IBM 650
Topic Paper #2

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ABSTRACT
This paper discusses the history, background, structure, and programming uses of the IBM 650 Magnetic Drum Data Processing Machine, also known as the Magnetic Drum Calculator (MDC).

Keywords
IBM 650, MDC, Bi-quinary, Coded, Decimal

1. INTRODUCTION
These days, all computer hardware is designed for two-bit binary communication. However, before massive amounts of standardization occurred in the technological realm, a few computers tinkered with the idea of making a computer run on hardware that wasn't base two. These computers, the Colossus, the UNIVAC, the and IBM 650, to name a few, were coded using bi-quinary coded decimal. Of these, the IBM 650 is the only one that was mass-produced.

2. HISTORY AND BACKGROUND
Prior to the release of the IBM 650 Magnetic Drum Data Processing Machine, informally called the MDC, which was released in December of 1954, there had not been a commercially released general-purpose business computer. It was the first *true* general-purpose computer as it could actually store a full set of decimal arithmetic equations. Originally it manipulated simply numerical mathematic equations, and later the ability to store sets of characters was added [4]. A machine of this type was necessary since prior machines were simply Card Programmed Calculators (CPC).

3. HARDWARE STRUCTURE
The MDC was an electronic calculator that was intermediate is speed, capacity, and cost. Significant components comprising the machine are the are nearly 2,000 tubes, 3,600 crystal diodes, magnetic recording circuits and punching thyratrons, a 4" by 14" Cobalt-nickel plated drum (for storage) that rotates at 12,500 Rounds Per Minute (RPM), and a single magnetic head used for reading and writing to storage [2]. A Power Supply, nearly equal in size proportions, is attached to the Consol Unit which is adjacent to the Read-Punch Unit, used for the input-output of punch cards [4]. The hardware communicated using bi-quinary coded decimal instead of in binary coded decimal as all modern computers (and even most historical computers) do [2].

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4. PROGRAMMING
The MDC did not have an operating system, as it was not necessary with input and output always being communicated directly to and from the user to the hardware itself.

Unlike previous machines, the IBM 650 had the ability to store programs. The machine even had a bit of error correction built into it. If an error was detected, rather than crashing spontaneously, the machine attempts to rerun the procedure. The machine broke larger problems up into numerous smaller problems in order to minimize errors [3].

The IBM 650 was originally coded using machine language, but it was eventually upgraded to SOAP (Symbolic Optimal Assembly Program) in 1955. By 1957 a FORTRAN compiler was available for SOAP, and in 1959 a native FORTRAN compiler was released for the MDC. There were over thirty programming languages that would eventually compile natively to the IBM 650.

5. CONCLUSIONS
Though only about 2,000 IBM 650 systems were produced, the MDC was significant in the advancement of computer technology [4]. Though bi-quinary was not the most efficient way to build a computer, the MDC made this evident for future designers and was also a great help to the businesses that benefited from it.

6. REFERENCES
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