

ADC

Digital to Analog Converter

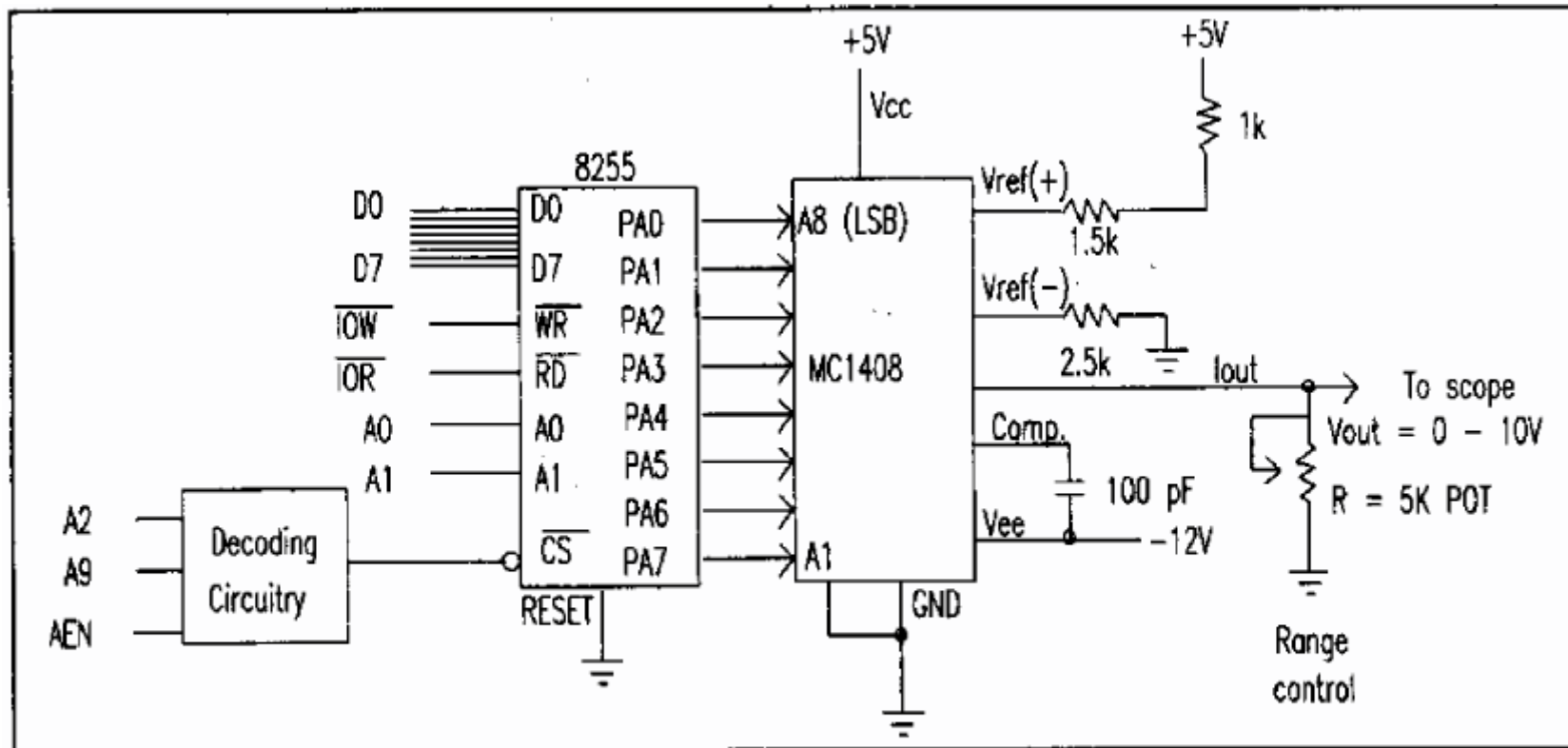


Figure 4-42. DAC Connection to 8255

Resolution: 8 bit

Example – Step Ramp

Example 4-18

In order to generate a stair-step ramp, set up the circuit in Figure 4-42 and connect the output to an oscilloscope. Then write a program to send data to the DAC to generate a stair-step ramp.

Solution:

```
      MOV  AL,80H      ;all ports as output
      MOV  DX,303H    ;control reg address of PC Trainer
      OUT  DX,AL
A1:   MOV  AH,01      ;check for key press
      INT  16H       ;using PC BIOS INT 16
      JNZ  STOP      ;stop if any key is pressed
      SUB  AL,AL     ;other wise generate a stair-step ramp
      MOV  DX,300H
A2:   OUT  DX,AL
      INC  AL        ;next step
      CMP  AL,0      ;
      JZ   A1        ;if zero check for the key press
      MOV  CX,02FFH ;delay (for fast CPUs increase value in CX)
WT:   LOOP WT       ;let DAC recover
      JMP  A2        ;create next step
STOP: MOV  AH,4CH    ;go to DOS
      INT  21H
```

Analog to Digital

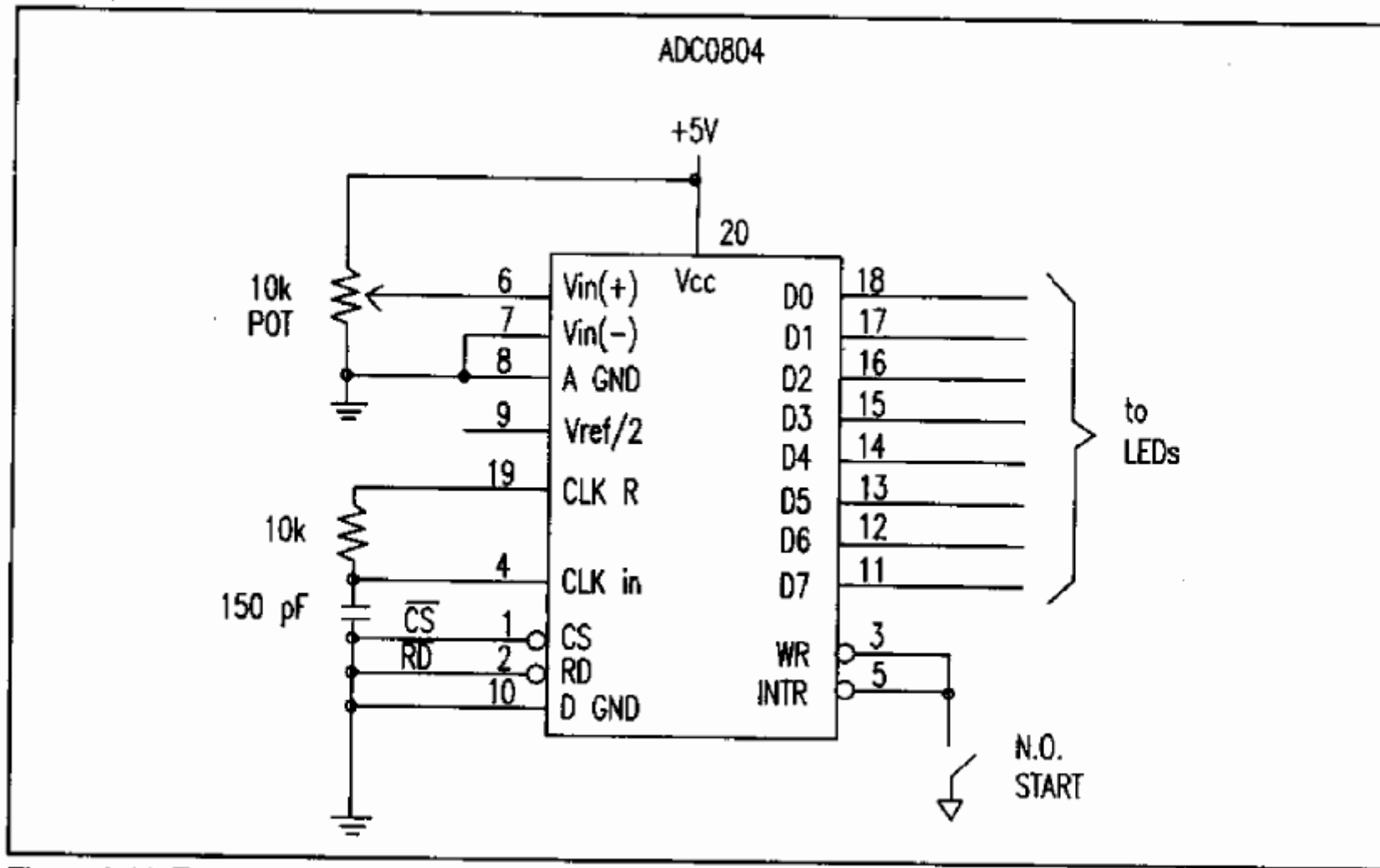


Figure 4-44. Testing 804 in Free Running Mode

V_{in} Range

Table 4-16: $V_{ref}/2$ Relation to V_{in} Range

$V_{ref}/2(V)$	$V_{in}(V)$	Step Size (mV)
not connected*	0 to 5	$5/256 = 19.53$
2	0 to 4	$4/255 = 15.62$
1.5	0 to 3	$3/256 = 11.71$
1.28	0 to 2.56	$2.56/256 = 10$
1	0 to 2	$2/256 = 7.81$
0.5	0 to 1	$1/256 = 3.90$

Notes: $V_{CC} = 5V$

* When not connected (open), $V_{ref}/2$ is measured at 2.5 volts for $V_{CC}=5V$.
Step size (resolution) is the smallest change that can be discerned by an ADC.

Timing

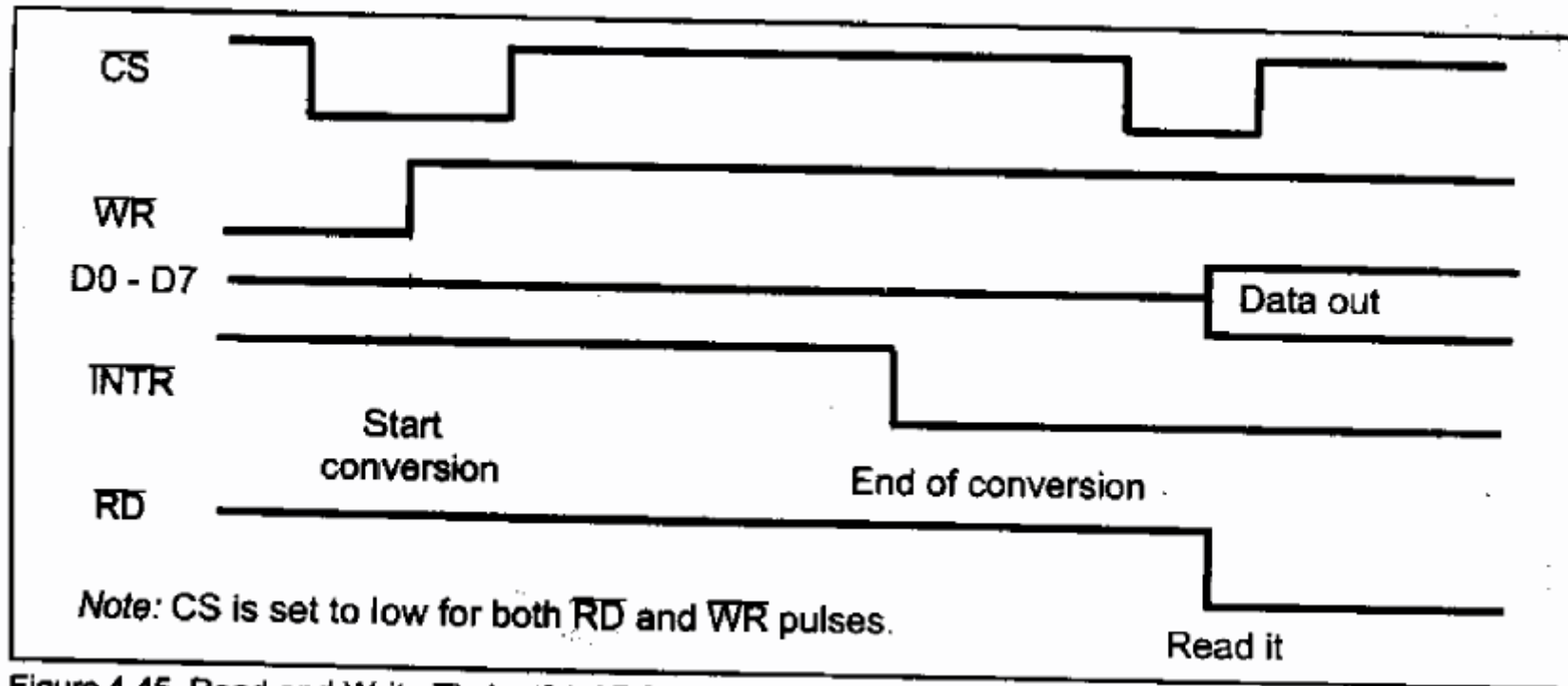


Figure 4-45. Read and Write Timing for ADC804

Interfacing ADC

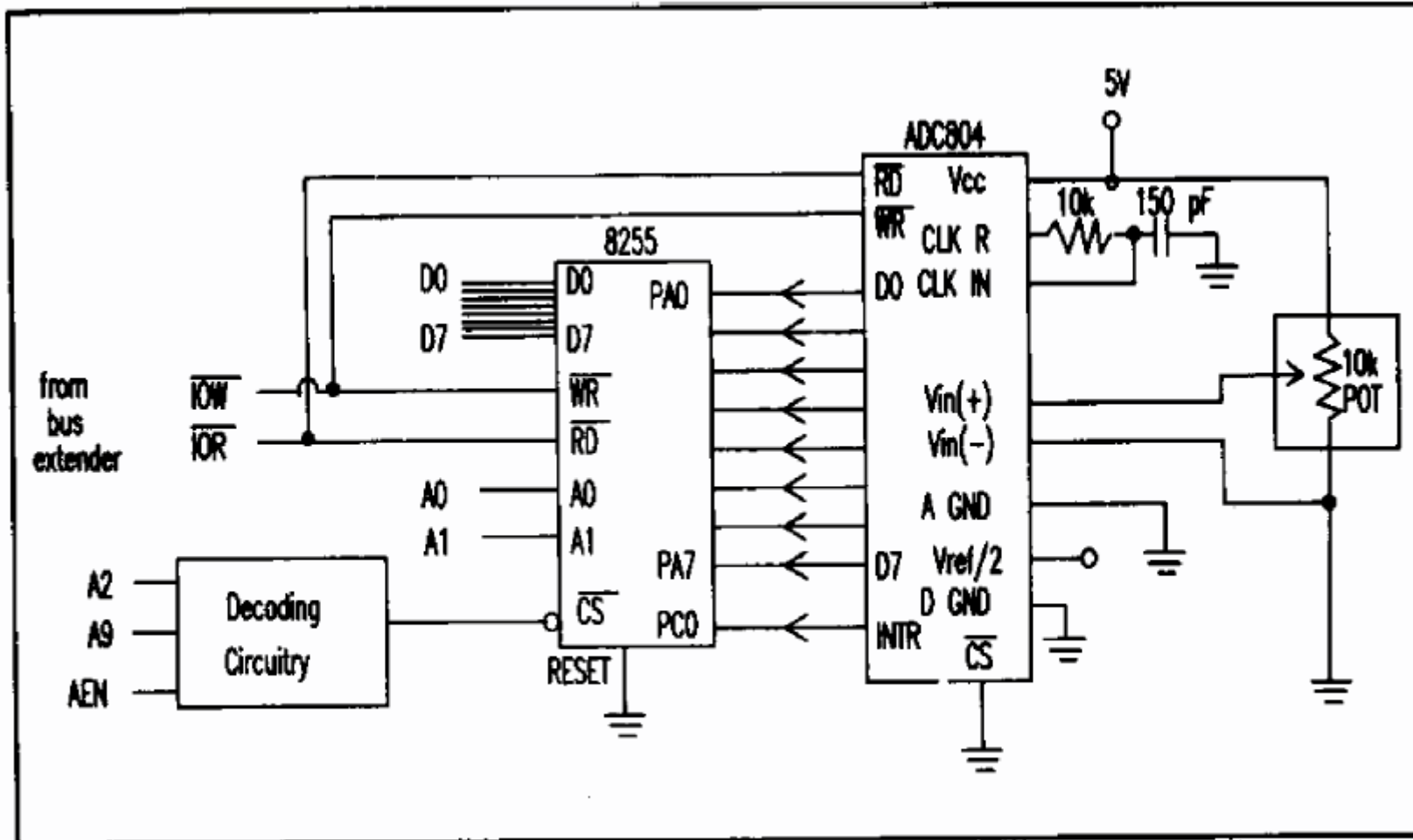


Figure 4-46. 8255 Connection to ADC804

Example

Example 4-20

Examine the ADC804 connection to the 8255 of the PC Interface Trainer in Figure 4-46. Write a program to monitor INTR and bring in analog input into register AL.

Solution:

```

                MOV  AL,99H      ;ports A and C as input
                MOV  DX,303H     ;control port address of PC Trainer
                OUT  DX,AL       ;initialize ports
A1:             MOV  DX,302H     ;port C address of PC Trainer
                IN   AL,DX       ;get INTR status
                AND  AL,00000001 ;mask all except PC0
                CMP  AL,00000001 ;is it end of conversion (or INTR low)?
                JE   A1         ;if no keep checking PC0
                ;the conversion is finished, next get the data from port A
                MOV  DX,300H     ;port A address of PC Trainer
                IN   AL,DX       ;8-bit binary data representing analog input
                ;now AL has the analog input
```


Temperature Sensor

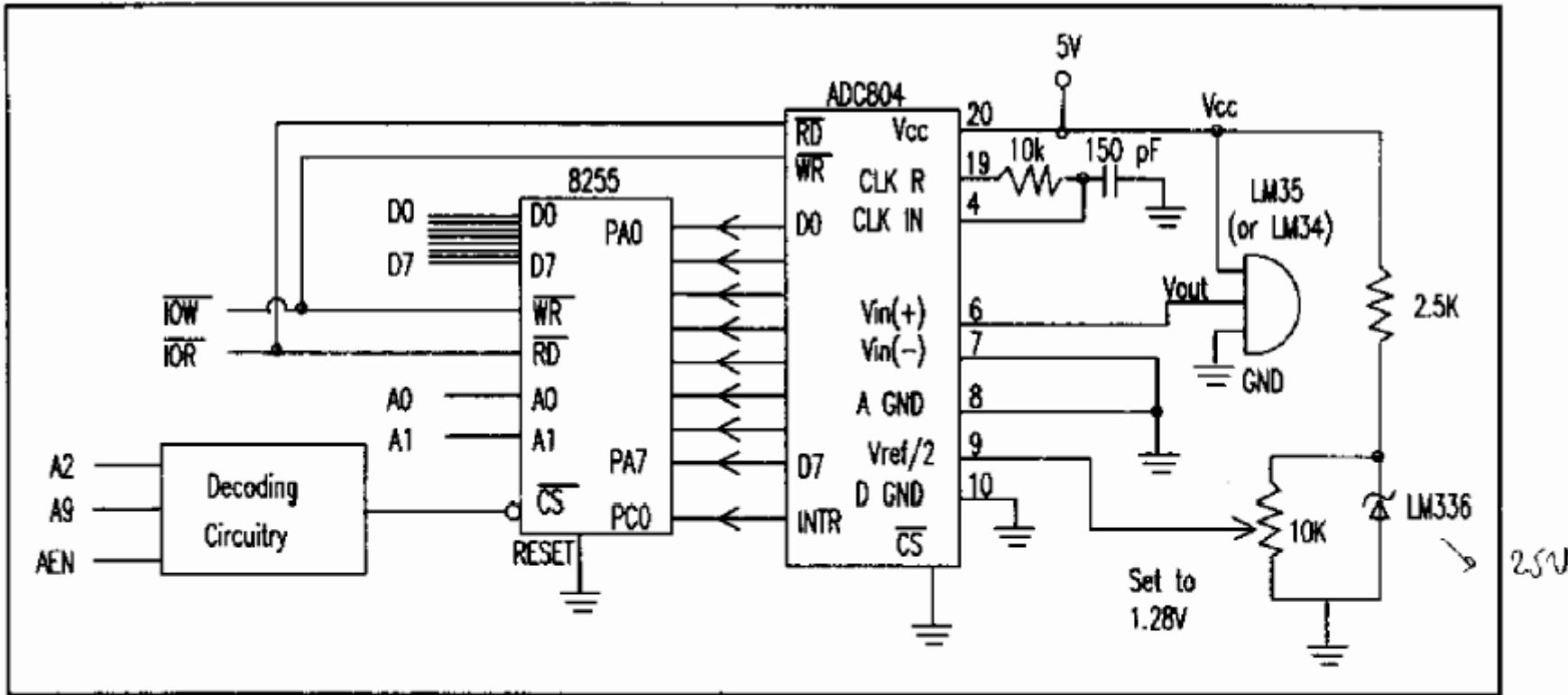


Figure 4-47. Temperature Sensor Connection to ADC804

Table 4-20: Temp. vs. V_{OUT} of the 804

Temperature (C)	V _{in} (mV)	ADC804 V _{out}	
		D7	D0
0	0	0000	0000
1	10	0000	0001
2	20	0000	0010
3	30	0000	0011
10	100	0000	1010
30	300	0001	1110