9 FERRANTI: MONOLITHIC MICROCIRCUITS

During the early development of semiconductor electronic components individual products had their own particular function, which in each case was roughly analogous to the function performed by a given type of thermionic valve. While the use of semiconductor components provided significant advantages over valves (in particular smaller physical size, lower power consumption and, once the devices had become established commercial products, lower unit-costs) these components, like valves, were manufactured as individual items and then wired together to make a circuit. However, by the early 1960s leading semiconductor manufacturers in America (notably Fairchild and Texas Instruments) had developed commercial processes that were capable of forming interconnected arrangements of components on a single chip of semiconductor material. These chips, or integrated circuits, enabled the functions of a number of electronic components to be performed by a single device. Once this breakthrough had been made there were compelling technological and commercial reasons for cramming more components onto a chip or, in the language of the industry, achieving higher levels of integration, since this provided considerable scope for reducing costs and increasing performance.

Against the background of American developments in integrated circuit technology, Ferranti's Micronor II range of monolithic microcircuits (or single-chip integrated circuits) represented one of four innovations that enabled the company to gain the Queen's Award to Industry in 1967. Micronor II was developed by Ferranti's Electronic Department (which since 1977 has been Ferranti Electronics Limited) in response to an in-house need. This need was specified by Ferranti's Automation Systems Division (ASD) who required high-performance integrated circuits for use in its Argus 400 and 500 process control computers, and for related projects. Micronor II met these needs and when it appeared in 1965, after only two years of development, also provided Ferranti with a sophisticated product which was subsequently sold on the open market. Although sales of Micronor II have declined in recent years, it is still produced, both for the open market and for use in what is now Ferranti Computer Systems Limited.
In addition to its continued production of Micronor II, Ferranti has maintained a development strategy which has provided a stream of new products. These products have had to compete in what has become an international market for semiconductor devices, dominated by large multinational firms, and characterised by extremely rapid technological change.

*Early semiconductor development at Ferranti*¹

The Ferranti Valve Department produced its first products in 1932 after two years of development work undertaken in collaboration with a team of academic scientists from Imperial College in London. These valves were sold as components and also used in the company’s production of radio receivers. Government assistance for development work was provided by the Inter-Services Committee for the Coordination of Valve Development and the Ministry of Supply.

In 1950 Ferranti remained committed to valves and had no semiconductor interests. However, as Mullard and Philips assumed a European lead in germanium-based semiconductor devices, Ferranti set two or three people to investigate silicon-based semiconductor material for potential applications in weapon control systems. Silicon was selected because it was suitable for operation at temperatures up to 140°C, and so was considered to be better for military applications than germanium, which was limited to a maximum operating temperature of 70°C. It was also realised that silicon devices had the advantage of being able to operate over a wider frequency-range than could be obtained with germanium. Ferranti’s early adoption of silicon subsequently proved to be especially fortuitous when it emerged that this material was better suited to the production of more sophisticated semiconductor devices. The company was therefore well-placed when silicon, rather than germanium, became the basis of semiconductor technology.

In 1953 semiconductor work at Ferranti was put on a more formal footing when a small research team, headed by Dr A. A. Shepherd, was formed within the Guided Weapons section. The research which followed was assisted by financial support from the Ministry of Supply, while the starting-point for technological development came from America through a licence from Bell Telephone Laboratories (BTL) where the transistor was invented. Ferranti’s first products were silicon diodes which, when they appeared in 1954, were the first of their type.