

## Change log for MMBasic Ver 2.7A

- Implemented the ability to selectively switch the program output to the USB and video interfaces off and on. Note that the output is always restored at the command prompt. The commands are:   OPTION USB ON           OPTION USB OFF  
                          OPTION VIDEO ON       OPTION VIDEO OFF.
- Fixed a bug which corrupted a file of more than 4076 bytes written to the internal flash drive A:.
- Fixed a number of issues with the INPUT command when used on a serial port. Now the command will wait indefinitely until a carriage return character is received.
- The INPUT and LINE INPUT commands will now set the variables to zero or a null string if there is insufficient data to fill them.
- Fixed a bug which caused the LIST command to scroll too far if lines were longer than the screen width or if the LOCATE command had been used.
- Version 2.7 of the User Manual remains valid and has not changed.

## Change log for MMBasic Ver 2.7

- Optimised several areas within MMBasic to improve speed of execution. This speed improvement will depend on the type of program running but it should be about 40% faster than version 2.6.
- Implemented an additional flash drive using the PIC32's internal flash memory. This drive is referred to as A: while the SD card is B: The drive A: is useful with the mini Maximite (see Silicon Chip November 2011) and the UBW32 as both of these do not have a SD card. See the functional summary in the "Maximite User Manual" for more details.
- Implemented a number of additional video fonts and provided the ability to switch between them using the FONT command. Multiple fonts can be displayed simultaneously on the screen and custom fonts can be loaded from internal flash or SD card.
- Implemented the XModem protocol (in the XMODEM command) for copying data to and from drive A: or B:.
- Upgraded the EDIT command to use the editing keys (arrow, insert, home, end, etc) on a keyboard. The EDIT command has many extra features such as the ability to go direct to a line that has caused an error. The old editing keys have been discontinued.
- MMBasic is now always in editing mode when entering text at the command prompt or the INPUT or LINE INPUT commands. This means that the editing keys can be used at any time to correct entered text.
- Changed the codes generated by the special keys on a keyboard (arrow keys, function keys, etc). These are unique and generate different codes if the control, shift or both keys are held down. See Appendix E of the Maximite User Manual.
- Added mapping of vt100 escape codes generated by terminal emulators such as Terra Term and Putty to the codes generated by a directly connected keyboard. This means that a key press on the terminal emulator will have the same effect as the same key on the Maximite's keyboard.
- Modified the CLS command to also generate the clear screen codes for an attached vt100 compatible terminal emulator.

- Added the AUTO command to automatically generate line numbers when entering a program.
- Added programmable function keys. The keys F1 to F12 can now be programmed to generate a string of characters when pressed. See the OPTION command for details.
- To suit the new editing functions the cursor has been changed to a blinking underline.
- The SAVE command has been modified so that the file name is optional and if omitted the last filename used in SAVE, LOAD or RUN will be automatically used. A predefined and read only variable MM.FNAME\$ will contain this automatic filename.
- Added the ability of the VAL() function to accept strings starting with &H (hex), &O (octal) and &B (binary).
- Created a separate version of MMBasic for the UBW32 experimenter's board. This is fully compatible with the Maximite version but uses a different hex file from the Maximite version so that it can be loaded using the UBW32 bootloader program. See <http://geoffg.net/ubw32.html> for details.
- Fixed a bug which corrupted some transmitted characters when the serial port COM1: was opened as console.
- Fixed a bug where serial port COM1: always had flow control enabled, regardless of the "FC" option.
- Fixed an issue where Control-C on a serial port opened as console would not interrupt a running program.
- Fixed a bug which caused the SAVEBMP command to fail with a confusing error message when a file or COM port was open as file number #1 or #2.
- Fixed a bug which prevented the RUN "filename" command from throwing an error if the file did not exist.
- Fixed a bug that caused the LOF() function to return an invalid value.
- Updated the User Manual to V2.7 to include the new features listed above.

## Change log for MMBasic Ver 2.6

- This version is 30% faster when running a program compared to Ver 2.5. This is a result of optimising the video generation routines. Other benefits include faster scrolling and the elimination of noise which sometimes appeared on the VGA video output.
- Implemented asynchronous serial capability. Two serial ports are available with speeds up to 19200 baud with hardware flow control, configurable buffer sizes and interrupt on buffer full. For a full description see Appendix A of the Maximite User Manual
- Implemented the Serial Peripheral Interface (SPI) communications protocol. Any number of SPI devices can be interfaced on any I/O pins with speeds up to 500KHz baud. For a full description see Appendix C of the Maximite User Manual.
- Modified the SOUND command so that the duty cycle can be specified and the output frequency can be set as high as 1MHz. These changes allow the sound output to be used as a precision Pulse Width Modulation (PWM) output for driving analogue circuits.
- Implemented the LOG() function (it was documented but not implemented in Ver 2.5).
- Changed the DATE\$ = statement to allow a two digit year. In this case MMBasic will automatically add 2000 to the year.

- The USB driver in MMBasic has been modified to reduce the number of characters lost when sending data to a slow host.
- Fixed an issue where the video output would blank while large amounts of data were being received on the USB interface.
- Fixed a bug that prevented MMBasic from responding to an interrupt if a previous interrupt routine had been halted while running (by an error or CTRL-C).
- Fixed a bug which prevented MMBasic from reading and writing data to the SD card and USB interface that contained a byte with the value of zero (ie, CHR\$(0)).
- Fixed a bug where the STRING\$() function would cause MMBasic to crash if it was supplied with the wrong number of arguments.
- Updated the “Maximite User Manual” to V2.6 to include the new features listed above.

Note that currently the RENUMBER command does not renumber line numbers used in the open commands for the I<sup>2</sup>C and serial port interfaces.

## Change log for MMBasic Ver 2.5

- Fixed a bug where the MOD operator did not throw an error on an attempted divide by zero.
- Fixed a bug with the DATE\$ function not rolling over month end correctly.
- Fixed a bug where a character with the decimal value of 255 could not be stored in a file.
- Fixed a bug related to indexing into an array with Option Base 1 in effect.
- Fixed a bug which caused a crash when 10 files were simultaneously open.
- Fixed a bug when resolving constant values with a floating point exponent (ie, 5.32e-12).
- Changed the maximum line number that can be used in a MMBasic program to 65000.
- Added the EDIT command to allow convenient editing of program lines held in memory.
- Added the OPTION PROMPT command to enable customisation of the command prompt.
- Added the function CWD\$ which returns the current working directory on the SD card.
- Added PEEK/POKE commands for manipulating memory within the PIC32 processor.
- Added a preset read only variable MM.VER which returns the version number of the firmware.
- Added the COPYRIGHT command to list all contributors to the software and summarise the copyright.
- Integrated support for I2C (written by Gerard Sexton). This fully supports master and slave operation, 10 bit addressing, address masking and general call, as well as bus arbitration (ie, bus collisions in a multi master environment). The description of these commands is contained in Appendix B of the Maximite User Manual.
- Allowed the function PIN() to return the digital value of a pin that is configured for open collector output. This is useful when the pin is shared with other devices that might also pull the voltage on the pin low.
- Updated the “Maximite User Manual” to V2.5 to fix many typographical errors and include the new features listed above. Thanks to all the Maximite users who proofread this document and alerted me to its faults.

## Change log for MMBasic Ver 2.4

- Fixed an issue which caused glitches or noise on the video output while a BASIC program was running. This particular issue caused random horizontal lines of pixels to be intermittently shifted 8 pixels to the right when MMBasic was running a program (ie, not waiting for user input).
- A bug which caused the unary negation function to fail has been fixed. For example, `PRINT -SIN(2)` now works.
- Fixed a bug which caused the `RENUMBER` command to miss renumbering a `GOSUB` embedded in an `IF...THEN...ELSE` command.
- Fixed a bug which caused negative numbers in `DATA` statements to be returned as positive numbers. As a side result you can now use numeric expressions (eg, `8 * 60`) in `DATA` statements.
- The `RUN "file"` command now checks if "file" exists before clearing the program currently in memory. This means that if used with `OPTION ERROR CONTINUE` you can recover from an error when trying to run one program from within another.
- The semicolon character (;) is now optional between expressions in the print statement. For example, you can now use: `PRINT "Voltage is " x "mV"`  
This was added to improve Microsoft compatibility.
- Updated the "Maximite User Manual" to V2.4 to include the new features listed above

## Change log for MMBasic Ver 2.3

- Fixed a timing error which caused all timed functions (date, time, pause, etc) to run fast.
- Fixed a bug in the `SOUND` function which caused a greater than usual error in the frequency of the sound.
- Fixed a bug where `UNTIL` was not recognised in the `LOOP` command.
- Fixed a bug which in some circumstances could cause an exception (a reset) when loading a program that was too large for the program space.
- Fixed a bug which occasionally caused the `EXIT FOR` command to fail.
- Fixed a bug which caused `IRETURN` to fail when returning from an interrupt which had interrupted a `PAUSE` command.
- The internal mechanism for tokenising keywords (ie, command names, etc) has been changed to allow more keywords to be added to the language in the future. As a side effect the rules for naming variables has been relaxed (See the "Maximite User Manual V2.3" for details). In particular, it is now valid to have a variable name which is the same as a command name.
- Added the function `PIXEL(x,y)` to find the value of a pixel on the VGA or composite screen and the statement `PIXEL(x,y) =` to turn a pixel on or off. This supersedes the `PSET` and `PRESET` commands that are now only included for Microsoft compatibility.
- Added the command `SAVEBMP file$` which will save an image of the current VGA or composite screen as a BMP file on the SD card.

- Added the command RENUMBER which will renumber the program currently held in memory including all references to line numbers in commands such as GOTO, GOSUB, ON, etc.
- Added the ability to use a line number with the RUN command to start the program at a specified line number (this was documented in V2.2 but not implemented).
- Added the question mark symbol (?) as a shortcut for the PRINT command/keyword.
- Updated the “Maximite User Manual” to V2.3 to include the new commands and other changes.

## Change log for MMBasic Ver 2.2

- An error is now thrown when concatenating two strings with a combined length of greater than 255 characters (previously this would cause the interpreter to crash).
- MMBasic now throws an error when presented with an input line of greater than 255 characters (previously it just discarded the extra characters).
- Fixed a bug in the PRINT command which caused an intermittent crash on the construct:  
PRINT #n (ie, no following comma)
- On an internal crash (caused by a bug in MMBasic) the Maximite will now restart with a suitably apologetic error message.
- The keyboard is now checked every 20 $\mu$ S (previously it was every 25 $\mu$ S) to improve reliability in detecting keystrokes.
- The MEMORY command has been added. This will list the three memory segments used by MMBasic and the amount of space used in each.
- The Maximite User Manual has been updated to version 2.2. This contains minor updates to clarify some parts of the text and add the MEMORY command. Other than this there has been no significant change to the description of the commands or functions used in MMBasic.