RSC-4x Module Programmer Board
MPB User Manual

With FluentChip™ Technology

Introduction

Welcome to the RSC-4x family of mixed-signal processors and the world of low-cost, high-performance speech recognition! In addition to offering the world's most advanced speech processor for mass production, Sensory also offers the benefits of hardware speech recognition with a line of standardized modules based on the revolutionary RSC-4128 chip. Developers can now utilize either Sensory's VR Stamp™ module for small quantity production requirements, or they can develop products designed to use RSC-4x chips in quantity with the RSC-4x Rapid Prototyping Module (RPM). The RPM allows developers to quickly design prototypes featuring FluentChip™ speech technologies just by adding an industry-standard 40-pin footprint DIP module that has been programmed using a PC and a Module Programmer Board (MPB). The VR Stamp Programmer board has been superseded by the RSC-4x Module Programmer Board but provides the same functionality.

Sensory' FluentChip™ Technology is capable of running HMM (Hidden Markov Model) and neural network based speaker independent (SI), speaker dependent (SD), speaker verification (SV), speech and music synthesis including SXL requiring 0-wait state, record and playback (RP), and sound effect technologies on Sensory's RSC-4x family of microcontrollers.

Additional speech tools are available, such as **QuickSynthesis™ 4**, which allows speech to be compressed for low data rate synthesis. Development for the RPM is the same as for an RSC-4x chip, and uses the **Phyton Project-SE IDE**, which is a free download from Phyton (www.phyton.com.) A limited-life C Compiler is available in the VR Stamp Toolkit, and an unrestricted version is available for purchase from Phyton directly for other development needs. These tools are designed to run under Windows 2000 and XP operating systems only.

NOTE: The VR Stamp, RPM and MPB are subsets of the Sensory's RSC-4x Demo/Evaluation V2 Board, so it can also be used for module development. However, neither the VR Stamp Toolkit nor the RSC-4x Demo/Evaluation V2 Toolkit can be used to develop products using Sensory's RSC-164, 264, 364, Voice Extreme, or SVC families of chips.
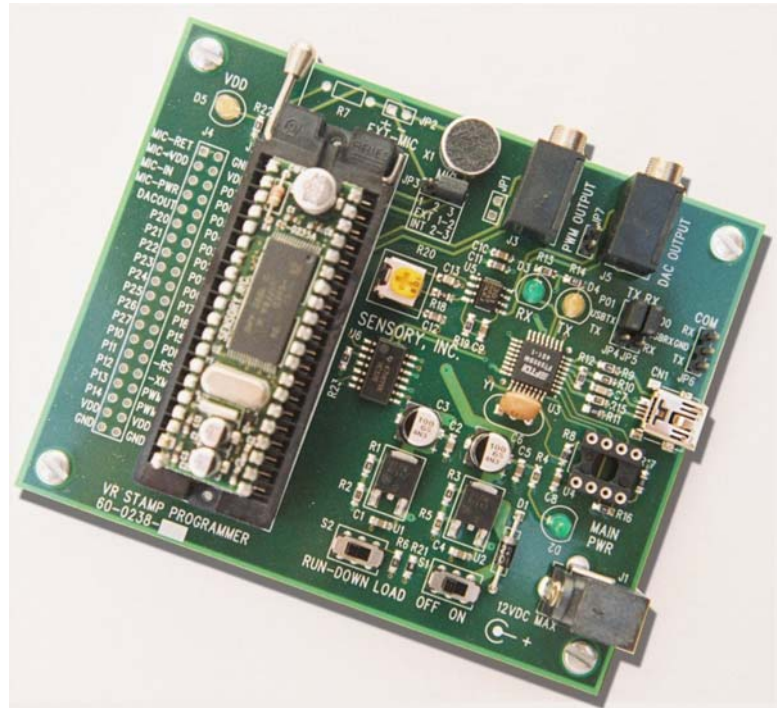
Overview

The Module Programmer Board allows you to:
- Download an application program from a PC to a module
- Develop module-based applications
- Demo key speech technologies
- Sample key Sensory speech technologies

Additional Resources

- For the VR Stamp schematic, refer to 70-0066
- For the RPM schematic, refer to: 70-0068
- For the MPB schematic, refer to: 70-0069

Programming a Sensory Module

The Module Programmer Board allows you to prepare either the VR Stamp or RPM for use in your electronic product. You can download an application program from a PC, and once the application program is installed on the module, you can unplug and install it into your product.

MPB USB Driver Setup

Sensory's programming boards utilize the FT232B(L) USB UART IC chip manufactured by Future Technology Devices Int'l. In order to interface with a PC, you need to download and install their USB driver.

‣ To download the driver, refer to:
‣ http://www.ftdichip.com/Drivers/VCP.htm

‣ For installation instructions, refer to:
‣ http://www.ftdichip.com/Documents/InstallGuides.htm

‣ For more information, refer to the Future Technology Devices Int'l website at:
‣ http://www.ftdichip.com

Note: Many USB problems not resolved by COM port configuration can be resolved by eliminating USB hubs or by selecting another USB port.

Uninstalling USB Drivers

If you need to remove the drivers, go to the Windows Control Panel and choose "Add or Remove Programs". Remove "FTDI USB Serial Converter Drivers".
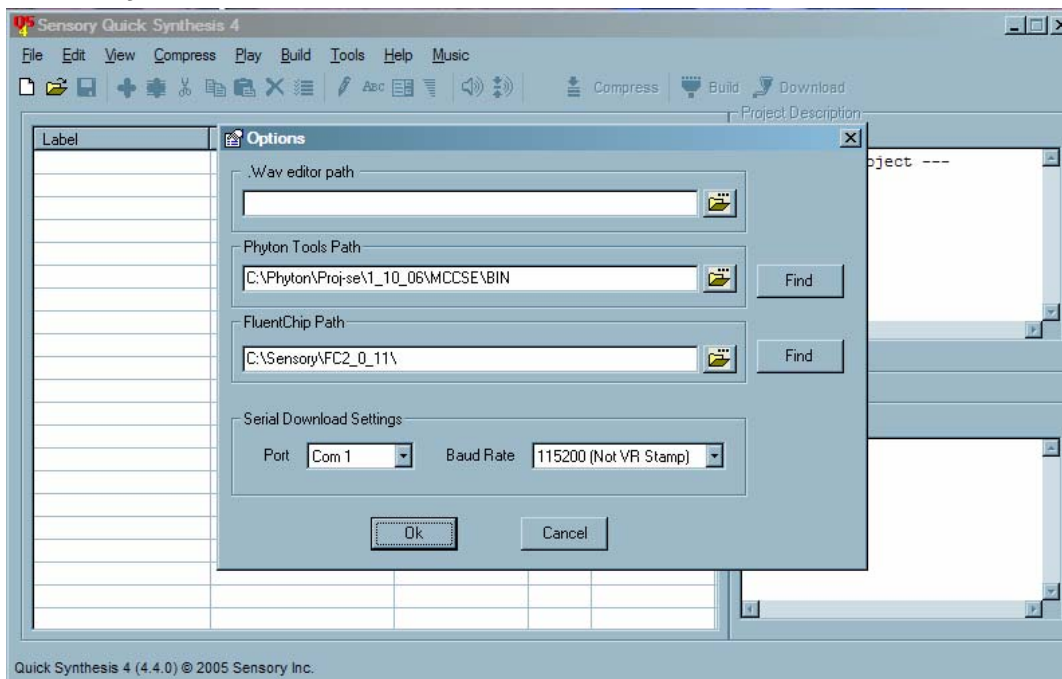
COM Port Configuration

The COM port you select for the VCP Driver must match the COM port you select for Sensory software tools. The following screen shots show where to change the COM port:
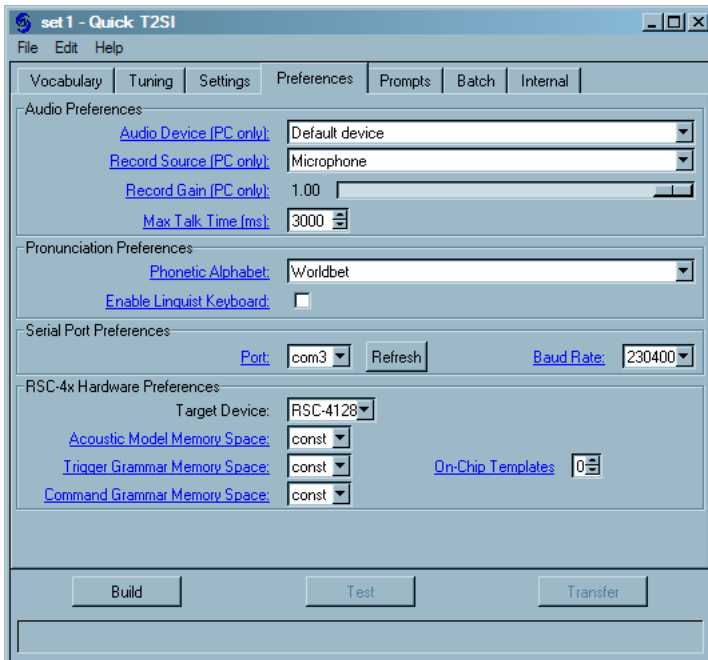
## SensoryLoader 4 (SL4)
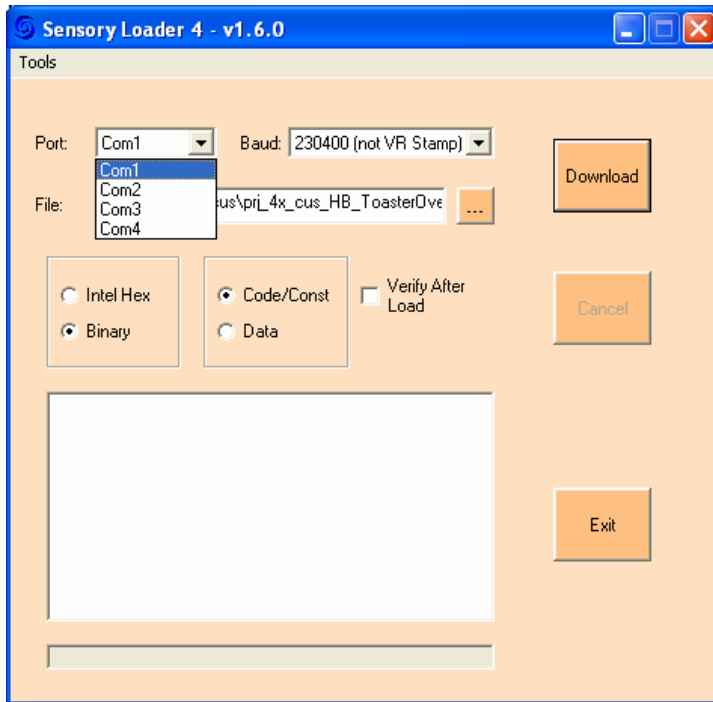
QuickSynthesis™ 4.

Quick T2SI™, Quick T2SI-Lite™

For additional information on setting the COM port for Quick T2SI™ or Quick T2SI-Lite™, refer to "QuickStartGuide.chm" located in the docs folder. For QuickSynthesis™ 4, refer to "QuickSynthesis4.chm" located in the FluentChip™ docs directory.

To see the port selected for the VCP driver, please refer to the Device Manager in your PC's Administrative Tools Control Panel under Computer Management/System Tools—or—System Properties on My Computer.
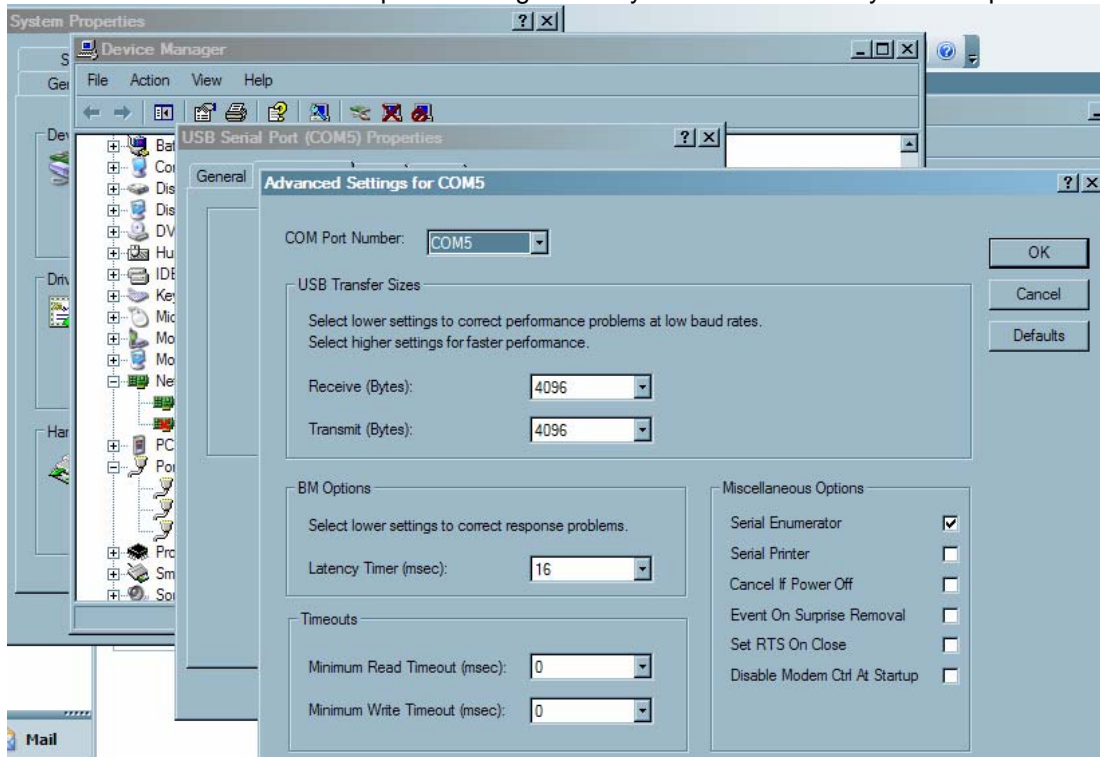
Programming the RPM or VR Stamp Modules

For a quick development with Sensory modules, we have provided the following features in the programmer:
‣   Through holes for all IO pins
‣   RUN/DOWNLOAD switch
‣   Audio jacks for PWM and DAC outputs
‣   On-board microphone
‣   Header for an external microphone connection

1)   Install the RPM or VR Stamp into the 40 pin DIP ZIF socket following industry standard practices to minimize ESD issues. Pin one is labeled on the module, and pin one of the ZIF socket is on the corner closest to the ZIF lever.
2)   To download a demo, sample or application, set the RUN/DOWNLOAD switch to DOWNLOAD, and set the ON/OFF switch to the ON position. Launch "SensoryLoader4". Download the desired demo, sample or application.

Running Applications or Demos using the MPB

1)   If required for your application, assemble and connect hardware such as LED's and switches to the port pins on the programmer. To run samples and demos provided in this toolkit, please refer to the diagram "Wiring the MPB for Demos and Sample Programs."
2)   To run demo programs, you need to wire the switches and LED's to the MPB. For the wiring, refer to "Wiring the MPB for Demos and Sample Programs" on page 5.
3)   To run a demo, sample or application, set the RUN/DOWNLOAD switch to RUN, and then set the ON/OFF switch to ON position.

Microphone
The MPB is designed so that you can use the on-board or external (custom) microphone.

To use the on-board microphone, put the jumper as listed below:
‣   JP3: 2-3

To use the external microphone, connect an external microphone to JP2, and put the jumper as listed below:
‣   JP3: 1-3

To use the external microphone, you need to install the microphone source resistor. To select the resistor, refer to
‣   Design Note - Selecting a Microphone, (80-0259).
Audio Outputs
PWM output is routed to the audio jack (J3) and though holes (JP1). You can connect the speaker to J3 or JP1.

The optional audio output for the amplified DAC out is also provided at J5 and JP7. Please note that although the VR Stamp and RPM have the DAC output, the signal is not amplified in the module itself. The DAC output signal is amplified on MPB for your convenience. Adjust R20 for the volume.

Maximum Baud Rate
Currently the maximum baud rate for programming Sensory modules is 57600.

Sample Programs
Sample programs in the FluentChip Technology Library are a great place to start. Since VR Stamp's memory size for code is limited to 1Mbit and there is no data flash for storing the Record and Playback data, not all sample programs can be used with the VR Stamp. For this reason, VR Stamp compatible sample programs are listed below.

- barge
- beat
- clock
- lipsync
- music
- pitch
- pwrdown
- rtlipsync
- sdcl
- sdf
- sdws
- sdwsm
- sv
- svsleep
- svws
- svwsm
- sx
- t2si
- t2simath
- t2sisd
- t2siss
- tt
- wdt

In addition to these samples, the following technologies can be utilized on the RPM due to its 32Mbit serial Flash IC, which can store voice data:

- rpmemo
- rpmsg
- sdmsg

To run sample programs, you need to wire the switches and LED's to the MPB. For the wiring, refer to "Wiring the MPB for Demos and Sample Programs".

"Config.mca"
"Config.mca" defaults to an option that is compatible with provided demos or samples using the following schematic "Wiring the MPB for Demos and Sample Programs". "Config.mca" option for "VR_STAMP" custom I/O on the final applications is also provided.

Wiring the MPB for Demos and Sample Programs
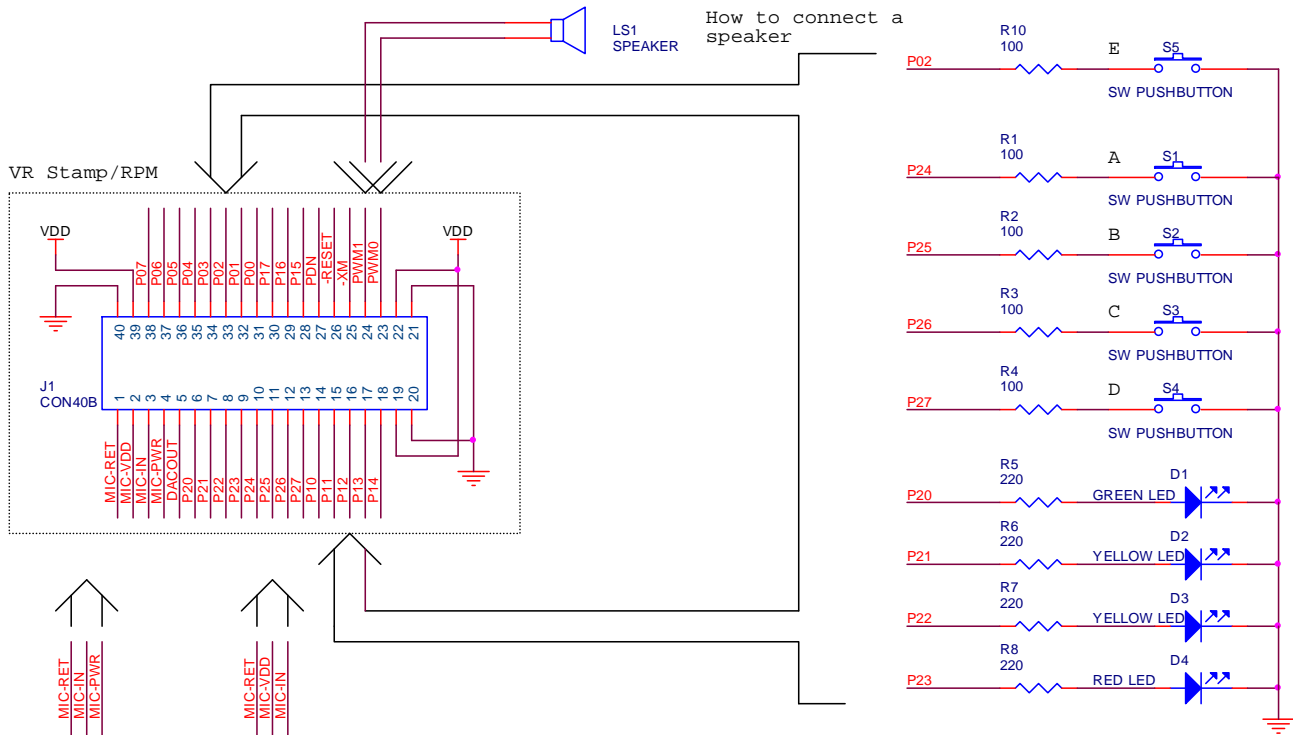
To be compatible with RSC-4x Demo/Eva board, 60-0239, connect the switches and LEDs as shown.
To be compatible with RSC-4x Demo/Eva board, 60-0208, change P2X to P1X. Note that button E is not available in this configuration.

Title		
	VR Stamp Sample Schematic	
Size A	Document Number 70-0070	Rev B
Date:	Monday, July 09, 2007	Sheet 1 of 1

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The Interactive Speech™ Product Line

The Interactive Speech line of ICs and software was developed to "bring life to products" through advanced speech recognition and audio technologies. It is designed for cost-sensitive consumer-electronic applications such as home electronics, home automation, toys, and personal communication. The product line includes the award-winning RSC-4x general-purpose microcontrollers and tools, the *VR Stamp™* 40 pin DIP module and tools, the SC series of speech and music synthesis microcontrollers. Our suite of software development kits are designed to run on non-Sensory processors and DSP's, and support most popular operating systems.

RSC Microcontrollers and Tools
The RSC product family contains low-cost 8-bit speech-optimized microcontrollers designed for use in consumer electronics. All members of the RSC family are fully integrated and include A/D, pre-amplifier, D/A, ROM, and RAM circuitry. The RSC family can perform a full range of speech/audio functions including speech recognition, speaker verification, speech and music synthesis, and voice recording/playback. The family is supported by a complete suite of evaluation and development toolkits.

Speech Recognition Modules and Tools
The VR Stamp™ is a complete speech recognition module based on the RSC-4x and is ideal for fast design and easy production. A low-noise audio channel and standardized 40-pin DIP footprint allow rapid prototyping, less debugging, and shorter time to market. The *VR Stamp Toolkit* includes everything needed to get started today, including VR Stamps, Module Programming Board, sample applications, and a complete set of development tools featuring the Phyton IDE and limited-life C compiler, QuickSynthesis™ 4 and Quick T2SI-Lite™ speech tools.

SC Microcontrollers and Tools
The SC-6x product family features the highest quality speech synthesis ICs at the lowest data rate in the industry. The line includes a 12.32 MIPS processor for high-quality, low data-rate speech compression and MIDI music synthesis, with plenty of power left over for other processing and control functions. Members of the SC-6x line can store as much as 37 minutes of speech on-chip and include as many as 64 I/O pins for external interfacing. Integrating this broad range of features into a single chip enables developers to create products with high quality, long duration speech at very competitive price points.

FluentSoft™ Technology
FluentSoft™ Recognizer is the engine powering the FluentSoft™ SDK. It provides a noise-robust, large-vocabulary, speaker-independent solution with continuous digit recognition and word-spotting capabilities. This small-footprint software recognizes up to 5,000 words; runs on non-Sensory processors including Intel XScale, TI OMAP, and ARM9 platforms; and supports operating systems such as MS Windows, Linux, and Symbian.

3Dmsg™ Technology
3Dmsg's (www.3Dmsg.com) Animated Speech technology offers animated avatars with advanced speech recognition and synthesis capabilities for use in smartphones, language trainers, and kiosk applications. Facial expressions can be configured to show emotions and lip synchronization can be automatically driven from voice or text data.

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