

13 August 1952

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TRIP REPORT

From 1 July to 5 August I was at project SCAMP, at the Institute of Numerical Analysis of the Bureau of Standards, located on the campus of the University of California at Los Angeles, California, contract NA oar 28-47.

The project had a varying number of mathematicians present. Prof. Spencer of Princeton was there for only the first three days. Prof. Albert of Chicago University had been there only four days altogether when I left, spending the rest of his time with the Rand Corporation, a few miles away. Some of the others had been there continuously for six to eight weeks. On 4 August there were 22 people there, counting AFSA representatives.

The work got under way slowly, but by August had acquired noticeable momentum. The problem getting most attention was that of determining the existence of finite geometries of given order. It is known that there is at least one of order 8, but it is not known whether there are more. It is not yet known whether there are any of order 10. These problems are of interest because they parallel certain cryptanalytic problems, and have the advantage of having no security limitations.

Prof. Cairns is doing an excellent job of organizing and leading the symposium. A considerable degree of enthusiasm for the problems has developed among the members, and I feel sure that work will continue after SCAMP has terminated. Tompkins is devoting about half his time to the symposium, and is valuable in keeping the direction of the investigations toward real problems.

The location in Los Angeles offers the following advantages.

- a) Office space has been made available by U. C. L. A. in good quantity.
- b) Housing is readily available of a quality commensurate with the standards of the participants.
- c) The libraries of I. N. A. and U. C. L. A. together constitute a very extensive source of reference.

d) The Rand Corporation and I. W. A. each attract a large number of prominent mathematicians, so that during the summer Los Angeles is the center for American Mathematics.

e) The climate is cool and the area offers many diversions, so that a scientist can feel that in working there he is at the same time not depriving his family of a vacation.

I discussed the arrangements with Prof. D. H. Lehmer, the Director of the Institute. He seemed pleased with our symposium on all but one point, security. As he expressed it, they have a policy against accepting classified projects, and they had to make an exception in our case. I also talked with Prof. M. Hestenes, the chairman of the Mathematics Department of U. C. L. A. He also was happy about the arrangements, but said that another time the furnishing of office space might be more difficult and less satisfactory.

Being in Los Angeles gave me an opportunity to visit the Computer Research Corporation, and to visit the Corona Laboratories of the Bureau of Standards. Reports on these side trips are attached as Appendices I and II.

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H. H. CAMPAIGNE
Chief, 3e

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Appendix II

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APPENDIX I

Visit to the Computer Research Corporation at 3348 El Segundo Blvd.,
Hawthorne, California.

This is right in the middle of Los Angeles. I was favorably impressed by their offices and by Richard Sprague, their director of electronic design, who took us around. We saw only a corner of the laboratories, and cannot judge them.

I gathered that their main effort now is going into a big computer, the CRC 107. They are making two, at about \$400,000 each.

The machine we are interested in is the CRC 102A, called CADAC. They have delivered one, an abbreviated version, which belongs to the Air Force and is at MIT. It has been running since January 15 with a satisfactory maintenance record. They have orders for four more to be delivered in 7 to 9 months. The magnetic tape mechanisms have not yet been built. They expect to use the same unit on the 102A and the 107, so they will put a great effort into this one unit, which will cost \$12,000. The 102A will be capable of having up to 64 units. A reel of tape will hold something over 100,000 words; 2¹³ groups of 8 each, in fact.

The logic is a 3-address system in 36 bit words. The input is octal or decimal digits from keyboard, punched tape, or cards. Output is the same. It is not possible to put in or get out alphabetic material. This means everything would have to be converted into digits outside the computer.

The details of maintenance as reported by them are these. They check diodes every day, replacing marginal ones before they fail. This takes half an hour a day. Then they have a design which they claim makes intermittent errors almost impossible; this design is applicable only to low frequency machines. In 3 months operation only 4 errors required unscheduled repairs.

The drum revolves 40 rpm. By using minimum access techniques one can average one 3-address instruction per revolution. This is made possible by 8 special words in a revolver which comes around 8 times per revolution. Minimum access time is achieved by changing the addresses, which can be done in a completely arbitrary but awkward way.

I was favorably impressed by all but two things. First, they have not yet built the machine they describe. Second, the input - output is not flexible enough for us. Time may cure the first, and Dr. Eachus may be able to improve the second.

APPENDIX II

Visit to the Bureau of Standards Laboratory at Corona.

Mr. Dudley Buck reported to me the day we went to Corona, 24 July.

The laboratory at Corona is very nicely set up with lots of space in very good buildings. Blois is just getting in some equipment and office supplies. While we were there a man from Stanford University, Dr. Warren Procter, was there to consult on nuclear spin echoes as a memory method. The director of Corona, Huntoon, sat in on the session we had which lasted two hours. In fact, he did most of the questioning. He seems very interested. I believe they need the help of a logician, for many of the techniques they are considering may involve unorthodox algorithms, or might need logical combinations adapted to their peculiarities. W. (J. G.) P. Billingsley and Mr. Buck have been instructed to contribute what they can in this respect.