

SLOGGER

Slogger Advanced Systems
215 Beacon Road
Chatham
KENT ME5 7BU

Electron Rombox & Rombox-P User Guide

Copyright (C) 1985
All rights reserved

ELECTRON ROMBOX AND ROMBOX-P

INTRODUCTION

The Electron ROMBOX by Slogger Advanced Systems has been designed to allow ROM based software to be used on the Electron micro-computer.

With this facility a completely new range of software becomes immediately available to the Electron user.

The following manual describes how to operate ROM based software on the Electron and how to make use of the Slogger ROMBOX and the facilities it provides. Details of the ROMBOX-P option are provided in Section 6.

A schematic of the ROMBOX is given below.

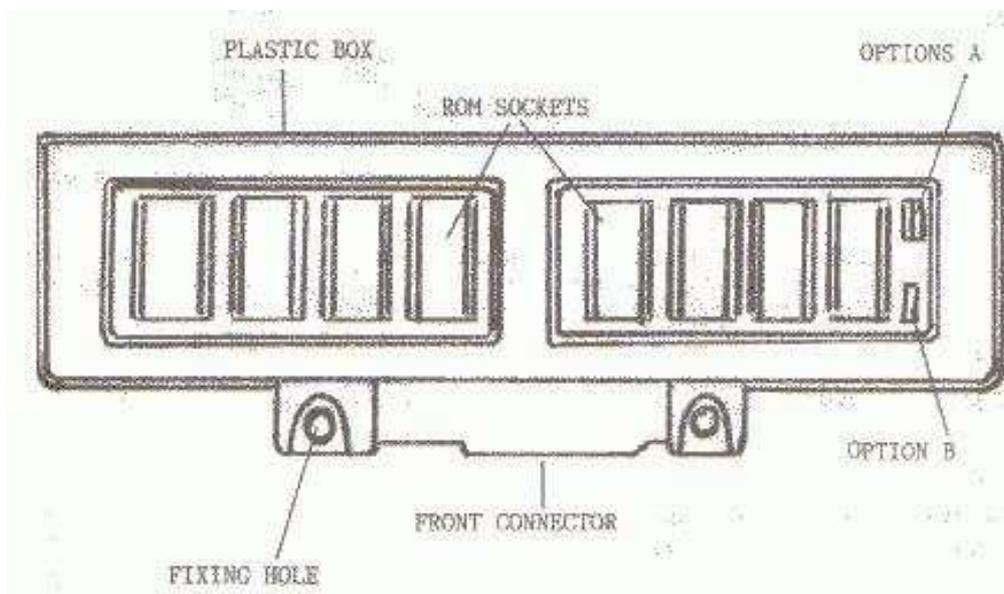


Diagram 1.1

SECTION 1 - ROM SOFTWARE

1.1 ROM DETAILS

ROM : (READ ONLY MEMORY)

A ROM is an electronic device that has data stored invisibly in its microcircuits, data that is accessible only to a computer or some other special purpose equipment. It is this data that is called software.

Physically a ROM is an almost flat rectangular 'chip' of hard plastic or ceramic material (about 1.5ins by 0.5ins) with two rows of connector pins along its length.

Once correctly fitted into a socket on the ROMBOX the electronic data stored inside the ROM is directly accessible to the computer.

A ROM based system has no moving parts and so can transfer data to the computer many thousands of times faster than a cassette or disk system. For ROM systems the transfer is only one way however and it is not possible to load data back into a ROM except with special equipment.

ROMs are specified by the amount of data they can store, usually in thousands of bits with the capital letter K. The ROMBOX can run ROMs of 64K bits or 128K bits size, as well as a 32K under user selectable conditions.

1.2 RAM DETAILS

RAM : (RANDOM ACCESS MEMORY)

It is also possible for the ROMBOX to run other memory devices such as static RAM for software development by advanced users. The options required for this are given in section 4 and more details are given under application notes in section 5.

1.3 ROM PAGES

To distinguish between different ROMs, it is usual to refer to a ROM as sitting at a PAGE whose number is related to its socket position.

The eight sockets/pages provided on the ROMBOX are all software-selectable allowing the user to greatly increase the capabilities of the Electron permitting advanced graphics facilities or word processing to be performed as well as advanced games, all directly accessible from the keyboard.

SECTION 2 - ROM BASED SOFTWARE

2.1 INTRODUCTION

The Electron Operating System allows any one of 16 paged ROMs, referenced as ROM pages 0 through 15, to reside in the memory map from address &8000 to &BFFF (See User Guide). You may select the ROM which resides in this address range by the appropriate Operating System call (see below).

Four of these pages 8, 9, 10 and 11 are internal to the Electron and being of special significance to the Operating System are not available to the general user. The BASIC language ROM resides in page 11.

The remaining 12 can be made generally available and the Slogger ROMBOX is arranged to access these in blocks of four. The four pages not available (8, 9, 10 and 11) are missed out of diagram 1.1. The remaining 12 are arranged so that pages 4, 5, 6 and 7 are fixed whilst pages 0, 1, 2, 3 and 12, 13, 14, 15 are optionally selectable.

Pages 4, 5, 6 and 7 are provided for on top of the ROMBOX with the left hand of four sockets, whilst the remaining selectable four are set as the right hand bank. An explanation of how user selectable options operate on the right hand bank is given in section 4.

2.2 SELECTING A LANGUAGE ROM DURING A SESSION

A language ROM may be selected at any time whilst working with the computer by typing:

```
*<ROM title> <RETURN>
```

<ROM title> - is the language name that the ROM will recognise as a call to activate itself and will vary from ROM to ROM.

e.g. *BASIC <RETURN> will select the BASIC language ROM.

Generally the command *HELP can be used to give information on the screen as to which ROMs have been fitted or what facilities they offer.

Alternatively, if the Slogger ELKMAN ROM is fitted, *REPORT will give a full readout of all ROMs fitted together with their titles and sizes.

2.3 SELECTING THE DEFAULT LANGUAGE ON RESET

The default language, for the Electron, can be set as any chosen language, e.g. BASIC, PASCAL or STARMON, which the Electron will automatically run at switch-on or by pressing the BREAK key.

The language ROM selected depends on whether the reset occurring is a HARD or SOFT reset. A hard reset is a switch-on condition or a CTRL-BREAK; whereas a soft reset is characterised by a SHIFT-BREAK or BREAK only selection.

On a hard or soft reset the Electron Operating System scans each ROM in turn from pages 15 through to 0, identifying and noting ROMs which have special significance, such as language ROMs. The ROM type and page of each ROM recognised by the Operating System is held in a table of memory which is used by certain Operating System calls.

One such call, *FX 252,<ROM page> informs the Operating System which language ROM to enter following a soft reset. It is with this call that you can select a particular ROM to be the default language which the Electron will run on a BREAK.

Following a hard reset the Operating System will always select the language ROM in the highest ROM page as the default. Since BASIC resides in ROM page 11, this means that the default language ROM must reside in one of the pages 11 to 15.

With the Acorn Plus 1 add-on interfacing to your Electron, the above rule no longer applies in so far as the Operating System will now select the first language ROM it finds in pages 15 to 0, selecting BASIC as a last resort if no language is found.

SECTION 3 - FITTING INSTRUCTIONS

If you have not fitted an interface to your Electron before then read the following instructions carefully:

1. NEVER fit an interface to the rear of your Electron whilst the power is on as this may cause permanent damage to both your Electron and interface. I.e. ALWAYS switch power off.
2. Turn your Electron upside down (it's easier to see what you're doing) and remove the protective cover from the expansion plug (it may already be off). Refit the plastic cover to the expansion plug of the ROMBOX.
3. Turn the ROMBOX upside down and locate its front connector to the Electron expansion plug. Push the two units together so that they join neatly.
4. With the two holes in the ROMBOX lined up with the two screw holes in the Electron, fit the two plastic screws provided to secure the two units together. DO NOT overtighten ... it is sufficient just to hand tighten these screws.

Installation is now complete.

3.2 FITTING ROMS AND RAMS

ROMs and RAMs are very sensitive to static electricity and can be easily destroyed if handled badly. Static electricity can be produced by simply rubbing against anything made of nylon. Removal of a pullover containing nylon can create static electricity often noted in the form of crackling.

For this reason, it is a good idea to avoid touching the pins of the ROM device until the pins have been located into a vacant socket.

When fitting ROMs it is essential to fit them the correct way round. There are only two possible ways to fit a ROM, the wrong way will almost certainly destroy the device when power is applied. One end of the ROM has an indentation. When inserting the ROM, ensure that this end faces away from the back of the Electron and lines up with the indentation in the socket.

With previously unused ROMs it may be difficult to insert the device due to the legs of the ROM being splayed out slightly. The legs can be realigned slightly by carefully resting the rows of pins on a flat surface one row after another and gently rebending the rows.

3.3 REMOVING ROMS AND RAMS

Unless a special socket called a zero insertion force socket (Z.I.F.) has been fitted, removal of a ROM is accomplished as follows:

Firstly switch the power to the unit OFF, taking care that you will not lose important data in any RAM you may have fitted. Then gently

lever out the ROM you wish to remove first from one end and then the other, taking care not to bend the legs of the ROM.

Once removed, the ROM should be placed somewhere safe to avoid it being unduly handled.

SECTION 4 - OPTION SELECTION

4.1 INTRODUCTION

On the right hand side of the ROMBOX you will find three 'jumpers' two together (Option A) and one other (Option B) as shown in figure 4.1. These options provide the flexibility of allowing different devices to be used, as well as controlling the way in which ROMs can be accessed by the computer.

Each option jumper can be fitted in one of two positions NORTH or SOUTH.

NORTH is with the two pins furthest away from the Electron linked together.

SOUTH is with the two pins closest to the Electron linked together.

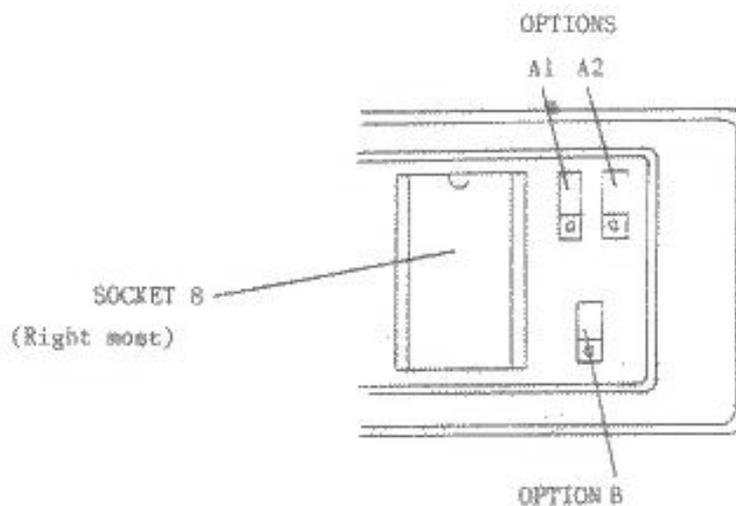


Diagram 4.1

4.2 OPTION A

This option controls the type of device connected to the ROMBOX i.e. 64K/128K ROM, 32K ROM or 64K STATIC RAM.

A1 NORTH, A2 NORTH

64K or 128K ROMs can be used in any of the 8 sockets.

A1 NORTH, A2 SOUTH

64K or 128K ROMs can be used in any socket except for the right hand socket next to the option pins.

This right hand socket will accept a 32K ROM. Note that a 32K ROM has fewer pins than a 64K or 128K device. Insert the 32K ROM into the part of the socket closest to the Electron.

A1 SOUTH, A2 SOUTH

64K or 128K ROMs can be used in any socket except for the right hand socket next to the option pins. This right hand socket will accept 64K static RAM. This device is the same size as the 64K or 128K ROMs and is fitted in the same manner.

A1 SOUTH, A2 NORTH

In this configuration, a Slogger RAM extension unit can be fitted into the right-hand socket and 16K of STATIC RAM can be used. This allows large programs to be loaded or saved to tape or disc. For more details on this, contact Slogger at the address given at the back of this document.

4.3 OPTION B

This option controls the right hand side of 4 ROM sockets or pages.

B1 NORTH

Right hand bank selected as pages 0, 1, 2 and 3.

B1 SOUTH

Right hand bank selected as pages 12, 13, 14 and 15.

With the Acorn Plus 1 fitted the first language ROM other than BASIC detected by the system will be entered, BASIC being entered if no other language ROMs are present.

If the Plus 1 is fitted and ROM cartridges are to be used, then the right hand bank should be selected as 12, 13, 14 and 15. ROM pages 14 and 15 are always available, but 12 and 13 may not always be used since 12 is required for the internal ROM of the Plus 1 and 13 is designated for future ROM cartridges.

Pages 0, 1, 2 and 3 cannot be used with the Plus 1 if cartridges are to be inserted as these pages are used by the cartridges themselves and so not available for other devices.

SECTION 5 - APPLICATION NOTES

5.1 GENERAL INFORMATION

Once a ROMBOX has been fitted, many applications can be considered from advanced games to software development.

If the user wishes to make a greater use of the ROMBOX by fitting an expanded sideways RAM area of alternate ROMs, it is a simple matter to take from any socket all the signals relevant to running memory devices.

The electrical signals on the ROMBOX sockets follow a standard Intel 27 series pinout. This pinout is outlined in Fig 5.1

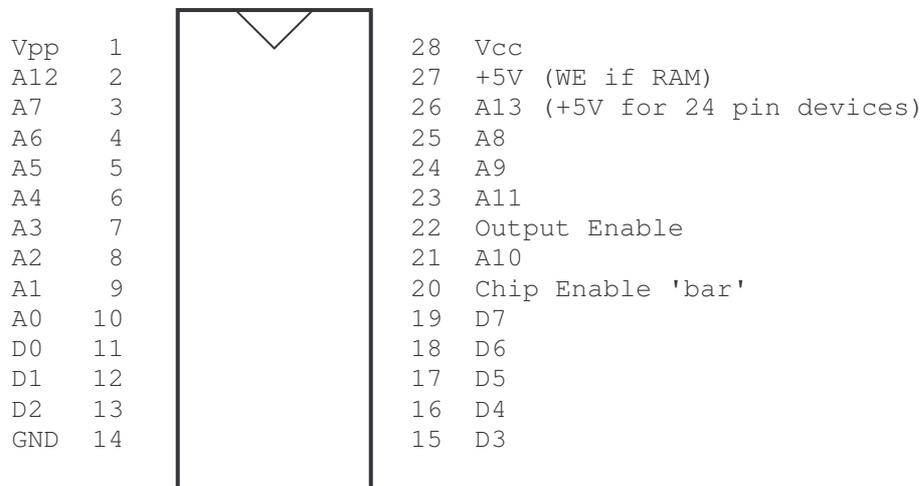
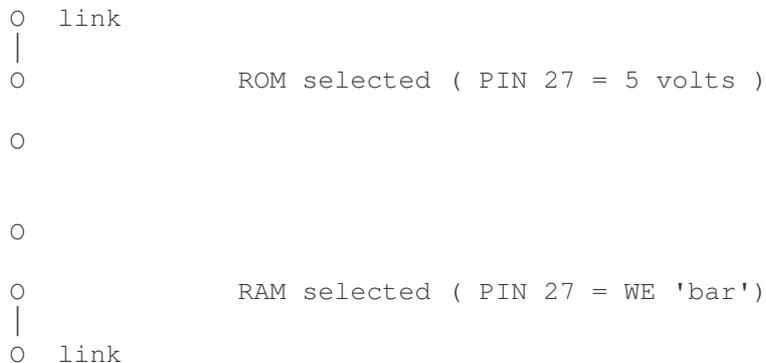


Fig 5.1

The options links allow Socket 8 (the right most socket) to be reprogrammed as follows:

Option A1

This allows the socket to be used with RAM devices:



Option A2

This allows 4K ROMs to be used in the socket:

```
0 link
|
0          8K or 16K ROMs selected

0

0

0          4K ROMs selected (Pin 26 = 5 volts)
|
0 link
```

Option B

This allows sockets 5, 6, 7 and 8 (the right hand bank of 4) to be programmed as either pages 0, 1, 2 and 3 or 12, 13, 14 and 15

```
0 link
|
0          Program as 0, 1, 2 and 3

0

0

0          Program as 12, 13, 14 and 15
|
0 link
```

5.2 ROM/RAM APPLICATIONS

For those who wish to read the contents of a ROM or RAM, it is suggested that the Slogger Advanced Systems STARMON is used. This allows any part of any ROM/RAM or any part of the computer's main memory to be read. Alternatively Slogger's ELKMAN will perform the same functions together with extra information on all ROMs/RAMs fitted.

For those who do not have access to a STARMON or ELKMAN the following machine code program will allow specific memory locations to be read or written. The following program should be called with:

A% set to the ROM address (range: &8000 to &BFFF)
B% set to the ROM page
C% being the byte to write of the byte read

The read/write a byte program is as follows:

```
5 DIM Z% 50
10 FOR pass = 0 TO 3 STEP 3
20 P%=Z%
```

```
30 [ OPT pass
40
50 .write JSR INIT
60 LDA &40C : STA (&70),Y
70 JMP exit
80
90 .read INIT JSR INIT
100 LDA (&70),Y : STA &40C
110
120 .exit LDA #11
130
140 .romsel PHA : LDA #&C : STA &FE05
150 PLA : STA &F4 : STA &FE05 : RTS
160
170 .INIT LDA &404 : STA &70
180 LDA &405 : STA &71
190 LDY #0 : LDA &408 : JMP romsel
200
210 ] NEXT pass
220 A%=&8000 : B%=3 : C%=&4C
230 CALL write
240 CALL read : PRINT C%
```

On line 220, B% has been set to 3. This could alternatively be set to 15 if option B is set to the SOUTH.

SECTION 6 - ADDITIONAL SUPPORT

6.1 PRINTER OPTION

If a printer option has been fitted to the ROMBOX then additional to the standard unit, a Centronics interface and connector are provided and a Slogger ROMBOX-P Printer ROM must be inserted in one of the sockets on the ROMBOX.

6.2 PRINTER SET UP

Once you have connected your printer to the ROMBOX-P via the ribbon cable and connectors, the printer is then ready for use. First however, the Operating System must be informed about the type of printer connected.

This is achieved by making the following *FX calls:

- *FX3,0 - Select output to printer and screen
- *FX5,1 - Select Centronics output (parallel)
- *FX6,10 - Sets printer ignore character

Having made the *FX calls required, ROMBOX-P is ready to send the data required to the printer.

Enter CTRL-B (VDU 2 in a program) to send subsequent screen output to the printer and CTRL-C (VDU 3 in a program) to stop further output. This will always be the case if output to screen and printer have been enabled by a *FX call.

Sometimes it is necessary to force all subsequent output to the printer to be ignored. This is useful when printed output is not required or a printer is not connected or on-line. Selection of this printer sink is achieved by a *FX5,0.

6.3 PRINTER IGNORE CHARACTER

The *FX6,<ASCII code> command allows the user to define a character which should not be sent to the printer during the data transfer.

Generally this facility is provided to stop line feed characters being sent out to the printer in cases where the printer automatically forces a line feed when a carriage return is received.

If output to both printer and screen is selected, you can get a 'printer ignore character' out to the printer by sending it immediately after a CTRL-A or VDU 1 command from within a program.

e.g. VDU 1,10 ... sends a linefeed to printer.

6.4 SELECTING THE OUTPUT DEVICE

When you first switch on, both the screen driver and printer driver are enabled and all output is sent to the screen only. Output may be sent to the printer driver as well by using CTRL-B or VDU 2 as before. To alter the way that output is routed, you must use the *FX3 command as follows:

	Output to device	
	Printer	Screen
*FX3,0	Y	Y
*FX3,4	N	Y
*FX3,6	N	N
*FX3,10	Y	N

*FX3,10

All output is sent to the printer only and CTRL-B and CTRL-C will have no effect.

*FX3,0

This is the default setting, as on switch on, and causes output to be sent to both printer and screen. A single character can be sent to the printer only by preceding it with a CTRL-A or VDU 1. This method provides a means of sending the 'printer ignore character' or any printer control codes that might have unwanted effects if sent to the screen also.

6.5 THE INTERNAL PRINTER BUFFER

Characters sent to the printer are first stored in an area of the computer memory known as the internal printer buffer, and only sent on to the printer when the printer can handle it, usually a line or a character at a time. If you wish to remove all remaining characters from the buffer, you can usually either press ESCAPE (which empties all the buffers on the system) or use the command *FX21,3 (which empties the printer buffer only). You can disable the emptying of all buffers on pressing ESCAPE with the command *FX230,1 and enable it again by *FX230,0.

Your printer may also have its own printer buffer so that printing may continue for a short while after using ESCAPE.