One Earth week = 7 Earth days X 39 Earth minutes per Earth day = _____ Earth minutes slower

2. Calculate how many Earth days behind that Mars time would be in one week.

_____ Earth minutes slower X 1 Earth day / 24 hours = _____ Earth days that Mars time would be behind in one week.

Adapted from JPL Laboratory for use in role models and careers in the classroom by Patricia G. Smith,
Instructor at STARBASEOK-OKC

*For more information about Mars see the following web site,
http://marsrovers.jpl.nasa.gov/spotlight/spirit/a3_200040108

Executive Jewelers



Montrose, California

They said it couldn't be done. But in the sleepy little town of Montrose, California, nestled in the hills surrounding JPL, master watchmaker Garo Anserlian of Executive Jewelers is perfecting a timepiece for hundreds of Earthlings bound to Mars' irregular day. Past the glass cases of what looks like an ordinary jewelry store is a workshop where watches are losing 39 minutes a day.

Rover controllers have to monitor Spirit (and soon, Opportunity) all the time; this doesn't just mean 24 hours a day "it means 24 hours, 39 minutes a day. The Martian day is longer than Earth's, but this minimal variance can amount to physical and mental fatigue. Every day, team members are reporting to work 39 minutes later than the previous day. "Everything on this mission is based on local solar time on Mars," said Julie Townsend, Mars Exploration Rover avionics systems engineer. "From home, during the mission practice tests, it was very difficult to constantly translate Earth time to Mars time."

Townsend and her co-worker Scott Doudrick, a systems engineer on the project, set out to find a solution for this other worldly problem. The pair

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began to ask watchmakers to tackle the challenge but each one turned them away, saying that it couldn't be done unless they placed a large order (10,000 plus) for quartz-controlled watches; they insisted that attempting to convert mechanical watches was not possible.

A neighborhood store located on a strip of distinct specialty shops without a chain store in sight Garo's workshop is far from a cookie-cutter assembly line. Tables covered with disassembled watches and clocks seem to mirror the intent watchmaker's mind; taking things apart and fixing them is, for him, second nature.

"When I do to know the it," he stressed. **hobby, it is my**

A man, who at the age of underling to his guides his own apprentice, nine-David. Clearly father, David novice clock- and declared that take over the does inherit the have benefited finely honed skills, acquired under master watch and clockmakers in Switzerland and Germany.



something I like maximum about **"This is not just a career."**

found his passion eight, an father, now young year-old son, enamored of his relayed his own making prowess he would one day store. When he business, he will from his father's

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Garo acknowledged that the Mars watch request is the strangest he has ever received. It took him about two months to design, fine-tune and streamline the process that would keep the watch on Mars time.

"Since I was a young child, I've put my heart into making very precise time pieces. Now I was being asked to create a watch that was slow on purpose. It was going to be a challenge if it was even possible," Garo said. "I spent more than \$1,000 trying to figure this out, damaging watches, trying different parts, just searching for a way."

Watch making is a careful process that involves very small parts and wheels. In order to make the watches useful to the Mars Exploration Rover



team, Garo had to physically attach additional specific lead weights thus precisely altering the movement of the wheels and hands on certain existing famous-maker wristwatches. Working on the 21-jeweled self-winding mechanical wristwatches was sometimes frustrating.

"At one point my helpers and I looked at each other and said 'forget it, we're wasting time and money.'" But Townsend and Doudrick wouldn't let him

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quit. The two came by his shop every week, assuring him that his highly anticipated watches would be a valuable asset to the team.

Garro finished Doudrick's watch first and after initial testing, discovered that it was off by no more than ten seconds in 24 hours Earth time " an amazingly accurate feat for an entirely mechanical watch. Now, when the store is fully staffed, the experts can retrofit and thus create about ten watches per day. After he accommodates all rover team members who wish to own a custom-made Mars watch, he will market his patented rarity to the public.

Garro watched with million of others as mission control described Spirit's near-perfect landing. But his connection to the mission was personal.

"I felt proud; I got goose bumps," he said. "I saw that some of them had two watches on and I thought, one of them was mine! I was proud as an American that it landed and secondly that my watches will be used."

Used, indeed, by a team of scientists and engineers who looked to a truly old world craft for a solution to a very modern problem. And like the rover team, that faced countless challenges and criticism, Garro gets to say, "I told you so" to those who said it couldn't be done.*

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