

POUGHKEEPSIE
Department 539
South Road Laboratory

October 8, 1958

MEMO TO: Mr. G. E. Werner

SUBJECT: Real Time Clock

Reference: Your file memo of September 19, 1958, "Proposals
for Elapsed and Real Time Clocks".

Proposal III of the above-mentioned memo has been agreed upon as the method to be used in incorporating the elapsed and real time clocks into the machine.

Enclosed is a draft of the real time clock description which will appear in the next manual edition.

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3.6 The Real Time Clock

The real time clock is provided to measure time difference or duration over relatively long periods. This clock consists of a number 36 bits long which is continually stepped up by pulses originating from the same 1024 cycle per second oscillator which controls the updating of the elapsed time clock. The two clocks are updated consecutively in the same time interval. The leftmost 26 bits of the real time clock measure time in seconds. A full cycle is about 777 days. The accuracy of the clock is such that the maximum error in a one hour period may be one second.

The value of the clock reading is stored in memory. Each time the oscillator delivers a pulse it is read out, incremented by one using the index adder, and returned to memory.

The clock runs continually while the computer is under program control even if the computer is executing a SET AND WAIT operation. If the clock has reached its maximum reading of all ones, the next oscillator pulse will set it to all zeros. No indication is given when the clock recycles to zero.

The contents of the clock counter may be read out at any time by addressing it as the memory operand of a fetch-type instruction. This clock is a read-only counter; it can not be set to a new value under program control. If it is addressed as the memory operand of a store-type instruction, the data to be stored are lost and do not replace the contents of the clock. In this respect, the real time clock is treated like location 0.

The real time clock occupies bits 28 to 63 of memory location 2. Since this is in the protected area of memory, any reference to the clock when the interruption system is in the enabled state will actuate either indicator DS or indicator DF.

Programming Notes:

The real time clock can be used to obtain a time-of-day indication. A known external time is taken as a reference and the setting of the real time clock at that time is stored in memory. The time-of-day at a later time can be obtained by using the time which has elapsed since the reference time. The difference between the current clock setting and the setting at the time of reference can be converted to hours, minutes and seconds. If this time difference is added to the time-of-day which was used as the reference, the current external time of day is obtained.

Since the real time clock is continually stepping and has a recycle time of over two years, it may be used to provide a convenient "serial number" for program outputs. Each output can include a clock reading which will provide a chronological identification of the output.