

MORE ABOUT THE P-GRAM PLUS CARD

(Written for the Swedish user group PROGRAMBITEN 92-3)

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I have bought a P-GRAM+ with clock from Bud Mills Services. The price was 230 \$ and 5 \$ postage. The extra postage to Europe is really 5 dollars because it is sent as "SMALL PACKET". You should read the review by Charles Good in PB 92-2 (reprinted from BITS,BYTES&PIXELS January 1992). The price is lower now after that article was written. I will only describe things that was not mentioned in the previous article.

The P-GRAM+ comes with an Operating Guide of 37 pages and a Construction Guide of 13 pages. You will also get five disks: PG+DSR+, P-G_UTILS, PG+SOURCE, GUMS V1 and MODULES.

The P-GRAM+ cannot be used together with "Quality Improvement" consoles which was made by TI to prevent the use of other than TI's own modules. All old consoles with silver and black colour with the copyright 1981 at the colour bars can be used.

P-GRAM+ is a card which is put into the expansion box. You can choose 7 different CRU addresses: >1000, >1200 - >1700. CRU >1700 is usually recommended because there is no advantage with a low number. The card has 192 kbytes RAM divided in 16 kbytes DSR RAM, 16 kbytes module RAM, and 4x40 kbytes GRAM. There is one 1 Mbit (128 kbytes) static RAM (NEC D431000ACZ-85L) and two 256 kbit (32 kbytes) static RAM. A lithium battery will keep the memory when the box is turned off.

You can put a module in TI-99/4A's module port also when the P-GRAM+ is active. The P-GRAM+ will then disable itself so the external module will be used. You can save that module to disk if you write CALL PG from BASIC. It is possible to save the GROMs with 34 or 26 sectors. The P-GRAM+ have the same file format as GRAM Kracker (FILENAME, FILENAME1, FILENAME2 etc.). The P-GRAM+ will save a 10 character file name by incrementing the last character (MYCARTFILE, MYCARTFILF, MYCARTFILG etc.) but the GRAM Kracker will replace it with an "1" (MYCARTFILE, MYCARTFIL1, MYCARTFIL2 etc.). The P-GRAM+ cannot load GRAM Kracker's 10 character file name but a shorter file name works. You can always change the file name with a disk manager so it is possible to load.

All memory is controlled by CRU bits so you do not need any manual switches which is needed for GRAM Kracker. These CRU bits are unique for just the P-GRAM+ and cannot be used by other GRAM equipments. You can control the following with the CRU bits:

- activate DSR
- activate GRAM/RAM
- write protect P-GRAM
- activate bank switch of RAM >6000
- activate the low part of RAM >6000
- activate the high part of RAM >6000

EDITOR/ASSEMBLER MODULE

You can use module RAM together with Editor/Assembler by setting a special flag: g>6003 to >A5.

The change of colours in the EA module is not completely described in the P-GRAM+ manual. You must do the change in three different places:

- g>652C character colours, foreground and background in Graphic1.
- g>6537 screen colour a short period before the main menu and for the Editor.
- g>6B3D screen colour for the main menu.

These three addresses have the value >F5 from start. I changed to >F4 to get white text on dark blue background.

You can also change the default colours for LOAD and RUN of assembly programs.

- g>653C character colours, foreground and background in Graphic1 (usually >13, black on light green).
- g>6547 screen colour (usually >F3, light green screen).

OTHER MODULES WITH PROBLEM

Multiplan can usually only use GRAM bank 1. The file MPINTR has absolute addresses to GROM. You get a patch program which make it possible to run also from GRAM bank 2-4, but after the patch you can only use the particular GRAM bank you made the patching to.

Personal Record Keeping and Statistics can only run from GRAM bank 1. Personal Report Generator will not show with Review Module Library but is shown by GMENU and can then be run from any GRAM bank 1-4. This module uses GROM 3 and 4 but have strangely its header on GROM 4.

PROGRAMS ON THE DISKS

GMENU by R.A.Green is a menu program which shows all GRAM banks at the same time so you do not need to step through these. It starts automatically at reset of the computer. It works good from all GRAM banks and not only bank 1 as is stated in the manual.

GRAM Packer is NOT on the disks but there is a P-PACKER file that unprotects the P-GRAM+ write protection and must run before GRAM Packer. DM1000 comes as a packed example to GRAM 3 and 4. You also get a modified CALL file because the original does not work with RAM disk. Bud Mills Services sells GRAM Packer separate for 10 dollars.

BOOT is on one of the disks. It shows the clock on the screen all

the time. It does not work with G to see other GRAM banks. My computer will get a faulty screen with white stripes. I suspect that the problem is due to my DIJIT AVPC 80 column card because I have had problems also without the P-GRAM+.

You also get Gram User Menu System (GUMS) and Debugging Aid (RAGDBAE) which are fairware from R.A.Green.

MULTIMOD contains Disk Manager III (DM2 with DSK1-9 but only from CRU >1000 and CRU >1100), Editor/Assembler and TI-Writer. The two last ones do not have the external files to load from the disk.

MYARC HFDC

I have stored all my files on my hard disk under the subdirectory WDS1.GRAM. Myarc MDM5 for HFDC does not work together with the P-GRAM+. You get a patch for DM V version 1.27 but this cannot be used for any of the other version that I have. Does someone have patches for other versions such as 1.30? I can load MDM5 in the following way:

- SHIFT/CTRL at reset will start the AVPC in 99/4A mode.
- Choose BASIC.
- CALL PGOFF will disable the P-GRAM+.
- CALL FW will load Funnelweb from Horizon RAM disk.
- load WDS1.MYARC.MDM5.

P-GRAM+ has a clock which has a battery so it will work also when the expansion box is turned off. Myarc HFDC has a clock without a battery so it must be set every time the box is turned on. This clock is used to time stamp when a file was created or changed. The following short BASIC program will read from the P-GRAM+ clock and write to the HFDC clock.

```
100 REM P-GRAM CLOCK TO HFDC TIME
110 REM Jan Alexandersson
120 REM 1992-07-05
130 REM READ P-GRAM CLOCK
140 OPEN #1:"CLOCK"
150 INPUT #1:A$,DATE$,TIME$
160 CLOSE #1
170 MONTH$=SEG$(DATE$,1,2)
180 DAY$=SEG$(DATE$,4,2)
190 YEAR$=SEG$(DATE$,7,2)
200 HOUR$=SEG$(TIME$,1,2)
210 MIN$=SEG$(TIME$,4,2)
220 SEC$=SEG$(TIME$,7,2)
230 REM WRITE HFDC TIME
240 OPEN #2:"TIME",INTERNAL,FIXED
250 PRINT #2:SEC$,MIN$,HOUR$,DAY$,MONTH$,YEAR$
260 CLOSE #2
```

HARDWARE MODIFICATION

There is a new modification of the P-GRAM and RAM disk from June 1992. P-GRAM change #1 (Horizon RAMDISK Change #4) will mount a diode (1N914) at one of the LEDs.

THE P-GRAM+ BOARD

(Written for the Swedish user group PROGRAMBITEN 92-4)

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I have discovered two more problems with my P-GRAM+ card.

The Mini Memory module is saved with >A5 as a mark for writable RAM to the RAM 09 file but the loader expect that to be in the GROM 3 file. You can add this with P-GRAM+'s own memory editor and then save to disk and load again.

GRAM Packer will not work with my P-GRAM+ also when I use the P-PACKER file. It looks like the access to the floppy disk will set the write protect in P-GRAM+ due to my DIJIT AVPC.

P-GRAM AND P-GRAM+

(Written for the Swedish user group PROGRAMBITEN 93-2)

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P-GRAM with 72 kbytes from Sept 1988 has always cost 200 \$ built.
P-GRAM+ with 192 kbytes which came in Nov 1989 has cost built
with clock:

Nov 1989	300 \$
Apr 1990	290 \$
Nov 1990	280 \$
Jul 1991	250 \$
Mar 1992	230 \$

READ THE CLOCK FROM P-GRAM

You can read the clock in two different ways:

- As Corcomp with OPEN #1:"CLOCK" and INPUT #1:WEEK\$,DATE\$,TIME\$

- As MBP from CPU addresses:

```
c>8640 1/10000 (rounded to thousandth)
c>8642 hundredth
c>8644 second
c>8646 minute
c>8648 hour
c>864A day of week
c>864C day
c>864E month
```

```
100 REM READ PGRAM CLOCK1
130 REM READ AS CORCOMP CLK
140 OPEN #1:"CLOCK"
150 INPUT #1:W$,D$,T$
160 CLOSE #1
170 CALL CLEAR
180 PRINT "AS CORCOMP CLOCK"
: "DAY OF WEEK ";W$:"DATE ";D
$: "TIME ";T$: : : :
190 REM READ AS MBP CLOCK
200 DEF BD(X)=X-6*INT(X/16)
210 CALL PEEK(-31168,T,@,H,@
,A,@,B,@,C,@,D,@,E,@,F)
220 PRINT "AS MBP CLOCK"
230 PRINT "1/10000",BD(T)
240 PRINT "1/100",BD(H)
250 PRINT "SECOND",BD(A)
260 PRINT "MINUTE",BD(B)
270 PRINT "HOUR",BD(C)
280 PRINT "DAY OF WEEK",BD(D)
290 PRINT "DAY",BD(E)
300 PRINT "MONTH",BD(F)
```

You can read the clock into TI-Writer editor with Load File 0 1 1
CLOCK according to Charles Good with the following result:
0,01/03/93,19:19:16 (day of week, date, clock).

TO COMPARE TWO READINGS

You will sometimes get a faulty value if you read the clock on two occasions and calculate the difference. The cause of this is that you cannot read second, hundredth and 1/10000 exactly at the same time. The following program shows sometimes a deviation of ± 0.01 sec and more seldom ± 1 sec.

```

100 REM READ PGRAM CLOCK2
110 REM TIME DIFFERENCE
120 REM ERROR, NOT GOOD
150 DEF BD(X)=X-6*INT(X/16)
160 CALL PEEK(-31168,TA,@,HA,@,MA)
170 CALL PEEK(-31168,TB,@,HB,@,MB)
180 M1=BD(MA)
190 M2=BD(MB)
200 H1=BD(HA)
210 H2=BD(HB)
220 T1=BD(TA)
230 T2=BD(TB)
240 PRINT STR$(M1);TAB(4);ST
R$(H1);TAB(7);STR$(T1);
250 PRINT TAB(12);STR$(M2);T
AB(15);STR$(H2);TAB(18);STR$(T2);
260 PRINT TAB(22);M2+H2/100+
T2/10000-M1-H1/100-T1/10000
270 PRINT
280 GOTO 160

```

The following assembly program can be called from Extended Basic. It will read the clock twice and only choose the next value if the nearest smaller time unit is zero. The uncertainty in the reading is eliminated in this way.

```

*****
* Read P-GRAM Clock TWO times
* Convert BCD to decimal
* Compare and select reading
* for XB:
* CALL LINK("CLK",H,M,S,HUN,TUS)
* Jan Alexandersson, Sweden
* 1993-01-31
*****

```

```

DEF CLK

CIF EQU >0020
FAC EQU >834A
STATUS EQU >837C
NUMASG EQU >2008
XMLLNK EQU >2018
GPLWS EQU >83E0

WS BSS >20
BUF1 BSS 8
BUF2 BSS 8
BUF3 BSS 8

```

```

CLK      LWPI WS          load workspace

***** Initial values for read
LI      R4,BUF1  select buffer
LI      R0,2     read 2 times
LOOP2   LI      R3,>8648 hour address
LI      R1,5     read 5 values
***** Read clock value
LOOP1   CLR      R2
        MOVB    *R3,R2
        SWPB    R2
***** Convert BCD to decimal
MOV      R2,R6
SRL      R6,4     divide by 16
LI      R5,6
MPY      R5,R6    multiply by 6
S        R7,R2    subtract
***** Store value in buffer
        SWPB    R2
        MOVB    R2,*R4+
        DECT    R3      new clock addr.
        DEC     R1      next value
        JNE     LOOP1
***** Read second values
LI      R4,BUF2  select buffer
DEC     R0
JNE     LOOP2

***** Compare the 2 readings
LI      R1,4
LI      R3,BUF1  compare start
LI      R4,BUF1  read start
LI      R5,BUF2  read start
LI      R6,BUF3  write start
LOOP3   INC      R3
        MOVB    *R3,*R3  test if zero
        JNE     NEXT
        MOVB    *R5+,*R6+ store value
        INC     R4
        JMP     TEST
NEXT    MOVB    *R4+,*R6+ store value
        INC     R5
TEST    DEC     R1
        JNE     LOOP3
        MOVB    *R4,*R6  store 1/10000

***** Output values to Basic
LI      R1,1     first variable
LI      R6,BUF3  select buffer
LOOP4   CLR      R2
        MOVB    *R6+,R2  read value
        SWPB    R2
        MOV     R2,@FAC
        BLWP    @XMLLNK
        DATA   CIF      integer/floating
        CLR     R0      not an array
        BLWP    @NUMASG  value to Basic
        INC     R1      next variable

```

```

        CI    R1,6
        JNE   LOOP4

***** Return to Extended Basic
        CLR   R1
        MOVB  R1,@STATUS
        LWPI  GPLWS
        RT

        END

100 REM READ PGRAM CLOCK3
110 REM TIME DIFFERENCE
120 REM LINK WITH COMPARE
150 CALL INIT
160 CALL LOAD("DSK2.PG-CLK3/O")
170 CALL LINK("CLK",HOUR1,M1
,S1,H1,T1)
180 CALL LINK("CLK",HOUR2,M2
,S2,H2,T2)
190 PRINT STR$(S1);TAB(4);ST
R$(H1);TAB(7);STR$(T1);
200 PRINT TAB(12);STR$(S2);T
AB(15);STR$(H2);TAB(18);STR$(T2);
210 PRINT TAB(22);HOUR2*60*6
0+M2*60+S2+H2/100+T2/10000-H
OUR1*60*60-M1*60-S1-H1/100-T
1/10000
220 PRINT
230 GOTO 170

```

P-GRAM+ WITH 4 GRAM PAGES

P-GRAM+ can have 4 pages with GRAM. I have loaded:
 Page 1 Super-XB on R1-R2 + G3-G7
 Page 2 Personal Record Keeping G3-G6 + Funnelweb G7 + GMENU G3
 Page 3 Multimod G3-G6 (E/A + DM III + TIWR) + RAGDBAE G7
 Page 4 Multiplan G3-G7

Personal Record Keeping cannot load as a module because Basic must run from GRAM-page 1. It is possible to start Basic and then use CALLs from both Editor/Assembler and Personal Record Keeping in the same Basic program. All my own Basic programs for PRK run without any problems.

Funnelweb is only a loader for the FW file, placed on Horizon RAM disk, which make it easy to change the settings.

The four GRAM pages use different addresses to read data (GRMRD) and write address (GRMWA):

Page	GRMRD	GRMWA
1	>9800	>9C02
2	>9804	>9C06
3	>9808	>9C0A
4	>980C	>9C0E

REFERENCES

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Jun 86 p.39 Maximem, review
Aug 86 p.38 GPL Assembler, GPL Linker, TI Intern
Sep 86 p.26 GPL tutorial, McCormick
Sep 86 p.38 GRAM Karte, review
Sep 86 p.44 Add DM1000 to GRAM
Nov 86 p.26 General GRAM/RAM loader
Dec 86 p.31 Halt for GRAM Kracker
Dec 86 p.34 GRAM Packer, GK Utility
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Sep 88 p.38 Horizon releases P-GRAM
Dec 88 p.38 P-GRAM card, review
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May 90 p.40 P-GRAM PLUS card
Jun 90 p. 8 GRAM devices still out
Apr 91 p.28 Rich GKXB available
Jul 91 p.29 Multiplan 4.0 patches
May 92 p.25 OS/99 version 3, review
Sep 92 p.29 Rich RXB Extended Basic
Dec 92 p.21 Rich RXB and Gramulator
Dec 92 p.27 Compare XB-AL-GPL
Feb 93 p.06 OS 99's extendability
Feb 93 p.25 OS 99 V4 released

BITS,BYTES&PIXELS(Lima Ohio UG)

Dec 91 Chicago Fair: OPA POP-CART
Jan 92 The P-GRAM Plus with clock
Jan 92 PGRAM Clock utility software
Jan 92 Load File 0 1 1 CLOCK
Apr 92 GRAM User Menu System (GUMS)
Apr 92 Souped up supercarts