THE CAPTAIN'S WHEEL
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TI99/4A 32K MEMORY EXPANSION MODULE

INSTALLATION:

1.) Be sure that all power is OFF before making any changes to your system's configuration.

2.) Place the memory module with the ship logo in the upright position and facing you on the right side of the console.

3.) Lift the 44 pin connector slide door, (Black consoles only), and carefully insert the blue memory module connector into the slot. The module should now be tight against the console.

4.) Turn the console on. If the power up logo screen does not appear as normal then turn the console off and re-insert the module. The module must be placed before the speech synthisizer in the peripheral expansion chain.

5.) Connect any other peripherals and verify that they are functioning properly.

6.) Run some programs that use memory expansion to verify that everything is working properly.

USING THE 32K MEMORY:

The Captain's 32K memory exspansion will opperate with any software written to be run with the TI 32K memory expansion card. To use this or any memory expansion with the TI99/4A you must have module or peripheral expansion box card sotware designed to work with it. Some of the modules are: Extended Basic, Logo II, Editor Assembler, File Utilities (our memory loader and utilities software), TI-Writer, MicroSoft Multiplan. PEB cards which allow memory access are: P-Code, CorComp Disk Controler, Myarc Disk Controler.

The way you may use your 32K memory expansion depends on the software you are using at the time. Software such as TI-Writer, TI Logo II, and MicroSoft Multiplan will tell you when you have used up the available memory and will be transparent the rest of the time. Other software will give you direct control of the memory with the capibilities of each being listed with that software documentation. For example Extended Basic, Editor Assembler, and Mini Memory will allow you to use such commands as: CALL PEEK, CALL INIT, CALL LOAD, and CALL LINK.

TROUBLE SHOOTING:

1.) Be sure that contacts are clean and properly aligned. This is the most common cause of peripheral failure.

2.) Disconnect the 32K memory module and verify that all other parts of the system are functioning properly. If all other systems function properly then place the memory module onto the system with nothing else connected. If the system still does not function properly then note any sysmptoms and return the module for repair.

WARRANTY DURATION OF AND COVERAGE:

This expansion module is warranted against defective materials or workmanship for a period of 90 days to the origional purchase by the consumer. This warrenty shall be void if the device has been damaged by accident, unreeasonable use, neglect, improper or unauthorized service or other causes not arising out of defects in material or workmanship.

DISCLAIMERS:

Any implied warranties arising out of this sale, including but not limited to the implied warrenties of merchantability and fitness for a particular purpose, are limited to the duration of 90 days. Captain's Wheel shall not be liable for loss of use of the hardware or other incidental or consequential costs, expenses, or damages incurrred by the consumer or any other user.

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

USING CALL LOAD AND CALL PEEK:

These are some of the CALL PEEK and CALL LOAD for use with Extended Basic, Editor Assebler and a 32K memory expansion.
The P & Q variables are used for CALL PEEK and the numbers are for CALL LOAD.
You Must use CALL INIT in order to have access to CALL PEEK and CALL LOAD, for example to remove Extended Basic protection from a program so that it may be or resaved; first load the program then type in the following:

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CALL INIT
CALL LOAD(-31931,0)
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You will then be able to list the program or resave it.

ADDRESS , VALUE(S)	MEANING IN EXTENDED BASIC
	CALL VERSION(X) IF X=100 100= NEWEST VERSION OF X/B CART
8192 , P	USE (PEEK,P) IF P<> 70 OR <>121 THEN DO A CALL INIT
8194 ,	FIRST FREE ADDRESS IN LOW MEMORY
8196 ,	LAST FREE ADDRESS IN LOW MEMORY
-28672 , P	P=0 SPEECH NOT ATTACHED P=96 OR P=255 SPEECH IS ATTACHED
-31572 , 0 TO 255	VARY KEYBOARD RESPONSE
-31740 , P , Q	PUT IN DIFFERENT TO CHANGE BEEPS,WARNINGS, ETC
-31744 , 0 TO 15	CONTINUATION OF LAST SOUND (0=LOUD AND 15=SOFT)
-31748 , 0 TO 255	CHANGE THE CURSOR FLASHING AND RESPONSE TONE RATES
-31788 , 160	BLANK OUT THE SCREEN (MUST PUSH A KEY TO ACTIVATE)
, 192	NO AUTOMATIC SPRITE MOTION OR SOUND
, 224	NORMAL OPERATION
, 225	MAGNIFIED SPRITES
, 226	DOUBLE SIZE SPRITES
, 227	MAGNIFIED & DOUBLE SIZED SPRITES
, 232	MULTICOLOR MODE (48 BY 64 SQUARES)
-31794 , P	TIMER FOR CALL SOUND (COUNTS FROM 255 TO 0)
-31804 , X , Y	RETURN TO THE TITLE SCREEN (USE "PEEK (2,X,Y)")
, P	CHANGE THE CURSOR FLASH RATE (0 TO 255)
-31806 , 0	NORMAL OPERATION
, 16	DISABLE QUIT KEY (FCTN =)
, 32	DISABLE SOUND (USE NEG DUR FOR CONTINOUS SOUND)
, 48	DISABLE SOUND & QUIT KEY
, 64	DISABLE AUTO SPRITE MOTION
, 80	DISABLE SPRITES & QUIT KEY

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        , 96          DISABLE SPRITES AND SOUND
        , 128         DISABLE ALL THREE
-31808 , P , Q        DOUBLE RANDOM NUMBERS (0 TO 255) NEED "RANDOMIZE"
-31860 , 4            GO FROM EX-BASIC TO CONSOLE BASIC (NEED "NEW")
        , 8           AUTO RUN OF DSK1.LOAD
-31866 , P , Q        END OF CPU PROGRAM ADDRESS (P*256+Q)
-31868 , 0            NO "RUN" OR "LIST" AFTER "BREAK" IS USED
        , 0 , 0       TURNS OFF THE 32K MEMORY EXPANSION
        , 255 , 231   TURNS ON THE 32K MEMORY EXPANSION
-31873 , 3 TO 30      SCREEN COLUMN TO START AT WITH A "PRINT"
-31877 , P            P&32 = SPRITE COINCIDENCE  P&64 = 5 SPRITES ON A LINE
-31878 , P            HIGHEST NUMBER SPRITE IN MOTION (0 STOPS ALL)
-31879 , P            TIMER FOR VDP INTERRUPTS EVERY 1/60 OF A SEC (0 TOP 255)
-31880 , P            RANDOM NUMBER (0 TO 99) NEED "RANDOMIZE"
-31884 , 0 TO 5       CHANGE KEYBOARD MODE (LIKE "CALL KEY(K,...)")
-31888 , 63 , 255     DISABLE ALL DISK DRIVES (USE "NEW" TO FREE MEMORY)
        , 55 , 215    ENABLE ALL DISK DRIVES (USE "NEW" TO FREE DRIVES)
-31931 , 0            UNPROTECT X-B PROTECTION
        , 2           SET "ON WARNING NEXT" COMMAND
        , 4           SET "ON WARNING STOP" COMMAND
        , 14          SET "UNTRACE" COMMAND
        , 15          SET "UNTRACE" COMMAND & "NUM" COMMAND
        , 16          SET "TRACE" COMMAND
        , 64          SET "ON BREAK NEXT" COMMAND
        , 128         PROTECT X/B PROGRAM
-31952 , P            PEEK  P=55 THEN 32K EXPANSION MEMORY IS OFF <>55 MEANS ON
-31962 , 32           RETURN TO THE TITLE SCREEN
        , 255         RESTART X/B W/DSK1.LOAD
-31974 , P , Q        END OF VDP STACK ADDRESS (P*256+Q)
-32112 , 8            SEARCHES DISK FOR ?
-32114 , 2            RANDOM GARBAGE
        , 13          SCREEN GOES WILD
        , 119         PRODUCE LINES
-32116 , 2            RANDOM CHARACTERS ON SCREEN
        , 4           GO FROM X/BASIC TO BASIC
-32187 , 0            UNPROTECT XB PROGRAM
        , 2           SET "ON WARNING NEXT" COMMAND
        , 4           SET "ON WARNING STOP" COMMAND
        , 9           SET 0 LINE NUMBER
        , 14          SET "UNTRACE" COMMAND
        , 15          SET "UNTRACE" COMMAND & "NUM" COMMAND
        , 16          SET "TRACE" COMMAND
        , 64          SET "ON BREAK NEXT" COMMAND
        , 128         PROTECT XB PROGRAM
-32188 , 1            CHANGE COLOR AND RECEIVE SYNTAX ERROR
        , 127         CHANGE COLOR AND RECEIVE BREAKPOINT
-32630 , 128          RESET TO TITLE SCREEN
-32699 , 0            UNPROTECT XB PROGRAM
        , 2           SET "ON WARNING NEXT" COMMAND
        , 4           SET "ON WARNING STOP" COMMAND
        , 14          SET "UNTRACE" COMMAND
        , 15          SET "UNTRACE" & "NUM" COMMAND
        , 16          SET "TRACE" COMMAND
        , 64          SET "ON BREAK NEXT"
        , 128         PROTECT XB PROGRAM
-32700 , 0            CLEARS CREEN FOR AN INSTANT
-32729 , 0            RUN "DSK1.LOAD"
-32730 , 32           RESET TO TITLE SCREEN
-32961 , 51           RESET TO TITLE SCREEN
        , 149         SETS "ON BREAK GOTO" LOCKS SYSTEM
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THE FOLLOWING LOADS REQUIRE E/A OR MM

ADDRESS , VALUE(S)	MEANING
784 , P	USE POKEV(784,P) (WHERE P IS 16 TO 31) CHANGES BACKGROUND COLOR OF CURSOR
-24574 , 8	I THINK THIS ALLOWS THE MINI-MEM TO USE THE 24K FOR STORAGE
-30945 , 0	WHITE EDGES
-32272 , 0 , "" ,	-30945 , 0) WILL PUT YOU IN TEXT MODE
-32766 , 0	BIT MAP MODE
-32768 , 0	GRAPHICS (NORMAL MODE)
-32280 , 0	MULTI-COLOR MODE
-32352 , 107	WILL BLANK THE SCREEN, ANY KEY PRESS WILL RESTORE

LOAD INTERUPT SWITCH

The console goes into an idle when the load interupt switch is being depressed. Upon release the console executes the instuction found at the memory location stored at memory location >FFFF using the workspace register begining at the address stored at >FFFC. If you have additional memory banks and are using the load interupt to execute the programs then you should hold the load interupt switch down while the memory bank switches are being manipulated and release it only after all bank switches are in position.

DUPLICATE MEMORY BANK SWITCH

All duplicate memory banks are identical to the banks they duplicate so it does not matter which bank is active under normal operating conditions.

FILE UTILITIES V1.0

INTRODUCTION

File Utilities is a ROM based loader system designed to bridge the gap between disk operating systems and the cassette operating systems. It contains all of the loading capabilities for loading and runing normal object code files. It allows loading either from disk or cassette and allows transfering files from either of one to another.

GETTING STARTED

NOTE: If your console power up screen has VERSION 2.2 at the bottom of the screen then this software will not work with your console. You must return the software for a special V2.2 version of the software.

FILE UTILITIES SOFTWARE SWITCH

The loader software switch must be kept in the OFF position whenever there is a module in the module port. There must not be a module in the module port when the loader software is being used.

1.) Turn the LDR switch to the ON position.
2.) Turn the console ON
3.) Press any key tho get the menu screen and then press 2.

You are now ready to use FILE UTILITIES V1.0. You will now have four selections on the memu screen:

PRESS:

1.-TO LOAD FILES
2.-TO TRANSFER FILES
3.-TO SAVE MEMORY
4.-TO QUIT

1.-TO LOAD FILES

Select 1 from the menu screen. The loader menu screen will now be displayed:

PRESS:

1.-FOR FIX/80 FILE
2.-FOR PROGRAM FILE
3.-GOTO MAIN DISPLAY

This loader will load and run any software that can be loaded with any other TI loader software with the exception of basic or extended basic software which use CALL INIT, CALL LOAD from the basic program itself; these types of object code files may or may not be loaded depending upon their individual functions.

This loader will support CS1 loading of object code files only in the program image format; you may not load or transfer to load DIS/FIX 80 object code files with CS1. If you know where in memory the DIS/FIX 80 was loaded and at what memory location the first executable memory byte is in memory, you may then load that file into memory from disk, reset the computer, and then save the memory begining with the first executable memory location to cassette in the program format.

2.-FOR PROGRAM FILE

Press 2. Place TEST #1 into the cassette or the File Utilities disk into drive #1. ENTER FILE NAME should now be displayed at the bottom of the screen. Type in CS1 and then press ENTER. For disk drive type in DSK1.EDITA1 and then press ENTER; you will later type in the filename of the object code program type file you wish to load that is shown on the disk directory; however for now use EDITA1. The screen prompts will instruct you as what to do from here on. Be sure not to rewind between files when using cassette even though you may be intructed to do so when there is more than one file required for that object code program.

1.-FOR DIS/FIX 80 FILE

You use the same proceedure to loader files here as listed above with one exception; if the file is not an auto-start program you must know and type in and ENTER that particular program name once the program file has bee loaded. Many programs use START for the program name; however, there are some programs which use other names.

2.-TO TRANSFER FILES

You may only transfer PROGRAM object code files from disk to cassette or from cassette to disk using these options. You will only be asked for the FILENAME of the disk based PROGRAM object code file as CS1 does not support filenames. When your screen display's the ENTER DISK FILE NAME prompt you must type in the drive name as well as the file name. eg. DSK1.Filename

When transfering from Disk to CS1 and there are two or more files in that program series you should save all of the files on the same cassette one right after the other in the same order that they are listed in the disk directory without rewinding.

3.-SAVING MEMORY

You may use the save memory option to save memory located in any portion of the CPU RAM or ROM. This may be a handy tool for converting some DIS/FIX 80 disk based object code files to PROGRAM files for use with the CS1 object code loader. You will need to have an extensive understanding of the TI99/4A object code file and loader conventions in order to accomplish this with your files. This work is not comprehensive enough in scope to handle all of the information required to accomplish this with any file. For more information on the configuration of files the user may turn to such software as DiskAssembler and Explorer by Miller Graphics and the Editor Assembler manual.

These conventions must be observed when using the save memory option:

1.) No more than 8,186 bytes of memory may be saved in one file or at one time. If more memory is to be loaded in the load and run mode than 8,186 [>1FFA] then it must be linked from one file to the other by creating your own headers.

2.) The first byte of the first file saved must be executable object code preferably the begining of the program.

3.) If the memory segment you wish to save is 8,186 or less and the memory saved is going to be a single file then you may select the standard header option.

4.) All memory addresses and data are entered in hexidecimal. >2000 = 8,192 / >A000 = 40,960 / >B000 = 45,056 / >C000 = 49,152 / >D000 = 53,248 / >E000 = 57,344 / >F000 = 61,440

HEADER FLAGWORD?

The header flagword is devided into two hexidecimal bytes. The first byte or first two characters entered tell the loader whether or not this is the last file to be loaded during this loading session. FF means that there will be more files to load when this file is being loaded and 00 means that this is the last file to be loaded. The last byte or last two characters of the header flagword should always be FF for normal loading conditions.

HEADER LOAD TO WORD?

This hexidecimal word or four characters are to be the hexidecimal memory location to which this file begins loading.

MEMORY BASED FILE UTILITIES V1.0

A memory based copy of File Utilities is included on both disk and cassette for you and your freinds to use to transfer file and otherwise play with. This loader operates out of >E000->FFFF and may be loaded using the Extended Basic Word Processor Utility load option, Just change UTIL1 to FILE/UTILI; from the E/A number 5 load program file option; or from the TI-Writer Utility option, same as the extened basic loader above.