APPENDIX

1

REFERENCE

ATYPE

#	Description
0	No axis daughter board fitted
1	Stepper daughter board
2	Servo daughter board
3	Encoder daughter board
4	Stepper daughter with position verification / Differential Stepper
5	Resolver daughter board
6	Voltage output daughter board
7	Absolute SSI servo daughter board
8	CAN daughter board
9	Remote CAN axis
10	PSWITCH daughter board
11	Remote SLM axis
12	Enhanced servo daughter board
13	Embedded axis
14	Encoder output
15	Reserved
16	Remote SERCOS speed axis
17	Remote SERCOS position axis
18	Remote CANOpen position axis
19	Remote CANOpen speed axis
20	Remote PLM axis
21	Remote user specific CAN axis
22	Remote SERCOS speed + registration axis
23	Remote SERCOS position + registration axis
30	Remote Analog Feedback axis

#	Description
31	Tamagawa absolute encoder + stepper
32	Tamagawa absolute encoder + servo
33	EnDat absolute encoder + stepper
34	EnDat absolute encoder + serv
35	PWM stepper
36	PWM servo
37	Step z
38	MTX dual port RAM
39	Empty
40	Trajexia Mecotrolink
41	Mechatrolink speed
42	Mechatrolink torque
43	Stepper 32
44	Servo 32
45	Enc out 32
46	Tamagawa 32
47	Endat 32
48	SSI 32
49	Mechatrolink servo inverter

Note: Some ATYPEs are not available on all products.

COMMSTYPE

#	Description
20	CAN Communications card
21	USB Communications card
22	SLM Communications card
23	Profibus Communications card
24	SERCOS Communications card
25	Ethernet Communications card
26	4 Analog Out card (PCI208)
27	8 Analog Out card (PCI208)
28	Analog Input card
29	Enhanced CAN Communications card
30	ETHERNET IP

AXISSTATUS / ERRORMASK

#	Description
0	No axis daughter board fitted
1	Stepper daughter board
2	Servo daughter board
3	Encoder daughter board
4	Stepper daughter with position verification / Differential Stepper
5	Resolver daughter board
6	Voltage output daughter board
7	Absolute SSI servo daughter board
8	CAN daughter board
9	Remote CAN axis

#	Description
10	PSWITCH daughter board
11	Remote SLM axis
12	Enhanced servo daughter board
13	Embedded axis
14	Encoder output
15	Trio CAN
16	Remote SERCOS speed axis
17	Remote SERCOS position axis
18	Remote CANOpen position axis
19	Remote CANOpen speed axis
20	Remote PLM axis
21	Remote user specific CAN axis
22	Remote SERCOS speed + registration axis
23	Remote SERCOS position + registration axis
24	SERCOS torque
25	SERCOS speed open
26	CAN 402 position mode
27	CAN 402 velocity mode
30	Remote Analog Feedback axis
31	Tamagawa absolute encoder + stepper
32	Tamagawa absolute encoder + servo
33	EnDat absolute encoder + stepper
34	EnDat absolute encoder + servo
35	PWM stepper
36	PWM servo
37	Step z
38	MTX dual port RAM

#	Description
39	Empty
40	Trajexia Mechatrolink
41	Mechatrolink speed
42	Mechatrolink torque
43	Stepper 32
44	Servo 32
45	Step out 32
46	Tamagawa 32
47	Endat 32
48	SSI 32
49	Mechatrolink servo inverter

CONTROL

Controller	CONTROL
Motion Coordinator MC202	202
Motion Coordinator MC302X	293
Motion Coordinator Euro205x	255
Motion Coordinator MC206	206
Motion Coordinator MC206X	207
Motion Coordinator PCI208	208
Motion Coordinator MC224	224
Motion Coordinator Euro209	259

Communications Ports

Chan	Device:-
0	Serial Port 0 - RS232 - Motion Perfect / Command Line
1	Serial Port 1
2	Serial Port 2
3	Fibre optic port (value returned defined by DEFKEY)
4	Fibre optic port (returns raw keycode of key pressed)
5	*Motion* Perfect user channel
6	*Motion* Perfect user channel
7	*Motion* Perfect user channel
8	Used for *Motion* Perfect internal operations
9	Used for *Motion* Perfect internal operations
10	Fibre optic network data

Communications Errors

Bit	Value
0	RX Buffer overrun on Network channel
1	Re-transmit buffer overrun on Network channel
2	RX structure error on Network channel
3	TX structure error on Network channel
4	Port 0 Rx data ready
5	Port 0 Rx overrun
6	Port 0 parity error
7	Port 0 Rx frame error
8	Port 1 Rx data ready
9	Port 1 Rx overrun
10	Port 1 parity error
11	Port 1 Rx frame error
12	Port 2 Rx data ready
13	Port 2 Rx overrun
14	Port 2 parity error
15	Port 2 Rx frame error
16	Error FO Network port
17	Error FO Network port
18	Error FO Network port
19	Error FO Network port

Error Types

Number	Message
1	Command not recognized
2	Invalid transfer type
3	Error programming Flashl
4	Operand expected
5	Assignment expected
6	QUOTES expected
7	Stack overflow
8	Too many variables
9	Divide by zero
10	Extra characters at end of line
11	] expected in PRINT
12	Cannot modify a special program
13	THEN expected in IF/ELSEIF
14	Error erasing Flash
15	Start of expression expected
16	) expected
17	, expected
18	Command line broken by ESC
19	Parameter out of range
20	No process available
21	Value is read only
22	Modifier not allowed
23	Remote axis is in use
24	Command is command line only
25	Command is runtime only

Number	Message
26	LABEL expected
27	Program not found
28	Duplicate label
29	Program is locked
30	Program(s) running
31	Program is stopped
32	Cannot select program
33	No program selected
34	No more programs available
35	Out of memory
36	No code available to run
37	Command out of context
38	Too many nested structures
39	Structure nesting error
40	ELSE/ELSEIF/ENDIF without previous IF
41	WEND without previous WHILE
42	UNTIL without previous REPEAT
43	Variable expected
44	TO expected after FOR
45	Too may nested FOR/NEXT
46	NEXT without FOR
47	UNTIL/IDLE expected after WAIT
48	GOTO/GOSUB expected
49	Too many nested GOSUB
50	RETURN without GOSUB
51	LABEL must be at start of line
52	Cannot nest one line IF

Number	Message
53	LABEL not found
54	LINE NUMBER cannot have decimal point
55	Cannot have multiple instances of REMOTE
56	Invalid use of $
57	VR(x) expected
58	Program already exists
59	Process already selected
60	Duplicate axes not permitted
61	PLC type is invalid
62	Evaluation error
63	Reserved keyword not available on this controller
64	VARIABLE not found
65	Table index range error
66	Features enabled do not allow ATYPE change
67	Invalid line number
68	String exceeds permitted length
69	Scope period should exceed number of Ain params
70	Value is incorrect
71	Invalid I/O channel
72	Value cannot be set. Use CLEAR_PARAMS command
73	Directory not locked
74	Directory already locked
75	Program not running on this process
76	Program not running
77	Program not paused on this process
78	Program not paused
79	Command not allowed when running Motion Perfect

Number	Message
80	Directory structure invalid
81	Directory is locked
82	Cannot edit program
83	Too many nested OPERANDS
84	Cannot reset when drive servo on
85	Flash Stick Blank
86	Flash Stick not available on this controller
87	Slave error
88	Master error
89	Network timeout
90	Network protocol error
91	Global definition is different
92	Invalid program name
93	Program corrupt
94	More than one program running when trying to set GLOBAL/CONSTANT
95	Program encrypted

MTYPE

MTYPE	Move Type
0	Idle (No move)
1	MOVE
2	MOVEABS
3	MHELICAL
4	MOVECIRC
5	MOVEMODIFY
6	MOVESP
7	MOVEABSSP
8	MOVECIRCSP
9	MHELICALSP
10	FORWARD
11	REVERSE
12	DATUMING
13	CAM
14	FORWARD_JOG
15	REVERSE_JOG
20	CAMBOX
21	CONNECT
22	MOVELINK
23	MOVETANG
24	MSPHERICAL

NETSTAT

Bit Set	Error Type	Value
0	TX Timeout	1
1	TX Buffer Error	2
2	RX CRC Error	4
3	RX Frame Error	8

Data Formats and Floating-Point Operations

The TMS320C3x processor used by the *Motion Coordinator* features several different data types. In the *Motion Coordinator* we use two main formats. The following descriptions are taken directly from the TI documentation.

Single-Precision Floating Point Format

In the single precision format, the floating-point number is represented by an 8-bit exponent field (e) and a twos complement 24-bit mantissa field (man) with and implied significant non-sign bit.

31 24	23	22 0
e	s	f

Operations are performed with an implied binary point between bits 23 and 22. When the implied most significant non-sign bit is made explicit, it is located to the immediate left of the binary point.

The floating point number *'x'* is given by:

$$x= \quad 01.f \times 2^e \quad \text{if s=0}$$
$$10.f \times 2^e \quad \text{if s=1}$$
$$0 \quad \text{if e=-128}$$

The following examples illustrate the range and precision if the single-precision floating-point format:

Most Positive:	$x = (2 - 2^{-23}) \times 2^{127}$	$= 3.4028234 \times 10^{38}$
Least Positive:	$x = 1 \times 2^{-127}$	$= 5.8774717 \times 10^{-39}$
Least Negative:	$x = (-1 - 2^{-23}) \times 2^{-127}$	$= -5.8774724 \times 10^{-39}$
Most Negative:	$x = -2 \times 2^{127}$	$= -3.4028236 \times 10^{38}$

Single-Precision Integer Format

In the single precision integer format, the integer is represented in twos complement notation.

31 0
s

The range of an integer *x*, represented in the single-precision integer format, is:

$$-2^{31} <= x <= 2^{31} - 1$$

Product Codes

Processors	
P135	MC206X
P151	Euro205x Stepper base card
P159	Euro209 Stepper base card
P170	MC224
P180	PCI208
P190	MC302-K
P192	MC302X

Options - MC224 Only	
P301	Axis Expander, for 1 to 4 daughter baords
Options - Euro205x Only	
P445	Daughter Board Mounting Kit
Options - Euro209 Only	
P447	Daughter Board Mounting Kit
Options - MC206X Only	
P399	Daughter Board Adapter

Daughter Boards - Euro205x-Euro209-MC206X-MC224	
P200	Servo Encoder Daughter
P201	Enhanced Servo Daughter
P210	Servo Resolver Daughter
P220	Reference Encoder Daughter
P225	8 Analog Input Daughter
P230	Stepper Daughter
P240	Stepper Encoder Daughter
P242	Hardware PSWITCH Daughter

P260	Analog Output Daughter
P270	SSI Servo Encoder Daughter
P280	Differential Stepper Daughter
P290	CAN Daughter
P291	SERCOS Daughter
P292	SLM Daughter
P293	Enhanced CAN Daughter
P295	USB Daughter
P296	Ethernet Daughter
P297	Profibus Daughter
P298	Ethernet IP

Options - I/O	
P316	CAN 16-I/O
P325	CAN 8 analog Inputs

Keypads & Cables	
P350	RS232 Serial Cable
P354	Mini-DIN to Flying lead 3m
P361	USB Cable 1.5m
P435	TTL Serial to Fibre Optic Adapter (not MC302X / MC302-K)
P502	Mini-Membrane Keypad
P503	Membrane Keypad
P582	2 metre SLM Cable
P583	SLM Splitter

A range of Fibre-Optic cables can be supplied for both the Trio FO Network and to the SERCOS specification. Contact your Trio Distributor for details.