

MARK I UPGRADES

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\$1.5 million renovation now underway

The \$1.5-million modernization of the Mark I Space Environmental Chamber that began last month marks a 30-year evolution of space system testing facilities at AEDC.

"By late October, Mark I will have leapt from the 1960s into the 1990s," Capt. Josh Mulder, AEDC Space Systems test manager, said.

According to AEDC officials, this is the first major upgrade on the 82-foot-by-42-foot-diameter test chamber in three decades and will make the facility a prime candidate for future Department of Defense and commercial industry space systems.

Requirements and funding for the upgrade are part of a 10-year, \$30-million contract signed earlier this year with Loral Space Systems to test their commercial satellites.

AEDC pipefitters began a major phase of the upgrade when they removed eight oil diffusion pumps used to create the vacuum environment in the chamber.

The 1960's-era pumps will be replaced by four turbo replacement pumps and seven cryogenic pumps. The cryo pumps use helium instead of oil, eliminating potential oil contamination of the test article, and were a key require-

ment in the Loral contract. The turbo pumps Mark I employees installed last week and the cryo pumps are scheduled for installation later this month.

Pipefitters also installed cryogenic supply lines for the test user's circuits. These lines will provide the user the ability to cool their test fixtures and associated hardware.

Laborers cleaned and scraped the interior chamber walls and painters pressure washed the liquid nitrogen cryo panels in preparation for painting. "After the chamber is painted, a chamber 'bakeout' pumpdown will be performed to remove contaminants from the paint," Allen Rogers, Space Systems Branch coach, said. "This will prevent gaseous contamination of a satellite during a test."

To perform the bakeout, two 60-foot towers, with 160, 1,000-watt quartz lamps normally used for high-speed photography in the chamber will provide the intense heat necessary to decontaminate the paint.

However, before painting could begin, electricians had to remove the towers and secure the electrical cords to each of the lamps. They also added and secured 40

new lights, increasing power capacity to 200,000 watts.

According to Albert Dawbarn, senior electrical engineer, the lights will maintain a constant 24-hour temperature of 100 degrees Celsius under vacuum conditions to provide the environment necessary to completely remove possible contaminants.

Electricians also installed heater controls that will operate 120 DC and 40 AC heaters simulating heat loads and controlling the satellite's heaters. Each heater is individually controlled and operates on independent set points. According to Sverdrup senior project engineer Jim Sisco, the new computerized temperature system will be more powerful and will have more control channels allowing more accurate temperature control of the satellite.

Remaining work includes installation of a new data acquisition system that will increase the data output channels to more than 1,200 compared to the current 200.

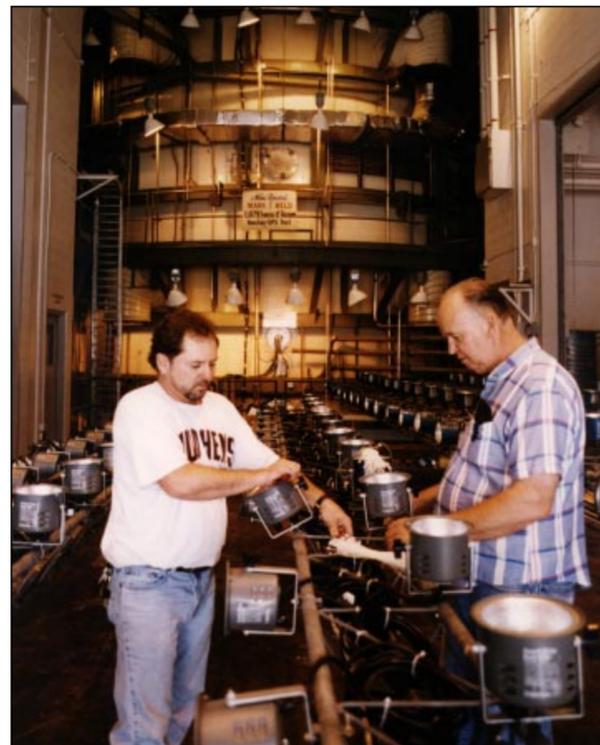
The upgrade is scheduled for completion in October with the first test tentatively scheduled for January 2000. Center officials expect to test between 30 and 40 Loral satellites during the next 10 years.



Pipefitter Randy Millen welds cryogenic supply lines for the test user circuits in Mark I. These lines provide cooling for the customer's test fixtures and hardware. The weld seams must be cryogenically rated as well as withstand the vacuum and heating conditions experienced in space.



Electricians Kenny Uselton, left, and Wayne Arnold check out a new automatic transfer switch that will provide emergency power to the satellite heaters in case of a power outage.



Electricians David Horton, left, and Donald Willis secure each of the 160 quartz lamps that will provide the intense heat needed to decontaminate the new paint in the chamber.



Outside machinist Troy Perry removes a feed-through flange from Mark I to allow installation of new electrical power feed-throughs for two 60-foot light towers housing the heat lamps.



Instrument technician Roger Johnson inspects components of newly arrived data acquisition system that will increase the data channels in Mark I from 200 to more than 1,200 to support Loral satellite testing. The system will be installed later this month.

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