Technical Note

TN_101

USB-to-CAN and RS232-to-CAN Migration Guide

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Connective Peripherals have launched replacements for its existing CANUSB and CAN232 CAN products. The replacements, USB2-F-7001 (USB to CAN) and S1-A-7001 (RS232 to CAN) CAN Plus adapters, improve the current features, add advanced commands and increase performance of the previous products.

The new CAN Plus adapters add 5 new commands, provide full 29 bit filtering, will handle concurrent CAN commands and both come in an improved industrial strength mechanical enclosure.

Additionally the S1-A-7001 operates up to 1Mbit/s on the RS232 interface and the USB2-F-7001 comes with an advanced DLL to enable development of application software.

This Technical Note outlines the **advanced** features of the Connective Peripherals USB2-F-7001 and S1-A-7001.

Information is also provided to ensure a smooth transition from the previous generation Connective Peripherals CANUSB and CAN232 products to the newer more powerful products.

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1 What's New? - Comparison Guide

The Following table highlights the improvements made between the previous Connective Peripherals CAN products and the new improved products.

Features	**NEW CAN PRODUCTS** **S1-A-7001** **USB2-F-7001**	**OLD CAN PRODUCTS** **CAN232** **CANUSB**
CAN 1.1 and 2.0	Yes	Yes
CAN speeds	10Kbps to 1Mbps	10Kbps to 1Mbps
Maximum recommended CAN speed	***1Mbps (S1-A-7001)*** 1Mbps (USB2-F-7001)	125Kbps (CAN232) 1Mbps (CANUSB)
Concurrent CAN commands	***Yes***	No
RS232 speeds **(S1-A-7001 and CAN232 only)**	2.4Kbps through ***1Mbps***	2.4Kbps through 230.4Kbps (230.4Kbps not guaranteed)
Identical Commands **("U" valid for S1-A-7001 and CAN232 only)**	S – Set CAN Speed O – Open CAN Channel C – Close CAN Channel t – Transmit 11-bit ID CAN Message T – Transmit 29-bit ID CAN Message U – Set UART Speed (to 230.4Kbps) V – Get Version Info N – Get Serial Number Z – Enable/Disable Time Stamp	S – Set CAN Speed O – Open CAN Channel C – Close CAN Channel t – Transmit 11-bit ID CAN Message T – Transmit 29-bit ID CAN Message U – Set UART Speed (to 230.4Kbps) V – Get Version Info N – Get Serial Number Z – Enable/Disable Time Stamp
Different Commands **(The arguments of these commands are not the same, "U" valid for S1-A-7001 and CAN232 only)**	s – Set CAN Speed – Advanced F – Get CAN Flag Status m – Set Acceptance Mask M – Set Acceptance Code U – Set UART Speed (above 230.4Kbps)	s – Set CAN Speed – Advanced F – Get CAN Flag Status m – Set Acceptance Mask M – Set Acceptance Code U – Set UART Speed (above 230.4Kbps not available)
Unsupported Commands **(valid for S1-A-7001 and CAN232 only)**	P – Poll Incoming FIFO – Single A – Poll Incoming FIFO – All	P, A are not enabled by default on CAN232
New Commands	H – Help L – Listen E – Echo R – Reset B – Bootloader	(Not available on CAN232)
Filtering	Full 11-bit ***Full 29-bit***	Full 11-bit Partial 29-bit (upper 16 bits)
MCU	PIC18F2680/4680 @ 24MHz	SJA1000 plus Atmel Atmega162 @ 16MHz
Bootloader	Yes	Yes
External Power Requirement **(valid for S1-A-7001 and CAN232 only)**	6VDC to 15VDC @ ~100mA	8VDC to 15VDC @ ~100mA
Mechanical	New industrial strength plastics. USB2-F-7001 also comes with DIN rail mounting bracket and separate USB cable.	Fixed length USB cable fixed to CANUSB.
Temperature Range	-40˚C to +85˚C	0˚C to +55˚C

2 New Features

The new Connective Peripherals CAN Plus adapters provide enhanced CAN interfaces to your host computer. There are currently two models in the CAN Plus family:

- USB2-F-7001 – USB to CAN adapter
- S1-A-7001 – RS232 to CAN adapter
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These adapters utilize the latest Microchip PIC microcontroller with an embedded CAN interface. The CAN Plus adapters offer these new features:

- Lower cost – Both USB and RS232 versions are priced lower than their predecessors
- Upgradeable firmware – A boot loader allows firmware updates without the need for a service call
- Full standard (11-bit) and extended (29-bit) filtering down to a single CAN ID or a range of IDs
- Higher bus loading – The faster PIC allows for more CAN frames to be sent or received
- Full support of standard and non-standard CAN speeds from 10Kbps through 1Mbps
- Concurrent CAN commands – Multiple commands can be issued without waiting for a response
- Faster RS232 speeds, up to 1Mbps (S1-A-7001)
- Faster USB throughput, up to 1Mbyte/sec. (USB2-F-7001). The USB bus operates at Full Speed, 12Mbps
- Wider power supply voltage range (S1-A-7001)
- Industry Standard CiA DS-102 DE-9P connector
- Extended temperature range (-40˚C to +85˚C)
- In-house firmware development and product support

The previous CAN232 and CANUSB products could not be upgraded to support these features. The new product architecture also allows support to provide enhancements to the USB2-F-7001 and S1-A-7001 in future upgrades of the new products.

As a result of using this new hardware architecture, the new CAN Plus adaptors are not 100% compatible with the original CAN232 and CANUSB products. Some modifications to existing applications will be necessary when switching to the new improved products.

3 Third Party Applications

If you are using the CAN Plus products in conjunction with a third-party application, such as an automotive engine analysis program, check with the application vendor for an updated version of the program that supports the CAN Plus products.

If an updated application does not yet exist, contact Connective Peripherals Support (support@connectiveperipherals.com) with the application and developer contact information. Connective Peripherals will work with the developer to add support for the CAN Plus product line.

Device Drivers (USB2-F-7001 only)

The USB2-F-7001 uses the USB Vendor ID of 0x0403 and Product ID of 0xFAC6. Device drivers are available from www.connectiveperipheals.com.

CANUSB device drivers will not work with the USB2-F-7001.

The S1-A-7001 does not require device drivers.

4 Programming Differences

Full details on ASCII commands are found in the USB2-F-7001 and S1-A-7001 datasheets. Details on the USB2-F-7001 DLL API are found in the USB2-F-7001 Programming Guide.

While commonality exists between the programming interfaces of the previous CAN232/CANUSB products and the new CAN Plus products, it is important to note that existing applications will need updated and fully tested with the USB2-F-7001 DLL and programming interface or ASCII commands on both CAN Plus products.

4.1 ASCII Commands – New commands and differences

New USB2-F-7001 and S1-A-7001 ASCII Commands:

- "H", "h" or "?" – Help – shows the list of available commands
- "L" – Listen – Places the adapter in listen-only mode (must have at least 3 CAN nodes on the bus)
- "E" – Echo – Just echoes back an "E"
- "R" – Reset – Resets the PIC
- "B" – Bootloader – Allows firmware upgrades to be loaded

USB2-F-7001 and S1-A-7001 ASCII Commands with different formats from the previous CANUSB/CAN232 products:

- "s" – Set Custom CAN bit rate - The baud rate divisors on the USB2-F-7001 and S1-A-7001 PIC require 3 bytes. If a custom CAN rate is desired, these three bytes must be specified and are defined in the PIC datasheet.
- "M" and "m" – The USB2-F-7001 and S1-A-7001 CAN ID mask (m) and acceptance code (M) can be specified to a full 29-bits. The CANUSB and CAN232 could only filter on a maximum of 16-bits. The current firmware provides one filter consisting of either a single CAN ID or range of CAN IDs.
- "F" – Get Status Flags – The USB2-F-7001 and S1-A-7001 PIC has a different status register than the CANUSB and CAN232 controller. The result is that flags have different bit meanings.
- "U" – U0 through U6 are identical.
  The S1-A-7001 supports two new RS232 baud rates: U7 (460.8kbps) and U8 (1Mbps).
  Before attempting to use 1Mbps, be sure the host RS232 port can handle this exact rate.
- RTR frames are not currently supported.

4.2 DLL API (USB2-F-7001 only) – New Functions & Differences

New USB2-F-7001 API functions:

- canplus_Listen
- canplus_Reset

USB2-F-7001 API Calls with different formats from the previous CANUSB product:

When using the USB2-F-7001 DLL API:

- USB2-F-7001 API calls are of the format: "canplus_CommandName" whereas the CANUSB calls were in the format "canusb_CommandName".
- USB2-F-7001 API parameter differences are detailed as follows:
  - canplus_Open:

        - szBitrate: if a custom CAN bit rate is desired, szBitrate will require three bytes (CANUSB required two). Common CAN bit rate selections remain unchanged.
        - acceptance_code: Must be either 11- or 29-bits.
        - acceptance_mask: Must be either 11- or 29-bits.
    - canplus_Status:
        - The same PIC status flag definitions apply as with the ASCII command.
- RTR frames are not currently supported.

4.3 Hardware

The CAN Plus adapters have a new enclosure that matches the new Connective Peripherals "Plus" theme. Flexible mounting options are included. Full details can be seen in the USB2-F-7001 and S1-A-7001 Datasheets.

For the S1-A-7001, hardware flow control is implemented on the RS232 interface in order to eliminate data overruns.

5 Contact Information

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Appendix A – References

Document References

USB2-F-7001 datasheet

S1-A-7001 datasheets

USB2-F-7001 Programming Guide

Acronyms and Abbreviations

Terms	Description
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange,
CAN	Controller Area Network
DLL	Dynamic Link Library
FIFO	First In First Out
USB	Universal Serial Bus
UART	Universal Asynchronous Receiver/Transmitter

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Appendix C - Revision History

Revision	Changes	Date
1.0	Initial release	2009-06-02
1.1	Re-branding to reflect the migration of the product from EasySync to Connective Peripherals name – logo change, copyright changed, contact information Changed, all internal hyperlinks changed.	2019-03-21