▶Trio Motion Technology◀

Application Note

Trio Motion Technology Ltd.
Shannon Way,
Tewkesbury
Glos. GL20 8ND U.K.

Tel: 01684 292333
Fax: 01684 297929
Email: apps@triomotion.com
Web: www.triomotion.com

Doc No.: **TN20-04**
Version: **1.2**
Date: **12 December 2000**
Subject: ***DeviceNet* – BASIC Program Example**

Introduction

This document will allow a programmer to install and set-up the Trio BASIC program "DN_Slave.BAS" in order to attach the Motion Coordinator to a DeviceNet fieldbus network as a slave.

Scope of Operation

This document applies to the BASIC program developed for Motion Coordinator types MC202, MC204, MC216 and Euro205. The program is provided for evaluation and example purposes and no guarantee is made as to its suitability for a particular DeviceNet application.

In order to include the Motion Coordinator in a DeviceNet network the following components are required:

1. Trio BASIC program DN_Slave.bas
2. DeviceNet EDS file. (Electronic Data Sheet)
3. This Document.
4. Motion Perfect and serial programming cable.

Installation and Set-up

The program must be loaded into the Motion Coordinator and set to run from power-up. Set the CANIO_ADDRESS to 33 so as to prevent the Motion Coordinator from acting as a CANIO master and generating non-DeviceNet CANbus messages on power-up. Insert a program line to set VR(239) to the required MAC-ID or set the VR(239) value from the Motion Perfect terminal. (Make sure the FLASHVR instruction is used on the MC202)

e.g. From the terminal type:

```
CANIO_ADDRESS = 33
VR(239) = 23       ‘ where 23 is the required MAC-ID
```

The program is set to run DeviceNet at 500Kbps. This can be changed at line 562 of the program:

```
CAN(port,baudrt,1) ' for 500 kbps
CAN(port,baudrt,2) ' for 250 kbps
CAN(port,baudrt,3) ' for 125 kbps
```

Limitations

The DeviceNet response may be relatively slow because this is implemented in BASIC.
When using the built-in CANbus port for DeviceNet, CAN IO modules cannot be connected to the Motion Coordinator.

DeviceNet Information

This Section contains DeviceNet information for the multi-axis Trio Motion Coordinator model MC202, MC204, MC216 and Euro205.

The Motion Coordinator operates as a slave device on the DeviceNet network. The Motion Coordinator supports Explicit Messages of the predefined master/slave connection set and Polled I/O. It does not support the Explicit Unconnected Message Manager (UCMM).

Polled I/O allows the master to send 4 integer variables to the Motion Coordinator and to read 16 integer variables from the Motion Coordinator. These values are mapped to the global VR() variables in the Motion Coordinator. The values are transferred periodically at a rate determined by the DeviceNet Master. VR(0) to VR(250) are also accessible over DeviceNet individually by way of the Explicit Messaging service.

This appendix defines the DeviceNet message types, class services and objects that are supported by the Motion Coordinator DeviceNet port.

DeviceNet Message Types

As a group 2 slave device, the Motion Coordinator supports the following message types.

CAN Identifier Field	Group 2 Message Type
10xxxxxx111	Duplicate MAC ID Check Messages
10xxxxxx110	Unconnected Explicit Request Messages
10xxxxxx100	Master Explicit Request Message
10xxxxxx011	Slave Explicit Response Message

xxxxxx = Motion Coordinator Node Address

DeviceNet Class Services

As a group 2 slave device, the Motion Coordinator supports the following class services and instance services.

Service Name	**Service Code**
Reset	0x05
Get_Attribute_Single	0x0E
Set_Attribute_Single	0x10
Allocate_Group_2_Identifier_Set	0x4B
Release_Group_2_Identifier_Set	0x4C

DeviceNet Object Classes

The Motion Coordinator supports the following DeviceNet object classes.

Class	Object
0x01	Identity
0x03	DeviceNet
0x05	Connection
0x0F	Parameter

Identity Object Class Code: 01hex

Class Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Revision	UINT	Not Supported

Number of Instances: 1

Instance Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Vendor	UINT	277
2	Get	Product Type	UINT	0
3	Get	Product Code	UINT	202 / 204 / 216 / 205
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	 1 0
5	Get	Status	WORD	Device_Status①
6	Get	Serial Number	UDINT	unique 32 bit number
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING[10]	 10 "Trio MC202"

① device_status

bit 0	owned	0=not owned 1=owned (Group 2 allocated to master)
bit 1	reserved	always 0
bit 2	configured	always 0 (out-of-box configuration)
bit 3	reserved	always 0
bit 4-7	vendor specific	all 0
bit 8	minor cfg fault	0=no fault 1=minor configuration fault
bit 9	minor device fault	0=no fault 1=minor device fault
bit 10	major cfg fault	0=no fault 1=major configuration fault
bit 11	major device fault	0=no fault 1=major device fault
bit 12,13	reserved	always 0
bit 14,15	reserved	always 0

Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0E hex	Yes	Yes	Get_Attribute_Single
05 hex	No	No	Reset (Not implemented)

DeviceNet Object Class Code: 03hex

Class Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Revision	UINT	1

Number of Instances: 1

Instance Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Node Address	USINT	Software defines
2	Get	Data Rate	USINT	Software defines 00 = 125Kb/s 01 = 250Kb/s 02 = 500Kb/s
3	Get	BOI	BOOL	Default = 0
4	Get	Bus-Off Counter	USINT	Not implemented – Null (0) returned
5	Get	Allocation Information	Structure of: BYTE USINT	Allocation byte ① 0-63 = master address 255 = unallocated

① Allocation_byte

bit 0	explicit message	Supported, 1 to allocate
bit 1	Polled	Not supported, always 0
bit 2	Bit_strobed	Not supported, always 0
bit 3	reserved	always 0

Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0E hex	Yes	Yes	Get_Attribute_Single
4B hex	No	Yes	Allocate_Master/Slave_Connection_Set
4C hex	No	Yes	Release_Master/Slave_Connection_Set

## Connection Object		Class Code: 05hex

Class Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Revision	UINT	Not supported

Number of Instances: 2

Instance Attributes (Instance 1)

Instance Type : Explicit Message

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	State	USINT	0 = nonexistent 1 = configuring 3 = established 4 = timed out
2	Get	Instance Type	USINT	0 = explicit message
3	Get	Transport Class Trigger	USINT	83 hex
4	Get	Produced Connection ID	UINT	10xxxxxx011 binary xxxxxx = node address
5	Get	Consumed Connection ID	UINT	10xxxxxx100 binary xxxxxx = node address
6	Get	Initial Comm Characteristics	USINT	21 hex
7	Get	Produced Connection Size	UINT	7
8	Get	Consumed Connection Size	UINT	7
9	Get / Set	Expected Packet Rate	UINT	2500 default (msec) with timer resolution of 1 msec
12	Get	Watchdog Timeout Action	USINT	1 = autodelete
13	Get	Produced Connection Path Length	USINT	0
14	Get	Produced Connection Path		Null (no data)
15	Get	Consumed Connection Path Length	USINT	0
16	Get	Consumed Connection Path		Null (no data)

Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
05 hex	Yes	Yes	Reset
0E hex	Yes	Yes	Get_Attribute_Single
10 hex	No	Yes	Set_Attribute_Single

Instance Attributes (Instance 2)

Instance Type : Polled I/O

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	State	USINT	0 = nonexistent 1 = configuring 3 = established 4 = timed out
2	Get	Instance Type	USINT	1 = Polled I/O
3	Get	Transport Class Trigger	USINT	83 hex
4	Get	Produced Connection ID	UINT	01111xxxxxx binary xxxxxx = node address
5	Get	Consumed Connection ID	UINT	10xxxxxx101 binary xxxxxx = node address
6	Get	Initial Comm Characteristics	USINT	01 hex
7	Get	Produced Connection Size	UINT	20 Hex (See Note 1.)
8	Get	Consumed Connection Size	UINT	08 Hex (See Note 1.)
9	Get / Set	Expected Packet Rate	UINT	2500 default (msec) with timer resolution of 1 msec
12	Get	Watchdog Timeout Action	USINT	0
13	Get	Produced Connection Path Length	USINT	0
14	Get	Produced Connection Path		Null (no data)
15	Get	Consumed Connection Path Length	USINT	0
16	Get	Consumed Connection Path		Null (no data)
17	Get	Production Inhibit Time	USINT	0

Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0E hex	Yes	Yes	Get_Attribute_Single
10 hex	No	Yes	Set_Attribute_Single

Note 1:

4 Words (Signed Integer) written to VR(0) to VR(3)

16 Words (Signed Integer) read from VR(4) to VR(19)

Parameter Object Class Code: 0Fhex

Class Attributes

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	250
8	Get	Parameter Class Descriptor	WORD	1 = Supports Parameter Instances.
9	Get	Configuration Assembly Instance	UINT	0 = config. Assy. Not supported.

Number of Instances: 250

Instance Attributes

(All Instances access general purpose global variables)

Attribute ID	Access Rule	Name	DeviceNet Data Type	Data Value
1	Get / Set	Parameter Value	Specified in attributes 4, 5 and 6.	Actual value of VR(instance) global variable.
2	Get	Link Path Size	USINT	0
3	Get	Link Path	ARRAY	Null (no data)
4	Get	Descriptor	WORD	0
5	Get	Data Type	USINT	3 = Signed Integer
6	Get	Data Size	USINT	2

Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
05 hex	No	No	Reset (No remote reset of variables)
0E hex	Yes	Yes	Get_Attribute_Single
10 hex	No	Yes	Set_Attribute_Single

Basic Program: DN_Slave.bas
Program revision: 1.8
Date: 12 December 2000