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ATLAS

The case for putting an Atlas computer at Harwell was argued at a series of C.P.C. meetings in 1959-1960 and the paper to the A.E.A. written in the autumn of 1960 based on arguments which had been effectively settled in the summer of that year. Thus the basis of the formal proposal is now a year old and there have been several new developments since that time.

1. Harwell is now committed to much more work on solid state physics and will continue to channel more effort into this field. We can see more clearly the need for very large calculations to support the theoretical work, in fact it seems that mathematical and numerical attack is the only way to get a detailed understanding of metal theory, lattice defects and irradiation damage. This is in line with world trends; M.I.T. is organising its work on solid state and chemical physics into a major department and equipping it in 1961 with a 7090 for its exclusive use - in addition to the one provided for the general computational service.
2. There is a recognition of the need for fundamental theoretical work in the reactor field and two new groups are being formed in Theoretical Physics Division, to work on radiation damage and neutron transport respectively. Both of these will need powerful computational support.
3. Experience with big accelerators and bubble-chambers has shown that the analysis of experiments can need far more and far bigger calculations than had been expected. At Berkeley, for example, the 709 now used for this work will soon be over-loaded by at least a factor of 2 and is to be replaced by a 7090 during 1961. CERN also is seeing the need for a new computer (it has a 709) not very far ahead. Thus it seems certain that the NIRS Orion will be overloaded and that much more of their data-analysis than had been expected will have to be put on to the Atlas.

The estimates of 25 hrs. per week for AERE and 8 for NIRS were arrived at in the later C.P.C. discussions and we recognized that these were very rough and almost certainly under-estimates. We cannot be at all precise even now, but these figures give the best estimates we can make in the new circumstances; they are for 1964:

A.E.R.E.

T.P.:	Solid state	6	
	Radiation damage	3	
	Neutron transport	3	
	Nuclear theory	2	
			14 hrs. per week

Rest of station 5 - 10

Total for AERE (say) 20 - 25

Culham

10 - 15

Total for Research Group 30 - 40

N.I.R.N.S.

15

Total for Harwell site 45 - 55

Other customers will be the Government Research Establishments and some of the Universities. The Meteorological Office has suggested $2\frac{1}{2}$ hrs. per week - it would be very surprising if this were not exceeded. Oxford, which is expanding its physics side very fast, will certainly need a good deal of time on the machine, for it is not going to have any great computing power of its own; They have two big projects - band structure of metals, molecular theory - which could each use up to about 5 hours per week (1 hr. per day) so a total of 10 hrs. per week would not seem unreasonable. Reading, Southampton, Bristol, Exeter could be put down for at least $2\frac{1}{2}$ hrs. per week between them - in fact,

/Southampton.....

Southampton have already at least one quite big and important project (soil survey by analysis of plant distribution) they would like to get on to an Atlas. All this adds another 15 hrs. per week to the demand.

Thus without any contribution from London or Cambridge one can see a usage of at least 60 hrs. per week even in 1964; this is already much more than one shift and in fact more than enough to fill up a 7090. There is no doubt whatever that the demand will increase as time goes on.

I think it would be disastrous to abandon the project or even to delay it - as it is, we cannot have the machine available to us before the spring of 1964, which is quite a long time ahead. It is recognized all over the world that a powerful computer is a vital part of a big research laboratory; Harwell's work and status - especially in the C.T.R. and Solid State Physics fields - will certainly suffer if it is not given this kind of equipment.

I should add that I have discussed all this with Dr. Marshall.

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