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# 8903/CN ControlNet Communications Option

Technical Manual  
HA469263U001 Issue 4

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# Safety Information



## Requirements

**IMPORTANT:** Please read this information BEFORE installing the equipment.

### Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Complete the following table for future reference detailing how the unit is to be installed and used.

INSTALLATION DETAILS	
<b>Model Number</b> <i>(see product label)</i>	
<b>Where installed</b> <i>(for your own information)</i>	
<b>Unit used as a:</b> <i>(refer to Certification for the Inverter)</i>	<input type="radio"/> Component <input type="radio"/> Relevant Apparatus
<b>Unit fitted:</b>	<input type="radio"/> Wall-mounted <input type="radio"/> Enclosure




### Application Area

The equipment described is intended for industrial motor speed control utilising DC motors, AC induction or AC synchronous machines

### Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

### Product Warnings

	<b>Caution</b> Risk of electric shock		<b>Caution</b> Refer to documentation		<b>Earth/Ground</b> Protective Conductor Terminal
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# Safety Information



## Hazards

### **DANGER! - Ignoring the following may result in injury**

1. This equipment can endanger life by exposure to rotating machinery and high voltages.
2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.
3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.
4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.
5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product.
6. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and earth.
7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".

### **WARNING! - Ignoring the following may result in injury or damage to equipment**

#### **SAFETY**

Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.
- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.
- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.
- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.
- Thermal sensors contained within the motor must have at least basic insulation.
- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.
- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.

#### **EMC**

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.
- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

### **CAUTION!**

#### **APPLICATION RISK**

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We can not guarantee the suitability of the equipment described in this Manual for individual applications.

#### **RISK ASSESSMENT**

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended.

In particular:

- Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off
- The motor's direction of rotation might not be controlled
- The motor speed might not be controlled
- The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition.

Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic
- Unintended operation

# Contents

Contents

Page

<b>CONTROLNET COMMUNICATIONS OPTION</b>	<b>1</b>
<b>Introduction</b> .....	<b>1</b>
Product Features .....	1
Product Order Code.....	1
Compatible Firmware.....	1
Restrictions.....	1
<b>Installation</b> .....	<b>2</b>
Wiring the System .....	5
<b>Channel LED Indications</b> .....	<b>6</b>
Initial Power-on Checks .....	6
<b>Drive Diagnostics</b> .....	<b>6</b>
• The ControlNet MMI View .....	6
• Parameter Descriptions .....	7
<b>Configuring the ControlNet System</b> .....	<b>8</b>
Step 1: Configuring the ControlNet Option using DSE .....	8
• Step 1.1: Inserting a CONTROLNET Function Block.....	8
• Step 1.2: Attaching Fieldbus Connectors .....	8
• Step 1.3: Configuring the Fieldbus Connectors.....	9
• DSE Data Types .....	11
• ControlNet PLC Data Types.....	11
• Conversion of DSE Type < > ControlNet PLC Type .....	11
• ControlNet Status Information .....	12
Step 2: Configuring the PLC using RSLogix 5000 .....	13
Step 3: Configuring the ControlNet Network using RSNetwork for ControlNet .....	17
<b>Example ControlNet Configuration</b> .....	<b>18</b>
<b>Appendix A : Troubleshooting</b> .....	<b>22</b>
• 890 ControlNet Option Status LEDs.....	22
<b>Appendix B : DSE/ControlNet Conversion Rules</b> .....	<b>23</b>
• LOGIC Type Connector .....	23
• INTEGER Type Connector.....	24
• VALUE Type Connector .....	25



# CONTROLNET COMMUNICATIONS OPTION

## Introduction

This manual describes the Parker SSD Drives' ControlNet™ Communications Option.

### Product Features

- Suitable for use with 890CD Common Bus Drive, 890SD Standalone Drive and 890PX Drive.
- Channel A and Channel B coaxial ports and NAP port (non-isolated)
- LEDs to indicate board and communications status
- Hardware/software selectable Node Address
- Up to 50 DSE input registers and 50 DSE output registers
- Up to 504 bytes of producer data and 504 bytes of consumer data.

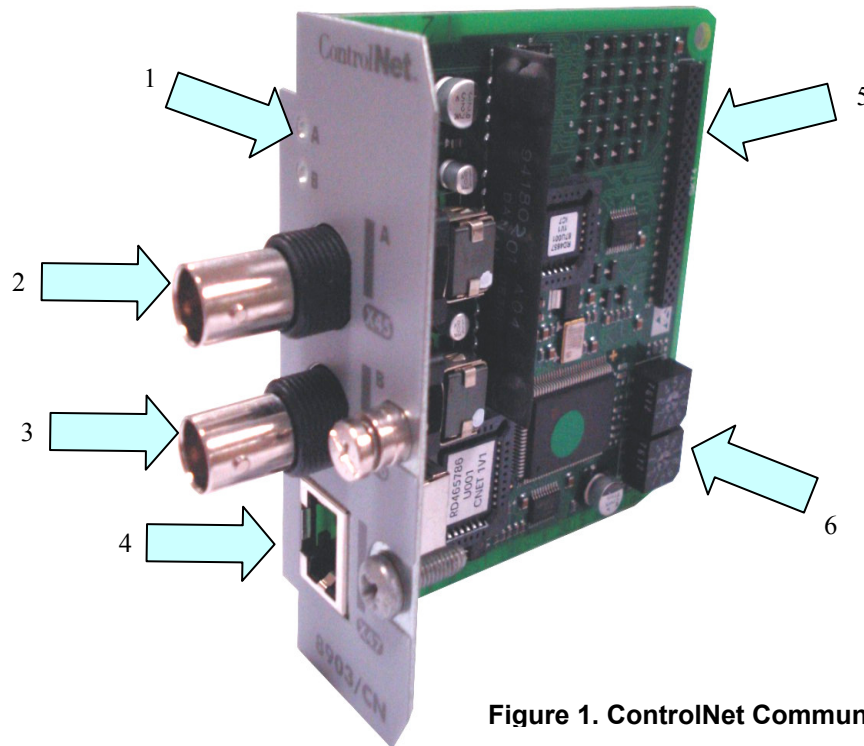


Figure 1. ControlNet Communications Option

1	LEDs for Channel A and Channel B	4	X47 - NAP port (Network Access Port)
2	X45 - Channel A	5	Connector to Control Board
3	X46 - Channel B	6	Node Address Switches

### Product Order Code

Not fitted order code: 8903-CN-00

Factory fitted order code: 890xx-xxxxxxxx-xxx-xxxCx

### Compatible Firmware

This option will work with the following versions of 890 firmware:

Version 1.4 onwards

Version 2.1 onwards

Version 3.1 onwards

Version 4.1 onwards

### Restrictions

Option must be fitted in Slot A.

# Installation

## WARNING!

Before installing, ensure that the drive wiring is electrically isolated and cannot be made "live" unintentionally by other personnel. Wait 5 minutes after disconnecting power before working on any part of the system or removing the covers from the drives.

### To Remove the Control Board

1. Remove the blanking plates, each secured by a single screw, that fits over the option slots (1).
2. Loosen the top and bottom screws from the handles of the Control Board (2).
3. Pull gently on the handles and slide the Control Board (2) out of the drive.

**Note:** Save the blanking plate and screw for future use. The drive should not be operated without either an option or a blanking plate fitted. When fitted, these maintain the drive's IP20 rating.

### Caution

This Option contains ESD (Electrostatic Discharge) sensitive parts. Observe static control precautions when handling, installing and servicing this Option.



Figure 2. 890 showing Control Board withdrawn with Options fitted

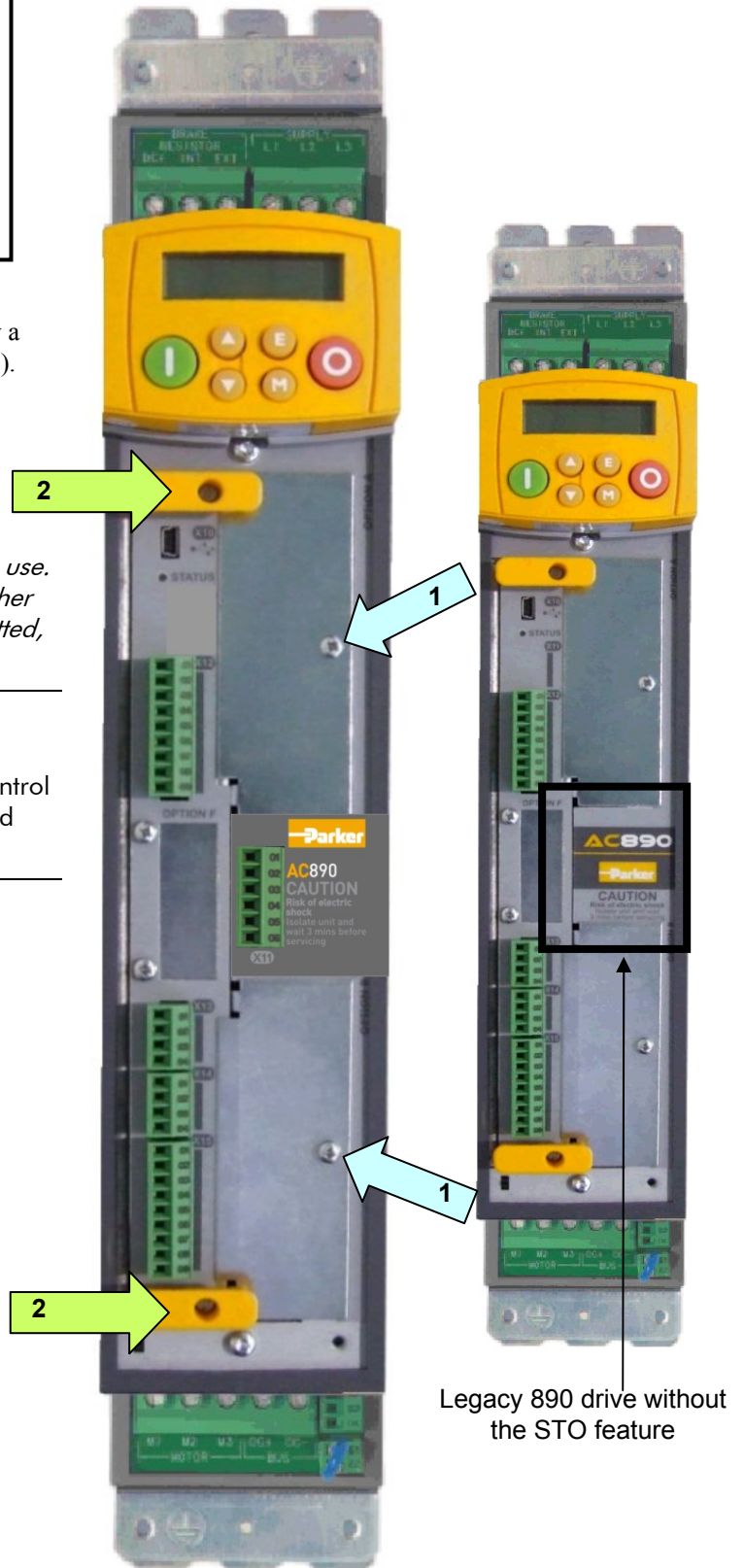


Figure 3. Front of 890 drive showing Control Board fitted



## Setting the Node Address

The Node Address is set via the Node Address Switches on the Option. Set a value of between 1 and 99 before installation.

Alternatively, setting both switches to zero allows the Node Address to be set using the DSE Configuration Tool via the CONTROL NET::NODE ADDRESS parameter.

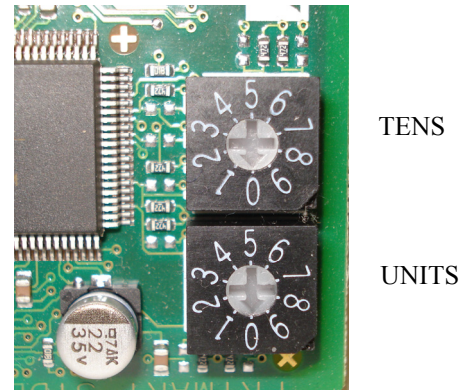


Figure 4. Node Address Switches

## Fitting the Option

The Option fits onto the Control Board.

1. Insert the connector into the Option as shown. The legs of the connector will protrude through into the connector on the other side of the Option.
2. Press the assembly into the **TOP** connector (adjacent to terminals X10, X11 and X12) on the Control Board. Ensure that the front panel of the Option overlaps the front of the Control Board.

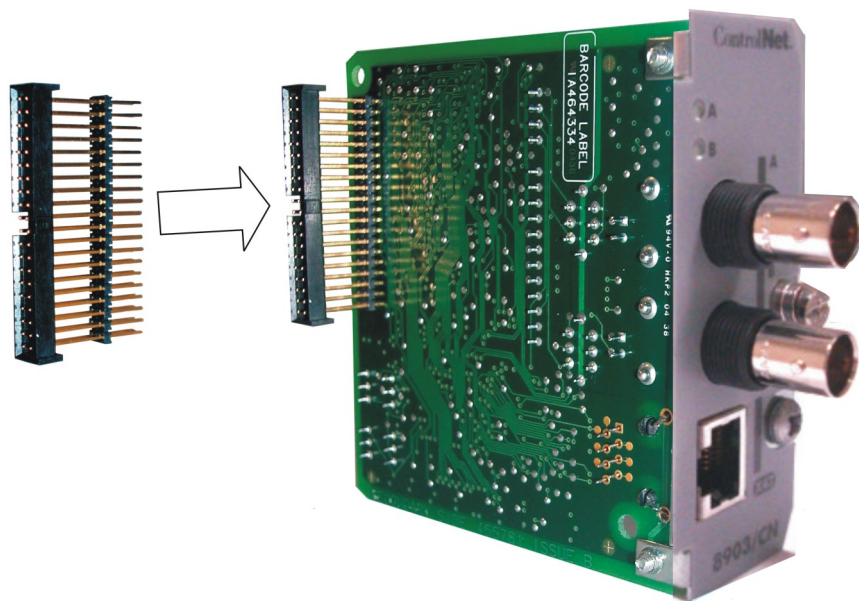


Figure 5. Fitting the connector to the Option

### Re-fitting the Control Board

1. Slide the board into the drive, engaging the edges of the boards into the slots. Push until the back edge of the Control Board PCB locates with the connectors in the drive.
2. Tighten in position using the top and bottom screws in the handles of the Control Board.
3. Screw the Option in position using the captive screw on the front of the Option.

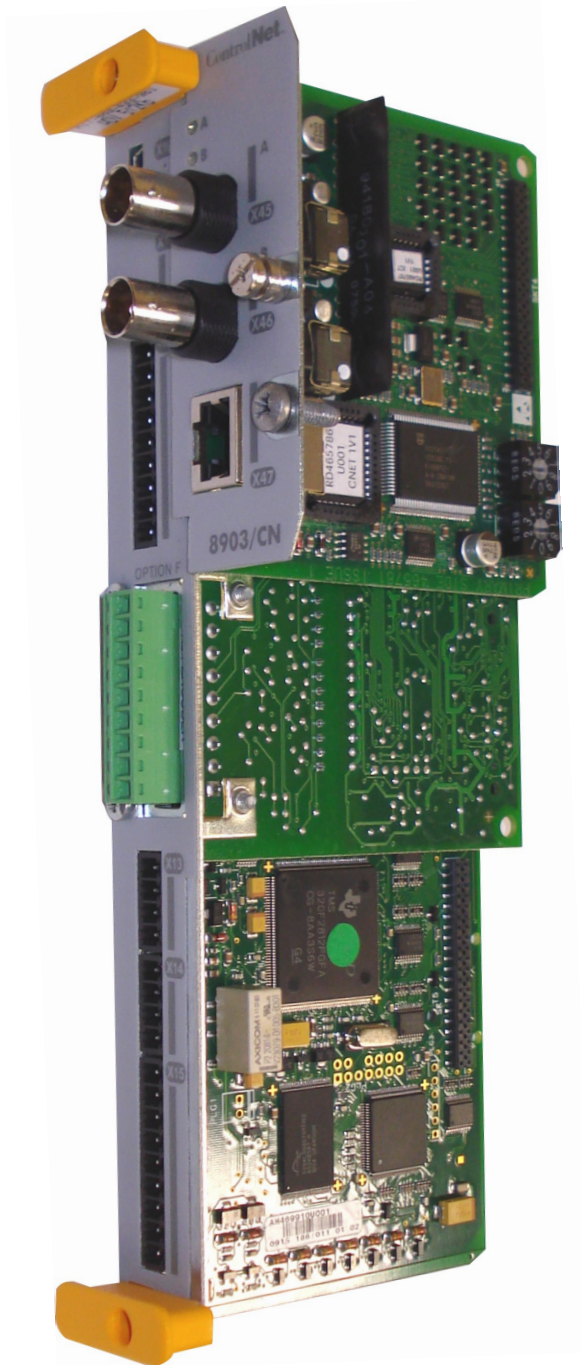


Figure 6. 890 Control Board with Option fitted

## Wiring the System

### Cable Specifications

The recommended trunk cable section is quad shield RG-6 type co-axial cable.

Use taps to connect to the Option. A 75Ω terminator must be installed on the end taps.

The network uses either Channel A, Channel B, or both. The diagram below shows a customer PLC ControlNet card connected to two Options (nodes) using Channels A and B. When both terminals are in use, the Options use the terminal offering the better quality signal.

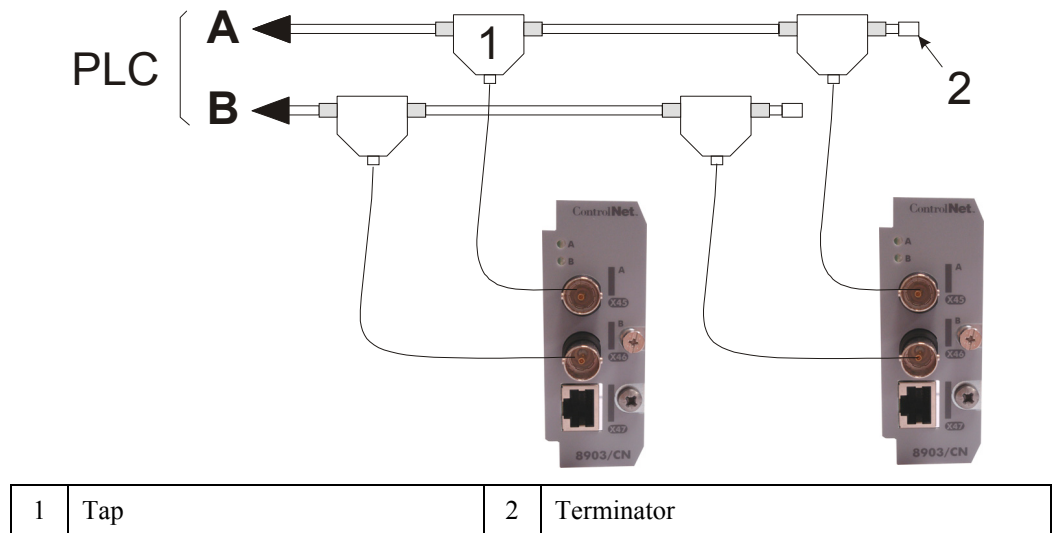


Figure 7. Simple Wiring Diagram

*Note:* For more information about cabling and terminators, refer to [www.ControlNet.org](http://www.ControlNet.org).

# 6

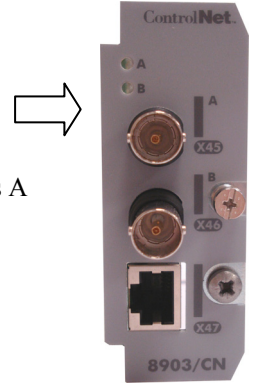
## Channel LED Indications

LEDs A & B indicate the state of the connected network.

A = Channel A, B = Channel B.

### Initial Power-on Checks

With the correct connections to the active PLC/SCADA supervisor, LEDs A and/or B will display as shown below.





Colour	LED Indication	Description
 GREEN	A or B : ON	NORMAL OPERATION OF CHANNEL
 GREEN	A or B : FLASH	NO NODE ADDRESS SET

Figure 8. Channel LED Indication

*Note:* Refer to Appendix A : Troubleshooting, page 22 for details of other indications.

## Drive Diagnostics

### The ControlNet MMI View

With the ControlNet Option correctly installed, the MMI will display a new set of parameters for CONTROLNET.

These are read-only parameters for diagnostics.

**MMI Menu Map**

1	SETUP
2	COMMUNICATIONS
3	CONTROLNET
	NODE ADDRESS
	ADDRESS METHOD
	NETWORK MODE
	CONNECTED
	CNET STATE
	SERIAL NUMBER
	FAULT
	DIAGNOSTIC

## Parameter Descriptions

<b>NODE ADDRESS</b>	<i>Read Only</i>	<i>Range: 1 to 99, and 0</i>
Displays the ControlNet node address of the drive the card is fitted to (displayed as <b>MAC Id</b> in DSE).		
<b>ADDRESS METHOD</b>	<i>Read Only</i>	<i>Range: Enumerated - see below</i>
Diagnostic showing the node address method. If either of the Node Address switches on the ControlNet Option is set to non-zero value at power-up, then the method is <b>HARDWARE</b> , otherwise it is <b>SOFTWARE</b> .		
<i>Enumerated Value : ADDRESS METHOD</i>		
0 : <b>HARDWARE</b>		
1 : <b>SOFTWARE</b>		
<b>NETWORK MODE</b>	<i>Read Only</i>	<i>Range: Enumerated - see below</i>
State of the ControlNet network connection.		
<i>Enumerated Value : NETWORK MODE</i>		
0 : <b>INVALID</b>		
1 : <b>POWER UP</b>		
2 : <b>CHECK FOR CABLE</b>		
3 : <b>WAITING TO ROGUE</b>		
4 : <b>CHK 4 MODERATOR</b>		
5 : <b>I'M ALIVE</b>		
6 : <b>ATTACHED</b>		
7 : <b>FORCED LISTEN</b>		
8 : <b>DUPLICATE NODE</b>		
<b>CONNECTED</b>	<i>Read Only</i>	<i>Range: FALSE / TRUE</i>
If <b>TRUE</b> indicates that a Class 1 connection is open.		
<b>CNET STATE</b>	<i>Read Only</i>	<i>Range: Enumerated - see below</i>
State of ControlNet application.		
<i>Enumerated Value : CNET STATE</i>		
0 : <b>NONE</b> board not attached		
1 : <b>FAULT</b>		
2 : <b>INITIALISE</b>		
3 : <b>VM CONFIGURE</b> waiting for a valid drive configuration		
4 : <b>WAIT 2 ATTACH</b>		
5 : <b>WAIT 2 CONNECT</b>		
6 : <b>RUNNING</b>		
<b>SERIAL NUMBER</b>	<i>Read Only</i>	<i>Range: decimal value</i>
Unique serial number of the Option.		
<b>FAULT</b>	<i>Read Only</i>	<i>Range: FALSE / TRUE</i>
If <b>TRUE</b> , indicates a ControlNet fault.		
<b>DIAGNOSTIC</b>	<i>Read Only</i>	<i>Range: 0x0000 to 0xFFFF</i>
ControlNet diagnostic value. "0000" = No Fault.		
Contact Parker SSD Drives technical support for assistance if any other value appears.		

## Configuring the ControlNet System

To configure the ControlNet system, complete the steps below. Our example is shown using a PLC running RSLogix 5000. For other systems, refer to the manufacturer's instructions.

### Step 1: Configuring the ControlNet Option using DSE

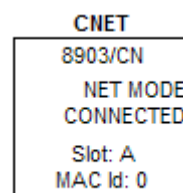
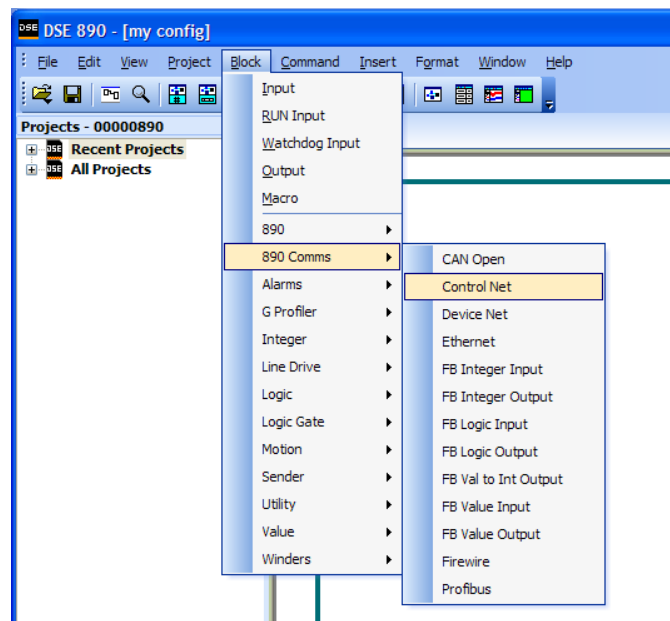
You can configure your ControlNet Option using DSE.

Follow the instructions below.

#### Step 1.1: Inserting a CONTROLNET Function Block

Display your configuration page. Click on the Block menu at the top of the screen.

1. Move the cursor down to select "890 Comms" and select "ControlNet".
2. Click to attach the block icon to the cursor. Move the icon to where you want on the screen. Click again to release the icon.



#### Step 1.2: Attaching Fieldbus Connectors

Seven fieldbus connector types are available:

FB Logic Input      FB Integer Input      FB Value Input  
 FB Logic Output      FB Integer Output      FB Value Output      FB Val to Int Output

**Input connector** : the data is sent from PLC → 890

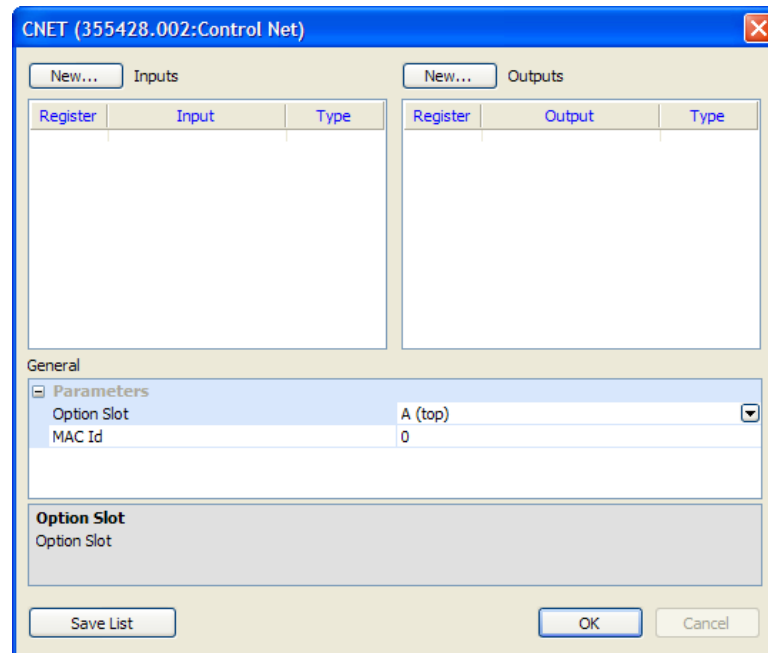
**Output connector** : the data is sent from 890 → PLC

The fieldbus connectors must be added before they will appear in the ControlNet function block.

*Note:* The function block and connectors can be renamed by using the right mouse button and selecting **Rename Block**.

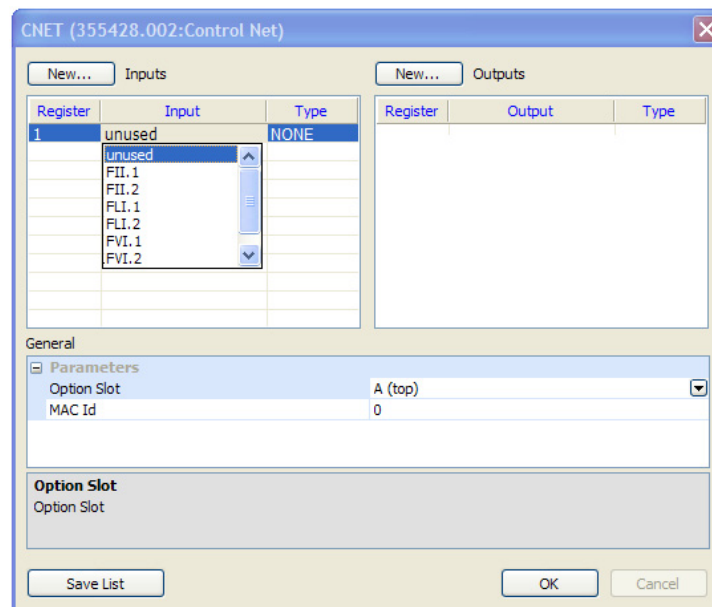
### Step 1.3: Configuring the Fieldbus Connectors

Double-click on the function block to display the dialog below. The fieldbus connectors (inputs and outputs) are assignable in the function block along with their data type to/from the PLC. The option slot and MAC Id can also be selected.

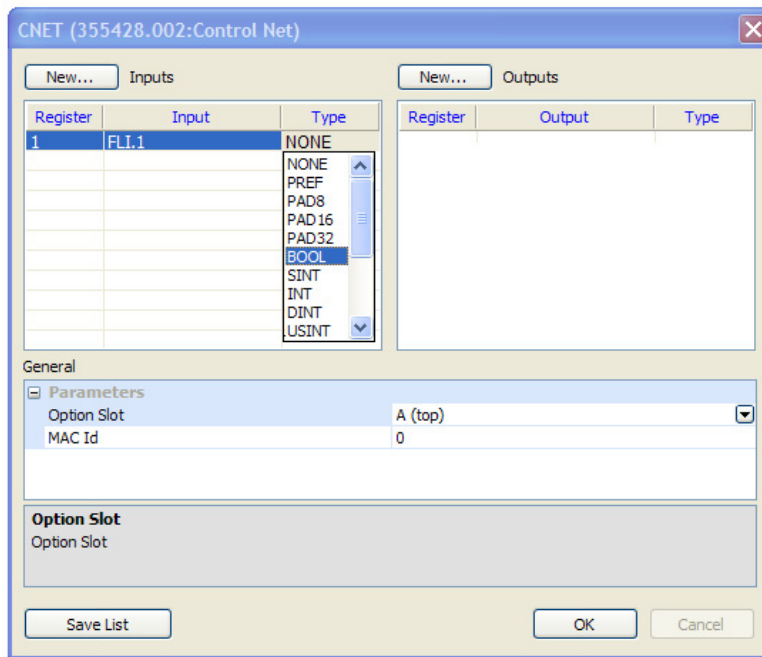


To configure the input and output connectors you have placed in the configuration:

1. Click on **New...** to add either an input or output register.
2. Under **Input** or **Output** select the drop-down menu and choose the required input/output connector.



- Under Type select the drop-down menu to choose the required PLC type of the register.



Right-click on a register to reveal a menu allowing you to insert, move or delete a register.

The three padding types PAD8, PAD16 and PAD32 can be used to align data in the PLC configuration. When using padding, the register should be set to "unused" so that no fieldbus connector is associated with it.

- Set up all the input/output registers in a similar way.

**Remember:**

- ◆ The order of the *inputs* in the DSE ControlNet configuration MUST match the order of the *outputs* from the PLC configuration.
- ◆ The order of the *outputs* in the DSE ControlNet configuration MUST match the order of the *inputs* to the PLC configuration.
- ◆ In *some* PLC configurations, the first four bytes of the input data are reserved.

- The MAC Id can be selected in the range 1 – 99. This can be confirmed by the NODE ADDRESS diagnostic on the MMI.

*Note:* The MAC Id set in DSE will only be used if the Node Address switches on the ControlNet Option is set to zero, otherwise the switch address on the Option will take precedence.

- "Option Slot" = A (top). The ControlNet Option can only be fitted in the OPTION A slot on the front of the drive. This is the default setting for "Option Slot".

**MMI Menu Map**

- 1 SETUP
- 2 COMMUNICATIONS
- 3 CONTROLNET
  - \_ NODE ADDRESS
  - \_ ADDRESS METHOD
  - \_ NETWORK MODE
  - \_ CONNECTED
  - \_ CNET STATE
  - \_ SERIAL NUMBER
  - \_ FAULT
  - \_ DIAGNOSTIC



## DSE Data Types

Data Type	Description	Range
LOGIC	Logic	False (F) and True (T)
INTEGER	32-bit signed integer	-2,147,483,648 to 2,147,483,647
VALUE	32-bit fixed point value	-32768.0 to 32767.9999

## ControlNet PLC Data Types

Data Type	Description	Range	Bytes Used
BOOL	8-bit Boolean	False (0x00) and True (0x01)	1
SINT	8-bit signed integer	-128 to 127	1
INT	16-bit signed integer	-32,768 to 32,767	2
DINT	32-bit signed integer	-2,147,438,648 to 2,147,483,647	4
USINT	8-bit unsigned integer	0 to 255	1
UINT	16-bit unsigned integer	0 to 65,535	2
UDINT	32-bit unsigned integer	0 to 4,294,967,295	4
BYTE	8-bit bit-string	0x00 to 0xFF	1
WORD	16-bit bit-string	0x0000 to 0xFFFF	2
DWORD	32-bit bit-string	0x0000 0000 to 0xFFFF FFFF	4
REAL	32-bit IEEE-754 floating-point value	1.19209290e-38 to 3.4028235e+38	4
PAD8	8-bit pad	-	1
PAD16	16-bit pad	-	2
PAD32	32-bit pad	-	4
PREF	Reserved	-	-

## Conversion of DSE Type < > ControlNet PLC Type

The DSE fieldbus connectors are each assigned a ControlNet PLC "Type" as described in "Step 1.3: Configuring the Fieldbus Connectors" on page 9.

The conversion between the DSE type and the PLC type is performed automatically.

Any PLC type can be assigned to a fieldbus connector, although some are not supported (refer to Appendix B : DSE/ControlNet Conversion Rules, page 23).

Some recommended PLC type assignments to fieldbus connectors are given in the table below:

Application Data Type	Fieldbus Connector	PLC Type	Bytes Allocated
Boolean	LOGIC	BOOL	1
32-bit signed integer	INTEGER	DINT	4
32-bit floating-point	VALUE	REAL	4
8-bit bit-string	INTEGER	BYTE	1
16-bit bit-string	INTEGER	WORD	2
32-bit bit-string	INTEGER	DWORD	4

## ControlNet Status Information

The ControlNet function block in DSE shows the selected MAC Id. When online, the *actual* MAC Id in use can be found by clicking the right mouse button over the “MAC Id:” text and selecting **Get**. This may be different to the MAC Id set in the function block configuration if the MAC Id has been set by the rotary switches on the Option.

The function block also provides two status outputs that can be wired to: NET MODE and CONNECTED.

For example, the CONNECTED output could be ANDed with the motor START causing the drive to stop if the PLC connection is lost.

**Note:** *A PLC connection is possible regardless of the PLC mode.*

The NET MODE output could be used with the LOGIC::LOOKUP function block to determine a particular state.

### NET MODE

Enumerated values:	Network Mode State
	0: INVALID
	1: POWER UP
	2: CHECK FOR CABLE
	3: WAITING TO ROGUE
	4: CHECK FOR MODERATOR
	5: I'M ALIVE
	6: ATTACHED
	7: FORCED LISTEN ONLY
	8: DUPLICATE NODE

### CONNECTED

Logic value:	True (T) indicates a Class 1 connection is open
--------------	---

## Step 2: Configuring the PLC using RSLogix 5000

This section contains an example for configuring a PLC using RSLogix 5000.

1. Start a new program and select the PLC processor and chassis type that is used in your project. Our example uses a 1756-L55 processor and 1756-A7 chassis. Remain Offline until you are ready to download the program.
2. In the I/O configuration, select the ControlNet scanner. Right click on the I/O Configuration folder to select a New Module. Select the type of scanner module that is used in the PLC.

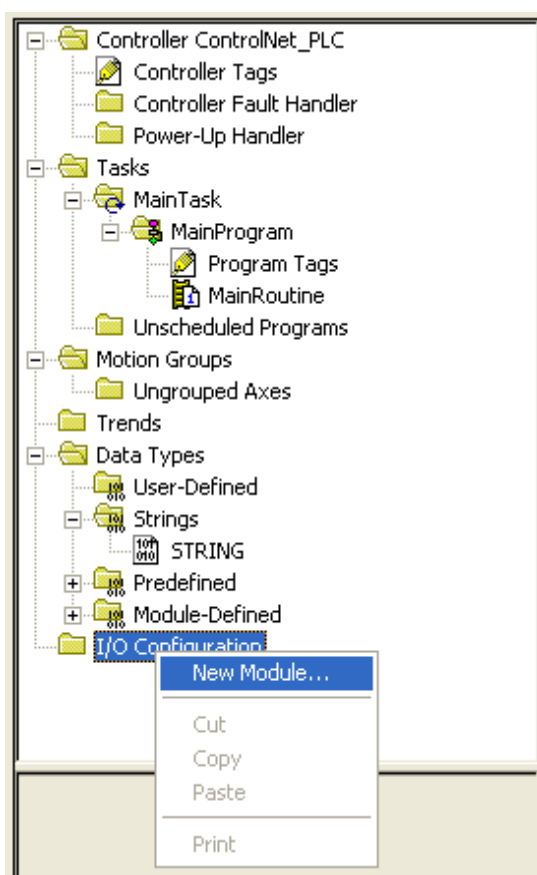


Figure 10. Selecting New Module

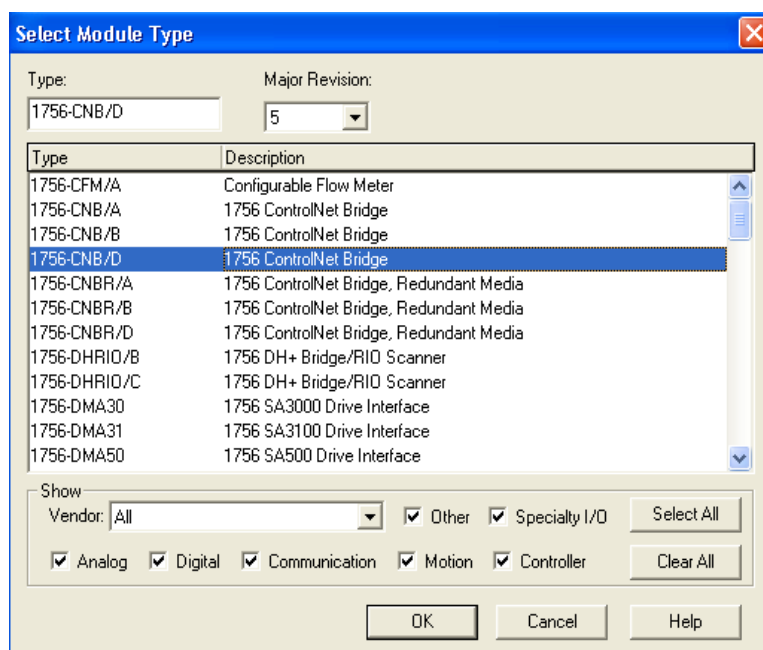


Figure 11. Select Scanner

3. Under the scanner card, add a new module. Right click on the scanner module and select New Module. Select Generic ControlNet module.
4. Module properties window allows you to name the module and to set the network address, data type and data size.
5. The input assembly instance is 2 and the output assembly instance is 1. Set the size as appropriate for your configuration. The configuration instance is 3 and the size is 0. The comms format is set for "DATA-SINT" to allow transfer of 8-bit bytes. Refer to Figure 14.
6. Click the NEXT button to enter the settings for the Requested Packet Interval. The default setting should be sufficient for most applications. When finished with the Requested Packet Interval screen, click the FINISH button to exit. Refer to Figure 15.

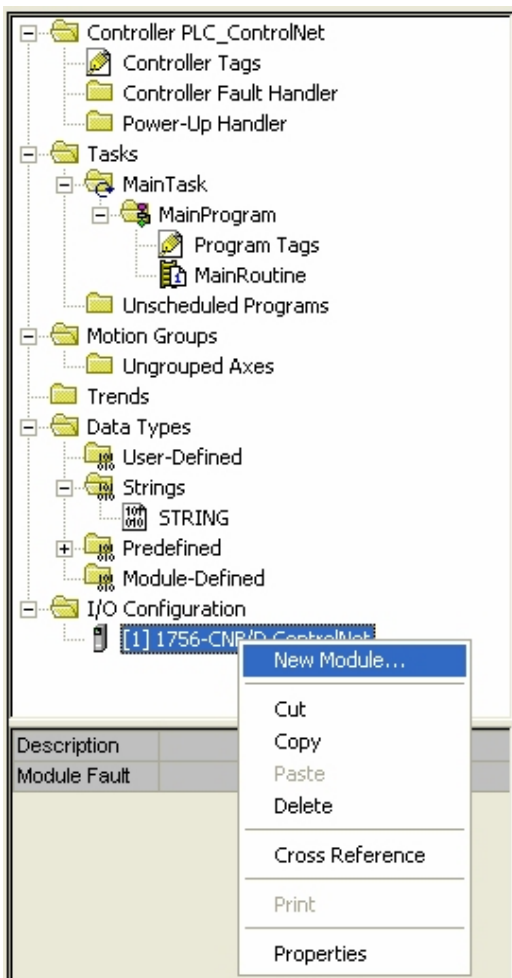


Figure 12. Select New Remote Module

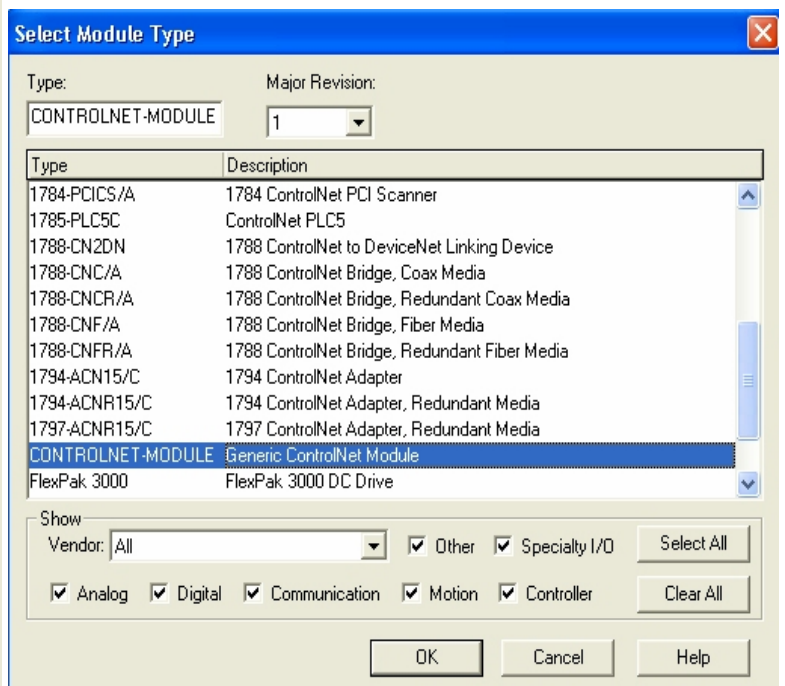


Figure 13 Select Remote Module Type

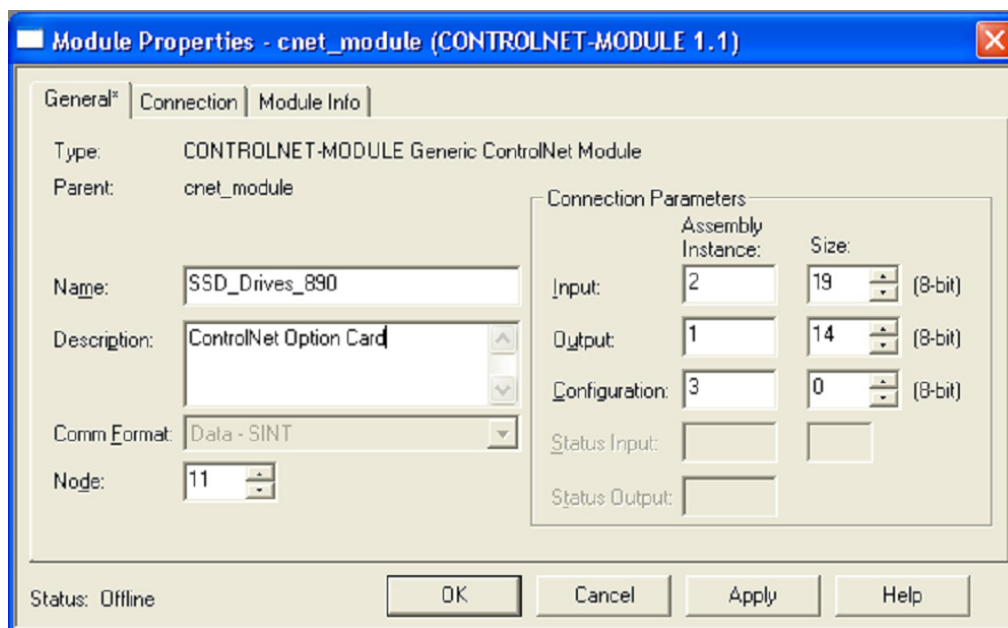


Figure 14. Defining the Module Name and Data Size

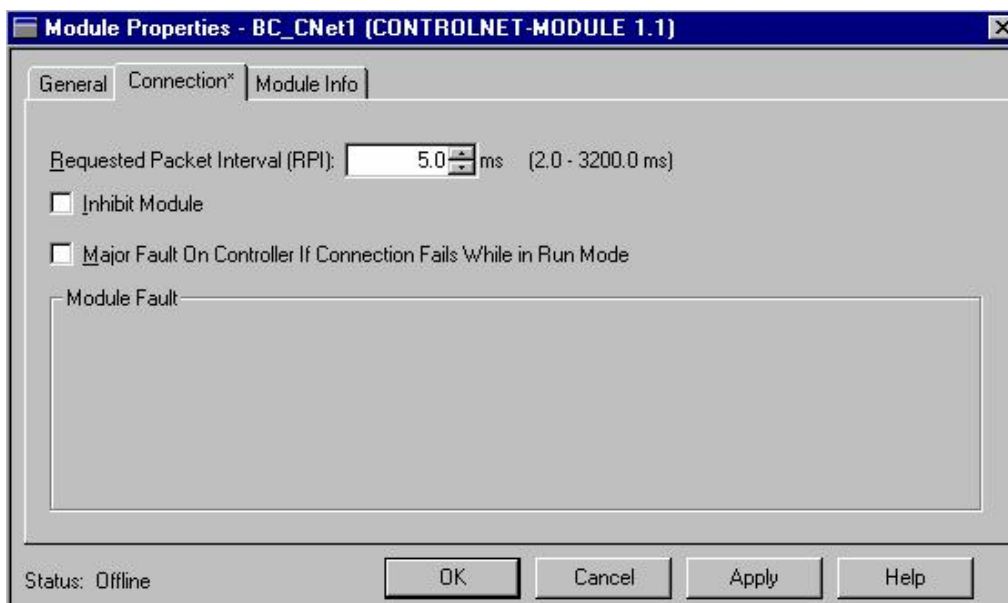
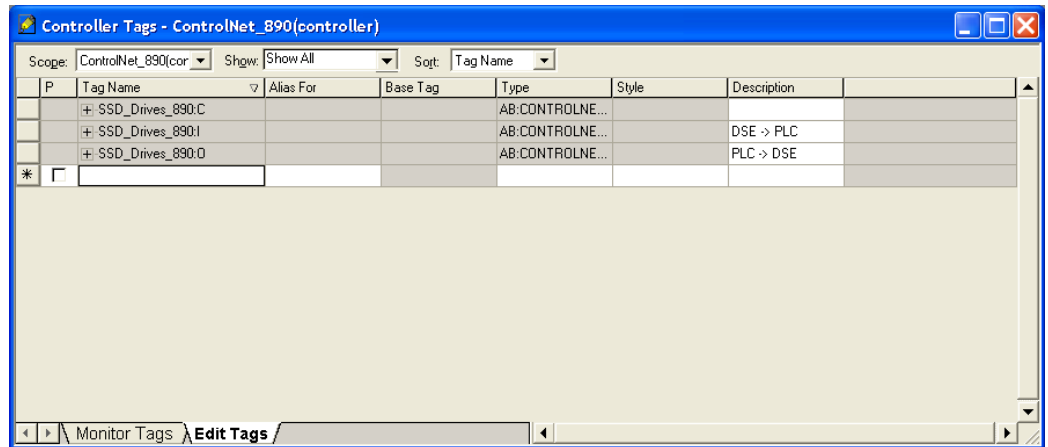


Figure 15. Packet Rate Selection



**Figure 16. Monitor Tags**

7. To monitor the tags created, double-click on Controller Tags. Refer to Figure 16.
8. The PLC automatically creates a configuration data block. The block always ends with a "C". This block is part of every configuration. "SSD\_Drives\_890:C" was created for this module. The type and size of the data is fixed, (Type: SINT, Size: 400 bytes). This configuration data block is created regardless of the configuration size.
9. The input and output data is configured as 8-bit bytes (SINT). This data needs to be reconstructed to the required format. This can be done by writing a PLC program using copy instructions to produce new tags for each parameter.
10. Once the PLC program is configured for the Option, the program can be downloaded to the PLC. The program needs to be loaded in the PLC prior to configuring the ControlNet interface using RSNetworx. This will ensure proper configuration for the ControlNet network.
11. The PLC should be put in Run Mode for the PLC program to run.
12. As the ControlNet scanner has not yet been configured to communicate an error "Connection not scheduled" will be reported. The connection is scheduled using RSNetworx for ControlNet.

## Step 3: Configuring the ControlNet Network using RSNetworx for ControlNet

The fastest way to configure the ControlNet network is by using RSNetworx for ControlNet, and with all the nodes connected to the network.

1. The EDS file is available on our web site, [www.SSDdrives.com](http://www.SSDdrives.com). Load the EDS file first. Using the Tools menu, select EDS Wizard. The EDS wizard will guide you through the process.

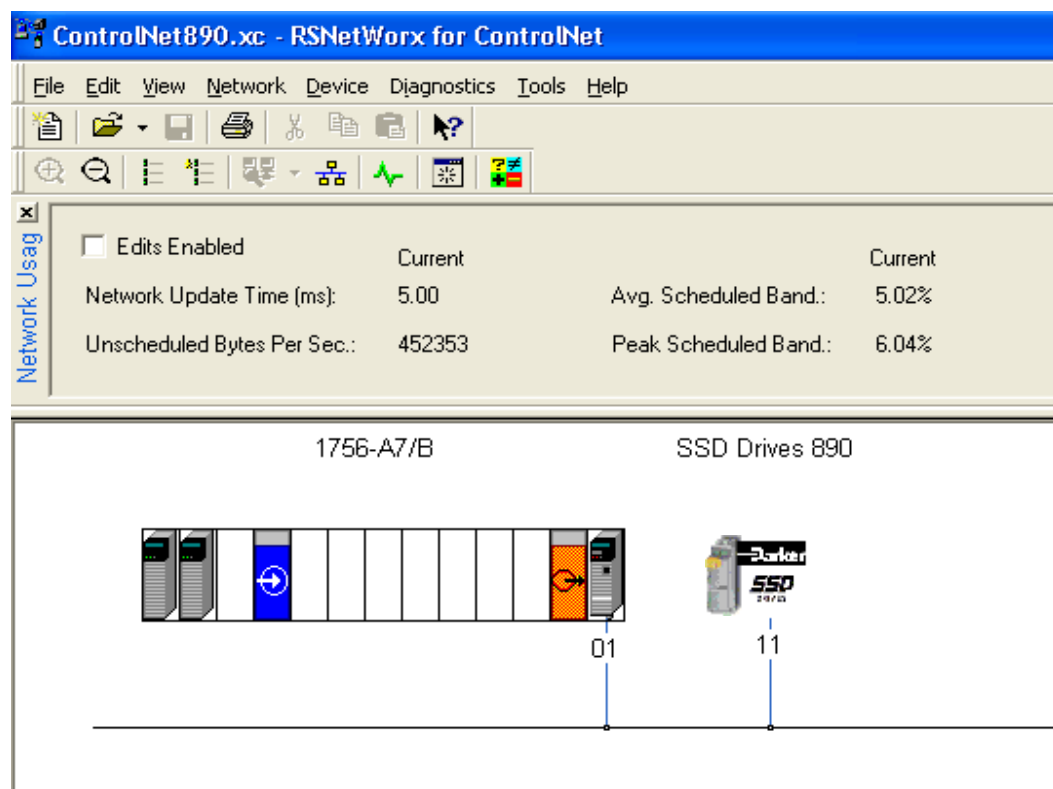


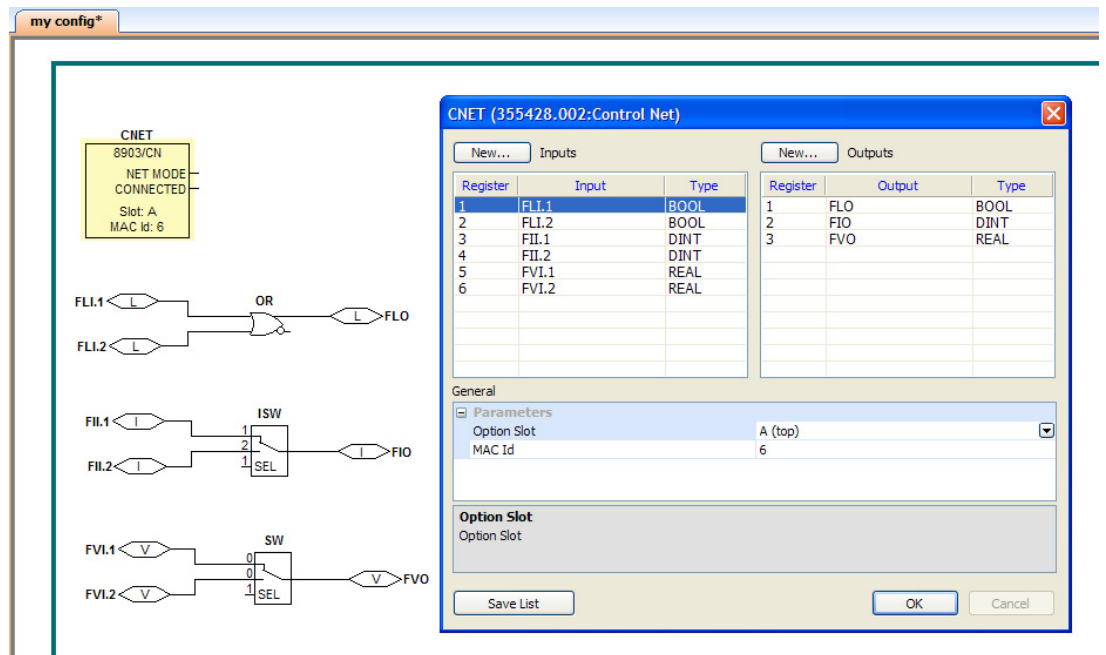
Figure 9 RSNetworx configuration screen

2. Refer to the instruction manual to set the scanner network address.
3. Ensure that all nodes on the network have a valid address set.
4. The RSNetworx software queries the network and reads the PLC configuration to generate the proper network configuration. This is done by selecting **NETWORK → ONLINE**. RSNetworx should see the nodes on the network.
5. RSNetworx is used to configure the network update time. Right click in the area outside of the modules and select Properties. Enter the update time and other network parameters as needed. The Network Update Time must be no less than 5ms and shorter than the PLC Requested Packet Interval. After configuring the rack and setting the network update time, you should have updates pending to the network.
6. To schedule connections and save the configuration to file, check the Edits Enabled box and select **FILE → SAVE**. After the network changes have been saved, the network and the I/O should become healthy.

# Example ControlNet Configuration

## DSE Configuration

This configuration is intended as an example only and is dependant on the PLC used.



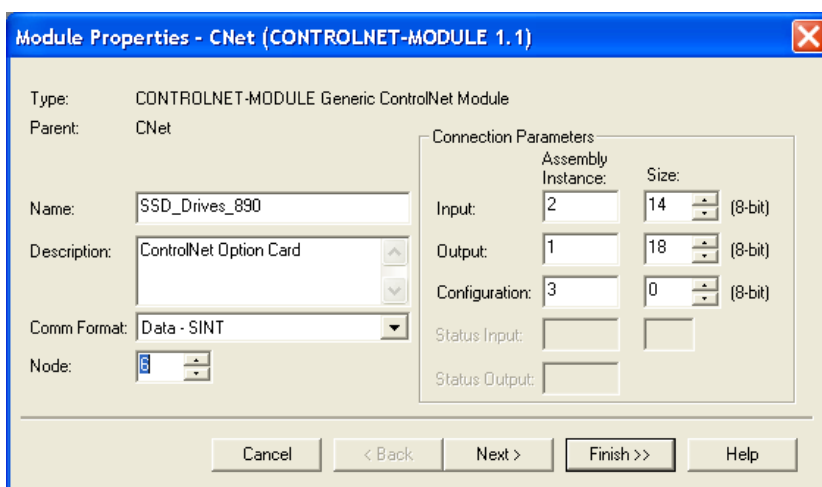
890 Inputs (PLC outputs)				
Register	Connector type	PLC type	PLC offset (bytes)	Bytes allocated
1	LOGIC	BOOL	0	1
2	LOGIC	BOOL	1	1
3	INTEGER	DINT	2	4
4	INTEGER	DINT	6	4
5	VALUE	REAL	10	4
6	VALUE	REAL	14	4
<b>TOTAL</b>				<b>18 bytes</b>

890 Outputs (PLC inputs)				
Register	Connector type	PLC type	PLC offset (bytes)	Bytes allocated
Reserved	-	-	0	4
1	LOGIC	BOOL	4	1
2	unused	PAD8	5	1
3	INTEGER	DINT	6	4
4	VALUE	REAL	10	4
<b>TOTAL</b>				<b>14 bytes</b>



## RSLogix 5000 Configuration

To set up the PLC using RSLogix5000, choose the Generic ControlNet Module. An example of setting up the Module Properties is shown below. We recommend to use the Comm Format as **Data – SINT** so that all data is treated as individual 8-bit bytes.

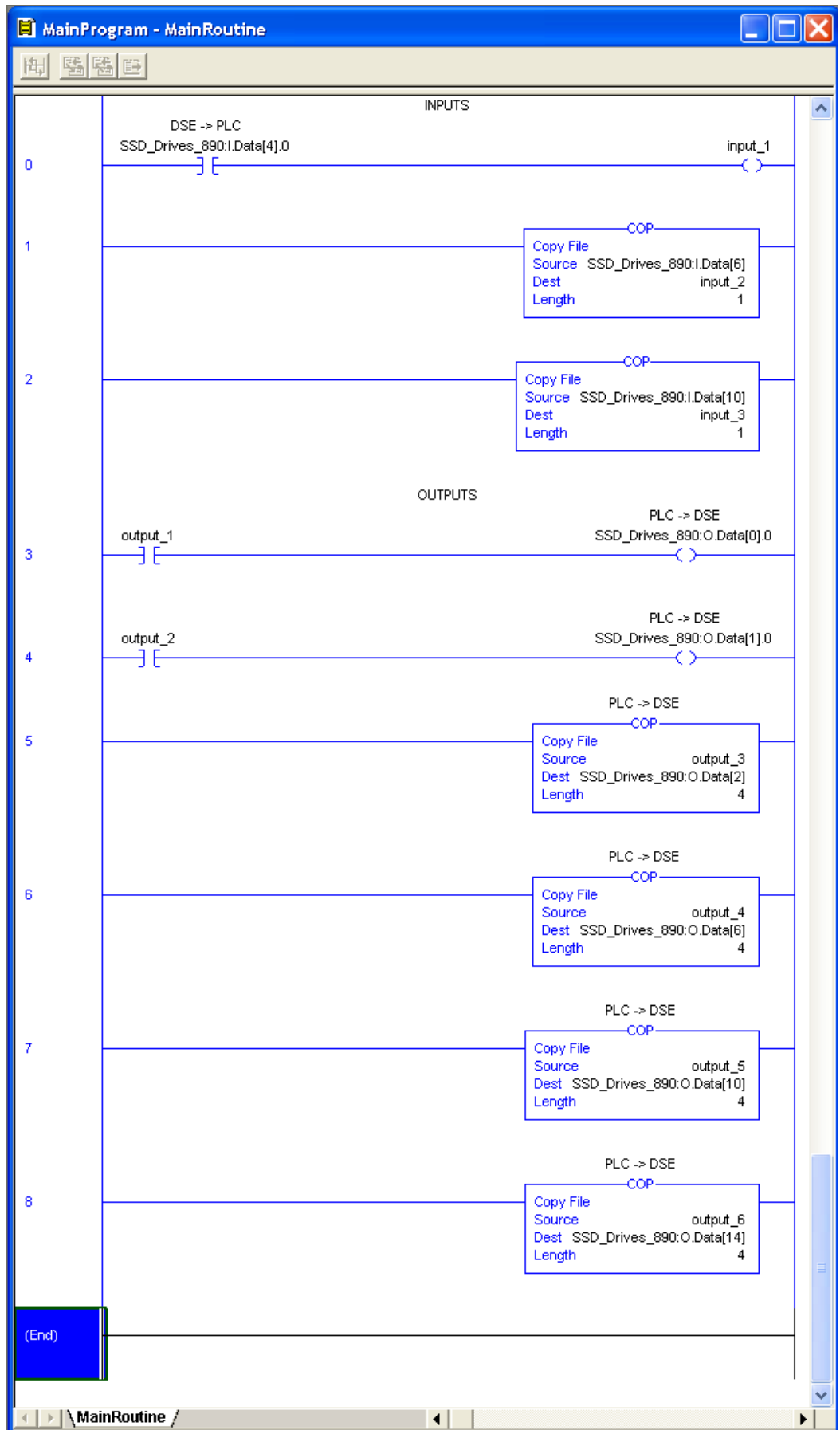


**Note:** Remember that 890 outputs are PLC inputs, and vice-versa.

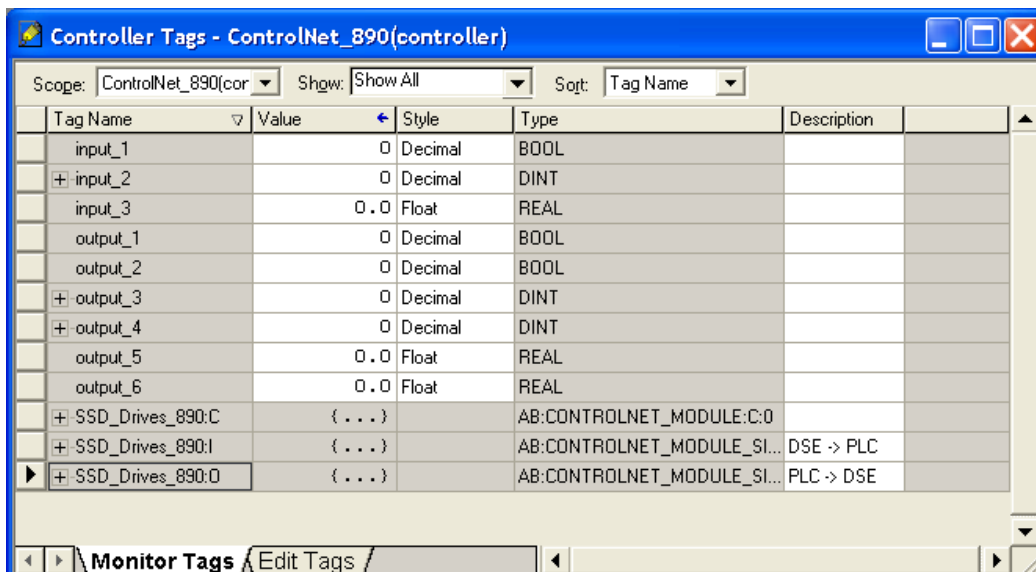
This will result in the Controller Tags shown below (the description comments have been added).

Tag Name	Value	Style	Type	Description
SSD_Drives_890.C	{ ... }		AB:CONTROLNET_...	
SSD_Drives_890.I	{ ... }		AB:CONTROLNET_...	DSE -> PLC
SSD_Drives_890.I.Data	{ ... }	Decimal	SINT[14]	
SSD_Drives_890.I.Data[0]	0	Decimal	SINT	reserved
SSD_Drives_890.I.Data[1]	0	Decimal	SINT	reserved
SSD_Drives_890.I.Data[2]	0	Decimal	SINT	reserved
SSD_Drives_890.I.Data[3]	0	Decimal	SINT	reserved
SSD_Drives_890.I.Data[4]	0	Decimal	SINT	FLO.1 (BOOL)
SSD_Drives_890.I.Data[5]	0	Decimal	SINT	pad
SSD_Drives_890.I.Data[6]	0	Decimal	SINT	FI0.1 (DINT) byte 1 (LSB)
SSD_Drives_890.I.Data[7]	0	Decimal	SINT	FI0.1 (DINT) byte 2
SSD_Drives_890.I.Data[8]	0	Decimal	SINT	FI0.1 (DINT) byte 3
SSD_Drives_890.I.Data[9]	0	Decimal	SINT	FI0.1 (DINT) byte 4 (MSB)
SSD_Drives_890.I.Data[10]	0	Decimal	SINT	FV0.1 (REAL) byte 1 (LSB)
SSD_Drives_890.I.Data[11]	0	Decimal	SINT	FV0.1 (REAL) byte 2
SSD_Drives_890.I.Data[12]	0	Decimal	SINT	FV0.1 (REAL) byte 3
SSD_Drives_890.I.Data[13]	0	Decimal	SINT	FV0.1 (REAL) byte 4 (MSB)
SSD_Drives_890.O	{ ... }		AB:CONTROLNET_...	PLC -> DSE
SSD_Drives_890.O.Data	{ ... }	Decimal	SINT[18]	
SSD_Drives_890.O.Data[0]	0	Decimal	SINT	FLI.1 (BOOL)
SSD_Drives_890.O.Data[1]	0	Decimal	SINT	FLI.2 (BOOL)
SSD_Drives_890.O.Data[2]	0	Decimal	SINT	FI1.1 (DINT) byte 1 (LSB)
SSD_Drives_890.O.Data[3]	0	Decimal	SINT	FI1.1 (DINT) byte 2
SSD_Drives_890.O.Data[4]	0	Decimal	SINT	FI1.1 (DINT) byte 3
SSD_Drives_890.O.Data[5]	0	Decimal	SINT	FI1.1 (DINT) byte 4 (MSB)
SSD_Drives_890.O.Data[6]	0	Decimal	SINT	FI1.2 (DINT) byte 1 (LSB)
SSD_Drives_890.O.Data[7]	0	Decimal	SINT	FI1.2 (DINT) byte 2
SSD_Drives_890.O.Data[8]	0	Decimal	SINT	FI1.2 (DINT) byte 3
SSD_Drives_890.O.Data[9]	0	Decimal	SINT	FI1.2 (DINT) byte 4 (MSB)
SSD_Drives_890.O.Data[10]	0	Decimal	SINT	FVI.1 (REAL) byte 1 (LSB)
SSD_Drives_890.O.Data[11]	0	Decimal	SINT	FVI.1 (REAL) byte 2
SSD_Drives_890.O.Data[12]	0	Decimal	SINT	FVI.1 (REAL) byte 3
SSD_Drives_890.O.Data[13]	0	Decimal	SINT	FVI.1 (REAL) byte 4 (MSB)
SSD_Drives_890.O.Data[14]	0	Decimal	SINT	FVI.2 (REAL) byte 1 (LSB)
SSD_Drives_890.O.Data[15]	0	Decimal	SINT	FVI.2 (REAL) byte 2
SSD_Drives_890.O.Data[16]	0	Decimal	SINT	FVI.2 (REAL) byte 3
SSD_Drives_890.O.Data[17]	0	Decimal	SINT	FVI.2 (REAL) byte 4 (MSB)

To reconstruct the data from individual bytes new tags can be created. A ladder program, etc. can be used to copy the data to/from the new tags. An example is shown below.



In the example below, the following new tags have been created:












New Tag Name	New Tag Type	Copied From	Representing DSE Connector
Input_1	BOOL 1-bit	I.Data[4] bit 0	FLO.1
Input_2	DINT 32-bit	I.Data[6..9]	FIO.1
Input_3	REAL 32-bit	I.Data[10..13]	FVO.1

New Tag Name	New Tag Type	Copied To	Representing DSE Connector
Output_1	BOOL 1-bit	O.Data[0] bit 0	FLI.1
Output_2	BOOL 1-bit	O.Data[1] bit 0	FLI.2
Output_3	DINT 32-bit	O.Data[2..5]	FII.1
Output_4	DINT 32-bit	O.Data[6..9]	FII.2
Output_5	REAL 32-bit	O.Data[10..13]	FVI.1
Output_6	REAL 32-bit	O.Data[14..17]	FVI.2

## Appendix A : Troubleshooting

### 890 ControlNet Option Status LEDs

**Table 1**

Colour	LED Indication	Description
 OFF	A & B : OFF	Drive is not initialised/fault
 RED	A & B : ON	Faulted Option - restart or repair
 RED/GREEN alternating	A & B : FLASH	Self-test routine
 RED/OFF	A & B : FLASH	Duplicate node address
 OFF	A or B : OFF	Disabled channel (depends on network configuration)
 GREEN	A or B : ON	NORMAL OPERATION OF CHANNEL
 GREEN/OFF	A or B : FLASH	Temporary error (drive will self- correct) or drive is not configured to go online (node address not set)
 RED/OFF	A or B : FLASH	Cabling fault, or no other drives (nodes) on the network
 RED/GREEN alternating	A or B : FLASH	Incorrect network configuration

**Table 2**

NETWORK STATES		
0	INVALID	Wrong Option Card / not fitted
1	POWER UP	Option Card not Commissioned
2	CHECK FOR CABLE	Inspect Cable for Continuity
3	WAIT TO ROGUE	Check if parameters match the network
4	CHECK FOR MODERATOR	Waiting for network parameters
5	IM ALIVE	Send "I'M ALIVE" message
6	ATTACHED	Communicating with Master
7	FORCED LISTEN ONLY	Receive Only Mode
8	DUP NODE	Duplicate Node Address

## Appendix B : DSE/ControlNet Conversion Rules

The rules governing the conversion between DSE data types and ControlNet PLC data types are given below. Note carefully that some conversions will result in rounding, limiting and truncation of the original value. Certain conversions are not supported, however if used then data space will be allocated in the buffer, but a data value of zero will be returned.

### LOGIC Type Connector

	Data from PLC	Data to DSE
<b>From BOOL to LOGIC</b>	False True	False True
<b>From REAL to LOGIC</b>	Not Supported Returns False	
<b>From SINT to LOGIC</b>	Zero Non-zero	False True
<b>From INT to LOGIC</b>	Zero Non-zero	False True
<b>From DINT to LOGIC</b>	Zero Non-zero	False True
<b>From USINT to LOGIC</b>	Zero Non-zero	False True
<b>From UINT to LOGIC</b>	Zero Non-zero	False True
<b>From UDINT to LOGIC</b>	Zero Non-zero	False True
<b>From BYTE to LOGIC</b>	Zero Non-zero	False True
<b>From WORD to LOGIC</b>	Zero Non-zero	False True
<b>From DWORD to LOGIC</b>	Zero Non-zero	False True

	Data from DSE	Data to PLC
<b>From LOGIC to BOOL</b>	False True	False True
<b>From LOGIC to REAL</b>	Not Supported Returns 0.0	
<b>From LOGIC to SINT</b>	False True	0 1
<b>From LOGIC to INT</b>	False True	0 1
<b>From LOGIC to DINT</b>	False True	0 1
<b>From LOGIC to USINT</b>	False True	0 1
<b>From LOGIC to UINT</b>	False True	0 1
<b>From LOGIC to UDINT</b>	False True	0 1
<b>From LOGIC to BYTE</b>	False True	0x00 0x01
<b>From LOGIC to WORD</b>	False True	0x0000 0x0001
<b>From LOGIC to DWORD</b>	False True	0x0000 0000 0x0000 0001

**INTEGER Type Connector**


	<b>Data from PLC</b>	<b>Data to DSE</b>
<b>From BOOL to INTEGER</b>	False True	0x0000 0000 0x0000 0001
<b>From REAL to INTEGER</b>	32-bit IEEE floating-point	-2,147,483,648 to 2,147,483,547 Fractional part rounded
<b>From SINT to INTEGER</b>	-128 to 127	-128 to 127
<b>From INT to INTEGER</b>	-32,768 to 32,767	-32,768 to 32,767
<b>From DINT to INTEGER</b>	-2,147,483,648 to 2,147,483,547	-2,147,483,648 to 2,147,483,547
<b>From USINT to INTEGER</b>	0 to 255	0 to 255
<b>From UINT to INTEGER</b>	0 to 65,535	0 to 65,535
<b>From UDINT to INTEGER</b>	0 to 4,294,967,295	0 to 2,147,483,647 limits apply
<b>From BYTE to INTEGER</b>	0x00 to 0xFF	0x0000 0000 to 0x0000 00FF
<b>From WORD to INTEGER</b>	0x0000 to 0xFFFF	0x0000 0000 to 0x0000 FFFF
<b>From DWORD to INTEGER</b>	0x0000 0000 to 0xFFFF FFFF	0x0000 0000 to 0xFFFF FFFF

	<b>Data from DSE</b>	<b>Data to PLC</b>
<b>From INTEGER to BOOL</b>	Zero Non-zero	False True
<b>From INTEGER to REAL</b>	-2,147,483,648 to 2,147,483,647	32-bit IEEE floating- point
<b>From INTEGER to SINT</b>	-2,147,483,648 to 2,147,483,647	-128 to 127 limits apply
<b>From INTEGER to INT</b>	-2,147,483,648 to 2,147,483,647	-32768 to 32767 limits apply
<b>From INTEGER to DINT</b>	-2,147,483,648 to 2,147,483,647	-2,147,483,648 to 2,147,483,647
<b>From INTEGER to USINT</b>	-2,147,483,648 to 2,147,483,647	0 to 255 limits apply
<b>From INTEGER to UINT</b>	-2,147,483,648 to 2,147,483,647	0 to 65,535 limits apply
<b>From INTEGER to UDINT</b>	-2,147,483,648 to 2,147,483,647	0 to 2,147,483,647 limits apply
<b>From INTEGER to BYTE</b>	0x0000 0000 to 0xFFFF FFFF	0x00 to 0xFF truncation applies
<b>From INTEGER to WORD</b>	0x0000 0000 to 0xFFFF FFFF	0x0000 to 0xFFFF truncation applies
<b>From INTEGER to DWORD</b>	0x0000 0000 to 0xFFFF FFFF	0x0000 0000 to 0xFFFF FFFF

**VALUE Type Connector**

	Data from PLC	Data to DSE
<b>From BOOL to VALUE</b>	Not Supported Returns 0.0	
<b>From REAL to VALUE</b>	32-bit IEEE floating-point	-32,768.0 to 32,767.9999 limits apply
<b>From SINT to VALUE</b>	-128 to 127	-128.0 to 127.0
<b>From INT to VALUE</b>	-32,768 to 32,767	-32,768.0 to 32,767.0
<b>From DINT to VALUE</b>	-2,147,483,648 to 2,147,483,547	-32,768.0 to 32,767.0 limits apply
<b>From USINT to VALUE</b>	0 to 255	0.0 to 255.0
<b>From UINT to VALUE</b>	0 to 65,535	0.0 to 32,767.0 limits apply
<b>From UDINT to VALUE</b>	0 to 4,294,967,295	0.0 to 32,767.0 limits apply
<b>From BYTE to VALUE</b>	Not Supported Returns 0.0	
<b>From WORD to VALUE</b>	Not Supported Returns 0.0	
<b>From DWORD to VALUE</b>	Not Supported Returns 0.0	

	Data from DSE	Data to PLC
<b>From VALUE to BOOL</b>	Not Supported Returns false	
<b>From VALUE to REAL</b>	-32,768.0 to 32,767.9999	32-bit IEEE floating-point
<b>From VALUE to SINT</b>	-32,768.0 to 32,767.9999	-128 to 127 limits apply/ rounding applies
<b>From VALUE to INT</b>	-32,768.0 to 32,767.9999	-32,768 to 32,767 limits apply/ rounding applies
<b>From VALUE to DINT</b>	-32,768.0 to 32,767.9999	-32768 to 32,767 limits apply/ rounding applies
<b>From VALUE to USINT</b>	-32,768.0 to 32,767.9999	0 to 255 limits apply/ rounding applies
<b>From VALUE to UINT</b>	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies
<b>From VALUE to UDINT</b>	-32,768.0 to 32,767.9999	0 to 32767 limits apply/ rounding applies
<b>From VALUE to BYTE</b>	Not Supported Returns 0x00	
<b>From VALUE to WORD</b>	Not Supported Returns 0x0000	
<b>From VALUE to DWORD</b>	Not Supported Returns 0x0000 0000	

ISS.	MODIFICATION	ECN No.	DATE	DRAWN	CHK'D
1	Initial Issue (HA469263U001)	17320	29/04/05	CM	MF
2	Various small amendments.	17320	03/06/05	CM	MF
3	Company name change	19591	31/07/07	CM	MF
4	Updated Warranty information and conditions of sale. Photos and screenshots updated. Standardised Safety pages over 3 pages. Product Code – added new coding. Page 2 – Replaced photos to show new Safe Torque Off feature. Replaced TechCard with Option and Replaced DSE 890 with DSE. Page 8 Replaced six with seven and added FB Val to Int Output. Other minor corrections and amendments.	(20358)			
		20814	12 Feb 10	FEP	MF
FIRST USED ON		MODIFICATION RECORD			
		8903/CN ControlNet Communications Interface			
		DRAWING NUMBER			SHT. 1
		ZZ469263C001			OF 1