UNIVERSAL PROTOCOL CONVERTER USER MANUAL





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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 <u>www.gaming-upc.com</u>.

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 <u>http://www.atmel.com/dyn/resources/prod_documents/Install</u> <u>AT91-ISP v1.12.exe</u>

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



G AT91-ISP v1.12 Setup		
	License Agreement Please review the license terms before installing a	AT91-ISP v 1. 12.
Press Page Down to see th	e rest of the agreement.	
SOFTWARE LICENSE AGRE	EMENT	<u>^</u>
Important- Read carefully		
This is a legally binding agr subsidiaries and affiliates (a license to use the Softwa peripherals ("Software"), Y	eement between Atmel Corporation, including its "Atmel") and You ("You"). In return for acquiring are and related documentation and hardware You agree to the following terms and conditions.	
1. Grant of License.		-
If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install AT91-ISP v1.12.		
Nullsoft Install System v2.37 -		
	< <u>B</u> ack I <u>Ag</u> ree	Cancel

AT91-ISP v1.12 Setup			
	License Agreement Please review the license terms before installing AT91-ISP v1.12.		
Readme file			
######################################	######################################		
Note : AT91-ISP runs under Windows 2000 and XP and ONLY with administrator privilege			
AT91-ISP v1.12 includes: - SAM-BA v2.8 - SAM-PROG v2.4 - Both based on AT91Boo -> AT91Boot_DLL.dll	t_DLL 1.3.1:		
If you accept the terms of agreement to install AT91	the agreement, click I Agree to continue. You must accept the ISP v1.12.		
Nullsoft Install System v2.37			
	< Back Next > Cancel		





G AT91-ISP v1.12 Setup		
	Installation Complete Setup was completed successfully.	
Completed		
Show <u>d</u> etails		
Nullsoft Install System v2.37 -		
	< <u>B</u> ack	ext > Cancel

(AT91-ISP v1.12 Setup	
Create shortcu	ts
SAM-BA Shortcuts Desktop Quick Launch Bar	
SAM-PROG Shortcuts Image: Construct the second	
Nullsoft Install System v2,37 —	< <u>B</u> ack <u>N</u> ext > Cancel



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 <u>support@gaming-upc.com</u> 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 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.



- Install Atmel ISP Programmer (you can download it from <u>here</u>)
- 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 <u>www.gaming-upc.com</u> within Download Centre / Firmware

🕲 UPCUtilites				
Welcome to the UPCUtilites Setup Wizard				
The installer will guide you through the steps required to install UPCU tilites on your computer.				
Click "Next" to continue.				
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.				
<u>C</u> ancel <u>Previous</u> <u>Next</u>				

🔂 UPCUtilites		
Select In:	stallation Folder	
The installer v	vill install UPCU tilites in the following folder.	
To install in the below or click	is folder, click "Next". To install to a different new or existing I "Browse".	folder, enter one
<u>F</u> older:	C:\Program Files\UPCUtilites\	<u>B</u> rowse
You can insta	II the software on the following drives:	
Volume		Disk 🔼
		3
		12
		<u>D</u> isk Cost
	<u>C</u> ancel <u>Previous</u>	<u>N</u> ext

i UPCUtilites	
Confirm Installation	
The installer is ready to install UPCUtilites on your computer.	
Click "Next" to start the installation.	
<u>C</u> ancel <u>P</u> revious	<u>N</u> ext

The UPC Utilities will now install

B UPCUtilites			
Installation Complete			
UPCUtilites has been sucessfully instal	lled.		
Click "Close" to exit.			
	<u>C</u> ancel	Previou:	s <u>C</u> lose

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)

Found New Hardware Wizard			
Please choose your search and installation options.			
Search for the best driver in these locations.			
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.			
Search removable media (floppy, CD-ROM)			
Include this location in the search:			
C:\Program Files\UPCUtilites VIPCUtilites			
Don't search. I will choose the driver to install.			
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.			
< <u>B</u> ack <u>N</u> ext > Cancel			

Ensure the location is C\:Program Files\UPCUtilities



Click Continue Anyway to install

Found New Hardware Wizard		
	Completing the Found New Hardware Wizard The wizard has finished installing the software for: UPC Serial	
	< <u>B</u> ack Finish Cancel	

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.

🚳 Universal Protocol Convertor Utilities		
File	Utiliites Help	
	Set UPC Options	
	Monitor	
	Set PR01 Configuration	
	Update UPC OS	

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

🚳 Universal Protocol Convertor Utilities	
Eile <u>U</u> tiliites <u>H</u> elp	
TIDC communications monitor	
Bun Stop Log File Location: C:\Program Files\UPCUtilites	
Target Traffic	
Packet #3	
UPCTX 7 8001116582 CMD: SYNC	
Packet #4	
Packet time offset: 14251ms UPC TX 7 80 00 11 65 82 CMD: SYNC	
Packet #5	
Packet time offset: 15253ms UPC TX 7 80 01 11 65 82 CMD: SYNC	
Packet #6 ······	
Packet time onset 16224ints UPCT X7 88 00 111 65 82 CMD: SYNC	
Packet #7	
Packet time offset: 1/250ms UPCT X7 R8 00 11 65 82 CMD: SYNC	
Packet #8	
UPCTX 7F 80 01 11 65 82	
Clear List Detected Protocol SSP Clear List Detected Protocol	t

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

🕮 Universal Protocol Convertor Utilities				
<u> Eile U</u> tiliites <u>H</u> elp				
Set UPC PR01 Configuration Data				
	Load Saved Configuration			
	Save Cfg to disc			
	<u>G</u> et UPC Data			
	Set Data In UPC			
	Auto Detect cfg			
	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.

🗃 Universal Protocol Convertor Utilities				
<u>File U</u> til	liites	Help		
	_			
	8 8 (Jpdate UPC OS		
		Open UPC OS <u>F</u> ile		
		Run Update		

The flashing red LED on the UPC indicates it is updating. <u>DO NOT</u> <u>DISCONNECT</u> 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 dependent 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

HOST

16 PIN IDC FEMALE 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