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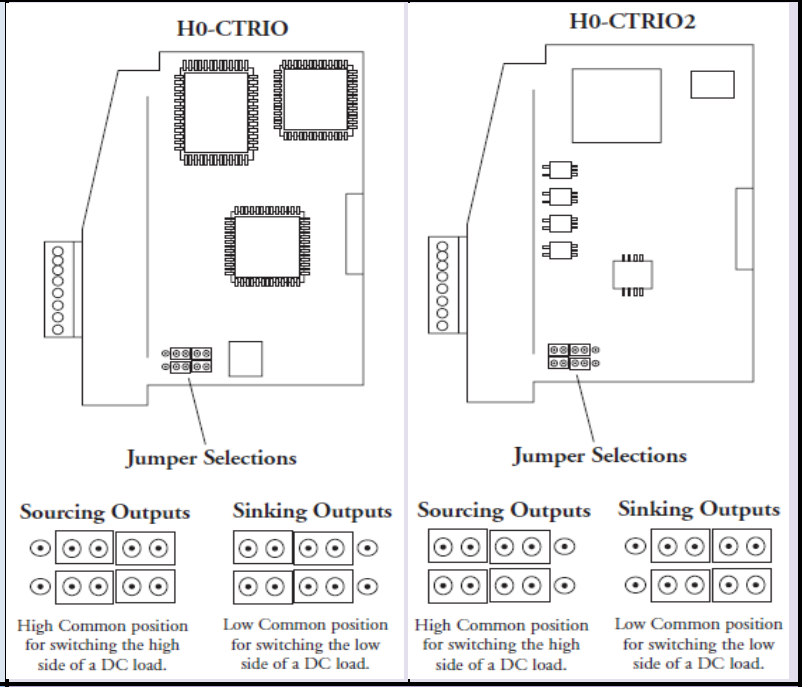
CTRIO/CITRO2 Replacement Considerations

Host ENGINEERING, INC.
Solutions Designed with Spirit

REPLACEMENT CONSIDERATIONS FOR H0-CTRIO/CTRIO2

FEATURE		H0-CTRIO	H0-CTRIO2
Module Type		Intelligent	
Power Consumption		250mA @ 5VDC	
Slot Placement Restrictions		None	
Operating Environment		0-60°C (32-140°F) 5-95% humidity (non-condensing) No corrosive gasses, Pollution Level = 2	
Jumper settings			
Physical Input Characteristics	Sink/Source	Both	
	Max Freq	100KHz	250KHz
	Min Pulse Width	5µs	0.5µs
	Input Voltage	9-30VDC @ 5-12mA Nominal range is 8mA @24VDC OFF below 2VDC @ 3mA ON above 9VDC	
	Max Voltage Drop	0.3V	
	OFF Voltage Blocking	36VDC	
	OFF to ON Response	<1µs	
	ON to OFF Response	<1µs	
Physical Output Characteristics	Sink/Source	2 Sink or 2 Source	
	Min Pulse Output Freq	20 Hz	
	Max Pulse Output Freq	25 KHz	250 KHz
	Protection	Thermal, over-voltage & over-current	
	Voltage Range	5-36VDC	
	Max Current	1 A / Point	
	Max Leakage Current	150µA @ 36VDC	
	Max Voltage Drop	0.3V	
	OFF Voltage Blocking	36 VDC	
	OFF to ON Response	<3µs	
	ON to OFF Response	<3µs	
Input Functions	Counter/Quad Counter	Identical	
	Pulse Catch	Identical	
	Edge/Dual-Edge Timer *[1]*	End/Start Not Simultaneous	End/Start Simultaneous
	Capture	If using hardware Reset input with Capture function see text in Reset row below	
	Limit	Identical	
	Inhibit	Identical	
	Reset *[2]*	If Firmware < 2.1.7 Harware Reset Clears Capture Value	Hardware Reset Keeps Capture Value
Output	Raw	Identical	

REPLACEMENT CONSIDERATIONS FOR H0-CTRIO/CTRIO2

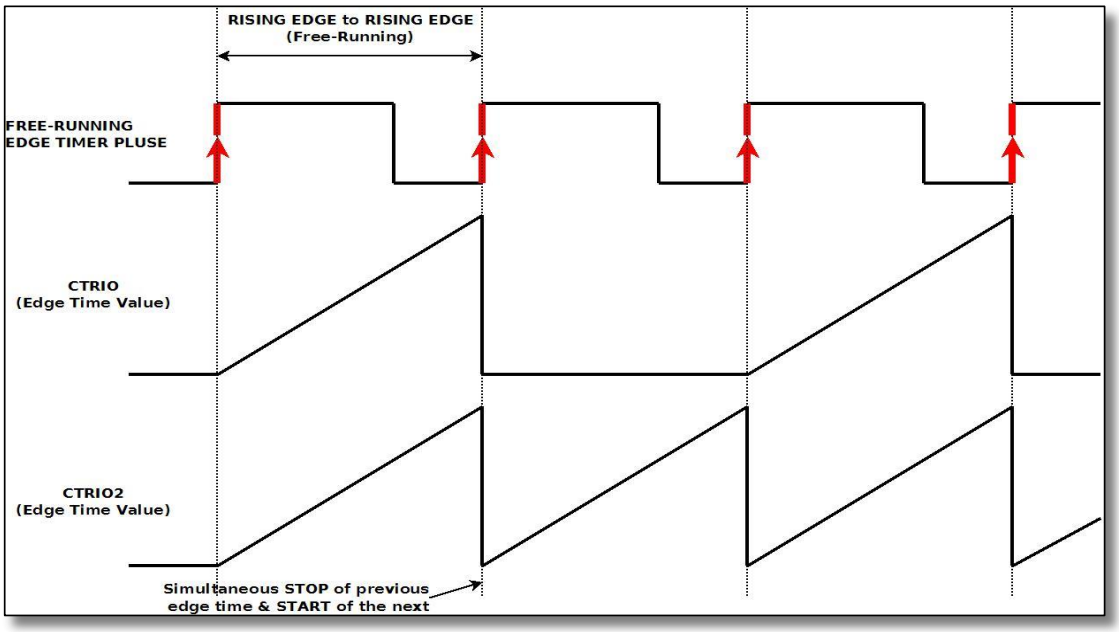
FEATURE		H0-CTRIO	H0-CTRIO2
Functions	Discrete	Identical	
	Pulse	Varies (see IBoxes & Do-more Instructions)	
DL IBoxes	CTRADPT (IB-1005) Add Entry to End of Preset Table	Identical	
	CTRCLRT (IB-1007) Clear Preset Table	Identical	
	CTREDPT (IB-1003) Edit Preset Table Entry	Identical	
	CTREDRL (IB-1002) Edit Preset Table Entry and Reload	Identical	
	CTRELVL (IB-1015) Edit Level	Identical	
	CTRINPT (IB-1004) Initialize Preset Table	Identical	
	CTRINTR (IB-1010) Initialize Preset Table on Reset	Identical	
	CTRIO (IB-1000) Config	Identical	
	CTRLDPR (IB-1001) Load Profile *[3]*	No PLS Tables No CTRIO2-only Pulse Profiles Dynamic Position --> Frequency: K20-K25000 Dynamic Velocity --> Frequency: K20-K25000	PLS Tables CTRIO2-only Pulse Profiles Dynamic Position --> Frequency: K20-K65535 Dynamic Velocity --> Frequency: K20-K250000
	CTRRDER (IB-1014) Read Error Code	Identical	
	CTRRGRD (IB-1016) Register Read *[4]*	Source Register: K0-K11	Source Register: K0-K19
	CTRRGWR (IB-1017) Register Write *[4]*	Source Register: K0-K11	Source Register: K0-K19
	CTRRTLM (IB-1011) Run To Limit Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTLM2 (IB-1019) Run To Limit Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTPM (IB-1012) Run To Position Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTPM2 (IB-1020) Run To Position Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRVEL2 (IB-1018) Velocity Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRVELO (IB-1013) Velocity Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRWFTR (IB-1006) Write File to ROM	Identical	
Do-more Instructions	CTAXCFG CTRIO2 Axis Configuration	N/A	
	CTAXDYNP CTRIO2 Axis Run Dynamic Position Mode	N/A	
	CTAXDYNV CTRIO2 Axis Run Dynamic Velocity Mode	N/A	
	CTAXJOG CTRIO2 Axis Jog Mode	N/A	
	CTAXLIMT CTRIO2 Axis Run Trapezoid w/Limits	N/A	
	CTAXTRAP CTRIO2 Axis Run Trapezoid	N/A	
	CTDYNPOS CTRIO Run Dynamic Position Mode	N/A	
	CTDYNVEL CTRIO Run Dynamic Velocity Mode	N/A	
	CTPLSADD CTRIO Add Entry to PLS	N/A	
	CTPLSEDT CTRIO2 Edit PLS Entry	N/A	
	CTREGRD CTRIO Read Register	N/A	
	CTREGWR CTRIO Write Register	N/A	

REPLACEMENT CONSIDERATIONS FOR H0-CTRIO/CTRIO2

FEATURE		H0-CTRIO	H0-CTRIO2
	CTRUNPOS **CTRIO Run Position Mode**	N/A	
	CTRUNVEL **CTRIO Run Velocity Mode**	N/A	
	CTTBLADD **CTRIO Add Entry to Preset Table**	N/A	
	CTTBLCLR **CTRIO Clear Table**	N/A	
	CTTBLEDT **CTRIO Edit Preset Table Entry**	N/A	
	CTTBLLD **CTRIO Load Table**	N/A	
	CTUPDLVL **CTRIO Update Level**	N/A	

NOTES:

[1] With free-running Edge Timer configured, the ending edge will simultaneously be the starting edge for CTRIO2.

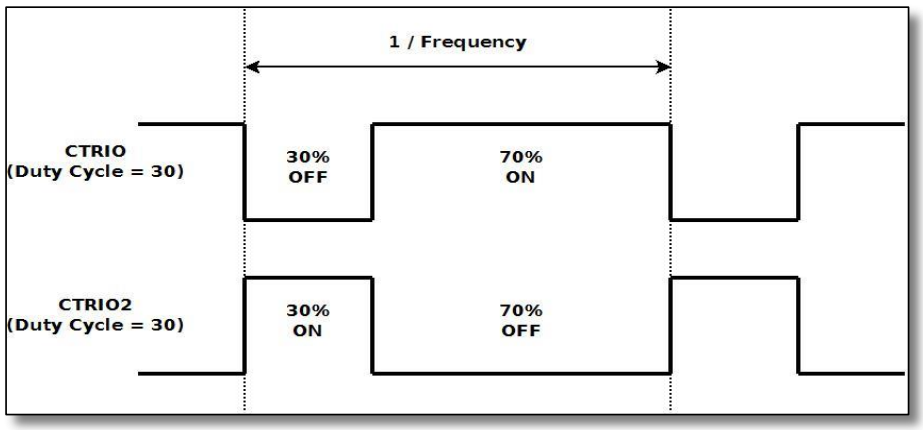


[2] In CTRIOs w/firmware earlier than v2.1.7 the Reset Input will clear both the Current Count register & the Captured Count register. Starting with CTRIO firmware v2.1.7 (and in all CTRIO2s), the Reset Input will only clear the Current Count register. The only way to clear the Captured Count register is when the Enable Capture bit is reset (turned OFF). See **CTRIO FAQ0006** on our website.

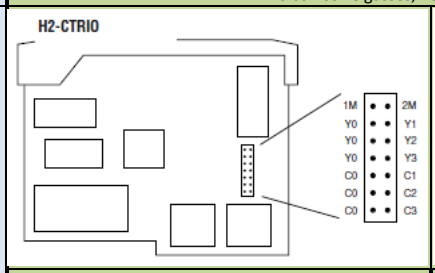
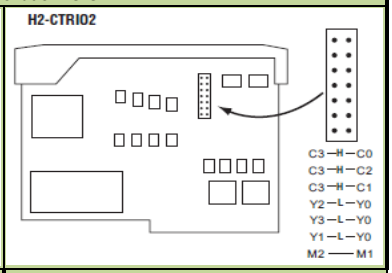
[3] CTRIOs do not support PLS Tables nor CTRIO2-only Pulse Profiles, but CTRIO2s do. If these are configured in a CTRIO, they cannot be used. Trying to use them with Ibox CTRLDPR or Do-more instruction CTTBLLD will result in error. However, since these are supported in CTRIO2s then both IBox CTRLDPR and Do-more instruction CTTBLLD can be used to load and run them. Also, the Dynamic Position Pulse Profile's frequency parameter is set in the profile itself and is a 16-bit word, therefore in the CTRIO2 a maximum frequency of 65,535 Hz can be used. Furthermore, since the Dynamic Velocity Pulse Profile's frequency is set in a 32-bit word (Parameter 3) at run time then the CTRIO2, in this case, can be utilized to its full capability of 250,000 Hz output frequency.

[4] CTRIO2s have 8 more registers available that contain the values for the software signal filters for each of its inputs (Ch1A, Ch1B, Ch1C, Ch1D, Ch2A, Ch2B, Ch2C & ChD).

[5] Even though the Pulse Output of the CTRIO2 can pulse at 250,000 Hz, the parameter that sets the frequency is only a 16-bit word thus limiting the maximum frequency to 65,535 Hz. Plus the Duty Cycle acts opposite from CTRIO to CTRIO2. A Duty Cycle of 30% means the output pulse will be OFF 30% of the time in the CTRIO but in the CTRIO2 it will be ON 30% of the time.



REPLACEMENT CONSIDERATIONS FOR H2-CTRIO/CTRIO2

FEATURE		H2-CTRIO	H2-CTRIO2
Module Type		Intelligent	
Power Consumption		400mA @ 5VDC	275mA @ 5VDC
Slot Placement Restrictions		No Slot 0 w/DL-PLC No Expansion I/O w/DL-PLC No ERM/EBC w/Do-more PLC	
Operating Environment		0-60°C (32-140°F) 5-95% humidity (non-condensing) No corrosive gasses, Pollution Level = 2	
Jumper settings			
		To reduce external wiring: 1M-2M (connects input commons) Y0-Y1 (connects outputs) Y0-Y2 (connects outputs) Y0-Y3 (connects outputs) C0-C1 (connects output commons) C0-C2 (connects output commons) C0-C3 (connects output commons)	**To reduce external wiring:** C3-H-C0 (connects output commons) C3-H-C2 (connects output commons) C3-H-C1 (connects output commons) Y2-L-Y0 (connects outputs) Y3-L-Y0 (connects outputs) Y1-L-Y0 (connects outputs) M2-M1 (connects input commons)
Physical Input Characteristics	Sink/Source	Both	
	Max Freq	100KHz	250KHz
	Min Pulse Width	5µs	0.5µs
	Input Voltage	9-30VDC @ 5-12mA Nominal range is 8mA @24VDC OFF below 2VDC @ 3mA ON above 9VDC	
	Max Voltage Drop	0.3V	
	OFF Voltage Blocking	36VDC	
	OFF to ON Response	<1µs	
	ON to OFF Response	<1µs	
Physical Output Characteristics	Sink/Source	4 Sink or 4 Source	
	Min Pulse Output Freq	20 Hz	
	Max Pulse Output Freq	25 KHz	250 KHz
	Protection	Thermal, over-voltage & over-current	
	Voltage Range	5-36VDC	
	Max Current	1 A / Point	
	Max Leakage Current	150µA @ 36VDC	
	Max Voltage Drop	0.3V	
	OFF Voltage Blocking	36 VDC	
	OFF to ON Response	<3µs	
	ON to OFF Response	<3µs	
Input Functions	Counter/Quad Counter	Identical	
	Pulse Catch	Identical	
	Edge/Dual-Edge Timer *[1]*	End/Start Not Simultaneous	End/Start Simultaneous
	Capture	If using hardware Reset input with Capture function see text in Reset row below	
	Limit	Identical	
	Inhibit	Identical	
	Reset *[2]*	If Firmware < 2.1.7 Harware Reset Clears Capture Value	Hardware Reset Keeps Capture Value
Output Functions	Raw	Identical	
	Discrete	Identical	
	Pulse	Varies (see IBoxes & Do-more Instructions)	
DL IBoxes	CTRADPT (IB-1005) Add Entry to End of Preset Table	Identical	
	CTRCLRT (IB-1007) Clear Preset Table	Identical	
	CTREDPT (IB-1003) Edit Preset Table Entry	Identical	
	CTREDRL (IB-1002) Edit Preset Table Entry and Reload	Identical	

REPLACEMENT CONSIDERATIONS FOR H2-CTRIO/CTRIO2

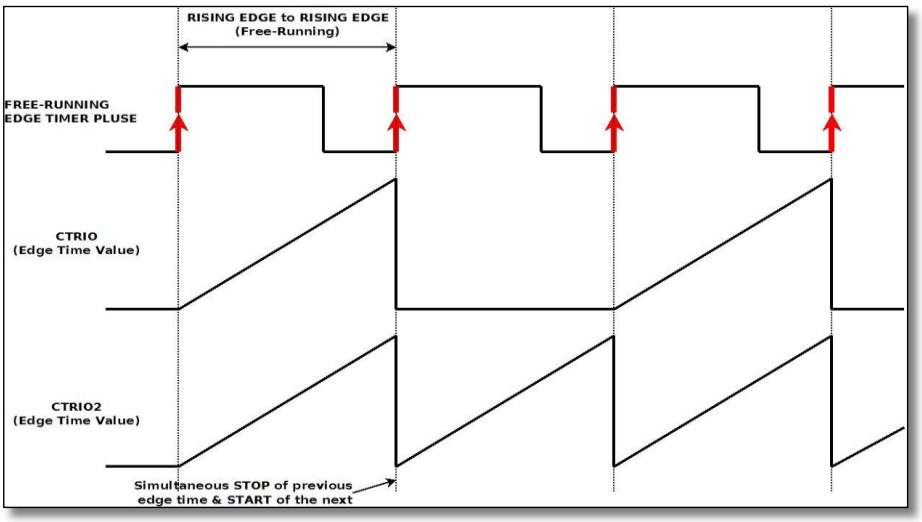
FEATURE		H2-CTRIO	H2-CTRIO2
	CTRELVL (IB-1015) Edit Level	Identical	
	CTRINPT (IB-1004) Initialize Preset Table	Identical	
	CTRINTR (IB-1010) Initialize Preset Table on Reset	Identical	
	CTRIO (IB-1000) Config	Identical	
	CTRLDPR (IB-1001) Load Profile *[3]*	No PLS Tables No CTRIO2-only Pulse Profiles Dynamic Position -->
Frequency: K20-K25000 Dynamic Velocity -->
Frequency: K20-K25000	PLS Tables CTRIO2-only Pulse Profiles Dynamic Position -->
Frequency: K20-K65535 Dynamic Velocity -->
Frequency: K20-K250000
	CTRRDER (IB-1014) Read Error Code	Identical	
	CTRRGRD (IB-1016) Register Read *[4]*	Source Register: K0-K11	Source Register: K0-K19
	CTRRGWR (IB-1017) Register Write *[4]*	Source Register: K0-K11	Source Register: K0-K19
	CTRRTLM (IB-1011) Run To Limit Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTLM2 (IB-1019) Run To Limit Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTPM (IB-1012) Run To Position Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRRTPM2 (IB-1020) Run To Position Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRVEL2 (IB-1018) Velocity Mode 2 *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRVELO (IB-1013) Velocity Mode *[5]*	Frequency: K20-K25000 Duty Cycle: K0-K99 (OFF)	Frequency: K20-K65535 Duty Cycle: K0-K99 (ON)
	CTRWFTR (IB-1006) Write File to ROM	Identical	
Do-more Instructions	CTAXCFG CTRIO2 Axis Configuration	N/A	New Feature
	CTAXDYNP CTRIO2 Axis Run Dynamic Position Mode	N/A	New Feature
	CTAXDYNV CTRIO2 Axis Run Dynamic Velocity Mode	N/A	New Feature
	CTAXJOG CTRIO2 Axis Jog Mode	N/A	New Feature
	CTAXLIMT CTRIO2 Axis Run Trapezoid w/Limits	N/A	New Feature
	CTAXTRAP CTRIO2 Axis Run Trapezoid	N/A	New Feature
	CTDYNPOS CTRIO Run Dynamic Position Mode *[6]*	Max Freq = 25000 No CTRIO2 profiles	Max Freq = 65535 New: CTRIO2 Profiles -->
Max Freq = 250000
	CTDYNVEL CTRIO Run Dynamic Velocity Mode *[7]*	Frequency: 20-25000	Frequency: 20-250000
	CTPLSADD CTRIO Add Entry to PLS	N/A	New Feature
	CTPLSEDT CTRIO2 Edit PLS Entry	N/A	New Feature
	CTREGRD CTRIO Read Register *[4]*	Source Register: 0-11	Source Register: 0-19
	CTREGWR CTRIO Write Register *[4]*	Source Register: 0-11	Source Register: 0-19
	CTRUNPOS CTRIO Run Position Mode *[6]*	Max Freq = 25000 No CTRIO2 profiles	Max Freq = 65535 New: CTRIO2 Profiles -->
Max Freq = 250000
	CTRUNVEL CTRIO Run Velocity Mode *[8]*	Frequency: 20-25000 Duty Cycle: 0-99 (OFF)	Frequency: 20-250000 Duty Cycle: 0-99 (ON)
	CTTBLADD CTRIO Add Entry to Preset Table	Identical	
	CTTBLCLR CTRIO Clear Table	Identical	
	CTTBLEDT CTRIO Edit Preset Table Entry	Identical	

REPLACEMENT CONSIDERATIONS FOR H2-CTRIO/CTRIO2

FEATURE		H2-CTRIO	H2-CTRIO2
	CTTBLLD CTRIO Load Table *[9]*	No PLS Tables	PLS Tables
	CTUPDLVL CTRIO Update Level	Identical	

NOTES:

[1] With free-running Edge Timer configured, the ending edge will simultaneously be the starting edge for CTRIO2.

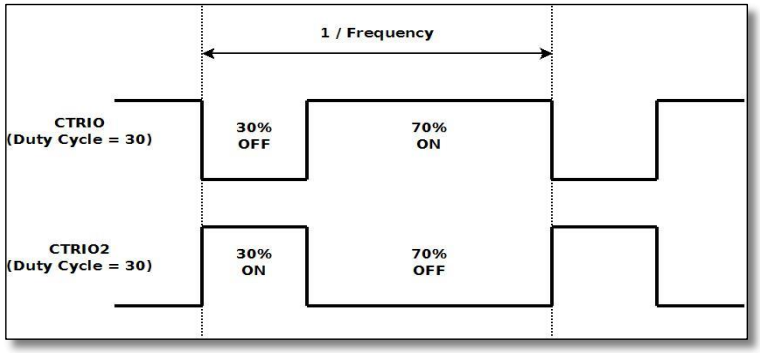


[2] In CTRIOs w/firmware earlier than v2.1.7 the Reset Input will clear both the Current Count register & the Captured Count register. Starting with CTRIO firmware v2.1.7 (and in all CTRIO2s), the Reset Input will only clear the Current Count register. The only way to clear the Captured Count register is when the Enable Capture bit is reset (turned OFF). See **CTRIO FAQ0006** on our website.

[3] CTRIOs do not support PLS Tables nor CTRIO2-only Pulse Profiles, but CTRIO2s do. If these are configured in a CTRIO, they cannot be used. Trying to use them with IBox CTRLDPR or Do-more instruction CTTBLLD will result in error. However, since these are supported in CTRIO2s then both IBox CTRLDPR and Do-more instruction CTTBLLD can be used to load and run them. Also, the Dynamic Position Pulse Profile's frequency parameter is set in the profile itself and is a 16-bit word, therefore in the CTRIO2 a maximum frequency of 65,535 Hz can be used. Furthermore, since the Dynamic Velocity Pulse Porfile's frequency is set in a 32-bit word (Parameter3) at run time then the CTRIO2, in this case, can be utilized to its full capability of 250,000 Hz output frequency.

[4] CTRIO2s have 8 more registers available that contain the values for the software signal filters for each of its inputs (Ch1A, Ch1B, Ch1C, Ch1D, Ch2A, Ch2B, Ch2C & ChD).

[5] Even though the Pulse Output of the CTRIO2 can pulse at 250,000 Hz, the parameter that sets the frequency is only a 16-bit word thus limiting the maximum frequency to 65,535 Hz. Plus the Duty Cycle acts opposite from CTRIO to CTRIO2. A Duty Cycle of 30% means the output pulse will be OFF 30% of the time in the CTRIO but in the CTRIO2 it will be ON 30% of the time.



[6] The Maximum Frequency parameter for the CTRIO Pulse Profiles is a 16-bit word thus limiting the maximum frequency to 65,535 Hz in a CTRIO2. However, the Maximum Frequency parameter for the CTRIO-only Pluse Profiles can be set to the full capacity of the CTRIO2 of 250,000 Hz.

[7] The Frequency parameter of the Do-more instruction CTDYNVEL is a 32-bit word thus allowing the full 250,000 Hz for the CTRIO2.

[8] The Frequency parameter of the Do-more instruction CTRUNVEL is a 32-bit word thus allowing the full 250,000 Hz for the CTRIO2. Also, the Duty Cycle acts opposite from CTRIO to CTRIO2. A Duty Cycle of 30% means the output pulse will be OFF 30% of the time in the CTRIO but in the CTRIO2 it will be ON 30% of the time. See diagram in Note ***[5]*** above.

[9] CTRIOs do not support PLS Tables but CTRIO2s do. If a PLS Table is configured in the CTRIO, it cannot be used. Trying to use one with Do-more instruction CTTBLLD will result in an error.