COMPUKIT UK101
NEW MONITOR

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PLEASE NOTE:—

- The New Monitor is supplied with all COMPUKIT UK101 purchases.
- References to the old monitor in the COMPUKIT UK101 manual must be ignored.
- The New Monitor technical overview is printed below.

Insert ROM into socket observing correct polarity. Apply power and press reset.

OPERATION

Some movement of subroutines has been inevitable in designing the new monitor but if the vectors have been used to enter the five main subroutines listed below then no problems will arise.

	INDIRECT JUMP IN.	VECTOR REF.
INPUT ROUTINE	$FFEB	JMP ($0218)
OUTPUT ROUTINE	$FFEE	JMP ($021A)
CTRL C ROUTINE	$FFF1	JMP ($021C)
LOAD ROUTINE	$FFF4	JMP ($021E)
SAVE ROUTINE	$FFF7	JMP ($0220)

Small changes - Input ASCII character from tape now in $FE6D and DISC bootstrap has been removed.

CURSOR - In all modes except edit there is a choice of steady or flashing cursor. In edit mode for BASIC only the cursor will always flash and at a rate that is faster than when flashing in non edit modes. This allows identification of being in editor.

The default mode is flashing cursor, this is always set up when reset is used but if you wish for a steady cursor then place a non zero value in $020F (decimal 527) eg. POKE 527 with 1

NOTE! - When using flashing cursor then a key value is entered as the key is lifted and so auto-repeat is not available. However when using steady cursor the key is entered on pressing the key and if held will auto-repeat.

STORING OF DATA ON TAPE - Sending of DATA

PRINT CHR$(2);P$ - for strings
PRINT CHR$(2);X - for variables

On execution of either of the above lines the data is sent out to the tape as well as the screen. The CHR$(2) is a signal to the output routine to send all following until the next RETURN out to the tape. But the CHR$(2) will only work if it is the first print character of a line ie. any PRINT statement that preceded this one must NOT have a comma or a semi-colon. In addition the string or variable must NOT be terminated with a comma or semi-colon but the CHR$(2) MUST always have a semi-colon. These rules also apply to the retrieval of data.

Retrieval of DATA

PRINT CHR$(1): INPUT P$ - To retrieve a string
PRINT CHR$(1): INPUT X - To retrieve a variable

The comments above about comma's and semi-colons are the same for this retrieval but note the colon before the INPUT
It is possible of course to use two lines eg.
PRINT CHR$(1) } the above is neater
INPUT P$ - }

Remember it is not possible to retrieve data that does not exist and the routine would stay in a continuous search. If you try to input a string into a variable the BASIC will print error. However a variable can always be input as a string.

To avoid this, start any data storage with a string that provides information about the stored data including its length if known. If not then use an end marker.
eg. PRINT CHR$(2); "END"
Then to retrieve we seek the end.
PRINT CHR$(1): INPUT P$
IF P$ = "END" THEN .....

Therefore always retrieve in the same order as sent and use some method of data identification with something to tell when all data is in. You will need something to signal tape on or off.

eg. INPUT "Type 'GO' when tape running";Z$
PRINT CHR$(2);P$

No action is needed on Z$ unless you wish to add an exit in case data is not to be sent after all.

EDITOR

This is only available when using BASIC and is for amending lines of program and only one at a time. To enter the editor type CTRL 'E' and EDIT will print on the screen. It is now waiting for a line number. If however you press only RETURN then the cursor moves to the next line and editor is not entered. If you type a non-decimal character it will exit immediatly but if you type a line number then that line will be listed and the cursor will be seen to flash faster.

N.B. if you type a line number that is not in the program then editor will be entered but only blank spaces appear. To exit press RETURN.
When in EDITOR -
You may move the cursor at will to edit;
UP .....CTRL 'K'
DOWN .....CTRL 'J'
RIGHT .....CTRL 'I'
LEFT .....CTRL 'H'

To ERASE place the cursor over the character and press RUBOUT.

To INSERT between two characters place the cursor over the right hand of the two between which the insertion is to be made and type

TO ENTER the amended line the cursor must sit somewhere in the line and press RETURN.

This line will now replace the old one of the same line number so note if you alter the line number it will replace the line of that number or become a new line if no such line was present. The extracted one will then be unchanged.

CLEAR SCREEN

CURSOR MOVEMENT

These can only be used from program.

UP.....	PRINT CHR$(11);
DOWN.....	PRINT CHR$(10); - same as line feed
BACK SPACE.....	PRINT CHR$(8);
RIGHT.....	PRINT CHR$(9);
START LINE.....	PRINT CHR$(13); - same as carriage return

NOTE a semi colon must always be used to stop the carriage return line feed that BASIC will send if not there.
The above can be put into strings.
eg. CL$ = CHR$(12)
Then to clear screen PRINT CL$;
or to place the cursor top left with out clearing the screen some times called home cursor;
HM$ = CHR$(13): FOR J = 1 TO 15:HM$ = HM$ + CHR$(11):NEXT
Now to home cursor PRINT HM$;
N.B. The characters are counted as printed characters by Basic and can upset the correct position if used when TAB is involved. On these occasions it will be better to calculate spaces and use SPC.

STACK

All stack initialisation has been set to $FF to use the full stack.

INTERRUPT

The vectors have been changed to take them out of the stack area but compatability is maintained as RESET places jumps in the new locations back to the old settings. This makes old routines compatible but allows the chance to write new programs that do not conflict with the stack.

NMI $0222
IRQ $0225

More notes on data saving
The format is as follows;
/02/....string or variable.../03/CR/..10nulls../LF/

The marks 02 and 03 are used by the routine to identify start and finish of a line.

The CR nulls LF serve two purposes;
1. They provide a break between data and allow time for some processing but take care on the amount.
2. As the tape is read then the CR and LF are already there as it goes to the screen.

N.B. When forming strings for saving remember that on retrieval BASIC will ignore any ASCII value less than eleven.

PAGE 2 STORE ALLOCATION

ADDRESS HEX	DECIMAL	CONTENTS
$0200	512	Temporary holding
$0201	513	BYTE from under the cursor
$0202	514	Temporary hold for A during screen print
$0203	515	LOAD flag
$0204	516	Unused
$0205	517	SAVE flag
$0206	518	CRT baud rate
$0207	519	CURSOR position on a line 0-47
$0208	520	CURSOR row number 0-15
$0209	521	Temporary hold of $0207 in EDITOR
$020A	522	Temporary hold of $0208 in EDITOR
$020B	523	Count of number of characters per line for EDITOR
$020C	524	DATA SAVE flag
$020D	525	DATA INPUT flag
$020E	526	DATA INPUT flag
$020F	527	FLASHING CURSOR flag - 0 for flash <>0 for steady
$0210	528	FLASH rate
$0211	529	Unused
$0212	530	CONTROL C flag
$0213	531	used by keyboard routine
$0214	532	
$0215	533	
$0216	534	
$0217	535	Unused
$0218	536	INPUT VECTOR
$0219	537	
$021A	540	OUTPUT VECTOR
$021B	541	
$021C	542	CONTROL C VECTOR
$021D	543	
$021E	544	LOAD VECTOR
$021F	545	
$0220	546	SAVE VECTOR
$0221	547	
$0222	548	NMI but reset puts in a JMP $0130
$0223	549	
$0224	550	
$0225	551	IRQ but reset puts in a JMP $01C0
$0226	552	
$0227	553	

Subroutine Entries

$F86B — Editor
$F9E7 — Test for key down. A = 0 for no key A<>0 for a key pressed
$F9F2 — Increase cursor position record by one.
$FA05 — Decrease cursor position record by one.
$FA13 — Input then check for edit, rubout and clear screen.
$FA57 — Screen print routine.
$FB22 — Clear screen.
$FB60 — Move display up one line.
$FB8D — Form cursor address in $E3/$E4.
$FBAC — Input routine.
$FBD4 — Output routine.
$FCB1 — Send A to cassette port.
$FD00 — Keyboard routine.
$FE00 — Monitor.
$FE05 — Entry to monitor by-passing stack initialisation.
$FE6D — Input ASCII from port, bit 7 clear; was in $FE80.
$FE93 — Convert ASCII hex to binary result in A = 80 if bad.
$FF00 — Reset.
$FF8B — Load flag routine.
$FF96 — Save flag routine.
$FF9B — Control C routine.
$FFEB — Indirect input — JSR here to enter via vector.
$FFEE — Indirect output — JSR here to enter via vector.
$FFF1 — Indirect control C — JSR here to enter via vector.
$FFF4 — Indirect load flag — JSR here to enter via vector.
$FFF7 — Indirect save flag — JSR here to enter via vector.

SAMPLER TAPE FOR THE COMPUKIT UK101

The tape supplied comes with an extended monitor on one side and two games on the other side. The two games are called:—

1. NEW YORK TAXI
2. HECTIC

To load the games, go into BASIC and type LOAD. After the game has loaded in type RUN to execute the program. Instructions on how to play the game are contained within the program.

EXTENDED MONITOR FOR THE COMPUKIT UK101

The extended monitor enables you to write machine code programs and debug them very efficiently providing such features as setting breakpoints and displaying register contents.

To load the program hit both RESET keys and go into the monitor by typing M.

Use the Monitor load command by typing L and start your cassette. This will load a checksum loader. You will notice the numbers in the middle of the machine flickering; this is the program loading into the machine. After the loader has been entered it will automatically execute and start loading the extended monitor; this is signified by numbers being entered from the bottom of the screen. When complete, the program automatically executes again and will leave a colon in the bottom left corner of the screen followed by the cursor. The machine is now ready to accept your commands which are listed below.

MEMORY DISPLAY AND MODIFICATION

@NNNN	Opens location NNNN. The COMPUKIT responds with "/CC" where CC is the contents of that location. CC may be changed by typing another 8 Bit Byte in Hex e.g. DD.
(CR)	Exits from this mode and closes current location.
(LF)	Increments to next location.
(↑)	Decrements to previous location.
(')	Prints ASCII or graphic character at that locaion.
DXXXX,YYYY	Dumps memory block from XXXX to YYYY (XXXX & YYYY are both 16 Bit addresses)
FXXXX,YYYY = DD	Fills memory from XXXX to YYYY — 1 with DD.
MZZZZ = XXXX,YYYY	Moves block of memory between XXXX and YYYY to a block starting at ZZZZ.
RZZZZ = XXXX,YYYY	Relocates rather than moves — same format as above.
QNNNN	Dissassembles block of 13 lines and pauses (LF) continues for another 13 lines, (CR) exits this mode. Non-executable codes are printed as ???.
N HEX > XXXX,YYYY	Searches for Hex String between XXXX and YYYY; if found goes to open mode at first occurrence of first Byte of Hex String. Hex may be up to 8 Bytes.
WASCII > XXXX,YYYY	Same as N but searches for ASCII String instead of Hex String. ASCII String can be up to 8 Bytes long.
HNNNN, XXXX (OP) = YYYY	Hex calculator — The operation (OP) which can be +, −, *, / is performed on NNNN and XXXX to produce an answer YYYY.
0	Prints overflow/remainder from Hex calculator.

BREAKPOINTS

BN,XXXX	Installs breakpoint N at location XXXX. N can be from 1 to 8.
EN	Eliminates breakpoint N.
T	Prints table of breakpoint addresses.
C	Continue from last breakpoint (if and only if stopped by a brea
I	Prints address the machine last entered by a breakpoint. Also contents of registers and stack pointer.
A X Y P K	These five print contents of accumulator X REG; Y REG; status pointer respectively. Open mode is entered and contents of an may be changed before program is continued.

AUDIO CASSETTE COMMANDS

S	Turns on save flag as in BASIC; all output then goes to casset screen.
L	Loads data in checksum format (same as KIM1) if error detect display ERR. Stop tape; rewind and press G to restart.
SXXX,YYYY	Saves in checksum format from XXXX to YYYY. Format is; LEN DATA; CHKSUM; where — LEN is the length of the block; ADD start address of the block; DATA is the data in the block; CHK checksum of the block.
V	This allows you to view the contents of a cassette without act loading it into memory.
GXXXX	This transfers control to location XXXX.

The extended monitor uses 2K of RAM from 0800 to 0FFF plus 48 locations in page zero loca to 00FF and also a checksum loader from 0700 to 07EF.

For complete initialisation enter at 0800 but to bypass this enter at 081F.

There are 3 spare letters — J, U and Z.

For extra user routines these functions have call addresses as follows:—

J = 0974
U = 098A
Z = 0994

Functions must end by RTS.

e.g. to call a routine at 0400 with "U" :—

LOAD 098A with 00
LOAD 098B with 04

NOTES

Most prompting of "," AND "=" is automatically produced by the monitor.

">" WITH N or W is not automatically prompted.

So there you have the extended monitor for the COMPUKIT UK101 which we hope will assist you that have the desire to program in 6502 machine code.

Should any fellow programmers come up with system programs that you have written, like a assembler for instance or any other useful programs we would be interested to hear about the

Best Wishes and Happy Programming,
ANDY FISHER — Software Consultant.

Some .1 capacitors are specified in the manual as being supplier in mylar, but in some kits are supplied as disc ceramics; these should be used in place of the mylar capacitors. The manual states that 68pf, 47pf and 22pf c are supplied; these are not critical values and the nearest values supplied should be used. One of the keyswitches supplied has a stronger spring in it than the rest; this switch is for the space bar so before inserting switch each one first to determine which is the special switch for the space bar.
Component change: R67: 27k changed to 56k. C48: .22 changed to .1