

**Mint<sup>MT</sup> Application Note****AN00155-003 – Porting from NextMove BX<sup>II</sup> to NextMove ESB-2****Overview**

NextMove ESB-2 is the latest addition to the NextMove family. It supersedes both NextMove ESB and NextMove BX<sup>II</sup>. This application note describes the main differences between a NextMove BX<sup>II</sup> and a NextMove ESB-2, and how to port Mint code running on a NextMove BX<sup>II</sup>.

The following table gives an overview of the main differences between the controllers.

	<b>NextMove BX<sup>II</sup></b>	<b>NextMove ESB-2</b>
Maximum axes	8	8
Maximum servo axes	4	4
Maximum stepper axes	0	4
Encoder channels	4	4
Auxiliary encoder channels	1	2 <sup>1</sup>
Analog outputs	4	4
Analog inputs	8	2
Digital inputs	16	20
Digital outputs	8	12
Fast inputs	4 dedicated	4 shared with digital inputs
Serial connections	RS232 and RS485	RS232 or RS485 (specified at order time)
USB connection	no	yes
CAN	CANopen and BaldorCAN	CANopen or BaldorCAN (selected with firmware)
Mint program space	256Kb	1024Kb
Battery backed RAM	yes	no
Non-volatile storage	-	3 Kb

<sup>1</sup> One full encoder channel and one slow speed channel multiplexed with three digital inputs.

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## Mechanical

NextMove ESB-2 has a different form factor to NextMove BX<sup>II</sup> so panel layout changes may be required if fitting into an existing application. Mounting details are in the product installation manuals:

NextMove ESB-2 installation manual (MN1957) section 3.2.1.

NextMove BX<sup>II</sup> installation manual (MN1904) section 3.1.2.



## Analog Inputs

NextMove BX<sup>II</sup> has eight 12-bit analog input channels that can be read as single-ended or as four differential pairs. NextMove ESB-2 has two 12-bit differential analog inputs. The following table compares the possible ADC modes:

ADC MODE	NextMove BX <sup>II</sup>	NextMove ESB-2
0	Single ended 0 – 5V	Differential +/- 10V
1	Differential 0 – 5V	-
2	Single ended +/- 2.5V	-
3	Differential +/- 2.5V	-
4	Off	Off
5	Differential +/- 10V	-

The number of analog inputs on NextMove ESB-2 can be expanded using CANopen.

## Analog Outputs

The 4 analog outputs on NextMove BX<sup>II</sup> are 14-bit. By default they operate in 12-bit mode. The DACMODE keyword can be used to change them to 14-bit mode.

The 4 analog outputs on NextMove ESB-2 are 12-bit only.

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## Digital Inputs

NextMove BX<sup>II</sup> has 16 opto-isolated digital inputs that can operate as current sinking or sourcing depending on connection method.

NextMove ESB-2 has 20 opto-isolated digital inputs that can operate as current sinking or sourcing depending on connection method.

## Digital Outputs

NextMove BX<sup>II</sup> has 8 opto-isolated digital outputs that are driven by a current sourcing PNP Darlington driver. The maximum current is 50 mA per channel.

NextMove ESB-2 has 12 opto-isolated digital outputs that are driven by a current sourcing UDN2987 driver. The maximum current is 500 mA per bank ( outputs 0-7 and outputs 8-11 ) with an individual channel maximum of 350 mA.

## Fast Inputs

NextMove BX<sup>II</sup> has 4 dedicated fast inputs for latching axis positions. One is a fast input with a latency of 30µs and the others have a latency of 1 ms.

On NextMove ESB-2, the first four digital inputs can be used as fast position inputs. The position latch is performed by an FPGA giving approximately 1 µs latency.

## Serial Ports

NextMove BX<sup>II</sup> has an RS232 and an RS485 port.

NextMove ESB-2 has a USB port and one serial port that can be ordered as either RS232 or RS485. The serial port supports a larger range of baud rates than the ports on NextMove BX<sup>II</sup>.

## CAN

NextMove BX<sup>II</sup> supports both the CANopen and BaldorCAN protocols at the same time. CANopen uses pins 1 and 2 and BaldorCAN uses pins 7 and 8.

On NextMove ESB-2, only one CAN protocol can be used and is selected by downloading either the CANopen or BaldorCAN variants of firmware. The CAN messages are produced on pins 1 and 2 of the RJ45 connector for both protocols.

The CAN driver on NextMove ESB-2 is opto-isolated and requires 12-24V to be externally supplied in the RJ45 connector on pins 4 and 5.

The terminator jumper for NextMove ESB-2 is located beneath the lid and is on by default.

## Mint Compatibility

NextMove BX<sup>II</sup> and NextMove ESB-2 both run similar versions of Mint. Changes in a Mint program will be required for hardware differences and where the code relies on the battery backed RAM of NextMove BX<sup>II</sup>.

A program on NextMove ESB-2 will be in the order of 10 times faster than NextMove BX<sup>II</sup>.

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The following is a list of keywords that may require modification when porting a Mint program from NextMove BX<sup>II</sup> to NextMove ESB-2.

**ADC, ADCERROR, ADCGAIN, ADCMAX, ADCMIN, ADCMODE, ADCMONITOR, ADCOFFSET, ADCTIMECONSTANT, HTACHANNEL** - The number of ADC channels is reduced with different modes of operation.

**BUS1 event, BUS2 event, BUSBAUD, BUSEVENT, BUSEVENTINFO, BUSNODE, BUSRESET, BUSSTATE, CONNECT, CONNECTSTATUS, NODELIVE, NODESCAN, NODETYPE, REMOTExxx** – There is only one CAN bus available, selected through firmware variant.

**DACMODE** – The analog output channels on NextMove ESB-2 are 12-bit only.

**ENCODERZACTIVELEVEL** – Not supported on NextMove ESB-2.

**FASTAUXSELECT, FASTSELECT** – The fast inputs on NextMove ESB-2 are the first four digital input channels.

**MISCERROR, MISCERRORDISABLE** – Not all bits are supported by NextMove ESB-2, see the Help file entry for details.

**TERMINALPORT** – By default on NextMove BX<sup>II</sup>, `_TERM1` is the RS232 port and `_TERM2` is the RS485 port. By default on NextMove ESB-2, `_TERM1` is the serial port (RS232 or RS485) and `_TERM2` is the USB port.

## Battery backed RAM

NextMove BX<sup>II</sup> has a battery to preserve the contents of RAM when the power is removed. This means the values of Mint variables and the Comms array are maintained and used when the unit is powered up. On NextMove ESB-2, all data is volatile and will be reset when the power is applied to the controller.

NextMove ESB-2 has NVRAM that can be used for non-volatile parameter storage with the `NVLONG` and `NVFLOAT` keywords.

When porting a Mint program, care should be taken to look for instances where data is expected to be preserved through a power cycle.

## Compatibility with Existing Host Applications

Changes may be required to an existing host application, depending on the functionality of the application. For example, if the host application only sends commands via the Comms array or monitors axis positions using ActiveX calls then no changes would be needed. This assumes the Mint program on the controller has already been converted.

If the application is controlled via the host (with no Mint program or a simple monitoring program) then the changes detailed for Mint would need to be applied to the host.

In either situation, it would be advantageous to change to USB for the communication link since it gives higher bandwidth and reliability.

## Mint WorkBench and ActiveX

Mint WorkBench v5.5 Build 5560 (or later) should be used with NextMove ESB-2. Previous versions of Mint WorkBench will display 'Unknown Controller' when the USB bus is scanned. The Mint WorkBench will still communicate correctly with the controller.

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'Mint WorkBench v5.5 & Mint Motion Center' can be downloaded from [www.baldormotion.com](http://www.baldormotion.com).

Each controller has a number of enumerations as follows:

	NextMove BX <sup>II</sup>	NextMove ESB-2
ControllerType	17	36
Platform	17	36
NodeType	25	29

### Product Variants

NextMove BX<sup>II</sup> is available in 3 variants supporting 2, 3 or 4 servo axes. NextMove ESB-2 is available in 3 servo or 4 servo variants and RS232 and RS485 variants.

The following table shows all NextMove ESB-2 variants and order codes.

Description	ESB-2 Order Code	Replaces (BX <sup>II</sup> )
USB and RS232, 3 servo, 4 stepper (differential)	NSB202-501	NMX004-501 NMX004-502
USB and RS485, 3 servo, 4 stepper (differential)	NSB202-502	NMX004-501 NMX004-502
USB and RS232, 3 servo, 4 stepper (single-ended)	NSB203-501	NMX004-501 NMX004-502
USB and RS485, 3 servo, 4 stepper (single-ended)	NSB203-502	NMX004-501 NMX004-502
USB and RS232, 4 servo, 4 stepper (differential)	NSB204-501	NMX004-503
USB and RS485, 4 servo, 4 stepper (differential)	NSB204-502	NMX004-503
USB and RS232, 4 servo, 4 stepper (single-ended)	NSB205-501	NMX004-503
USB and RS485, 4 servo, 4 stepper (single-ended)	NSB205-502	NMX004-503