The Ferranti ORION and ATLAS Computers

Ferranti Ltd. have embarked on two new computer projects: ORION, comparable with IBM's 709 and ATLAS, comparable with STRETCH. Both are transistor machines and Ferranti's emphasize that both are to be regarded as computing systems, that is, they are planned to allow for ease of attachment of large numbers of peripheral units such as card or tape readers and punches, printers, magnetic tape decks.

ORION

This is entirely a Ferranti design, with the order code largely influenced by their PEGASUS experience. The basic frequency is 500 kcs/sec; fast storage is on cores and can go up to 16384 words of 48 binary digits each. The order-code is 3 address, providing both fixed and floating point arithmetic, and can accommodate 128 instructions of which about 100 have so far been allocated; any of the first 255 registers can be used for B-modification. Times are not yet settled, but the following are not likely to be far out:

Simple fixed-point arithmetic, logical operations, jumps	60-80 μs
Floating point addition (3 address, $z = x + y$)	120
" " multiplication (" $z = xy$)	200
" " division (" $z = x/y$) up to	700

"Ampex" magnetic tape units will be used holding about 3×10^6 words per reel and transferring at 11,500 words per second; card equipment and printer will be by I.C.T., based on that developed for MERCURY. All transfers will be autonomous, with lock-outs to prevent use by the program of those parts of the store involved in the transfer; this will make time-sharing possible, with a priority list for the different programs. It will be possible to "consult" the machine at any moment by means of a directly-coupled typewriter.

Ferranti's estimate that, disregarding any effects of the larger fast store, ORION will be 3 to 5 times as fast as MERCURY - this is comparing programs written in machine code, not Autocode. They will develop an Autocode for ORION, and also will program it to accept MERCURY Autocode.

Production of the logical packages and machine frames has started at Manchester, and of the magnetic tape control will start in August in the Edinburgh factory. The first machine, which will be retained by Ferranti's, is scheduled to be working, without its magnetic tape, in June 1960, the tapes to be working in

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October 1960, June 1961 is given as the date when the first customer would have his machine.

The cost would depend on the amount of equipment; a large installation would cost about £250,000.

Firm figures for specification, cost and delivery should be available about August.

ATLAS

This is essentially the machine designed by Dr. Kilburn at Manchester University; it is intended to work at the highest speed practicable with existing components and to provide a computing system of up to very great size.

The machine works asynchronously. The word length is 48 binary digits, made up of 10 for the function code, two groups of 7 for modifier addresses and 24 for the store address. There is a "fixed" store of 8192 words and access time 0.2 μs which is not accessible to the programmer, but which will hold standard programs and useful constants; the B-store of 128 modifier registers is a core store, with access time 0.5 μs. The main store is on cores with access time at most 2 μs (there is hope of making this 1 μs) and could be up to 2^{24} words; the minimum size will be 2^{13} (8192) words. Present values for operating times are -

Floating point addition (1 address)		1.5-2	μs
"	" multiplication	3-4	"
"	" division	10-15	"

Because of overlapping of orders, much of the organisational work in a program will in effect take no time.

Magnetic tape will be as for ORION; all operations will be carried out by routines in the fixed store, which place the initiating instructions in a queue of capacity 64 instructions and lock out the relevant parts of the main store. The main program will continue without interruption unless the queue is full or an attempt is made to refer to a locked-out part of the store. Up to 16 tapes can be reading or writing simultaneously (giving a transfer rate of 180,000 words per second) and at the same time up to 32 others can be searching.

Time-sharing will be possible. It can be arranged that whenever the main program has to wait for some peripheral equipment or a part of the store to become free, a subsidiary program is taken up; thus it will be possible to interleave

testing with production, or to use the computer as an off-line printer without loss of production time. As with ORION, it will be possible to interrupt or consult from the console.

Work is going on in Dr. Kilburn's laboratory, where at the moment about 6 Ferranti engineers have joined the University team. The plan is to have enough of the machine built by the end of this year to establish the operating speeds and to have the prototype working by June 1962: this is to be a complete and engineered machine with 8192 words of core store, about 100,000 words on drums, and several magnetic tapes. Work on production models will go on in the Ferranti factory in parallel and delivery in 1963 is being suggested. The cost would depend on the amount of peripheral equipment and the size of the core store (this costs about £8 to £10 per word); a large installation would cost between £500,000 and £1,000,000.

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