The engineering design of the ORACLE, the second general-purpose computer built at Argonne National Laboratory, is described in the paper reprinted here. It was presented originally at the meeting of the Association for Computing Machinery held at the University of Toronto, Ontario, Canada, September 8–9, 1952.

This paper is of interest as illustrative of the computer development carried out at Argonne National Laboratory. The author, J. C. Chu, supervised the engineering and construction work there that produced both the AVIDAC and the ORACLE. In this paper he sets down engineering design principles followed, describes the general characteristics and the logical design of the second machine, and provides several illustrations of engineering circuits used. Of primary interest, however, is the discussion of the features of the ORACLE memory, which represented a significant advance in Williams-tube systems.

The ORACLE memory was composed of 80 cathode ray tubes, packaged two per unit, which were designed to check one another in 1024-word mode or to operate independently as a 2048-word memory. In addition, a circuit was incorporated to increase the reliability of the Williams-tube memory by automatically stabilizing the beam currents in the cathode ray tubes. One storage location in each tube was used as a test point. The circuit was designed to sample the output of this location periodically and adjust the beam current to maintain this output at a constant amplitude. Since all the other storage locations of the tube used the same beam, their outputs were also stabilized.

The first name given the Oak Ridge machine, ORAC, is reflected in the title of the paper; in September 1952, the name was changed to ORACLE.