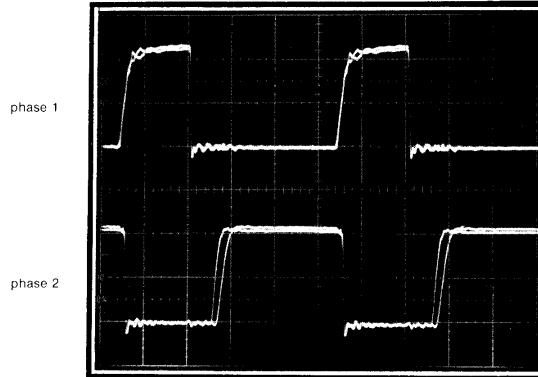


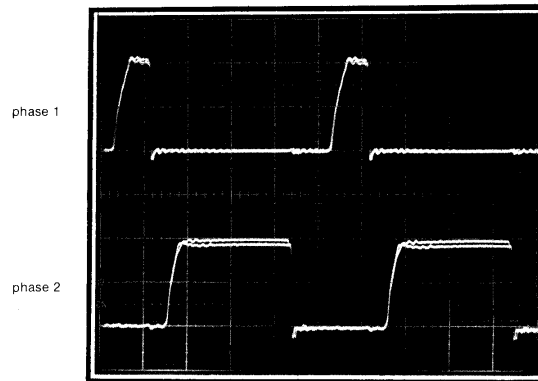
At the heart of every computer is a CPU clock. This clock generates a precise series of pulses which enable the CPU to step in an orderly sequence, through the various states required to execute the instructions, of a program, stored in memory. The 8080 CPU used in the Altair 8800 requires two discrete, but synchronized, series of clock pulses. The Altair uses IC-Q, a 74123, and its associated circuitry to generate the necessary pulses from a stable crystal controlled source. Unfortunately this circuit does not perform well. These critical pulses are excessively susceptible to noise and to temperature drift or other component variations.

The picture to the right illustrates these problems. This picture is a double exposure, taken at two temperature extremes. Notice the variation in the leading edge of phase two, the overlapping of the end of phase two and the start of phase one, and the noise riding along the waveforms. This is a particularly bad example of an Altair clock, the CPU would not run at all. Substituting a different brand of 74123 for IC-Q, as MITS suggests, does improve the overlap problem, but the noise and temperature variations remain. While many Altair 8800's run in spite of these problems, some run intermittently or not at all.



Standard Altair clock

The second picture shows the output of the Parasitic Engineering circuit under the same conditions. Notice the almost complete lack of timing variation with temperature change, the correctly positioned phase two, and the much lower noise level. Plus, every Parasitic Engineering Clock Fix Kit works this well. This is because every kit includes a special bi-polar M.S.I. integrated circuit. This I.C. is temperature compensated and has very tight pulse width specifications. Furthermore, it is backed up by high stability carbon film resistors and monolithic capacitors, for the timing components. The results are clean, consistent, correctly timed clock pulses, for your Altair 8800.



Parasitic Engineering clock

The pictures were taken with a Tektronix 465 oscilloscope. Sweep was set at 100 ns/div; vertical deflection at 2v/div.

Don't take chances on a marginal clock; your Altair can't work reliably without a reliable clock; order your kit today.

only \$15

The Parasitic Engineering Clock Fix Kit contains complete instructions, our special I.C., and all other necessary parts. The kit installs easily right on the Altair CPU board. Kits are shipped postpaid anywhere in the United States.

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