Control Technology Corp.

Quick Reference

for Model 2700 Registers

R indicates read, W indicates write.

General Purpose Registers

General Purpose registers are 32-bit. They may be accessed for a variety of reasons.

1-8	Internal Counters: R/W, Counters may also be used as general purpose registers.
9-125	General Purpose Registers: R/W, Data in these registers is stored in volatile memory (lost when controller is powered down).
129-130	General Purpose Registers: R/W, (volatile)
133-500	General Purpose Registers: R/W, (volatile)
501-1000	General Purpose Registers: R/W, Data is stored in nonvolatile memory.
32001-36000	Additional non-volatile registers (Model 2700AP only)

Data Table Registers

126	Data Table Pointer: R/W, Used with column reference.
131-132	Data Table Row and Column Pointers: R/W, Used with register 9000
9000	Access to the Data Table: R/W, Phantom - works with 131 & 132.

Phantom Register

127-128	Pointer for Phantom Register and Phantom Register

Alternate Access to Resources

1001-1999	Alternate Access to Outputs 1-999: R/W, 0 = off, 1 = on.
2001-2999	Alternate Access to Inputs 1-999: R only, 0 = open, 1 = closed.
3001-3016	Four-Digit Displays, W only, Used with 2204 module.
4001-4016	Eight-Digit Display: W only, Used with 2204 module.
5001-5008	High Speed Counter: R/W, Used with 2208 module.
5501	Frequency Counter: R/W, Store 1 to place first 2208 in frequency counter mode.
6001-6016	Decimal Point Position: R/W, Used with Numeric Display on 2204.
10001-10032	Access Outputs as a 32-bit Number: R/W
10101-10164	Access Outputs as a 16-bit Number: R/W
10201-10328	Access Outputs as a 8-bit Number: R/W
11001-11032	Access Inputs as a 32-bit Number: R only
11101-11164	Access Inputs as a 16-bit Number: R only
11201-11328	Access inputs as a 8-bit Number: R only
13005	Flag Access as 32-bit Number: R/W, Alternate access to Flags 1-32.
13201-13232	Alternative Access to Flags: R/W, 0 = off, 1 = on.

Access to Analog Input and Output Points

8001-8128	Alternate Access to Analog Outputs: R/W
8501-8628	Alternate Access to Analog Inputs: R only
9001-9128	Gain Range Select: R/W, Used with 2213 & 2215 Analog Input modules.
9501-9628	Resolution of Analog Inputs: R/W, Specifies resolution for 2213 & 2215 analog input modules, 0 = 11-bit conversion & 1 = 14-bit conversion.
18001-18128	Model 2220 and Multipro Digital Output Access: R/W, Available in 2600 and 2700 series controllers with firmware revision R 2.9 or higher.
18501-18628	Digital Filter Length for Model 2220 and Multipro Analog Inputs: R/W, Available in 2600 and 2700 series controllers with firmware revision R 2.9 or higher.
19001-19128	Analog Input Minimum Threshold Set Point: R/W, Controls on-board digital outputs on model 2220 and Multipro.
19501-19628	Analog Input Maximum Threshold Set Point: R/W, Controls on-board digital outputs on model 2220 and Multipro.

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Communications Control Registers

12000	Select Controller Communications Port: W access
12000	Message Transmission Status for Controllers: R access, 0 = not busy, 1 = busy.
12001	Transmit Message from Data Table: W only, Store row number to transmit.
12001-12248	Controller Receive Buffer Access, R only, 1 character per location.
12300	Protocol Variation: R/W, Controls RS-232 terminal protocol modes. 0 = computer, 1 = terminal
12301	Baud Rate Selection: W only, 0 = 300, 1 = 600, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19.2K, 7 = 38.4k.
12302	Character Count in Receive Buffer: R access
12302	Clear Input Buffer: W access, Discards incoming message and clears input buffer.
12303	Disable Automatic Parsing, R/W, 0 = inhibits response, 1 = resumes normal response to incoming messages.
12304	Extract Number from RS-232 Receive Buffer: R only, Automatically assembles ASCII strings into a numeric value. The result is a signed 32-bit number. Automatically assembles strings of ASCII characters containing numeric information into a numeric value. Number multiplied by 10,000, allowing decimal points to 4 places.
12305	Communications Priority: R/W, When running multiple tasks. 0 = normal, 1 = priority.
12306	Serial Port Switching: R/W, Initiate and deactivate serial port switching.
12307	Serial Port Switching Delay: R/W, Specifies time delay for the switching relay.
12309	Specify Output for Serial Port Switching: R/W
12310	Data Configuration for On-board Communications Port: R/W, 1 = 7-data bits, Odd parity, 0 = return to default of 8-data bit, no parity mode.

Model 2216 DeviceNet Module Special Registers

13250-13399	I/O Data Registers: R/W, Provides access to specific section of an I/O message. Register reads mapped as inputs and writes mapped as outputs. Mapped registers with nonfunctioning connections return a 0.
13300-13463	Individual Module Status and Retry Time: R/W, Upper 16 bits are individual module status and lower 16 bits give retry time (read). Retry time is in seconds. Writing 0 immediately retrys once if there is an error. Uses hexadecimal notation. See table in Register Reference Guide for hexadecimal to decimal equilivents.
13464	Scanner Status: R/W, Provides status information for the scanner. Uses hexadecimal notation. See table in Register Reference Guide for hexadecimal to decimal equivalents.
13465	Scanner Module Status: R/W, When configured properly and scanning, writing module's MACID is read as 1. 0 = module not configured, not present or has error.
13466	Digital Input Status: R/W, Writing input number (1 - 1024) to register is read as 1 if input data valid and 0 if invalid. Active connection with no errors.
13467	Digital Output Status: R/W, Writing output number (1 - 128) to register is read as 1 if output data valid and 0 if invalid. Active connection with no errors.
13468	Analog Input Status: R/W, Writing input number to register is read as 1 if analog input data valid and 0 if invalid. Active connection with no errors.
13469	Analog Output Status: R/W, Writing input number to register is read as 1 if analog output data valid and 0 if invalid. Active connection with no errors.
13480	Scanner MACID: Read only, Lists current active DeviceNet setting.
13481	Scanner Baud Rate: Read only, Scanner baud rate, 0 = 125 kBd, 1 = 250 kBd, 2= 500 kBd
13482	Configuration Switch: Read only, Stores configuration switch settings, MACID lower 8 bits, next bit = baud rate.
13483	Module Serial Number, Read only
13490	Software (Firmware) Version, Read only, Format = (major revision No * 100) + minor revision No.
13491	Start Register - Bit Strobe Slave Response, R/W, Stores starting register number.
13492	Register Count - Bit Strobe Slave Response, R/W, Stores register count.
13493	Start Register - Poll/COS Slave Response, R/W, Stores starting register number.
13494	Register Count - Poll/COS Slave Response, R/W, Stores register count.
13495	Start Register - Poll Slave Input, R/W, Stores starting register number for poll slave input message.
13496	Register Count - Poll Slave Input (Slave Mode), R/W, Stores register count for poll slave input message.
13499	Update Cycle (ms) for Slave Mode. R/W, Stores update cycle time (in ms) or scan rate for slave registers 13491-13495. 0 = disable slave.
13500-13489	Store Explicit Messages, R/W, Stores data to be included in explicit messages or for response to explicit messages.
13590	Module ID for Explicit Message, R/W, Stores module ID for explicit messaging.
13591	Message Number and Register Status, W, Lists message number to send.

13591	Message Number and Register Status, R, Lists register status. <0 = busy, 1 - 254 = No. of bytes response received (includes protocol and service byte codes), 255 = no connection.
13592	Requested and Actual Explicit Message Format, R/W, In write mode,specifies the requested explicit message format, 0 = 8/8, 1 = 8/16, 2 = 16/16, 3 = 16/8. In read mode, sets actual messge format in low byte, 8 = 1, 255 = no connection.
13593	Data Index for Registers 13594 - 13599, R/W, Index or pointer, works in conjuction with controller's data buffer. If no connection, accessing register results in error.
13594	Service Code - Explicit Messge, R/W, Stores the service code for an explicit message. Works in conjuction with register 13593.
13595	Class ID Value - Explicit Messge, R/W, Stores the class ID value for an explicit message. Size depends on format specified in 13592. Works in conjuction with register 13593.
13596	Instance Value - Explicit Messge, R/W, Stores the instance value for an explicit message. Size depends on format specified in 13592. Works in conjuction with register 13593.
13597	Selected Data as Signed Byte - Extended to 32 bits, R/W, Stores data as a signed byte. In read mode, can be extended to 32 bits. In write mode, only lowest 8 data bits are used. Works in conjuction with register 13593.
13598	Selected Data as Signed Word (16 bits) - Extended to 32 bits, R/W, Stores data as a signed word. In read mode, can be extended to 32 bits. In write mode, only lowest 16 data bits are used. Works in conjuction with register 13593.
13599	Selected Data as Signed Long Integer 32 bits, R/W, Stores data as a signed long integer; can be extended to 32 bits. Works in conjuction with register 13593.

Model 2217 Ethernet Communications Module Special Registers

20000	Node Number: R/W, Controller's node number, 1 - 999. Requires power cycle after change.
20007	Specify Connection Type: R/W, 0 = 10base2 and 1 = 10baseT. Requires power cycle if connection type changes.
20010 & 20014	Communications Baud: R/W, 300, 600, 1200, 2400, 4800, 9600, 19200, & 38400 baud
20011 & 20015	Data Length: R/W, 7, 8 & 9 data bits.
20012 & 20016	Serial Port Parity Select: R/W, 20048 = no parity, 20549 = even parity, 20559 = odd parity
20100	Revision Number: R only, For major revisions
20101	Revision Number: R only, For minor revisions
20102	Millisecond Timer: R only, 2217 module only. Range is -2,147,483,648 to +2,147,483,647

Model 2217 Ethernet Communications Module Peer to Peer Communications Registers

21000-21999	Peer Node: R/W, Specifies node number of controller to contact, 1 - 999.
22000-22999	Peer Resource: R/W, Identifies which register to access in controller specified by registers 21000-21999.
23000-23999	Peer Data Access: R/W, Specifies data to be written or read from peer resource identified in registers 22000-22999
24000-24999	Transaction Success: R only, 1 = successful transaction, 0 = bad transaction.

Pulse Width Modulated Outputs

5901 & 5905	Pulse Output Configuration for Outputs 1 and 2: R/W, Specifies the number of pulses sent out of output 1 (5901) and output 2 (5905). Store -1 for continuous operation.
5902 & 5906	Time Lapse in Current Pulse Interval Period: R Only, Tracks lapsed time (in milliseconds) during the pulse interval period for output 1 (5902) and output 2 (5906).
5903 & 5907	Output Pulse On-time: R/W, Maximum = 65535 ms (or 65.535 seconds) and minimum = 1 ms. Output 1 is 5903 and output 2 is 5907.
5904 & 5908	Output Pulse Interval Period: R/W, Maximum = 65535 ms (or 65.535 seconds) and minimum = 2 ms. Output 1 is 5904 and output 2 is 5908.

PLS Function (Special Option)

5910	Data Table Row Pointer: R/W, Specifies the beginning of the PLS area.
5911, 5921	Servo Number for Reference: R/W, 5911 is for bank 1 and 5921 is for bank 2.
5912, 5922	Current PLS Position: R/W, 5912 is for bank 1 and 5922 is for bank 2.
5913, 5923	Roll over Position for Table: R/W, 5913 is for bank 1 and 5923 is for bank 2.
5914, 5924	Base Position, R only, 5914 is for bank 1 and 5924 is for bank 2.
5951-5958	Output Transition Enable: R/W, 0 = output ignores PLS control, 1 = PLS functions controls output state.
5959-5966	5951-5958 are for bank 1 and 5959-5966 are for bank 2.
5971-5978	Active Column Pointer: R only, Indicates the active column number in the Data Table for each row and output.
5979-5986	1 per row. 5971-5958 are for bank 1 and 5979-5986 are for bank 2.

Model 2700 Controller Real Time Clock

13014	Seconds: R/W
13015	Minutes: R/W
13016	Hours: R/W, 24 hour clock
13017	Day of Month: R/W
13018	Month of Year: R/W, 1-12
13019	Year: R/W, Two fields
13020	Day of Week: R/W, 1-7, where Sunday = 1

Model 2700 Controller 2701E CPU

5821-5828	Digital Input Software Counters: R/W
5831-5838	Counter Input Registers: W only

Model 2700 Controller 2703AP CPU

5001	Master encoder position
5101	Time period (in msec) for frequency counter based on master encoder
5102	Frequency based on specified time period

Miscellaneous Special Functions

5801-5808	Output Trigger Thresholds for Counters: R/W, Triggers an output when a counter reaches a specified value. Register 5801 is associated with counter 1 and output 1, register 5802 is associated with counter 2 and output 2, etc. Available in controllers with firmware revision R 2.8 or higher..
6500	Snapshot of Controller's Step Status: W only, Writing any value triggers snapshot.
6500	Number of Active Tasks: R only, Must write to this register before reading it. (See above.)
6501-6564	Step Number of Active Tasks: R only, Lists the step numbers of active tasks.
6599	Step Number Scanned: R only
13002	Continuous millisecond counter: R/W, Increments every 1 millisecond. Range is -2,147,483,648 to +2,147,483,647.
13003	Revision level of Firmware: R only, Multiplied x 100.
13004	Controller Architecture: R only, 1 indicates CTC's expanded architecture.
13008	Controller Model Code: R/W, Must be set to 3 to use CT Utilities. (DOS version)
13009	Automatically Turn Off Output at Software Fault: R/W, Storing an output number to this register and then turning that output ON in your program will cause that output to turn OFF in the event of any program software fault. This is commonly used to control a relay circuit that will drop out field power if a software fault occurs, for any reason.
13010	Analog Input Range: R/W, Storing 1 sets all analog inputs to 1 millivolt level (2220 only).
13011	Task Priority: R/W, Specifies Super Task serviced on a priority basis.
13012	Current Task Number: R only

Motion Control Modules Special Functions

For Model 2205 Stepping Motor Control Module Only

7001-7016	Current Stepping Motor Position: R only, Access when motor is stopped

For Model 2206 Stepping Motor Control Module Only

13701-13716	Soft Stop Position: R Only, Stores position where a soft stop input (to a dedicated input) occurred.
13801-13816	Soft Stop Option: R/W, Storing 1 activates soft stop registration option. (2206 uses servo instructions.).

Special Functions for 2206 Stepping Motor and 2214 and 2219 Servo Modules

14001-14016 Current Stepping Motor Position: R/W, Gives you the current position for 2206 module. Storing a value establishes a new position for the stepping motor; can write only when motor is stopped. Current Servo Position: R/W, Lists current position of servos 1 - 16.

14101-14116 Servo Position Error: R only, Position error of servos 1 - 16.

14201-14216 Current Velocity: R Only, Lists the current theoretical velocity of 2206 module.
Velocity: R only, Velocity of servos 1 - 16. Theoretical velocity for 2214 & actual for 2219.

14301-14316 2206 Stepping Motor Status: R Only, 0 = axis not initialized, 1 = stopped, 2 = motion imminent: waiting for start, 3 = accel, 4 = at max speed, 5 = decel to new max speed, 6 = decel to stop, 7 = soft stop.
Status for 2214 & 2219 Modules: R/W, 0 = axis not initialized, 1 = stopped, 2 = motion waiting for start input, 3 = accelerating, 4 = at maximum speed, 5 = decelerating to new speed, 6 = decelerating to stop, 7 = soft stop.
2219 only, 8 = begin registration move, 9 = searching for home, 10 = following, at ratio from leader, 12 = command accepted, 128-255 = errors.

14401-14416 Integrated servo error: R only, Error of servos 1-16

14501-14516 Response Bandwidth: 2214 module, servo response bandwidth, 1 - 1000 Hz, of servos 1-16. 2219 module, velocity feed-forward constant.

14601-14616 Deceleration Velocity: R/W, Specifies a separate deceleration velocity (steps/sec^2).

14701-14716 Dedicated Inputs for 2206 : R/W, Uses bit map, 2 = home, 4 = jog CCW, 8 = soft limit for soft stop, 16 = reverse limit, 32 = forward limit, 64 = jog CW.
Dedicated Inputs for 2214 and 2219: R/W, 1 = home, 2 = start, 3 = kill command (2219 only), 4 = reverse limit, 5 = forward limit. 6 = index (2219 only).

Special-Purpose Registers used with Model 2219 Servo Control Module

14901-14916 Analog Output Value: R only, For commanding servo drive, servos 1 - 16. Range = ± 10000. Revision 2.10 or higher.

Leader On-Start Feature

13801-13816 Leader On-Start Enable: R/W, 0 = disabled, 1 = enabled.

13901-13916 Leader Position Set Point: R/W, For triggering armed axis.

Axis Status and Feed Forward Parameters

14501-14516 Velocity Feed-forward Constant: R/W, 16-bit unsigned, normal values 0 to 65535.

14801-14816 Acceleration Feed-Forward Constant: R/W, 16-bit unsigned, normal values 0 to 65535.

Registration Feature

16000, 16010 to 16150 Registration Begin: R/W, Specifies beginning of registration window. Absolute position. 16000 is for servo 1, 16010 is for servo 2, etc.

16001, 16011 16151 Registration Window: R/W, Specifies the width of the registration window. Relative position. 16001 is for servo 1, 16011 is for servo 2, etc.

16002, 16012 to 16152 Registration Position: R only, Indicates position where registration occurred. Absolute position. 16002 is for servo 1, 16012 is for servo 2, etc.

16003, 16013, to 16153 Registration Offset: R/W, Modifies offset location; uses current move where registration occurred. Relative position. 16003 is for servo 1, 16013 is for servo 2, etc.

16004, 16014, to 16154 Registration Status: R/W, Indicates if registration occurred. 0 = waiting for trigger, 1 = registration triggered. 16004 is for servo 1, 16014 is for servo 2, etc.

Axis Following Feature

16005, 16015, to 16155 Ratio Numerator: R/W, 16-bit signed number, range ± 32767. 16005 is for servo 1, 16015 is for servo 2, etc.

16006, 16016 to 16156 Ratio Denominator: R/W, 15-bit signed number, range ± 32767. 16006 is for servo 1, 16016 is for servo 2, etc.

16007, 16017 to 16157 Leader Position: R, 32-bit signed. 16007 is for servo 1, 16017 is for servo 2, etc.

16008, 16018 to 16158 Leader Velocity: R, 32-bit signed. 16008 is for servo 1, 16018 is for servo 2, etc.

16009, 16019 to 16159 Transfer Data to Cam Table Row: W only, Transfers values in a data table row to cam table row. 16009 is for servo 1, 16019 is for servo 2, etc. For 2219-CF Module only.

16009, 16019 to 16159 Read Cam Table Row, R only, Identifies cam table row being executed. 16009 is for servo 1, 16019 is for servo 2, etc. For 2219-CF Module only.

17005, 17015 to 17155 Number of Bytes per Row in Cam Table: R only, 17005 is for servo 1, 17015 is for servo 2, etc. For 2219-CF Module only.

Additional Special Purpose Registers Available on the Model 2219

17000, 17010, to 17150	Servo Firm Ware Version Number: R only, (byte * 100) + byte. 17000 is for servo 1, 17010 is for servo 2, etc.
17001, 17011 to 17151	Servo Filter Selection: R/W, (byte), 0 = default PID, 1 = Direct CCW, 2 = Direct CW, 3 = PID, 5 = PAV, 7 = virtual master. 17001 is for servo 1, 17011 is for servo 2, etc.
17002, 17012 to 17152	Reverse Dedicated Input Polarity: R/W, Uses a mask. Default is normally open. Setting the corresponding bit to 1 inverts the active input state. Bit 0 = Not used, bit 1 = Home, bit 2 = Start, bit 3 = Kill Command fixed, bit 4 = Reverse Limit, bit 5 = Forward Limit, bit 6 = Index fixed, bit 7 = Not used. 17002 is for servo 1, 17012 is for servo 2, etc.
17003, 17013 to 17153	Direction of Home: R/W, 0 = default CCW, 1 = CW, 3 = CW index home only, -3 = CCW index home only. 17003 is for servo 1, 17013 is for servo 2, etc. Revision 2.8 or later
17004, 17014 to 17154	2219 Options: R only, 0 = Standard 2219, 1 = Cam Follower. 17004 is for servo 1, 17014 is for servo 2, etc.
17006	Error limit register. If error is larger than value in this register, servo axis will become un-initialized, any motion stop, and output will be set to zero. Default value = 32767.

Alternate Access to Motion Control Module Functions

15000-15159	The alternate access registers contain the same information as the 14000-series, but are grouped by axis.
15000	R/W, Stepping Motor/Servo 1 Position (same as 14001)
15001	R only, Stepping Motor/Servo 1 Error (same as 14101). Not used with stepping motors.
15002	R only, Stepping Motor/Servo 1 Velocity (same as 14201)
15003	R only, Stepping Motor/Servo 1 Status (same as 14301)
15004	R only, Servo 1 Internal Error (same as 14401)
15005	R/W, Servo 1 Bandwidth for model 2214, servo 1 feed-forward velocity for model 2219
15006	R/W, Stepping Motor/Servo 1 axis Deceleration rate (same as 14601)
15007	R only, Stepping Motor/Servo 1 Monitoring Dedicated Inputs
15008	R/W, Servo 1 Acceleration Feed-forward Constant (same as 14801, Model 2219 only)
15009	R only, Analog Output Value for Servo Command (same as 14901, Model 2219 only)

15010-15019	Stepping motor/servo axis 2	15090-15099	Stepping motor/servo axis 10
15020-15029	Stepping motor/servo axis 3	15100-15109	Stepping motor/servo axis 11
15030-15039	Stepping motor/servo axis 4	15110-15119	Stepping motor/servo axis 12
15040-15049	Stepping motor/servo axis 5	15120-15129	Stepping motor/servo axis 13
15050-15059	Stepping motor/servo axis 6	15130-15139	Stepping motor/servo axis 14
15060-15069	Stepping motor/servo axis 7	15140-15149	Stepping motor/servo axis 15

2703AP I/O Mapping

2703AP Input	*QS Input Register #*	*2703AP Output*	*QS Output Register #*
1	993	1	993
2	994	2	994
3	995	3	995
4	996	4	996
Reserved	998	Status LED1	998
Registration Input 1	999	Status LED 2	999
Registration Input 2	1000	Status LED 3	1000