

Brazil advances in space technology

by Geraldo Luis Lino

On Nov. 2, the Brazilian government made its first attempt to launch a satellite, using its Satellite Launch Vehicle, or VLS, as it is known by its Portuguese acronym. Launched from the Alcantara base in the state of Maranhão, the VLS mission was to place in orbit an SCD-2 A satellite, which would carry out remote sensing of environmental data. Like the VLS, the SCD-2 A was built entirely in Brazil.

Unfortunately, a problem in one of the VLS's four rocket engines forced mission control to abort the launch and explode the rocket just one minute after liftoff. Despite the international media's harping on the "failure" of the satellite launch, it in fact represents a significant achievement for Brazil. The completion of the VLS, the first Brazilian-made orbital rocket, represents a crucial phase in the Complete Brazilian Space Mission, or MECB, as well as a historic moment in the country's scientific and technological endeavors. With the VLS, Brazil joins that select group of countries capable of placing an artificial satellite in orbit, using its own technology. Moreover, Brazil is one of only a few nations able to plan, build, and test its own satellites.

When President Bill Clinton visited Brazil in mid-October, among his delegation was Dan Goldin, director of the National Aeronautics and Space Administration. During this visit, Brazil and the United States signed an agreement, in which Brazil will collaborate in the International Space Station. No other developing nation has signed such an agreement, and Brazil's participation paves the way for others, such as China and India, to also join. Thus, it is a real milestone. Moreover, this type of technological cooperation with the United States is the type of constructive, mutually beneficial initiative which can go a long way toward overcoming the antagonism and suspicion which characterizes the current U.S.-Brazil relationship.

The VLS launch is no small achievement for a program which, although more than 40 years old, is forced to operate—like everything else in Brazil—under the weight of enormous difficulties. These include chronic underfunding, as well as the policy of "technological apartheid," imposed by the foreign architects of the "new world order"—not to mention their domestic allies. Even *Science Today* magazine, put out by the Brazilian Society for the Advancement of Science, attacked the MECB in one of its first editorials. For budgetary

reasons, the Air Force, which coordinates the MECB, hadn't been previously able to carry out an experimental rocket launch.

The deliberate evisceration of the technological programs of the Armed Forces, beginning with the government of Fernando Collor de Mello (1990-92) and continuing under the present Fernando Henrique Cardoso administration, aggravated these budgetary restrictions.

A national project

The VLS is a four-stage rocket, propelled by solid fuel. With a height of 19.5 meters and a cargo weight of 50 tons, it can launch satellites weighing 100-350 kilograms, into orbits at an altitude of 250-1,000 kilometers. This can be done at several inclinations, from equatorial to polar orbits. In fact, the location of the Alcantara base, at 2° latitude from the equator, facilitates the launches, by providing a substantial savings in fuel, compared to rockets launched from bases located at higher latitudes.

At a cost of \$6.5 million, the VLS is one of the least-expensive satellite launchers in the world. It was developed by the Aeronautical Technology Center (CTA), at a total cost of \$171 million. It is scheduled to be continued in two more advanced models: the VLS-2, able to lift 400 kg to altitudes of 2,000 km; and, the VLS-3, which will be capable of placing satellites weighing up to one ton into geostationary orbits, at altitudes of 22,000-36,000 km. Both models will use liquid fuel, a technology still being developed in the country.

Brazil's space program began in 1954, with the creation of a group of experts from the National Research Council, and the Brazilian Air Force, under the direction of Brig. Oswaldo Baloussier. In 1961, the National Commission for Space Activities was founded, coordinated by Col. Aldo Vieira da Rosa, one of the CTA's founders and a key backer of Brazil's aerospace activities. In 1965, construction began of the launch base at Barreira do Inferno, located in the state of Rio Grande do Norte, in Brazil's northeast.

In December 1966, the first of a series of rockets was launched, for meteorological and atmospheric research. All were imported, primarily from the United States. In the 1970s, after the founding of the Space Activities Institute, the Sonda Program was set up. These were the first series of nationally produced rockets. There were four models, Sonda I through Sonda IV, each representing a crucial phase of the program. The VLS's first stage is made up of four Sonda IV rockets. As has occurred in other countries, the technological spinoffs from the Brazilian space program have been applied in different industrial sectors, but their importance goes well beyond the economic benefits. Aside from the training of an important critical cadre of scientists and technicians in a state-of-the-art sector of human knowledge, it will, in the future, provide the country with a passport for greater participation in what will be humanity's great adventure in the 21st century: conquering the cosmos.