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Electron Expansion 2.0 User Guide

For the Acorn Electron with
the ROMBOX PLUS or Acorn PLUS1

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ELECTRON EXPANSION 2.0 - FITTING INSTRUCTIONS

The upgrade ROM should be inserted into the internal ROM socket within either the ROMBOX PLUS or PLUS 1, replacing the existing chip. The ROM performs all the functions of the old one, but also contains additional software to support the SLOGGER Switched Joystick Interface and any 8k, 16k or 32k Sideways RAM.

To commence, the old ROM must be removed from its socket. ROMBOX PLUS users will find this socket situated internally to the left of the rear cartridge port. To access the ROM within the PLUS 1 it is necessary to remove the three retaining screws at the bottom of the PLUS 1 and remove the upper part of the casing. Then locate the chip nearest the front and right of the unit, adjacent to the front cartridge slot.

Please note the position of the notch in the original ROM and the corresponding notch on the socket that contained the ROM. The new ROM also has a notch in it and this should be aligned so that the notch matches up with the corresponding notch on the socket as before, noting also that the original PLUS 1 ROM is smaller and if reinserted it must be in the correct location.

To remove the ROM, you should gently lever it out of the socket with a small screwdriver or similar tool, working first at one end and then the other.

Rest the new ROM over the socket, and check to ensure that all the pins on the chip are located in their correct holes in the socket. When you are sure that none of the pins are bent under or out of the socket, you may apply a firm but even pressure to the chip so that all the pins are pushed fully home into the socket.

Once all the pins are fully inserted into their holes, the ROMBOX PLUS or PLUS 1 may be re-connected to the Electron and the power switched on. To ensure that the new ROM is operative, please type:

*HELP

and the following sign on should appear:

Electron Expansion 2.02 (or later)
Printer.ADC.RS423

BUFFER
JOYSTICK
RLOAD
ROMS
RSAVE

OS 1.00

If this is not the case then remove the power from the Electron immediately and ensure that the ROM is located correctly.

ELECTRON EXPANSION 2.0 - ADDITIONAL COMMANDS

A brand new set of commands has now been incorporated within the operating ROM and can be viewed at any time by typing *HELP.

1. Sideways RAM (SWR) Printer Buffer

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Both the SLOGGER ROMBOX PLUS and the Acorn PLUS 1 will support Sideways RAM. The software within the Electron Expansion 2.0 has built-in commands to allow Sideways RAM to be used as a Printer Buffer. Printers are inherently slow and if a large listing is being printed then it may be some time before you are able to continue using your computer. With a Printer Buffer selected, although printing continues at its normal speed, as far as the computer is concerned, the information to be printed is off-loaded very quickly into the buffer so releasing this bottle-neck.

When the command *BUFFER ON is issued, a search will be made for vacant 8k or 16k Sideways RAM and an error message is issued if no Sideways RAM is found. A check is also made for the presence of a ROM image as it could have an undesirable effect if overwritten by the Print Buffer code. CTRL-BREAK should always be pressed after this command so that the code transferred to the RAM can initialise itself. This buffer is not flushed by the ESCAPE key in BASIC.

Note that printing (if in progress) will continue after BREAK and CTRL-BREAK has been pressed. It is possible that a character may be lost in this event ... it depends on whether a printer character was being processed at the time of the BREAK.

2. MASTER RAM BOARD Printer Buffer

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The 12k free within SLOGGER's MASTER RAM BOARD is also supported by Electron Expansion 2.0 and can be enabled as a Printer Buffer using the *BUFFER SHADOW command. When the command *BUFFER SHADOW is issued and accepted, the Print vectors are changed to reference the appropriate code with the Expansion ROM. The buffer therefore comes into effect immediately. Please note that the buffer is not flushed by the ESCAPE key but if the BREAK key is pressed then the buffer is deselected.

Print Buffer (Command Summary)

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*BUFFER	This command displays the status and size of the Print Buffer.
*BUFFER ON (SWR only)	Will set up the printer buffer by transferring buffer code to Sideways RAM and must be followed by pressing the BREAK key to initialise the Printer Buffer.
*BUFFER OFF (SWR only)	This command disables the Printer Buffer.
*BUFFER FLUSH (SWR only)	Empties the buffer.
*BUFFER PAUSE (SWR only)	Will pause the print out.
*BUFFER RESUME (SWR only)	Will resume printing after *BUFFER PAUSE.
*BUFFER SHADOW	Enables 12k of the Master RAM Board as a Printer Buffer.

3. BACKUP ROMS TO TAPE OR DISC

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It is not practical or sometimes possible to have all your ROM software permanently connected to your computer at any one time. A very popular use for Sideways RAM is as a support for Sideways ROMs, i.e. STARWORD, STARSTORE, VIEW, VIEW SHEET, etc. Using the RSAVE command, it is simplicity itself to save an image of your ROM onto cassette or disc under a meaningful name. Loading your Sideways RAM is just as easy using the RLOAD command.

The commands supported are as follows:

*RSAVE R(id) (filename)	This command is used to save the contents of any ROM to Tape or Disc with (id) identifying the ROM by its Sideways page number e.g. R0 or R1 in the rear cartridge port and (filename) being the filename to be saved on Tape or Disc.
*RLOAD (filename) R(id)	Similar to *RSAVE, this command is used to load Sideways RAM with ROM software directly from Tape or Disc.
*ROMS	*ROMS reports the status of each of the 16 ROM pages on the Electron. This command may therefore be used to report the (id) of ROMs before using *RSAVE.

Note ... some ROM software require the RAM to be "Write Protected". This should be done (if possible) immediately after the RLOAD command has transferred and loaded the Sideways RAM with the ROM image. e.g. two of the more popular software products which require "Write Protecting" are VIEW and VIEW SHEET.

4. USING SLOGGER'S JOYSTICK INTERFACE

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To use the new *JOYSTICK command structure, the SLOGGER JOYSTICK INTERFACE must be inserted in the front socket of either the ROMBOX PLUS or PLUS 1. The commands can be used to emulate the keyboard with software that is written in the Acorn approved manner. This would be most likely with commercial software where joysticks could not normally be used, or where a keyboard option could more easily be used with a joystick.

The new commands also contain emulation of the Analogue Port of the PLUS 1 so that joysticks with an Analogue joystick option may also be used. The commands take the form

```
*JOYSTICK (1-4)
*JOYSTICK (1-4) Up Down Left Right Fire
*JOYSTICK (1-4) SETUP
*JOYSTICK (1-4) TEST
```

(The *JOYSTICK command can be abbreviated to *J. for convenience)

Where

(1-4) is a number to determine the address of the interface which must compare to the setting of the internal switches of the cartridge, with the following interpretations:

1	if interface mapped at	&FCC0
2	"	"
3	"	"
4	"	"

The usual value is 3.

Up Down Left Right Fire are then internal key values of the keys to be emulated by the joystick for use within a command line

```
*JOYSTICK (1-4) SETUP
```

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SETUP is a routine to use the joystick with commercial software.

So, to run the routine for using the joystick with games, type

```
*J. 3 S.
```

You will then be prompted for the keys normally used for movement within the program. To use the joystick with a game using the popular controls : / Z X and the SPACE BAR, when prompted type:

```
Press UP          :
Press DOWN        /
Press LEFT        Z
Press RIGHT       X
Press FIRE        SPACE
Overlay address : RETURN
```

Note that if the Analogue joystick is to be emulated it is not necessary to use the complete *JOYSTICK command but to type only *J.3.

In certain cases it may not be practical to use the SETUP routine, eg. within a command line. For this purpose use *J.3 followed by the internal key values of the keys in question to be emulated by the joystick. The following table lists the internal key values for the Acorn Electron.

KEY	NUMBER	KEY	NUMBER	KEY	NUMBER
A	-66	S	-82	-	-24
B	-101	T	-36	;	-88
C	-83	U	-54	:	-73
D	-51	V	-100	,	-103
E	-35	W	-34	.	-104
F	-68	X	-67	/	-105
G	-84	Y	-69	SPACE	-99
H	-85	Z	-98	ESCAPE	-113
I	-38	1	-49	CAPS LK	-65
J	-70	2	-50	CTRL	-2
K	-71	3	-18	DELETE	-90
L	-87	4	-19	COPY	-106
M	-102	5	-20	RETURN	-74
N	-86	6	-53	SHIFT	-1
O	-55	7	-37	UP CURSOR	-58
P	-56	8	-22	DOWN "	-42
Q	-17	9	-39	LEFT "	-26
R	-52	0	-40	RIGHT "	-122

Overlay address

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The correct way for the Joystick software to emulate the keyboard is to intercept the OSBYTE and OSKEY calls using the "Extended Vectors" residing in the upper part of Page D. Most games, however, stamp all over Page D and so SLOGGER had to find an alternative reliable means of interception since the SLOGGER Joystick interface and software is aimed primarily at the games' player.

This was achieved by a very short routine resident in a selectable area of memory defined by the Overlay address. If no value is typed in at the prompt for the address then the default address of &150 is used; this rarely being used by games as it is in the middle of the Stack!!! Values in the range 0 to &7FF0 may be used but with caution.

Hexadecimal numbers should be preceded by "&".

Master RAM Board

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For Electrons running with the Master RAM Board in TURBO mode, the user may enter the value 0 for the Overlay address (for games such as ELITE) to achieve a higher success rate.

*JOYSTICK (1-4) TEST

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This command may be used to check that the software is 'talking' to the interface. As the joystick is manipulated so the directions are displayed in the form of UP, DOWN, LEFT, RIGHT and FIRE.

TECHNICAL SPECIFICATIONS

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In order for the joystick to emulate various control keys it is necessary to intercept calls to the Operating System requesting "key pressed" information. To effect this, five calls are intercepted

OSBYTE &79	Keyboard scan
OSBYTE &7A	Keyboard scan from 10 decimal
OSBYTE &80	Read ADC channel
OSBYTE &81	Read key with time left
OSKEY	Keyboard control vector (&228, 9)

Note that both keyboard and joystick are scanned by OSBYTEs 79, 7A, 81 and OSKEY.

The Joystick Interface software was designed primarily for games' players where the game does not support joysticks. The correct way to intercept OSBYTE and OSKEY calls requires the use of memory in Page &0D (D9F - DEF ... expanded vector set). However, many games illegally corrupt this area and so an area of memory in the stack was used. This location is &150 and is 14 bytes (decimal) in length.

PLUS 1 OPERATING SYSTEM - ADDITIONAL PROGRAM MODIFICATIONS

The PLUS 1's normal manner of selecting a language ROM in preference to BASIC, regardless of the ROM's Sideways location and priority has now been suppressed. This allows the highest language ROM of those in sockets 11-15 (BASIC being 11) to be selected on switch on and a CTRL-BREAK, and requires those below BASIC to be manually invoked ... eg. *STARMON to call STARMON or *WORD to call VIEW.

Cassette loading and saving problems when using software in Modes 0-3 have been corrected.