User Guide

SE77-DeviceNet

Commander SE

Part Number: 0452-0053
Issue Number: 2

www.controltechniques.com

Safety Information

The option card and its associated drive are intended as components for professional incorporation into complete equipment or systems. If installed incorrectly the drive may present a safety hazard. The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control mechanical equipment that can cause injury.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this Installation Guide carefully.

Careful consideration must be given to the functions of the drive and option card which might result in a hazard, either through their intended functions, e.g. auto-start, or through incorrect operation due to a fault or trip, e.g. stop/start, forward/reverse, maximum speed, loss of a communications link.

In any application where a malfunction of the drive or option card could lead to damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk. To ensure mechanical safety, additional safety devices such as electro-mechanical interlocks may be required. The Drive must not be used in a safety-critical application without additional high-integrity protection against hazards arising from a malfunction.

General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional operating parameters of the equipment or from mismatching the Drive with the motor.

The contents of this User Guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the User Guide, without notice.

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Firmware: V1.01.00

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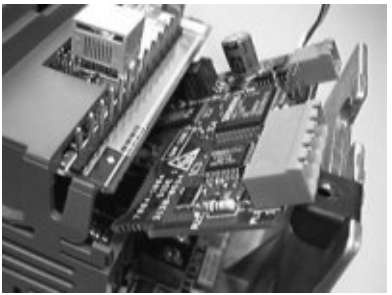
1 Mechanical Installation

Care should be taken when handling the SE77-DeviceNet card, as it may be damaged by electrostatic discharge. To prevent inadvertent damage, touch an earthed bare metal surface to discharge yourself before removing the interface card from the anti-static bag.

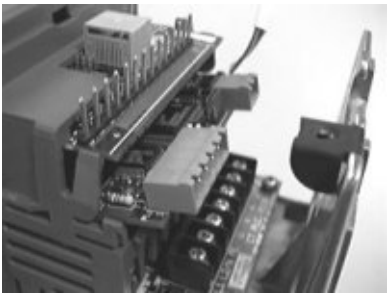
NOTE The Commander SE must be disconnected from the mains supply before installing or removing an option module.

1.1 Commander SE Size 1

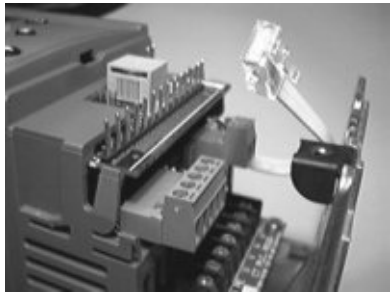
1. Remove the two terminal blocks from the option card. Slide the SE77-DeviceNet card diagonally into the Commander SE.



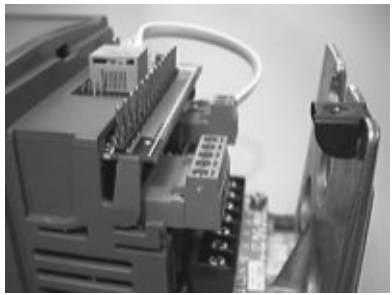
2. Ensure that the SE77-DeviceNet card is aligned between the runners moulded into the plastic casing, and slide into the Commander SE.



3. Push the SE77-DeviceNet card firmly into the Commander SE until the plastic spring clips latch it securely in place.



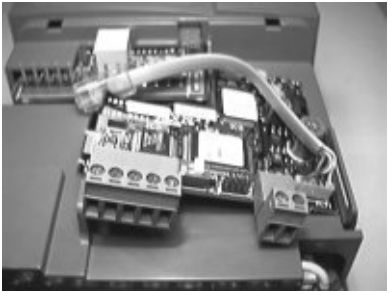
4. Plug the flylead into the RJ45 socket on the Commander SE.



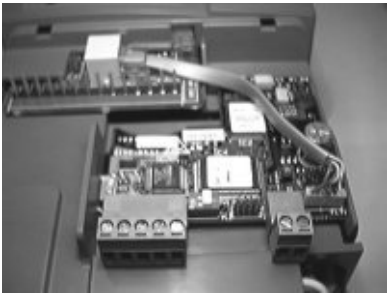
1.2 Commander SE Sizes 2, 3, 4 and 5

The following instructions apply to Commander SE drives in the size 2, 3, 4 and 5 frames. (1.1kW and above.)

1. Locate the right hand side of the SE77-DeviceNet card under the flange.



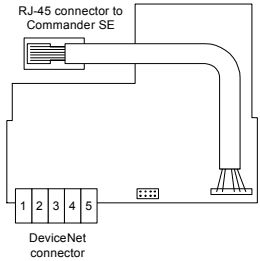
2. Push the left hand side of the SE77-DeviceNet card down to clip into place. Connect the fly-lead to the RJ-45 connector on the Commander SE.



2 Electrical Installation

2.1 DeviceNet Connector

The SE77-DeviceNet card has a single 5-way screw terminal block connector for the DeviceNet data connections.



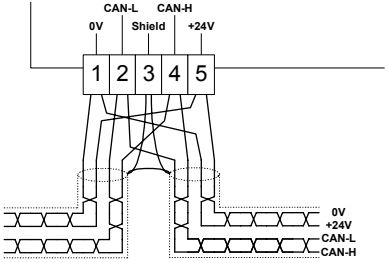
The connections for the DeviceNet connector are given in the table below

Table 2.1 SE77-DeviceNet Connector

Terminal	Function	Description
1	0V	0V DeviceNet external supply
2	CAN-L	Negative data line
3	Screen	Cable braided screen connection
4	CAN-H	Positive data line
5	+24V	+24V DeviceNet external supply

2.2 DeviceNet Data Connections

To connect the Commander SE to the DeviceNet network, make the connections as shown in the diagram below. The length of the "pigtail" screen connection should be kept as short as possible.



2.3 DeviceNet Cable

DeviceNet cable has 2 twisted pairs plus overall screening. The data wires are white and blue, and the network power supply wires are red and black.

Table 2.2 DeviceNet Cable Colour Codes

Cable	Data Signal	Terminal	Description
Black	0V	1	0V external power supply
Blue	CAN-L	2	Negative data line
Braided Shield	Screen	3	Cable screen
White	CAN-H	4	Positive data line
Red	+24V	5	+24V external power supply

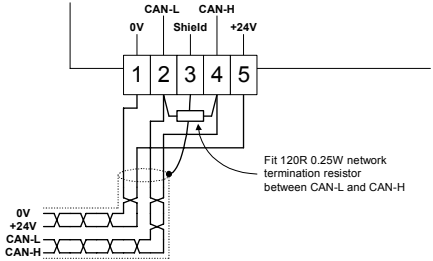
DeviceNet networks run at high data rates, and require cable specifically designed to carry high frequency signals. Low quality cable will attenuate the signals, and may render the signal unreadable for the other nodes on the network. Cable specifications and a list of approved manufacturers of cable for use on DeviceNet networks is available on the Open DeviceNet Vendors Association web site at www.odva.org.

NOTE Control Techniques can only guarantee correct and reliable operation of its DeviceNet interfaces if all other equipment installed (including the network cable) has been approved by the ODVA.

2.4 DeviceNet Network Termination

It is very important in high-speed communications networks that the network communications cable is fitted with the specified termination resistor network at each end of the cable. This prevents signals from being reflected back down the cable and causing interference.

Termination resistors should be fitted as shown in the diagram below.



NOTE Failure to terminate a network correctly can seriously affect the operation of the network. If termination is not fitted, the noise immunity of the network is greatly reduced, while if too many nodes have their internal termination resistor networks enabled, the network will be over-loaded and may not operate at all.

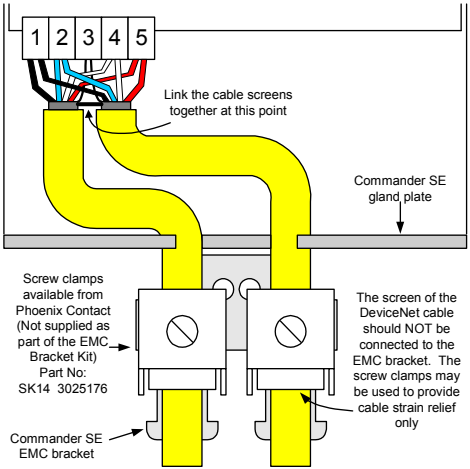
2.5 DeviceNet Cable Screen Connections

An EMC Bracket Kit is available for each size of Commander SE. This plate can be attached to the Commander SE gland plate, and provides a suitable point to clamp the motor cable screen to earth.

Table 2.3 Commander SE EMC Bracket Kits

Commander SE	Kit Part No	Kit Name
Size 1	9500-0014	SE11
Size 2	9500-0016	SE12
Size 3	9500-0017	SE13
Size 4	9500-0018	SE14
Size 5	9500-0041	SE15

The SE77-DeviceNet card should be wired with the cable shields isolated from earth at each Commander SE. The cable shields should be linked together at the point where they emerge from the cable, and formed into a short pigtail to be connected to pin 3 on the DeviceNet connector.



NOTE The DeviceNet cable shield should be grounded at one place ONLY in the network. This is to prevent it from becoming live in the unlikely event of a fault in one of the interfaces.

For further details, refer to DN-6.7.2, “DeviceNet Cable System: Planning and Installation Manual”, available from the Allen Bradley web site at www.ab.com.

2.6 DeviceNet Power Supply Requirements

A comprehensive guide to wiring and sizing a power supply for a DeviceNet network is available from the Allen Bradley web site at www.ab.com. DN-6.7.2 “DeviceNet Cable System: Planning and Installation Manual” provides all necessary details and guidelines to specifying and installing a suitable power supply for a DeviceNet network.

The SE77-DeviceNet card is powered by the DeviceNet network power supply. The typical operating currents drawn from the DeviceNet power supply are shown in the table below. A factor of 2 should be allowed for in-rush current during power-up.

Table 2.4 SE77-DeviceNet Power Consumption

DeviceNet Supply Voltage	Typical Current
19.2V (24V -20%)	45mA
21.6V (24V -10%)	40mA

Table 2.4 SE77-DeviceNet Power Consumption

DeviceNet Supply Voltage	Typical Current
24V nominal	38mA
26.4V (24V +10%)	35mA
30V (24V+20%)	35mA

2.7 Maximum Network Length

The maximum number of nodes that can be connected to a single DeviceNet network segment is 64 nodes. The maximum length of network cable for a DeviceNet network is specified by the Open DeviceNet Vendors Association, and depends on the data rate to be used. Full details of network cable lengths and wiring limitations are available in the Allen Bradley Document Reference DN-6.7.2.

Table 2.5 Maximum Network Lengths

Data Rate (bits/sec)	Maximum Trunk Length (m)	Maximum Drop Length (m)	Max. Cumulative Drop (m)
125K	500	6	156
250K	250	6	78
500K	100	6	39

3 Getting Started

NOTE The Commander SE must be fitted with firmware V1.08.00 or later for use with a fieldbus interface. SESoft V1.04.00 or later provides support for all Commander SE fieldbus interfaces.

3.1 SESoft Wizard

The SESoft Wizard guides the user through the basic configuration of the Commander SE. Specify the power supply and motor details in pages 1 and 2 of the Wizard. For the "Speed Input References" screen (page 3), follow the instructions below:

- Set the Speed Input to "**Fieldbus**".
- Set the Fieldbus Type to "DeviceNet".
- Specify the Node Address for the Commander SE.
- Specify the Data Rate to be used.

Complete the remainder of the Wizard, and click **DOWNLOAD** to download the configuration to the Commander SE. When complete, click **FINISH** to exit the Wizard.

The Wizard will download all appropriate information to the Commander SE, configure it to use the digital speed reference #1.21, change the communications mode to "FbuS", and save all parameters in the Commander SE.

- Power down the Commander SE.
- Plug the SE77-DeviceNet card into the Commander SE.
- Power up the Commander SE.

The SE77-DeviceNet card is now ready to communicate with the DeviceNet master controller.

3.2 Basic Communications Quick Start

The SE77-DeviceNet can also be configured to establish basic DeviceNet communications from the Commander SE keypad and display.

- Connect the SE77-DeviceNet to the Commander SE.
- Power up the Commander SE, and ensure that #0.10 is set to "L2".
- Set the Communications Mode (#0.41) to "FbuS".
- Set the Node Address (#0.45) as required and press the M key.
- Set the Data Rate (#0.46) as required and press the M key.
- Power down the Commander SE.

When the SE77-DeviceNet next powers up, it will read the configuration parameters from the Commander SE, and configure itself accordingly.

Table 3.1 Basic Configuration Parameters

Function	Parameter	Recommended Setting
Communications Mode	#0.41	"Fbus"
Node Address	#0.45	1 to 61
Data Rate	#0.46	4, 3, or 2
Network Status	#0.47 (RO)	Current status of the SE77-DeviceNet

NOTE "FbuS" mode must be selected to allow keypad access to #0.45, #0.46 and #0.47.

3.3 Commander SE Communications Mode

Commander SE: #0.41

The Commander SE has several communications mode that can be selected by #0.41. When a fieldbus interface card is connected to the Commander SE, it will automatically change the communications mode to "FbuS". This change will take effect immediately without any need to store the parameters or reset the Commander SE.

3.4 DeviceNet Node Address

Commander SE: #0.45

Every node on a DeviceNet network must be given a unique network address. If 2 or more nodes are assigned the same address, only one node will join the network and start communicating with the master controller. All other nodes with the same address will be prevented from joining the network. The valid range of addresses is from 0 to 63, with a default address of 63

If an invalid node address is set in #0.45, the SE77-DeviceNet will reject the configured address, default to 63, and update #0.45 with the address that is actually being used.

NOTE Changes to #0.45 will be stored automatically when the MODE button is pressed after the value has been set.

3.5 DeviceNet Data Rate

Commander SE: #0.46

Every node on a DeviceNet network must be configured to run at the network data rate. If a node is configured with the wrong data rate, it may cause errors on the CAN network, and eventually trip on “t60”, Bus Off Error. This parameter should be set to the same value on all nodes on the network. The SE77-DeviceNet has a default data rate setting of 125 Kbits/sec.

Table 3.2 Data Rate

#0.46	bits/sec
4	125K
3	250K
2	500K

3.6 DeviceNet Data Format

The default data format is 3 Polled Words, which is the same data format as used on Unidrive and Mentor II. Each polled data word is mapped to a Commander SE parameter with default mappings as shown in the table below.

Table 3.3 Default Data Mapping

Polled Word	Default Mapping Status
OUT Word 0	Control word
OUT Word 1	Digital speed reference 1
OUT Word 2	Not mapped
IN Word 0	Status word
IN Word 1	Post-ramp speed reference
IN Word 2	Motor load current as % of rated load current

3.7 DeviceNet Network Status

Commander SE: #0.47

The status of the DeviceNet network is displayed in #0.47, and can be viewed on the display on the Commander SE.

Table 3.4 Network Status

#0.47	Status	Description
>0	Network healthy	Indicates the number of network cycles per second, and the slave is exchanging data with the master controller.
0	Network healthy, no data transfer	Indicates that the master controller has established communications with the node, but data transfer has not yet started.
-1	No network master	Indicates that the SE77-DeviceNet has initialised correctly, and is waiting for the master controller to initialise communications
-2	Internal failure	Indicates that part of the SE77-DeviceNet initialisation test was not successful. Replace the module if this error persists.

3.8 Network Loss Trip

3.8.1 Loss of DeviceNet Network

If the DeviceNet network stops operating, the SE77-DeviceNet will trip the Commander SE on “t62”. The default time delay between network loss and Commander SE trip is 200ms, so the actual delay trip time will be between 200 and 400ms. The master controller will automatically detect that the slave node is no longer communicating on the network, and will update its own internal status registers. Refer to the master controller documentation for details.

3.8.2 Loss of RS485 "FbuS" Link

The Commander SE has a serial communications watchdog that must be updated at least once every second. The SE77-DeviceNet ensures that this watchdog is updated regularly while the RS485 link is healthy. If the RS485 link is broken, the watchdog in the Commander SE will not get updated, and the Commander SE will trip "SCL".

If the SE77-DeviceNet remains powered up, it will continue to communicate with the master controller. The loss of the RS485 link to the Commander SE is indicated by bit 15 of the status word being set to 1. (All other bits in the status word are reset to 0 in this state.) Bit 15 is reset to 0 when the RS485 link is re-established.

NOTE If bit 15 of the status word is set to 1, the remaining IN polled data words will continue to hold the last values read from the Commander SE. Bit 15 is an important check for the validity of the IN data.

More more details about the status word, refer to section 4.2.

3.9 Restore DeviceNet Defaults

Commander SE: #15.30

Default DeviceNet values can be restored to the Commander SE using SESoft or the Universal Keypad. This resets ALL DeviceNet parameters (including node address) back to the factory default values.

Table 3.5 Restore Defaults

#15.30	Status
0	No action
1	Restore default settings

NOTE To restore communications to the node, the node address (#0.45) must be set to the required value, and the Commander SE powered down. Communications will be re-established (with default settings) when power is re-applied to the Commander SE.

3.9.1 Commander SESoft

- Power down the Commander SE and disconnect the SE77-DeviceNet.
- Connect the SESoft communications lead, and power up the Commander SE.
- In SESoft, go to **MENU 15**, and click **LOAD DEFAULTS**.
- Power down the Commander SE and re-connect the SE77-DeviceNet.
- Re-apply power to the Commander SE.
- The SE77-DeviceNet will overwrite all #15.PP parameters with their default values. The default values will take effect immediately.

3.9.2 Universal Keypad

- Set #15.30 to 1.
- Store the Commander SE parameters from the Universal Keypad by setting #MM.00 to 1000, and pressing the red **RESET** button.
- Power down the Commander SE, and re-connect the SE77-DeviceNet.
- The SE77-DeviceNet will overwrite all #15.PP parameters with their default values. The default values will take effect immediately.

3.10 Restore Previous DeviceNet Configuration

The SE77-DeviceNet itself stores the last set of configuration parameters that were used. These values can be restored to the Commander SE using SESoft or the Universal Keypad.

3.10.1 SESoft

- Go to the Menu 15 Screen
- Set the Fieldbus Type to "**None**" and click on the **PROGRAM** button. SESoft will set #15.01 to 0 and store all parameters.
- Power down the Commander SE, and re-connect the SE77-DeviceNet.
- Re-apply power to the Commander SE.
- The SE77-DeviceNet will detect that #15.01 is 0, and download the previously stored values (including the node address) to all #15.PP parameters. The stored values will take effect immediately.

3.10.2 Universal Keypad

- Set #15.01 to 0.
- Store the Commander SE parameters from the Universal Keypad by setting #MM.00 to 1000, and pressing **RESET**.
- Power down the Commander SE, and re-connect the SE77-DeviceNet.
- Re-apply power to the Commander SE.
- The SE77-DeviceNet will detect that #15.01 is 0, and download the previously stored values (including the node address) to all #15.PP parameters. The stored values will take effect immediately.

NOTE Universal Keypads with firmware V1.01.05 or earlier fitted, do not provide access to #15.01. It is recommended that the Universal Keypad should have firmware V1.04.00 or later fitted.

4 Control and Status Words

4.1 DeviceNet Control Word

The DeviceNet control word allows the digital control of the Commander SE to be implemented using a single data word. Each bit in the DeviceNet control word has a particular function, and provides a method of controlling the output functions of the Commander SE (RUN FWD, JOG, TRIP, etc.) with a single data word.

b15	b14	b13	b12b	b11	b10	b9	b8
Reserved							

b7	b6	b5	b4	b3	b2	b1	b0
TRIP	RESET	DIG REF	FBUS CTRL	RUN REV	JOG	RUN FWD	ENABLE

NOTE For safety reasons, the external HARDWARE ENABLE signal (terminal 9) must be present (connected to +24V, terminal 7) before the fieldbus control word can be used to start the Commander SE. Typically, this terminal is controlled by the external Emergency Stop circuit to ensure that the Commander SE is disabled in an emergency situation.

To enable fieldbus control of the Commander SE, set the FBUS CTRL bit to 1. The 0-1 transition of the FBUS CTRL bit will cause the SE77-DeviceNet to set #6.43 to 1 in the Commander SE, and enable fieldbus control of the Commander SE. When the FBUS CTRL bit is reset to 0, the SE77-DeviceNet will reset #6.43 to 0, thus putting the Commander SE back into terminal control mode.

The DIG REF bit allows the source of the speed reference to be changed via DeviceNet. The 0-1 transition of the DIG REF will cause the SE77-DeviceNet to set #1.14 to 3, selecting digital speed reference as the source of the speed reference. (By default, this will be Digital Speed Reference 1, #1.21.) When the DIG REF bit is reset to 0, the SE77-DeviceNet will set #1.14 to 1, selecting the analogue input as the source of the speed reference. (The actual digital speed reference selected will depend on the setting of the Digital Speed Reference Selector, #1.15)

Table 4.1 Control Word

Bit	Function	Description
0	ENABLE	Must be set to 1 to put the Commander SE in READY mode. Resetting to 0 will immediately disable the Commander SE, and the motor will coast to stop. The external HARDWARE ENABLE signal (terminal 9) must also be present before the Commander SE can be enabled and run.
1	RUN FWD	Set to 1 (with ENABLE set to 1) to run the motor in the forward direction. When reset to 0, the Commander SE will decelerate the motor to a controlled stop before the outputs disabled

Table 4.1 Control Word

Bit	Function	Description
2	JOG	Set to 1 with RUN FWD or RUN REV bit also set to one to jog the motor in the appropriate direction. The Commander SE will ramp the motor to the normal speed reference if the bit is reset to 0
3	RUN REV	Set to 1 (with ENABLE set to 1) to run the motor in the reverse direction. When reset to 0, the Commander SE will decelerate the motor to a controlled stop before the outputs disabled
4	FBUS CTRL	A 0-1 transition of this bit will set #6.43 to 1 to enable fieldbus control of the Commander SE. #6.43 can subsequently be over-written by a digital input if a terminal or fieldbus control selector switch is required. A 1-0 transition will reset #6.43 to 0, setting the Commander SE back into terminal control.)
5	DIG REF	A 0-1 transition of this bit will set #1.14 to 3 to select digital speed reference control. #1.14 can subsequently be over-written by a digital input controlling #1.42 if an analogue/ digital reference select switch is required. A 1-0 transition will reset #1.14 to 1 to select analogue reference control.
6	RESET	A 0-1 transition will reset the Commander SE from a trip condition. If the cause of the trip has not been cleared, the Commander SE will trip again immediately
7	TRIP	A 0-1 transition will force a “t52” trip on the Commander SE. If the RESET and TRIP bits change from 0 to 1 on the same cycle, the TRIP bit will take priority
8-15	Reserved	

When a trip occurs, the Commander SE automatically sets the control word (#6.42) to 0. This ensures that, for safety reasons, the Commander SE is in a safe, disabled state and cannot re-start immediately when it is reset.

However, the DeviceNet control word held in the SE77-DeviceNet is not affected by a Commander SE trip, and the SE77-DeviceNet will only update the Commander SE control word (#6.42) when it sees a change in the DeviceNet control word. Therefore, if the DeviceNet control word is not updated, the Commander SE will not automatically restart when full communications is re-established. A change to the DeviceNet control word is required before the Commander SE control word will be updated.

For this reason, it is necessary (and good safety practice!!) for the master controller program to monitor the status word, and reset the DeviceNet control word to a safe state if any Commander SE trip, DeviceNet fault or RS485 "FbuS" link loss error is detected. (The Commander SE’s internal control word is reset to 0 automatically when the Commander SE trips.) When both DeviceNet and “FbuS” communications links are healthy again, and it is safe to reset and re-start the Commander SE, the appropriate DeviceNet control word can be set, a change of DeviceNet control word is detected, the SE77-DeviceNet will update the Commander SE control word (#6.42) and the Commander SE will restart.

Some example DeviceNet control word values to control the Commander SE are given in the table below.

Table 4.2 Example Control Words

Control Word (Hex)	Control Word (Dec)	Action
0x0000	0	Control word disabled, Commander SE will operate under terminal control
0x0010	16	Disabled
0x0011	17	Enabled, stopped
0x0033	51	Enabled, run fwd, digital speed ref
0x0039	57	Enabled, run rev, digital speed ref
0x0013	19	Enabled, run fwd, analogue speed ref
0x0019	25	Enabled, run rev, analogue speed ref
0x0017	23	Enabled, jog fwd
0x001D	29	Enabled, jog rev
0x0080	128	Trip Commander SE
0x0070	112	Reset Commander SE into fieldbus control
0x0040	64	Reset Commander SE into terminal control

4.2 DeviceNet Status Word

The status word returns the status of multiple functions within the Commander SE, e.g. At Speed, Zero Speed, Drive Healthy, etc., and provides a quick method of checking the current status of the Commander SE. The status word is mapped to polled data as #90.12.

b15	b14	b13	b12b	b11	b10	b9	b8
FBUS LOSS	#10.15	#10.14	#10.13	#10.12	#10.11	#10.10	#10.09

b7	b6	b5	b4	b3	b2	b1	b0
#10.08	#10.07	#10.06	#10.05	#10.04	#10.03	#10.02	#10.01

Bit 15 of the status word will be set to 1 (with all other bits reset to 0) if the "FbuS" communications link between the DeviceNet interface and the Commander SE is lost.

NOTE Bit 15 of the status word effectively indicates that the master controller does not have control of the Commander SE. Under this condition, it is the User's responsibility to ensure that the master controller takes appropriate action to ensure system safety is maintained, in all respects.

The table below shows the function indicated by each bit in the status word when set to 1. A bit set to 0 indicates that the condition is false.

Table 4.3 Status Word

Bit	Parameter	Description
0	#10.01	Drive Healthy
1	#10.02	Drive Running
2	#10.03	Zero Speed
3	#10.04	Running At Or Below Minimum Speed
4	#10.05	Below Set Speed
5	#10.06	At Speed
6	#10.07	Above Set Speed
7	#10.08	Load Reached
8	#10.09	In Current Limit
9	#10.10	Regenerating
10	#10.11	Dynamic Brake Active
11	#10.12	Dynamic Brake Alarm
12	#10.13	Direction Commanded
13	#10.14	Direction Running
14	#10.15	Mains Loss
15	FBUS LOSS	“FbuS” Communications Link lost

4.3 Selecting Control Source Externally

A selector switch can be used to select whether the RUN FWD, JOG, RUN REV functions are controlled externally by the digital inputs, or remotely DeviceNet master. This allows a machine to be run in a “manual” mode temporarily, e.g. while feeding new material though a machine, and switched to “automatic” mode, running under PLC control once material loading has been completed.

Another switch can also be used to select the source of the speed reference for the Commander SE. This may allow the speed of the machine to be controlled manually while new material fed through at a slow speed, and switched to automatic PLC control once material is flowing freely.

4.3.1 FBUS CTRL

When a 0-1 transition of the FBUS CTRL bit in the DeviceNet control word occurs, the SE77-DeviceNet will set #6.43 to 1. This will disable terminal control of the Commander SE, and allow the fieldbus to control the ENABLE, RUN FWD, JOG and RUN REV functions of the Commander SE. Similarly, when FBUS CTRL is reset to 0, the SE77-DeviceNet will set #6.43 to 0 to enable terminal control again.

If a digital input is configured to directly control #6.43 in the Commander SE, the value written to #6.43 by the SE77-DeviceNet will be immediately overwritten by the digital input. This allows the source of the ENABLE, RUN FWD, JOG and RUN REV functions of the Commander SE to be selected externally.

NOTE Use SESoft or the Universal Keypad to configure a spare digital input to control #6.43.

4.3.2 DIG REF

When a 0-1 transition of the DIG REF bit in the DeviceNet control word occurs, the SE77-DeviceNet will set #1.14 to 3. This will select the digital speed references as the source of the Commander SE speed reference. When DIG REF is reset to 0, the SE77-DeviceNet will set #1.14 to 1 to re-select the analogue reference as the source of the speed reference.

If a digital input is configured to directly control #6.43 in the Commander SE, the value written to #6.43 by the SE77-DeviceNet will be immediately overwritten by the digital input. This allows the source of the ENABLE, RUN FWD, JOG and RUN REV functions of the Commander SE to be selected externally.

NOTE #1.14 cannot be controlled directly by a digital input, but #1.42 can be used to select digital speed reference externally. Use SESoft or the Universal Keypad to configure a spare digital input to control #1.42.

Refer to the Commander SE User Guide for details on how to configure digital inputs.

5 Diagnostics

The information from the parameters described below should always be noted before contacting Control Techniques for technical support.

5.1 Fieldbus Code

Commander SE:#15.01
The fieldbus code identifies the fieldbus option module last fitted to the Commander SE.

Table 5.1 Fieldbus Code

#15.01	Fieldbus
1	Profibus-DP
2	Interbus
3	Reserved
4	Reserved
5	DeviceNet
6	CANopen

5.2 Firmware Version

Commander SE:#15.02
The version of firmware present in the DeviceNet interface can be read from #15.02 in the Commander SE.

Table 5.2 Firmware Version

Major Code (#15.02)	Minor Code (#15.50)	Firmware Version
1.01	0	V1.01.00

5.3 DeviceNet Node Address

Commander SE:#0.45 or #15.03
Every DeviceNet node must be assigned a unique node address. If two or more nodes have the same address, this will cause a conflict when the master attempts to initialise the network.

DeviceNet nodes default to a node address of 63, so ideally, each node address should be configured on each node BEFORE any attempt is made to connect it to the network. #0.45 can be modified using the keypad on the Commander SE itself.

5.4 DeviceNet Data Rate

Commander SE:#0.46 or #15.04
The Commander SE DeviceNet interface must be configured to run at the network data rate. This parameter should be set to the same value on all nodes on the network.

Table 5.3 Data Rate

Data Rate (#0.46 or #15.04)	bits/sec
4	125K
3	250K
2	500K

5.5 Network Status

Commander SE:#0.47 or #15.06 (Read only)
The network activity can be monitored in #0.47 on the Commander SE. When the interface is communicating with the DeviceNet network, the approximate number of messages per second is displayed. If polled data transfer is stopped by the master, but is not due to any network errors, #0.47 will show 0.

-1 indicates that the DeviceNet interface has initialised correctly, but is waiting for the master to initiate communications.

- Check that the DeviceNet cables and screens have been wired correctly, and the physical connections are good.
- Ensure that the DeviceNet interface is connected to the RJ-45 communications connector on the Commander SE, and that the network status parameter indicates that the network is running.
- Ensure that the network has been terminated.
- Check that the node address has been set correctly and only one node on the network has that particular address.
- Check that the node has been configured correctly in the master.
- Data format selected is correct.

-2 indicates an interface initialisation failure. If this fault persists, replace the DeviceNet card.

5.6 No Data Transfer

If data is not being transferred from the master controller to the Commander SE, make the following checks:

- The mapping parameters have been programmed correctly. If an incorrect mapping was entered, it will have been reset to 0.
- Check that there are no mapping parameter conflicts, i.e. an analogue input is not trying to control the same parameter as a polled OUT channel. The "Linking Screen" in SESoft shows all input and output mapping parameters on a single screen for this purpose.
- Check that the Network Status (#0.47) is >0. (See section 3.7)

5.7 Commander SE Trip Codes

Table 5.4 Trip Codes

Trip Code	Error
t52	This code indicates that the trip was caused by bit 7 in the control word being set to 1. The trip is initiated by a 0-1 transition of bit 7 in the control word. (See section 4.1)
t60	DeviceNet network failure. This trip can be caused by a network fault, e.g. broken wire, disconnected node, missing termination resistors, etc. "t60" will also occur if the master controller stops the network while it is being re-programmed or reset.
t62	DeviceNet Network Loss. The node has not received a polled data message for a time period specified in #15.07. This trip can be caused by a network fault, e.g. disconnected node, missing termination resistors, broken wire, etc. "t62" may also occur if the master controller stops the network while it is being re-programmed or reset. (See section 3.8.1)
t62	Polled Connection Timeout The polled data connection has timed out. The timeout delay is defined as 4 * Expected Packet Rate. This trip is disabled when #15.07 is set to 0. (Expected Packet Rate is defined i nhte master controller configuration, and usually defaults to 75ms.)
SCL	RS485 "FbuS" link failure. Communications between the DeviceNet interface card and the Commander SE (RJ45) port have been interrupted. (See section 3.8.2)