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13 Jan. 1987.

Dear Dr. Hendry.

Apologies for the delay in replying to your letter of 14th November last. I retired about 18 months ago and it took a little while to catch up with me. Christmas and my war with my word processor can be blaned for the rest.

I have taken the liberty of including two reminiscences which might fill the odd gap in the story, but it was a long time ago and memory does improve with age. Two small points from your Chapter 8. On p.18, the proposal for the EMIDEC 1100 was from me, with David Robinson's assistance, not from Hounsfield. On p. 20, the use of a computer for Record Royalty calculation was considered by the 1100 team, indeed a member of the O & M Dept. was attached to us for this. I remember that the investigation discovered many piles of Records in the Store, unsold for years, which was not surprising since they had never got into the catalogue. The story was rather spoilt by the realisation that many were private recordings, with a few extra made on spec.

My lack of direct contact with the 2400 team inhibits coments on its activities. I am asking Central Research Labs. to contact EMI Electronics in case they have anyone left that can add to the story

Yours sincerely.

R. J. Froggatt.

SOME NOTES ON THE EMI COMPUTERS.

These notes have been compiled almost entirely from memory, as after thirty years or so, few records are still available. Accuracy should be judged accordingly.

1) BACKGROUND.

At the end of the war, R&D work was largely concentrated in the Research Laboratories and the Design Department of the Gramophone Company at Hayes. The Research Labs. gradually turned back to their prewar occupation of television and allied topics; designs began to concentrate on radio sets. Both retained a considerable interest in Defence contracts; indeed Designs began to build up a Systems capability, as distinct to their previous largely Product Design function.

When Sir Ernest Fisk was appointed Head of EMI, he reorganised the Company horizontally: EMI Sales and Service, Factories, Suppliers, Engineering Development, Research, etc. etc. This policy eventually proved a disaster and, after the shares dropped to 8/6, he was sacked with a pension of £5000 a year.

C. S.Agate, Head of Designs Department, was appointed Managing Director of EMI Engineering Development and Clifford Metcalfe, his Chief Draughtsman, a Director of the Company.

2) STARTUP.

When Metcalfe suceeded Agate, he had decided that his future lay in Commercial Electronics. This was unwise. The Company was entrenched in the MOD cost-plus mentality and private investment was anathema. Sir Joseph Lockwood, who eventually suceeded Fisk was understood to favour Records rather than Electronics for investment.

Metcalfe comissioned R.E.Spencer to produce a report on the future of the Electronic Business Machine, the word "Computer" being unpopular with the EMI Board. Spencer's Report was in advance of its time. It envisaged a host of small computers, workstations, serviced by a large central store. Unfortunately at that time it was not possible to make small computers economically.

However this report served its purpose. Metcalfe decided to go into Business Machines and R.T.Clayden was recruited from English Electric. He had been based at NPL and was busy turning ACE into DEUCE. In common with several others there he had started life at EMI CRL.

3) THE PILOT MACHINE.

The carrot which led Metcalfe on was a requirment from ICI Fertilizers for an invoicing machine, which had probably influenced Spencer's thinking. The yearly Christmas present of a bag of fertilizer to Metcalfe seemed very apropriate to cynical engineers. Clayden began the construction of the so-called Pilot Machine. At this point I joined his team together, somewhat later, with David Robinson. In those days, computer design took place in two stages: firstly ,the logical design in which the functions of the machine were specified in detail, and then, the circuit design needed to realise the logic .David and I remained logical designers to the end.

The Pilot Machine was designed as the skeleton of a larger machine, such as would meet ICI's requirments. Unfortunately it was uneconomic as a stand alone machine or without considerable additions. Clayden exploited the NPL tecnology of twin-triode long-tailed pairs, but replaced the mercury delay lines of ACE with circulating registers on a magnetic drum, this last being provided by the EMI estblishment at Wells, Somerset, together with a bulk store using 4" wide magnetic tape.

4) THE AUSTIN MACHINE.

The Austin Motor Co., under Sir Leonard Lord, had decided to employ computers at its Longbridge factory. A team toured the various computer manufactures. ending up with EMI Engineering Development, where Metcalfe did a superb selling job and had Austins telling him why EMI was the right firm to carry out the job. Two reasons appear to have influenced them: EMI was big enough to stand any loss on a fixed priced contract and EMI's past experience in complex electronic systems,in particular television.

The contract was to be prosecuted in the same way as a Defence one. Although it was always hoped that further orders would be obtained the machine's specification was to be sufficient only to meet the Austin requirements. This, for example, resulted in Tape Decks derived from domestic recorders, obselete before they were built. The hope that the contract would be profitable on its own was mistaken, especially with 18 months debugging on the customer's premises

Technology for the computer proper remained as for the Pilot Machine, with Wells supplying the magnetic drum and tape decks. Clayden subcontracted the design and making of the control units for the peripheral equipments to teams under Kramskoy and Hounsfield. The former relationship foundered, largely due to personality troubles. Hounsfield decided to employ solid state circuits, using magnetic core logic which he was developing . This was a very bold measure, as the technique was unproved on the scale to be used, but well justified in the event.

5) EMIDEC 1100.

In 1956 I decided that there were enough engineers coping with the Austin machine. David Robinson and I therefore considered what the design of the next machine should be. Hounsfield's magnetic core circuitry was, at that time, the most economical way of realising the required functions, although within the next year the cost of transistors was to plummet and, if anticipated might have well have resulted in the adoption of alternative techniques. The machine proposed was christened OXO 4 for no reason whatever, much to the chagrin of those who sought significance in its name. Metcalfe expressed interest in the project in October 1956 and with appointment of Nornan Hill as Head of Computer Division at the start of 1957 the specification was firmed up, in particular raising the immediate access store size to 1000 36bit words from 256 and the project took off, eventually under Hounsfield. Before it vanished after the takeover by ICT I think 26 machines were sold; it was the first all solid state computer available for commercial sale, although the power supplies still employed valves.

6) EMIDEC 2400.

The EMIDEC 2400 was funded by NRDC in return for a levy on all computers sold by EMI (again the policy of no Company investment). The notional specification was derived from a requirment from the Freemans Mail Order Co. for invoicing. The first unit to be built was an input multiplexer to serve a galaxy of Work Stations but this was never commisioned. All EMIDEC 2400's were sold to HM Government, apart from one to Russia, where the appelation "Business Machine" helped it to escape the Concom rules and the £100,000 contingency for servicing in Russia, never used, certainly helped EMI's cash flow.

7) DEMISE.

In spite of attempts to ensure that all projects were self financing, there was a continual cash drain to the Company. There were too many companys in the business for the market. At its peak EMI was employing about 80 programmers, most of which were acting as salesmen, chasing what orders were available. Rationalisation was inevitable, EMI'S nerve broke and they sold out to ICT.

COMPUTER TAPE DECKS AT EMI.

1) ORIGINS.

EMI's interest in magnetic tape recording started 1n the late 40s'. A demonstration was given to the EMI Board early in 1948, using either German heads or decks, which I no longer remember, but the other was locally made. Dr. G.F.Dutton was primarily responsible for developing this activity to produce the magnificent BTR.2 Tape Deck for the BBC. Lack of followup ensured that EMI later lost its lead in this area. MOD contracts for specialised tape decks followed.

EMI Engineering Development had acquired the Scophony Baird factory at Wells, Somerset as a preproduction factory. This also included some design staff, who were kept busy, largely on government contracts. Harry Harison was transfered to Wells, together with the government contracts. when the design load had diminished. The centre of gravity on magnetic recording was estabilised at Wells.

2) PILOT MACHINE.

Clayden subcontracted work on magnetic storage to Wells, although keepimg a firm hand on their activities. The Magnetic Drum contained both the one-word immediate access registers and the main storage. This latter used mechanical shifting of a limited nunber of heads to minimise costs. At this time the ability to switch the low level signals from reading heads directly had not been developed and the economics of providing separate amplifiers was prohibitive. A continuously running 4" Tape Deck for bulk storage was also provided but, in fact, was never used.

3) AUSTIN MACHINE.

The drum store was continued, suitably extended, for the Austin Machine. A management decision was made that no developement needed in excess of the Austin requirements should be undertaken for Tape Decks. This resulted in the production of modified domestic tape decks with a clock rate of 2kc/s, a useless product for any other application.

4) EMIDEC 2400.

Kramskoy placed a subcontract to the Domestic Electronics Division (Moon under Challis) for a fast start-stop Tape Deck. In spite of what appeared a promising start, Kramskoy lost interest and placed a further contract on Wells. This resulted in the production of massive battle-ship type construction which again proved uneconomic compared with the competition. (Its construction could be likened to that of the Powers Samastronic Printer, which both the 1100 and the 2400 used as the fastest one available to us. It originally had three bicycle chains in its mechanism but one was later replaced by a toothed rubber belt.God bless Vickers, Crayford.)