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There were cheers again Monday at 75 Cambridge Parkway, Cambridge, Mass., following the safe return of the Apollo 12 astronauts.

That's a three-story brick building overlooking the Charles River Basin where the men and women of Instrumentation Laboratory, Massachusetts Institute of Technology, developed the guidance systems for the Apollo spaceships and also develop the programs for the on-board guidance computers for each mission--including Apollo 12.

In addition, the Laboratory stands an around-the-clock watch during a mission and, by means of a private telephone line to the mission control center at Houston, Tex., helps mission control and the astronauts operate the systems during flight.

Monday's cheers were set off when word was flashed along the line that Astronauts Charles (Pete) Conrad, Al Bean and Richard Gordon were safe on the water in their space capsule, Yankee Clipper, in the mid-Pacific Ocean.

The M.I.T. guidance system aboard the Apollo 12 command module had been used to steer the Apollo 12 moon probe through earth orbit, out of earth orbit and along a translunar coast to orbit around the moon, in orbit around the moon and then out of moon orbit and back to earth to a safe re-entry and landing. Aboard the lunar module, an M.I.T. system had steered the astronauts out of moon orbit and down to a pinpoint landing on the moon surface, then up from the surface to a successful rendezvous with the orbiting command module.

Not the least among those at M.I.T. who were celebrating the moonship return was pretty Margaret Hamilton of Cambridge, a mathematician and computer specialist who was in direct charge of programming the guidance computers aboard both the Yankee Clipper and aboard the lunar module, the Intrepid, which Conrad and Bean used to land on the moon.

Indeed, it was Margaret, and the men who work for her, who did the recoding of the Intrepid's guidance programming to permit the last-minute retargeting that helped Intrepid make a pinpoint landing.

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"We weren't sure the new programming would actually have to be used," she said. "But it was and apparently it helped."

Margaret is a 1958 graduate of Earlham College, Richmond, Ind., in mathematics and has been at Instrumentation Laboratory working on Apollo since 1965. A Michigan native, she graduated from high school at Hancock, Mich.

Instrumentation Laboratory is the oldest of all Apollo contractors and the Laboratory's director, Dr. Charles Stark Draper, has been described as one of the three or four men in the country whose genius made missions to the moon possible.

Dr. Draper originated inertial guidance based on gyroscopes, accelerometers to sense vehicle motions, and on-board computers to integrate the motions and steer the vehicles. When the federal space agency was contemplating a manned moon mission, Dr. Draper was asked if he thought he could design and develop a guidance system of sufficient accuracy and reliability.

His answer was yes and to support his confidence he offered to go along as the system operator on the first mission. (Although now 68, Dr. Draper is a pilot and still soars in sailplanes for diversion.)

His offer to go along was not accepted, but he was asked to do the guidance job. The Laboratory's original work began under a study contract awarded in April, 1961, a full month before President John F. Kennedy announced the Apollo mission to the moon as a national goal.

Deputy director of the Laboratory for all space programs is Ralph R. Ragan of (Giles Road) Lincoln and the director of the Apollo project itself for the Laboratory is David G. Hoag of (116 Winthrop St.) Medway, Mass., both M.I.T. alumni whose advanced studies were under Dr. Draper in automatic control.

Over the years as the task grew in size and complexity as many as 900 persons were employed on the Apollo guidance project, 300 of them professional scientists and engineers. The system that evolved consists of three parts--optics with a space sextant and telescope, an inertial measurement unit with gyroscopes and accelerometers, and a computer which the astronauts used via a keyboard and numerical display windows. The computer itself is hardly larger than a briefcase, yet it is as powerful as many computers that fill large rooms.

The hardware itself is manufactured to M.I.T. designs by private industry. For example, Raytheon Co., Lexington, Mass., makes the computers. The M.I.T. Laboratory, however, develops the programs that are carried in the computers to make them perform each step of a mission.

The original specifications for the guidance system set forth by the space agency did not include the ability for a precise pinpoint landing on the moon. Instead, the specification was for anywhere inside a relatively large landing oval.

Successes in guidance with earlier Apollo missions, including the first moon landing by Apollo 11 last July, led to a decision to try for pinpoint accuracy this time. Among the ideas advanced on how to do this was one from engineers at M.I.T. providing for retargeting of the lunar module computer just prior to final descent.

It was this reprogramming and recoding that had to be developed and tested by Margaret Hamilton and the computer group she heads at the M.I.T. Laboratory.

Ordinarily, target data for the landing is inserted by radio from earth one orbit before the lunar module uncouples from the command module and begins its descent to the lunar surface.

In Apollo 12, the ground was able to track Intrepid a short distance along its downward trajectory, compute new landing target instructions and radio them up to the Intrepid computer. Reprogramming was necessary to make the computer accept the last-minute data and use it in steering the ship toward the desired landing spot in the Sea of Storms, a spot very near the unmanned Surveyor 3 spacecraft which was sent to the moon more than two years ago.

Margaret and her co-workers knew their new programming worked when they heard a gleeful Conrad describe the Intrepid's descent as "fantastic...right down the middle of the road."

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