18.. EIGHT CHANNEL ANALOGUE TO DIGITAL CONVERTER

Introduction

You will appreciate from reading earlier chapters in this book that the computer deals in digital quantities. This leaves only two options for each bit of information. It must be either 1 or 0. In the real world, quantities which we may wish to measure can often take a wide range of values. Some examples are blood pressure, temperature, light intensity, or volume of sound. These parameters can usually be expressed as a variable voltage by using a special transducer. An analogue to digital converter (ADC) will accept as its input a variable voltage (say 0 — 2.55 volts) and provide a digital output which can be read by a computer. In this circuit an 8 bit ADC has been used, and consequently its output can vary from 0 — 255 in integral steps. The circuit can therefore measure down to an accuracy of 0.01 volts.

Construction details

The 8 channel ADC connects directly to port A and port B of the PIO chip described in the chapter 15. The author used a 25 way D type connector to facilitate removal of devices from the PIO. The unit in use is shown in fig 13c. You can see the D type connector protruding from the side of the box. The component layout on 0.1" pitch veroboard is shown in fig 13b. Make the breaks in the copper tracks as shown before soldering in the components. It is recommended that all of the integrated circuits should be plugged into sockets and not soldered directly onto the board. This will make it easier to replace faulty chips and eliminates the possibility of damaging the chips due to overheating during soldering.

R4 and C4 have been asterixed on the layout diagram. These are the timing components for the clock circuit. The photograph of the circuit board in fig 13d shows R4 as a variable resistor in series with a fixed resistor. This enables you to set the oscillator to its maximum of 600KHz, however it is not normally necessary to run it at this speed because BASIC is so slow. It is also difficult to ensure that the frequency is not above 600KHz unless you have access to an oscilloscope or frequency counter. You are therefore recommended to omit the variable resistor R4 and use one fixed 1K8 resistor in its place. Interconnection between components should be made in accordance with the circuit diagram in fig 13a.

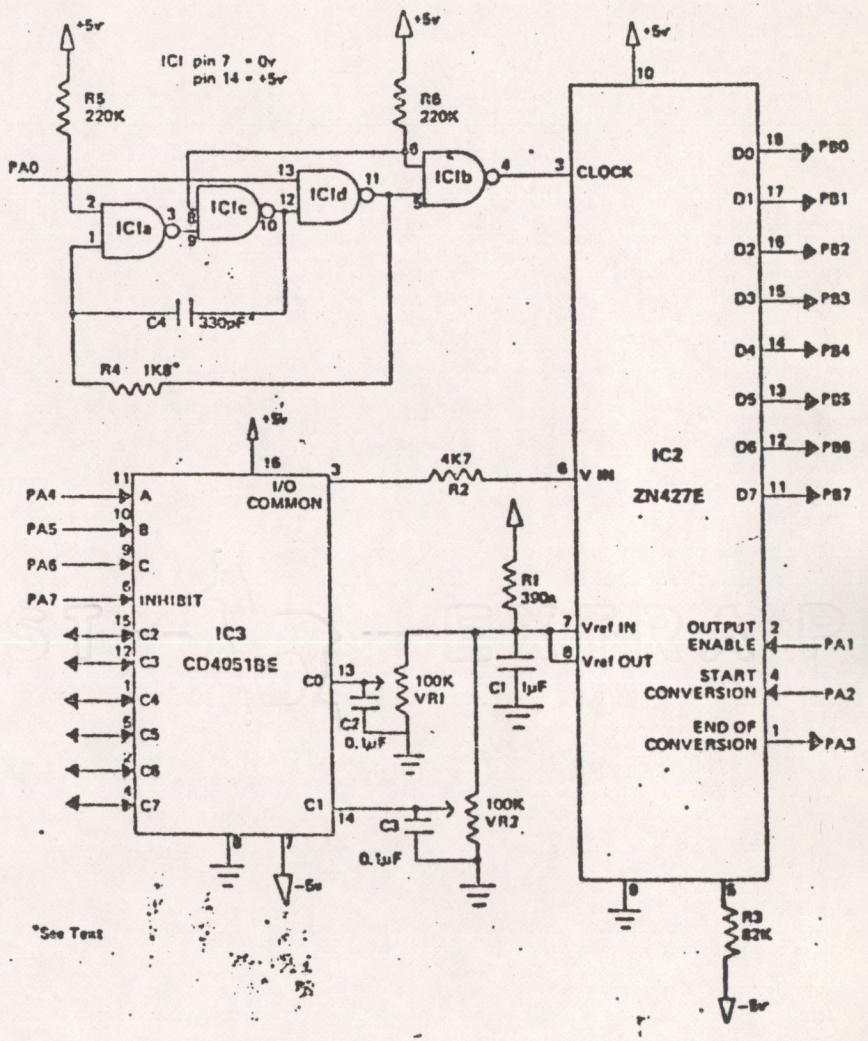

FIG 13a – 8 CHANNEL ANALOGUE TO DIGITAL CONVERTER CIRCUIT