

Telecoms and watches sustain chips

THE most prominent feature of the Semiconductor Complex at Chandigarh is a reflecting pool the size of a football pitch surrounded by splashing fountains. On a morning last month when the habitually clear sunlight was reflected from the pool, Dr M. J. Zarabi, the chairman and managing director of the company that owns the plant, was quick to say that the reflecting pool is functional as well as decorative; it is meant to cool the water used on the silicon production lines.

But they are not as active as they should by now have been. Semiconductor Complex Ltd owes its existence (since 1983) to a decade's earlier brooding by the government of India about India's place in chip-making technology. Despite earlier interest by the Atomic Energy Commission in silicon devices (some of it in collaboration with the Dutch company Philips), a committee first formed in 1971 eventually recommended that India should build its own capacity for designing and manufacturing silicon chips.

Work began on the Chandigarh site in 1983, with technical assistance from American Microsystems Inc. (AMI) with the technology of 5- μm devices — and then the vapour deposition plant caught fire and burned down at the end of 1987. (There was an electrical short-circuit, but nobody was injured in the fire).

That has been a huge setback for the company. The previous government agonized over the proposal that the damaged plant should be rebuilt. Meanwhile, the Semiconductor Complex has arranged to fabricate silicon wafers at

AMI's Austrian plant, using its own workers relocated for the purpose to gain experience. But in 1991, with the accession of the Rao government, the decision to rebuild was taken. Now the crucial fabrication plant is being restored again; predictably, when it is commissioned a year from now, it will be a better plant — and will have cost the equivalent of \$70 million.

But Zarabi is not depressed. He has worked at the plant since the beginning, but only recently as the boss. Meanwhile, he is proud of two things. First, the company has been making a profit on its operations since 1989 (before allowing for capital charges), largely on the strength of silicon chips designed for telecommunications switches (made elsewhere in India) and the timing mechanisms of watches, which are sold to watch manufacturers using different labels. Annual sales now amount to Rs670 million.

Zarabi's second source of pride is that the Semiconductor Complex, building on the 5- μm technology acquired from AMI, is now able to manufacture devices with a resolution of 1.2 μm . The hope is that the company will be able to make chips with 1.2- μm resolution by the middle of this decade.

Against the time when the burned building is restored, the company plans a

number of distinctive products. For one thing, it is busily working on the design of chips that will operate at d. c. voltages higher than the usual 6 or 9 volts. Its concession to the decision in the current five-year plan that potable water must be a



India's telecommunications technology could fit the bill for export markets

national priority is to devise a biosensor card to monitor the purity of water supplies.

The constitution of the Chandigarh company is typical of the standard Indian pattern of nationalization. Formally, Semiconductor Complex Ltd is a public company, but its shares are held exclusively by the government or by other nationalized companies. Similarly, the directors of the company are appointed by the Department of Electronics in Delhi. It is one of several companies similarly constituted and all active in the field of silicon electronics.

Zarabi nevertheless is unshaken in his belief that indigenous chip-manufacture is essential for India's well-being. He acknowledges that the acquisition of 5- μm technology was essential to get started, but says he would have resisted any suggestion that the finer chip constructions should not have been developed at Chandigarh. But "who are we in this part of the world to say we shall never need other people's technology?" Zarabi's position is that India will always, in technology, follow a mixed policy of "development and buying"; but he insists that it is possible to buy from a position of strength if there has been indigenous development as well.

Much the same is said at the Centre for the Development of Telematics (C-DOT) at Bangalore, another nationalized venture of the Indian government for the development of digital telephone switches which is also exactly ten years old, which is primarily a designer of equipment manufactured by others. More than 30 Indian companies have been licensed to manufacture different products, some of them with no previous experience in the

Bangalore central to electronics

BANGALORE has become the centre of India's electronics industry not simply because it boasts of the Indian Institute of Science, but for a more mundane reason: there seems to be less dust in the atmosphere than anywhere else in India.

As well as C-DOT and a growing number of small private companies, the city also houses one of the largest electronics manufacturing plants in India, Bharat Electronics Ltd, a government-owned defence contractor now seeking a place in the civilian market.

The company's claim that its military communications equipment is among the best in the world is well attested. Ten years ago, this seemed to offer a basis on which India might enter the international consumer electronics market, which never happened.

The plant is everything one would expect of such a place. By Indian

standards, every room is a clean room, but most are technically so, with shoe-changing entryways and every employee in a white hat and coat. (Bharat has even devised a uniform into which everybody changes, which, for the women employees, consists of a fawn-coloured sari.) At Bangalore, the company also follows enlightened employment practices: there is a crèche for more than 100 toddlers accompanying their mothers to work, as well as a fleet of buses to take everybody home at the end of the day.

With 20,000 industrial employees scattered over 10 sites in India, Bharat is an important part of the Indian economy. But why so scattered? That may be one of the hidden costs of being a government-owned company. Its latest plant, in the foothills of the Himalayas, has been put there to generate employment. □