Memory Management on the TI-83 Plus
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The TI-83 Plus graphing calculator is equipped with Flash memory: special hardware that allows you to upgrade the operating system, install special software called APPS, and utilize additional memory features. This extends the useful life of the calculator and expands its functionality. This document explains two ways in which you can use the memory of the calculator for backing up your work: **Archiving** and **Grouping**.

The memory of the calculator is divided into two sections: **RAM** and **ARCHIVE**.

RAM (an acronym for Random Access Memory) is the 'working memory' for most of the things that you do on the calculator: Programs, lists, matrices, functions, and other data is kept in RAM. Each of these 'things' that you work with in RAM is called a *variable*. Each variable has three properties: a name, a type, and a value.

ARCHIVE memory is a separate, but connected, portion of memory used for APPS, GROUPS, and 'safe' storage ('archiving') of your RAM variables.

Memory management is important because you may need to 'free up' RAM to make room for other data or programs. **Archiving** protects your files from intentional or inadvertent resets. **Grouping** allows you to make copies of files, such as one student's Lists, so that the calculator can be used by another student for the same activity. The TI-83 Plus has *only* about 24k bytes of RAM and 160k bytes of ARCHIVE memory. The Silver Edition has 1500k bytes of ARCHIVE memory.
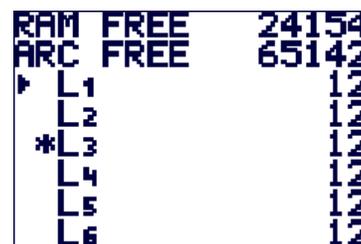
Press [MEM] (2nd +) to access the MEMORY main menu shown at the right. Your screen will only display the first seven menu items, however.

MEMORY item 2:**Mem Mgmt/Del…**, is used for deleting and moving variables between the RAM and ARCHIVE areas of memory.

When a variable is in RAM, it is 'usable'. That is, the variable is available for general use as a 'normal' variable. When the variable is in ARCHIVE memory, it is not available for use. Why put a variable in archive? Again, the main reason is to 'free up' RAM for something else without deleting any variables. You will usually put programs and lists into archive because these variables take up the most memory.

Press **[MEM] 2:Mem Mgmt/Del…** to see the screen to the left. Then select **1:All…** to see the screen to the right showing all the variables in your calculator.

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```
RAM FREE   24154
ARC FREE   65142
► L₁          12
  L₂          12
 *L₃          12
  L₄          12
  L₅          12
  L₆          12
```

This variable list screen to the left contains a lot of information. The two numbers at the top, RAM FREE and ARC FREE, are the numbers of bytes available in each portion of memory: RAM and ARCHIVE. On the left side of the screen is the 'selection pointer' pointing to a particular variable. Move the selection pointer down or up with the cursor control keys, ▾ and ▴. The second column (just to the *left* of the variable names) is the indicator that tells you whether a variable is in RAM or ARCHIVE. A blank space indicates that it is in RAM and an asterisk (*) indicates that it is in ARCHIVE. The number on the right is the size of the variable in bytes. Now for the cool part:

***Archiving* is the act of moving a variable from RAM to ARCHIVE.**

To move a variable *between* RAM and ARCHIVE, press ENTER when the selection pointer is pointing to the variable. ENTER switches the location of the variable.

As you move a variable, notice the numbers at the top of the screen change to indicate the new memory-free values. When you move a variable from RAM to ARCHIVE, the RAM FREE value increases and the ARC FREE value decreases by the size of the variable.

The Memory Management variable list screen is also used for deleting variables, although *it is seldom necessary to delete variables on theTI-83 Plus.*

To delete a variable, make sure the 'selection pointer' is pointing to it, then press DEL.
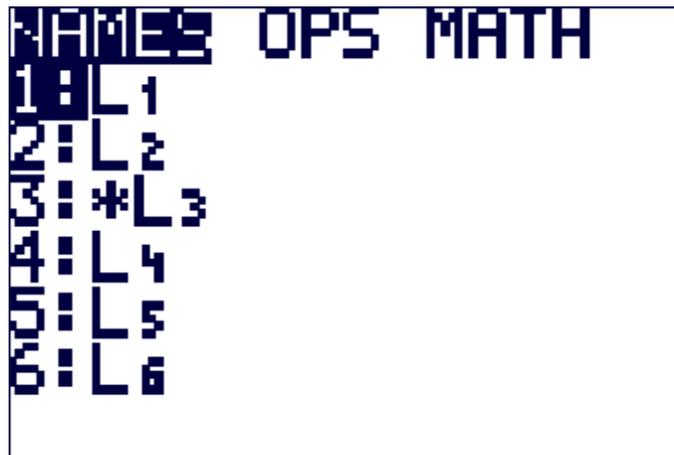
Some variables (like programs and lists) provide you with one last chance to change your mind: **"Are You Sure?"**. To finally delete the variable, select 2. If you decide not to delete the variable, press ENTER or select 1.

```
Are You Sure?
1:No
2:Yes
```

When a variable is in ARCHIVE, an asterisk appears to the left of its name in its own menu, too. To the right is a picture of a [LIST] menu with one archived list, L3. Caution: since L3 is in ARCHIVE memory, it is not available for regular use. If you try to make a Stat Plot using L3 while it is in ARCHIVE, you get the error message:
>   **ERR:ARCHIVED**
>   **1:Quit**
This error message will appear whenever you try to use an archived

```
NAMES  OPS  MATH
1:L₁
2:L₂
3:*L₃
4:L₄
5:L₅
6:L₆
```

variable. If you need to use an archived variable, you must move it back from ARCHIVE to RAM using the Memory Management tool ([MEM] 2).

The second useful memory management tool in the TI-83 Plus is the ability to "group" variables into a GROUP file. This is identical to the computer linking technique of grouping variables into a single file (*.8xg files) on the computer using TI-Graph-Link or TI-Connect software. But a computer is not used here.

Grouping makes a file <u>in the calculator</u> containing *copies* of the variables that you want. Grouping does not 'free up' memory. The GROUP file resides in ARCHIVE, so it does not use any RAM. This is a very handy tool for backing up your calculator variables, especially programs and lists.

To GROUP: select [MEM] 8:Group…

```
MEMORY
2↑Mem Mgmt/Del…
3:Clear Entries
4:ClrAllLists
5:Archive
6:UnArchive
7:Reset…
8█Group…
```

```
GROUP UNGROUP
1█Create New
```

Selecting "**Create New**" then asks for a NAME for the GROUP file. Enter any name, up to eight characters long, and press [ENTER].

The next screens work like the LINK-'Send'-selection screen. Selecting **All-** gives a list of all variables in the calculator (that can be put into a GROUP file), unselected:

```
SELECT  DONE
    L₁        LIST
    L₂        LIST
  ▪ L₄        LIST
    L₅        LIST
  ▪ L₆        LIST
  ▶ Y₁        EQU
    Window    WINDW
```

Just as in linking, use [▲]and [▼] to point to variables and press [ENTER] to 'select' (or unselect) them for copying into the GROUP file. The two lists, L4 and L6, on the left have been 'selected' for this GROUP file (note the square mark). You may choose mixed data types, for instance: some lists, some programs, and some matrices. When you have selected all your variables, press [▶] to go to the "DONE" menu and press [ENTER] to finish making the GROUP file.

The HOME screen displays the message:

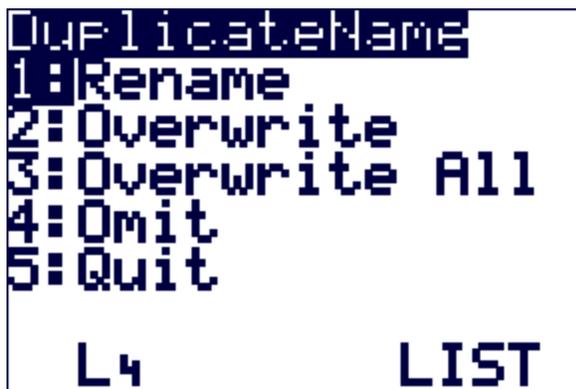**Copying Variables to Group: AAAA** (*your group file name*)

and then displays **"Done"** on the right side of the screen. The key word here is **"Copying"**; *your variables are undisturbed in* **RAM**. The GROUP file contains *copies* of the selected variables, just as linking transmits copies of your variables to another calculator.

The GROUP files reside in ARCHIVE, so a normal Reset, **[MEM] 7 1 2**, will not disturb any GROUP files. The GROUP files can be linked (sent) to other TI-83 Plus calculators, and can be stored on a computer using TI-Graph-Link or TI-Connect software.

Ungrouping is the act of putting *copies* of the variables in a GROUP file back into RAM. *The GROUP file remains intact. Copies of the variables are placed back into RAM.*

To "UNGROUP":

Press **[MEM] 8:Group…**, press ▶ to UNGROUP, select your GROUP file from the list using ▼ and ▲ (notice the asterisks: all GROUP files reside in ARCHIVE). Press ⌈ENTER⌉. If any of the variables in the GROUP file are already in RAM, then you get a "DuplicateName" menu of choices:

```
DuplicateName
1:Rename
2:Overwrite
3:Overwrite All
4:Omit
5:Quit

      L4          LIST
```

Just as in Linking, choose 2 to overwrite the variable with the one from the GROUP file.

GROUP notes:
- You cannot put an Archived variable into a group file. Unarchive it first, then make the GROUP file.
- Once a GROUP file is established, it cannot be modified, only UNGROUPED or DELETED. You cannot add variables to a group file afterward.*
- When linking to a computer, you cannot make a group file on the computer containing a GROUP file from the calculator.

TIP: make a GROUP file of all your programs. This prevents loss from inadvertent resets. Just UNGROUP the programs group. When you add programs to your calculator that you want to keep, delete the programs GROUP, then make it again.

To delete a GROUP:

[MEM] 2:Mem Mgmt/Del… C:Groups… gives the list of GROUP files. Press ⌈DEL⌉ next to one of them to delete it and press ⌈ENTER⌉ at the "Are You Sure?" menu.

Which brings up a special caution: do not confuse **[MEM] 8** with **[MEM] 2 C**. **[MEM] 8** is for Grouping and Ungrouping. **[MEM] 2 C** is for viewing the size of and deleting GROUP files. When the ARCHIVE gets full, consider putting your large GROUP files on a computer, then delete them from the calculator.

* to manage the variables in a GROUP, send it to the computer and use **TI-Connect**'s **GroupExplorer** to add or remove variables, then send it back to the TI-83 Plus.

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Summary of Memory Management on the TI-83 Plus
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- 2 sections of memory: RAM and ARCHIVE
- Archiving/Unarchiving moves variables
- Grouping/Ungrouping copies variables
- Archived variables are unavailable. Must unarchive before using
- Grouped variables are still available for use
- Cannot put an archived variable into a group file
- Archived variables and group files can be 'linked' into other calculators or a computer
- Ungrouping leaves the group file intact
- Rather than deleting to free up RAM, consider moving to archive first
- Normal RESET ([MEM] 7 1 2) leaves archived variables and group files intact

Keystroke summary

Archive -- UnArchive:

[MEM] 2:Mem Mgmt/Del…
1:All… (or choose your variable sub-type)

▼ ▲ to point to a variable

ENTER to move a variable (note the * toggle)

GROUP:

[MEM] 8:Group…
1:Create New
(enter a name)

▼ ▲ ENTER to select (multiple) variables (note the squares)

▶ to DONE

ENTER to do it

UNGROUP:

[MEM] 8:Group…

▶ UNGROUP

▼ ▲ to point to the desired group file

ENTER to do it

Deleting variables:

[MEM] 2:Mem Mgmt/Del…
1:All… (or choose your variable sub-type)

▼ ▲ to point to a variable

DEL, possibly "Are You Sure?"

One final note:

On the [MEM] menu, there are two menu items, **5:Archive** and **6:UnArchive**. These are used in programs so that the program can manipulate specific variables' locations. For example, a program may contain the statement

```
:Archive L1, L2, L3, L4, L5, L6
```

to move these six lists from RAM to ARCHIVE. You do not need to use these two commands unless you are programming.

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