ภาคภนวก ก.

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โปรแกรมควบคุมการทำงานของ ADC และแสดงน้ำหนัก

```
#include <stdio.h>
#include <conio.h>
#include <graphics.h>
#include <dos.h>
#include <math.h>
#define PORT_A          0x300
#define PORT_B          0x301
#define PORT_C          0x302
#define CTRL_PORT       0x303
#define CTRL_WORD       0x89
#define MORE            255                                     /*Data is More than incoming Weight*/
#define LESS            254                                     /*Data is Less than incoming Weight */
#define W_Disp          midx-50,midy-25,midx+50,midy+25,1       /*Weight Display viewport */
#define R_Disp          maxx-190,maxy-40,maxx-160,maxy,2        /*No. of Round Display viewport*/
main()
{
 float weight;
 float sum = 0;
 int gd = DETECT, gm, maxx, maxy, midx, midy;
 int I, A, B, num = 1, done = 0, r_disp = 0;
 char *x="\0', c;
 initgraph(&gd,&gm,"");
 maxx = getmaxx();
 midx = maxx/2;
 maxy = getmaxy();
 midy = maxy/2;
 outtextxy(maxx-210, 20, "Function Key");
 outtextxy(maxx-240, 30, "'Esc' - Exit weighting");
 outtextxy(maxx-240, 40, "'r'  - Reset weighting");
 outtextxy(maxx-240, 50, "'p'  - Pause weighting");
 outtextxy(maxx-240, 60, "'d'  - Rounds display on/off");

 settextstyle(1, 0, 5);
 outtextxy(midx-70, 90, "Weight");
 setlinestyle(0, 0, 9);
 rectangle(midx-55, midy-27, midx+55, midy+27);
 outtextxy(midx+80, midy-15, "Kg");
 setviewport(W_Disp);

 while(!done)
 {
  if (kbhit())
  {
    c = getch();
    if(c == 27) done = 1;                                       /* Exit weighting */
    if(c == 'r') {num = 1; sum = 0;}                            /* Reset weighting */
    if(c == 'p')                                                /* Pause Weighting */
          {
            settextstyle(1, 0, 1);
            setviewport(midx-150, midy+31, midx+150, midy+91, 3);
            outtextxy(5, 15, "Pause! Press 'Enter' to resume");
            getch();
            clearviewport();
            setviewport(W_Disp);

          }
   if (c == 'd')
          {
           if (r_disp == 0)
           {
                    settextstyle(1, 0, 1);
                    setviewport(0, 0, maxx,maxy, 8);
                    outtextxy(maxx-150, maxy-40, "Rounds Weight");
           }
           else
           {
```

```
                    setviewport(maxx-180, maxy-40, maxx, maxy, 6);
                    clearviewport();
                }
                r_disp = !r_disp;
            }
    }
    outportb(CTRL_PORT, CTRL_WORD);          /* Send control word to control port */
    delay(2);
    A = 0;                                   /* Initial value of A */
    for(i = 0x80; i > 0; i /= 2)             /* Loop binary search for port A */
    {
            outportb(PORT_A, A+i);           /* Send port A with data to compare */
            outportb(PORT_B, 0);             /* with incoming weight by port B is set to 0 */
            delay(2);
            if(inportb(PORT_C) == LESS)
            {
                    A += i;
            }
    }
    for(B = 0; B <= 255; B++)                /* Loop sequential search for port B */
    {
            outportb(PORT_A, A);
            outportb(PORT_B, B);
            delay(2);
            if(inportb(PORT_C) == MORE)
            {
                    B--;
                    break;
            }
    }
    weight = (1.95*(A+(B/256.)));            /* Weight calculating */
    sum = sum+weight;                        /* Summary Weight all of round weighting */
    num++;
    if (!(num%10))                           /* Average Weight display every 10 rounds */
    {
     settextstyle(1, 0, 5);
     sprintf(x, "%3d\0", (int)(sum/(num-1)), weight);   /* Print out Average weight */
     setviewport(W_Disp);
     clearviewport();
     outtextxy(20, 0, x);
     if (r_disp == 1)
     {
            settextstyle(1, 0, 1);
            setviewport(R_Disp);
            clearviewport();
            sprintf(x, "%3d\0", num);        /* Display Round */
            outtextxy(0, 0, x);
     }
    }
    if (num == 201)
    {
      num = 1;
      sum = 0;
    }
  }
  closegraph();
}
```

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รายละเอียดและคุณสมบัติเฉพาะของ Load cell

Specifications:

Norminal Ouput at Capacity	2 mV/V ± 0.1%
Norminal Capacity	500 Kg.
Linearity Error	0.017%
Output Resistance	351 Ohm
Input Resistance	410 Ohm
Repeatability	0.01%
Compensated Temp. Range	-10 to 50° C.
Safe Load	100% Capacity
Recommended Exitation	5V to 12V ac/dc
Maximum Exitation	15 Vdc.

Cabling

Red	+ Exitaion
Black	- Exitation
Green	+ Signal
White	- Signal