

# UNIVERSAL PROTOCOL CONVERTER USER MANUAL



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UNIVERSAL PROCOL CONVERTER

## 1 INTRODUCTION

This manual describes the operation of the UPC Validator Interfacing System, programmed with firmware via the Atmel SAM-BA programming software or via USB.

This document is intended for those who will:

- Program the UPC
- Implement the UPC into machines

We recommend that you study this manual as there are many new features permitting new uses and more secure applications. If you do not understand any part of this manual please refer to [www.gaming-upc.com](http://www.gaming-upc.com).

## 2 KIT COMPONENTS

The UPC Kit comprises of the following:

- UPC Device
- UPC to Validator cable

## 3 POWER REQUIREMENTS

When programming the UPC using the SAM-BA software, it is necessary to provide power from an external source.

## 4 GENERAL DESCRIPTION

The UPC is a validator interfacing system designed to enable the implementation of Bank Note Validators in the field into specific machines (see Appendix 2 for supported Banknote validators).

It is possible to programme the UPC with an alternative software file to ensure machine compatibility. The UPC is a communications buffer and leaves the factory as a straight through voltage converter.

Once the UPC has been programmed, the user can:

- Implement the validator with a standard SSP interface into a specific machine.
- The UPC can be programmed with compatible interface software via the Atmel SAM-BA programming software. Reprogramming is also possible via USB.
- The UPC software will ensure compatible operation of the validator in the host/gaming machine.
- The UPC is configurable to work with machines which deliver power at voltages of +12v or up to +48V. The voltage selection on the UPC must be made by setting the jumper link on the UPC.
- The UPC can operate in various serial mode options – TTL, RS232 or Opto isolated communications.
- There are three additional parallel input lines and three parallel output lines for the UPC at TTL levels.
- The validator will be powered from +12v via the UPC.



## 5 SOFTWARE INSTALLATION – ALSO REFER TO SECTION 7 PROGRAMMING

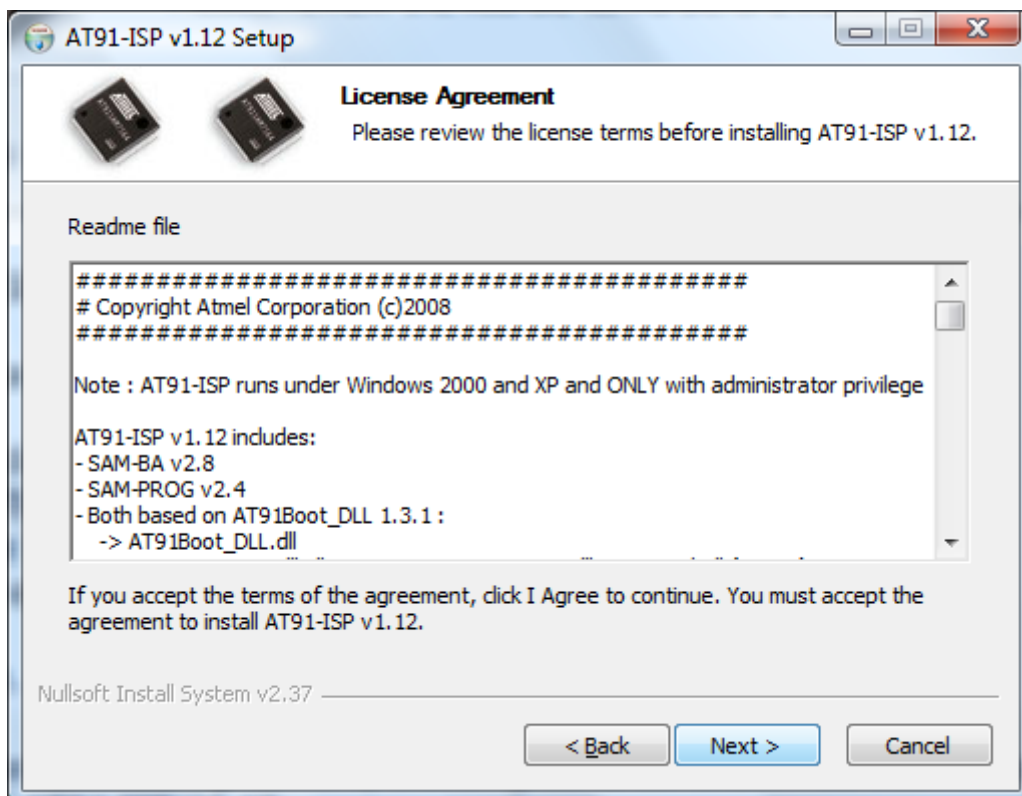
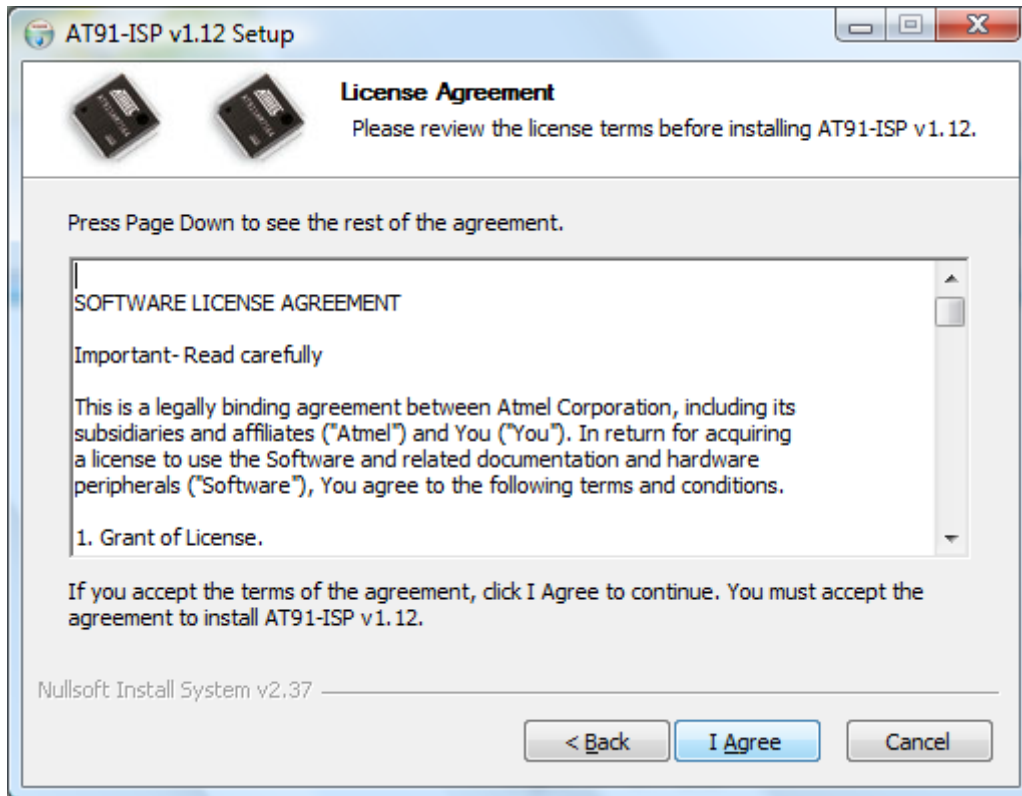
**NOTE: - Install the SAM-BA software on to your PC.**

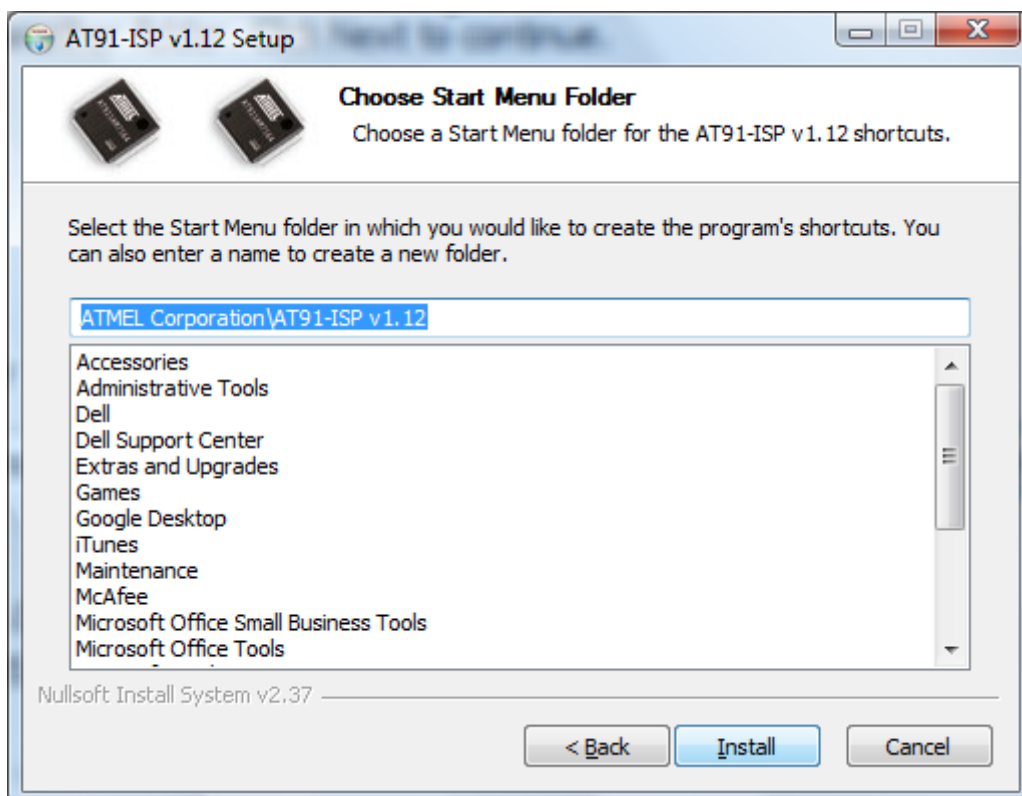
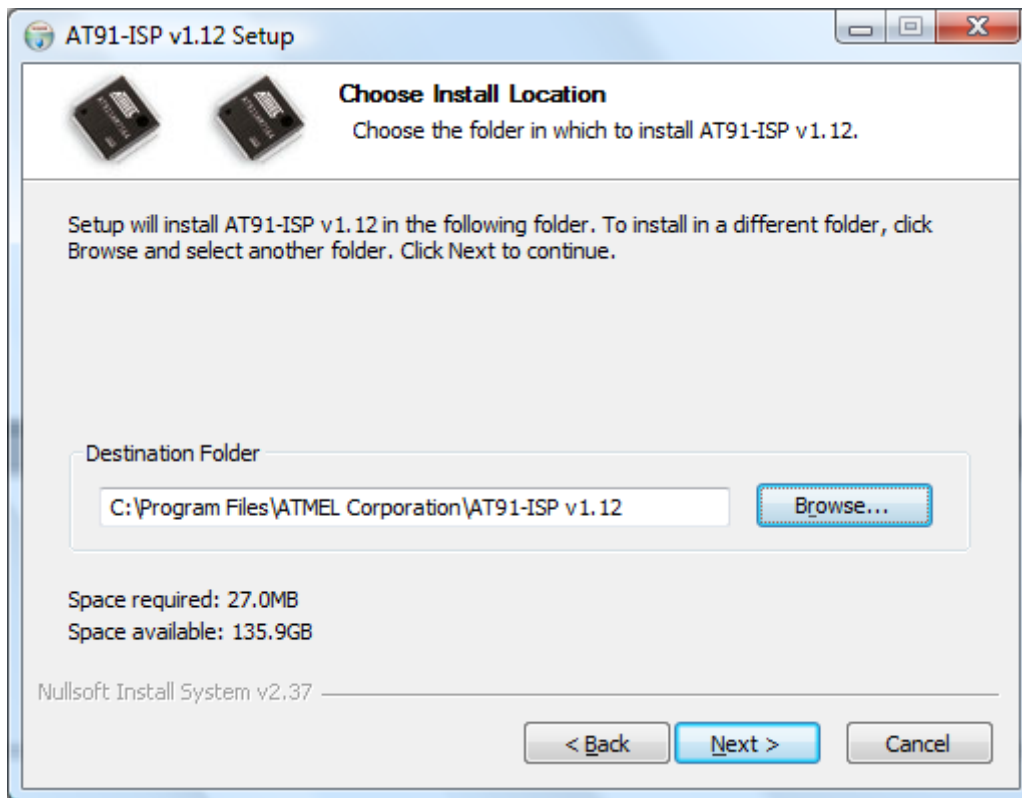
The software is available for download using the following web site link [http://www.atmel.com/dyn/resources/prod\\_documents/Install\\_AT91-ISP\\_v1.12.exe](http://www.atmel.com/dyn/resources/prod_documents/Install_AT91-ISP_v1.12.exe)

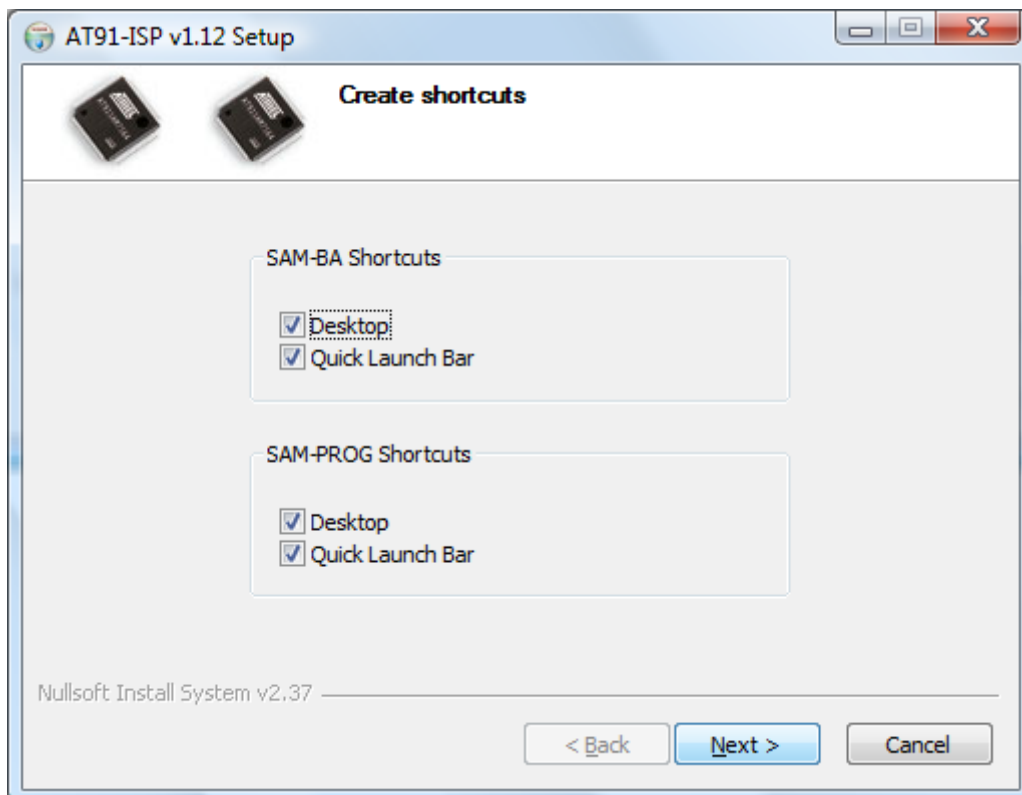
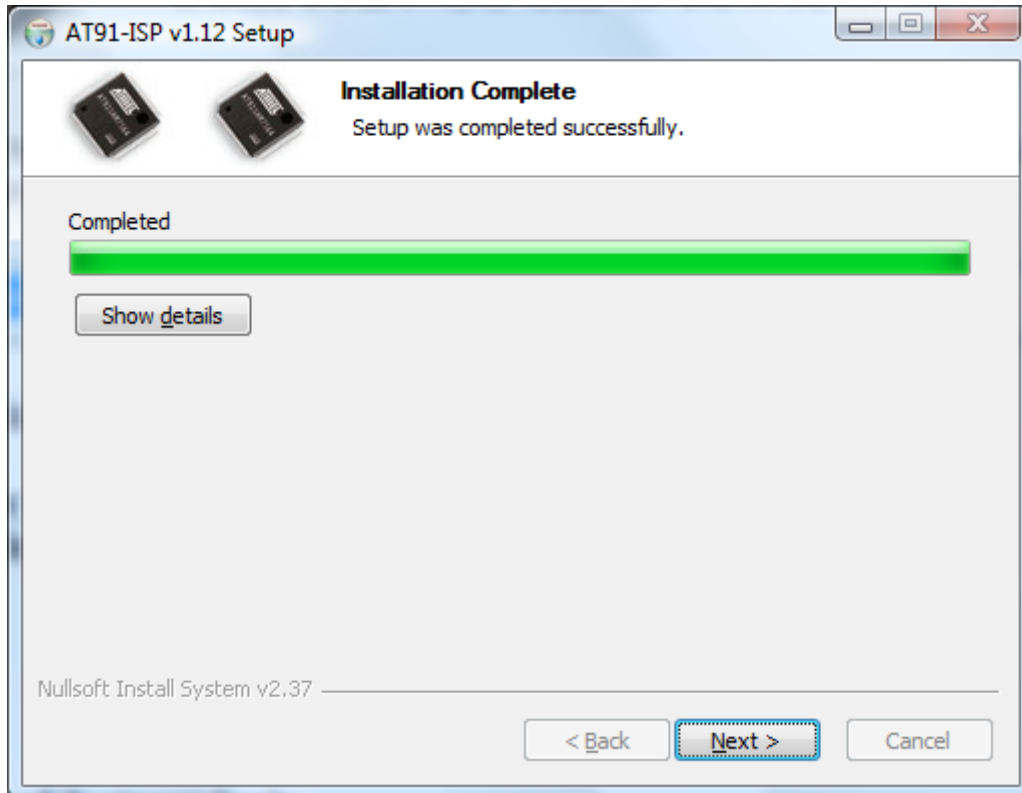
It is necessary to ensure that the COM port selected on your PC to allow programming of the UPC must be within the following range: COM1 to COM10

It is necessary to use serial communication via debug serial interface, TXD on pa10 (pin 29), and RXD on pa9 (pin 30) Pins 29 & 30 of the microcontroller are only used as spare comm inputs on the UPC so we can use them for downloading firmware











## 6 CONNECTING THE UPC TO A PC

The UPC is connected to a PC for programming purposes via a DA2 kit. The power for the UPC is then supplied via the DA2 kit. When programming using SAMBA (or JTAG) binary interface files should be used.

The programming cable connects to pins 11 & 15 of the UPC on the validator connector (CON2). The firmware is downloaded to the UPC via a DA2 kit.

The programming cable is configured specifically for the UPC. It is necessary to ensure that the following pins have been crossed on the programming cable: Pins 11 & 12 and 15 & 16 must be crossed over. See APPENDIX B for a drawing of the cable.



## 7 PROGRAMMING THE UPC

The UPC supports the following interfaces. Please contact [support@gaming-upc.com](mailto:support@gaming-upc.com) for full details of compatible interfaces.

- **PR01**
- **PR02**
- **PR03**
- **PR04**
- **PR05**
  
- **PR00**
  - UPC used only as power supply (+48v to +12v) and i/o voltage levels converter

### Compatible Protocols still to be implemented on UPC

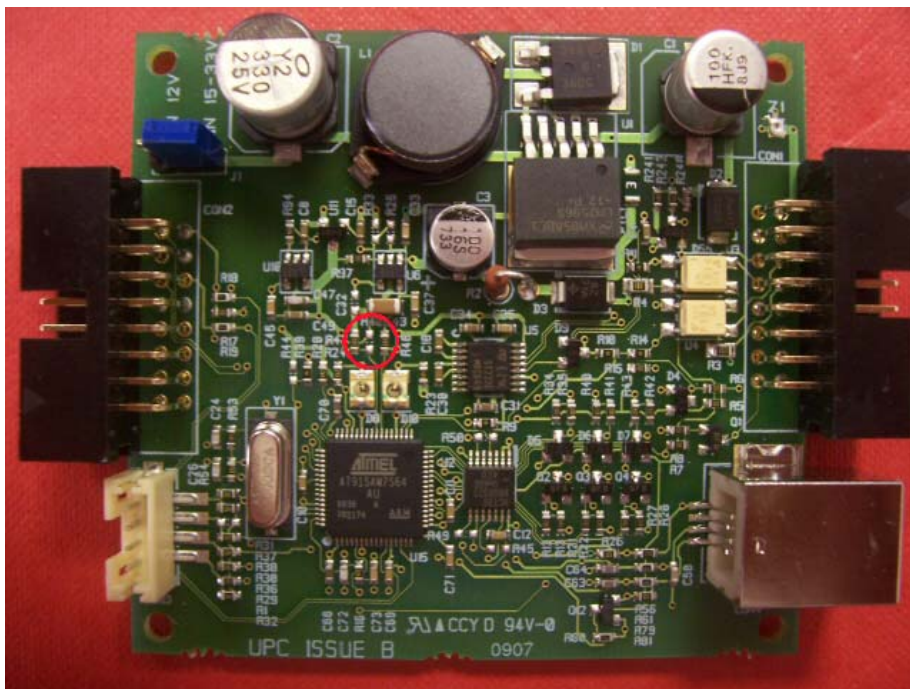
- **PR06**
- **PR07**

Please refer to [www.gaming-upc.com](http://www.gaming-upc.com) for further information.

SAMBA or JTAG programming is necessary if firmware becomes corrupted (this could happen during programming).

**DO NOT DISCONNECT** the UPC while the firmware upgrade is taking place. Doing so could permanently damage the UPC. It is necessary to insert a short circuit in place of R48 (see location highlighted on the picture below) for more than 10 seconds, but less than 15 seconds, to allow a new file to be programmed into the UPC.

The UPC can be programmed via a DA2 kit with the Sam-Ba software from Atmel as described in this manual. The device that should be selected for programming is AT91SAM7S64-EK.

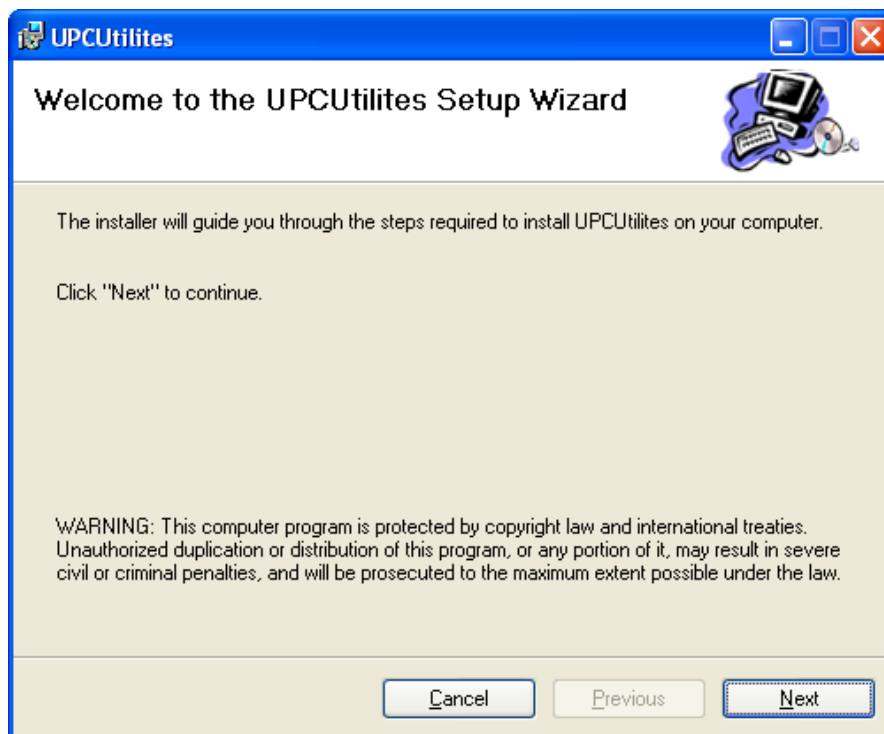


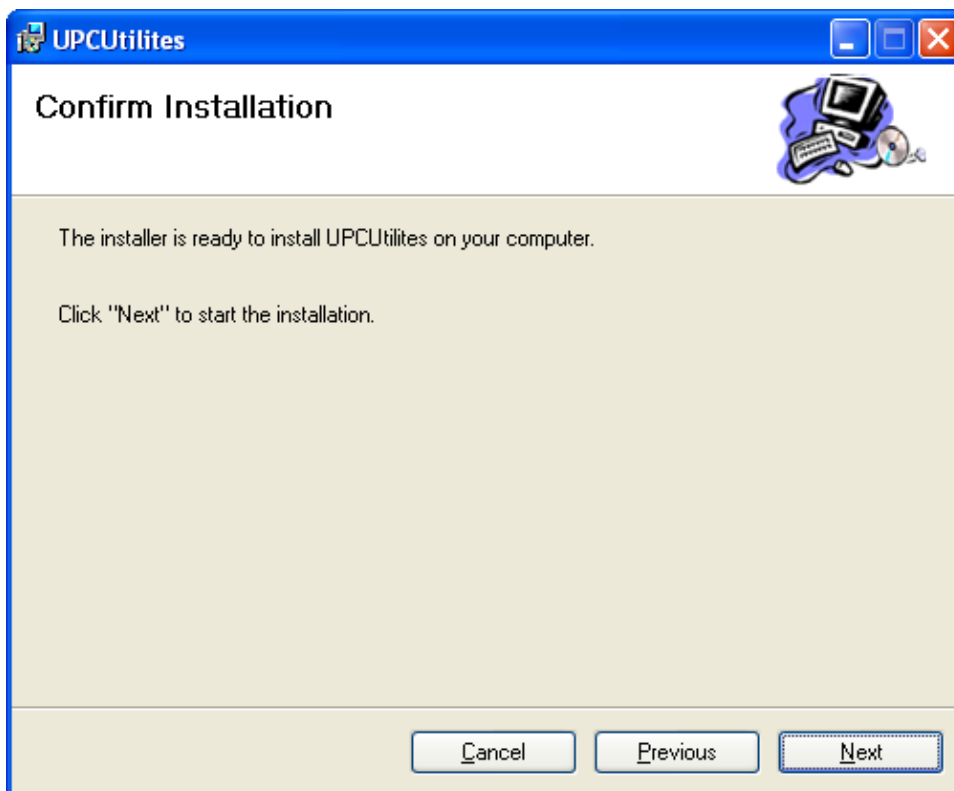
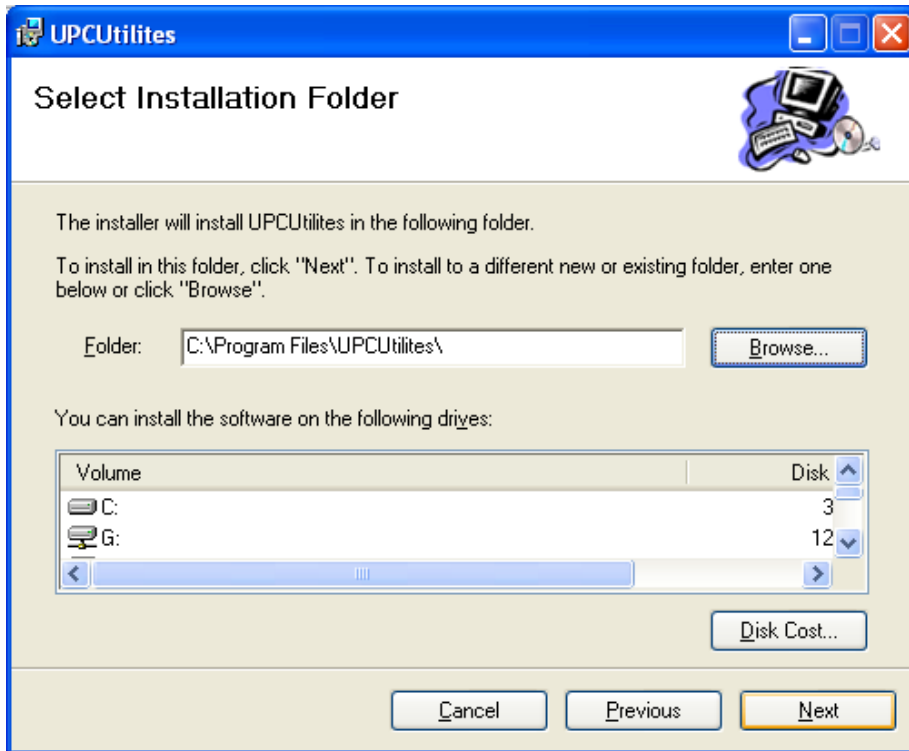
- 1) Install Atmel ISP Programmer (you can download it from [here](#))
- 2) Connect UPC CON2 to DA2 via special programming cable
- 3) Short R48 ('donotfit' resistor next to LEDs) on UPC for more than 10 seconds but less than 15 seconds
- 4) Unplug UPC and plug back again

- 5) Start Atmel SAM-BA
- 6) Select correct DA2 COM port (must be within COM1 and COM10)
- 7) Select board AT91SAM7S64-EK
- 8) Click on 'connect'
- 9) Click on the open icon next to 'Send file' button and select firmware file
- 10) Click on the 'Send file' button
- 11) Confirm unlocking and locking programmed sectors
- 12) Click on Link, Disconnect. Unplug the UPC

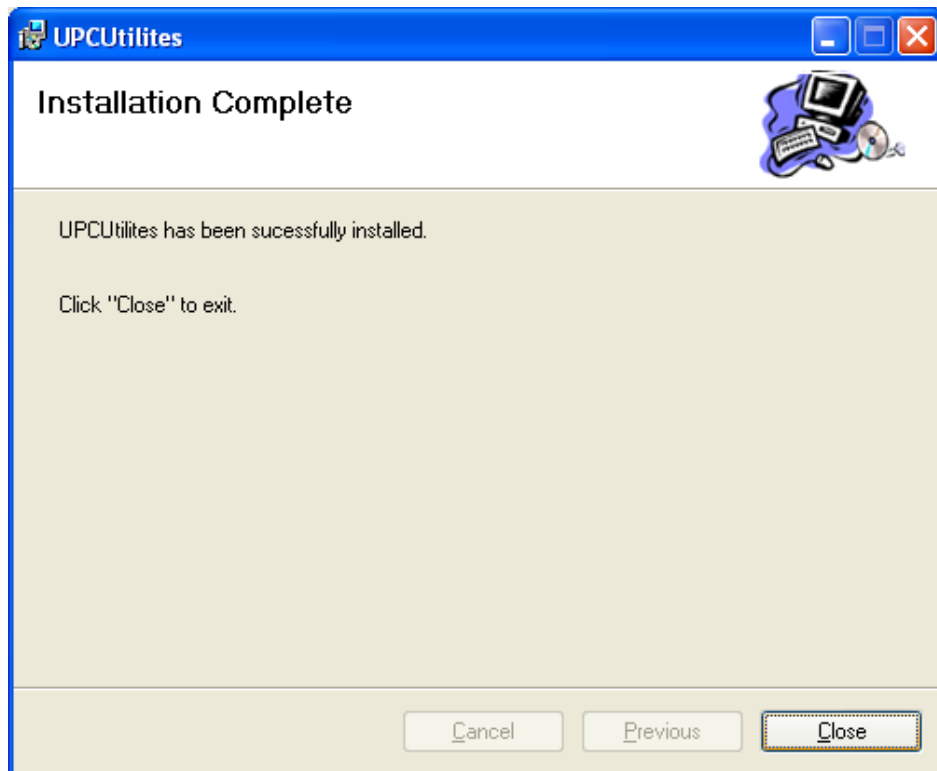
### 7.1 PROGRAMMING VIA USB - RECOMMENDED

Install the UPC Utilities software UPCUtilities\_1\_0\_3.msi available to download from [www.gaming-upc.com](http://www.gaming-upc.com) within Download Centre / Firmware

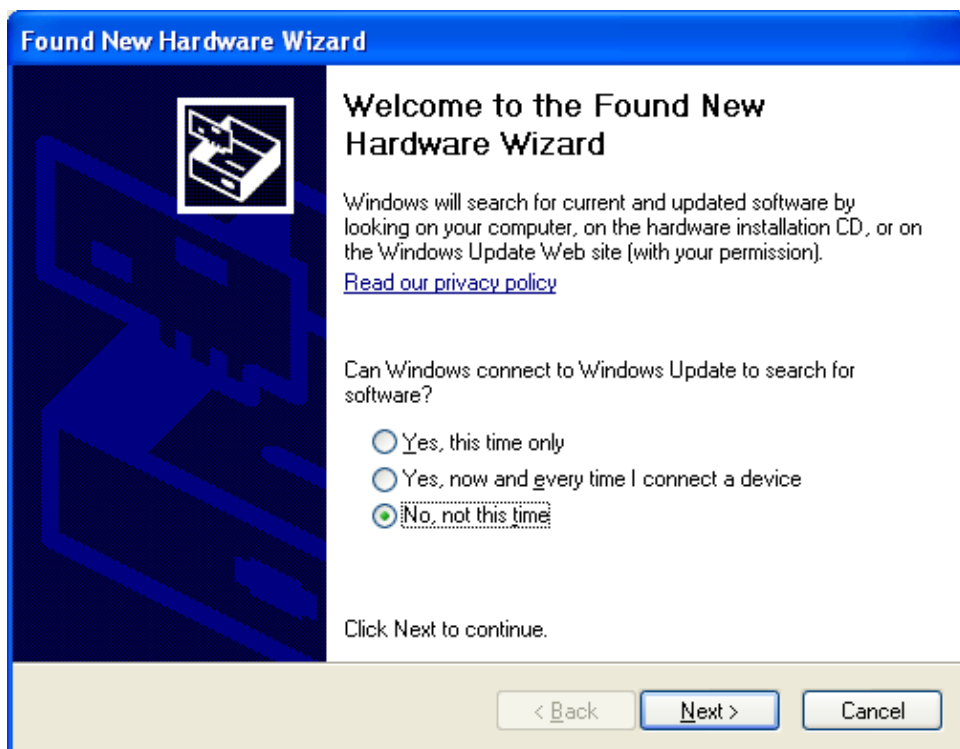




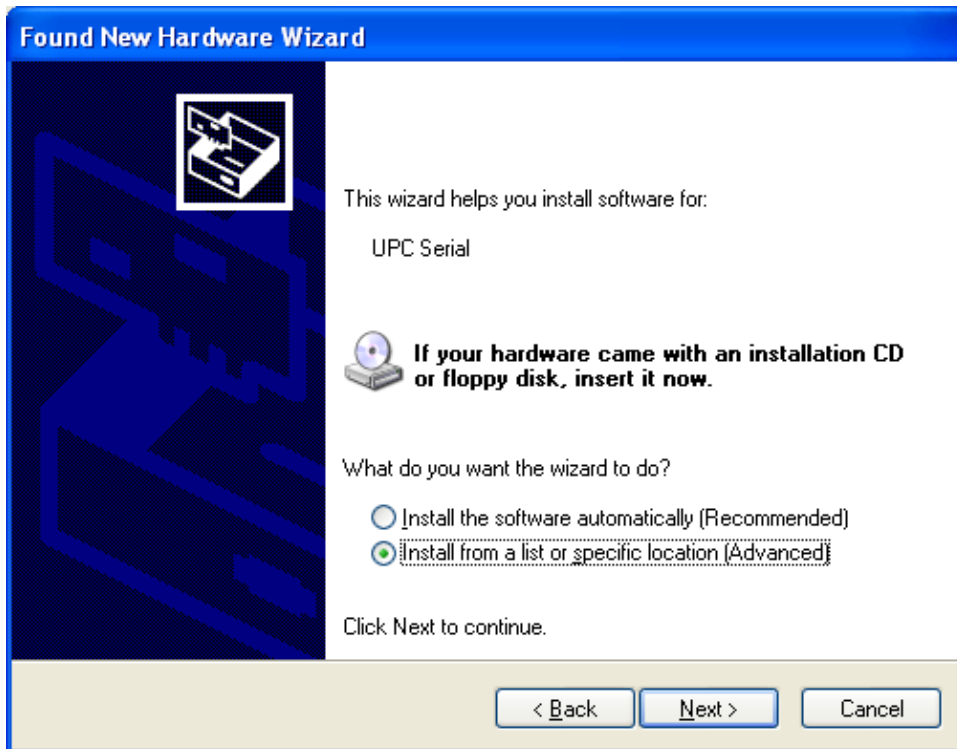
The UPC Utilities will now install



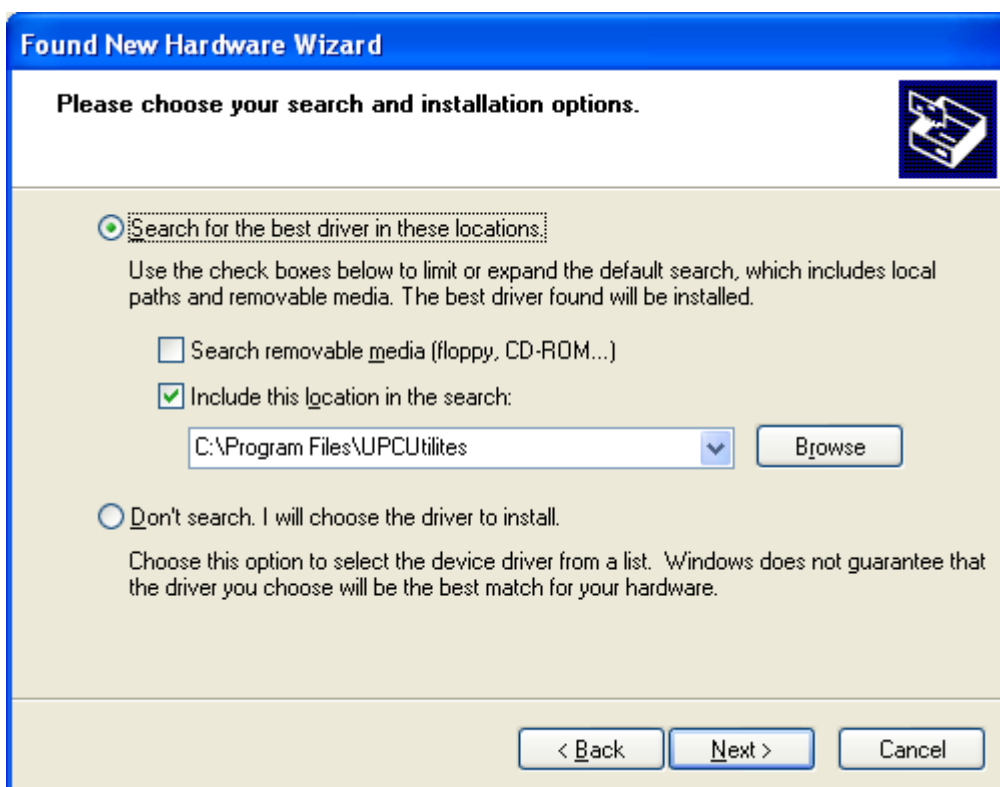
Connect the UPC to a pc via a USB cable. Found new hardware message will appear.



Select No, not this time to Windows Update.



Select Install From A List Or Specific Location (Advanced)

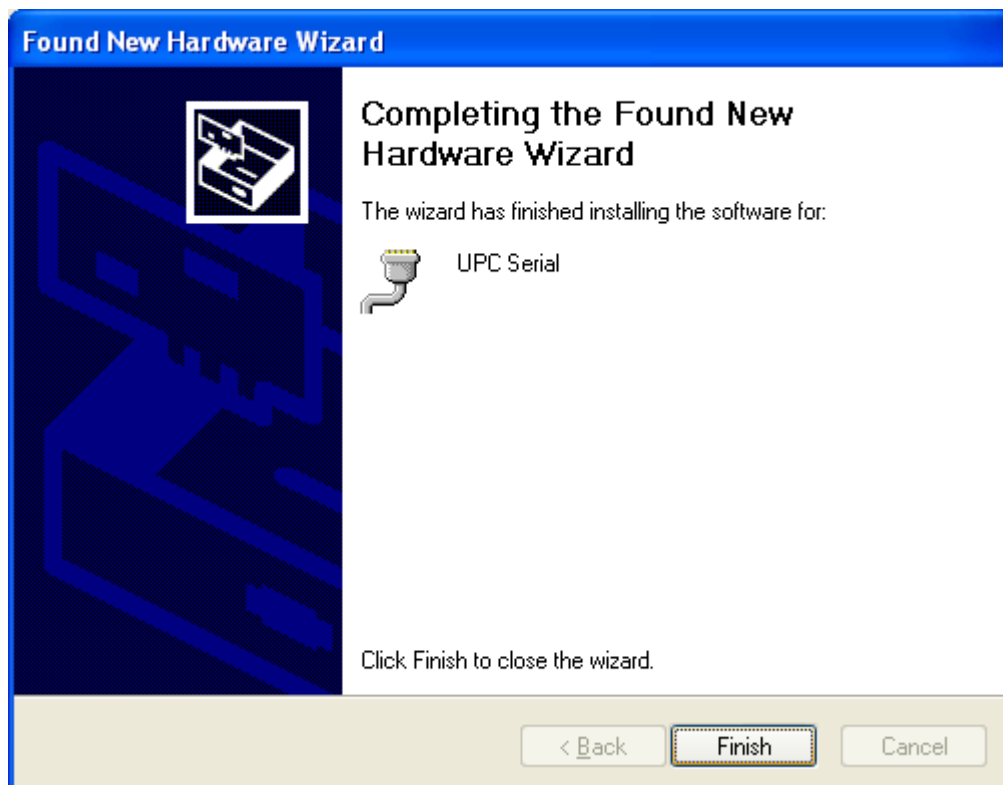


Ensure the location is C:\Program Files\UPCUtilities

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Click Continue Anyway to install



Click Finish – The UPC software is now installed

To open the UPC Utilities Program select: Start – All Programs – UPC Utilities – Universal Protocol Converter Utilities.

Using the Utilities Menu tab you can access

Set UPC Options

Monitor

Set PR01 Configuration

Update UPC OS

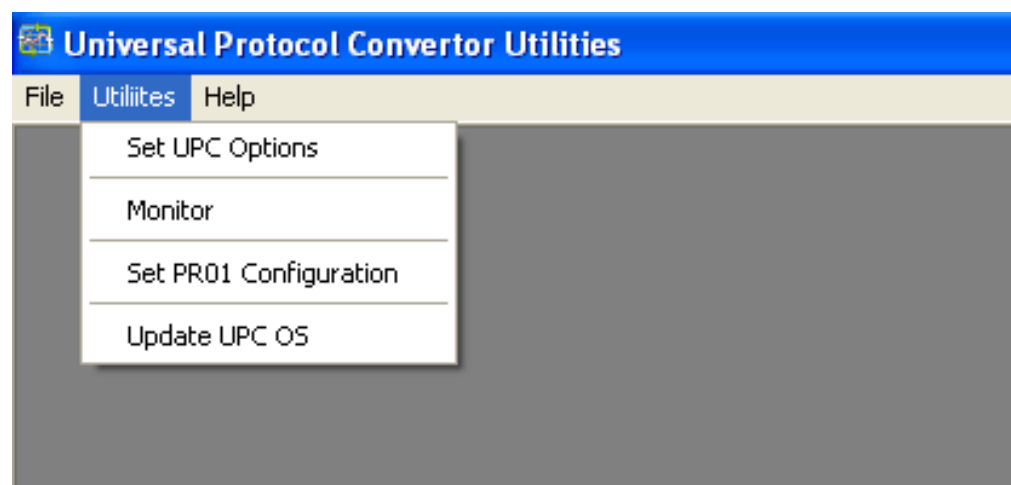
Connect the UPC to your PC via a USB cable for programming.



### Set UPC Options

Provides information on the currently installed UPC interface and firmware version.

Host Drive TTL RS232 or Host Drive Opto Isolated options.





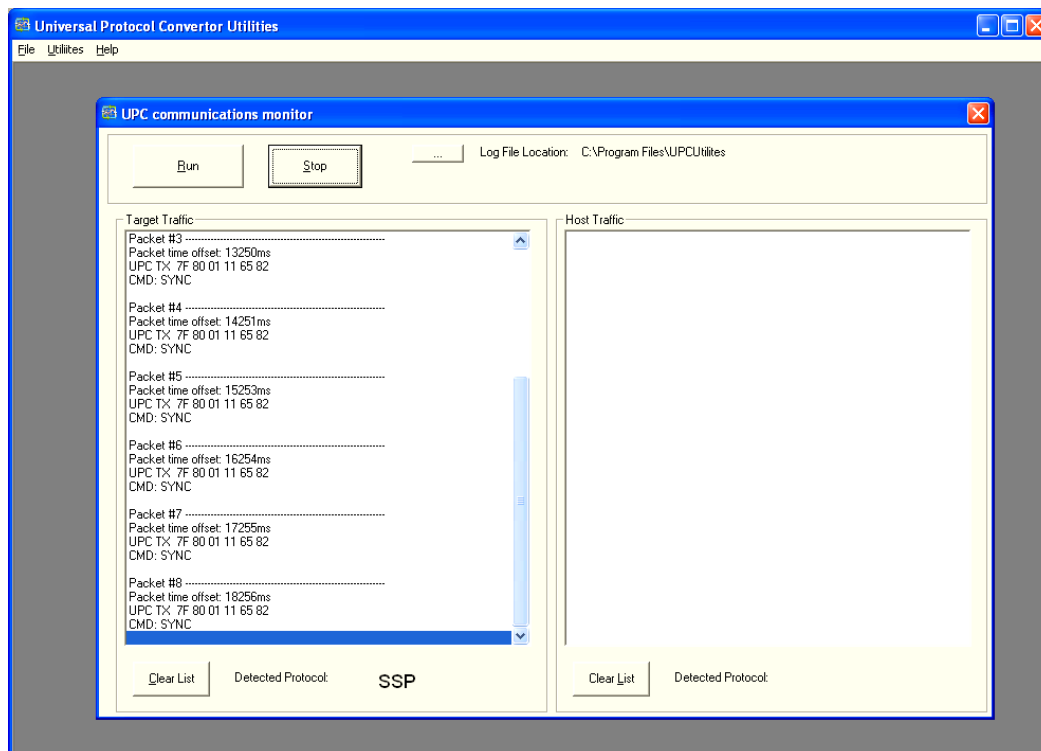
## Monitor

Select RUN to monitor all traffic:

Target Traffic indicates communication between UPC and validator

Host Traffic indicates communication between UPC and host machine

Log file locations – allows traffic communication to be saved to a file on your PC



## Set UPC PR01 Configuration Data

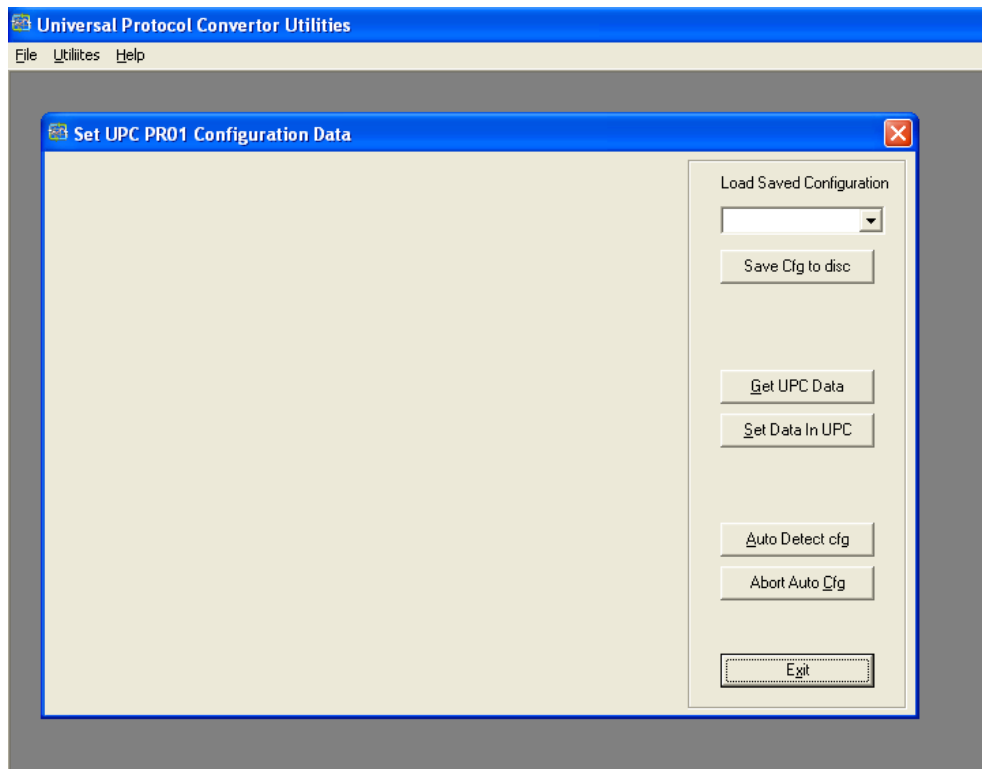
Get UPC Data – allow manual changes

Set Data to UPC – to set changes to UPC

Auto Detect Cfg – attach to existing validator and host machine for current interface information.

Abort Auto Cfg

Exit



## Update UPC OS

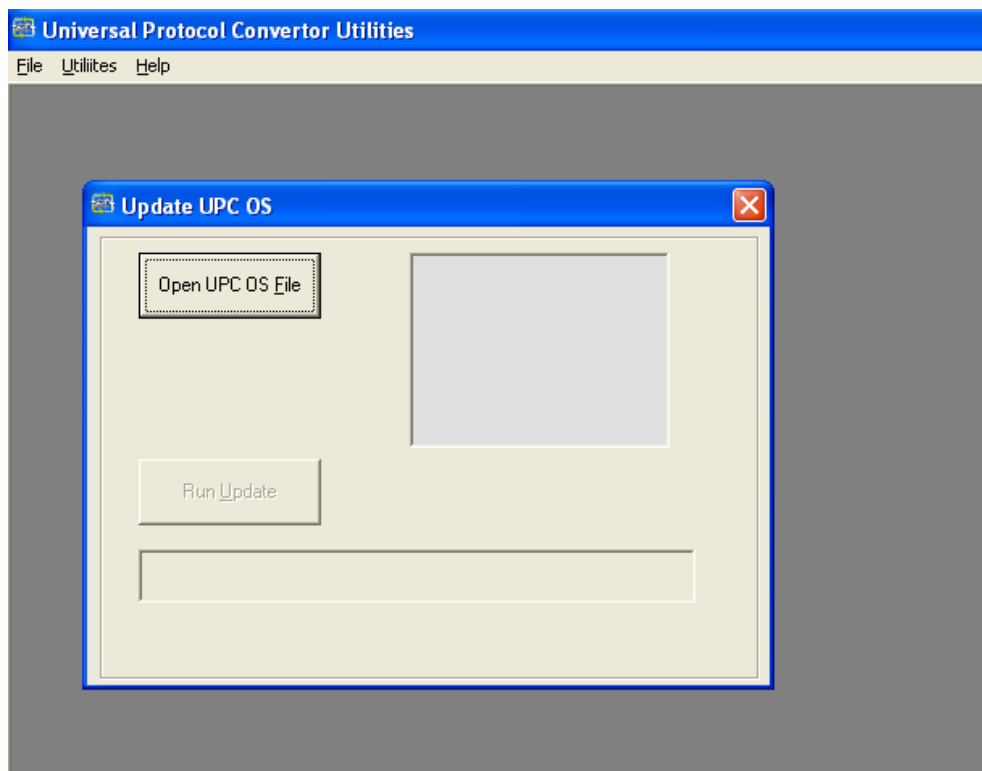
Use Open UPC Files to alter interfaces.

If the update files do not appear automatically select C: Program Files/UPC Utilities/Update Files

Select the required interface. Use dpc. files when programming via USB.

Click Run Update.

**Please note this update will take approximately 2-3 minutes  
DO NOT DISCONNECT.**



The flashing red LED on the UPC indicates it is updating. **DO NOT DISCONNECT** the USB or UPC during update.

## 8. USING THE UPC

### 8.1 CONNECTING A VALIDATOR TO THE UPC

Connect the UPC to the banknote validator via the supplied cable (CN382)



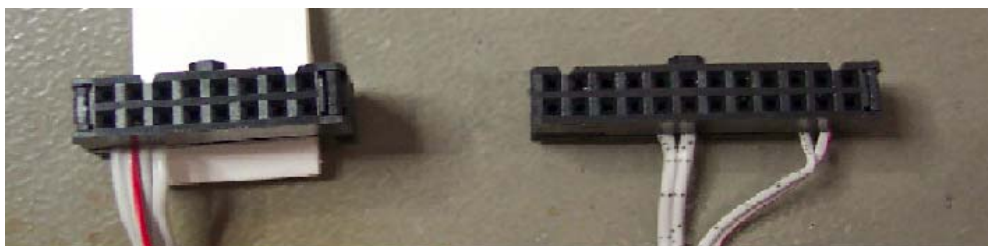
## 8.2 CONNECTING THE UPC TO THE HOST MACHINE

The connections to the UPC are dependant on which interface is to be used. The cable must be wired as required. The connections are shown in the table below

Pin Number	Function
1	+V
2	0V
3	RS232 TxD
4	RS232 RxD
5	TxD Opto Emitter
6	RxD Opto Anode
7	TxD Opto Collector
8	RxD Opto Cathode
9	Parallel In 2
10	Parallel In 3
11	TTL RxD
12	Parallel In 1
13	Parallel Out 2
14	Parallel Out 3
15	TTL TxD
16	Parallel Out 1

The pictures below show an example cable of an RS232 connection





UPC

16 PIN IDC FEMALE

HOST

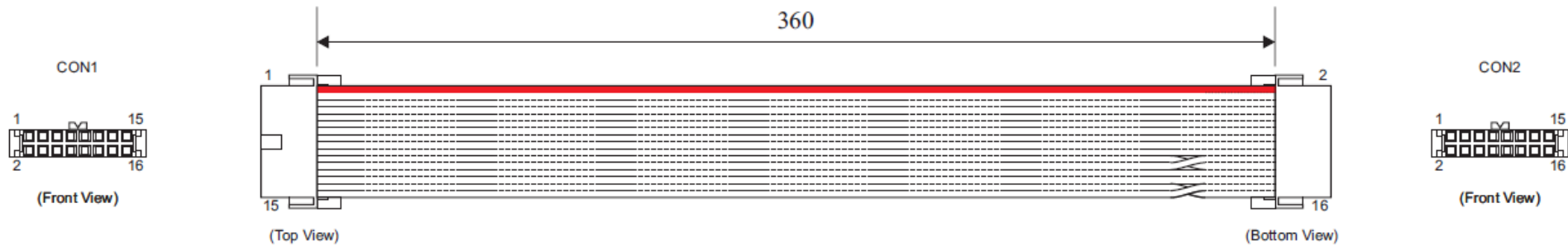
24 PIN IDC FEMALE

## APPENDIX A – COMMS INDICATOR

Led colour	Indication
Red	Valid data from the Host machine
Green	Valid data from the validator

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## APPENDIX B – SAMBA PROGRAMMING CABLE



Terminal	Housing	Comments
CON1	2x8way 2.54mm pitch IDC connector with key and strain relief	Leotronics 5440-0116
CON2	2x8way 2.54mm pitch IDC connector with key and strain relief	Leotronics 5440-0116

### Connectivity by conductor

CON1 Pin	CON2 Pin	Gauge (AWG)	Colour	Comments
1	1	-	Red	-
2	2	-	-	-
3	3	-	-	-
4	4	-	-	-
5	5	-	-	-
6	6	-	-	-
7	7	-	-	-
8	8	-	-	-
9	9	-	-	-
10	10	-	-	-
11	12	-	-	-
12	11	-	-	-
13	13	-	-	-
14	14	-	-	-
15	16	-	-	-
16	15	-	-	-

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## **APPENDIX C – SUPPORTED BANK NOTE VALIDATORS**

The UPC has been tested with the following bill acceptors

- NV9
- NV10
- BV20
- BV50
- BV100
- NV200