Old, new meet in Mission Control

By James Hartsfield

Mission Control, Houston, is moving—albeit only a few hundred yards—but the change will move the famous manned space flight control facility from the 1960s into the 21st century and beyond.

Mission simulations began Dec. 20 in the new version of Mission Control Center. The simulations usher in a drastic change in the tools and costs associated with manned space flight control. The new control center eliminates the NASA-unique equipment and massive hardware orientation of the current MCC, replacing it with a modular, software-oriented design that uses standard, commercially available equipment.

The new MCC, developed at a cost of about $250 million, is planned to begin actual operations for control of shuttle flights this summer, and the current mission control then will be slowly phased out, eventually relinquished to history.

“A shuttle mission is the end result of a journey, and the first step in that journey is the first simulation,” said John Muratore, chief of JSC's Control Center Systems Division. “The first simulation in the new MCC means that we now have enough capability and reliability in the facility to start using it for real work. It's no longer under development. It's now moving into operation.”

The new MCC's design offers an unprecedented flexibility in flight control operations, allowing the facility to be changed from controlling a shuttle to controlling any other spacecraft at almost the speed of simply choosing a different function from a computer menu. The commercially available equipment and up-to-date technology used in the new MCC will greatly reduce maintenance costs for the facility as well.

Unseen by most who are familiar with television views of the current mission control is the support equipment for the control room, a first floor completely filled with, by today's standards, obsolescent mainframe computer equipment. A staff of about 80 is required around the clock during shuttle missions to operate the equipment, and maintenance on the curr...
New MCC is world’s largest fiber network

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rent mission control must be done on a circuit board by circuit board basis. For that maintenance, specialists who know the old equipment in such circuit by circuit detail are always on hand because similar equipment was long ago purged from the commercial world.

The new MCC uses workstations interconnected via a local area network, doing away with the older mainframe approach and bringing it in line with the systems most commonly in use today. Manufacturers can maintain the equipment on a modular basis, pulling out and replacing entire workstations rather than intricate parts, a change that will reduce the maintenance personnel required for mission control by about 180 positions as the current control center is phased out.

In part, the greater capability and lower costs of the new MCC are benefits gained by NASA from an industry the space program helped create. "In the 1960s, as late as 1963, 90 percent of all of the electronic chips, computer chips, in the U.S. were bought by NASA and the Air Force," Muratore explained. "The industries supporting NASA at that time went on to use that technology to revolutionize consumer electronic products. By using more easily maintained and more capable commercially available equipment in the new MCC, we are reaping a harvest from seeds planted by NASA in the Apollo era."

In the new MCC, a total of 197 workstations can be used to control both the space shuttle in flight and the International Space Station to be launched in 1997. Currently, 204 workstations are required for shuttle flight operations alone. The number of equipment racks needed in the new MCC is half the amount in the current mission control. The networks in the new MCC are linked by 125,000 feet of fiber optic cable, making it the world’s largest fiber data distributed interface network.

The majority of software packages used in the new MCC are standard, commercially available products as well. Only a "thin layer" of software that is inherently required to accomplish tasks unique to shuttle flight control has been developed by NASA. The software also makes use of intelligent systems to assist flight controllers in monitoring the health of the shuttle, although the flight controllers themselves are, as always, the primary mechanism for detection of malfunctions and attempts to resolve them.

Although the setting and tools are changing, the philosophy, discipline, and the flight control positions themselves remain the same.

"The original mission control was a technological wonder of the world when it was built. Nothing like it had ever existed before. It was the first of its kind," Muratore said. "The new mission control is a wonder in the way we are applying technologies to a difficult and complex job. It is the best of its kind."