User Guide

SE74-INTERBUS

Commander SE

Part Number: 0452-0058
Issue Number: 3

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.

Drive software version

This product is supplied with the latest version of user-interface and machine control software. If this product is to be used in a new or existing system with other Drives, there may be some differences between their software and the software in this product. These differences may cause this product to function differently. This may also apply to Drives returned from a Control Techniques Service Centre.

If there is any doubt, contact a Control Techniques Drive Centre.

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Issue Code:	3
Hardware:	Issue 01.00
Firmware:	V1.00.00

Contents

1 Mechanical Installation

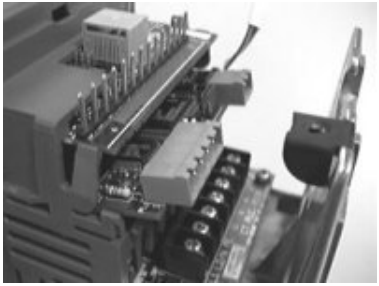
Care should be taken when handling the SE74-INTERBUS card, as it may be damaged by electrostatic discharge. To prevent inadvertent damage, touch an earthed bare metal surface to discharge yourself before removing the SE74-INTERBUS card from the anti-static bag

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

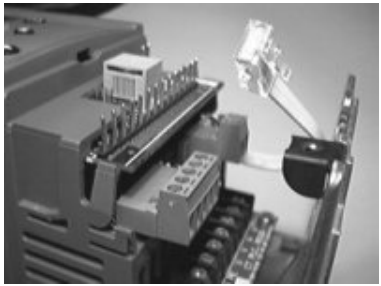
1.1 Commander SE Size 1

1. Remove the two terminal blocks from the option card. Slide the SE74-INTERBUS card diagonally into the Commander SE.

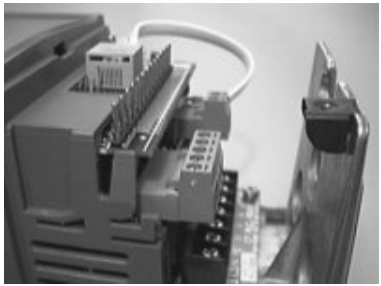
2. Ensure that the SE74-INTERBUS card is aligned between the runners moulded into the plastic casing, and slide into the Commander SE.



3. Push the SE74-INTERBUS card firmly into the Commander SE until the plastic spring clips latch it securely in place.

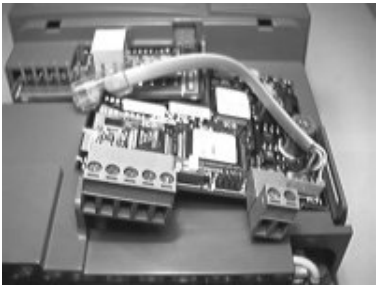


4. Plug the flylead into the RJ45 socket on the Commander SE.

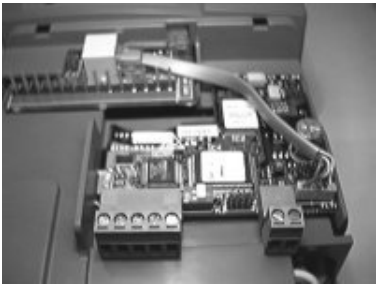


1.2 Commander SE Sizes 2, 3, 4 and 5

1. Locate the right hand side of the SE74-INTERBUS card under the flange.



2. Push the left hand side of the SE74-INTERBUS card down to clip into place. Connect the fly-lead to the RJ-45 connector on the Commander SE.

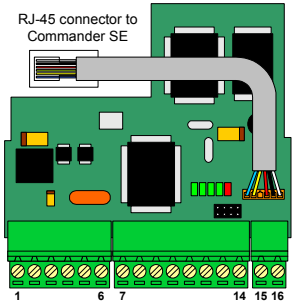


2 Electrical Installation

2.1 SE74-INTERBUS Module

The SE74-INTERBUS module provides 6-way and 8-way screw terminal connectors for the INTERBUS Remote Bus IN and INTERBUS Remote Bus OUT data connections. An additional 2 -way screw connector is provided for a +24V back-up power supply.

Figure 2-1 SE74-INTERBUS Module



The pin connections for the INTERBUS Remote Bus IN and OUT connectors are given in the table below. 0V COM is internally linked to the 0V line of the Commander SE, and 0V ISO is isolated from 0V COM.

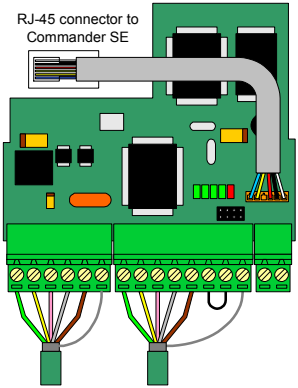
Table 2.1 SE74-INTERBUS Connections

Terminal	Function	Description
1	/DO1	Negative Data IN line, connect to /DO2
2	DO1	Positive Data IN line, connect to DO2
3	/DI1	Negative Data OUT line, connect to /DI2
4	DI1	Positive Data OUT line, connect to DI2
5	0V ISO	0V Isolated
6	RBI Screen	Remote Bus IN cable screen connection
7	/DO2	Negative Data OUT line, connect to /DO1
8	DO2	Positive Data OUT line, connect to DO1
9	/DI2	Negative Data IN line, connect to /DI1
10	DI2	Positive Data IN line, connect to DI1
11	0V COM	0V Common, internally linked to Commander SE 0V
12	RBST	Remote Bus OUT Enable
13	+5V	+5V Comms
14	RBO Screen	Remote Bus OUT cable screen connection
15	+24V BACKUP	+24V Back-up power supply
16	0V BACKUP	0V Backup power supply

2.2 SE74-INTERBUS Connections

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

Figure 2-2 SE74-INTERBUS Connections



NOTE The Remote Bus OUT Enable (RBST) must be linked to +5V if the Remote Bus OUT terminals are to be connected to another node "downstream" on the network.

2.3 INTERBUS Cable

INTERBUS cable has three twisted pairs plus overall screening. The colours normally used on INTERBUS networks are shown in the table below.

Table 2.2 INTERBUS Cable Colour Codes

Cable	Data Signal	Terminal	D-type	Description
Green	/DO1, /DO2	1, 7	6	Negative data OUT line
Yellow	DO1, DO2	2, 8	1	Positive data OUT line
Pink	/DI1, /DI2	3, 9	7	Negative data IN line
Grey	DI1, DI2	4, 10	2	Positive data IN line
Brown	0V ISO, 0V COM	5, 11	3	0V
Shield	Screen	6, 14	Shell	Cable screen

INTERBUS cable is 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. A list of suppliers approved by the INTERBUS Club is available from the INTERBUS Club web site at www.INTERBUS.com.

NOTE Control Techniques can only guarantee correct and reliable operation of the SE74-INTERBUS module if all other equipment installed (including the network cable) has been approved by the INTERBUS Club.

2.4 SE74-INTERBUS Cable Screen Connections

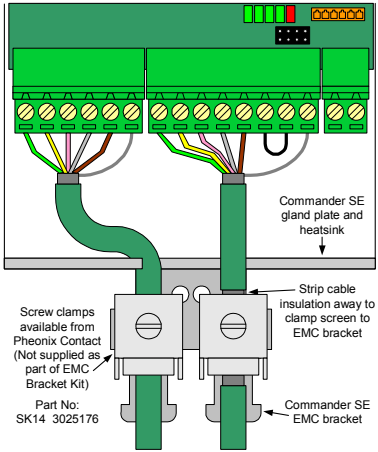
An EMC Bracket Kit is available for each size of Commander SE. This plate must be fastened to the Commander SE gland plate, and provides a path to earth via the Commander SE heatsink.

Table 2.3 EMC Bracket Kits

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

Ensure that the Commander SE heatsink is in close contact with the backplate. The end of the Remote Bus IN and OUT cable screens should be formed into "pigtails" and connected to pin 6 and pin 14 respectively on the INTERBUS connector.

Figure 2-3 SE74-INTERBUS Screen Connections



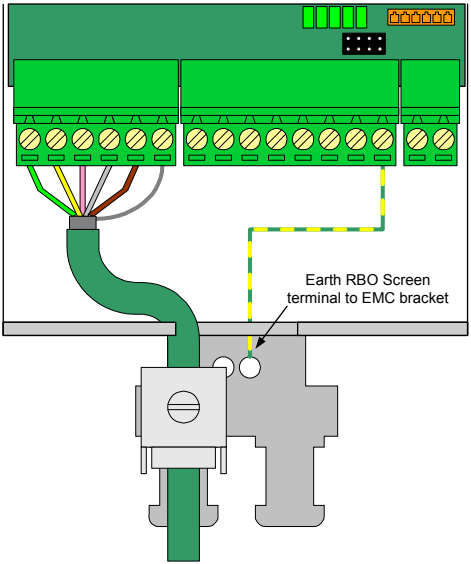
The screen of the Remote Bus OUT cable should be exposed and clamped to the EMC bracket, which is in turn fastened to the Commander SE gland plate. The screen of the Remote Bus IN cable should NOT be connected to the EMC bracket.

With this arrangement, the SE74-INTERBUS module will work equally well when powered by the Commander SE internal power supply, or from an external 24V supply, with the external supply earthed or left floating.

2.5 INTERBUS Network Termination

External termination resistors are not required on INTERBUS networks, as each section of cable is automatically terminated on every INTERBUS node. The connections required for the last node on the network are in Figure 2-4. The RBO Screen (pin 14) should be earthed to the EMC bracket.

Figure 2-4 SE74-INTERBUS Termination



2.6 Back-up Power Supply

Usually, the SE74-INTERBUS module will draw power via the RJ-45 communications lead from the unregulated +28V rail of the Commander SE. If the SE74-INTERBUS module is disconnected form the Commander SE, e.g. to check and update the configuration of the Commander SE using SESoft, the SE74-INTERBUS module will power down, breaking the INTERBUS network ring, and causing the INTERBUS network to stop communicating.

By connecting a +24V back-up power-supply to the SE74-INTERBUS module, the INTERBUS ring is not broken, and the node will continue to communicate with the master controller. The SE74-INTERBUS module will indicate (using the status word) to the master controller that it is not currently communicating with the Commander SE. When the SE74-INTERBUS module is re-connected to the Commander SE, communications will be re-established automatically.

Table 2.4 Backup Power Supply Terminals

Terminal	Function	Description
15	+24V BACKUP	This allows a back-up power supply to keep the INTERBUS network operating if the Commander SE is switched off
16	0V BACKUP	0V for the back-up power supply

NOTE

A+24V back-up power supply is strongly recommended with the SE74-INTERBUS module. If a Commander SE is powered down with an SE74-INTERBUS module connected, the INTERBUS network ring will be broken, causing the network to stop communicating.

The back-up power supply should be +24V ±20%, and should have sufficient current capability to supply all SE74-INTERBUS nodes connected to it. This condition will occur if the main power supply to the Commander SE is lost. The consumption of the SE74-INTERBUS module is dependent on the supply voltage, with typical and maximum currents listed in Table 2.5.

Under normal operating conditions, the Commander SE and the back-up power supply share the power supply requirements of the SE74-INTERBUS module. An in-rush current of 2.0 times the nominal current should be allowed for at powe-up, although this factor will typically be nearer 1.7.

Table 2.5 SE74-INTERBUS Current Consumption

Back-up Supply Voltage	Nominal Current (Commander SE is off)	Typical Current (Commander SE is off)
19.2V (24V -20%)	70mA	0mA
21.6V (24V -10%	65mA	10mA
24V nominal	60mA	35mA
26.4V (24V +10%	55mA	48mA
28.8V (24V+20%)	50mA	45mA

NOTE

Control Techniques strongly recommends that a dedicated external +24V back-up power supply should be used, as electrical noise from other external sources may cause disturbance to the INTERBUS system.

2.7 Maximum Network Length

The maximum length of cable is 1200m between INTERBUS nodes. Hence, the maximum total length of the INTERBUS network depends entirely on the number of nodes connected to the network.

3 Getting Started

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

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 "INTERBUS".

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 SE74-INTERBUS card into the Commander SE.
- Power up the Commander SE.

The SE74-INTERBUS module is now ready to communicate with the INTERBUS master controller.

3.2 Basic Communications Quick Start

The SE74-INTERBUS module can also be configured to establish basic INTERBUS communications from the Commander SE keypad and display.

- Connect the SE74-INTERBUS 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.
- Power down the Commander SE.

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

When the SE74-INTERBUS module is next powered up, it will read the updated configuration parameters from the Commander SE, and configure itself accordingly. The data format is auto-detected when the master controller initialises the network.

Table 3.1 Basic Quick Start Parameters

Function	Parameter	Recommended Setting
Communications Mode	#0.41	"FbuS"
Node Address	#0.45	1 to 125
Data Rate	#0.46 (RO)	The data rate is automatically detected on INTERBUS networks, and displayed in #0.46
Network Status	#0.47 (RO)	Indicates the current status of the INTERBUS network

3.3 Commander SE Communications Mode

Name	Commander SE Communications Mode		
Slot 1	#0.41	Default	ANSI (0)
Access	RW	Range	ANSI (0), RTU (1), FBUS (2)

The Commander SE has several communications mode that can be selected by #0.41. When a SE74-INTERBUS module 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 SE74-INTERBUS Node Address

Name	SE74-INTERBUS Node Address		
Param	#0.45	Default	0
Access	RW	Range	0 to 125

Every node on a INTERBUS network must be given a unique node address. If 2 or more nodes are assigned the same address, they may prevent the network from operating. The valid range of addresses is from 1 and 125.

If an invalid node address is set in #0.45, the SE74-INTERBUS module will reject the configured address, default to 125, and update #0.45 with the address that is actually being used. If the configured node address in #0.45 is 0, the stored node address in the INTERBUS module will be used. If this is also 0, the SE74-INTERBUS module will be disabled until a valid node address is set.

NOTE Changes to #0.PP parameters in the Commander SE are automatically stored when the MODE button is pressed after the value has been set.

3.5 SE74-INTERBUS Data Rate

Name	SE74-INTERBUS Data Rate		
Param	#0.46	Default	N/A
Access	RO	Range	0 to 9

The SE74-INTERBUS module automatically detects the network data rate, and displays the data rate in #0.46. The data rates supported by the SE74-INTERBUS module are listed in Table 3.2.

Table 3.2 SE74-INTERBUS Supported Data Rates

#0.46	bits/s		#0.46	bits/s
0	12.0M		5	187.5K
1	6.0M		6	93.75K
2	3.0M		7	Reserved
3	1.5M		8	19.2K
4	500K		9	9.6K

3.6 SE74-INTERBUS Data Format

The SE74-INTERBUS module automatically detects the required data format when the master controller initialises the network. Data consistency is optional, and is also detected during network initialisation.

3 Cyclic Words with CT Mode 1 non-cyclic data (with or without consistency) is the same data format as used on Unidrive and Mentor II. Each cyclic data word is mapped to a Commander SE parameter with default mappings as shown in the table below..

Table 3.3 SE74-INTERBUS Default Data Mappings

Cyclic Channel	Default Mapping Status
IN Word 0	Reserved for non-cyclic PCP communications
IN Word 1	Status word
IN Word 2	Post-ramp speed reference
IN Word 3	Motor load current as % of rated load current
OUT Word 0	Reserved for non-cyclic PCP communications
OUT Word 1	Control word
OUT Word 2	Digital speed reference 1
OUT Word 3	Not mapped

Other data formats are also supported. See section 5.2 for details.

3.7 INTERBUS Network Status

Name	INTERBUS Netowrk Status		
Param	#0.47	Default	N/A
Access	RO	Range	-2 to 999

The status of the SE74-INTERBUS module and INTERBUS network is displayed in #0.47, and can be viewed on the display on the Commander SE.

Table 3.4 INTERBUS 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 comms with the node, but data transfer has not yet started.
-1	No network master	Indicates that the INTERBUS interface has initialised correctly, and is waiting for the master controller to initialise communications
-2	Internal failure	Indicates that part of INTERBUS interface initialisation test was not successful. Replace the module if this error persists.

3.8 Network Loss Trip

3.8.1 Loss of INTERBUS Network

If the INTERBUS network stops operating, the SE74-INTERBUS module will trip the Commander SE on “t60”. 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. (See section 10.1 for more details.) 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 SE74-INTERBUS module ensures that the 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 SE74-INTERBUS module remains powered up, it will continue to communicate with the INTERBUS 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 6.2.

3.9 Restore SE74-INTERBUS Default Values

Name	Restore Default Values		
Ref	#15.30	**Default**	0
Access	RW	**Range**	0 or 1

Default SE74-INTERBUS values can be restored using either SESoft or the Universal Keypad. This resets ALL SE74-INTERBUS configuration 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. (This does not apply to the INTERBUS module.)

The +24V Back-up power supply should be switched off or disconnected while default parameters are restored.

3.9.1 SESoft

- Power down the Commander SE and disconnect the SE74-INTERBUS module.
- 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 SE74-INTERBUS module.

- Re-apply power to the Commander SE.
- The SE74-INTERBUS module 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 SE74-INTERBUS module.
- The SE74-INTERBUS module will overwrite all #15.PP parameters with their default values. The default values will take effect immediately.

3.10 Restore Previous SE74-INTERBUS Configuration

The SE74-INTERBUS module stores the last set of configuration parameters in its own FLASH memory. These values can be restored to the Commander SE using SESoft or the Universal Keypad.

NOTE A brand new Commander SE will have #15.01 set to 0 by default. When a previously confiured SE74-INTERBUS module is connected, it will detect that #15.01 is set to 0, and will automatically revert to the configuration values stored in its internal FLASH memory.

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 SE74-INTERBUS module.
- Re-apply power to the Commander SE.
- The SE74-INTERBUS module will detect that #15.01 is 0, and download the previously stored values 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 SE74-INTERBUS module.
- Re-apply power to the Commander SE.
- The SE74-INTERBUS module will detect that #15.01 is 0, and download the previously stored values to all #15.PP parameters. The stored values will take effect immediately.

NOTE Universal Keypads must have V1.04.00 or later fitted to allow access to #15.01.

4 Control and Status Words

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NOTE The SE74-INTERBUS module must have firmware V1.01.00 or later (see section 5.2) installed for the DIG REF bit to be used.

4.1 SE74-INTERBUS Control Word

Name	SE74-INTERBUS Control Word		
Param	#90.12	**Default**	0
Access	WO	**Range**	0 to 255

The SE74-INTERBUS control word allows digital control of the Commander SE to be implemented using a single data word. Each bit in the SE74-INTERBUS 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

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 SE74-INTERBUS module 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 SE74-INTERBUS module will reset #6.43 to 0, thus putting the Commander SE back into terminal control mode.

NOTE For safety reasons, the HARDWARE ENABLE signal (terminal 9) must be present (connected to +24V, terminal 7) before the SE74-INTERBUS control word can be used to start the Commander SE. This signal is usually linked to the external Emergency Stop circuit to ensure that the Commander SE is disabled in an emergency situation.

The DIG REF bit allows the source of the speed reference to be changed via the fieldbus. The 0-1 transition of the DIG REF will cause the SE74-INTERBUS module to set #1.14 to 3, selecting digital speed reference as the source of the speed reference. (By default, this will Digital Speed Reference 1, #1.21.) When the DIG REF bit is reset to 0, the SE74-INTERBUS module 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)

A full description of each bit in the control word is given in the table below.

Table 4.1 Control Word Bit Descriptions

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
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 will automatically reset 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 control word in the SE74-INTERBUS module is not affected by a Commander SE trip. As the SE74-INTERBUS module will only update the Commander SE control word (#6.42) when it sees a change in the SE74-INTERBUS control word, the Commander SE control word is not updated. Hence, the Commander SE will not automatically re-start when full communications is established. A change to the SE74-INTERBUS control word is required before the Commander SE will restart.

For this reason, it is necessary (and good safety practice!!) for the master controller program to monitor the status word, and reset the SE74-INTERBUS control word to a safe state if any Commander SE trip, SE74-INTERBUS fault or RS485 "FbuS" link loss error is detected. When both INTERBUS and “FbuS” communications links are healthy again, and it is safe to re-start the Commander SE, the appropriate SE74-INTERBUS control word can be set, a change of SE74-INTERBUS control word is detected, the SE74-INTERBUS module will update the Commander SE control word (#6.42) and the Commander SE will restart.

Some example SE74-INTERBUS control words are shown 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 run 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 SE74-INTERBUS Status Word

Name	SE74-INTERBUS Status Word		
Param	#90.12	**Default**	0
Access	RO	**Range**	0x0 to 0xFFFF

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 operating status of the Commander SE. The status word is mapped to cyclic 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 will be set to 1 (with all other bits reset to 0) if the "FbuS" communications link between the SE74-INTERBUS module 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.

Table 4.3 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 Descriptions

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

Table 4.3 Status Word Bit Descriptions

Bit	Parameter	Description
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 INTERBUS 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 INTERBUS control word occurs, the SE74-INTERBUS module 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 SE74-INTERBUS module 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 SE74-INTERBUS module 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 INTERBUS control word occurs, the SE74-INTERBUS module 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 SE74-INTERBUS module 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 SE74-INTERBUS module 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 Module Codes

Name	Fieldbus Module ID Code		
Param	#15.01	Default	N/A
Access	RO	Range	0 to 6

The fieldbus code identifies the type of fieldbus option module last fitted to the Commander SE. 0 indicates that the Commander SE does not have any valid fieldbus module configuration parameters in #15.PP,.

Table 5.1 Fieldbus Module Codes

Fieldbus Code (#15.01)	Fieldbus Module Type
0	No module fitted
1	Profibus-DP
2	INTERBUS
3	Reserved
4	Reserved
5	DeviceNet
6	CANopen

5.2 SE74-INTERBUS Firmware Version

Name	SE74-INTERBUS Major Firmware Version		
Param	#15.02	Default	N/A
Access	RO	Range	0 to 999

Name	SE74-INTERBUS Minor Firmware Version		
Param	#15.50	Default	N/A
Access	RO	Range	0 to 99

The SE74-INTERBUS module firmware version can be read from #15.02 and #15.50 in the Commander SE. Thiese parameters shoudl always be checked before contacting Control Techniques for technical support.

Table 5.2 SE74-INTERBUS Firmware Version

Major Code (#15.02)	Minor Code (#15.50)	Firmware Version
1.01	2	V1.01.02

5.3 SE74-INTERBUS Node Address

The master controller automatically assigns the node address during network initialisation. The address assigned to a node depends on the physical connection position within the INTERBUS network ring.

5.4 SE74-INTERBUS Data Rate

Name	Fieldbus Module ID Code		
Param	#15.04	Default	4
Access	RO	Range	4

The data rate for INTERBUS networks is fixed at 500 kbit/s. #15.04 is also displayed in #0.46, allowing the data rate to be viewed on the Commander SE display.

5.5 INTERBUS Network Status

Name	INTERBUS Network Status		
Param	#15.06	Default	N/A
Access	RO	Range	-2 to 999

The network activity can be monitored in #15.06. #15.06 is also displayed in #0.47, allowing the network status to be monitored on the Commander SE display. When the SE74-INTERBUS module is communicating with the INTERBUS network, the approximate number of messages per second is displayed. If cyclic data transfer is stopped by the master, but is not due to any network errors, #0.47 will show 0.

-1 indicates that the SE74-INTERBUS module has initialised correctly, but is waiting for the master to initiate communications.

- Check that the INTERBUS cables and screens have been wired correctly, and the physical connections are good.
- Ensure that the SE74-INTERBUS module is connected to the RJ-45 communications connector on the Commander SE, and that the network status parameter indicates that the network is running.
- Check that the node has been configured correctly in the master.
- Check that the selected data format is correct.

-2 indicates an SE74-INTERBUS module initialisation failure. If this fault persists, replace the SE74-INTERBUS module.

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 cyclic 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 4.7)

5.7 SE74-INTERBUS Trip Codes

If certain errors occur, the Commander SE will trip and show the trip code in the upper window.

Table 5.3 SE74-INTERBUS 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 6.1)
t60	Interbus Network Loss. The node has not received a cyclic data message for a time period specified in #15.07. This trip can be caused by a network fault, e.g. broken wire, disconnected node, missing termination resistors, etc. "t60" may also occur if the master controller stops the network while it is being re-programmed or reset. (See section 10.1)
SCL	RS485 “FbuS” link failure. Communications between the SE74-INTERBUS module and the Commander SE (RJ45) port have been interrupted. (See section 4.8.2)