New launch boosts Indian space effort

by Susan B. Maitra and Ramtanu Maitra

The successful launching of the Augmented Space Launch Vehicle (ASLV) by the Indian Space Research Organization (ISRO) on May 20 reaffirmed the confidence generated by the Indian space program over the past decade. The success was particularly welcomed since it came within a few days after the U.S. had officially imposed sanctions on ISRO for two years, for allegedly violating the Missile Technology Control Regime (MTCR)—a missile cartel signed by 12 developed nations and yet to be ratified by the United Nations—by contracting purchase of cryogenic rocket engines from the Russian space agency, Glavkosmos. The sanctions make any sale by a U.S. manufacturer to the ISRO a violation.

More importantly, the ASLV launch, putting the SROSS-C satellite into orbit, has established ISRO's claims that the snags that had led to two earlier failures of ASLV launches have been smoothed out, and that the next phase of the program, involving the launching of the Polar Satellite Launch Vehicles (PSLV), will be ready by next year. In other words, the success of the May 20 launch has put the Indian space program on the right track.

The launch of the ASLV from the Sriharikota rocket range in the coastal state of Andhra Pradesh has nonetheless generated an absurd discussion, to the effect that the launch is in response to the U.S. action. The *Times of India* editorial the next day called it a "fitting reply." However, launching a satellite requires detailed planning which takes a number of factors into account and is done months in advance. Dr. U.R. Rao, chairman of the Space Commission, has made it clear to the press that "it is not a reply to anybody," but "to prove to ourselves," and "live up to expectations placed by the country."

The launch itself was flawless. Every stage of the 23.8 meter five-stage rocket, with a liftoff weight of 41.7 tons performed exactly as it was supposed to, and about eight minutes after the blastoff, the 106 kg SROSS-C satellite was injected into the desired near-Earth orbit. Earth stations located at the Nicobar Islands, Kerala, Karnataka, and Mauritius, immediately began tracking the satellite. The satellite, indigenously designed by scientists at the National Physical Laboratory (NPL) at Delhi, has already sent its first set of data to ISRO. SROSS-C is designed to study the structure and dynamics of the low altitude ionosphere-thermosphere, useful for the study of weather and in communications.

NPL scientists have told reporters that NASA, Japan, and Germany have agreed to have their satellite tracking and data acquisition facilities collect the relevant data in the ionosphere and thermosphere. SROSS-C is also carrying the Gamma Ray Burst experiment payload designed by ISRO.

From the rocketry point of view, the ASLV-D3 (ASLV-D1 in 1987 and the ASLV-D2 in 1988 both met with failure) can be considered a trailblazer for India's future rocket development. The rocket carried a large number of new technologies in it, including the closed-loop guidance system, strap-on technology, and a large number of controls which needed to be proven for the next stage rockets, the PSLVs. Dr. Rao pointed out that the textbook performance of the ASLV-D3 has proven the validity of all these new technologies.

In addition, a number of other modifications were featured in the ASLV-D3 launch. The thrust profile of the boosters was altered, and their burn-out, in real time, was directly linked to the ignition of the first stage. The autopilot was strengthened and two extra fins were provided to the rocket. Also, the weight of the SROSS satellite, which had accompanied the failed ASLV launches earlier, was reduced from 150 kg to 106 kg. The rocket, for the first time, used the indigenous solid fuel.

Future prospects for indigenous programs

The Indian space program came into its own in the 1960s with the appointment of Dr. Vikram Sarabhai as chairman at ISRO. It was then that the concept of developing satellite launch vehicles began to take shape. In the 1970s, following Dr. Sarabhai's untimely death and the appointment of Dr. Satish Dhawan as the chairman, that the program took a "mission approach." It was Professor Dhawan who set the target for the nation that India would enter the field of 1,000 kg to 1,700 kg remote sensing satellites with microwave payloads. He also conceived the multi-payload (meteorological, television, and communications) satellites and formulated the need for the INSAT-2, 2,000 kg class communication satellites in the 1990s. Now the work is in progress of developing INSAT-2 satellites indigenously for launch in the mid-1990s. The INSAT system is already providing vital services to the country in the areas of communication, television transmission, and meteorological services. The INSAT-1 series were launched from abroad. The last of the series, INSAT-1D was successfully launched on June 12, 1990, aboard a U.S. Delta rocket.

The development of an indigenous second generation INSAT-2 test satellite has made susbstantial progress with the completion of structural model qualification and integration and test on the electrical thermal model. The flight model fabrication is now in progress. However, there are reasons to believe that the INSAT-2 satellite development will be impeded by the sanctions imposed by the United States and

now considered by other signatories of the MTCR (see *EIR*, May 29).

In addition, India has a series of remote sensing satellites, denoted by IRS. IRS-1A was launched in 1988 and IRS-1B was launched in August 1991. The IRS series has become the mainstay of the National Natural Resource Management System, providing quality imagery for applications including: land use and land cover mapping; agro-climatic planning; wasteland mapping; integrated land and water resources study for combatting drought; crop acreage and yield estimation; and forest mapping. Recently, a hydro-geomorphological map of the entire country covering 447 districts has been completed showing ground water potential using satellite information and conventional data under a project of the National Drinking Water Mission initiated by the late Rajiv Gandhi.

In rocketry development, the ASLV will pave the way for the 44.2 meter high PSLVs, weighing 275 tons. These rockets will be used for launching the IRS series of satellites weighing around 1,000 kg. It is evident from ISRO's announcement that the first of the PSLV rockets will be launched in 1993 that several qualification tests on the stage motor systems, avionics packages, vehicular structurals, etc., have been successfully conducted. The giant mobile service tower for the PSLV assembly at the Sriharikota range has been commissioned. The first stage motor of PSLV is the third largest solid motor in the world. The second stage motor, which has a large liquid engine, has also qualified successfully, reports indicate.

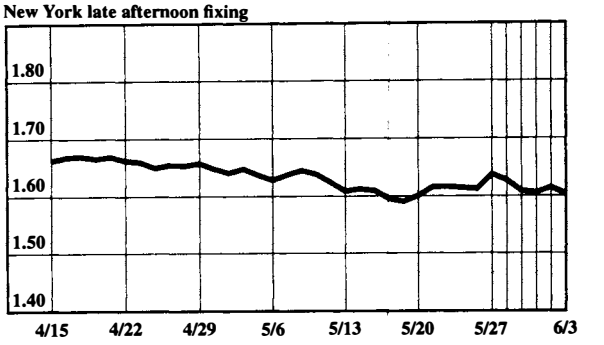
The development of cryogenic engines has also been initiated to permit enhancement of the capability of the PSLV and to be incorporated in the geostationary satellite launch vehicles (GSLVs). This will help launch geostationary satellites of the 2,000 kg class and make India totally self-reliant in launch technology. It is the contracting of cryogenic rocket engines and related technologies from the Russian Federation that has irked the United States, which has slapped on a two-year sanction. Indian scientists claim that the United States is particularly uneasy about India developing the capability to launch 2,000 kg class satellites. If India is allowed to develop this capability, along with its top-notch launch center, it could compete effectively with western nations in commercially launching satellites for other nations.

While the main thrust of the Indian space program in the coming decade is to make operational all services related to communications, remote sensing, television broadcasting, and meteorological data, and to achieve self-reliance both in rocket launching and satellite capabilities, ISRO has drawn up a profile for the decade 1990-2000, which envisages new initiatives in the areas of new materials, development of reusable vehicles, materials-processing in space, satellite navigation, ocean resource surveillance, and a host of new technologies which will cater to the requirements of the next century.

Currency Rates

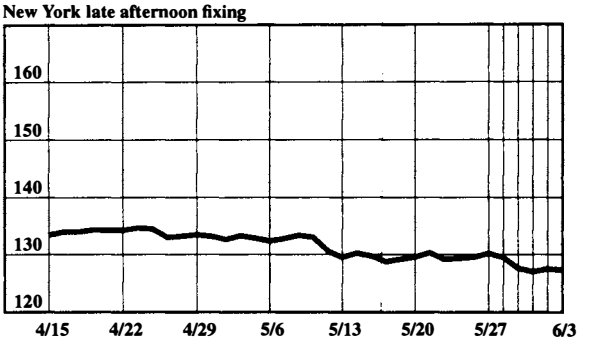
The dollar in deutschemarks

New York late afternoon fixing



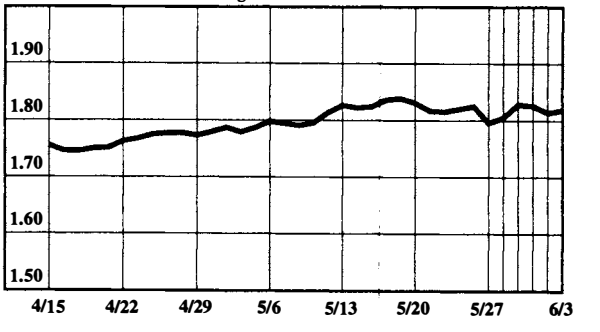
The dollar in yen

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing



The dollar in Swiss francs

New York late afternoon fixing