CONTROL TECHNIQUES
www.controltechniques.com

User Guide

CT Firmware Programmer

Issue: 1.2

General Information

The ***CT Firmware Programmer*** is to only be used by Control Techniques personnel.
The ***CT Firmware Programmer*** is not for supply outside Control Techniques.

Software Versions

WARNING:

If new target code is loaded into a drive, solutions module or keypad there may be some difference in the functional behaviour of the target system.

If there is any doubt, contact Control Techniques Technical Support.

Compatibility

The CT Firmware Programmer has been designed and tested to operate with the following Control Techniques products. Other products may be compatible with the CT Firmware Programmer but have not been tested. Contact Control Techniques Technical Support for further information.

Target	Flash Type
Unidrive SP	SH2
SM-Applications	SH2
SM-Applications Lite	SH2
SM-Universal Encoder Plus	SH2
SLM (*currently under development*)	Fieldbus AMD
SM-Profibus	Fieldbus AMD
SM-DeviceNet	Fieldbus AMD
SM-Interbus	Fieldbus AMD
SM-CAN	Fieldbus AMD
SM-CANopen	Fieldbus AMD
SM Keypad Plus	Keypad Plus AMD 4M Bit

The CT Firmware Programmer can be used to install the core operating system and boot code. Software would normally be loaded directly or through the drive.

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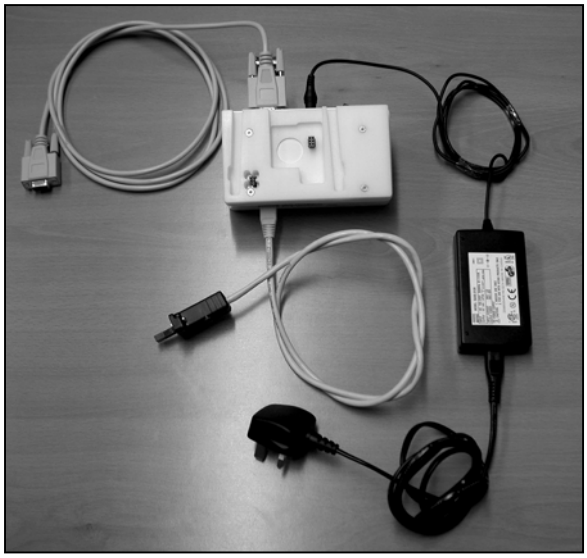
Note: This guide refers to SPFlash Version 1.04

Requirements

Hardware provided

- ***CT Firmware Programmer.***
- ***Firmware Programming Adapter Lead.***
- ***PC to programmer cable : 9 pin male to 9 pin female serial extension lead*** *(1 to 1 connection).*
- ***Universal 24V_{DC} Power supply.***
- ***UK or Euro mains power supply cable.***



Software

- SPFlash programming software (Ver 1.04 or later), (*To control the CT Firmware Programmer*)

A suitable target software file, eg.

- Unidrive SP target software file (`*.mot` file)
- Solution module / SM Keypad Plus target software file (`*.hex` file)
- SM Keypad Plus target string database file (`*.hex` file)

NOTE:

The latest version of SPFlash, and target software is available to download from the CT Support website.

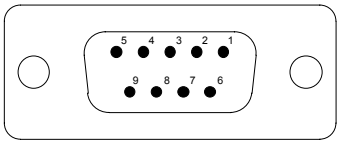
(http://www.ctsupport.com)

1.0 Connections

1.0 Connecting the CT Firmware Programmer to a PC

The CT Firmware Programmer connects to a spare RS232 serial port on the host PC. The connecting lead should be a one-to-one, male-female extension type lead.
Three connections are used between the programmer and the PC:

PC	Title	Programmer
3	Transmit	3
2	Receive	2
7	Signal Ground	7



Pin-out of the programmer when looking at the rear panel.

1.1 Connecting the CT Firmware Programmer to it's power supply

+24V_{DC} is connected to the programmer via a 2.5mm DC power socket, situated on the rear panel of the programmer. The power supply should be capable of supplying up to 1A.

1.2 Connecting the CT Firmware Programmer to a Unidrive SP

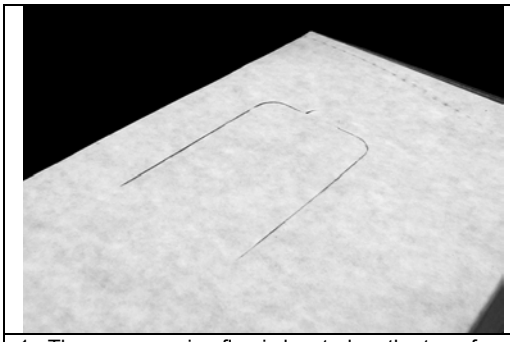
Connecting the CT Firmware Programmer to a Unidrive SP for programming requires the use of the Firmware Programmer Adapter Lead, this lead should be connected between the "**Drive Prog**" socket on the programmer and the drive's SM Keypad connector.

WARNING:

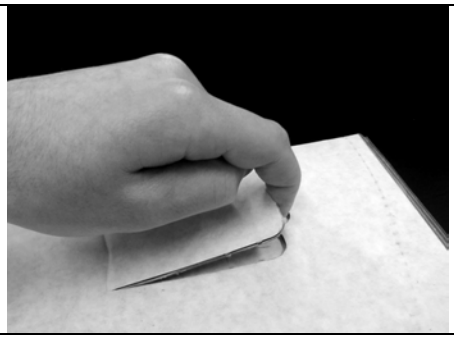
The drive to be programmed should be disconnected from it's high voltage power supply and the DC bus allowed to discharge before it is connected to the ***CT Firmware Programmer***.

1.3 Connecting the CT Firmware Programmer to a Unidrive SP whilst boxed.

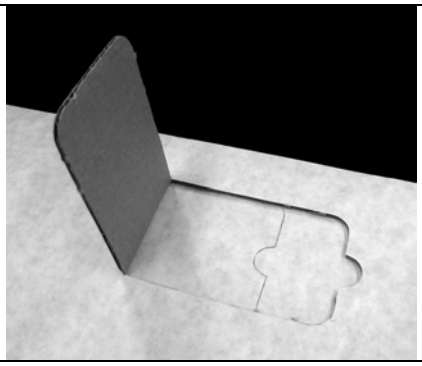
To enable easy upgrading of software versions it is possible to reprogram the Unidrive SP without needing to remove it from it's packaging materials. The following sequence of photographs shows how this is achieved.



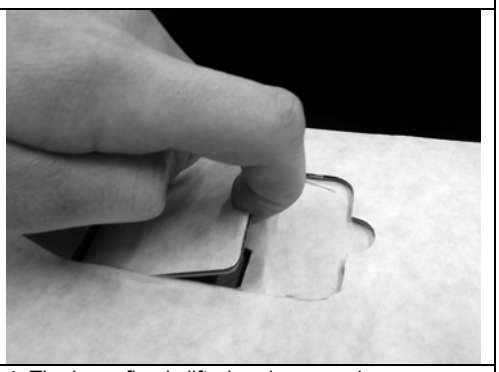
1. The programming flap is located on the top of the Unidrive SP box.



2. Lift the outer flap.

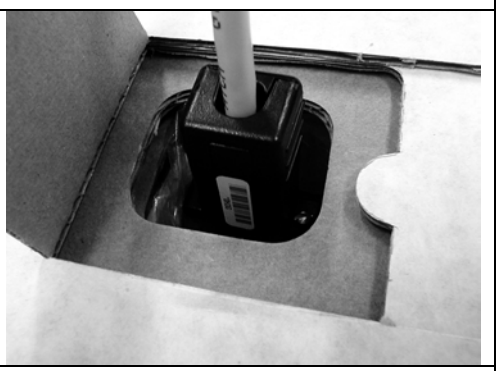


3. With the outer flap open, the inner protection flap is exposed.

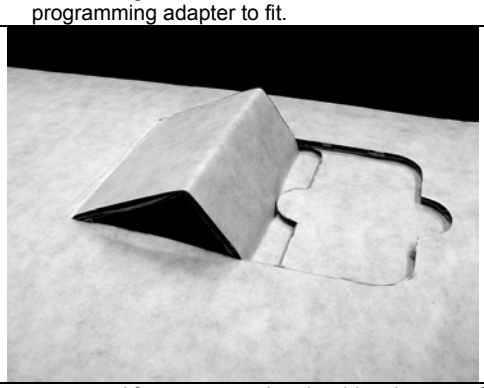


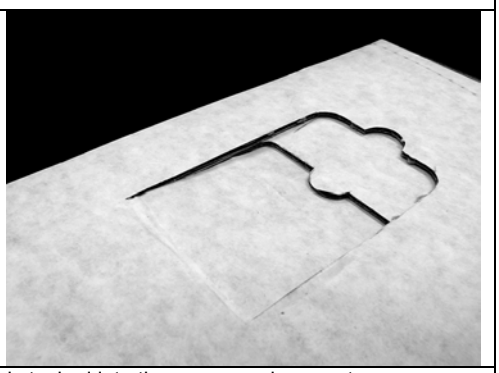
4. The inner flap is lifted and removed.

5. With the inner flap now removed it is necessary to make a small hole in the plastic bag surrounding the drive to enable the programming adapter to fit.



6. The Firmware Programming Adapter Lead can be fitted to the drive in the normal way.





7. After programming the drive the outer flap is tucked into the programming aperture.

1.4 Connecting the CT Firmware Programmer to an SM Keypad Plus

The SM Keypad Plus to be programmed will locate directly on the top of the Firmware Programmer; no additional connection leads are required.

1.5 Connecting the CT Firmware Programmer to a Solution Module.

The solution module to be programmed will locate directly on the top moulding of the Firmware Programmer; no additional connection leads are required.

WARNING:

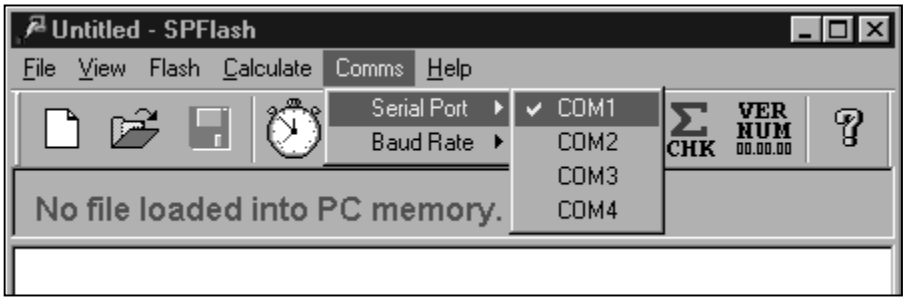
The solution modules listed at the start of this user guide are suitable for use with the CT Firmware Programmer. Solution modules not included in the list may not be compatible, check with Control Techniques Technical Support first.

2.0 Setting Up 'SPFlash' Software.

The set-up procedure should be followed before programming a target drive or solutions module.

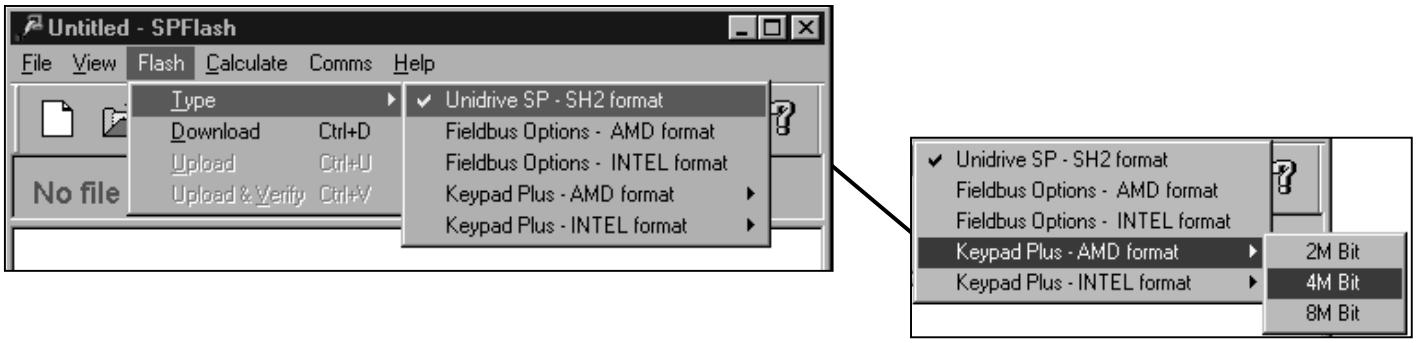
2.0 Setting the PC serial port.

The serial port to be used on the host PC is selected from the 'Comms > Serial Port' menu.



2.1 Selection of flash type.

The type of target FLASH to be programmed should be selected via the 'Flash > Type' menu.



HINT:

The following targets are currently supported. Contact CT Technical Support before programming if the target is not listed here.

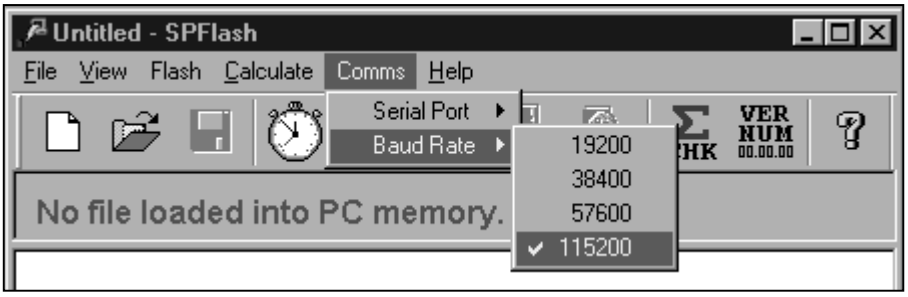
Target	Flash Type	File Format
Unidrive SP	SH2	*.mot
SM-Applications *	SH2	*.mot
SM-Applications Lite *	SH2	*.mot
SM-Universal Encoder Plus	SH2	*.mot
SLM (*currently being developed*)	Fieldbus AMD	*.hex
SM-Profibus	Fieldbus AMD	*.hex
SM-DeviceNet	Fieldbus AMD	*.hex
SM-Interbus	Fieldbus AMD	*.hex
SM-CANopen	Fieldbus AMD	*.hex
SM-CAN	Fieldbus AMD	*.hex
SM Keypad Plus	Keypad Plus AMD 4M Bit	*.hex

NB: The Fieldbus and SM Keypad Plus options could change to Intel format at some time in the future

** See compatibility chart at the start of this user guide.*

2.2 Setting the communications baud rate

The serial port baud rate needs to suit the drive or solution module to be programmed. Baud rate adjustment is managed through the 'Comms > Baud Rate' menu.



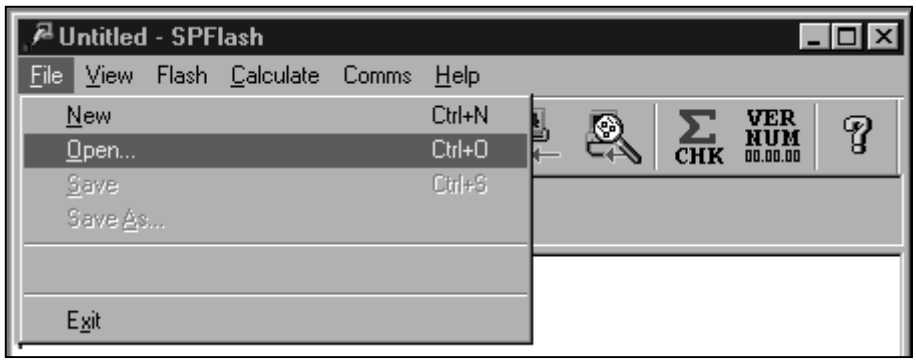
HINT:

The recommended normal baud rate for programming is '57600', however, if your host PC is capable of high speed communication rates then it is possible to program a Unidrive SP at a baud rate of '115200' - This higher baud rate will not work with other targets.

3.0 Programming

3.1 Loading the target code into the PC memory array.

Having correctly set up SPFlash to match the type of target to be programmed, it is necessary to load the relevant code into the SPFlash PC memory array. Use the 'File > Open' menu, or press the shortcut button on the toolbar.



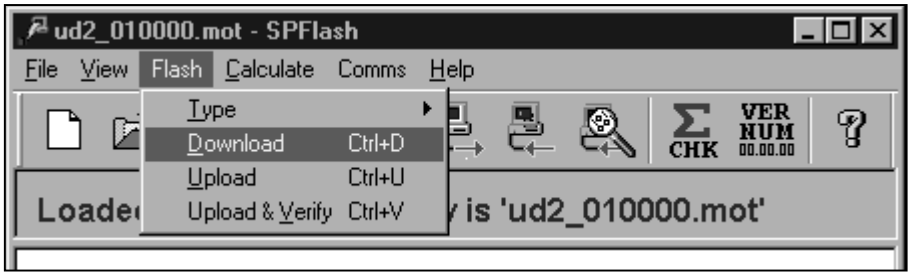
3.2 Programming

- Ensure the CT Firmware Programmer has been correctly connected between the PC and the Drive or Solution Module to be programmed and that SPFlash has been correctly configured. (*see Section 1.0 & Section 2.0*)

- Turn on the programmer using the switch situated on the rear panel of the programmer. The red '**Power**' LED should illuminate. If the programmer has been connected to a Unidrive SP the red '**5V**' LED should illuminate very soon afterwards. If the '5V' indicator does not illuminate then recheck the connections.

- If the Firmware programmer is to be used to program either the LCD SM Keypad Plus, or any other form of solution module, the green '**Option/LCD Detected**' LED should illuminate at the same time as the red '**5V**' LED.

- With the power correctly applied it is possible to start the software download. Select the 'Flash > Download' menu, or press the shortcut button on the toolbar.



- Whilst programming the target, the checksum of each 256 byte data block in the target file is monitored to ensure the information has not become corrupted during its transfer from the PC. If a problem is encountered whilst programming the flash memory an error message will be generated.

HINT:

Programmer Panel Lights

Light	Unidrive SP	Solution Module	SM Keypad Plus
Option/LCD Detected	✖	✓	✓
5V	✓	✓	✓
Power	✓	✓	✓

NOTE:

Unidrive SP

As different versions of drive software may reference the parameter database in different ways it is advisable to reload the drive defaults after programming.

HINT:

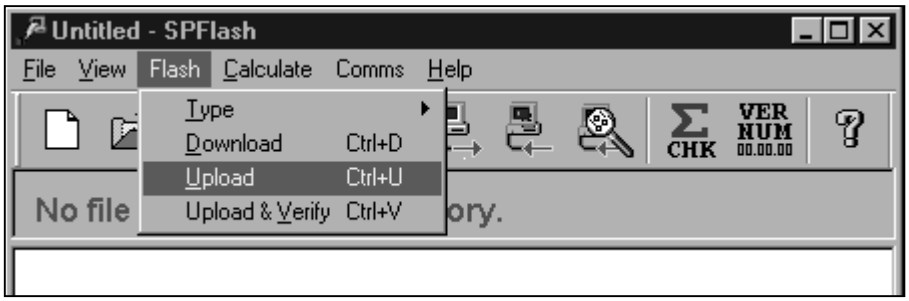
To update the alternative string database on the SM Keypad Plus (*LCD keypad for Unidrive SP*) the downloadable *.hex file created by the development PC tool is opened and downloaded by SPFlash in the same way as new target software would be. The string database target *.hex file will automatically be loaded into the correct area of flash memory leaving the target keypad software version unaltered.

4.0 Uploading Data

Uploading the contents of the FLASH memory back into the SPFlash PC memory array enables versions of software to be copied from one target to another (*this facility is not available with Unidrive SP – SH2 format targets*).

- Ensure the CT Firmware Programmer has been correctly connected to the target drive or solution module, and that the SPFlash software has been set up correctly (*see Section 1.0 & Section 2.0*)

- Uploading is started by selecting the ' Flash > Upload' menu option, or press the shortcut button on the toolbar.



- Once the data has uploaded it is possible to save it using the 'File > Save As' command.

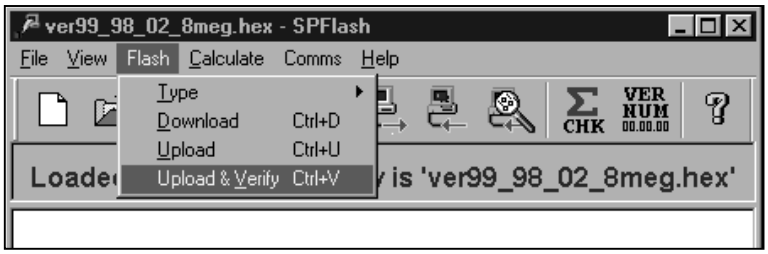
4.1 Upload & Verify

This will calculate the checksum of the code currently located in the target flash memory, then compare it to the checksum of the code held in SPFlash's PC memory array. The PC memory array is not replaced by data held in the target's FLASH, this function only compares the checksums of the two data sets.

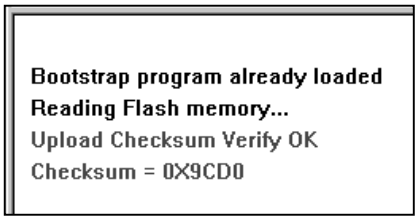
- Ensure the CT Firmware Programmer has been connected to the module, and that SPFlash has been set up correctly (*see Section 1.0 & Section 2.0*)

- Load the reference code into the SPFlash PC memory array (*Section 3.1*)

- Upload & Verify the code from the FLASH memory by selecting 'Flash > Upload & Verify'.



When the upload has finished the checksum is calculated and compared to the data held in PC memory, the results are displayed on the screen.



5.0 Toolbar

	New	Clear the SPFlash PC memory array.
	Open	Load the SPFlash PC memory array with an existing target software file.
	Save	Save the data held in the PC memory array to a file on disk.
	Repeat	Repeatedly try to connect to a target module and download the current contents of the SPFlash PC memory array.
	Stop Repeat	Exit from repeat mode.
	Download	Download code from the PC memory array to the target FLASH memory.
	Upload	Upload the contents of the target FLASH memory into the PC memory array. *(not available from a Unidrive SP target '*.mot' file)*
	Upload & Verify	Uploads the target FLASH memory contents and compares it against the code held in the PC memory array *(only available after completing a download when using a Unidrive SP – '*.mot' file)*
	Calculate Checksum	Calculates and displays the checksum of the data held in the PC memory array
	Software Version Number	An area of the memory array is specified for holding version number information. This button will display the contents of the array location. If the target software file supports this function then the correct software version will be displayed.
	SPFlash Version Number	SPFlash program information and version number.

6.0 Error Messages

Error message	Cause
Flash device erase failed	Faulty flash device or faulty hardware.
Communication checksum error	Serial communication hardware (*cables, connectors etc*) integrity failure.
Communication error	Serial communication hardware (*cables, connectors etc*) integrity failure.
Programming failed at 0xXXXX	Failed programming at the specified address block due to a faulty flash device.
Last block sent to stop programming has failed	Faulty flash device or a serial communication hardware integrity failure.
Cannot connect	No power or serial communication hardware integrity failure.
Bootstrap program load has failed	Serial communication hardware integrity failure.
Connected, but Flash erase failed	Faulty flash device.