

รายการอ้างอิง

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ภาคผนวก ก

โปรแกรมซอฟต์แวร์สำหรับวัดซีพีเอ็ม ด้วยคอมพิวเตอร์ NEC รุ่น PC-9801 (ภาษา BASIC)

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10' /*****
20' *   N-88 Basic program for NEC PC-9801
30' *   Description : Mesurement of Weak Absorption Region
40' *   by Constant Photocurrent Method (CPM)
50' *
60' *
70' *   Initialize procedure for JOBIN YVON DATA LINK   by Suwat Sopotpan
80' *****/
90' */
100 CONSOLE 0,25,0,1 :SCREEN 3,0,0,1:GOSUB *CLSSCR
110 DM6847 = 1: DL = 2: TR6162 = 14: TR6143 = 18 ' GPIB address
120 GOSUB *ENTRANCE      /* Start MonoChorometer */
130 GOSUB *DATASET      /* Initial Parameter */
140 GOSUB *DEVICESET    /* Start Devices Control */
150 GOSUB *MENU0
160 *WAIT1:
170 *WAITIN:
180 GETIN$=INKEY$:IF(GETIN$="") GOTO *WAITIN
190 CHAR = INSTR(CHR$(28)+CHR$(29)+CHR$(30)+CHR$(31),GETIN$)
200 ON CHAR GOSUB *RIGHT,*MENU1,*UP,*DOWN
210 GOTO *WAITIN
220 /***** MENU *****/
230 '
240 '
250 *MENU0:
260 SCREEN 3,0,0,1:CLS 1
270 *MENU1:CLS 1 :COLOR 7
280 MARKJOB = 1
290 MARKROW = 12: MENURCONSTMIN = 12: MENURCONSTMAX = 20: MENUCCONST = 29
300 CHOICEMAX = 5: CHOICEMIN = 1: MENUSCALE = 2: MENU = 1
310 LOCATE MENUCCONST , MARKROW : PRINT CHR$(223)
320 VIEW (160,120)-(490,360),0,7 'X*Y (640*480)
330 LOCATE 23,9: PRINT "      CPM Mesurement      " ' Row X column
340 LOCATE 33,12: PRINT "Mesurement setup "
350 LOCATE 33,14: PRINT "New Mesurement"
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360 LOCATE 33, 16: PRINT "Open Data File"
370 LOCATE 33, 18: PRINT "Save Data"
380 LOCATE 33, 20: PRINT "Exit"
390 *WAIT0:GOTO *WAIT1
410 *MENU2: MENU = 2:CLS 1
420   MARKJOB = 1
430   MARKROW = 19: MENURCONSTMIN = 19: MENURCONSTMAX = 21: MENUCONST = 48
440   CHOICEMAX = 3: CHOICEMIN = 1: MENUSCALE = 1
450   VIEW (160, 120)-(490, 360), 0, 2
460   LOCATE MENUCONST , MARKROW : PRINT CHR$(223)
470   LOCATE 24, 10: PRINT "   ";MESURE$;" Parameter   "
480   LOCATE 27, 13: PRINT "Start Wave Length "; WMIN; " (nm) "
490   LOCATE 27, 15: PRINT "Stop Wave Length "; WMAX; " (nm) "
500   LOCATE 27, 17: PRINT "Step Wave Length "; WVAL; " (nm) "
510   LOCATE 20, 20: PRINT CHR$(15)
520 IF(MESURE$="CPM") THEN LOCATE 24, 20:PRINT"Constant Current";MVPSET; "(nA)"
530 VIEW (395, 304)-(465, 318), 0, 5: COLOR 2: LOCATE 51, 19: PRINT "Start"
540 VIEW (395, 320)-(465, 334), 0, 5: COLOR 2: LOCATE 51, 20: PRINT "Change"
550 VIEW (395, 336)-(465, 352), 0, 5: COLOR 2: LOCATE 51, 21: PRINT "CanCel"
560 *WAIT2: GOTO *WAIT1
580 *MENU3: MENU = 3 :GOSUB *CLSSCR
590   MARKJOB = 1
600   MARKROW = 13: MENURCONSTMIN = 13: MENURCONSTMAX = 19: MENUCONST = 29
610   CHOICEMAX = 4: CHOICEMIN = 1: MENUSCALE = 2
620   VIEW (0,305) - (638,398),0,0
630   VIEW (160, 120)-(490, 360), 0, 3
640   LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
650   LOCATE 27,10: PRINT "   ";MESURE$;" Data   "
670   LOCATE 33,13: PRINT "Print Text Data "
680   LOCATE 33,15: PRINT "Plot & Print Data "
690   LOCATE 33,17: PRINT "Resume Mesure ";MESURENEXT$
700   LOCATE 33,19: PRINT "Cancel"
710 *WAIT3: GOTO *WAIT1
740 *SDATA:
750 *MENU4: MENU = 4
760   MARKJOB = 1
770   MARKROW = 10: MENURCONSTMIN = 10: MENURCONSTMAX = 11: MENUCONST = 29
780   CHOICEMAX = 2: CHOICEMIN = 1: MENUSCALE = 1
790   VIEW (160, 120)-(370, 200), 0, 4
800   LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
810   COLOR 2: LOCATE 21,8: PRINT "Do You Want to Save Data"
820   VIEW (250, 157)-(320, 173), 0, 5: COLOR 7: LOCATE 33,10: PRINT "Save "
830   VIEW (250, 175)-(320, 191), 0, 5: COLOR 7: LOCATE 33,11: PRINT "Abort "

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840 *WAIT4: GOTO *WAIT1
870 *MENU5: MENU = 5
880     MARKJOB = 1
890     MARKROW = 12: MENURCONSTMIN = 12: MENURCONSTMAX = 16: MENUCONST = 57
900     CHOICEMAX = 5: CHOICEMIN = 1: MENUSCALE = 1
910     VIEW (0,305)-(638,398),0,0
920     LOCATE 1,20 :PRINT "   "
930     LOCATE 1,22 :PRINT "   "
940     LOCATE 69,20:PRINT "   "
950     LOCATE MENUCONST , MARKROW : PRINT CHR$(223)
960     VIEW (450, 193)-(540, 208), 0, 5: COLOR 7: LOCATE 58,12: PRINT "Print  "
970     VIEW (450, 208)-(540, 224), 0, 5: COLOR 7: LOCATE 58,13: PRINT "Zoom In "
980     VIEW (450, 224)-(540, 240), 0, 5: COLOR 7: LOCATE 58,14: PRINT "Zoom Out "
990     VIEW (450, 240)-(540, 255), 0, 5: COLOR 7: LOCATE 58,15: PRINT "Scale"
1000    VIEW (450, 255)-(540, 270), 0, 5: COLOR 7: LOCATE 58,16: PRINT "Go Back "
1010 *WAIT5: GOTO *WAIT1
1040 *MENU6: MENU = 6
1050     MARKJOB = 1
1060     MARKROW = 14: MENURCONSTMIN = 14: MENURCONSTMAX = 18: MENUCONST = 48
1070     CHOICEMAX = 3: CHOICEMIN = 1: MENUSCALE = 2
1080     VIEW (380,220) - (440,310),0,6
1090     LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
1100     LOCATE 49,14: PRINT "lph "
1110     LOCATE 49,16: PRINT "CPM "
1120     LOCATE 49,18: PRINT "Cancel"
1130 *WAIT6: GOTO *WAIT1
1160 *MENU7: MENU = 7 :CLS 1
1170     MARKJOB = 1
1180     MARKROW = 12: MENURCONSTMIN = 12: MENURCONSTMAX = 18: MENUCONST = 31
1190     CHOICEMAX = 4: CHOICEMIN = 1: MENUSCALE = 2
1200     VIEW (160, 120)-(490, 360), 0, 5
1210     LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
1220     COLOR 7:LOCATE 25,9: PRINT "   Please Select Data   "
1230     LOCATE 33,12: PRINT "Photo Current Data "
1240     LOCATE 33,14: PRINT "CPM Data "
1250     LOCATE 33,16: PRINT "Photons Data"
1260     LOCATE 33,18: PRINT "Cancel"
1270 *WAIT7: GOTO *WAIT1
1290 *MENU8: MENU = 8
1300     MARKJOB = 1
1310     MARKROW = 15: MENURCONSTMIN=15: MENURCONSTMAX =18: MENUCONST=68
1320     CHOICEMAX = 3: CHOICEMIN=1: MENUSCALE=1
1330     LOCATE MENUCONST, MARKROW: PRINT CHR$(223)

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1340 VIEW(540,240)-(600,285),0,6:COLOR 7:LOCATE 69,15:PRINT "fine"
1350 VIEW(540,240)-(600,255),0,6:COLOR 7:LOCATE 69,16:PRINT "medium"
1360 VIEW(540,255)-(600,270),0,6:COLOR 7:LOCATE 69,17:PRINT "coarse"
1370 *WAIT8: GOTO *WAIT1
1400 *MENU9: MENU = 9
1410 MARKJOB = 1
1420 MARKROW = 10: MENURCONSTMIN = 10: MENURCONSTMAX = 11: MENUCONST = 29
1430 VIEW (160, 120)-(370, 200), 0, 2
1440 CHOICEMAX = 2: CHOICEMIN = 1: MENUSCALE = 1
1450 LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
1460 COLOR 3: LOCATE 21,8: PRINT "Mesuring Will Terminate?"
1470 VIEW (250, 157)-(320, 173), 0, 4: COLOR 7: LOCATE 33,10: PRINT "Ok"
1480 VIEW (250, 175)-(320, 191), 0, 5: COLOR 7: LOCATE 29,11: PRINT " No "
1490 *WAIT9: GOTO *WAIT1
1510 *MENU10: MENU = 10:CLS 1
1520 MARKJOB = 1
1530 MARKROW = 12: MENURCONSTMIN = 12: MENURCONSTMAX = 18: MENUCONST = 31
1540 CHOICEMAX = 4: CHOICEMIN = 1: MENUSCALE = 2
1550 VIEW (160, 120)-(490, 360), 0, 5
1560 LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
1570 COLOR 7:LOCATE 25,9: PRINT "    Select Setting    "
1580 LOCATE 33,12: PRINT "Set Motor Position "
1590 LOCATE 33,14: PRINT "Mesuring Parameter"
1600 LOCATE 33,16: PRINT "Not Avilable Now"
1610 LOCATE 33,18: PRINT "Cancel"
1620 *WAIT10: GOTO *WAIT1
1640 *MENU11: MENU = 11
1650 MARKJOB = 1
1660 MARKROW = 20: MENURCONSTMIN = 20: MENURCONSTMAX = 21: MENUCONST = 45
1670 CHOICEMAX = 2: CHOICEMIN = 1: MENUSCALE = 1
1680 VIEW (280, 280)-(490, 360), 0, 5
1690 LOCATE MENUCONST , MARKROW: PRINT CHR$(223)
1700 COLOR 6: LOCATE 38,18:PRINT "Do You Want to Save ? "
1710 VIEW(330, 320)-(470, 350), 0, 1:COLOR 7:LOCATE 47,20: PRINT "Save "
1720 VIEW(330, 335)-(470, 350), 0, 1:COLOR 7:LOCATE 47,21: PRINT "Abort "
1730 *WAIT11: GOTO *WAIT1
1750 *MENU12: MENU = 12:CLS 1
1760 MARKJOB = 1
1770 MARKROW = 19: MENURCONSTMIN = 19: MENURCONSTMAX = 21: MENUCONST = 48
1780 CHOICEMAX = 3: CHOICEMIN = 1: MENUSCALE = 1
1790 VIEW (160, 120)-(490, 360), 0, 2
1800 LOCATE MENUCONST , MARKROW : PRINT CHR$(223)
1810 LOCATE 24, 10: PRINT "    ";MESURENEXT$;" Parameter    "

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1820 LOCATE 27, 13: PRINT "Start Wave Length "; WMIN; " (nm) "
1830 LOCATE 27, 15: PRINT "Stop Wave Length "; WMAX; " (nm) "
1840 LOCATE 27, 17: PRINT "Step Wave Length "; WVAL; " (nm) "
1850 LOCATE 20, 20: PRINT CHR$(15)
1860 IF(MESURES="I-ph") THEN LOCATE 24, 20:PRINT"Constant Current";MVPSET; "(nA)"
1870 VIEW (395, 304)-(465, 318), 0, 1: COLOR 2: LOCATE 51, 19: PRINT "Start"
1880 VIEW (395, 320)-(465, 334), 0, 1: COLOR 2: LOCATE 51, 20: PRINT "Change"
1890 VIEW (395, 336)-(465, 352), 0, 1: COLOR 2: LOCATE 51, 21: PRINT "CanCel"
1900 *WAIT12: GOTO *WAIT1
1930 '***** END MENU *****/
1940 '/***** OPTIONS *****/
1970 *OPTION1: CLS 1 :GOSUB *OPTION11:CLS 1
1980 VIEW (160, 120)-(490, 360), 0, 5
1990 LOCATE 24, 15: PRINT "Moving Motor to ";P1/200;"(nm)..OK"
2000 TDEL =2:GOSUB *TDELAY
2010 RETURN
2020 *OPTION2: RETURN
2030 *OPTION3: LOCATE 27, 13: PRINT STOP1$
2040 STOP0$ = STOP2$:GOSUB *PAUSE:RETURN
2050 *OPTION5: CLS 1: IRESET REN
2060 LOCATE 33, 13: PRINT "CPM Unrelease 1996"
2070 LOCATE 36, 15: PRINT "Thank You"
2080 TDEL = 2: GOSUB *TDELAY
2090 VIEW (0, 0)-(639, 399), 0, 0: RETURN
2100 *OPTION6: RETURN
2110 *OPTION8: CLS 1:LOCATE 37, 15: PRINT "Cancel":GOSUB *OFFKEY:RETURN
2120 *OPTION9: LOCATE 20, 13: PRINT ERROR1$
2130 PRINT @TR6162;"di(f)1.4-5.9,d0,l<10>,de1s)"
2140 STOP0$ = ERROR2$:GOTO *BEEPLOOP
2150 *OPTION11: GOSUB *ASKPOS
2160 LOCATE 22,13 :PRINT "Move monochromator from";P;"(nm) to"
2170 LOCATE 39,15:PRINT "( nm)"
2180 LOCATE 33,15:INPUT P1
2190 LOCATE 22,13:PRINT " Now Moving Motor ....";P1;"(nm) "
2200 COLOR 6:LOCATE 33,15:PRINT " Wait ...":COLOR 7
2210 GOSUB *MOVETO
2220 RETURN
2240 '***** END OPTIONS *****/
2270 '/***** INPUT KEYS *****/
2290 *UP:
2300 LOCATE MENUCONST , MARKROW: PRINT " "
2310 MARKROW = MARKROW - MENUSCALE
2320 MARKJOB = MARKJOB - 1

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2330 IF MARKJOB < CHOICEMIN THEN MARKJOB = CHOICEMAX: MARKROW = MENURCONSTMAX
2340 LOCATE MENUCONST, MARKROW: COLOR 7: PRINT ">>"
2350 RETURN
2380 *DOWN:
2390 LOCATE MENUCONST, MARKROW: PRINT " "
2400 MARKROW = MARKROW + MENUSCALE
2410 MARKJOB = MARKJOB + 1
2420 IF MARKJOB > CHOICEMAX THEN MARKJOB = CHOICEMIN: MARKROW = MENURCONSTMIN
2430 LOCATE MENUCONST, MARKROW: COLOR 7: PRINT ">>"
2440 RETURN
2470 *RIGHT:
2480 IF MENU = 1 THEN RETURN *GOJOB1
2490 IF MENU = 2 THEN RETURN *GOJOB2
2500 IF MENU = 3 THEN RETURN *GOJOB3
2510 IF MENU = 4 THEN RETURN *GOJOB4
2520 IF MENU = 5 THEN RETURN *GOJOB5
2530 IF MENU = 6 THEN RETURN *GOJOB6
2540 IF MENU = 7 THEN RETURN *GOJOB7
2550 IF MENU = 8 THEN RETURN *GOJOB8
2560 IF MENU = 9 THEN RETURN *GOJOB9
2570 IF MENU = 10 THEN RETURN *GOJOB10
2580 IF MENU = 11 THEN RETURN *GOJOB11
2590 IF MENU = 12 THEN RETURN *GOJOB12
2600 RETURN
2620 /****** END INPUT KEYS *****/
2650 *GOJOB1:CLS 1
2660 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOTO *MENU10
2670 IF MARKJOB = 2 THEN GOTO *MENU6
2680 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *LFILE :GOSUB *MENU7
2690 IF MARKJOB = 4 THEN VIEW (160, 120)-(490, 360), 0, 4: GOSUB *SFILE
2700 IF MARKJOB = 5 THEN VIEW (160, 120)-(490, 360), 0, 5: GOSUB *OPTIONS:END
2710 TDEL = 2: GOSUB *TDELAY
2720 GOTO *MENU1
2740 *GOJOB2:
2750 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOSUB *SELECTPROCESS1:GOSUB *SDATA
2760 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: GOSUB *PARA:CLS 1: GOTO *MENU2
2770 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTIONS8
2780 TDEL = 2: GOSUB *TDELAY
2790 GOTO *MENU1
2810 *GOJOB3:
2820 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOSUB *LPDATA0
2830 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: GOSUB *PFILE:GOSUB *MENU5
2840 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *SELECTPROCESS2: GOSUB *SDATA

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2850 IF MARKJOB = 4 THEN VIEW (160, 120)-(490, 360), 0, 4: GOSUB *OPTION8
2860 TDEL = 2: GOSUB *TDELAY :VIEW (1, 1)-(638, 398), 0, 0
2870 GOTO *MENU1
2890 *GOJOB4:
2900 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOSUB *SFILE
2910 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: GOSUB *OPTION8
2920 TDEL = 2: GOSUB *TDELAY
2930 GOTO *MENU1
2950 *GOJOB5:
2960 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOSUB *LPDATA1
2970 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: ZOOM=ZOOM-1:GOSUB *ZOOM: GOTO *MENU5
2980 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: ZOOM=ZOOM+1:GOSUB *ZOOM: GOTO *MENU5
2990 IF MARKJOB = 4 THEN GOTO *MENU8
3000 IF MARKJOB = 5 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTION8
3010 VIEW (1, 1)-(638, 398), 0, 0:ZOOM =0
3020 TDEL = 2: GOSUB *TDELAY
3030 GOTO *MENU7
3050 *GOJOB6:
3060 IF MARKJOB = 1 THEN MESURE$="I-ph": GOTO *MENU2
3070 IF MARKJOB = 2 THEN MESURE$="CPM":GOTO *MENU2
3080 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTION8
3090 TDEL = 2: GOSUB *TDELAY
3100 GOTO *MENU1
3120 *GOJOB7:
3130 IF MARKJOB = 1 THEN GOSUB *CHECKPL:MEASURE$="I-ph":MEASURENEXT$="CPM":GOSUB *FOR1
3140 IF MARKJOB = 2 THEN GOSUB *CHECKCPM:MEASURE$="CPM":MEASURENEXT$="Photons":GOSUB *FOR2
3150 IF MARKJOB = 3 THEN GOSUB *CHECKPHOTONS:MEASURE$="Photons":GOSUB *FOR3
3160 IF MARKJOB = 4 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTION8:TDEL =2:GOSUB *TDELAY:GOTO
*MENU1
3170 GOSUB *LOADPLOT:GOSUB *MENU3
3180 RETURN
3190 *GOJOB8:
3200 IF MARKJOB = 1 THEN GAIN = .1
3210 IF MARKJOB = 2 THEN GAIN = .5
3220 IF MARKJOB = 3 THEN GAIN = 1
3230 TDEL = 1:GOSUB *TDELAY
3240 GOSUB *PFILE:GOTO *MENU5
3260 *GOJOB9:
3270 IF MARKJOB = 1 THEN GOSUB *STOPMOTOR :GOSUB *CLOSEDEV:RETURN *MENU0
3280 IF MARKJOB = 2 THEN VIEW (160,120)-(370,200),0,6:LOCATE 29,11:PRINT"Continue.."
3290 RETURN
3310 *GOJOB10:
3320 IF MARKJOB = 1 THEN GOSUB *OPTION1

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3330 IF MARKJOB = 2 THEN GOSUB *PARA2:GOTO *MENU11
3340 IF MARKJOB = 3 THEN GOTO *MENU10
3350 IF MARKJOB = 4 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTION8
3360 TDEL = 2: GOSUB *TDELAY
3370 GOTO *MENU1
3390 *GOJOB11:
3400 IF MARKJOB = 1 THEN VIEW (160, 120)-(490, 360), 0, 1: GOSUB *SAVESET
3410 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: GOSUB *OPTION8
3420 TDEL = 2: GOSUB *TDELAY
3430 GOTO *MENU1
3441 *GOJOB12:
3442 IF MARKJOB = 1 THEN RETURN
3443 IF MARKJOB = 2 THEN VIEW (160, 120)-(490, 360), 0, 2: GOSUB *PARA:CLS 1: GOTO *MENU12
3444 IF MARKJOB = 3 THEN VIEW (160, 120)-(490, 360), 0, 3: GOSUB *OPTION8
3445 TDEL = 2: GOSUB *TDELAY
3446 GOTO *MENU1
3470 /***** End Jobs *****/
3480     *FOR1:FOR I=1 TO WTOT
3490         TMP(I)=VPL(I)
3500     NEXT I
3510     RETURN
3530     *FOR2:FOR I=1 TO WTOT
3540         TMP(I)=VCPM(I)
3550     NEXT I
3560     RETURN
3580     *FOR3:FOR I = 1 TO WTOT
3590         TMP(I)=VPHOTONS(I)
3600     NEXT I
3610     RETURN
3630 *MESG:   IF (RAIN >6) THEN RAIN = 0
3640     COLOR RAIN+1:LOCATE 27,2:PRINT ERROR2$
3650     RAIN = RAIN +1
3660 RETURN
3670 /***** Start Photocurrent *****/
3680 *STARTPL :
3690     STARTPL$=TIMES:PLDATES=DATES:VPLMAX = 0:FILTEROK = 0
3700 GOSUB *ONKEY
3710 GOSUB *INITSET:GOSUB *MONSCRI:LOCATE 27,2:PRINT"Wait .."
3720 ISET IFC: ISET REN: CMD DELIM = 0
3730 GOSUB *OPENDEV0
3740 FOR I =1 TO WTOT
3750 IF (FILTEROK=0) THEN GOSUB *CHECKFILTER
3760     P1 =T(I) :GOSUB *MOVETO :GOSUB *POSITION :GOSUB *MESG

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3770     GOSUB *RDATA:YPLOT = PVOLT*1000:GOSUB *PDATA
3780     IF(VPLMIN > PVOLT) THEN VPLMIN =PVOLT*1000
3790     IF(VPLMAX < PVOLT) THEN VPLMAX =PVOLT*1000
3800     VPL(I) = PVOLT*1000
3810     NEXT I
3820     STOPPL$=TIMES:PLOK =1
3830     GOSUB *OFFKEY:GOSUB *CLOSEDEV
3840     RETURN
3850     /***** End Mesure Photocurrent *****/
3870     /***** Start Process *****/
3880     *STARTPROCESS: STARTCPM$ = TIME$:CPMDATE$=DATE$
3890     GOSUB *ONKEY:GOSUB *INITSET
3900     GOSUB *MONSCRI:GOSUB *MONVPH :LOCATE 27,2:PRINT "Wait .."
3910     ISET IFC: ISET REN: CMD DELIM = 0
3920     V6162 = 0:VCPMMAX =0:FILTEROK = 0
3930     GOSUB *OPENDEV1
3940     FOR I = 1 TO WTOT
3950     IF (FILTEROK=0) THEN GOSUB *CHECKFILTER
3960     AGAIN =0 : P1=T(I): GOSUB *MOVETO: GOSUB *POSITION:GOSUB *MESG
3970     *RAGAIN : GOSUB *RDATA : GOSUB *CHNGPTN
3980     IF AGAIN = 1 GOTO *RAGAIN
3990     YPLOT = V6162+DC : IPH(I) = PVOLT*1000
4000     GOSUB *PDATA
4010     VCPM(I)=YPLOT :NLOOP = 0
4020     IF (YPLOT > VCPMMAX) THEN VCPMMAX = YPLOT
4030     NEXT I
4040     STOPCPM$ = TIMES
4050     CPMOK =1 :FILTEROK = 0
4060     GOSUB *OFFKEY :GOSUB *CLOSEDEV
4070     RETURN
4080     /***** END Start process *****/
4090     '
4100     /***** Mesure Photons *****/
4110     *STARTPHOTONS :
4120     STARTPHOTONS$=TIMES:PHOTONSDATE$=DATE$
4130     GOSUB *ONKEY :VPHOTONSMAX = 0:LOCATE 27,2
4140     GOSUB *INITSET
4150     GOSUB *MONSCRI:LOCATE 27,2:PRINT"Wait .."
4160     ISET IFC:ISET REN:CMD DELIM=0
4170     GOSUB *OPENDEV2
4180     FOR I = 1 TO WTOT
4190     P1 = T(I): GOSUB *MOVETO:GOSUB *POSITION :GOSUB *MESG
4200     PRINT @TR6162;"di(f01.4-5.9,d"+STR$(VCPM(I)-10)+" ,i<10>,del1s)"

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```

4210     TDEL =SETDELAY:GOSUB *TDELAY
4220     INPUT @DM6847;VPHOTONS : YPLOT = VAL(VPHOTONS)
4230     GOSUB *PDATA
4240     VPHOTONS(I) = YPLOT:IF (YPLOT > VPHOTONSMAX) THEN VPHOTONSMAX = YPLOT
4250     NEXT I
4260     PHOTONSOK =1 :STOPPHOTONS$=TIMES
4270     GOSUB *OFFKEY :GOSUB *CLOSEDEV
4280     RETURN
4310 *OPENDEV0: PRINT @TR6162;"DI(F01.4-5.9,D10,L<10>,DE1s)"
4320     PRINT @TR6162;"CS"
4330     PRINT @TR6143;"V6 D+110 V D+500 MA E"
4340     RETURN
4350 *OPENDEV1:
4360     PRINT @TR6162;"CS"
4370     PRINT @TR6143;"V6 D+110 V D+500 MA E"
4380     RETURN
4390 *OPENDEV2:
4400     PRINT @TR6162;"CS"
4410     RETURN
4430 *CLOSEDEV: PRINT @TR5162;"DI(F01.4-5.9,D0,L<10>,DE1s)"
4440     PRINT @TR6162;"CS"
4450     PRINT @TR6143;"V6 D+0 V D+500 MA E"
4460     RETURN
4490 /****** End Measure photons *****/
4500 *SELECTPROCESS1:
4510 IF(MESURES="I-ph")THEN GOSUB *DATASCALE0:GOSUB *STARTPL
4520 IF(MESURES="CPM") THEN GOSUB *DATASCALE1:GOSUB *STARTPROCESS
4530 RETURN
4560 *SELECTPROCESS2:
4570 IF (MESURES="I-ph")THEN GOSUB *DATASCALE1:GOSUB *MENU12:GOSUB *STARTPROCESS:RETURN
4580 GOSUB *DATASCALE2:GOSUB *MENU12:GOSUB *STARTPHOTONS
4590 RETURN
4610 *DATASCALE0:
4620     SCALEMAX=1000 :SCALEMIN = 0
4630     A1$= "Photo Current (nA)" :XX$ = "Wavelength (nm)"
4650 RETURN
4680 *DATASCALE1 :
4690     SCALEMAX = 10 + DC: SCALEMIN = 0
4700     A1$= "Lamp Voltage (V)":XX$ = "Wavelength (nm)"
4720 RETURN
4740 *DATASCALE2:
4750     SCALEMAX=1 :SCALEMIN =0
4760     A1$= "Detector Voltage (V)" :XX$ = "Wavelength (nm)"

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```

4780 RETURN
4810 *CHECKPL: IF (PLOK) THEN GOSUB *DATASCALE0: RETURN
4820     CLS 1:VIEW (160, 120)-(490, 360), 0, 4
4830     LOCATE 35,15: PRINT "No Iph Data"
4840     TDEL = 2:GOSUB *TDELAY:RETURN *MENU7
4860 *CHECKCPM: IF (CPMOK) THEN GOSUB *DATASCALE1:RETURN
4870     CLS 1:VIEW (160, 120)-(490, 360), 0, 4
4880     LOCATE 35,15: PRINT "No CPM Data"
4890     TDEL = 2:GOSUB *TDELAY:RETURN *MENU7
4910 *CHECKPHOTONS: IF (PHOTONSOK) THEN GOSUB *DATASCALE2:RETURN
4920     CLS 1:VIEW (160, 120)-(490, 360), 0, 4
4930     LOCATE 33,15:PRINT "No Photons Data "
4940     TDEL = 2:GOSUB *TDELAY:RETURN *MENU7
4960 ' /***** Scale's Screen *****/
4970 *MONSCRI:
4980     GOSUB *CLSSCR
4990     VIEW (160, 120)-(490, 360), 0, 0
5000     SLINE = 7
5010     VIEW (50, 50)-(550, 300), 0, 1 '500X250
5020     LINE (0, 0)-(500, 0), SLINE
5030     LINE (0, 0)-(0,250), SLINE
5040     LINE (500, 0)-(500, 250), SLINE
5050     LINE (500, 250)-(0, 250), SLINE
5060     FOR Y = 50 TO 200 STEP 50
5070         FOR X = 0 TO 500 STEP 10
5080             CIRCLE (X, Y), 1,3
5090         NEXT X
5100     NEXT Y
5120     FOR X = 50 TO 450 STEP 50
5130         FOR Y = 0 TO 250 STEP 10
5140             CIRCLE (X, Y),1, 2
5150         NEXT Y
5160     NEXT X
5170     LOCATE 6,1:COLOR 7:PRINT A1$
5180     X = 40 - (LEN(XX$) / 2)
5190     COLOR SLINE: LOCATE X - 1, 20: PRINT XX$
5210     K# = (WMAX - WMIN) / 10
5220     FOR I = 0 TO 10
5230         COLOR 7
5240         LOCATE (1 + I) * 6.3 - 1, 19: PRINT USING "####"; WMIN + K# * I
5250     NEXT I
5270     K# = (SCALEMAX - SCALEMIN) / 5
5280     FOR I = 0 TO 5

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5290     COLOR 7
5300     LOCATE 0, 18 - (I * 3): PRINT USING "####.#"; SCALEMIN + K# * I
5310     NEXT I
5320     RETURN
5340 *MONVPH:
5350     VIEW (50, 338)-(550, 398), 0,4
5360     IDIFF = IPSET * 2: IMAX = IPSET + (IDIFF / 2): IMIN = IPSET - (IDIFF / 2)
5370     LINE (0, 30)-(550, 30), 7
5380     LOCATE 1, 20: PRINT IMAX
5390     LOCATE 1, 22: PRINT IPSET
5400     ' LOCATE 1, 23: PRINT IMIN
5410     LOCATE 73, 20: PRINT "I-Ph"
5420     VIEW (568, 350)-(638, 390), 0, 1
5430     RETURN
5450 '***** END Scale's Screen *****/
5480 '/***** Set New parameter *****/
5490 *PARA:  CLS 1
5500     COLOR 7
5510     LOCATE 33, 9: PRINT "Set New Parameter"
5520     COLOR 6
5530     WMIN0=WMIN:WMAX0=WMAX:WVAL0=WVAL:MVPSET0=MVPSET
5540     LOCATE 27, 12: PRINT "Start Wavelength"; WMIN; " (nm)"
5550     LOCATE 27, 14: PRINT "Stop Wavelength "; WMAX; " (nm)"
5560     LOCATE 27, 16: PRINT "Step      "; WVAL; " (nm)"
5570     IF(MESURE$="CPM") THEN LOCATE 27, 18: PRINT "Constant Photo Current";MVPSET;"(nA)"
5580     COLOR 7
5590     LOCATE 42, 12: INPUT WMIN:IF (WMIN=0)THEN WMIN=WMIN0
5600     LOCATE 42, 14: INPUT WMAX:IF (WMAX=0)THEN WMAX=WMAX0
5610     LOCATE 42, 16: INPUT WVAL:IF (WVAL=0)THEN WVAL=WVAL0
5620     IF(MESURE$="CPM") THEN LOCATE 48, 18: INPUT MVPSET
5630         IF (MVPSET=0) THEN MVPSET=MVPSET0
5640     IPSET=MVPSET
5650     RETURN
5670 *PARA2:  CLS 1
5680     COLOR 7
5690     LOCATE 31, 9: PRINT "Set Mesuring Parameter"
5700     COLOR 4
5710     DC0=DC :FILTERPOS0=FILTERPOS:SETDELAY0=SETDELAY
5720     LOCATE 27, 12: PRINT "Lamp DC Voltage "; DC; " (Volt)"
5730     LOCATE 27, 14: PRINT "Change Filter Position ";FILTERPOS; "(nm)"
5740     LOCATE 27, 16: PRINT "Delay Time      ";SETDELAY; " (Sec)"
5750     COLOR 7
5760     LOCATE 42, 12: INPUT DC:IF (DC < 0)THEN DC = DC0

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5770     LOCATE 47, 14: INPUT FILTERPOS:IF (FILTERPOS=0)THEN FILTERPOS=FILTERPOS0
5780     LOCATE 42, 16: INPUT SETDELAY:IF (SETDELAY=0)THEN SETDELAY=SETDELAY0
5790         RETURN
5810 ***** END Set Parameter *****/
5820 '
5840 /****** Save Data *****/
5860 *SAVESET:
5870 OPEN "a:CPM.ini" AS #1
5880     PRINT #1, DC
5890     PRINT #1, SETDELAY
5900     PRINT #1, FILTERPOS
5910 CLOSE #1
5920 RETURN
5940 *SFILE: CLS 1
5950     DATAOK=PLOK+CPMOK+PHOTONSOK
5960     IF (DATAOK = 0) THEN LOCATE 32,15:PRINT ERROR3$:RETURN
5970     GOSUB *OFFKEY
5980     VIEW (160, 120)-(490, 360), 0, 4
5990     LOCATE 32, 9: PRINT " Save File "
6010     LOCATE 29, 12: PRINT "Path name b: "
6040     DIR$ = "b:*.cpm"
6050     VIEW (200, 180)-(450, 220), 0, 4
6060     LOCATE 29, 12: PRINT "File name "
6070     LOCATE 44, 12: INPUT F$
6080     IF F$ = "" THEN GOTO *SFILE
6090     OPEN DV$ + F$ + DFEXT$ AS #1
6100     IF LOF(1) > 0 THEN GOSUB *WILLSAVE
6110     GOSUB *GETSENSE
6120     GOSUB *SFILE4
6130 RETURN
6160 *WILLSAVE:
6170     LOCATE 27, 12: INPUT "File already exist, overwrite "; OV$
6180     IF (OV$ = "Y") OR (OV$ = "y") THEN RETURN
6190     CLOSE #1:GOTO *SFILE
6230 *SFILE4: GOSUB *PLDATA
6240     GOSUB *CPMDATA
6250     GOSUB *PHOTONSDATA
6260     PRINT #1, IPSET
6270     PRINT #1, WMIN
6280     PRINT #1, WMAX
6290     PRINT #1, WVVAL
6300     PRINT #1, WTOT
6310     FOR I = 1 TO WTOT

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6320     PRINT #1, VPL(I)
6330     PRINT #1, VCPM(I)
6340     PRINT #1, IPH(I)
6350     PRINT #1, VPHOTONS(I)
6360     NEXT I
6370  CLOSE #1
6380     VIEW (1, 120)-(150, 360), 0, 0  /* Clear Screen */
6390     GOSUB *ONKEY
6400     VIEW (1, 1)-(638, 398), 0, 0  /* Clear Screen */
6410 RETURN
6440 *GETSENSE:
6450     SEL = 0: SCALE$ = "uV"
6460     PRINT
6470     LOCATE 24, 16: PRINT "Please select the sensitivity"
6480     LOCATE 0, 9
6490     VIEW (1, 120)-(150, 360), 0, 4
6500     PRINT "1 : 1 microvolt"
6510     PRINT "2 : 2.5 microvolt"
6520     PRINT "3 : 10 microvolt"
6530     PRINT "4 : 25 microvolt"
6540     PRINT "5 : 100 microvolt"
6550     PRINT "6 : 250 microvolt"
6560     PRINT "7 : 1 millivolt"
6570     PRINT "8 : 2.5 millivolt"
6580     PRINT "9 : 10 millivolt"
6590     PRINT "10 : 25 millivolt"
6600     PRINT "11 : 100 millivolt"
6610     PRINT "12 : 250 millivolt"
6620 *GETS1:
6630     LOCATE 24, 18: INPUT "Select : ", SEL
6640     IF (SEL < 1) OR (SEL > 12) THEN GOTO *GETS1
6650     IF (SEL > 6) THEN SCALE$ = "mV": SEL = SEL - 6
6660     RESTORE *GETSDATA
6670     FOR I = 1 TO SEL
6680         READ SENSE
6690     NEXT I
6700     LOCATE 24, 18: PRINT "Sensitivity : "; SENSE; SCALE$; "..OK"
6710     IF (SEL < 6) THEN SENSE = SENSE /1000
6720     IF (MESURE$="PL") THEN PLSENSE = SENSE
6730     IF (MESURE$="CPM") THEN CPMSENSE = SENSE
6740     IF (MESURE$="PHOTONS") THEN PHOTONSENSE = SENSE
6750     RETURN
6760 *GETSDATA:

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```

6770 DATA 1.0
6780 DATA 2.5
6790 DATA 10.0
6800 DATA 25.0
6810 DATA 100.0
6820 DATA 250.0
6850 *PLDATA:
6860 IF(PLOK =0) THEN GOTO *PLC0
6870 IF (PLCOMMENTS$="") THEN LOCATE 24,14 :INPUT "I-ph Comment:",PLCOMMENTS
6880 *PLC0: PRINT #1,PLOK
6890 PRINT #1,PLDATES
6900 PRINT #1,STARTPL$
6910 PRINT #1,STOPPL$
6920 PRINT #1,PLSENSE
6930 PRINT #1,VPLMIN
6940 PRINT #1,VPLMAX
6950 PRINT #1,PLCOMMENTS$
6960 RETURN
6980 *CPMDATA:
6990 IF (CPMOK=0) THEN GOTO *CPMC0
7000 IF (CPMCOMMENTS$="") THEN LOCATE 24,14 :INPUT "CPM Comment:",CPMCOMMENTS
7010 *CPMC0: PRINT #1,CPMOK
7020 PRINT #1,CPMDATES$
7030 PRINT #1,STARTCPM$
7040 PRINT #1,STOPCPM$
7050 PRINT #1,CPMSENSE
7060 PRINT #1,VCPMMAX
7070 PRINT #1,CPMCOMMENTS$
7080 RETURN
7100 *PHOTONSDATA:
7110 IF (PHOTONSOK=0) THEN GOTO *PHOTONSC0
7120 IF (PHOTONSCOMMENTS$="") THEN LOCATE 24,14 :INPUT "Photons Comment:",PHOTONSCOMMENTS$
7130 *PHOTONSC0: PRINT #1,PHOTONSOK
7140 PRINT #1,PHOTONSDATES$
7150 PRINT #1,STARTPHOTONSS$
7160 PRINT #1,STOPPHOTONSS$
7170 PRINT #1,PHOTONSENSE
7180 PRINT #1,VPHOTONSMAX
7190 PRINT #1,PHOTONSCOMMENTS$
7200 RETURN
7210 /****** Load Data *****/
7220 *LFILE: CLS 1
7250 DV$ = "B:": DFEXT$ = ".cpm"

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```

7260 VIEW (160, 120)-(490, 360), 0, 3
7270 COLOR 7
7280 LOCATE 31, 9: PRINT " Load file "
7290 LOCATE 29, 12: PRINT "Path name "; DV$
7320 DIR$ = DV$ + "*.cpm"
7330 LOCATE 0, 0: COLOR 5: FILES DIR$
7340 VIEW (200, 240)-(450, 280), 0, 4
7350 LOCATE 29, 16: INPUT "File name : ", F$
7360 IF F$ = "" THEN GOTO *LFILE
7370 OPEN DV$ + F$ + DFEXT$ FOR INPUT AS #1
7380 GOSUB *PLDATAIN
7390 GOSUB *CPMDATAIN
7400 GOSUB *PHOTONSDATAIN
7410 INPUT #1, IPSET
7420 INPUT #1, WMIN
7430 INPUT #1, WMAX
7440 INPUT #1, WVAL
7450 INPUT #1, WTOT
7460 FOR I = 1 TO WTOT
7470 INPUT #1, VPL(I)
7480 INPUT #1, VCPM(I)
7490 INPUT #1, IPH(I)
7500 INPUT #1, VPHOTONS(I)
7510 T(I) = WMIN + WVAL * (I - 1)
7520 NEXT I
7530 CLOSE #1
7540 RETURN
7570 *PLDATAIN :
7580 INPUT #1, PLOK
7590 INPUT #1, PLDATES
7600 INPUT #1, STARTPL$
7610 INPUT #1, STOPPL$
7620 INPUT #1, PLSENSE
7630 INPUT #1, VPLMIN
7640 INPUT #1, VPLMAX
7650 INPUT #1, PLCOMMENTS
7660 RETURN
7670
7680 *CPMDATAIN :
7690 INPUT #1, CPMOK
7700 INPUT #1, CPMDATES
7710 INPUT #1, STARTCPMS
7720 INPUT #1, STOPCPMS

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```

7730     INPUT #1,CPMSENSE
7740     INPUT #1,VCPMMAX
7750     INPUT #1,CPMCOMMENT$
7760     RETURN
7770 '
7780     *PHOTONSDATAIN:
7790     INPUT #1,PHOTONSOK
7800     INPUT #1,PHOTONSDATES
7810     INPUT #1,STARTPHOTONS$
7820     INPUT #1,STOPPHOTONS$
7830     INPUT #1,PHOTONSENSE
7840     INPUT #1,VPHOTONSMAX
7850     INPUT #1,PHOTONS COMMENTS
7860     RETURN
7870 '
7890     *LOADPLOT :GOSUB *CLSSCR: GOSUB *MONSCR1
7900         ZOOM=0:FMAX=SCALEMAX
7910         FOR I = 1 TO WTOT
7920             YPLOT = TMP(I)
7930             GOSUB *PDATA
7940             NEXT I
7950             TDEL=I:GOSUB *TDELAY
7960     RETURN
7980 ***** END Load Data *****/
8020 /****** Print Data *****/
8030 *LPDATA0: GOSUB *LPDATA2
8040     J = 1 : NLINE = 40
8050 *REPRINT:
8060 LPRINT "No";STRING$(29," ");"WAVELENGTH";STRING$(27," ");HEAD$;SCALES
8070     GOSUB *LPAGE :NLINE=50
8080     GOTO *REPRINT
8090 RETURN
8110 *LPDATA1:
8120     VIEW(1,1)-(638,398),0,7
8130     GOSUB *MONSCR1
8140     GOSUB *PFILE
8150     VIEW(1,305)-(638,398),0,0
8160     GOSUB *LPDATA2: COPY 3 :LPRINT CHR$(12)
8170 RETURN
8180 *LPDATA2: LOCATE 1,20 :PRINT "   "
8190     LOCATE 1,22 :PRINT "   "
8200     LOCATE 69,20:PRINT "   "
8210 IF(MESURE$="I-ph") THEN GOSUB *PRINTIPH

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8220 IF(MESURE$="CPM") THEN GOSUB *PRINTCPM
8230 IF(MESURE$="PHOTONS") THEN GOSUB *PRINTPHOTONS
8240 LPRINT MESURE$;" measurement "
8250 LPRINT "Date "; DATES
8260 LPRINT "Measuring Time from "; STARTTIMES; " to "; STOPTIMES
8270 LPRINT "File Data "; F$; ".cpm"
8280 LPRINT "Comment "; COMMENTS$
8290 LPRINT "Conditions "
8300 LPRINT " step "; WVAL;" nm"
8310 LPRINT "I ph Constant "; IPSET;" nA"
8320 RETURN
8340 *PRINTIPH : DATES = PLDATES : COMMENTS$=PLCOMMENTS$:HEAD$="Photocurrent"
8350 IPSET=0
8360 STARTTIMES$=STARTPL$:STOPTIMES$=STOPPL$:SCALES$="(nA)"
8370 RETURN
8390 *PRINTCPM : DATES =CPMDATES : COMMENTS$=CPMCOMMENTS$:HEAD$="Lamp Voltage"
8400 STARTTIMES$=STARTCPM$:STOPTIMES$=STOPCPM$:SCALES$="(Volt)"
8410 RETURN
8420 *PRINTPHOTONS :
8430 DATES = PHOTONSDATES : COMMENTS$=PHOTONSCOMMENTS$
8440 HEAD$="Thermopile Voltage"
8450 STARTTIMES$=STARTPHOTONSS$:STOPTIMES$=STOPPHOTONSS$
8460 SCALES$="(Volt)"
8470 RETURN
8480 '
8490 *LPAGE:
8500 FOR I = 1 TO NLINE
8510 IF (I >= 10) THEN SPACE1 = 29:GOSUB *PRINT1
8520 IF (I < 10) THEN SPACE1 = 30:GOSUB *PRINT1
8530 J = J+1 : IF J > WTOT THEN LPRINT CHR$(12):RETURN *MENU1
8540 NEXT I
8550 LPRINT CHR$(12)
8560 RETURN
8570 '***** END Print Data *****/
8590 *PRINT1: LPRINT J;STRING$(SPACE1," ");T(J);STRING$(30," ");TMP(J):RETURN
8610 '/***** INITIAL DATA *****/
8620 *DATASET:
8640 DIM T(5001), VPL(5001), IPH(5001), TMP(5001),VPHOTONS(5001),VCPM(5001)
8650 DIM INFTMP(15000!)
8660 WMIN = 600:WMAX = 1400:WVAL = 10
8670 WTOT = 0
8680 SENSE = PLSENSE = PHOTONSENSE = 1 ' default SENSE 1 mV /TEMPO
8690 VPLMIN = 1E+30

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8700 DV$ = "b:"          ' DATA FILES DIRECTORY
8710 DFEXT$ = ".cpm"      ' Data file extension
8720 MVPSET = 20         '70 nA
8730 GAIN = .2
8740 ERROR1$ = "Process Terminated .. Lamp Over Load or TR6162 Over Range"
8750 ERROR2$ = "Press F1 to Quit Mesuring "
8760 ERROR3$ = "No Data To Save .."
8770 STOP1$ = "Please Insert Filter"
8780 STOP2$ = "Press ENTER To Continue"
8790 VER$ = "CPM Measurement"
8800 OPEN "a:cpin.ini" FOR INPUT AS #1
8810     INPUT #1, DC
8820     INPUT #1, SETDELAY
8830     INPUT #1, FILTERPOS
8840 CLOSE #1
8850 RETURN
8870 ' ***** END INITIAL DATA *****/
8880 '
8900 ' /****** INITIAL SET DEV *****/
8920 *DEVICESET.
8930 ISET IFC: ISET REN: CMD DEL IM = 0
8940 PRINT @DM6847;"F1 R0 NLO M0 COG PR3 PH0"
8950 PRINT @TR6162;"DI(F01.4-5.9,D0,L<10>,DE1s)"
8960 PRINT @TR6162;"CS"
8970 PRINT @TR6143;"V6 D+0 V D+500 MA E"  /* Bias 110 Volt*/
8980 RETURN
9000 ' ***** END SET DEV *****/
9030 *BEEPLOOP: LOCATE 27,15 :PRINT STOP0$.
9040     GOSUB *ONKEY
9050     *WAITBEEP :BEEP:GOTO *WAITBEEP
9070 *PAUSE : LOCATE 27, 15: PRINT STOP0$.
9080     LOCATE 53, 15: INPUT PROMPT
9090     LOCATE 27, 13: PRINT "          "
9100     LOCATE 27, 15: PRINT "          "
9110 RETURN
9140 *TDELAY: /* Avilable When TDEL <= 59 Sec */
9150     TREF = VAL(MID$(TIMES$, 7, 2))
9160 *TIME1:
9170     TNOW = VAL(MID$(TIMES$, 7, 2)): A = TNOW - TREF
9180     IF (A < 0) THEN A = A + 60
9190     IF A < TDEL THEN GOTO *TIME1
9200 RETURN
9220 *ONKEY :

```

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9230     ON KEY GOSUB *MENU9,,,,,,,,,*MENU9:KEY(1) ON
9240     RETURN
9250 *OFFKEY : KEY(1) OFF
9260     RETURN
9280 *BACK:RETURN
9290 *ONKEYALL :
9300     RETURN
9340 *CLSSCR
9350 VIEW (0,0)-(639,399),0,0:CLS 1
9360 RETURN
9380 *RDATA:  TOTAL = 0:NUMBERS = 8
9390     TDEL = SETDELAY : GOSUB *TDELAY
9400     FOR J = 1 TO NUMBERS
9410         TDEL = 1:GOSUB *TDELAY
9420         INPUT @DM6847; PLVOLTS
9430         TOTAL = TOTAL + VAL(PLVOLTS)
9440     NEXT J
9450         PVOLT = TOTAL / NUMBERS
9460     IF (MESURES="CPM") THEN GOSUB *PLOTVPH
9470 RETURN
9500 *PDATA:
9510     VIEW (50, 50)-(550, 300)
9520     X% = ((T(I) - WMIN) * 500) / (WMAX - WMIN)
9530     Y% = 250 * (1 - (YPLOT/ SCALEMAX) )
9540     PSET (X%, Y%), 7: CIRCLE (X%, Y%), 1, 6
9550     IF I > 1 THEN LINE (X1%, Y1%)-(X%,Y%), 7 :CIRCLE(X1%,Y1%),1,0
9560     X1% = X%: Y1% = Y%
9570 RETURN
9600 *INITSET :
9610     WTOT = ABS(INT((WMAX - WMIN) / WVAL)) + 1
9620     IF WTOT > 5001 THEN WTOT = 5001
9630     FOR I = 1 TO WTOT
9640         T(I) = WMIN + WVAL * (I - 1)
9650     NEXT I
9660     WMAX = T(WTOT)
9670 RETURN
9700 *CHNGPTN :
9710     FORD =(PVOLT*1000 - IPSET)      /* IPSET(nA)
9720     IF ABS(FORD) < 5 THEN AGAIN = 0:RETURN /* abs Error < 5 nA */
9730     AGAIN = 1:NLOOP = NLOOP +1
9740     IF ABS(FORD) > 150 THEN INC = 1
9750     IF ABS(FORD) <= 100 THEN INC = .5
9760     IF ABS(FORD) <= 80 THEN INC = .4

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9770     IF ABS(FORD) <= 60 THEN INC = .35
9780     IF ABS(FORD) <= 50 THEN INC = .3
9790     IF ABS(FORD) <= 35 THEN INC = .25
9800     IF ABS(FORD) <= 30 THEN INC = .2
9810     IF ABS(FORD) <= 25 THEN INC = .15
9820     IF ABS(FORD) <= 20 THEN INC = .1
9830     IF ABS(FORD) <= 15 THEN INC = .08
9840     IF ABS(FORD) <= 10 THEN INC = .05
9850     IF FORD > 0 THEN INC = - INC
9860     LOCATE 59,1:PRINT "adjust: ";NLOOP;" = "
9870     LOCATE 67,1:PRINT USING "###.###";INC
9880     LOCATE 73,1:PRINT "V"
9890     GOSUB *CHVOLT
9900 RETURN
9920 *CHVOLT :
9930     V6162 = V6162 + INC
9940 IF V6162 > 10 THEN V6162 = V6162 - INC
9950 IF V6162 < 0 THEN V6162 = V6162 - INC
9960     LOCATE 70,9:PRINT"Lamp Now"
9970     LOCATE 71,10:PRINT USING "###.###";V6162
9980     LOCATE 77,10:PRINT "V"
9990     PRINT @TR6162;"DI(F01.4-5.9,D"+STRS(V6162)+",L<10>,DE1s)"
10000 RETURN
10030 *POSITION :
10040     VIEW (560, 210)-(630, 240), 0, 1
10050     COLOR 7
10060     LOCATE 71, 13: PRINT USING "#####.###"; P
10070     LOCATE 71, 14: PRINT "(nm)"
10080 RETURN
10110 *PLOTVPH:
10130     PLOTV = PVOLT*1000 - IPSET
10140     VIEW (50, 338)-(550, 398)
10150     X% = (T(I) - WMIN) / (WMAX - WMIN) * 500
10160     Y% = 30 * (1 - (PVOLT*1000/IPSET))+30
10170     CIRCLE (X%,Y%),2,4
10180     LOCATE 71,22:PRINT USING "#####.###";PVOLT*1000
10190     LOCATE 73,23:PRINT"nA"
10200     IF AGAIN = 1 THEN CIRCLE (X0%, Y0%), 2, 0
10210     X0%=X% : Y0%=Y%
10220 RETURN
10250 *PFILE: GOSUB *MONSCRI
10260     FOR I = 1 TO WTOT
10270     YPLOT = TMP(I)

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10280     GOSUB *PDATA
10290     NEXT I
10300 RETURN
10310 '
10320 '
10330 *ZOOM:
10340     SCALEMAX = FMAX *(1+GAIN*ZOOM)
10350     IF ( SCALEMAX<=0) THEN ZOOM = 0 :GOTO *ZOOM
10370     GOSUB *PFILE
10380 RETURN
10410 *CHECKFILTER:
10420     IF(T(I) > FILTERPOS) THEN GOSUB *OPTION3:FILTEROK =1
10430 RETURN
10450 '----- Initialize procedure -----'
10460 '           for           '
10470 '     JOBIN YVON DATA LINK with HR 320     '
10480 '-----'
10490 '
10500 ' by     Suwat Sopitpan
10510 ' date   5 January,1994
10520 '
10530 '-----'
10540 *ENTRANCE
10550 OPEN "com:N81NS128" AS #DL
10560 CLS 3: COLOR 6
10570 PRINT "THE MONOCHROMATOR SYSTEM BEING INITIATED ; PLEASE WAIT..."
10580 TDEL = 3 : GOSUB *TDELAY : COLOR 3
10590 *PHASE1
10600 PRINT #DL,CHR$(32);           : GOSUB *TDELAY
10610 IF LOC(DL) = 0 THEN *PHASE1
10620 *PHASE2
10630 IF LOC(DL) > 1 THEN *PHASE3
10640 SS = INPUT$(LOC(DL), DL): PRINT "**";
10650 IF SS = "F" THEN *PASS ELSE *NOTPASS
10660 '-----
10670 SS = INPUT$(LOC(DL), DL): PRINT "**";
10680 *PHASE3
10690 FOR N = 1 TO 4
10700 PRINT #DL,CHR$(13);           : GOSUB *TDELAY
10710 IF LOC(DL) = 0 THEN *PHASE3
10720 SS = INPUT$(LOC(DL), DL): PRINT "**";
10730 NEXT N
10740 PRINT #DL,CHR$(248);           : GOSUB *TDELAY

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10750 PRINT #DL,CHR$(222);           : GOSUB *TDELAY
10760 IF LOC(DL) = 0 THEN *PHASE3
10770 $$ = INPUT$(LOC(DL), DL); PRINT "**";
10780 IF $$ <> "b" THEN *NOTPASS
10790 PRINT #DL,CHR$(32);           : GOSUB *TDELAY
10800 IF LOC(DL) = 0 THEN *PHASE3
10810 $$ = INPUT$(LOC(DL), DL); PRINT "**";
10820 IF $$ = "bF" THEN *PASS
10830 *NOTPASS
10840 COLOR 5
10850 PRINT "INITIALIZE FAIL !!!"
10860 GOTO *EXIT
10870 *PASS
10880 COLOR 5
10890 PRINT
10900 PRINT "INITIALIZE OK. YOU CAN CONTROL THE MONOCHROMATOR"
10910 PRINT "-----"
10920 PRINT : COLOR 3
10930 GOSUB *CALIBRATE
10940 RETURN
10950 *EXIT
10960 CLOSE #DL
10970 END
10980 *WAITTING
10990 FOR DD = 1 TO DELAY
11000 NEXT DD
11010 RETURN
11020 *CALIBRATE
11030 PRINT "PLEASE KEY THE WAVELENGTH ON HR 320 [nm] : ";
11040 *CALB1
11050 GOSUB *SETPOS
11060 *CALB2
11070 IF LOC(DL) = 0 THEN *CALB2
11080 $$ = INPUT$(LOC(DL),DL)
11090 IF $$ <> "o" THEN *CALB1
11100 RETURN
11110 '-----
11120 ' HR 320 Service subroutines.
11130 '-----
11140 '*moveto   : goto any position
11150 '*askpos   : ask for the actual position
11160 '*setpos   : set the position
11170 '

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11180 '
11190 '-----
11200 *MOVETO
11210 '
11220 *MOVETO1
11230 GOSUB *BUSY : GOSUB *ASKPOS
11240 P1 = P1 * 200: P = P * 200
11250 IF P1 > P THEN SIGN$ = "+" ELSE SIGN$ = "-"
11260 PULSE$ = STR$(ABS(P - P1))
11270 PULSE$ = RIGHT$(PULSE$, LEN(PULSE$) - 1)
11280 GOSUB *MOVE : GOSUB *BUSY : GOSUB *ASKPOS
11300 RETURN
11310 '-----
11320 *CLEARBUFF
11330 IF LOC(DL) = 0 THEN RETURN
11340 A$ = INPUT$(LOC(DL), DL)
11350 RETURN
11360 '----- SUBROUTINE ASK for POSITION -----'
11370 *ASKPOS
11380 P$ = ""
11390 *AP2
11400 PRINT #DL, "H0" + CHR$(13);
11410 *AP3
11420 IF LOC(DL)=0 THEN *AP3
11430 A$ = INPUT$(1, DL)
11440 IF A$= "o" THEN *AP4 ELSE GOSUB *CLEARBUFF
11450 GOTO *AP2
11460 *AP4
11470 A$ = INPUT$(1, DL)
11480 IF A$=CHR$(13) THEN *AP5 ELSE *AP6
11490 *AP5
11500 P = VAL(P$)
11510 P = P / 200 ' return value in nanometer
11520 '
11530 RETURN
11540 *AP6
11550 P$ = P$ + A$
11560 GOTO *AP4
11570 '-----
11580 *SETPOS
11590 INPUT " ", W
11600 INPUT W
11610 W = INT(W * 200)

```

```

11620 W$ = STR$(W)
11630 PRINT #DL, "G0," + W$ + CHR$(13);
11640 RETURN
11650 '----- SUBROUTINE MOTOR BUSY ? -----
11660 *BUSY
11670 PRINT #DL, "E";
11680 *BUSY1
11690 IF LOC(DL)=0 THEN *BUSY1
11700 A$ = INPUT$(1, DL)
11710 IF A$="o" THEN *BUSY2 ELSE GOSUB *CLEARBUFF
11720 GOTO *BUSY
11730 *BUSY2
11740 A$ = INPUT$(1, DL)
11750 IF A$ < "z" THEN GOSUB *CLEARBUFF ELSE RETURN
11760 GOTO *BUSY
11770 '----- SUBROUTINE MOVE RELATIVE -----
11780 *MOVE
11790 PRINT #DL, "F0," + SIGN$ + PULSES + CHR$(13);
11800 *MOVE1
11810 IF LOC(DL) = 0 THEN *MOVE1
11820 A$ = INPUT$(1, DL)
11830 IF A$ < "o" THEN GOSUB *CLEARBUFF ELSE RETURN
11840 GOTO *MOVE
11850 '-----
11860 *STOPMOTOR
11870 *STOP1
11880 PRINT #DL, "L"; : TDEL = 1 : GOSUB *TDELAY
11890 *STOP2
11900 IF LOC(DL) = 0 THEN *STOP2
11910 A$ = INPUT$(1, DL)
11920 IF A$ < "o" THEN GOSUB *CLEARBUFF ELSE *STOP3
11930 GOTO *STOP1
11940 *STOP3
11950 GOSUB *POSITION : RETURN
11960 '-----

```

ประวัติผู้วิจัย

นาย เกรียงไกร จิรกวีกุล เกิดเมื่อวันที่ 23 กรกฎาคม พ.ศ. 2518 ที่ตำบลบางคอแหลม จังหวัดกรุงเทพมหานคร สำเร็จการศึกษาชั้นมัธยมศึกษาตอนปลายจากโรงเรียนเตรียมอุดมศึกษา สำเร็จการศึกษาปริญญาตรี วิศวกรรมศาสตรบัณฑิต จากภาควิชาวิศวกรรมไฟฟ้า คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ในปีการศึกษา 2538 และเข้าศึกษาต่อในหลักสูตร วิศวกรรมศาสตรมหาบัณฑิต สาขาสิ่งประดิษฐ์สารกึ่งตัวนำ ภาควิชาวิศวกรรมไฟฟ้า คณะ วิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2539