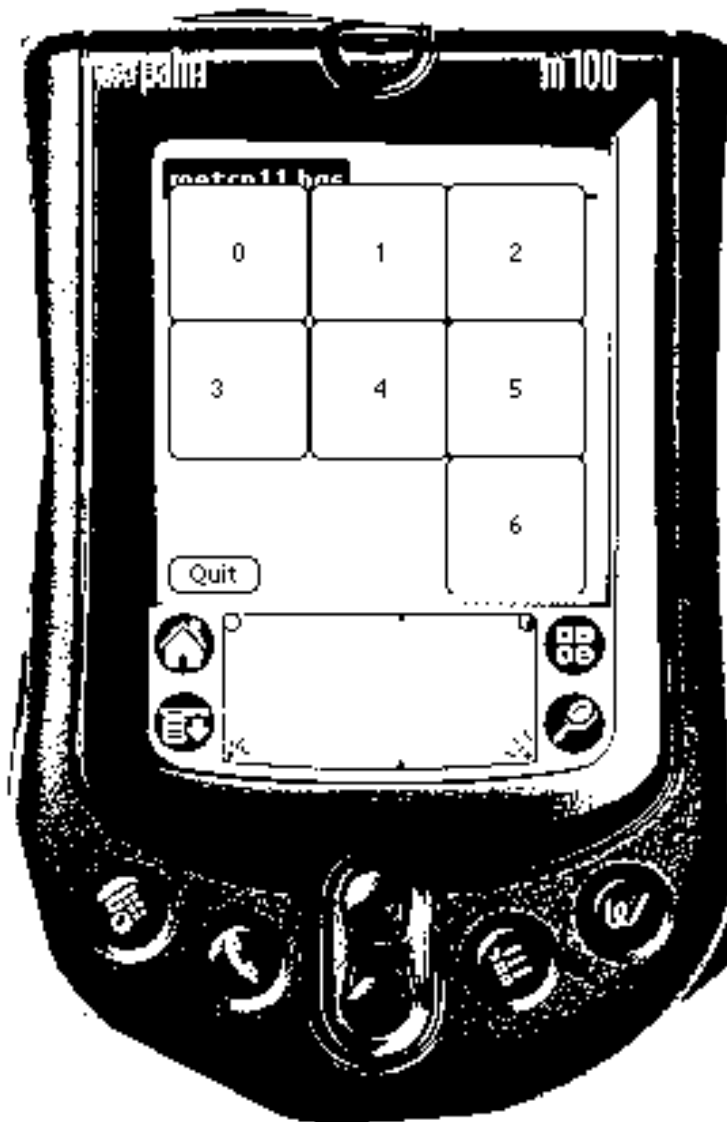


# *MeteorCount V. 2.x*

for the Palm® Handheld Computer



**Visual meteor counting in a digital age**

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supported by the Wagner Foundation

## Why counting meteors with a Handheld computer ?

Meteor observers normally record their counting data on paper rolls or on tape (1) Both techniques share the advantage of avoiding dead time. In analysing the data, tape recording have to be played back and transferred to a written list. This and the following data analysis can be a tedious, time consuming procedure, especially when several thousand meteor data of a meteor storm have been recorded. The analysis itself can be eased by computer programs like Meteor Companion or Visdat. However, since the original data do not come in a digital format, they have to be manually entered into a computer, another laborious step. This fact prevented that the maximal advantage could be taken from these programs.

It has been repeatedly suggested to enter the observations into a computer directly under the sky. For instance, a decade ago Molau (2) constructed a hand-box and linked it to the game port of a PC to enter magnitudes and stream associations. He provided software for data analysis. However this method never gained widespread popularity among observers mainly since micro tape recorders are so much more portable than desktop or even notebook PCs.

By now, a new breed of small computers has emerged, the so called handheld organisers. They are normally used as digital note- and address books or date managers. Data are entered through a touch-screen display or by hitting a small numbers of keys. Weighting less than a micro tape recorder, these devices can be synchronised ("hot-synced") with a desktop PC in order to get data from the organiser to the PC and vice-versa.

Palm handhelds are especially economical in terms of power consumption. On the 2001 Leonid expedition my Palm M100 ran for 2 ice-cold nights on one set of batteries (a 3rd night would have been possible, but I did not dare it).

I developed *MeteorCount* to record meteors directly under the skies in a simple digital format. The first test run came with the Lyrids 2001. When the Perseids came the same year, the software was more or less bug-free. Analysing the Palm data with Ivan Goethals excellent meteor data analysis package "Meteor Companion" I could submit the completely reduced data to the IMO only 10 minutes after returning home from the observing run.

The Leonid meteor storm of 2001 was another challenge. On the expedition to Korea the Palm M100 faithfully recorded more than 4000 meteors within about 4 hours. Again, analysing the data was a rapid and pleasant activity.

This manual describes how to count meteors using your Palm and MeteorCount and how to analyse the data.

## I This *MeteorCount* Distribution

consists of all you need to

- **count meteors on your Palm**
- **convert the data**
- **analyse the data**

Specifically you will find in the package:

### ***ybasic.prc***

This is Hot Paw Basic interpreter, Version 1.3.1. (Shareware) . Install this program on your Palm through the Palm Desktop Utility. This Shareware distribution has some limitations, which all do not affect its functioning when it comes to running *MeteorCount*. It will only able to display 4 BASIC programs in its directory. The paid version won't show this limitation, which are otherwise irrelevant for meteor observing. If you consider to buy ybasic, you can see details at <http://www.hotpaw.com/rhn/hotpaw/#1>, where additional info on Hot Paw Basic is available.

**I would recommend to run Meteor Count on the Version 1.3.1. distributed with this package. It was developed and tested with this version.** It should also run on older versions of Hot Paw Basic. However its compatibility with more recent versions has not been tested. During the product history of Hot Paw Basics there already have been some minor syntax changes , so be aware.

### ***mathlib.prc***

The freeware math library mathlib is required for Hot Paw Basic to run and must be installed through the Palm Desktop Utility.

### ***autooff.prc***

In order to save power, the Palm has an "Auto Off" Feature. In Palm OS 3.5 you can only choose between 30s, 1min, 2min, and 3min. There is no possibility to disable the shut down completely. If you launch this little program, it will shut down the shutdown, regardless of what is specified in the "Settings/General" menu. Launch AutoOff before starting MeteorCount. If you want to enable the shutdown again, hit the "Auto Off" Icon again and choose a new shutoff time.

Be careful not to drain the power by accidentally forgetting to switch the palm off after use.

### ***metcn203.txt***

This is the source code of *MeteorCount*, to be run by Hot Paw Basic. Load this code to a windows editor, copy it to your clipboard and **install it as a new memo** using the Palm Desktop Utility.

### ***palmcv9.exe***

This is a simple DOS program to convert data from the *MeteorCount* format to the "Obs Language" . Copy it to a separate directory on your PC.

### ***Meteorcomp.zip***

This is Ivan Goethals ingenious data analysis package Meteor Companion, Version 1.2. Meteor Companion will read meteor observations provided in the "Obs Language", break them up into useful intervals, determine magnitude distributions and create marvellously looking IMO report forms. Unzip everything to a separate directory on your PC. Run meteorcomp.exe under Windows. **Refer to meteorcomp1.hlp for a detailed description of this software**

Things you need: a) a Palm (operation system 3.5, probably 3.0 will also work). b) Palm desktop software or something similar. A PC running Windows 95 or 98

### ***manual.pdf***

This is **this** text in Acrobat reader format.

## **II How to run *MeteorCount***

### **1) Start up your Palm**

### **2) Set the Palm Clock.**

Since the accuracy of the Palm Clock is limited, you should set the clock by clicking the clock symbol. If possible take radio controlled watches to do this, or use a GPS system. Although the data analysis program can handle time zones, **I would recommend setting the Palm to UT when observing.**

**3) Do some stability considerations:** Nothing is more dramatic than data loss during a meteor storm. Observe the directions given in the chapter "Things to avoid". In my hand ybasic and the program were running very stable, as was the Palm Operation System. If you run a large number of "hacks" on the Palm, that may degrade the stability of the system. So deactivate them.

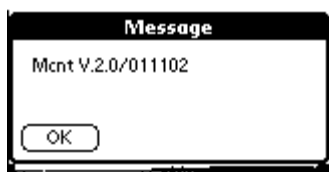
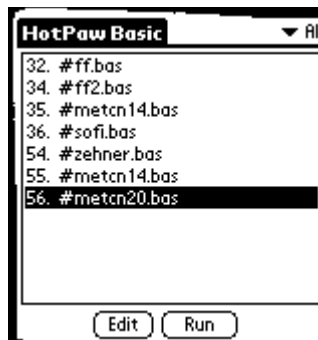
### **4) Start Hot Paw BASIC (YBasic)**

*MeteorCount* will run on Hot Paw Basic Version 1.3.1. The shareware version of YBasic will run *MeteorCount*, but is limited in displaying more than 3 other BASIC programs in its file menu (which does not matter when it comes to run this single program). If you use YBasic more frequently, you should consider buying it.

After installing *MeteorCount* you will find the YBasic Icon on your screen:  
**Click on the yBasic Icon** to launch YBasic. A list of BASIC programs will appear on your screen.

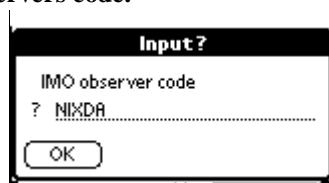


Select **metcn203.bas** and **RUN**



*MeteorCount* will start up and display the intro information. The version Number (2.03) and the date of this version (Dec. 1, 2002) are displayed. Click OK

Version 2.03 will ask for your **IMO obervers code**.



Enter your 5 letter obervers code (in the example NIXDA), if you have one. This is only important if you want to change your data files with other folks around in order to identify your observations. If you do not intend to do this you can skip the entry by clicking "OK".

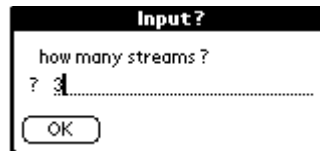
**2) Before the watch: Enter all relevant parameters for the observation**

**Initial Considerations**

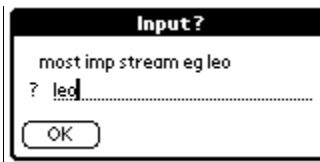
Suppose you are going to observe the Leonids. A look in the IMO table will reveal that the Leonids will be the most important stream, followed by the Southern and Northern Taurids (STA and NTA). Since you are going to count and not to plot, it is reasonable to assume that you cannot safely discriminate between STA and NTA, but designate them as "Taurids" (TAU). Additionally, alpha Monocerotids (AMO) will be active.

So you are going to enter LEO as the most important stream, followed by TAU and by AMO.

*MeteorCount* will ask you the number of streams. Enter 3, either through the keyboard fields or through Graffiti, and click ok

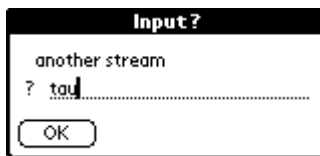


You can now specify the streams. *MeteorCount* will ask you first to enter the most important stream. In our case that will be LEO



Enter "leo", and click ok

In the same way, *MeteorCount* will ask you to specify the other streams. You can now enter TAU and AMO.



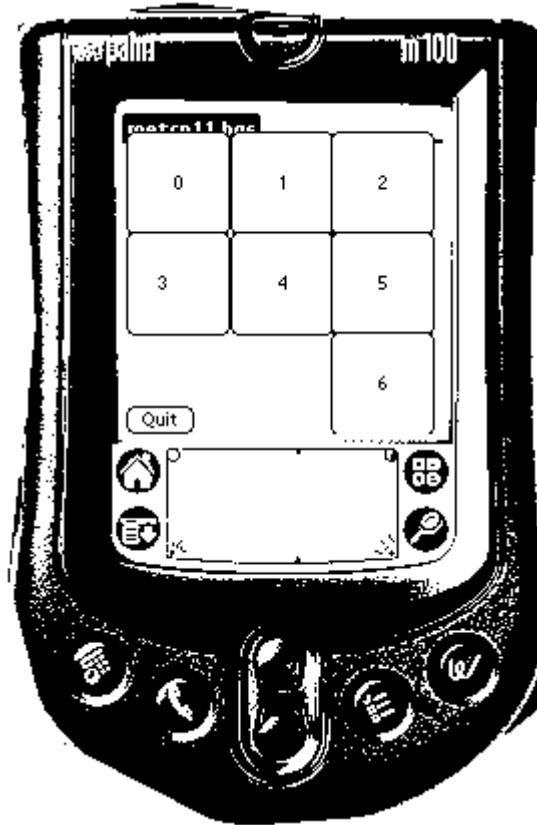
After these entries are completed, the following message will pop up:



You can do all these things well before the actual observing run. You can now switch off your Palm until the actual beginning of the observation in order to save battery power. As soon as you click "OK", the observation is started.

### III ) Observing

As soon as you hit "ok", the observation is started. The following very simple user interface will show up:



#### **Overview and practical hints**

Generally, meteors of the most important stream are entered by simply hitting the field F corresponding to the magnitude of the meteor. E.g. hit field 2 to enter a 2mag meteor of the most important stream.

**Key A** allows you to enter half magnitude intervals

**Key B** allows you to delete the last entry

**Key C** allows you to enter negative magnitude values

**Key D** will switch to sporadics and to the other active streams entered before

**Key E** lets you enter sky coverage estimates, star field counts (for determining limiting magnitudes) and to interrupt the observation for taking a break.

**Never hit the leftmost key. Also do not hit the Quit button. I think it is crucial to tape a cardboard mask on the surface of the Palm to prevent you from accidentally hitting these keys.**

**Deactivate the illumination of the display.** It will ruin your dark adaption and drain the batteries. Take a red light torch instead. Most entries can be done without looking on the display. Acoustical signals will give you a control of the entries.

**Place a finger between the 2 rows in the display.** This will help you not to confuse the rows 0, 1, 2 and 3, 4, 5. Do a bit of training before an actual observing run.

#### **Entering meteors of the most important stream**

Let's again assume that the most important stream are the Leonids (leo), followed by the Taurid and the Alpha Monocerotids. You just saw a 4 mag Leonid.

**Action:** Just hit the field F corresponding to the magnitude of the meteor.

**Example:** Hit field 4 to enter a 4 mag Leonid

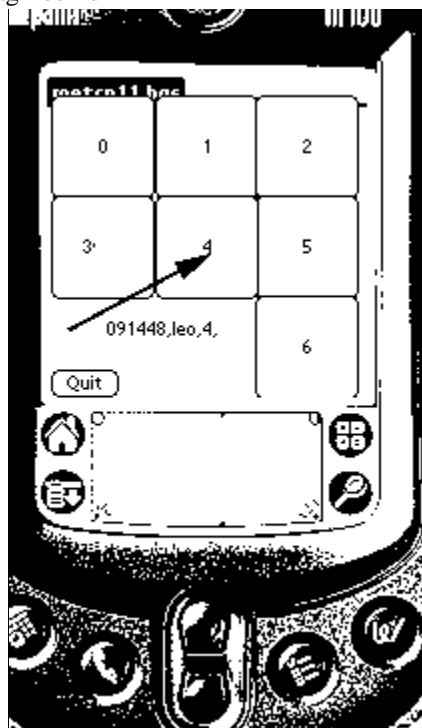


Figure: Hit field 4 to enter a 4th magnitude meteor of the most important stream (in this example: a Leonid)

MeteorCount will record a string corresponding to the time in seconds, the stream, and the magnitude.

**091448, leo, 4,**

means a Leonid of 4th magnitude was recorded at 9h 14m 48s

### Entering half magnitude intervals

IMO encourages observers to record the brightness to 0.5 magnitudes. Hit key A to add 0.5 magnitudes to the following value of the entry. Example: Key A followed by field 4 will result in a magnitude entry of 4.5

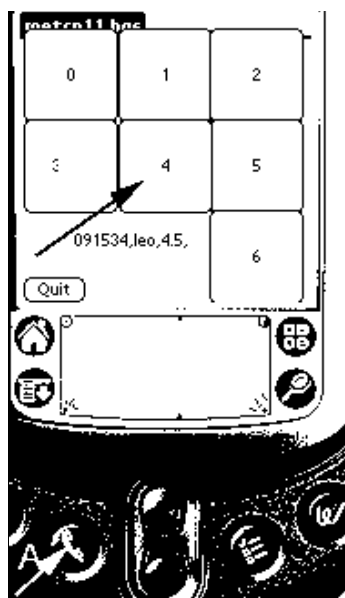


Fig: Hit Key A and then field 4 (marked by arrows) in order to enter the magnitude 4.5. In the given example, a Leonid of magnitude 4.5 was recorded.

### Entering negative magnitudes

Fireballs and bright meteor can reach negative magnitude values. To enter those, press key C and then the field corresponding to the magnitude value. Suppose you want to enter a magnitude -4 meteor, hit key C and then field 4.

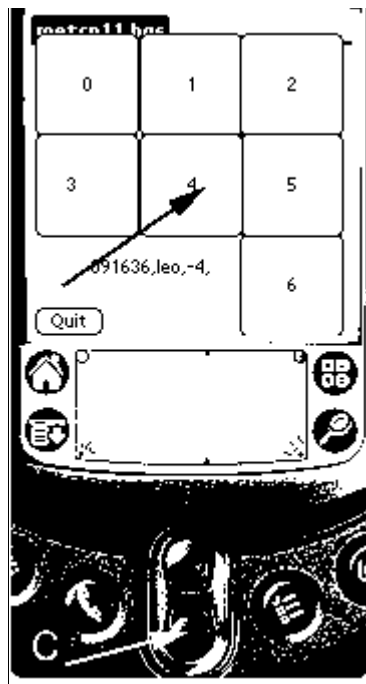


Fig: In order to enter a -4 mag Leonid fireball first press key C, followed by field 4

### Entering Sporadics

This is done by pressing key D once before hitting the field of the magnitude.

Example: You want to enter a sporadic of magnitude 4.

- Hit key D once
- hit field 4

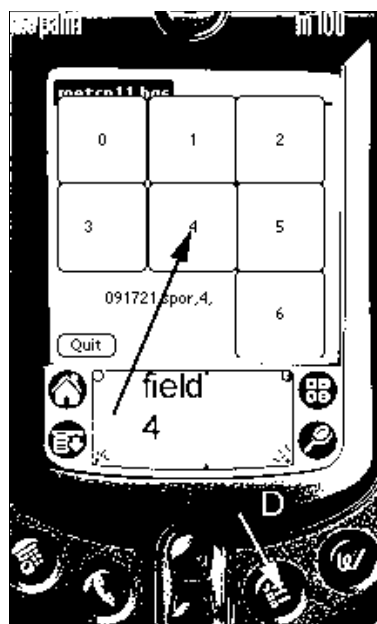


Fig: In order to enter a 4 mag Sporadic, hit key D once and then field 4

### **Entering meteors of other streams**

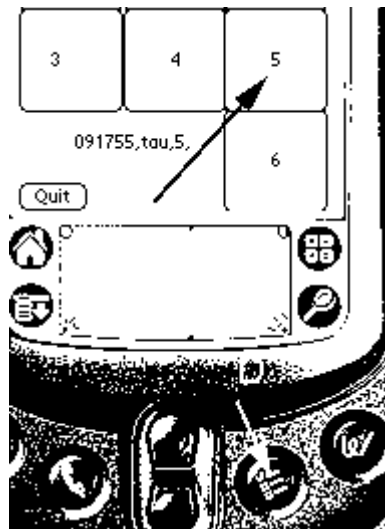
If you want to enter meteors of other streams, hit key D twice or more. Example: You have entered the Leonids as most important stream, followed by the Taurids (tau) and the alpha Monocerotids (amo). Then

hitting key D once always means a sporadic (see above)

hitting key D twice means a Taurid (tau)

hitting key D 3 times means an Alpha Monocerotid.

Example: You want to enter a 5 mag Taurid: Hit key D twice and then field 4



*Figure: Hit key D twice, followed by field 5 to enter a 5 mag Taurid*

Another example: Hit the key D three times and then field 2: An Alpha Monocerotid of mag 2 is entered.

### **Combining keys A, C and D**

Keys A, C, and D can be freely combined. To enter a -2.5 mag Alpha Monocerotid in our general example: Hit keys A, C, and then three times key D, followed by field 2. The sequence in which keys A, C and D are pressed does not matter. Note that key a decreases a negative magnitude value by 0.5 .

## Correcting wrong entries

To delete the last entry, press key B. Then enter the meteor correctly.

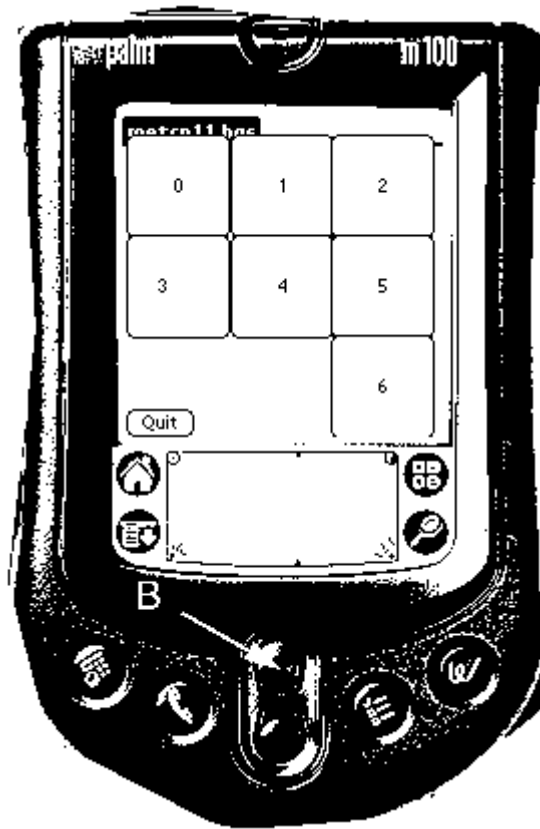


Fig.: Hit key B to delete the last entry

## Acoustic signals

In order to make blind operation of the device easier and to provide some interactive feedback, *MeteorCount* uses a variety of sound signals

- The frequency of the sound corresponds to the value of the field number. This means for meteors of positive magnitudes: The higher the sound, the brighter the meteor. You will be easily able to notice your error if you accidentally hit the field 5 instead of field 2. Correct your error by hitting key B.

### Other acoustic signals:

**If you hit key A** (to enter half magnitude intervals) a short deep snarring noise will occur

**If you hit the correction key B**, a morse tone C (-.-) will be emitted

**If you hit the negative magnitude key C**, to beeps can be heard (-.)

**Each pressing of key D** (for entering sporadics or other streams) will release a tone of increasing frequency (sporadics have the lowest sound, and the frequency rises with the position of the stream on the list entered at the beginning of the observation. If the key D is pressed too often, a morse signal (-.-) will be heard, and the entry is discarded. Repeat entering the stream using key D.

**Entering other things:**

Key E is used to enter

- cloud coverage estimates in %
- starfield counts
- and to interrupt the observation for a break

For all these things you have to enter numerical values. For instance you'll want to enter a cloudiness of 23% or note the fact that there were 21 stars in IMO field 8.

Prior to Version 2.0, these things had to be entered by the palm "keyboard" or by the **Graffiti** system, which was a bit cumbersome. In fact these were the only things that could not be entered "blindly", without looking on the Palm and its display.

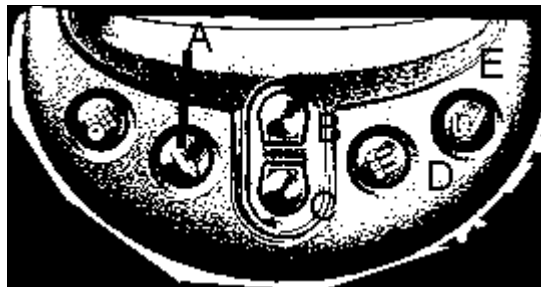
From Version 2.0, the entry of numerical value is permitted by a novel system using the keys A B C and D. This is called the **New Numerical Entry System NNES**.

Enter cloud coverage:

- Press key E twice to switch into the "Enter other things" mode
- Enter the cloud coverage in percents using NNES.

For this you have 4 keys :

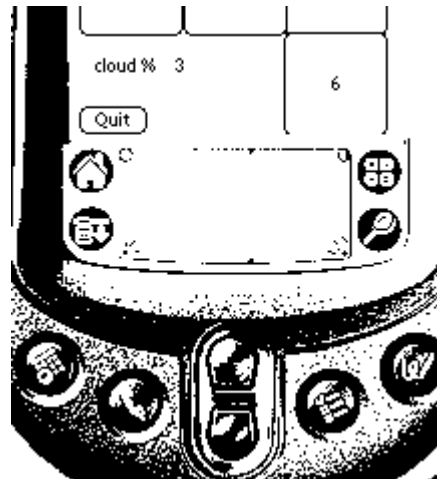
- Key A will increase the value by 10
- Key C will increase the value by 1
- Key B will clear (delete) the entry
- Key D is the "Enter" key.



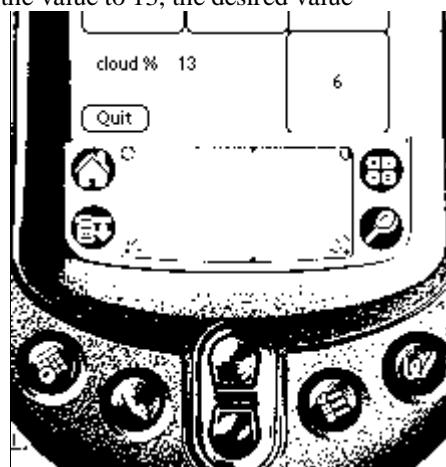
**Example:** You estimate the cloudiness to be 13%. Hit Key E twice to get into the "Enter other things" mode.

The text "clouds%" will appear on the display.

Hit key C three times. This will enter "3".



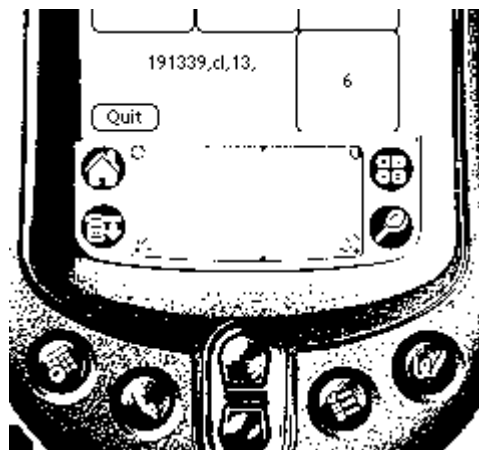
Hit key A once. This will increase the value to 13, the desired value



Alternatively you could hit Key A once and Key C three times. Or Key C twice, then Key A once and finally Key C once. Or hit Key C 13 times....Always remember that you have key B to delete your entry.

**!!!Audible beeps will assist you. You hear what you do !!!**

Finally hit Key D to enter this value.  
*MeteorCount* will return to normal observing mode.



The time of the entry and the entry will appear as usually in the display.

**Entering zero % cloudiness:** In order to enter 0% cloudiness (when a cloudy period has ended), please enter any value as described above, delete it by hitting key B, and enter the value by hitting key D. Just hitting the Enter Key D alone would switch the system to entering starfield counts.

**Enter a starfield count (determine limiting magnitude)**

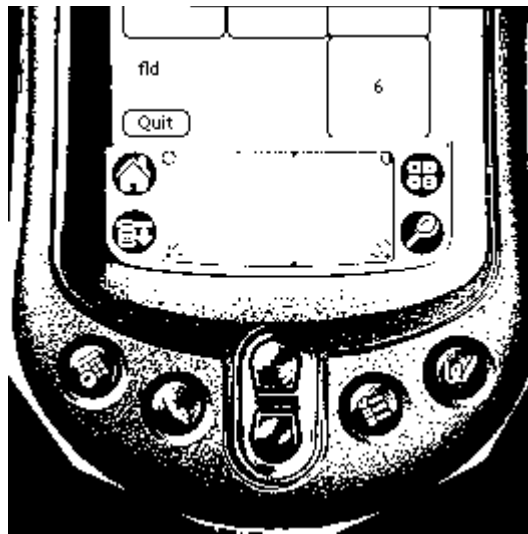
In order to be analysed observations must be accompanied by a determination of the limiting magnitude. This is done by counting stars in pre-defined star fields. Refer to the IMO handbook for more information.

Suppose you counted 11 stars in field 5.

First hit key E twice to switch to the "enter other things" mode .

Again "cloud% " will appear on the screen. Without entering anything else, press the "Enter Key" , Key D.

Now the display will read "fld" and two audible beeps will be released.



Enter "5" using the New Numerical Input System (by hitting key C five times)

Press Key D to enter that value.

Now the text "**stars**" appears in the display, and you can enter "11" by using the New Numerical Input System. This could be done by pressing key A once and key B once, or by hitting Key C 11 times (note: the latter method can be used as a counter, simply press key C when you spot a star in the IMO field).

Press Key D to finish your entry.

MeteorCount will return into normal observing mode. The limiting magnitude entry is displayed as usual. Again, the entry consists of a time (092348 means 9h 23m 48s), the symbol "lm" (for "limiting magnitudes and other things") followed by the field number (5 in the example) and the star count (11 in the example). A wrong entry can be deleted after completion using key B.

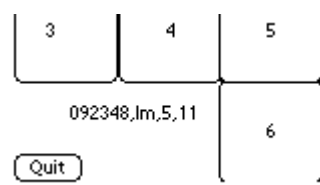


Fig: A starfield count (11 stars in field 5) has been entered at 9:23:48.

## Have a break or finish up your observation

**Caution: Directly clicking on the Quit-Field during observing is not the method intended to finish your observing!** Your file will not be properly terminated, and you will even loose the last meteor. The QUIT-button is a feature of YBASIC and not of MeteorCount. Better hide it behind the cardboard cover described in the next section!

**Instead, if you want to interrupt or terminate your observation, proceed as follows**

- hit key E twice to switch to the "enter anything else mode"

"cloud%" will appear, hit key D

two audible beep will be heard, and "fld" will appear on the display.

Hit key D again.

Three audible beeps will be released, and the message:

**"Hit anything to restart"**

will show up. Your observation is interrupted. You can switch the Palm off to save power. If your break is over, simply click with the stylo on the OK field, and your observation continues.

If you want to finish observing you can **NOW** click the QUIT field or on the Home field . Your file will contain all meteors and will be correctly terminated.

## Things to avoid

Avoid pressing the keys and symbols shown in the following figure. Hitting them will stop *MeteorCount*. You have to restart *MeteorCount* in this case. Best you cut a cardboard mask covering these things and tape-glue it on your Palm.

**!!!The QUIT-key, which is a feature of YBASIC rather than of Meteor Count, does ABORT the program and is not intended to correctly terminating your observation !!!**

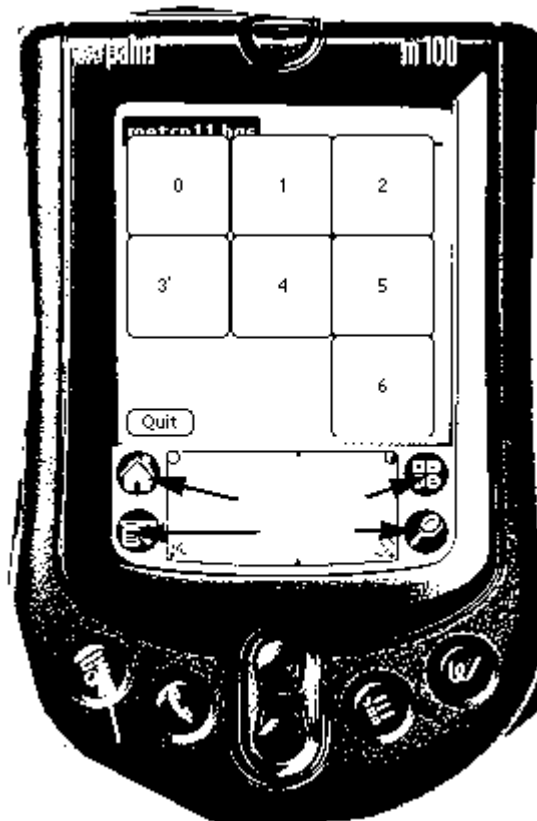


Fig: Avoid hitting these keys and symbols during observation. Also avoid to hit the QUIT-Key

## IV Data storage

### MeteorCount's data storage format

Observations are stored to so called **memos** into the Palm's memory.

A typical file will look like this:

```
20021119152747NIXDA
```

```
152800,cl,20,
152839,lm,2,19
153112,lm,8,16
153928,leo,4,
154053,spor,4,
154139,leo,3,
154156,tau,4,
```

```
...
```

```
160101,lm,end,end
161011,lm,beg,beg
```

```
161211,leo,2.5,
161235,leo,2,
```

```
.....
```

```
201015,lm,end,end
```

### First line

```
20011117152747NIXDA
```

The first line of the memo also is its file name. *MeteorCount* automatically names its memos according to the date and time of the creation (normally the beginning of the observation) in the format `yyyymmddhhmmss`. In this case, the memo was created on 2001-11-17 at 15h 27m 47s. NIXDA is the IMO code of the observer.

### Entries

All subsequent entries consists of 4 strings separated by "," as delimiter. In any case, the first string means the time in the format `hhmmss`

**Meteor entries** look this way:

```
153928,leo,4,
```

The first string is the time (as always), the second one the stream association (in this case "leo"), the third one is the magnitude (in this case "4"), and the fourth one is empty.

### Limiting magnitude estimates

```
152839,lm,2,19
```

The first string is the time, the second one reads "lm" (for "limiting magnitudes and other stuff"), the third one is the field number (in this case: IMO field 2), and the fourth one is the number of stars (in this case 19). The example means: At 15h28m39s 19 stars were counted in field 2.

### Cloud estimates

```
152800,cl,20,
```

The first string is the time (format hhhmss), the second reads "cl" (for cloud estimate), the third gives the percentage of sky obscured, and the fourth is empty.

### Breaks

The end of the observation is marked by an end statement:

201015,lm,end,end

The first string is the time (hhmmss), the second one reads "lm", the third and fourth one "end".

This statement should terminate each data file.

If the observation was re-started after a break, the beginning statement would read like this

201216,lm,beg,beg

The first string is the time (hhmmss), the second one reads "lm", the third and fourth one "beg":

The line after the "beg" statement only contains a CR

### Capacity of a memo/ memory considerations

Memos in Palm OS are restricted to 4 kB. This corresponds to about 280 to 300 meteors. If this limit is reached, *MeteorCount* automatically creates a new memo, with the first line indicating the date and time of the creation. Thus *MeteorCount* can record about 75000 meteors per megabyte of free memory.

## V Data Analysis

### Data analysis on a PC

Overview: The data are transferred to the PC by hot-syncing. For analysis on a PC Ivan Goethals program Meteor Companion is used. It does all the analysis and creates IMO compatible report forms. For the observations, it uses a file format different from the one used in *MeteorCount*. Thus the data in the memo have to be converted. Unfortunately, neither the Palm desktop software nor Meteor Companion have a ASCII export option. Thus the data have to be copied and pasted through the Windows clipboard.

Step 1: Transfer your data to a PC by performing a hot-sync

Step 2: Copy the memo to an ASCII text file

Launch up your Palm desktop software. Select "Memos" and click on your Memo. The Memo with the data will be displayed in a window in the righter half of the screen. Click into the memo, and select "Edit / Select All."

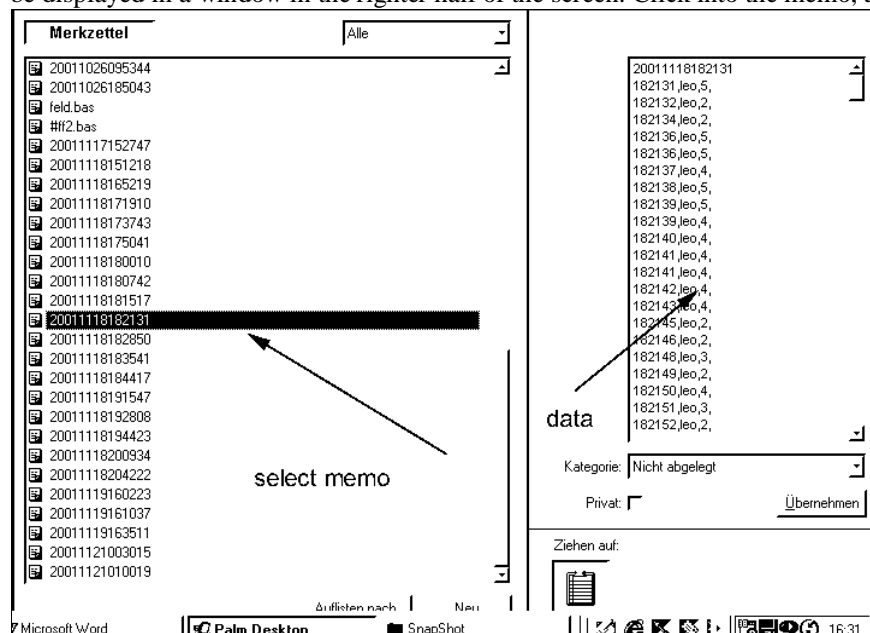


Fig: Palm Destop software. The contents of the memo is displayed at the window at the right and can be copied from there into any Windows editor. Store it as an ASCII file

Copy the data into the Windows clipboard (CTRL C or via the menu EDIT/COPY of the Palm Desktop Software to your editor (use the windows editor, a word processor, or the Windows Word Pad for this). Store the file AS A TEXT FILE (!!!!) to the hard disk

### Step 3: Converting the data using palmcnv

Palmcnv is a quick and dirty DOS program to perform the translation from the *MeteorCount* format to the "Obs language" used by Meteor Companion.

Suppose you want to convert your Perseid observations stored in *MeteorCount* format to the file pers.txt  
Start Palmcnv.exe under DOS:

A dialog will appear like this one

```

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X                               Palm Converter                               X
X                               Palm to obs-Language                        X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Observer Name 2 lett eg HL? HL
Input filename to be read? pers.txt
Output filename in obs language? pers.obs
How many minutes between time intervals ?? 30
timezone delta UT (eg 1 for CET) for palm clock? -1_

```

The entries mean:

**Observer 2 letter code:** Meteor Companion is able to handle more than one observer (a situation that won't occur with palm observers). Each one must be designated with a 2 letter code. In this case, the code is hl.

**Input Filename to be read:** This is the *MeteorCount* file to be converted, with full DOS path - and filename

**Output Filename in obs language:** This is the obs language target file (to be used in Meteor companion)

**How many minutes between time intervals?:** Meteor Companion uses time marks, much similar to what tape recorder or roll observes are used to. In contrast *MeteorCount* has time stamps for each event. Palmcnv puts time stamps in regular intervals or at each break. It is wise to enter these time marks more frequently (you can still merge small time intervals in Meteor companion).

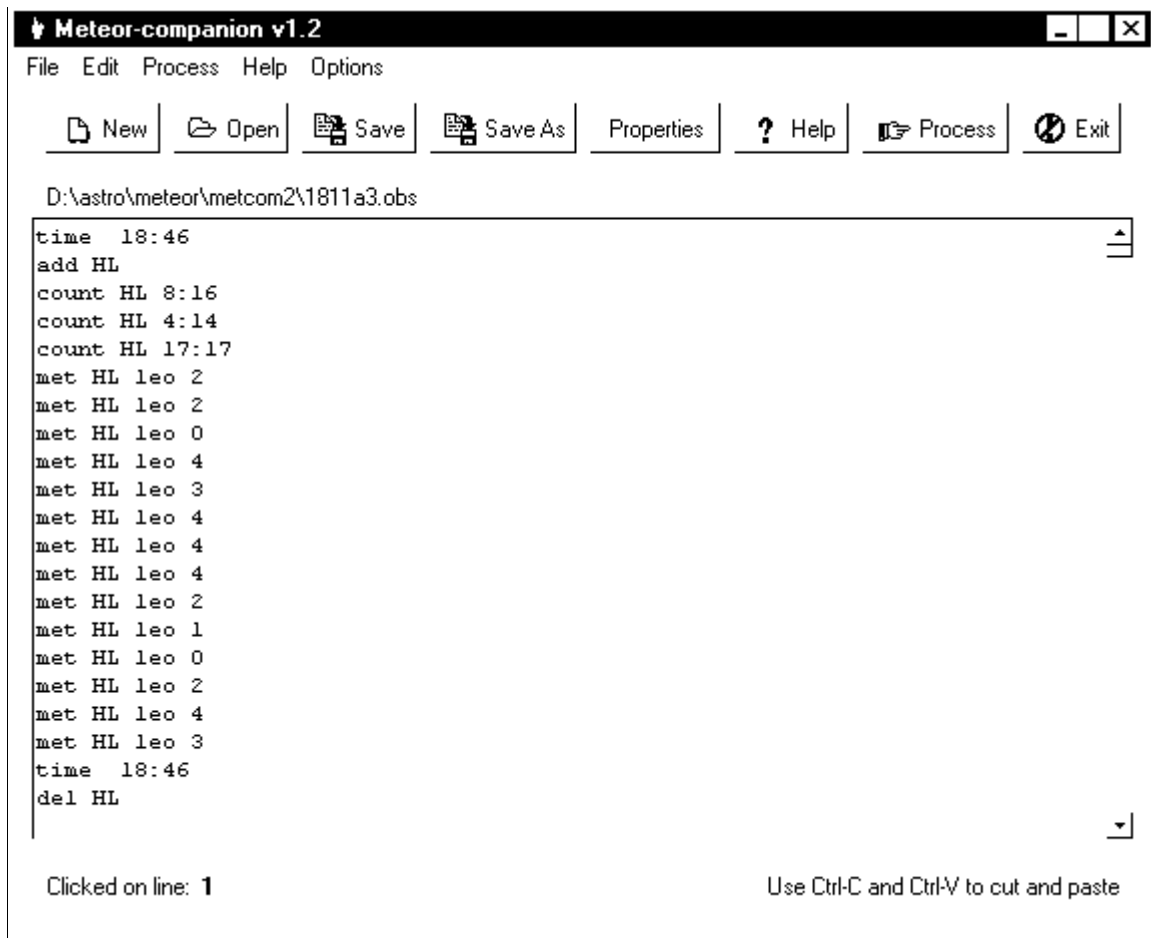
**time zone delta UT:** If you use your Palm for your daily date management purposes you may not want to set the Palm clock to UT. However I recommend to set the time of the Palm to UT.

Therefore you can enter here the difference of your Palm clock to UT in hours. Central European time will require an entry of +1, Central European Summer time an entry of +2 hours. UT will be, of course 0, and on the American continent this entry will be negative. The program will than perform the conversion.

If you of course set your Palm Clock to UT, (because you use the palm exclusively for meteor observing enter "0" at this point.

### Step 4: Copy the data into Meteor Companion

Load the resulting file into an editor, and copy/paste it through the Windows Clipboard to Meteor companion.  
The result should look like this:



It maybe that the file has to be slightly edited. Meteor companion requires to have magnitude star counts at the beginning of the file, directly after the "add" statement. You'll have to place them here. You will perhaps also need to enter a del statement at the end of the file as shown in the figure.

For meteor storms there is a limit of lines in Meteor Companion. You notice that problem when you fail to copy the data into Meteor Companions editor field (the problem occurs at about 1800 meteors). In analysing the 2001 meteor storm (more than 4000 meteors), I had to split them into 3 files, which was no trouble at all.

### Step 5: Enter other relevant data

To do this, click the properties Icon. **Refer to the manual of Meteor Companion for details.** The following screenshots show some settings that have to be made before Meteor Companion can analyse the data:

- load or enter an observing site (use IMO codes where appropriate)

**Properties**

Observation
Observers
Observed showers

Start date (in UT)  
dd/mm/yyyy  
|18 / |11 / |2001

Method  
Please select the appropriate observing-method for each shower on the shower-tab.

Place

IMO |33504| altitude |1127| m |Load| |Save|

Place |TAEGU| Country |KOREA|

Longitude |128 ° |56 ′ |0 ″ ☐ W  
☐ E

Latitude |36 ° |9 ′ |0 ″ ☐ N  
☐ S

|OK|
|Help|

- load or edit an observer

**Observer properties**

hl

First name |Hartwig|

Family name |Lüthen|

IMO-code |LUTHA|

Address |Behnstr. 13, 22767 Hamburg|

Properties for plottings

Time/plotting in seconds |0|

|Import|
|Export|
Done

### Step 6: Process the data

**Click on "Process" in Meteor Companions Main menu.**

Meteor companion will translate your observations and show a menu allowing you to break up the data into useful time intervals:

**Dividing into periods**

Currently dividing

Period:

Time interval:  -

Effect. time:

Percentage:

Meteors in interval:  =  %

Divide buttons:

Navigation:

Version: **Meteor companion v1.2**  
By Goethals Ivan <igoe@geocities.com>

URL: <http://www.student.kuleuven.ac.be/~m9607566/metcomp.htm>

**Break up the intervals using the divide buttons.**

If all intervals are properly defined, click on Continue. Still at that point, meteor companion can merge or delete some of the pre-defined intervals if you wish to do so.

At the end, an IMO report form is created.

```

V I S U A L   O B S E R V I N G   F O R M
Day: 18 Month: 11 Year: 2001          Begin: 18h46m      End: 20h51m
Location lng. 128deg56'00" E lat. 36deg09'00" N  h = 1127m  IMO code: 33504
Site: TREGU                          Country: KOREA
Observer: Hartwig Lüthen              IMO code: LUTHA

Showers:
+-----+
| Shw |alpha|delta| Shw |alpha|delta| Shw |alpha|delta| Shw |alpha|delta|
|-----+-----+-----+-----+-----+-----+-----+-----+-----|
| leo |   |   | amo |   |   |   |   |   |   |   |   |   |   |   |   |
| tau |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
+-----+

+-----+
| Period (UT) | Teff | F | Lm | leo | tau | amo |   |   |   |   |   |   |   |   |
|-----+-----+-----+-----+-----+-----+-----+-----+-----+-----|

```

It can be stored as formatted text and sent to the IMO visual commission via email. Note for meteor storms: Meteor Count rounds Teff to 0.01 hours. While this is ok for 99% of all meteor observing, when analysing storm rates you will want to use 1 or 2 min-Intervals. 1 minute is 0.0167 hours, which meteor companion will round to 0.02 hours. Two minutes is 0.0333 hours, which will be expressed by meteor companion as 0,03 hours. This example shows that you have to edit the Teff figures of extremely short time intervals manually.

**Literature cited**

(1) Rendtel J, Arlt R, McBeath A (eds) Handbook for Visual Meteor Observations. IMO monograph No. 2. Potsdam 1995 (ISBN 2-87355-004-X)

(2) <http://www-i6.informatik.rwth-aachen.de/Colleagues/molau/meteore/computer.html>

Further references

**Hot Paw Basic**

<http://www.hotpaw.com/rhn/hotpaw/#1>

<http://www.geocities.com/greenchile505/>

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