

# ***Able***

**C16x Loader Manual**  
**Version 1.19**

***User Manual***

***24 June 2005***

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## 1 INTRODUCTION

The C166 loader program allow the operator to communicate with the C166 Series of Able Communications micro-controllers. This allows these micro-controllers to be configured and programmed from a standard windows based personal computer using an inexpensive serial cable.

## 2 INSTALLATION

To install the software the setup program can be run or downloaded from the able web site downloads page at [able-technologies.co.uk](http://able-technologies.co.uk).

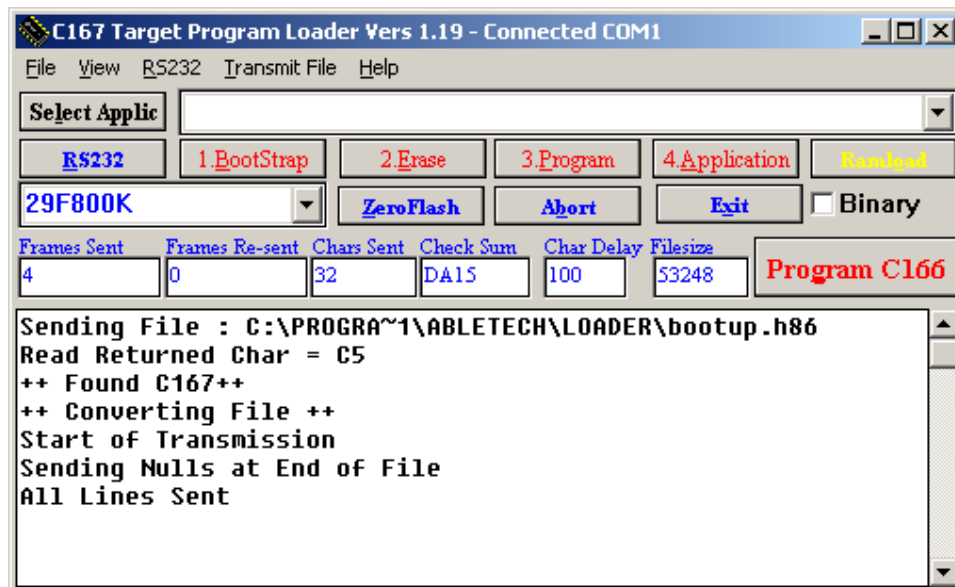
## 3 MINIMUM SYSTEM REQUIREMENTS

The system will run using windows 95/98/2000/xp . It will also run on slower machines with reduced speed performance.

## 4 UN-INSTALLATION

Uninstall the software from the control panel Add Remove programs option.

## 5 MAIN OPERATOR SCREEN



## 5.1 Selecting the Application File

The hex file which you wish to upload to the processor must be selected using the Select Applic button. This allows you to brows to the folder your H86 file has been stored in . The drop down box stores the history of all the files you have uploaded and can be used to select the file if it has previously been used.

## 5.2 Selection of a Flash Type

Depending on the version of the micro-controller being used it may be necessary to select a different flash type. This information will be supplied to with the micro-controller. To select a flash type press the small down arrow below the words **Select Flash Type** and a *drop-down* list will appear. From this list select the correct flash number. Selecting an incorrect flash type will cause spurious results.



Selecting the flash type sets the program file for flash operations. Each flash type has three programs associated with it , for a 29F800 flash type these are 29f800e.h86,29f800p.h86,29f800z.h86. These are for erasing, programming and clearing respectively. Some of the files are processor specific. The standard types 28f400,29f010,29f800 are for generic c166,c167 processor types. The 29f804k is for a c164 processor , the xc164k is for the internal flash in an xc164 processor type.

Some of the flash routines above have a “k” appended to the end of the flash type. This software uses an error correcting protocol to upload the application. Without the “k” suffix the software uses no error correction .

The sequence of events for uploading a file are :-

- a. 32 byte bootstrap loader is sent.
- b. Flash erase program is sent
- c. 768 byte loader is sent
- d. Application is sent

The sequence can be manually executed by pressing the appropriate button. The complete operation can be executed by pressing the “Program C1662 button.

## 5.3 Bootstrapping the Processor

Boot strapping is a term used to allow the PC to send programs and collect data from the Micro-controller. The bootstrap involves sending a very small program into memory and running this. This then allows operation to be performed from the PC. While the Micro-controller is running the bootstrap it will not be able to run any other software so care should be executed if a real-time control system is

being used. There are two methods of bootstrapping the Micro-controller either via hardware or via software.

Once the jumper is in place as in Section 5.3.1 The **Bootstrap** Button on the **Flashform** should be pressed.

### 5.3.1 Bootstrap via Hardware

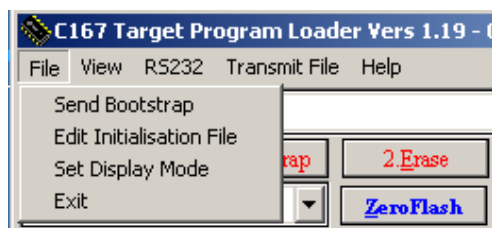
This is the simplest method, however it may not always be the most practical depending on the environment or the location of the Micro-controller within a system. The Micro-controller PCA requires a jumper to be placed on J2 see Appendix I – Jumper Location. This forces the Micro-controller to accept the Bootstrap Program.

**This jumper has then to be removed once the programming/data retrieval operations are complete.**

### 5.3.2 Bootstrap via Software

This section is only relevant if the micro-controller is running software written by Able. Establish communications in the usual way but ensure that the baud rate is set correctly to the application currently running in the controller. By resetting the Micro-controller via the reset switch without the bootstrap jumper connected you can set the bootstrap mode via the start up menu . Use the terminal emulator in the File/Terminal Menu options to get access to the c166 menu software. The “B” option will start the bootstrap code .

### 5.3.3 File Menu



#### 5.3.3.1.1 Send Bootstrap.

This is the same action as the Bootstrap button and sends the 32 byte bootstrap loader to the c166. No error correction is used here.

#### 5.3.3.1.2 Edit Initialisation File.

This allows the loader settings file to be changed , it is called c166ldr.ini.

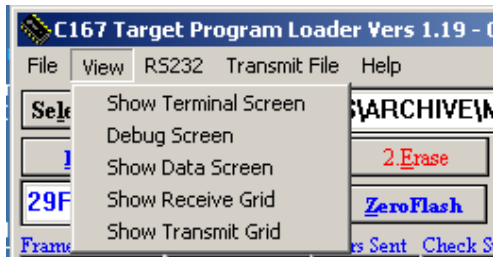
#### 5.3.3.1.3 Set Display Mode.

This sets a debug display mode to show information on data being sent to board. Each hex record that is transmitted is displayed in a pop up screen.

#### 5.3.3.1.4 Exit.

Exits the program.

## 5.3.4 View Menu



### 5.3.4.1 Show Terminal Screen

This option activates a simple terminal emulator to display the characters from the board

### 5.3.4.2 Debug Screen.

This displays a screen which shows the hex records as they are transmitted to the board.

### 5.3.4.3 Show Data Screen

This shows the rs232 communications characters for transmit and receive.

### 5.3.4.4 Show Receive Grid

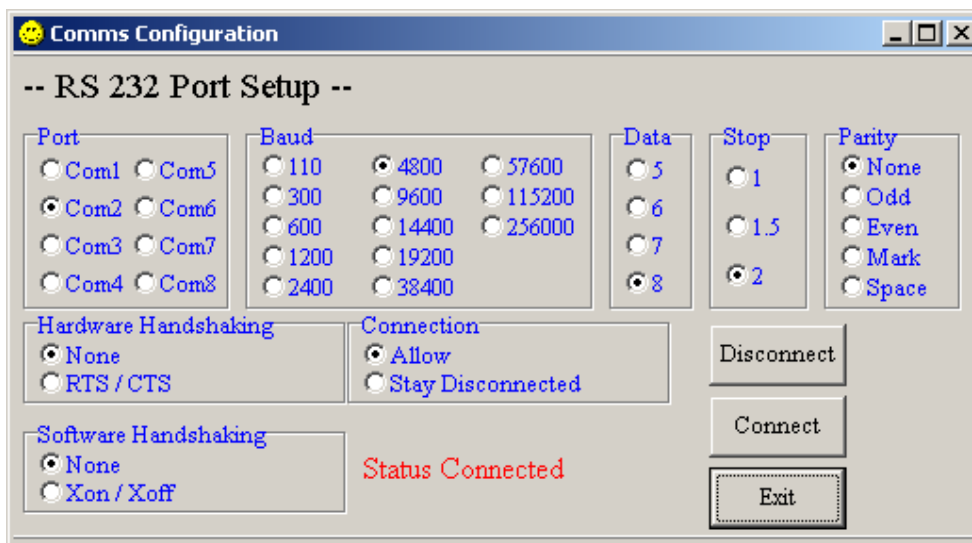
Diagnostic screen to display the received rs232 characters as hex.

### 5.3.4.5 Show Transmit Grid

Diagnostic screen to display the transmitted rs232 characters as hex.

## 5.4 RS232

Allows the PC to set up communications to the Micro-Controller Board via the RS232 port on the back.



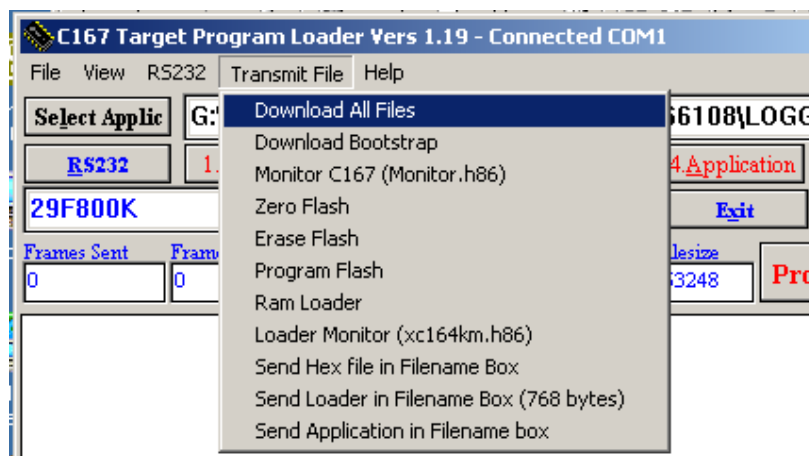
To ensure correct operation between the C166 Micro-controller and the PC, the first task is to establish communications. Using the **RS232 Init.** button from the main menu takes you to the screen shown above.

The default communication can be set up as follows however other baud rates can be used depending on the micro-controller software.

Parameter	Default Value	Notes
COM Port	Com2	On Standard PC a mouse is usually set up on COM1
Baud Rate	9600	
Data Bit	8	
StopBit	1	
Parity	None	
Handshaking	None	

### 5.4.1 Transmit File

This menu is not necessary for normal use and should be regarded as a diagnostics menu with advanced functions .



#### 5.4.1.1 Download all Files

This has the same function as the “Program C166” button.

#### 5.4.1.2 Download Bootstrap

This has the same function as the “Bootstrap” button.

#### 5.4.1.3 Monitor C167

This loads a 768 byte monitor program for generic c167 debugging using a terminal emulator. The file sent is monitor.h86. The bootstrap should be sent first.

#### **5.4.1.4 Zero FLash**

This has the same function as the “Zero Flash“ Button.

#### **5.4.1.5 Erase FLash**

This has the same function as the “Erase Flash“ Button.

#### **5.4.1.6 Program FLash**

This has the same function as the “Program“ Button.

#### **5.4.1.7 Ram Loader**

This has the same function as the “Ramload“ Button. This routine is used for loading into systems with ram at location zero. It will not work with flash rom.

#### **5.4.1.8 Loader Monitor (xc164km.h86)**

This has the same function as the “Program“ Button.

#### **5.4.1.9 Send Hex file in FileName box**

This has a similar function as the “Program“ Button but the file is sent as hex records directly.

#### **5.4.1.10 Send Loader in Filename Box**

This has the same function as the “Program“ Button.

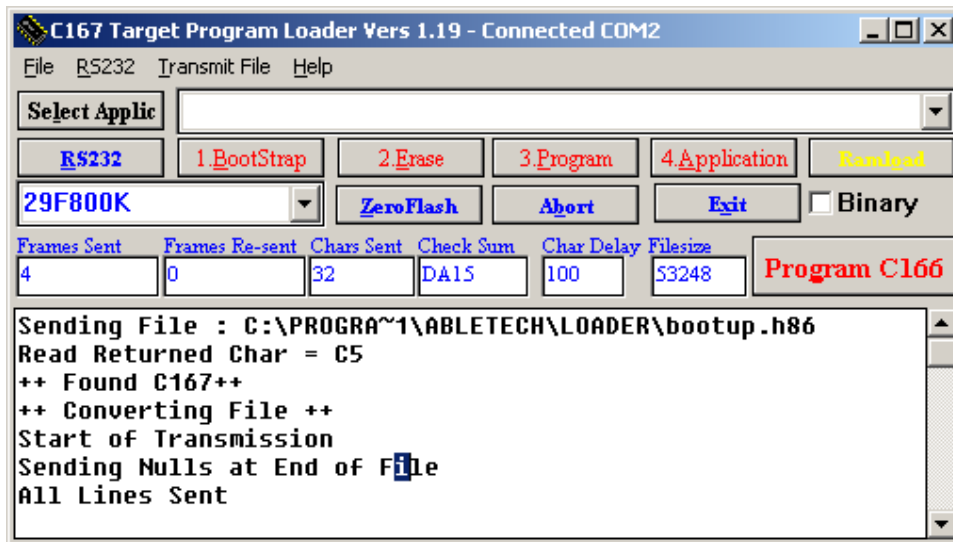
#### **5.4.1.11 Send Application in Filename Box**

This has the same function as the “Application“ Button.

### **5.4.2 Summary**

- ◆ The COM port set-up is usually set to **COM 1**.
- ◆ Default Baud rate **9600**.
- ◆ Stop Bits of **1**.
- ◆ Parity is set to **none**.
- ◆ Handshaking is set to **none**.
- ◆ Pressing the **Connect** Button tries to open the COM port. Errors are shown in the status bar at the top of the screen.
- ◆ **Disconnect** will close the selected COM port
- ◆ **Hide** closes the screen and speeds up communications.
- ◆ **Quit** closes the COM port similar to the disconnect. However this also closes the **RS232 Init**.  
Screen

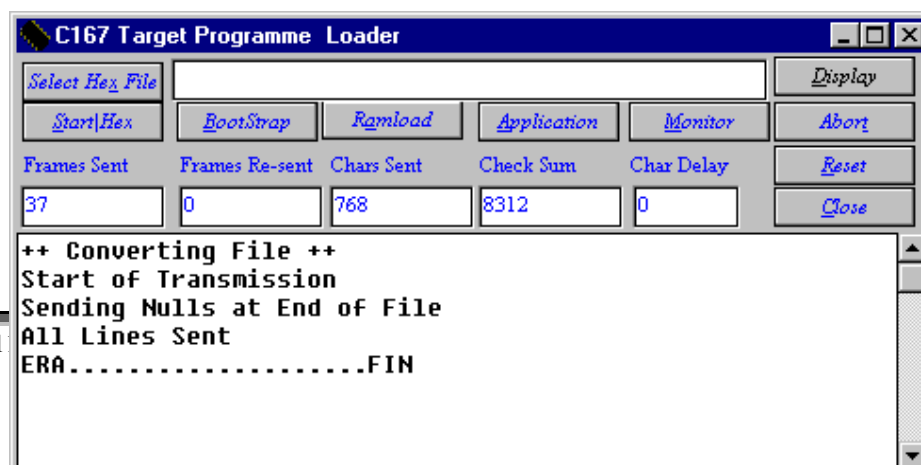




### 5.4.3 Erasing Flash

This has to be done before a new program or an update to a program can be performed. However it is not necessary when altering configuration values. Please consult the specific manual for the Micro-controller for further information about need to erase.

The process of erasing is simple providing the correct flash type was selected as in Section 5.2. Simply press the Erase Button on the Flash Form and the Erase program will start. The Loader form will show messages on the status of the erase and once erase has been completed successfully the following screen will be shown below.



### 5.4.4 Zeroing the Flash

This sends a different hex code to the flash chip and is used for resolving errors within the substrate of the flash and is hardly used. This would only be used if there was a problem erasing the flash chip. To perform a zeroing operation The Micro-controller will have to be bootstrap and waiting as before performing an erase. Note of incorrect selection of the flash type will cause spurious results. See Section 5.2

### 5.4.5 Programming the Flash

This is a two part sequence the

1. The Program button has to be pressed on the Flashform screen this enables the Once this small program has been loaded, the Micro-controller is ready to accept the Binary image. The letters **REQ** show that it is waiting.
2. The application button can now be pressed to send the application file.

### 5.4.6 Monitor

Instead of sending a new program to the Micro controller a Monitor program can be loaded. The monitor program allows access to view the flash memory. This can be loaded at anytime after the bootstrap and doesn't require the flash to be zeroed. Once the monitor program has been loaded open the Terminal screen and use the following key to navigate the memory.

KEY (Note Caps Lock Should be ON)	Function
H	Hundreds
S	Segments
M	Hundred Thousands
W	Write ones for 8k
R	Write zeros for 8k
N	Next line + 16 bytes
P	Zero segment
Z	Zero Pointer

## APPENDIX I – JUMPER LOCATION

Reset Jumper LK3

