

CTRIO Workbench Version 2: What's New

Here's a list of the new features that were added in Version 2.0

1. added H4-CTRIO and T1H-CTRIO support
2. added 5 user configurable Home Search Profiles
3. added I/O mapping details for all interface modules
4. status of CTRIO onboard outputs are now part of the I/O map
5. added System Functions (to Monitor I/O and through I/O map) that allow you to read and write to the CTRIOs internal registers. Doing this **expanded the I/O map by 32 input bits and 32 output bits**. This gives you the ability to write a stored value into the current count register to simulate retentive counts memory. It also gives you the ability to read the current pulse count. You can also change the 'reset to' value without reconfiguring the CTRIO.
6. added Dynamic Velocity profile, similar to straight velocity but adds accel/decel between velocity changes and determines direction from the input velocity value.
7. added offline configuration options for all CPUs
8. can configure the CTRIO outputs as Raw (simple discrete outputs)

Memory Map for Transfers from CTRIO to CPU

The following table shows which memory locations are used for memory transfers from the CTRIO module to the CPU. The starting memory location is defined by the user in the I/O Map within CTRIO Workbench. If you are using the *DirectLOGIC* CPU, you will use the memory address offsets in the second column. If you are using an H2-WinPLC or Hx-EBC in the CPU slot, you will use the non-PLC offsets in column one.

Data Type and Offset WinPLC & EBC	Address for Inputs (DirectLOGIC)	Definition	Format	Bytes
dwX0	n+0	Ch 1/Fn 1 Parameter 1	DWord	4
dwX1	n+2	Ch 1/Fn 1 Parameter 2	DWord	4
dwX2	n+4	Ch 1/Fn 2 Parameter 1	DWord	4
dwX3	n+6	Ch 1/Fn 2 Parameter 2	DWord	4
dwX4	n+10	Ch 2/Fn 1 Parameter 1	DWord	4
dwX5	n+12	Ch 2/Fn 1 Parameter 2	DWord	4
dwX6	n+14	Ch 2/Fn 2 Parameter 1	DWord	4
dwX7	n+16	Ch 2/Fn 2 Parameter 2	DWord	4
bX0...7 bX8...15	n+20	Ch 1/Fn 1 Status (Low Byte) Ch 1/Fn 2 Status (High Byte)	Word	2
bX16...23 bX24...31	n+21	Ch 2/Fn 1 Status (Low Byte) Ch 2/Fn 2 Status (High Byte)	Word	2
bX32...39 bX40...47	n+22	Output 0 Status (Low Byte) Output 1 Status (High Byte)	Word	2
bX48...55 bX56...63	n+23	Output 2 Status (Low Byte) Output 3 Status (High Byte)	Word	2
bX64...71 bX72...79 bX80...87 bX88 95	n+24	Monitor I/O System Functions Read/Write CTRIO Internal Registers	DWord	4



For DirectSOFT32 users: the I/O Map dialog displays the exact memory locations in use by the CTRIO module. Within the I/O Map dialog you can print out a report of memory locations in use.

Input (n) Parameter Definitions

Configured Function from CTRIO Workbench	Parameter 1 Contents DWORD	Parameter 2 Contents DWORD
Non-scaled Counter	Raw Input Value	Not Used
Scaled Counter	Scaled Value (pos. or rate)	Raw Value
Non-scaled Counter with Capture	Raw Value	Captured Value
Scaled Counter with Capture	Scaled Value (pos. or rate)	Captured Value
Non-scaled Timer	Previous Time (us)	In Progress Time (us)
Scaled Timer	Scaled Interval (rate)	In Progress Time (us)
Pulse Catch	Not Used	Not Used

Input Function Status Bit Definitions

Input function offsets are listed in the order of Ch1/Fn1, Ch1/Fn2, Ch2/Fn1, Ch2/Fn2

Ch(x)/Fn(x) Status Bits (transfers from CTRIO to CPU)	Bit Offsets WinPLC & EBC	V-memory Offsets DirectLOGIC PLCs
Count Capture Complete Bit	0, 8, 16, 24	20.0, 20.8, 21.0, 21.8
Timer Capture Start	0, 8, 16, 24	20.0, 20.8, 21.0, 21.8
Timer Capture Complete (Timing) OR At Reset Value (Counting)	1, 9, 17, 25	20.1, 20.9, 21.1, 21.9
Pulse Catch Output Pulse State	0, 8, 16, 24	20.0, 20.8, 21.0, 21.8
Pulse Catch Start	1, 9, 17, 25	20.1, 20.9, 21.1, 21.9

Output Status Bit Definitions

Output Status Offsets are listed in the order of the Output 0 - Output 3.

Output(x) Status Bits (transfers from CTRIO to CPU)	Bit Offsets WinPLC & EBC	V-memory Offsets DirectLOGIC PLCs
Command Error	38, 46, 54, 62	22.6, 22.14, 23.6, 23.14
Command Complete	39, 47, 55, 63	22.7, 22.15, 23.7, 23.15

Memory Map for Transfers from CPU to CTRIO

The following table shows which memory locations are used for memory transfers from the CPU module to the CTRIO. The starting memory location is defined by the user in the I/O Map within CTRIO Workbench. If you are using a *DirectLOGIC* CPU, you will use the memory address offsets in the second column. If you are using an H2-WinPLC or Hx-EBC in the CPU slot, you will use the non-PLC offsets in column one.

Data Type and Offset WinPLC & EBC	Address for Inputs (DirectLOGIC)	Definition	Format	Bytes
dwY0	n+0	Output 0 Parameter 3	DWord	4
dwY1	n+2	Output 1 Parameter 3	DWord	4
dwY2	n+4	Output 2 Parameter 3	DWord	4
dwY3	n+6	Output 3 Parameter 3	DWord	4
wY0	n+10	Output 0 Command	Word	2
wY1	n+11	Output 0 Parameter 1	Word	2
wY2	n+12	Output 0 Parameter 2	Word	2
wY3	n+13	Output 1 Command	Word	2
wY4	n+14	Output 1 Parameter 1	Word	2
wY5	n+15	Output 1 Parameter 2	Word	2
wY6	n+16	Output 2 Command	Word	2
wY7	n+17	Output 2 Parameter 1	Word	2
wY8	n+20	Output 2 Parameter 2	Word	2
wY9	n+21	Output 3 Command	Word	2
wY10	n+22	Output 3 Parameter 1	Word	2
wY11	n+23	Output 3 Parameter 2	Word	2
bY0...7 bY8...15	n+24	Ch 1/Fn 1 Control (Low Byte) Ch 1/Fn 2 Control (High Byte)	Word	2
bY16...23 bY24...31	n+25	Ch 2/Fn 1 Control (Low Byte) Ch 2/Fn 2 Control (High Byte)	Word	2
bY32...39 bY40...47	n+26	Output 0 Control (Low Byte) Output 1 Control (High Byte)	Word	2
bY48...55 bY56...63	n+27	Output 2 Control (Low Byte) Output 3 Control (High Byte)	Word	2
bX64...71 bX72...79 bX80...87 bX88 95	n+30	Monitor I/O System Functions Read/Write CTRIO Internal Registers	DWord	4

Output (n) Parameter Definitions

Configured Profile from CTRIO Workbench	Parameter 1 Contents DWORD	Parameter 2 Contents DWORD	Parameter 3 Contents DWORD
Trapezoidal	File # of stored profile	Not Used	Not Used
S-Curve, Symmetrical S-Curve	File # of stored profile	Not Used	Not Used
Dynamic Positioning	File # of stored profile	Not Used	Target Position
Dynamic Velocity	File # of stored profile	Not Used	Target Velocity
Home Search	File # of stored profile	Not Used	Not Used



For DirectSOFT32 users: the I/O Map dialog displays the exact memory locations in use by the CTRIO module. Within the I/O Map dialog you can print out a report of memory locations in use.

Input Function Control Bit Definitions

Input function offsets are listed in the order of Ch1/Fn1, Ch1/Fn2, Ch2/Fn1, Ch2/Fn2

Ch(n)/Fn(n) Control Bits (transfers from CPU to CTRIO)	Bit Offsets WinPLC & EBC	V-memory Offsets DirectLOGIC PLCs
Enable Count Capture	0, 8, 16, 24	24.0, 24.8, 25.0, 25.8
Scaled Counter	0, 8, 16, 24	24.0, 24.8, 25.0, 25.8
Enable Pulse Catch	0, 8, 16, 24	24.0, 24.8, 25.0, 25.8
Reset	1, 9, 17, 25	24.1, 24.9, 25.1, 25.9

Output Control Bit Definitions (for Preset Table Control)

Output Control Offsets are listed in the order of the Output 0 - Output 3.

Output(n) Control Bits (transfers from CPU to CTRIO)	Bit Offsets WinPLC & EBC	V-memory Offsets DirectLOGIC PLCs
Enable Output	32, 40, 48, 56	26.0, 26.8, 27.0, 27.8
Process Command	39, 47, 55, 63	26.7, 26.15, 27.7, 27.15

Output Control Bit Definitions (Pulse Output)

Pulse output control Offsets are listed in the order of Outputs 0/1, 2/3.

Output Control Bit transfers from CPU to CTRIO	Bit Offsets	V memory Offsets from Output Start (octal)	Read as:
Enable Output	32, 48	26.0, 27.0	Level
Go to Position	33, 49	26.1, 27.1	Rising Edge
Direction	36, 52	26.4, 27.4	Level
Process Command	39, 55	26.7, 27.7	Rising Edge

Output Control Bit Definitions (Raw Mode)

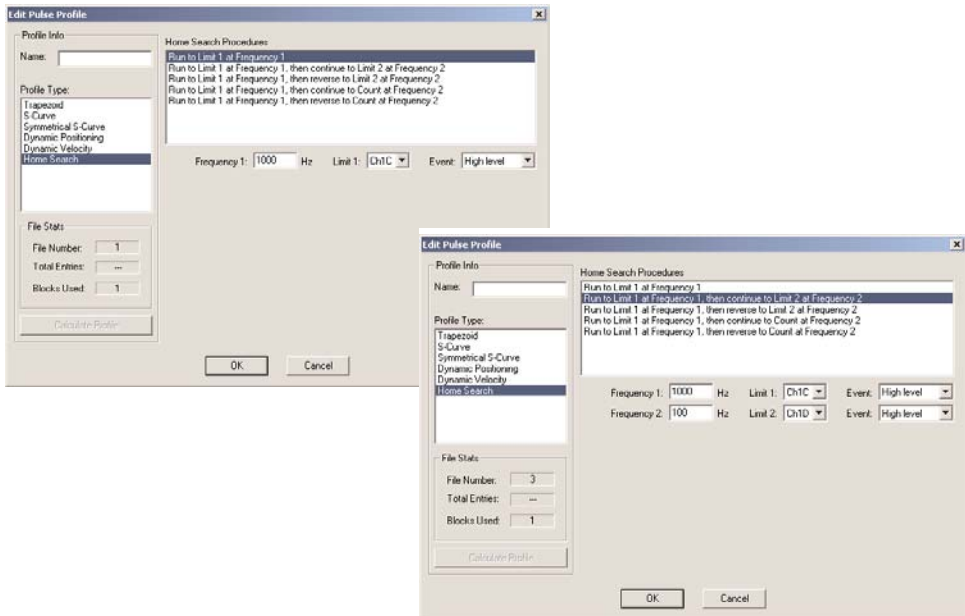
Output Control Offsets are listed in the order of the Output 0 - Output 3.

Output(n) Control Bits (transfers from CPU to CTRIO)	Bit Offsets WinPLC & EBC	V-memory Offsets DirectLOGIC PLCs
Enable Output	32, 40, 48, 56	26.0, 26.8, 27.0, 27.8

Home Search Profile

The Home Search profile is used to “*find the home position*”, which is usually a reference point to which the object being moved can return upon command at any time during or after the execution of a positioning profile.

There are several Home Search routines to choose from, all with the option to designate whether you want the limit(s) (CTRIO discrete input) to register on the rising edge, falling edge, high level or low level signal.



Frequency 1: The frequency at which the Home Search will begin.

Limit 1: Home Search Frequency 1 will run to CTRIO input Limit 1 and stop unless Frequency 2 is enabled.

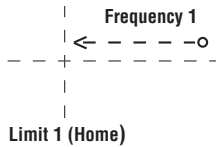
Frequency 2: (if enabled) Once Limit 1 is reached, the pulse output will continue at Frequency 2 until CTRIO Limit 2 is reached or pulse Count is reached at Frequency 2.

Limit 2: (if enabled) Home Search Frequency 2 will run to CTRIO input Limit 2 and stop.

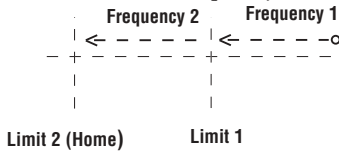
Count: (if enabled) The number of output pulse counts generated at Frequency 2 before terminating.

Home Search Routines

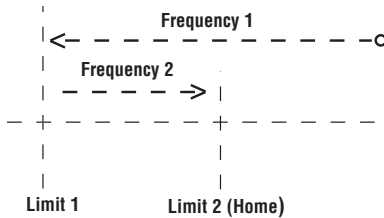
1. Run to Limit 1 at Frequency 1.



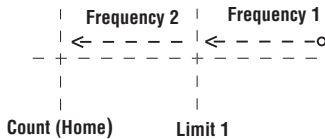
2. Run to Limit 1 at Frequency 1, then continue to Limit 2 at Frequency 2.



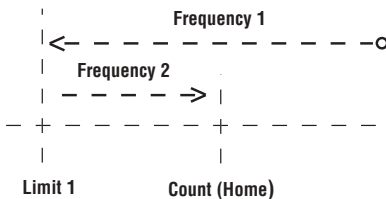
3. Run to Limit 1 at Frequency 1, then reverse to Limit 2 at Frequency 2.



4. Run to Limit 1 at Frequency 1, then continue to Count at Frequency 2.



5. Run to Limit 1 at Frequency 1, then reverse to Count at Frequency 2.



Trapezoid, S-Curve, Symmetrical S-Curve, Home Search Profiles

For predefined Trapezoid, S-Curve, Symmetrical S-Curve and Home Search profiles, the program needs to prepare the Load Table command by selecting Command Code = 0010 Hex/BCD and setting Word Parameter 1 to the File number of the profile (example: File 1 Trapezoid 1). Then the program can set the Process Command bit and watch for the Command Complete bit. Then the program should clear the Process Command bit and set the Direction bit and finally the Enable Output bit to start the output pulses. Clearing the Enable Output bit will always suspend pulsing and reset any profile in progress to it's beginning . Once complete, the profile remains loaded and can be restarted by clearing the Enable Output, changing the direction bit (if desired), and again setting the Enable Output.

For the Home Search routine, a CTRIO input must be assigned to Limit by the CTRIO Workbench Configure I/O dialog.

Easy step examples are given for PLCs with CTRIO I/O date mapped in the word and CR bit areas of CPU memory.

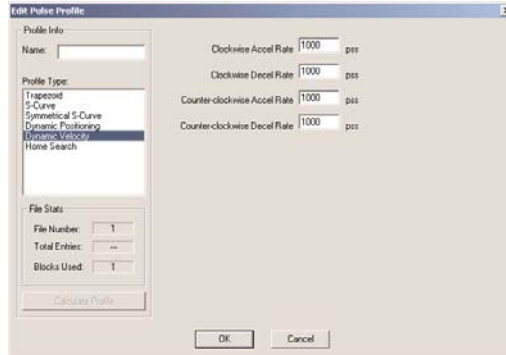
Running a Trapezoid, S-Curve, Symmetrical S-Curve Profile or Home Search Profile on CTRIO Y0 & Y1

Steps	Name	PLC Control Outputs Base Addr = V2030 (Bit-of-Word)	PLC Status Inputs Base Addr = V2000 (Bit-of-Word)	PLC Control Outputs Base Addr = V2030 (Control Relay)	PLC Status Inputs Base Addr = V2000 (Control Relay)	Action
1	Command Code	V2040		V2040		Set to 10 (Load Stored Profile)
2	Parameter 1	V2041		V2041		File # of stored profile, determined by user
3	Process Command	V2056.7		C227		Turn ON until Command Complete status bit is returned (see step 4)
4	Command Complete Status		V2022.7		C127	When ON, Profile is now loaded, clear Process Command bit (step 3)
5	Set Direction	V2056.4		C224		Set ON or OFF for Direction of Rotation
6	Enable Output	V2056.0		C220		Turn ON to start pulses
7	Output Enable Status		V2022.0		C120	When ON, module is confirming Enable Output
8	Output Active Status		V2022.4		C124	When ON, module is pulsing, OFF with Enable Status ON = profile has completed
9	Disable Output	V2056.0		C220		Turn OFF when pulse status is OFF and Enable Status is ON

To re-launch a loaded profile, repeat steps 5-9

Dynamic Velocity Profile

The Dynamic Velocity profile is a trapezoidal profile with the direction acceleration and deceleration rates specified. The target velocity is located in a memory register in the CPU/controller. Once the CPU/controller initiates the profile, output pulses will be generated at the target velocity until the CPU/controller disables the output pulses.



Clockwise Accel Rate: The clockwise rate at which the output will ramp up from 0pps to the target velocity that is specified in the CPU/controller memory register.

Clockwise Decel Rate: The clockwise rate at which the output will ramp down from the target velocity that is specified in the CPU/controller memory register to 0pps.

Counter-Clockwise Accel Rate: The counter-clockwise rate at which the output will ramp up from 0pps to the target velocity that is specified in the CPU/controller memory register.

Counter-Clockwise Decel Rate: The counter-clockwise rate at which the output will ramp down from the target velocity that is specified in the CPU/controller memory register to 0pps.

Dynamic Velocity

For Dynamic Velocity, the motion limits of clockwise acceleration and deceleration, and counter clockwise acceleration and deceleration come from the CTRIO Workbench Profile. The target velocity is stored in a register in the CPU/controller.

The program needs to prepare the Load Table command by selecting Command Code = 0010 Hex/BCD, set Word Parameter 1 to the File number of the profile (example: File 3 Dynamic Velocity 1) and set Word Parameter 3 to the desired target velocity. Then the program can set the Process Command bit and watch for the Command Complete bit. Then the program should clear the Process Command bit. Set the Enable Output bit to start the output pulses. Clearing the Enable Output bit will always suspend pulsing.

To change the velocity once the command has been processed, repeat the steps in the paragraph above.

Dynamic Velocity using the CTRIO Y0 and Y1

Steps	Name	PLC Control Outputs Base Addr = V2030 (Bit-of-Word)	PLC Status Inputs Base Addr = V2000 (Bit-of-Word)	PLC Control Outputs Base Addr = V2030 (Control Relay)	PLC Status Inputs Base Addr = V2000 (Control Relay)	Action
1	Command Code	V2040		V2040		Set to 10 (Load Stored Profile)
2	Parameter 1	V2041		V2041		File # containing cw accel/decel and ccw accel/decel
3	Process Command	V2056.7		C227		Turn ON until Command Complete status bit is returned
4	Command Complete Status		V2022.7		C127	When ON, Profile is now loaded, clear Process Command bit
5	Enable Output	V2056.0		C220		Turn ON to ramp to target velocity, Turn OFF to disable pulses.
6	Parameter 3	V2031 / V2030		V2031 / V2030		Target velocity: User defined (DWord)
7	Output Active Status		V2022.4		C124	When ON, module is pulsing