

GRAM KRACKER™



MILLERS GRAPHICS
1475 W. Cypress Ave.
San Dimas, CA 91773
U.S.A. EARTH

MG

GRAM KRACKER™

**Operators
Manual**

The Information contained in this manual is subject to change without notice.

Millers Graphics shall not be liable for technical or editorial errors or omissions contained herein; nor for incidental or consequential damages resulting from the furnishing, performance, or use of this material or product described by this manual.

This manual contains information protected by copyright. All rights are reserved. No part of this manual may be photocopied or reproduced in any form without prior written consent from Millers Graphics.

Gram Kracker Electronic Design and Internal Software
by D.C. Warren

Gram Kracker Cad/Cam Work
by Ron Bishop

Gram Kracker Utility Software
by George Steffen and D.C. Warren

Gram Kracker is a registered Trade Mark of Millers Graphics

Gram Kracker Software, Circuit Boards
and Associated Manual are Produced or
Printed in the United States of America

Copyright 1986

by

Millers Graphics
1475 W. Cypress Ave.
San Dimas, CA 91773
(714) 599-1431

TABLE OF CONTENTS

Using The Gram Kracker

Installation	1
Gram Kracker Control Panel	4
Gram Kracker Loader	6
Function Keys	6
Load Module	7
Save Module	8
Initialize Module Space	11
Load/Save Console	12
Edit Memory	15

The Utilities

Explorer Patch	22
E/A or TI-Writer Gram Disk	23
E/A or TI-Writer Mover	24
Extended Basic	25
Basic MSAVE	26
New Character Set	27

Inside The Gram Kracker

Removing the Circuit Boards	28
Installing Optional Grams	32
Installing a New Battery	35

Advanced Features

Util Option	37
Module Modifications	
Text Changes	38
Changing Colors	38
Super E/A Cart	40
Tax Module PIO	40
TE-II 1200 Baud	41
Operating System Modifications	
Converting V2.2 Consoles	42
Slashing the Zero	42
Auto Executing Item 2 on the Menu ..	43
Corcomp - Editor/Assembler Fix	43
Bypassing Auto Execute Modules	44

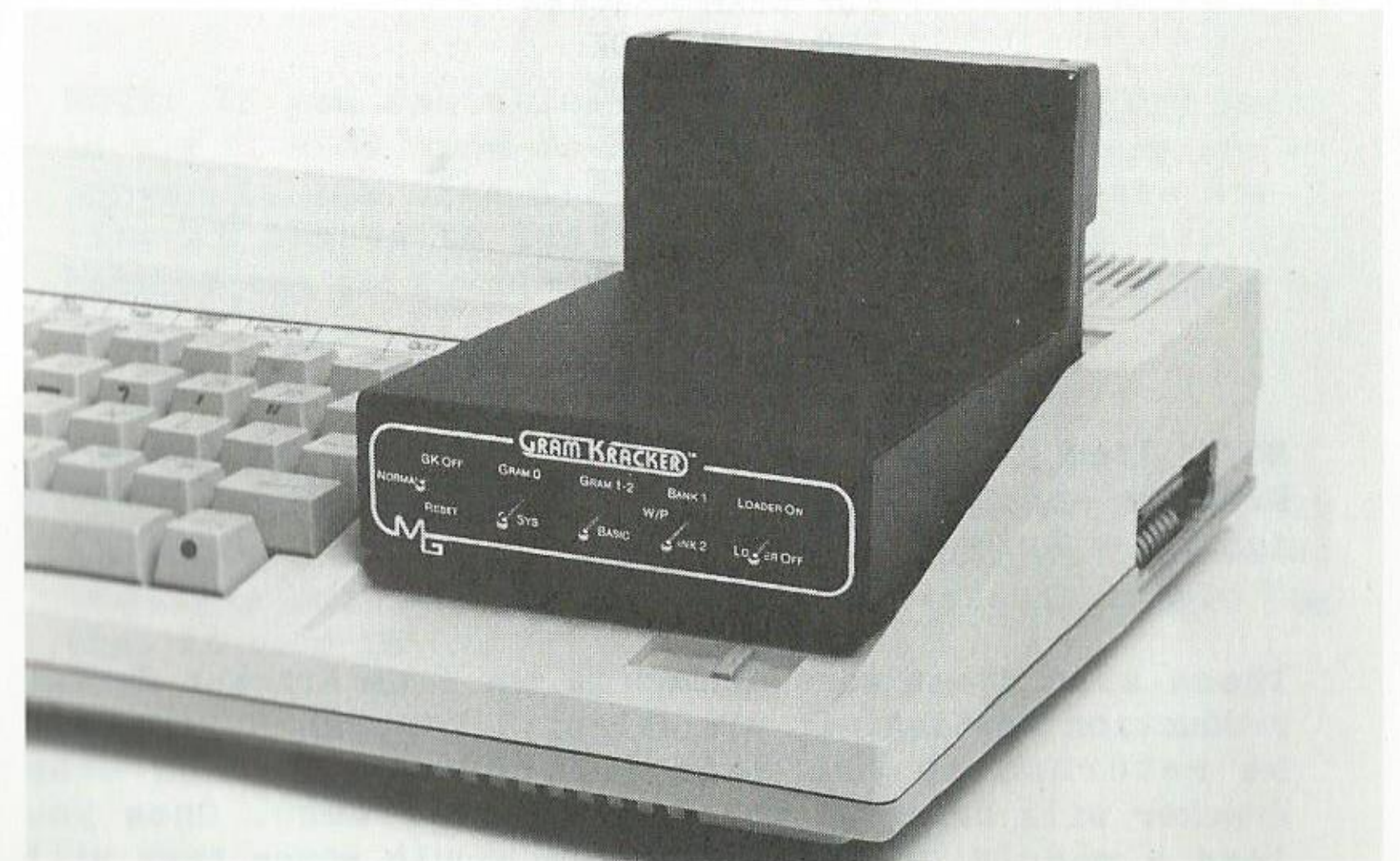
Appendixes

A Trouble Shooting	45
B Special Modules	47
C Gram Kracker Memory Map	49
D Grom/Gram Header Structure	51
E Adding Header to Auto Exec Modules ..	53
F Basic - XB CALL Header Difference ...	54
G Loader/Saver Order and Header Bytes .	55

INSTALLATION

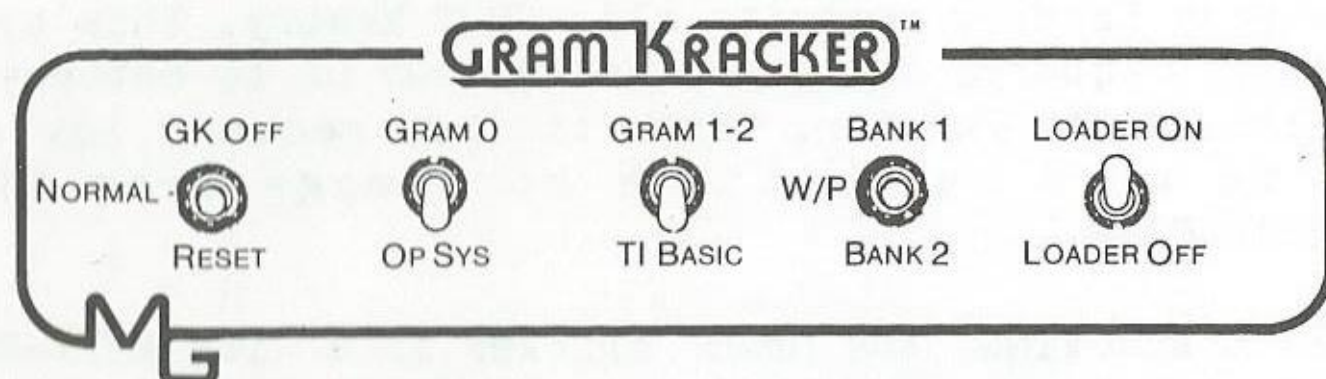
IF YOU ARE INSTALLING THE OPTIONAL GRAMS YOURSELF PLEASE FOLLOW THE GRAM KRACKER INSTALLATION STEPS ON THE NEXT 2 PAGES BEFORE INSTALLING THESE CHIPS.

1. The Gram Kracker contains all CMOS Memory. This type of memory requires low power and allows us to battery back up this unit. However, since it does require low power it is more susceptible to damage from STATIC ELECTRICITY.
2. BEFORE REMOVING the Gram Kracker from its ANTI-STATIC bubble bag you should touch a metal object that is GROUNDED. A water pipe or the metal on the back of the P-Box will serve this purpose. To be safe DO NOT TOUCH the contacts that slide into the computer.
3. Make sure your computer is turned off and slide the Gram Kracker all the way into the module port on your 99/4 or 99/4A computer. The Gram Kracker was designed with a snug fit to prevent it from moving around when you insert and remove modules.



Gram Kracker installed in the computer with a TI module plugged into it.

4. Before turning on your computer make sure the switches are selected as follows:



Normal Op Sys TI Basic W/P Loader On

5. Now, when you turn on your computer and press the space bar to go to the **TI MENU SCREEN** you should see the following menu:

- 1 FOR GRAM KRACKER
- 2 FOR GRAM 3 OK
- 3 FOR GRAM 4 OK
- 4 FOR GRAM 5 OK
- 5 FOR GRAM 6 OK
- 6 FOR GRAM 7 OK
- 7 FOR PROM OK
- 8 FOR RAMS OK
- 9 FOR OPTION GRAMS OK

NOTE: Item 9 will only appear if you have an 80K Gram Kracker and the Optional Ram chips (Grams 0,1 & 2) were installed and tested by us.

These menu items were placed in the Gram Kracker during production testing. If you select 2 through 9 you will be returned to the Main Tile screen. Item 1, Gram Kracker will bring up the Gram Kracker menu. Once you load a module or Initialize the module space they will disappear. Their only purpose is to indicate that your Gram Kracker has been fully tested prior to shipping.

MG

If the previous menu list does not appear on your menu screen then make sure the first switch is in the NORMAL position and not in the GK OFF position. Also, make sure you DO NOT have a module plugged into the Gram Kracker at this time, that the Gram Kracker is properly plugged into the computer and that it is making good contact. You might try removing the Gram Kracker and reinstalling it.

The connection between the Computer, the Gram Kracker and the internal connection where the module port circuit board plugs down into the computer mother board can be considered a weak link. These connections should be kept clean for efficient operation. Most of us have had our computers for quite some time and we have never cleaned these connectors, especially the one inside that plugs into the mother board.

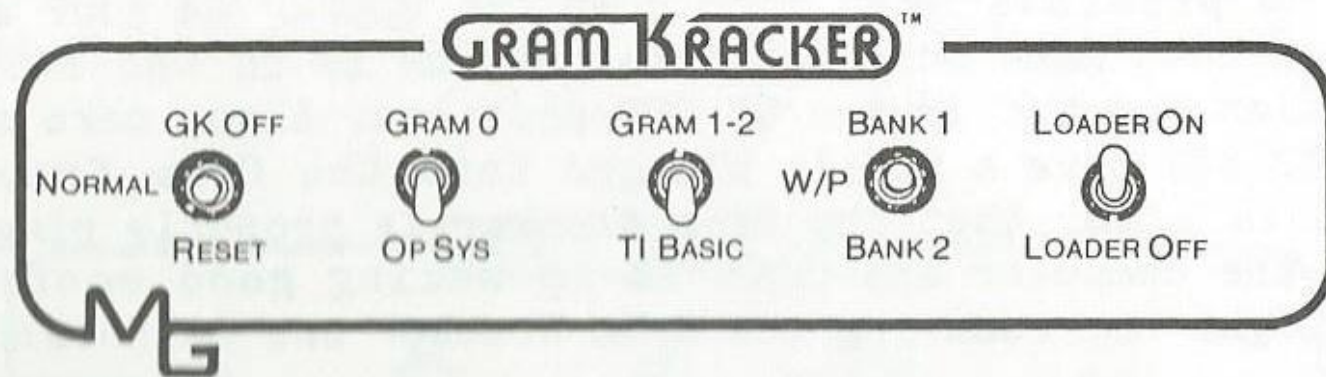
If you still cannot get this menu to come up please consult the Trouble Shooting section of this manual.

NOTE: If you installed the Optional Grams before going to the TI MENU there is a good chance these items are no longer in the Gram Kracker. When you separate the 2 circuit boards to install the chips or replace the battery the data contained in memory will most likely be lost.

NOTE: When you remove the Gram Kracker from your computer to take it to another location, we recommend that you put it back into the anti-static bubble bag that it came in.

MG

GRAM KRACKER CONTROL PANEL



GK Off

Allows you to manually turn off the Gram Kracker's MODULE SPACE. This permits the Gram Kracker selection to be displayed on the menu when an AUTO START module has previously been loaded into the Gram Kracker or when a module without a reset line, such as Atari, is plugged into the Gram Kracker's module port. Push the switch to the Reset position and then all the way up to the GK Off position. In this position Grams 3-7 (g6000-FFFF) and Cartridge Ram Banks 1 & 2 (c6000-7FFF) are turned OFF. The rest of the Gram Kracker is still operational.

Normal

The normal operating position for the Gram Kracker. With the switch in this position the Gram Kracker's module space will automatically be turned off when a module with a reset line is plugged into the Gram Kracker's module port. (No need to remove the Gram Kracker to use other modules)

Reset

This momentary position executes the Power Up routine to reset the computer back to the Main Title Screen. Pushing this switch down and then releasing it will reset the computer and place the Gram Kracker in its Normal operating mode. This should be done whenever you insert or remove a module from the Gram Kracker.

NOTE: Change the switches only when; the Console Power is Off, when you are on the Title Screen, when the Gram Kracker Loader/Saver instructs you to or when you are in the Memory Editor. Changing switches while a program is running may page it out of memory and cause your computer to lock up.

MG

Gram 0

Enables an alternate Operating System when an **Optional Ram (Gram 0) chip has been installed** and an alternate or modified Operating System has been loaded here. (g0000-g1FFF)

Op Sys

Enables the normal TI Operating System and Title Screen in Grom 0.

Gram 1-2

Enables Gram in the TI Basic space when the **Optional Ram (Gram 1 and 2) chips have been installed** (g2000-5FFF). This allows you to load other modules or programs in this space, with our utility, or allows you to modify TI Basic once you have loaded it into Gram.

TI Basic

Enables the normal TI Basic language in Groms 1 and 2.

Bank 1

Turns Off write protection and enables Bank 1 of the module Ram space (c6000-7FFF). Used during loading and editing of the module Ram/Gram space and Gram 0

W/P

Turns On write protection for the entire module space and for Gram 0 (Alternate Op Sys).

Bank 2

Turns Off write protection and enables Bank 2 of the module Ram space (c6000-7FFF). Used during loading.

Loader On

Places the Gram Kracker selection on the menu which enables its internal software at g2000-3FFF.

Loader Off

Disables the Gram Kracker's internal software and allows TI Basic to appear on the menu.

MG

GRAM KRACKER LOADER/SAVER

The Gram Kracker Loader is activated by placing the LOADER switch in the ON position and resetting the computer. This will allow it to come up on the menu in place of TI Basic. Then when you select GRAM KRACKER the 8K of internal software will display the following menu (for a system with Memory Expansion):

1. Load Module
2. Save Module
3. Init Module Space
4. Load/Save Console
5. Edit Memory

If you do not have Memory Expansion items 4 and 5 will not appear on the menu. If you are using a TI 99/4 instead of a TI 99/4A then item 5 will not appear on the menu.

The Function Keys

The Function Keys for the internal Gram Kracker software have been set up very similar to Extended or Console Basic's use and the Editor Assembler's use. (see EDIT MEMORY for the FCTN and CTRL keys used in the Memory Editor)

- FCTN 1** - Delete a Character
- FCTN 2** - Insert mode
- FCTN 3** - Erase the input line
- FCTN 4** - Clear - Abort Load/Save RS232 or PIO

- FCTN 9** - Abort all commands and/or Exit -
Press and HOLD it to abort a Load or Save operation.

- FCTN =** - Quit

- FCTN S** - Left Arrow
- FCTN D** - Right Arrow

- FCTN X** - Util Option (see Advanced Features)

MG

LOAD MODULE

To LOAD a Previously saved module:

1. Enable the Gram Kracker Loader (Loader On)
2. Make sure a module is NOT plugged into the Gram Kracker's module port.
3. Reset the Computer and make sure this switch is in the NORMAL position and not in the GK Off position.
4. Select GRAM KRACKER from the menu.
5. Select 3 Init Module Space from the Gram Kracker menu and follow the instructions at the bottom of the screen.
6. Select 1 Load Module from the Gram Kracker menu.
7. Type in the Device.Filename where it was saved to (or where it resides i.e. DSK1.XB or CS1 etc.) press ENTER and follow the instructions at the bottom of the screen.
8. When the red block disappears from alongside the Load Module selection the module is fully loaded. At this time you can press either FCTN 9 or FCTN = (Quit) to go back to the Main menu and use the module just loaded.

To LOAD a UTIL1 or RUN PROGRAM type Assembly File simply follow the above steps except type in the Assembly File name for step 7. After the file is completely loaded the "Restore Write Protect" message will appear. When you press the Space Bar to continue the Assembly File just loaded will automatically start up. Some of these Program type files, such as SBUG6, reside in the Cartridge Ram space and they expect this area to be UN-WRITE PROTECTED (switch in the Bank 1 or Bank 2 position).

NOTE: If your UTIL1 type Assembly File only loads into Memory Expansion, as most do, and DOES NOT load into any of the module Ram or Gram space, you may leave a module plugged into the Gram Kracker's module port.

MG

SAVE MODULE

To SAVE a module:

1. Enable the Gram Kracker Loader (Loader On)
2. Make sure the module you want to save IS plugged into the Gram Kracker's module port UNLESS you want to save the CONTENTS of the Gram Kracker's MODULE SPACE.
3. RESET the Computer and make sure this switch is in the NORMAL position.

NOTE: If the module that is plugged into the Gram Kracker is an Atari type module or one that you have modified by removing the Reset line place this switch in the GK OFF position immediately after RESET to allow the module to appear on the menu. Garbage will usually appear on the menu if the module does not have a reset line hooked up and this switch is in the NORMAL position instead of the GK OFF position. (See number 11 for Auto Execute modules)

**DO NOT PLUG A MODULE IN BACKWARDS OR YOU MAY
DAMAGE IT AND/OR YOUR CONSOLE!!**

4. Select GRAM KRACKER from the menu.
5. Select 2 Save Module from the Gram Kracker menu and follow the instructions at the bottom of the screen. (The "Restore Write Protect" message is for saving the contents of the Gram Kracker's module space.)
6. Type in the Device.Filename where you want to save it to (i.e. DSK2.TI-WRITER or CS1 etc.) and press ENTER. The Gram Kracker's Save routine will automatically go out a check to see if there is enough room free on this Device for this module (except CS1 and other devices that do not have a catalog routine built into their DSR)
7. If there is enough room free the routine will go ahead and save the module and the — Saving — message will appear on the screen. Each time this message flashes another 8K block is being saved and verified and the internal filename is automatically incremented for the next filename. (i.e. XB, XB1, XB2, XB3 etc.)

7. continued.

If there isn't enough free space the "Not Enough Free Space" message will appear at the bottom of the screen. This message may also appear when you are RE-SAVING a module to a Device that is almost full (i.e. saving DSK1.XB to a diskette that already contains the XB files). If this is the case just press the space bar to continue OTHERWISE press FCTN 9 (Abort) to stop the save routine so you can input another device or change floppies. If you accidentally press the space bar instead of FCTN 9 the save routine will halt with an "Out Of Space" error message and only part of the module will be saved to the chosen Device.

8. When the red block disappears from alongside the Save Module selection the module is fully saved. At this time you can press either FCTN 9 or FCTN = (Quit) to go back to the Main menu or you can follow the instructions in LOAD MODULE to load and run the saved module.
9. **TIP:** The Device.Filename prompt is 15 characters in length so, if you are saving to disk (DSKx.), do not type in a filename that extends beyond the last "e" in Device.Filename since it will be longer than the allowed 10 characters. Examples:

Device.Filename
DSK1.THIS-IS-OK

Device.Filename
DSK1.THIS-IS-NOT

eleventh filename character.

-
10. DO NOT use a NUMBER as the last character in a 10 character file name. For example, if you used the filename of DSK1.CARTFILE01 the Save routine will end up duplicating this as the second filename and write over the first file saved. The Save routine adds a number to the filename unless the filename is already 10 characters long. In that case it truncates the filename by 1 character and adds the number. Examples:

MYFILE	MYCARTFILE
MYFILE1	MYCARTFIL1
MYFILE2	MYCARTFIL2

If you were to save the module with the filename of MY_MODULE1 (10 characters) the Save routine would generate the following files because it would truncate the filename to 9 characters and then add the 1 digit.

MY_MODULE1
MY_MODULE1
MY_MODULE2

Since we can not have two files on the same disk with the same name the first MY_MODULE1 file will be over written by the second file and you will not have a complete module on the disk.

NOTE: If you have a Myarc or TI Disk controller you must have an 80K Gram Kracker (3 Option chips installed) to save AUTO START modules (Plato and Scott Foresman). See "Bypassing Auto Execute Modules" on page 44. The Corcomp disk controller generates a menu with the Gram Kracker selection on it BEFORE these Auto Start modules take control.

INIT MODULE SPACE

This menu selection clears out the entire 56K of module Ram and Gram space. It fills both Banks of Cartridge Ram (c6000-7FFF) and Grams 3-7 (g6000-FFFF) with zeros. It does not clear out Grams 0, 1 or 2 (g0000-5FFF), to clear this area use the Memory Editor Fill function.

1. Select 3 Init Module Space from the menu and follow the instructions at the bottom of the screen. If you have a module plugged into the Gram Kracker for this selection you will get a Write Protect error since the Gram Kracker module space is turned off. Also, make sure the GK Off - Normal - Reset switch is in the NORMAL position. If it is in the GK OFF position you will get a Write Protect error since the Gram Kracker module space is turned off.
2. When the red block disappears from alongside the Init Module Space selection the command is completed and the entire module Ram and Gram area will contain zeros.

NOTE: We recommend that you use this routine prior to loading a module. This will prevent incomplete programs from appearing on the menu.

If, however, you know for SURE that the module being loaded DOES NOT reside in the same space as the module(s) currently loaded then you may not want to use this routine. This would allow you to load multiple modules PROVIDED they DO NOT occupy the SAME AREA OF MEMORY, which most of them do. (Also see THE UTILITIES section of this manual)

LOAD/SAVE CONSOLE

This item will only appear on the Gram Kracker's menu if you have Memory Expansion. The 4 Load/Save Console selection will allow you to save the console Groms or to load the Optional console Grams according to your selection(s) from the following menu:

1. Load Console
2. Save Console
3. Grom/Gram 0
4. Grom/Gram 1
5. Grom/Gram 2

1. Choose which Grom/Gram(s) you want to save by pressing the appropriate number key(s) (3, 4, 5). A red block will appear alongside each item chosen. If you want to cancel a choice just press the appropriate number key again and the red block will disappear.
2. After you have chosen the Grom/Gram(s) press 1 to Load or 2 to Save.
3. You will now be prompted for a Device.Filename for each of the Grom/Grams chosen. Type in the desired Device.Filename and press enter. If more than 1 Grom/Gram was chosen the next Device.Filename prompt will automatically appear.

Examples:

Device.Filename Grom/Gram 0
DSK1.OPSYS

Device.Filename Grom/Gram 1
DSK1.BASIC1

Device.Filename Grom/Gram 2
DSK1.BASIC2

4. When the last Device.Filename is typed in and enter is pressed the following message will appear:

Enable Grom/Grams then
Press space bar to continue

At this time the routine is waiting for you to set the switches on the control panel according to what you want to Save or LOAD.

NOTE: When LOADING Console Gram 0 MAKE SURE THE WRITE PROTECT IS DISABLED (switch in Bank 1 or Bank 2 position). When you LOAD Grams 1 & 2 or you SAVE TI Basic MAKE SURE THE LOADER IS OFF since it resides in the Gram 1 - TI Basic space of g2000-3FFF.

5. After the Grom/Grams have been Saved/Loaded the following message will appear:

Restore Op Sys and Loader
Press space bar to continue

After you turn the Loader On, enable an Operating System (Grom 0/Gram 0) and press the space bar you will be returned back to the Gram Kracker's internal software. At this time you can press FCTN 9 to return to the Gram Kracker's first menu.

EXAMPLE:

SAVE Grom 0 (Op Sys) and then LOAD it back into Gram 0.

1. Select 4 Load/Save Console from the Gram Kracker menu. Next select 3 Grom/Gram 0 and then 2 Save Console from the Load/Save Console menu.
2. Type in your Device.Filename at the prompt and press Enter. When the "Enable Grom/Grams..." message appears make sure the Gram 0/Op Sys switch is in the Op Sys position and press the space bar.

3. When the Op Sys is finished saving just press the Space bar since the Op Sys and Loader are still enabled.
4. Now let's LOAD it back into Gram 0. First select 3 Grom/Gram 0 and then select 1 Load Console.
5. Type in the Device.Filename where you just saved it to and press Enter. When the "Enable Grom/Grams..." message appears make sure the Gram 0/Op Sys switch is in the Gram 0 position and the WRITE PROTECT switch is in the Bank 1 or 2 position and then press the Space Bar.
6. When the "Restore Op Sys..." message appears after Gram 0 is loaded turn on Write Protection and press the Space Bar. Now you can Press FCTN 9 to go back to the Gram Kracker's first menu. At this time the computer is using the Operating system that you loaded into Gram 0 since the Gram 0/Op Sys switch is in the Gram 0 position.

NOTE: The procedure for Saving TI Basic or Loading Grams 1-2 is the same as the above example. The only difference is to make sure the Loader On/Off switch is in the LOADER OFF position since it resides in the Grom/Gram 1 space of g2000-3FFF. To SAVE TI Basic place the Gram 1-2 - TI Basic switch in the TI BASIC position. To LOAD Grams 1-2 place the Gram 1-2 - TI Basic switch in the GRAM 1-2 position.

Also, when the "Restore Op/Sys...." message appears MAKE SURE you turn the Loader On before you press the Space Bar or you may cause your system to lock up!!

MG

EDIT MEMORY

Selection 5 - Edit Memory - on the Gram Kracker menu will only appear if you have Memory Expansion and you are using the Gram Kracker on a TI 99/4A not a TI 99/4. When you press 5 the following screen will appear:

```

c3E70      Start 0000      Finish 0000
              Dest c0000      Fill  00
=====
P I O .

```

```

=====
Window 1  Pg up 4  Color 7  Bias  0
Move  2  Srch  5  Dump  8  AscHx =
Fill  3  Pg dn 6  Back  9  Hm Enter

Device name c3E70          ERROR OK

```

This Memory Editor is a COMPLETE STAND ALONE program. It DOES NOT use any of the console ROM or GROM routines or Data. This allows you to turn On or Off ANY of the switches on the Gram Kracker Control Panel and to FILL, MOVE or modify anything you would like in ANY GRAM space, cartridge RAM space or High Memory Expansion cA000-FFFF. Also, since it contains its own keyscan routine it will not work with the original TI 99/4 console.

The Memory Editor runs in Low Memory Expansion (c2A30-3E9F). DO NOT FILL, MOVE or modify this area of Memory or you may cause the Memory Editor to lock up.

MG

=====

Wdow 1 Pg up 4 Color 7 Bias 0
Move 2 Srch 5 Dump 8 AscHx =
Fill 3 Pg dn 6 Back 9 Hm Enter

Device name c3E70 ERROR OK

The Memory Editor is FCTN Key driven. The FCTN Key assignments are displayed at the bottom of the screen, as shown above, and are as follows:

- FCTN 1** Window - Toggles between the 3 available memory windows which have a default setting of Cpu, Grom/Gram and Vdp (C, G or V)
- FCTN 2** Move - Moves a specified block of memory from one location in any type of memory to another location in any type of memory.
- FCTN 3** Fill - Fills a block of the currently displayed type of memory with the specified byte.
- FCTN 4** Page Up - Pages the next Higher addressed 244 bytes into the memory window.
- FCTN 5** Search - Activates and Deactivates the Search function which allows you to search through any type of memory in Hex, ASCII and ASCII with the Basic Bias.
- FCTN 6** Page Down - Pages the next Lower Addressed 244 bytes into the memory window.
- FCTN 7** Color - Toggles through a number of different Text and Screen colors for the memory editor.
- FCTN 8** Dump - Dumps a specified block of the currently displayed memory to the specified output device in Hex, ASCII and ASCII with the Basic Bias.

- FCTN 9** Back - Places the cursor in and out of the memory window and in and out of the Search data input line.
NOTE: When editing the module Ram or Gram space or the Gram 0 space you must have the Write Protect switch in the Bank 1 or 2 position in order to make changes to memory.

- FCTN 0** Basic Bias - Toggles the ASCII memory window display between normal ASCII and ASCII with the Basic Bias.

- FCTN =** ASCII HEX - Toggles the memory window display between Hex and ASCII or ASCII with Basic Bias if the Bias is turned on.

- CTRL =** Quit - Exits the Memory Editor and returns to the Gram Kracker Loader menu.
NOTE: The Loader switch MUST BE in the LOADER ON position in order to exit the Memory Editor.

- ENTER** When the cursor is in the memory window, pressing ENTER will home the cursor in the upper left hand corner of this window. When the cursor is in the input fields above the memory window, pressing ENTER will take you to the next field.

- ARROW KEYS** The Left and Right Arrow keys are active when the cursor is in the input field area. All Arrow keys are active when the cursor is in the memory window.

- SHIFT ARROW KEYS** When the cursor is in the memory window you can press SHIFT FCTN and an arrow key to lock the cursor on the current byte and drag the memory display around in the window.

c3E70 Start 0000 Finish 0000
 Dest c0000 Fill 00
=====

c3E70 Designates the current type of memory in the display window (Cpu, Grom/Gram or Vdp - C, G or V) and the current address at the home position of the memory window. When the cursor is in the memory window (FCTN 9) the address will track the current cursor position. You can place a C, G or V in the C field to change the memory type displayed or just press FCTN 1 - Window.

Start 0000 Designates the Start address for a FILL, MOVE or SEARCH operation. The Start address is for the memory type (C,G or V) currently displayed in the memory window.

Finish 0000 Designates the Finish address (inclusive) for a FILL, MOVE or SEARCH operation. Naturally, the Finish address is also for the memory type currently displayed in the memory window.

Dest c0000 Designates the memory type and address Destination for a MOVE operation. The source is determined by the current memory type displayed in the memory window and the Start and Finish addresses set in these fields. This DOES NOT indicate the destination for a FILL!

Fill 00 Designates the byte to be used for a FILL operation. The area to be FILLED is determined by the current memory type displayed in the memory window and the Start and Finish addresses set in these fields.

NOTE: Whenever you FILL, MOVE or EDIT Gram 0, Grams 3 - 7 and Cartridge Ram at c6000-7FFF the WRITE PROTECT switch MUST BE OFF. Also, if you want to FILL, MOVE or EDIT Gram 1, the Loader MUST BE OFF.



EXAMPLES:

MOVE the entire 8K contents of Grom/Gram 0 (g0000-1FFF) out to High Memory expansion at cA000. Set the input fields as follows and press FCTN 2 Move. (**NOTE:** xx indicates - don't care what this value is - not used for this operation)

gxxxx Start 0000 Finish 1FFF
 Dest cA000 Fill xx
=====

MOVE 8K of High Memory Expansion (cA000-BFFF) to Gram 7 (gE000-FFFF). Set the input fields as follows and turn off Write Protection before pressing FCTN 2 - MOVE.

cxxxx Start A000 Finish BFFF
 Dest gE000 Fill xx
=====

FILL Grams 0, 1 & 2 with >00. Set the input fields as follows and turn off Write Protection before pressing FCTN 3 - FILL. Also, enable Grams 0, 1 & 2 and turn Off the Loader.

gxxxx Start 0000 Finish 5FFF
 Dest xxxxx Fill 00
=====

DUMP the entire 8K contents of Grom/Gram 0 (g0000-1FFF) to the Output Device (see options on page 21 for setting the Output Device). Set the input fields as follows before pressing FCTN 8 DUMP. The Dump function outputs an 80 column printout of the Hex, ASCII and ASCII with Basic Bias characters.

gxxxx Start 0000 Finish 1FFF
 Dest xxxxx Fill xx
=====



The Gram Kracker Memory Editor contains a powerful Search feature. This function allows you to Search through any type of memory (C,G or V) for bytes in Hex, ASCII or ASCII with a Basic Bias added to it. To use the Search function simply follow these steps:

1. Select the type of memory you want to search through by pressing FCTN 1, window, or by typing a C,G or V in the first input field.
2. Press FCTN 5 - Search to activate the search function and then type in the Start and Finish addresses for the search. Next press FCTN 9 to place the cursor in the Search input field.
3. At this time you can press FCTN = for Hex or ASCII and if you select ASCII you can press FCTN 0 for Bias or no Bias. Bias is used in Grom for the Basic's Error Messages. CALLS, Program Names and DSR names DO NOT have a Bias Added to them.
4. After you have selected Hex, ASCII or ASCII with Bias you can type in the Hex or ASCII string to search for. Once this is typed in press FCTN S (Left Arrow) once to place the cursor on top of the last character or byte to search for in the string and then press ENTER to start the Search.
5. When the string is found the Memory Address and Window will change to show you where it was found. Also the START address will change to one address higher than the Memory address. This allows you to just press ENTER again to Search for the next occurrence. When you are finished Searching just press FCTN 5 again to leave the Search function.

EXAMPLE:

SEARCH the module Gram space (g6000-FFFF) for the Extended Basic ERROR messages. (NOTE: you must first load Extended Basic into the Gram Kracker or have the Extended Basic module plugged in. Also, when Editing the module space or Gram 0 memory the Write Protect switch must be in the Bank 1 or 2 position.)

MG

Press FCTN 5 - SEARCH, FCTN 0 - BIAS and FCTN = Hex/ASCII to enable the Search function and place the memory window in ASCII with the Bias turned on. Next, set the input fields as follows and press FCTN 9 to place the cursor in the Search input field.

```
gxxxx  Start 6000  Finish FFFF
                Dest xxxxx  Fill  xx
===== bias =====
E R R O R
-----
```

With the cursor in the Search input field type in ERROR and then PRESS FCTN S (Left arrow) once to place the cursor ON TOP OF THE LAST LETTER, or byte, to search for. Next press ENTER and the memory editor will search through Grom/Gram g6000 through gFFFF for the first occurrence of the word ERROR with a Basic Bias. After it has found the first occurrence you can either press FCTN 5 to leave the search function or press ENTER to find the next occurrence.

Options

OUTPUT DEVICE

The Memory Editor always starts up with the output device of PIO. displayed in the memory window. If you would like to change the output device simply press FCTN 9 to place the cursor in the memory window and type in your output device. You can type in any valid output device i.e. RS232.BA=9600, DSK1.MEMDUMP, RD.MEMDUMP, WDS1.SUBDIR.MEMDUMP etc.

NOTE: The output device is only used when you press FCTN 8 - DUMP and you have set up a Start and Finish address range to Dump.

COLORS

The Memory Editor starts up with the default colors of white letters on a dark blue screen. By pressing FCTN 7 - COLORS you can toggle between a number of different color combinations to find the one that best suits your taste.

MG

THE UTILITIES

The following files are on the Utility diskette that came with your Gram Kracker. They have all been set up to load with the LOAD MODULE selection on the Gram Kracker menu.

EXPLORER and EXPLORER1

These files are used to change your MG EXPLORER program (sold separately). It allows the Explorer to talk to 2 different types of GRAM.

First select 3 Init Module Space and then select 1 Load Module and type in DSK1.EXPLORER - After this file is loaded a new menu will appear with the following items on it:

- 1 True Gram
- 2 Pseudo Gram
- 3 Exit

The TRUE GRAM option is the one to use with the Gram Kracker, this option will NOT decrement the Gram Address prior to writing to it. The Pseudo Gram option is the way the Explorer is currently configured so it will not work properly with the Gram Kracker if you use it to edit Gram Memory. (NOTE: This is the way the TI Debugger and Super Bug work so they will NOT write to Gram Memory without a slight modification to their source code - remove the DEC before setting the Gram Address for a write.)

When you select 1 True Gram the following instructions will appear on the screen:

- * Remove Write Protect Tab
- * Install Disk in Drive One
- * Press ENTER to Start
- * Press BACK for New Option

This is to instruct you to remove the write protect tab from your EXPLORER diskette and to insert it in drive one. Then press ENTER to patch the Explorer program for True Gram Simulation. If you want to Abort this just press FCTN 9, BACK, to go back to the previous menu. After the patch is completed be sure to put the write protect tab back on the Explorer diskette.



E/AGRAMDSK or TIWGRAMDSK

E/AGRAMDSK loads the EDIT1, ASSM1 and ASSM2 files into the Gram Kracker and patches the previously loaded E/A module to allow for RAPID loading and execution of the Editor or Assembler.

TIWGRAMDSK loads the EDITA1, EDITA2, FORMA1 and FORMA2 files into the Gram Kracker and patches the previously loaded TI-Writer module to allow for RAPID loading and execution of the Editor or Formatter.

NOTE: E/AGRAMDSK or TIWGRAMDSK CAN NOT BE USED IF YOU ARE GOING TO USE E/A-MOVER or TIW-MOVER

1. Select 3 Init Module Space from the Gram Kracker menu and follow the instructions on the bottom of the screen.
2. Load a previously saved E/A module, for E/AGRAMDSK, or TI-Writer module, for TIWGRAMDSK into the Gram Kracker and then load the appropriate file, E/AGRAMDSK or TIWGRAMDSK, with the LOAD MODULE option of the Gram Kracker and follow the instructions on the screen.
3. MAKE SURE THE WRITE PROTECT SWITCH IS TURNED OFF (Bank 1 enabled). After the modification is complete you will be returned to the Master Title screen. At this time place the Write Protect switch back on (W/P position).
4. Go Back into the Gram Kracker and SAVE your new E/A or TI-Writer. (See NEWCHARS for the CHARA1 file)

These New modules now contain the EDIT1, ASSM1 and ASSM2 files for the E/A module or the EDITA1, EDITA2, FORMA1 and FORMA2 files for the TI-Writer module. When you use these new modules you no longer need to have these files in drive one. Instead they are RAPIDLY copied from Grom/Gram to Memory Expansion and executed. This not only frees up space on your work diskettes but they make using these New modules much nicer since you do not have to WAIT for these files to load from disk anymore.



E/A-MOVER or TIW-MOVER

These utilities allow you to MOVE the E/A and TI-Writer modules from their current location in Gram 3 (g6000-7FFF) to another Gram chip. For example you could use these files to move one of them to Gram 7 (gE000-FFFF) and then load Extended Basic into the Gram Kracker and save the New module as XB-EA or XB-TIW. This allows both modules to appear on your menu. If you have an 80K Gram Kracker you could move one to Gram 1 (g2000-3FFF) and the other one to Gram 2 (g4000-5FFF). This would leave ALL of the module space FREE for other modules and give you a menu with TI-Writer, Editor Assembler and any other module you would like on it.

NOTE: E/A-MOVER or TIW-MOVER CAN NOT BE USED IF YOU ARE GOING TO USE E/AGRAMDSK or TIWGRAMDSK.

1. Select 3 Init Module Space from the Gram Kracker menu and follow the instructions on the bottom of the screen.
2. Load a previously saved E/A module, for E/A-MOVER, or TI-Writer module, for TIW-MOVER into the Gram Kracker and then load the appropriate file, E/A-MOVER or TIW-MOVER, with the LOAD MODULE option of the Gram Kracker and follow the instructions on the screen.
3. MAKE SURE THE WRITE PROTECT SWITCH IS TURNED OFF (Bank 1 enabled). Also, if you are moving either of these modules to Gram 1 (g2000-3FFF) BE SURE TO TURN OFF THE LOADER! After the modification is complete you will be returned to the Master Title screen. At this time place the Write Protect switch back on (W/P position) and turn the Loader back on.
4. Once the module(s) have been moved where you want them you can go back and load any other module. This will allow multiple modules on your menu. If they were moved to Grams 1 & 2 you will need to SAVE Console Grom/Grams 1 & 2. Otherwise, just SAVE the module space. If the E/A is moved to Grams 4 through 7 you need to edit **g7FFC** after the other module is loaded and add these bytes for TI Basic: **OE B6 00**.

XBCALLS

This utility file will add the following new CALLs to Extended Basic.

- CALL NEW** - Adds the NEW command for use in a running program.
- CALL BYE** - Adds the BYE command for use in a running program to return you to the Master Title screen upon completion of your Extended Basic Program.
- CALL CLSALL** - This CALL will CLOSE ALL OPEN FILES - you do not need to give it any file numbers just execute CALL CLSALL.
- CALL CLOCK** - This is an Assembly/GPL hybrid program. When you execute it it moves a small interrupt driven Assembly routine out to Low Memory Expansion. This routine displays a 24 hour clock in the upper right hand corner of the screen. **NOTE:** Since it is interrupt driven it slows down during disk accesses.
- CALL CLKOFF** - Turns off the above clock.
- CALL CAT** - Catalogs a diskette, Ram Disk or Hard Disk - PROVIDED they have a standard Catalog routine in their DSR. If you can use a Basic or Extended Basic Catalog Program to catalog the device then CALL CAT will also work for that device. The Syntax for this Call is:
CALL CAT("DSK1.") for Drive 1 or
CALL CAT("RD.") for the Myarc Ram Disk or
CALL CAT("WDS1.") for the root directory of a hard disk (subdirectories cannot be accessed).

These CALLs ARE FOR USE WITH VERSION 110 EXTENDED BASIC ONLY! Load Extended Basic Version 110 into the Gram Kracker and then load the XBCALLS file with the LOAD MODULE option of the Gram Kracker. Once this file is loaded you will be returned to the GRAM KRACKER menu so just select SAVE MODULE and save your new Extended Basic.

MSAVE and MSAVE6

These two utility files allow you to write TI BASIC (not Extended Basic) programs that reside in the module space not in VDP Ram. They also add the Basic program to the menu and allow you to directly execute the program with the press of a key. The ability to run Basic programs in the module space is a feature that TI built into the Basic Interpreter. Some of the TI modules contain TI Basic as well as GPL.

MSAVE loads into Gram 7 (gE000-FFFF) and reserves this 8K space for TI BASIC (not Extended Basic) programs.

MSAVE6 loads into Gram 3 (g6000-????) so it can use all of the module Gram space for BASIC programs that you write (up to 40K).

1. Decide which utility you want to use and load it with the Load Module selection on the Gram Kracker menu. If you are going to use MSAVE6 select 3 Init Module Space before you load this file.
2. Once the file is loaded you can go into TI BASIC and load or write a Basic program then type in CALL MSAVE and follow the instructions on the screen. This routine moves your Basic program out to Gram, sets up a proper line number table in Gram and sets up a header for it on the menu so that it can be directly executed by pressing a key. (**NOTE:** The TI Operating System can only handle 9 items on the menu at one time.)
3. Besides adding CALL MSAVE to TI Basic these utility files also add CALL BYE for a nice exit back to the Main Title Screen.

NOTE: Since CALL MSAVE is a BASIC utility - you must have the Loader Off in order to access TI BASIC and whenever you select one of your Basic programs from the menu.

NEWCHARS and CHARA1

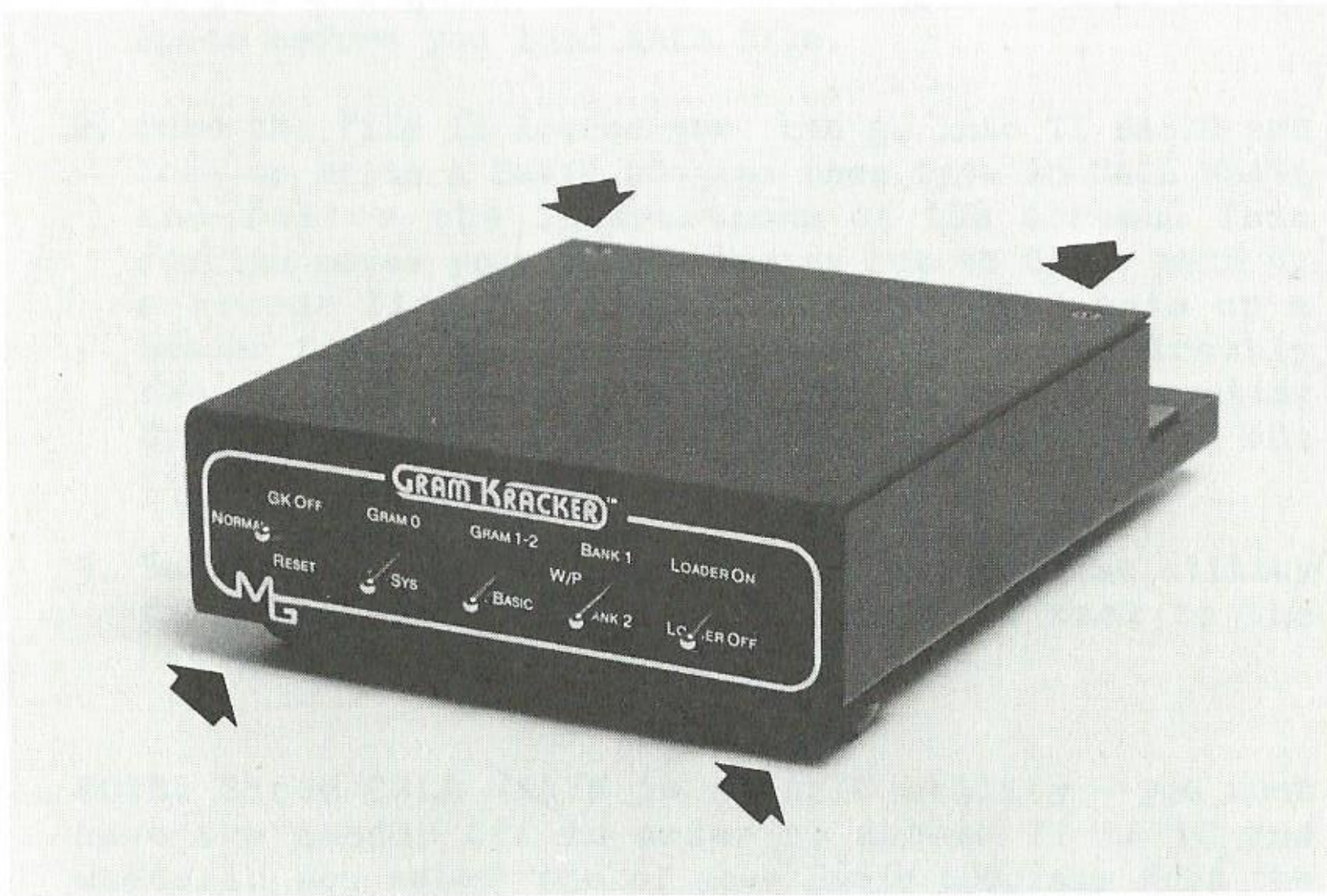
These files are used to install a new character set into GRAM 0. This requires an 80K Gram Kracker (optional Gram (Ram) chips installed).

1. Load an Operating System into Gram 0 (see Load/Save Console) and then load the NEWCHARS utility with the Load Module selection on the Gram Kracker menu.
2. Follow the instructions on the screen. **DON'T FORGET** to turn off Write Protection.
3. After the utility is finished loading the new character set into Gram 0 you will be returned to the Main Title Screen. Go back into the Gram Kracker and **SAVE** the new contents of Gram 0 (not Op/Sys) with the Load/Save Console selection.

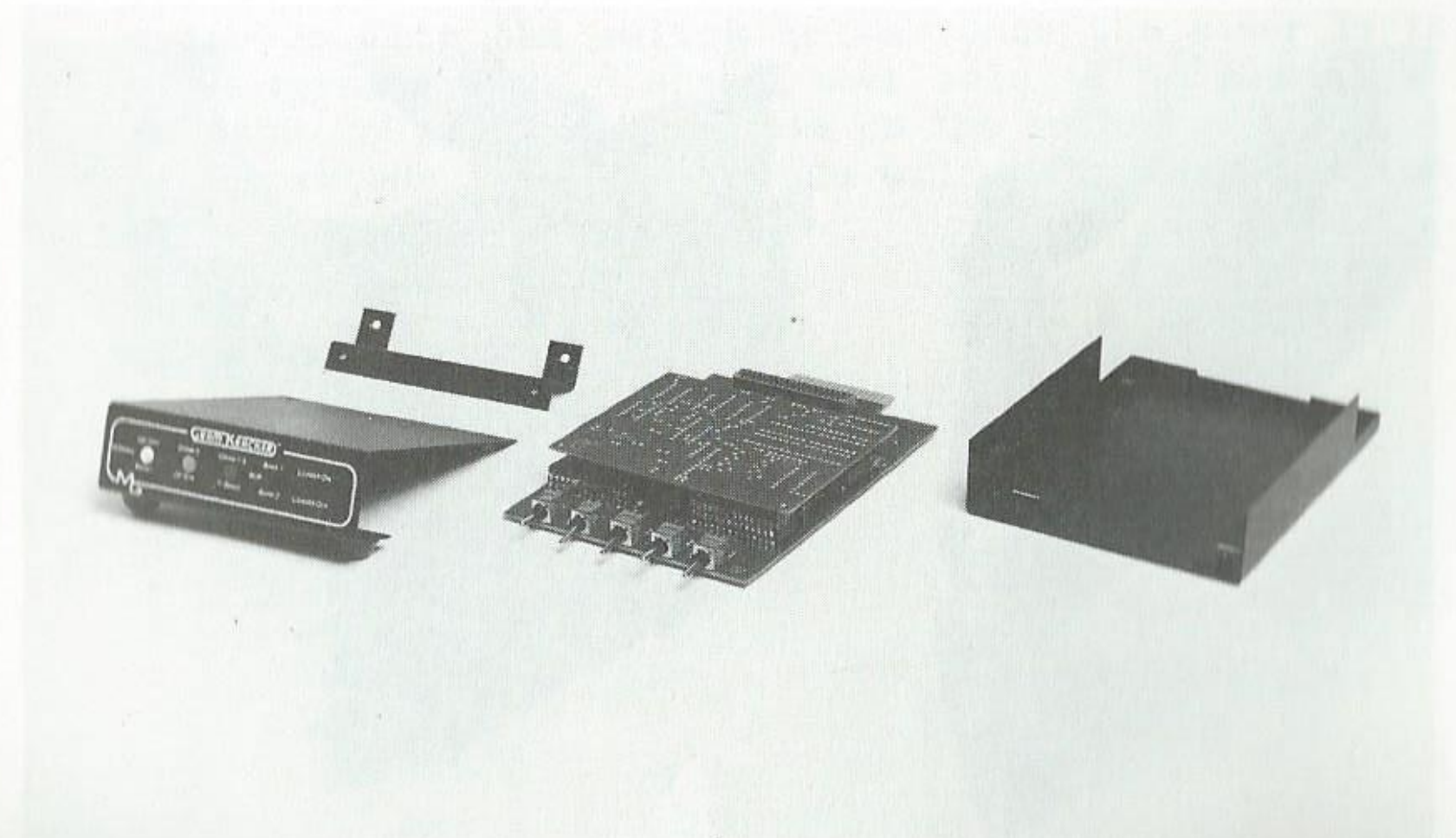
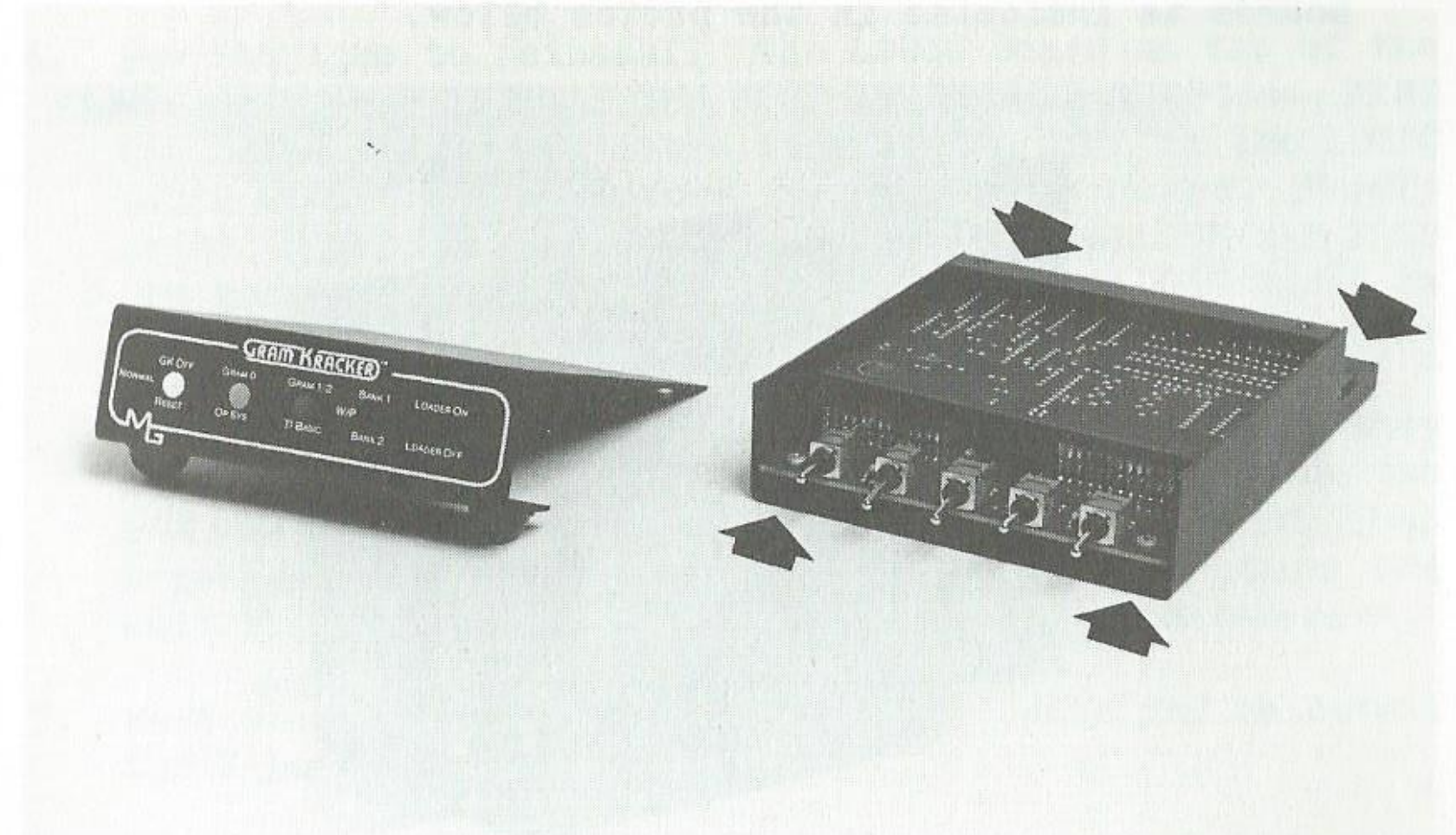
REMOVING THE GRAM KRACKER CIRCUIT BOARDS

PLEASE NOTE: If you would like us to install your optional Gram Chips for you we would be more than happy to do so. Just send the unit with your chips back to us along with 4.00 to cover return shipping and insurance and we will install and test them for you. Or, if you do not have the extra chips, you can send the unit back to us along with a check for 17.50 (13.50 for chips and 4.00 for shipping) and we will install and test them for you.

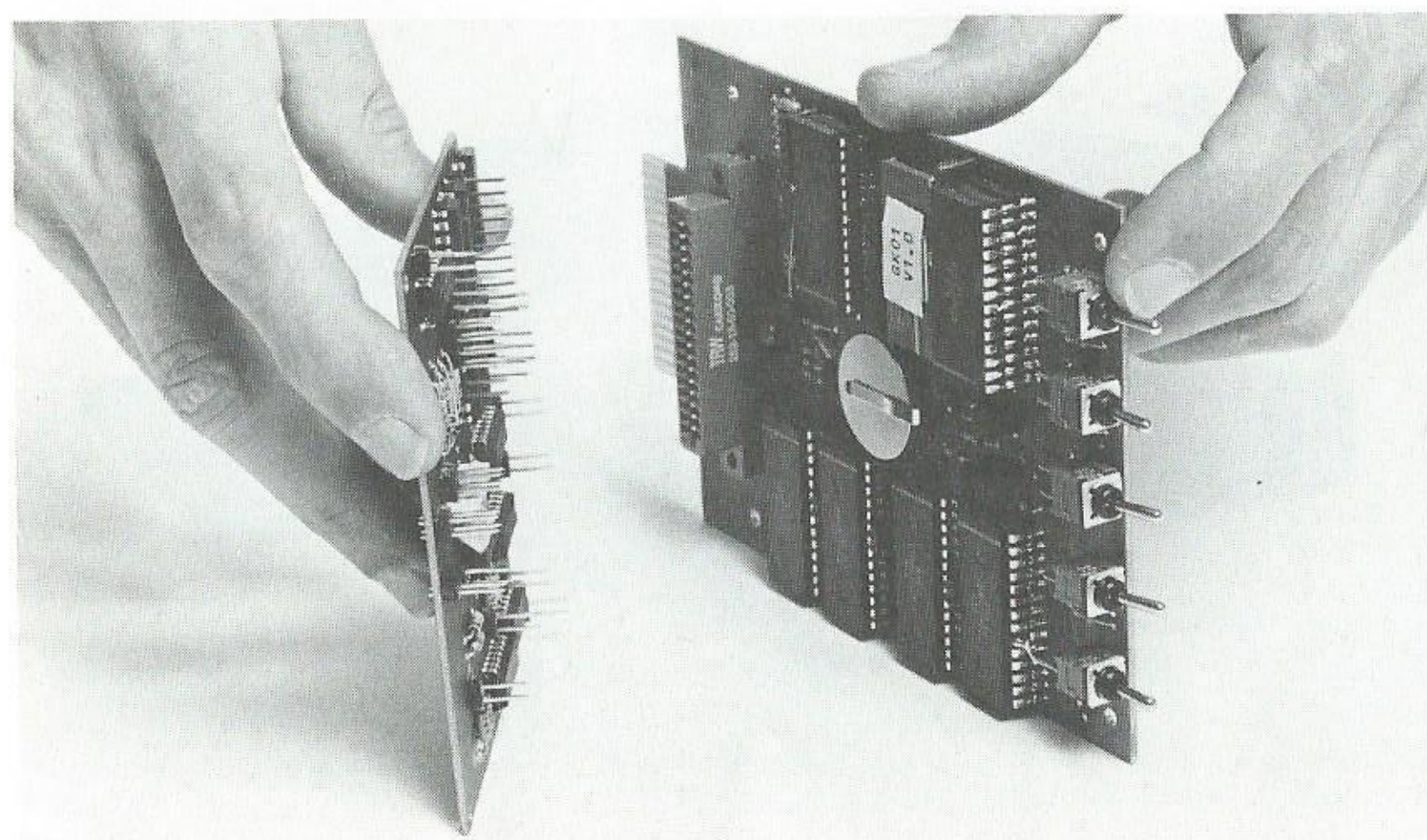
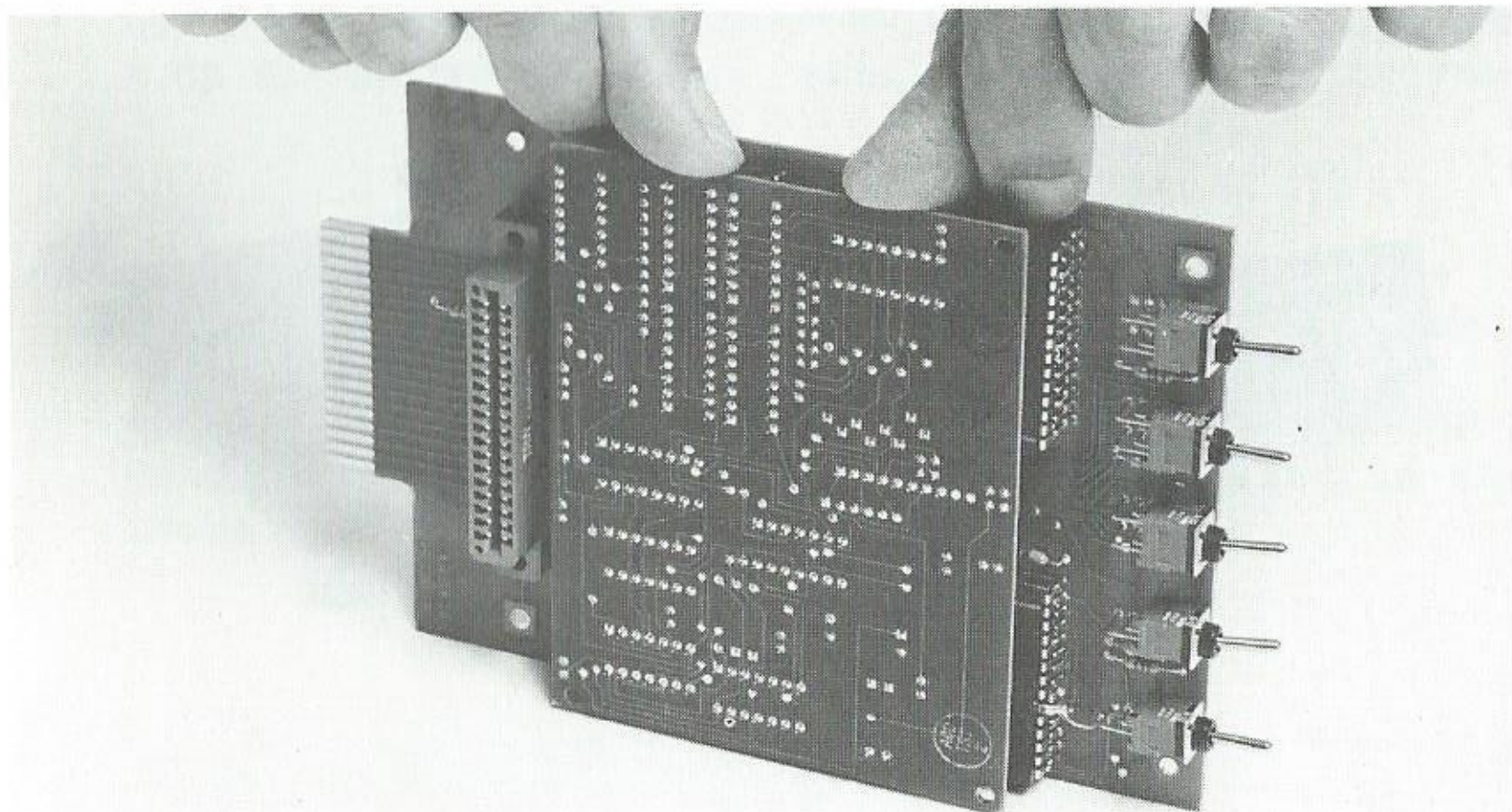
1. Properly ground yourself by touching the back of your P-Box and then remove the Gram Kracker from the computer.
2. Remove the 2 screws on the top of the case and the 2 screws on the bottom of the case as indicated in the photo below.



3. Slide the top cover off and then remove the 2 screws that hold the front Z bracket in place and the 2 screws near the switches. Next remove the unit from the case.



-
4. CAREFULLY separate the LOGIC Board (Top circuit board) from the MEMORY Board (Bottom circuit board) by gently prying the sides apart with your fingers a little at a time using your thumb and forefinger inbetween the two boards as indicated in the photos below.

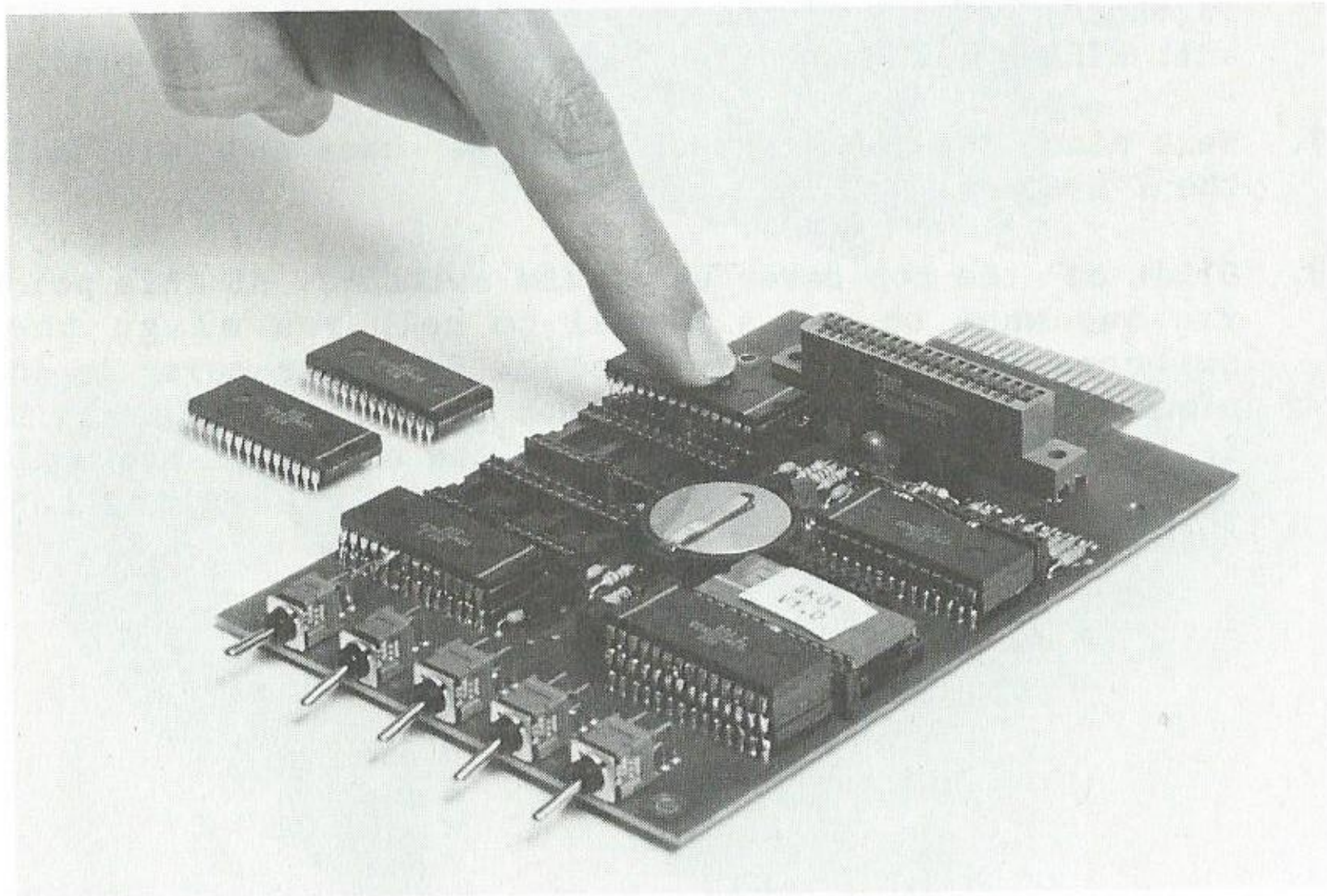


-
5. YOU ARE NOW READY TO INSTALL THE OPTIONAL RAM CHIPS OR A NEW BATTERY. Please proceed with that section of the manual, next few pages, and then return here to put your unit back together.
6. Now its time to reinstall the LOGIC Board on top of the Memory Board. THIS IS THE MOST IMPORTANT STEP!! - VERY CAREFULLY little by little line up the pins on the LOGIC Board with the connectors on the lower board. Slowly press together the 2 boards MAKING SURE ALL OF THE PINS are going into their connectors until the LOGIC Board is almost touching the top of the 3 Ram Chip Stack in the lower right hand corner of the MEMORY Board. The 2 boards will only go together just so far before they stop. Because of the number connections between the two boards they will be fairly snug as you push them together. If any of the pins miss their connectors the unit WILL NOT WORK and you will probably bend the pins.
7. Next place the boards back into the case and reinstall the Z bracket.
8. Slide on the top cover up to the switches. At this point you may want to use a pencil to help you align the switches with the switch holes. Once the cover is in place reinstall the 4 screws that hold it in place. It is best to put in the screws on the bottom of the unit by the rubber feet first. This will help keep the top cover aligned with the bottom.

INSTALLING THE OPTIONAL RAM CHIPS

After you have followed the steps on the previous pages for removing and separating the two circuit boards you can install the Optional Ram chips to make your Gram Kracker an 80K unit as follows:

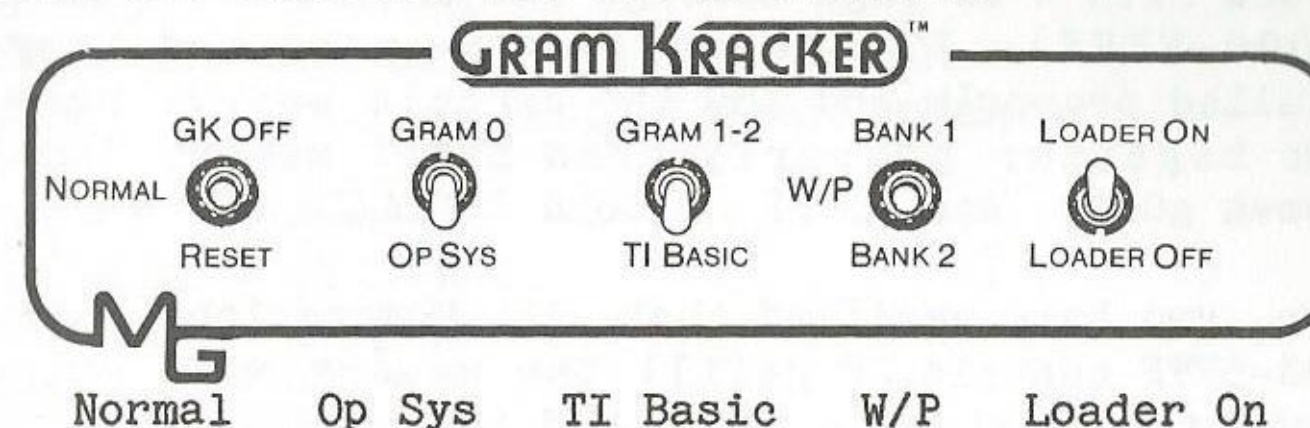
1. CAREFULLY line the chips up with the sockets, with the notch or number one pin facing into the middle of the circuit board, towards the battery, and press them straight down. **NOTE:** DO NOT handle the chips by their connection pins only touch the lengthwise edges. You may need to lay the chip on its side on a flat surface and CAREFULLY bend the legs in towards the middle of the chip to help line them up with the socket.



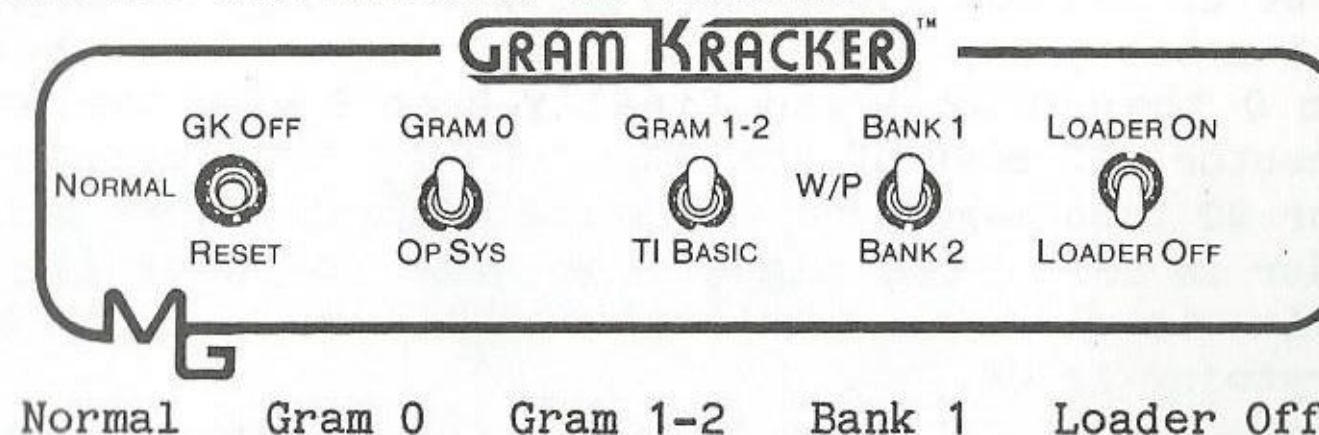
2. Go to page 31, steps 6 through 8, for instructions on reassembling the Gram Kracker and then go on to the next page to test the new Gram (Ram) chips just installed.

MG

3. Reinstall the Gram Kracker into your computer and make sure the switches are set as follows:



4. Turn on the computer, select Gram Kracker from the menu and then select 5 Edit Memory from the Gram Kracker menu. Next press FCTN 1 to change the memory window to Grom/Gram.
5. Now set the switches as follows:



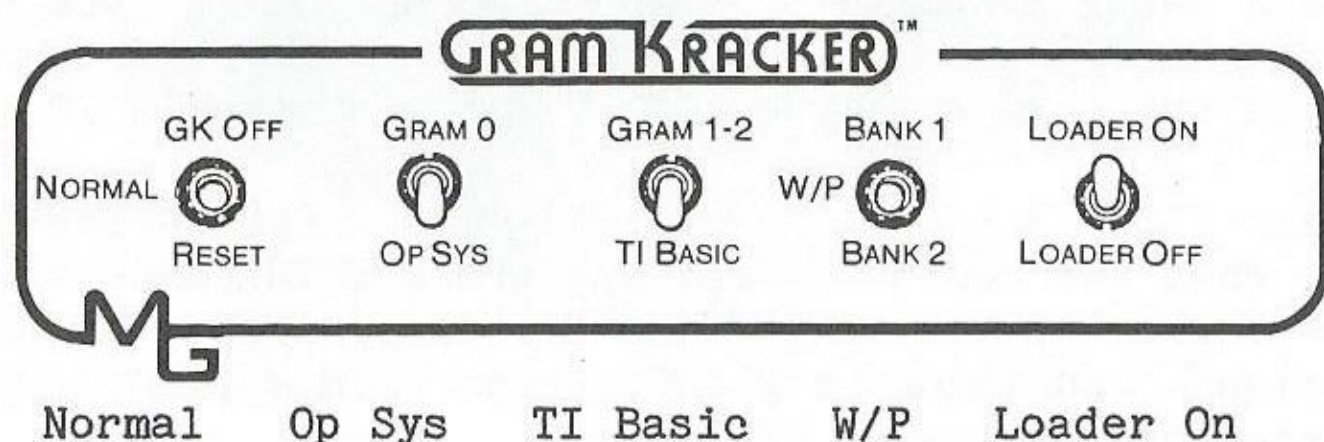
6. Press ENTER 3 times to place the cursor in the FINISH field and type in 5FFF. Then press ENTER 2 times to place the cursor in the FILL field and type in FF.
7. Press FCTN 3 to FILL Grams 0,1 and 2 (g0000-5FFF) with FF. When the cursor comes back press ENTER once to place the cursor in the MEMORY ADDRESS field (upper left hand corner) and type in g0000. Press FCTN = (ASCII/HEX) to place the display in HEX mode.

MG

8. At this time the memory window should be full of FFs. Now use FCTN 4 to page through the entire new Gram space (g0000-5FFF). If the chips are good and they are installed properly and the two circuit boards were put back together properly then EVERY memory location between g0000 and g5FFF SHOULD CONTAIN FF.
9. After you have verified that ALL Memory locations from g0000-5FFF contain FF refill the memory with 00. Just change the Fill byte to 00 and then press FCTN 3 FILL. Now verify that these same memory locations (g0000-5FFF) contain 00. If they do, then everything is OK. If they don't it is possible that the Ram chips are bad or that they are not installed properly.

NOTE: If the all memory locations but a few contain the FF or 00 then it is most likely that the Ram chip(s) is/are bad. Try swapping a couple of the chips around to see if the bad locations follow the chip. If they do, it is a bad chip. The chip closest to the switches is Gram 0 then Gram 1 and finally Gram 2 near the module connector. If most of the locations DO NOT contain the FF or 00 then make sure the Write Protect is OFF and the Loader is OFF. You might also want to check the the Logic to Memory Board connections to make sure everything is OK.
(If you cannot get them to fill right - give us a call.)

10. Set the Gram Kracker switches as follows:



And press CTRL = to exit the Memory Editor. You are now ready to use your 80K Gram Kracker.

INSTALLING A NEW BATTERY

Battery Specifications

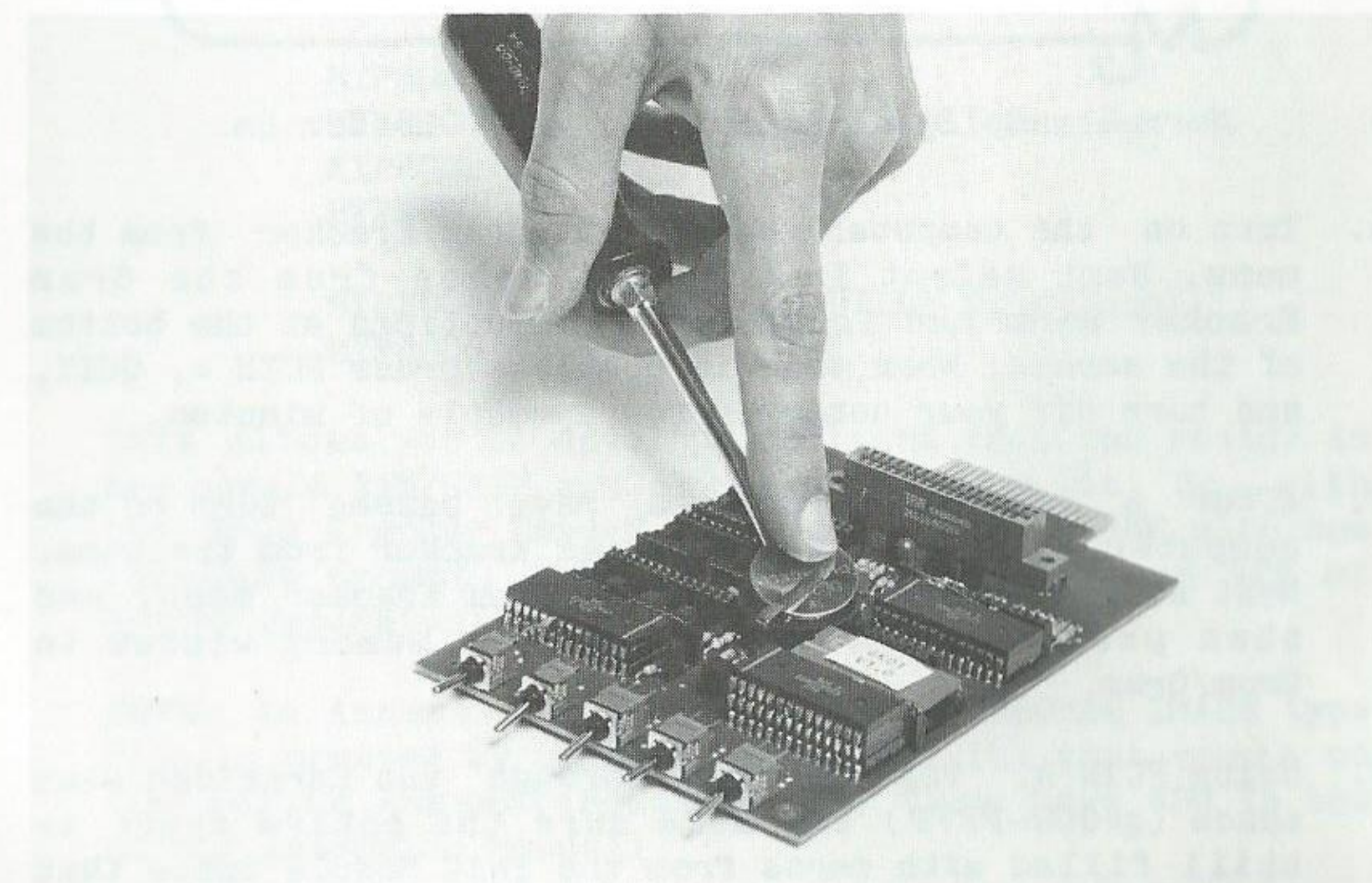
Voltage 3 Volts
Capacity 200 mAh (Mili-Amp Hours)
Size 24.5 mm (.965 inches) diameter

Battery Part Numbers

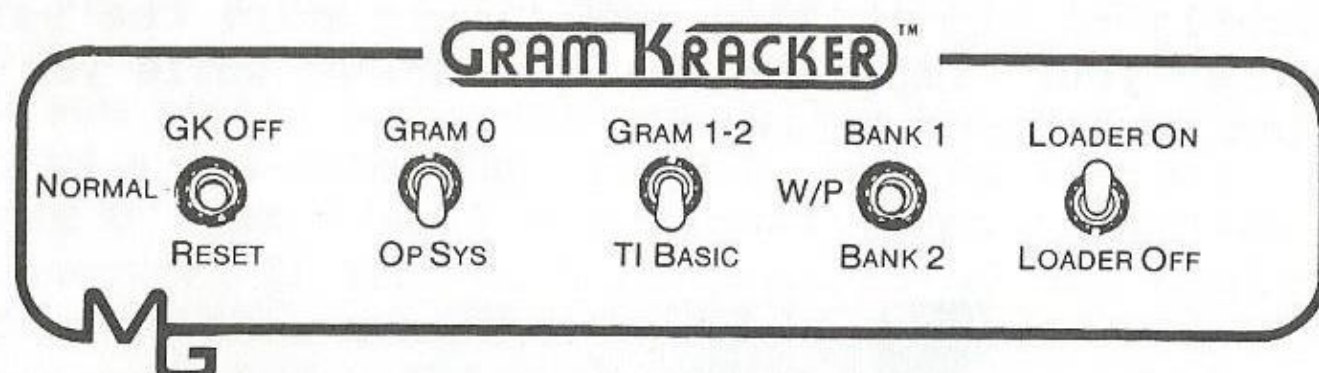
GE Varta - CR 2430
Duracell - CR 2430
Sanyo - CR 2430

After you have followed the steps in the section titled REMOVING THE GRAM KRACKER CIRCUIT BOARDS, on page 28, you can install and test a new battery as follows:

1. Remove the old battery by sliding a small flat bladed screwdriver underneath the battery. Then lift up slightly on the battery and firmly hold the battery between your finger and the screwdriver while you slide it out, see photo below.



2. You might want to test your new battery with a Volt Ohm meter to make sure that it is at least 3 volts before you install it. Sometimes these batteries sit on the shelf a long time before they are sold.
3. Install the new battery with the POSITIVE (+) SIDE UP by gently sliding it underneath the positive contact until it seats itself in the holder.
4. Go back to the section on REMOVING THE GRAM KRACKER CIRCUIT BOARDS, on page 31, and follow steps 6 through 8 for putting your unit back together. Then come back here to test out your new battery.
5. Reinstall the Gram Kracker into your computer and make sure the switches are set as follows:



Normal Op Sys TI Basic W/P Loader On

6. Turn on the computer and select Gram Kracker from the menu. Next select Init Module Space from the Gram Kracker menu and follow the instructions at the bottom of the screen. When this is complete press FCTN =, QUIT, and turn off your computer for a couple of minutes.
7. After a couple of minutes have passed turn on the computer again and select Gram Kracker from the menu. Next select Edit Memory from the Gram Kracker menu, and then press FCTN 1 to change the memory window to Grom/Gram.
8. Using FCTN 4, Page Up, look through the Cartridge Gram space (g6000-FFFF) and make sure the entire space is still filled with zeros from the Init Module Space that was executed in step 5. (If not - give us a call)

MG

ADVANCED FEATURES

UTIL OPTION

The Gram Kracker's Save Module routine contains a UTIL OPTION. This option gives software developers the ability to automatically CHAIN the loading of Assembly Language UTIL1 or PROGRAM IMAGE type files along with the loading of the Gram Kracker's module space.

1. To invoke the UTIL OPTION simply press FCTN X when the Device.filename prompt appears after selecting 2 Save Module from the Gram Kracker menu. Then, as the last 8K block of the module is saved, a special flag (>80) will be placed in the beginning of this block to indicate to the Loader that there are Assembly file(s) to be loaded into Expansion Memory.
2. After the module is saved, catalog the disk to find the last filename used and change your UTIL1 type file's filename, which should be on the same disk, to continue the filename order (i.e. 1 2 3 4 5 6 7 8 9 : ; < = > ? etc.). Example:

```

MYPROG
MYPROG1      Saved module filenames
MYPROG2
MYPROG3

MYPROG4      Your new UTIL1 filenames
MYPROG5

```

This allows you to develop software that can reside in the module RAM/GRAM and in Memory Expansion. So, with the Gram Kracker Loader you can load up to 88K with one filename prompt. (56K Cartridge RAM/GRAM and 32K of Memory Expansion)

NOTE: An Assembly Language UTIL1 or PROGRAM IMAGE type file is created by using the Save Utility that comes on the Editor Assembler diskettes. (see page 420 in the Editor Assembler Manual)

MG

MODULE MODIFICATIONS

TEXT CHANGES

Whenever you change Text in the module space or in Grams 0 - 2 NEVER make it any longer than the existing Text. If you do you will most likely wipe out an important part of the program and the module will not work properly!!

You can always make it shorter and pad it with spaces but do not make it any longer. Also, if you are changing the text that appears on the menu screen DO NOT use lower case letters since they are not defined yet by the Power Up routine.

We have modified most of the text in our modules by adding lower case. This has, in our opinion, improved the screen displays for these modules.

COLOR CHANGES

The following Grom addresses are where the Color byte(s) are located for a few of the modules. The color codes are the same as the ones used in Assembly Language (Basic color code minus one).

Editor/Assembler

g652C - Text and Background for menu screens
g6537 - Text/Screen color after first menu and for the Editor (Text mode)
g653C - Text and Background for Load and Run Program
g6547 - Screen color for Load and Run Program
g6B3D - Screen color for the first menu screen - but only the first time it is accessed.

TI-Writer

g6284 - Text and Background for menu screens
g68C1 - Screen color for menu and Default Text/Screen color for the Editor (the default Text/Screen color for the formatter is located in its disk file)

Mini-Memory

g6D15 - Text and Background for menu screens
g6BAE - Screen color for menu screens

TI Disk Manager II

The TI Disk Manager II module does not set its own Text and Screen colors. Instead, it uses the ones that are set on the menu screen.

Extended Basic

1. With Extended Basic loaded into the Gram Kracker select 5 Edit Memory from the Gram Kracker menu. Press FCTN = for Hex, FCTN 1 for Gram Memory and then press FCTN 5 for Search.
2. Type in 6000 for the START address and 7000 for the FINISH address. Press FCTN 9 to place the cursor in the Search String Input area and type in 4A 04 07 and then press FCTN S (Left arrow) to put the cursor on the last byte to search for (07) and press enter.
3. For most Extended Basic modules this Hex string will be found at >6938. Now press FCTN 5 to leave SEARCH and then press FCTN 9 to put the cursor in the memory window. You can now replace the 07 (third byte in the window) with the HEX SCREEN COLOR (>00 thru >0F) that YOU want. (i.e. >04 is dark blue).
4. Now press FCTN 5 to enter SEARCH again, the START and FINISH addresses are OK as they are. PRESS FCTN 9 to put the cursor in the Search String Input area and type in BE A8 0F 10, press FCTN S and then ENTER.
5. For most Extended Basic modules this Hex string will be found at >6945. Now press FCTN 5 to leave SEARCH. You can now replace the 10 (fourth byte in the memory window) with the HEX TEXT COLOR (>00 thru >F0) that YOU want. (i.e. >F0 will give you white letters on a transparent background so the HEX SCREEN COLOR will set the background color).
6. Press CTRL = to leave the Memory Editor and then resave your modified Extended Basic module.

SUPER E/A CART

Many 4A owners have built or purchased a Super Cartridge. This is usually an Editor Assembler module with 8K of Ram added to it. The Gram Kracker will simulate a Super Cartridge if you LEAVE THE WRITE PROTECTION OFF (Bank 1 or 2 position). This will give you an extra 8K of Ram for your Assembly programs in the Cartridge space of c6000-7FFF. (also see Appendix C - Gram Kracker Memory Map, for more information on Cartridge Rom/Ram)

TAX MODULE PIO

The following patch will allow you to change the Tax Investment module from RS232 to PIO for your printer.

1. After the module is loaded into the Gram Kracker, select 5 Edit Memory from the Gram Kracker menu. Next press FCTN 1 for Grom/Gram memory window.
2. In the first field of the Memory Editor type in g604A to set the Gram Address to Edit.
3. Press FCTN 9 to place the cursor in the the Editor Window.
4. Change R'R to P'R (make sure the write protect switch is turned off first)
5. Press CTRL QUIT to go back to the Gram Kracker menu and then resave the modified module.

TE II 1200 BAUD

The following modifications will allow you to change the TE II module from 300 & 110 baud to 1200 & 300 baud with 1200 baud for number 1 (default) and 300 for number 2.

1. Load the module into the Gram Kracker and select 5 Edit Memory from the Gram Kracker menu. Next press FCTN 1 for Grom/Gram Memory and FCTN = for Hex. Turn off Write Protection and press FCTN 5 Search to activate the Search function.
2. Type in 6000 for the Start Address and 77FF for the Finish Address and then press FCTN 9 to put the cursor in the Search input field. Then type in the values in the Search For column below. When they are found press FCTN 5 to leave Search and then change the found values to the ones listed in the Change To column.
3. After each change is made press FCTN 5 for Search and then press FCTN 9 to input the next Search For values. DO NOT change the Start and finish addresses at this time, just continue where you left off.

Search For	Change To
17 33 30	16 31 32
E1 33 30	E0 31 32
17 31 31	16 30 33
E1 31 31	E0 30 33
30 33	31 32
33 30 30 20	31 32 30 30

4. Before you start the search for the next two items change the Start Address to 8000 and the Finish Address to 9000.

Search For	Change To
31 31 30	33 30 30
30 33 30 30	31 32 30 30

5. After the modifications are complete use the SAVE MODULE routine to save your new TE II 1200 out to disk or cassette.

OPERATING SYSTEM MODIFICATIONS

An 80K Gram Kracker is required for the following modifications which will be made to an Operating System loaded in Gram 0. (see Load/Save console for loading Gram 0)

CONVERTING V2.2 CONSOLES

If you own two TI 99/4A consoles and one of them is a Version 2.2 it can be converted to a non-V2.2 by using the Operating System (Grom 0) from the non-V2.2 99/4A. Simply place the Gram Kracker in your non-V2.2 console and load Gram 0 with its Operating System. Then when you use the Gram Kracker on the V2.2 console with the Gram 0 switch on it will be a non-V2.2 console.

NOTE: You can not use the original 99/4 Operating System in a 99/4A because the console Roms are different and the keyboards are different.

SLASHING THE ZERO

If you have a standard character set loaded into Gram 0 you can slash the zero as follows:

1. Use the Gram Kracker's Memory Editor to search for the following bytes with a start address in Gram of 0000 and a finish address of 1000.

00 38 44 44 44 44 44 38

2. For most Operating Systems this Hex string will be found at >0723. Now press FCTN 5 to leave SEARCH and then press FCTN 9 to put the cursor in the memory window. Turn off Write Protection and type in the following bytes to change the zero to a slashed zero:

00 38 44 4C 54 64 44 38

3. After the change is made you might want to save Gram 0 with the Load/Save Console selection, unless you are going to make some of the other Operating System modifications.

AUTO EXECUTING ITEM 2 ON THE MENU

The following modification changes the Operating System LOADED INTO THE OPTIONAL GRAM 0. This will allow the Power Up routine to bypass the key presses needed and automatically execute item 2 on the menu. (Ideal for BBS Systems - now the computer will auto execute Extended Basic on Power Up.)

NOTE: This modification DOES NOT work with the Corcomp Disk Controller since it takes control on power up, but it will set up your Operating system to Auto Select item 3 on the Corcomp menu when you press the space bar.

1. Use the Gram Kracker's Memory Editor to search for and change the the following bytes in Gram 0. Use a Start Address of 0000 and a Finish Address of 1000.

To Bypass key press at Title Screen.

Search For	Change To
02 FF 03 41	02 FF BE 75 20

To Auto Select Item 2 on the TI menu.

02 FF 03 42	02 FF BE 75 32
-------------	----------------

NOTE: BE 75 32 is the opcode for Store >32 at 8375. 8375 is the memory location where the key code is stored after a key is pressed during a key scan. >32 is the hex value for ASCII '2'.

CORCOMP - EDITOR/ASSEMBLER FIX

If you have a Corcomp Disk controller you have probably noticed that there is a minor problem with the Editor Assembler module. From time to time when you type in a wrong file name this module will lock up with this card. To fix this problem search Gram 0 with a Start Address of 0000 and a Finish Address of 1000 and make the following patch to clear out a little more of Vdp Ram on Power Up. Thank You Danny Michael.

Search For:	35 0F FF A0 01 A0 00
Change To :	35 13 80 A0 01 A0 00

Appendix - A - Trouble Shooting

BYPASSING AUTO EXECUTE MODULES

This patch allows you to save Auto Execute modules, such as Plato, with the Gram Kracker and a TI or Myarc Disk Controller.

You should make this modification to a temporary Operating System loaded into Gram 0. You will only use this modified Operating System when you want to SAVE Auto Execute modules. When you want to RUN these modules you will need an Operating System without this patch.

Since these modules take control before the menu comes up you can not get to the Gram Kracker Loader. This patch will stop these modules from executing at all and allow the menu to come up instead. Use the Gram Kracker Memory Editor to search for and change the following bytes in Gram 0. Use a Start Address of 0000 and a Finish Address of 1000.

Search For: BE 43 13 06 03
Change To : BE 43 13 BE 42 60

After this change is made you might want to save this special Operating System for later use. Also, with this special Operating System in use, you can now SAVE all of your Auto Executing modules to disk. Once they are saved, load an Operating System into Gram 0 without this patch or place the Gram 0/Op Sys switch in the Op Sys position to RUN these modules.

NOTE: You can use GK OFF when an Auto Execute module is loaded into the Gram Kracker to prevent it from executing. This will allow the Gram Kracker Loader to appear on your menu. After you have selected Gram Kracker, place the GK OFF switch in the NORMAL position to Initialize the modules Space and/or load another module.

Problem	Probable Cause and Solution
Lock Up on the Title Screen or the Menu Screen	Bad data in the cartridge space with an >AA at the beginning of one of the Gram Chips. - Turn Loader On, Press Reset and place it in the GK Off position, Select Gram Kracker, place Reset switch in the Normal position and Init the module Space or Edit Memory and remove any >AA from g6000, g8000, gA000, gC000, gE000, Bank 1 c6000 and/or Bank 2 c6000.
	Bad data in the Optional Gram 0 space. - Place the Gram 0, Op Sys switch in the Op Sys position and press reset. Then reload a new Op System in Gram 0.
	Bad data in the Optional Gram 1-2 space. - Place the Gram 1-2 - TI Basic switch in the TI Basic position and press reset. Then reload the data in Gram 1-2 or use the Memory Editor to FILL this space with zeros.
	No reset line on the module plugged into the Gram Kracker's module port. - Press Reset and place the switch in the GK Off position.
	Bad contact between the module port and the Gram Kracker or between the module port circuit board and computer mother board connector (inside the computer). - Remove the Gram Kracker make sure the contacts are clean on it and in the cartridge port and reinstall the Gram Kracker.

Appendix - A - Trouble Shooting Continued

Problem	Probable Cause and Solution
Garbage on the Menu	<p>No reset line on the module plugged into the Gram Kracker's module port. - Press Reset and place the switch in the GK Off position. (Also see "No Title Screen")</p> <p>Bad data loaded into the Gram Kracker. Initialize the module Space and Reload the data. It is also possible that there is bad data in Gram 0 or Grams 1 & 2, enable Op Sys and TI Basic and press the reset switch. If that cleared up the problem reload Gram 0 and Grams 1 & 2.</p> <p>Bad contact between the module port and the Gram Kracker or between the module port circuit board and computer mother board connector (inside the computer). - Remove the Gram Kracker make sure the contacts are clean on it and in the cartridge port and reinstall the Gram Kracker.</p>
Module Won't Run Properly	See Appendix B - Special Modules - for further information.
Lost Data on Power Down	Possible dead battery or bad connection between the Logic Board and Memory board inside the Gram Kracker. Either replace the battery or check the Logic to Memory board connections.
Other Problems	If you have a problem that is not covered in this manual, that you can not solve, please give us a call at (714) 599-1431 and we will see what we can do to help.

Appendix - B - Special Modules

Extended Basic	Extended Basic contains 12K of Cartridge Rom. This Rom is in three 4K segments. The 4K segment at c6000 - c6FFF is fixed. There are two 4K segments that are bank swapped at c7000 - c7FFF. Extended Basic bank swaps by WRITING to Rom. Bank 1 is selected by writing to c6000, 6004, 6008 ... etc and Bank 2 is selected by writing to c6002, 6006, 600A ... etc. If you do not have the Write Protect ON Extended Basic WILL NOT WORK since it can not Bank Swap its upper 4K.
Mini Memory	The Gram Kracker can simulate the Mini Memory module by leaving the Write Protect switch in the Bank 1 or Bank 2 position. This turns OFF Write Protection and allows use of the Mini Memory Ram space at c7000 - c7FFF. Also, since the Gram Kracker is battery backed up, like the Mini Memory, it will function the same.
Atari Modules	These modules MUST BE SAVED with the GK Off - Normal - Reset switch in the GK OFF position. Also, some of these modules bank swap like Extended Basic except they bank swap the entire 8K cartridge Rom space (c6000 - c7FFF). You must have the Write Protect turned ON in order for them to RUN properly.
Personal Record Keeping Personal Report Generator Securities Analysis and Statistics	These modules contain TI Basic as well as GPL code. After these modules are loaded into the Gram Kracker place the Loader On - Loader Off switch in the LOADER OFF position. Also place the Gram 1-2 - TI Basic switch in the TI BASIC position. This will enable the TI Basic interpreter so these modules can run.

Appendix - B - Special Modules Continued

Milton Bradley Modules for the MBX System.

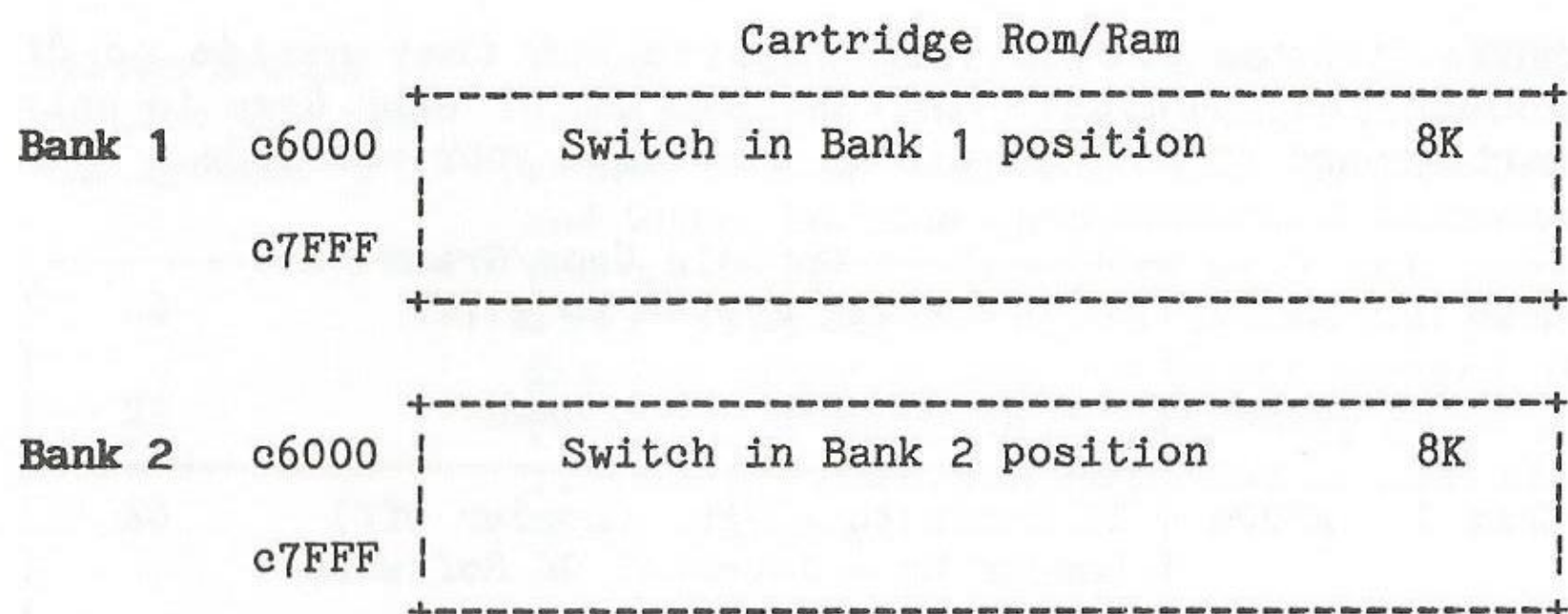
These modules have a very special architecture. They not only contain 4 banks of Rom but they also contain Ram and Grom. Because they contain 4 banks of Rom as well as Ram they will not work when they are loaded into the Gram Kracker since it has two banks instead of four. Also, their bank switching logic is different than Extended Basic and the Atari modules.

Appendix - C - Gram Kracker Memory Map

NOTE: TI Groms are only 6K in size but they reside on 8K boundaries. The data in the last 2K of each Gram is only garbage and it may be written over with your own code.

-----Console Grom/Grams-----		
Gram 0	g0000	TI Operating System to g17FF 6K
	g1FFF	g1800-1FFF - not used 2K
Gram 1	g2000	TI Basic to g37FF (Loader Off) 6K
	g3FFF	Loader On - Internal GK Software (g2000-3FFF 8K) g3800-3FFF - not used 2K
Gram 2	g4000	TI Basic to g57FF 6K
	g5FFF	g5800-5FFF - not used 2K
-----Cartridge Grom/Gram-----		
Gram 3	g6000	6K
	g7FFF	g7800-7FFF - not used 2K
Gram 4	g8000	6K
	g9FFF	g9800-9FFF - not used 2K
Gram 5	gA000	6K
	gBFFF	gB800-BFFF - not used 2K
Gram 6	gC000	6K
	gDFFF	gD800-DFFF - not used 2K
Gram 7	gE000	6K
	gFFFF	gF800-FFFF - not used 2K

Appendix - C - Gram Kracker Memory Map Continued



NOTE: The Cartridge Rom/Ram space in the Gram Kracker resides in CPU Memory and it is actually two different 8K chips that reside in the same address space at different times.

With the Write Protect ON a piece of software can write to:

c6000, c6004, c6008 etc. to select Bank 1
c6002, c6006, c600A etc. to select Bank 2

This is how Extended Basic bank swaps the upper 4K (c7000-7FFF) to get 12K out of an 8K space. This is also how the Atari modules do bank swapping to get 16K out of an 8K space.

To see this work, load Extended Basic into the Gram Kracker. Next select 5 Memory Editor from the Gram Kracker menu. Type in c6FFF0 for the Memory address and press FCTN = for Hex. Press FCTN 9 to put the cursor in the Memory Window, make sure Write Protection is ON and press and hold down the 1 key. As the cursor moves across the screen you will see the address space from c7000 to c7FFF swap banks. In reality the entire 8K block is switching banks but the first 4K (c6000 - c6FFF) is the same in both banks. This gives the appearance that the last 4K is bank switching and simulates the 12K of Rom in the Extended Basic module. If you load a 16K Atari module, such as Pole Position, you will notice that the entire 8K swaps banks, except for the Atari header.

Appendix - D - Standard Grom/Gram, Cartridge Rom/Ram and Peripheral DSR Header

Grom/Gram Base Addresses = g0000, g2000, g4000, g6000
g8000, gA000, gC000, gE000

For the proper address below replace x with 0, 2, 4, 6, 8, A, C or E depending the Grom/Gram, Rom/Ram referenced (i.e. g6000, g6001 etc.)

- | | |
|-------------------|---|
| gx000 - >AA | Valid Grom/Gram Header Identification Code. Without >AA as the first byte in the Grom/Gram Base address, the header WILL NOT be recognized by the Operating System. |
| gx001 - >00 - >FF | Version Number - NOTE: Negative version numbers (greater than >7F) designate foreign language version and/or Auto Start. Foreign Language Auto Start starts execution at g6013. Also, some of the Gram Kracker utilities reserve version numbers >55 thru >65 for their own use. |
| gx002 - >00 | Number of Application Programs - not used |
| gx003 - >00 | Reserved by TI - not used |
| gx004 - >0000 | Address of Power Up Header |
| gx006 - >0000 | Address of Application Program Header |
| gx008 - >0000 | Address of Cartridge DSR Routine Header |
| gx00A - >0000 | Address of Subprogram Header
NOTE: Subprograms are CALL-able from either TI Basic or Extended Basic. |
| gx00C - >0000 | Address of Interrupt Header - none in Grom/Gram or Cartridge Rom/Ram - this is here to keep a uniform header type between Cartridges and DSRs. |
| gx00E - >0000 | Reserved by TI - not used |

Appendix - D - Grom/Gram Header Continued

Example: These are the header(s) from the Terminal Emulator II module.

NOTE: there are approximately 3 different versions of the TE II module. Your version may not exactly match the version listed below.

g6000 - >AA Validation Byte
g6001 - >01 Version Number
g6002 - >00 Number of Application Prgs (there are 2)
g6003 - >00 Reserved
g6004 - g6020 Address of Power Up header
g6006 - g6053 Application Program Header
g6008 - g6024 DSR Header
g600A - g0000 No Subprogram Headers
g600C - g0000 No Interrupt Routine Header
g600E - g0000 Reserved

Power Up Header

g6020 - g0000 Pointer to next Power Up Header - no more
g6022 - g606C Start address of this Power Up Routine

DSR Header

g6024 - g602F Pointer to next DSR Header
g6026 - g609A Start address of this DSR Routine
g6028 - >06 Length of this DSRs Name
g6029 - text SPEECH

g602F - g0000 Pointer to next DSR Header - no more
g6031 - g60BD Start address of this DSR Routine
g6033 - >06 Length of this DSRs Name
g6034 - text ALPHON

Application Program Header (for menu screen)

g6053 - g603A Pointer to next Application Program Header
g6055 - g6267 Start address for this menu selection
g6057 - >14 Menu name length (20 chars)
g6058 text DEFAULT OPTION TE II

g603A - g0000 Pointer to next Application Prg - no more
g603C - g6292 Start address for this menu selection
g603E - >14 Menu name length (20 chars)
g603F text TERMINAL EMULATOR II

Appendix - E - Adding A Header to Auto Execute Modules

The example listed below is from the Plato Interpreter module. However, it also applies to many of the other Auto Start modules.

1. Load the module into the Gram Kracker and then select 5 Edit Memory from the Gram Kracker menu.
2. Press FCTN 1 for Gram and FCTN = for Hex. Then Press FCTN 9 to put the cursor in the memory window. Turn off Write Protection (enable Bank 1).
3. Change the byte at g6001 from FF or 81 to 01. Move the cursor over to g6006 and type in 7801.
NOTE: The Corcomp card will not recognize 7800 for an Application Program Header. It sees the 00 in the least significant byte as meaning there are no Application Programs here, it does not check the most significant byte.
4. Press FCTN 9 and change the address to g7801 and then press FCTN 9 again. Now type in 00 00 60 13. (g6013 is the default start address for Auto Execute modules that start up on the Foreign Language check.)
5. Next determine the length of the name that you want to put on the menu and type it in (in Hex). After the length is typed in press FCTN = for ASCII and type in the name.
Example: for "PLATO" your entry at g7801 should be,
00 00 60 13 05 50 4C 41 54 4F (in Hex)
. . ' . . P L A T O (in ASCII)
6. Turn on Write Protection, and press CTRL = to leave the editor. Press RESET and check the menu to make sure the name is right. If everything is OK go back into the Gram Kracker and resave your modified module. If it's not go back into the editor and check the areas that were edited (g6001, g6006 and g7801).

Appendix - F - Difference between Basic and XB Subprogram Headers

Examples:

TI Basic Subprogram Header
for CALL CLEAR

g4D24 - g4D2E Pointer to next Subprogram Header
g4D26 - g351C Start address of this routine
g4D28 - >05 Length of this name
g4D29 - text CLEAR

Extended Basic Subprogram Header
for CALL CLEAR

gA030 - gA03A Pointer to next Subprogram Header
gA032 - >05 Length of this name
gA033 text CLEAR
gA038 - gA9F8 Start address of this routine

The location of the Start Address word in these two header types is what keeps TI basic from accessing Extended Basic subprograms when the XB cartridge is plugged in and you are in TI Basic. This will also keep Extended Basic from accessing other modules CALLS that have been set up ONLY for Basic. TI made the Extended Basic an independent module. When you are in the Command or Edit mode of Extended Basic and you type in CALL FILES, which has a TI Basic type header, it goes thru a console Grom 0 routine at >10 called LINK to go out to the Disk Controller which allows it to recognize a Basic type header. When you are in RUN mode Extended Basic DOES NOT go through the Grom 0 >10 routine, this is why CALL FILES can not be accessed from a running XB program but can be accessed from a running TI Basic program.

Appendix - G - Loader/Saver Order and Header bytes

When a cartridge is saved to disk or cassette the areas of memory are saved in the following order according to what is in the module or Gram Kracker:

Bank 2 of the Cartridge Rom/Ram c6000-7FFF
Bank 1 of the Cartridge Rom/Ram c6000-7FFF
Grom/Gram 7 gE000
Grom/Gram 6 gC000
Grom/Gram 5 gA000
Grom/Gram 4 g8000
Grom/Gram 3 g6000

Description of the first 6 bytes in the first data sector of each of the disk files generated by the Save Module routine.

Byte	Description
00	More to load flag FF = More to load 80 = Load UTIL Option next 00 = Last file to load
01	What Gram Chip or Ram Bank 01 = Grom/Gram 0 g0000 02 = Grom/Gram 1 g2000 03 = Grom/Gram 2 g4000 04 = Grom/Gram 3 g6000 05 = Grom/Gram 4 g8000 06 = Grom/Gram 5 gA000 07 = Grom/Gram 6 gC000 08 = Grom/Gram 7 gE000 09 = Rom/Ram Bank 1 g6000 0A = Rom/Ram Bank 2 g6000 00 or FF = Program Image - load to Memory Expansion
02	0000 = Number of bytes to load
04	0000 = Address to start loading at

Example: First 6 bytes in each of the files generated by the Save Module routine for Extended Basic saved as XB.

XB	FF0A	2000	6000	saved data... Bank 2 cart Ram
XB1	FF09	2000	6000	saved data... Bank 1 cart Ram
XB2	FF07	2000	C000	saved data... Gram 6
XB3	FF06	2000	A000	saved data... Gram 5
XB4	FF05	2000	8000	saved data... Gram 4
XB5	0004	2000	6000	saved data... Gram 3

NOTES

NOTES

MG

MG

NOTES

M_G

NOTES

M_G

MILLERS GRAPHICS - LIMITED WARRANTY

Millers Graphics warrants the Gram Kracker peripheral, which it manufactures, to be free from defects in materials and workmanship for a period of 120 days from the date of purchase.

During the 120 day warranty period Millers Graphics will replace any defective products at no additional charge, provided the product is returned, shipping prepaid to Millers Graphics. The Purchaser is responsible for insuring any product so returned and assumes the risk of loss during shipping. All replaced parts and products will become the property of Millers Graphics.

Ship to:

**Millers Graphics
1475 W. Cypress Ave.
San Dimas, California 91773**

WARRANTY COVERAGE

The Gram Kracker peripheral is warranted against defective material and workmanship. THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLIGENCE, TAMPERING, IMPROPER SERVICE OR OTHER CAUSES NOT ARISING OUT OF DEFECTS IN MATERIALS OR WORKMANSHIP.

WARRANTY DISCLAIMERS

ANY IMPLIED WARRANTIES ARISING OUT OF THIS SALE, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE 120 DAY PERIOD. MILLERS GRAPHICS. SHALL NOT BE LIABLE FOR LOSS OR USE OF THIS PERIPHERAL AND ITS SOFTWARE OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE CONSUMER OR ANY OTHER USE.

Some states do not allow the exclusion or limitation of implied warranties or consequential damages, so the above limitations or exclusion may not apply to you in those states.

LEGAL REMEDIES

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.