

**Doc No.:** AN-261

**Version:** 1.1

**Date:** 25 January 2012

**Subject:** MC202 – MC302X Differences

## APPLICATION NOTE

### 1. Introduction

The MC202 went out of production during 2008. The nearest modern product which can be used as a replacement is the MC302X. However there are some significant detail differences between these 2 Motion Coordinators.



Fig 1: MC202 (P165)

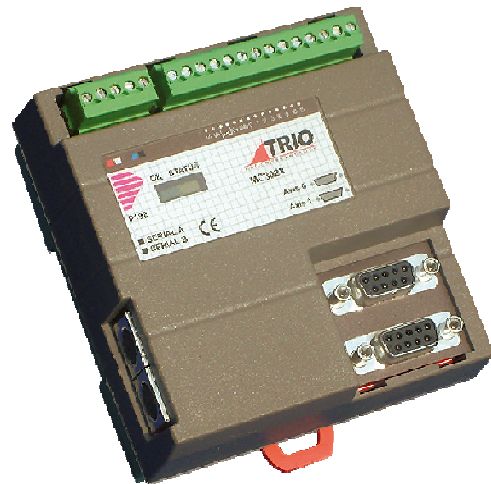


Fig 2: MC302X (P192)

### 2. Hardware differences

The biggest functional hardware differences are with the second serial port and the step+direction outputs. These may involve some circuit re-design and re-wiring when the MC302X is used as a replacement for the MC202.

#### **Serial Ports:**

MC202 has 1 x 8 pin connector on the front. MC302X has 2 x 8 pin connectors on the SIDE. This requires some space on the side so that you can access these sockets.

MC202 serial connector has 2 ports. 1 x RS232 programming port and 1 x TTL level auxiliary port which requires a serial adapter module (P349) or a fibre-optic adapter (P345) module.

MC302X serial connector A has one port. 1 x RS232 programming port.

MC302X serial connector B has one port which is available at a choice of either RS232 or RS485. No adapter is required.

MC302X does not support the P345 fibre-optic adapter.

### Encoder Ports:

MC202 has 2 encoder ports (RS422 line receiver) on a single screw terminal strip on the lower front edge.

MC302X has 2 encoder ports (RS422 line receiver) on 2 x 9-way D-type connectors on the lower right front.

### Stepper Ports:

MC202 has 2 step+direction output ports at Open Collector level. The connections are shared with encoder port 1.

MC302X has 2 step+direction output ports at RS422 differential line driver level. The connections are shared with encoder port 0 and encoder port 1.

## 3. Software:

MC302X system software V1.96 is generally backwards compatible with the MC202 system software V1.52. Known differences are few and include:

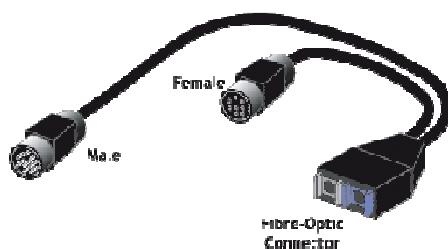
SRAMP command has no function in the MC302X

CAN(-1, 5, ..... ) command requires a data direction parameter in the MC302X which was not needed in the MC202.

You can check your programs to see if either of these commands is present.

Trio can't guarantee that all other commands will work exactly the same but in 99% of cases they will. Program execution speed in the MC302X is somewhat faster than in the MC202.

## 4. P435 Serial to Fibre Optic Adapter



The P435 allows a MC202 to connect to a Trio Keypad P503 or P502. The MC302X does not support the connection type used in this product. DO NOT CONNECT P435 to MC302X.

Fig 3: P435 Fibre-Optic Adapter

## 5. P349 Serial RS485 Adapter

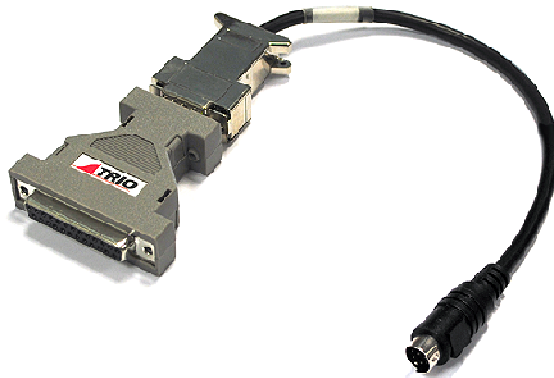


Fig 4: P349 (also known as P353)

The P349 is required if the MC202 needs to connect its second serial port, PORT #1, to a device using RS485.

The MC302X has the RS485 connection built-in so therefore making the P349 redundant. It is not required.

A cable which terminated in a 25-way D-type connector for the MC202+P349 will need to be re-wired to suit the direct 9-way mini-DIN connector on the MC302X. See the relevant manuals for connection details or see the summary below.

### Note:

The P349 is not only a 9-way to 25-way adapter. It contains active components which convert TTL signals into RS485 level differential serial data.

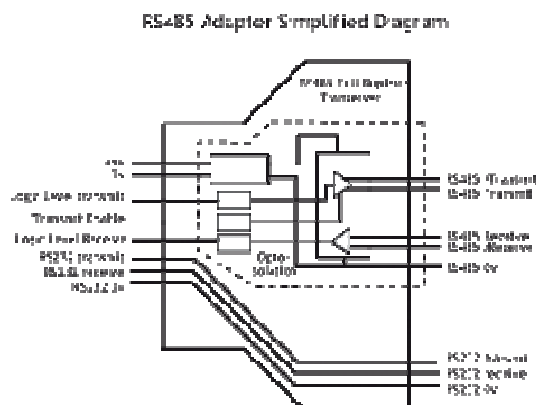
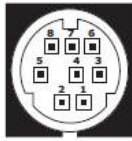


Fig 5: P349 (P353) functional diagram.

9-Way Dtype		25-Way Dtype	
1	+5v power	5	RS485 Gnd
2	RS232 Receive pass-through	6	RS485 Rx+
3	RS232 Transmit pass-through	7	RS485 Rx-
4	Logic 0V	8	RS485 Tx-
5	RS232 Pass-through 0v	9	RS485 Tx+
6	no connection		
7	Transmit enable input	11	Port #0 Rx
8	Logic level receive	12	Port #0 Tx
9	Logic level transmit	13	Port #0 RS232 Gnd

Fig 6: P349 (P353) Connector Pinout.

Serial Connector B:



Pin	Function	Note
1	RS485 Data In A Rx+	Serial Port #1
2	RS485 Data In B Rx-	
3	RS232 Transmit	Serial Port #1
4	RS232 GND	
5	RS232 Receive	

Pin	Function	Note
6	Internal 5V	Serial Port #1
7	RS485 Data Out Z Tx-	
8	RS485 Data Out Y Tx+	

Fig 7: MC302X Serial connector B pinout.

### Serial wiring

Using the information in figures 6 and 7, make up a new cable to replace the one which terminates in the 25 way D-type. The new cable will terminate in an 8-way mini DIN connector to plug into serial socket B of the MC302X.

The following table shows a list of the equivalent connections.

Signal name	P349 pin	MC302X pin
RS485 Rx+	6	1
RS485 Rx-	7	2
RS485 Tx+	9	8
RS485 Tx-	8	7
0V	5	4

Table 1: P349 - MC302X connector comparison

### Motion Perfect connection

The serial cable for Motion Perfect connection is the same for both the MC202 and the MC302X. In the MC302X, plug the Motion Perfect programming cable into serial socket A.

### Note

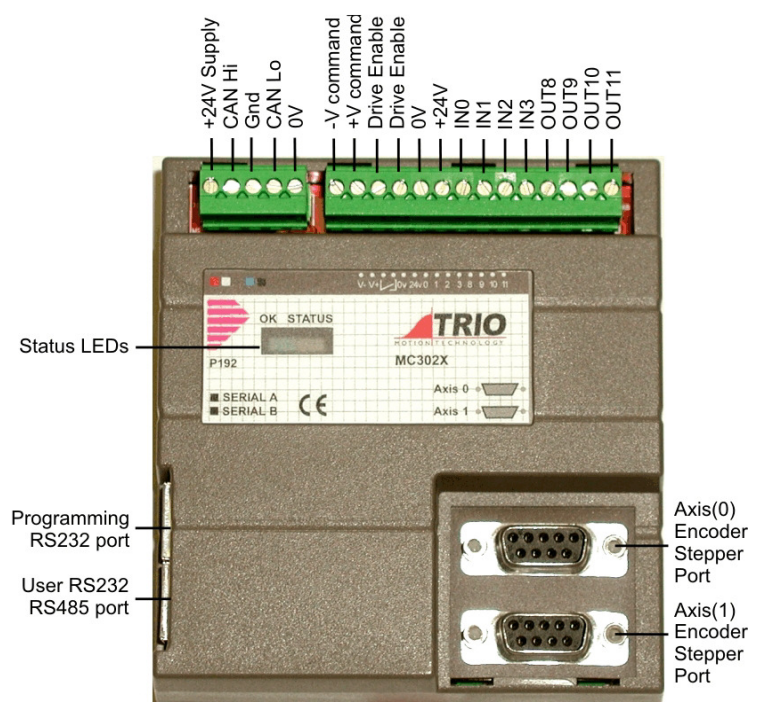
You will need the latest up-to-date version of Motion Perfect 2 with serial communications set to the "Fast Default" speed of 38400 bits per second.

## 6. Performance

Key differences of the MC302X vs. MC202

	MC302X	MC202
Stepper Freq	2MHz max.	500kHz max.
Stepper Output	Differential Line Driver (high-speed pulse)	Open Collector (squarewave)
Modes of operation	1 ½ Servo 2 Stepper	1 ½ Servo 2 Stepper
Max Encoder Frequency	6MHz edge rate	2MHz edge rate
Serial Ports	1 RS232 programming (38400* baud) 1 User Port, RS232 or RS485 (9600, 19200, 38400* baud) *default	1 RS232 programming (9600 baud) 1 TTL Serial (requires P349 adapter)
Input Power	24Vdc @ 40mA	24Vdc @ 100mA
Servo Loop	1ms, 500us, 250us	1ms fixed
Drive Enable relay	Solid state (0.1A)	Dry contact (0.5A)
Simulated Encoder Output capable	Yes	No
Max TABLE size	16000 locations	8000 locations
User Memory	512k byte	128k byte
Registration	Internal Step/Dir loop-back for registration	Requires external components for loop-back

## 7. MC302X Connector Layout



## 8. MC302X Axis Configuration

The two 9-pin D-shell connectors on the MC302X can be configured in multiple control modes as standard firmware features. No additional hardware or software is required. The Trio BASIC parameter ATYPE is used to configure the axes.

### Standard Axes Configuration

Axes 0 and 1 can be set for Servo, Stepper, or Encoder operation modes using ATYPE parameter.

Pin	Axis 0			Axis 1	
	Servo *	Stepper	Encoder	Encoder *	Stepper
	ATYPE=2	ATYPE=1	ATYPE=3	ATYPE=3	ATYPE=1
1	Enc A	Step +	Enc A	Enc A	Step +
2	Enc /A	Step -	Enc /A	Enc /A	Step -
3	Enc B	Direction +	Enc B	Enc B	Direction +
4	Enc /B	Direction -	Enc /B	Enc /B	Direction -
5	GND	GND	GND	GND	GND
6	Enc Z	Boost +	Enc Z	Enc Z	Boost +
7	Enc /Z	Boost -	Enc /Z	Enc /Z	Boost -
8	5V	5V	5V	5V	5V

\* Default configuration

### Alternate Axes Configuration

#### Stepper+Encoder - Axis 0

(2) Stepper Axes and (1) Encoder input - ATYPE=46

Pin	Axis 0	Axis 1
1	Step_0 +	Step_1 +
2	Step_0 -	Step_1 -
3	Direction_0 +	Direction_1 +
4	Direction_0 -	Direction_1 -
5	GND	GND
6	Enc A0	Enc B0
7	Enc /A0	Enc /B0
8	5V	5V

### Stepper+Encoder - Axis 1

(1) Stepper Axis and (2) Encoder inputs - ATYPE=46

Pin	Axis 0	Axis 1
1	Enc A0	Enc A1
2	Enc /A0	Enc /A1
3	Enc B0	Enc B1
4	Enc /B0	Enc /B1
5	GND	GND
6	Step_1 +	Direction_1 +
7	Step_1 -	Direction_1 -
8	5V	5V

### Stepper with Registration

Internally loops the axis own Step/Dir to its encoder input for registration facilities- ATYPE=4

Pin	Stepper VERIFY=OFF	Axis	(Internally mapped)
1	Step +	—	Enc A
2	Step -	—	Enc /A
3	Direction +	—	Enc B
4	Direction -	—	Enc /B
5	GND		GND
6	Boost +		Enc Z
7	Boost -		Enc /Z
8	5V		5V

### Simulated Encoder Output

Sets an axis to output a simulated quadrature encoder signal - ATYPE=14

Pin	Axis 0 or 1
1	Enc A
2	Enc /A
3	Enc B
4	Enc /B
5	GND
6	NC
7	NC
8	5V

## 9. Document History

### 1.0 December 2010

Original document.

### 1.1 January 2012

Combined with parts of "TN30\_22 MC302X HW ref". Sections 6, 7 and 8.