Programmable Limit Switch (PLS)

Associated files:

- PLS Demo.qcp
- PLS – PLT ON OFF.qcp

Required Software

SilverDust Firmware (not available on SilverNugget):
    SilverDust MG – Rev 15-10
    SilverDust IG & IGB – Rev 15-11

QuickControl
    Rev 4.3 Service Release 3

Overview

The PLS command allows user to construct a data table up to any number of pre-defined of trigger points. The pre-defined trigger points will be stored in the user registers in terms of position in counts. The flexibility of the command also enables user to choose the I/O to trigger and the modulo point where the cycle repeats.

The controller's interrupt cycle compares the current position with the positions in the data table every 120 uSec (microseconds). When the transition point is reached, the state of the I/O will transition automatically.

Command PLS Parameters & Data Table

The PLS command has four parameters.

1) The first parameter is the IO line number to be triggered. Output 2 in this example.

2) The second parameter is the initial state of the output, which is High(1) in this case.

3) The third parameter is the base register or starting register of the data table where the predefined trigger points are located.
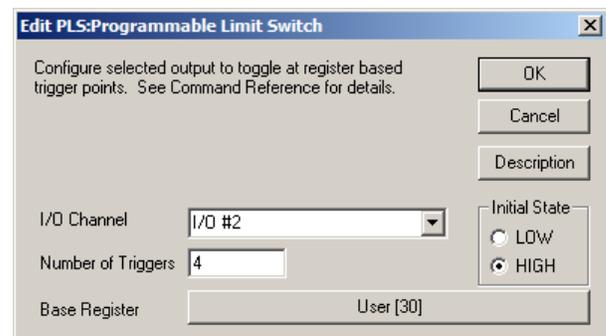
4) The last parameter is the number of desired trigger points. The number of registers needed is the number of trigger points + 2. If the starting register is 30, then registers 30, 31, 32, 33, 34 and 35 must be reserved for this operation. Any changes in those registers while the PLS command is active will produce undesirable results at the output stage.

Data Table

For the above example, the following data table is constructed:

Example 1:

Register 30 – Reserved
Register 31 – Modulo Value
Register 32 – First Transition Point
Register 33 – Second Transition Point
Register 34 – Third Transition Point
Register 35 – Last Transition Point

Register #	Values
Register 30	NA
Register 31	16000
Register 32	1000
Register 33	4000
Register 34	5000
Register 35	7000

Timing Diagram for 1 Cycle
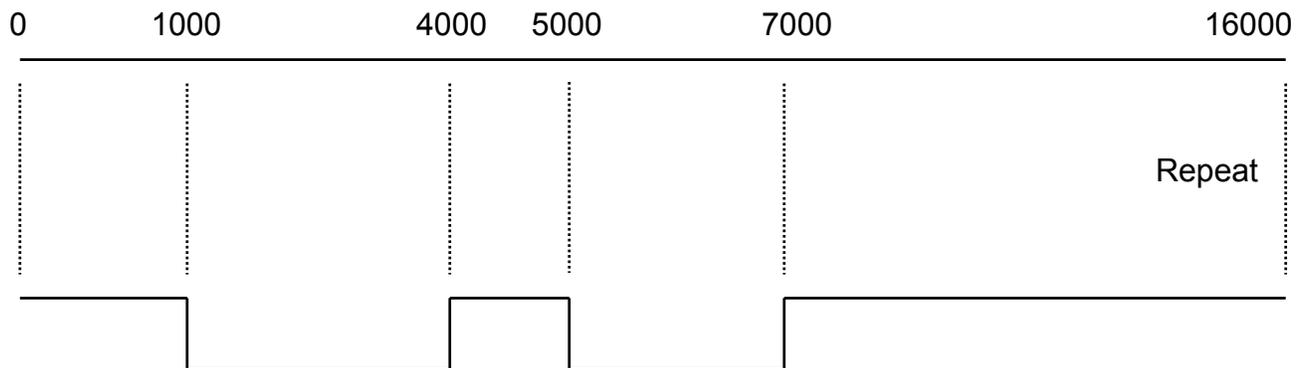
Note: The number of triggers can be any arbitrary value up to the amount of free registers available.

PLS Demo.qcp

Line# Oper	Label	Command
1:REM		Programmable Limit Switch Example.
2:REM		******Constructing the Data table*****
3:REM		Modulo value
4:WRP		Write 16000 to "User[31]" Register
5:REM		Trigger points in ascending order This is an example with 4 trigger points. If an odd number is chosen, an additional transiton will occur at the modulo point.
6:WRP		Write 1000 counts to "User[32]" Register
7:WRP		Write 4000 counts to "User[33]" Register
8:WRP		Write 5000 counts to "User[34]" Register
9:WRP		Write 7000 to "User[35]" Register
10:REM		IO #1 - 116 must be configured as output prior to selecting them with a PLS command. The ouput state should match the intial condition set in the PLS command. This example uses I/O #2.
11:CIO		Configure "I/O #2" as Output and Set(HIGH)
12:REM		PLS Command Setup.
13:PLS		Programmable Limit Switch
14:REM		Now entering Velocity mode to see the trigger points on I/O #2.
15:VMP		Velocity Mode: acc=400000.98 cps/s, vel=4000 cps

Flexibility: Registers 31-35 can be modify on the fly to change the location of trigger points as well as the modulo value. The new value will take effect next servo cycle. The delay will be one servo cycle = 120 uSec.

Caution: PLS is a mode command. The command is active until a stop command or an all halt command issue. I/O trigger will still occur if the shaft rotated manually by user during driver motor disable period. An alternative to turning off I/O triggering is the PLT command. See PLT description below.

Programmable Limit Trigger (PLT)

Programmable Limit Trigger (PLT) allows enabling/disabling I/O triggering set up by PLS. PLT also provides additional flexibility by changing the number of trigger points without resetting the modulo counter. For example, if the application requires 4 triggers from 10000 – 20000 counts and only 2 triggers from 20000-30000 counts. Please note that in order to use PLT, prior PLS command setup is required.
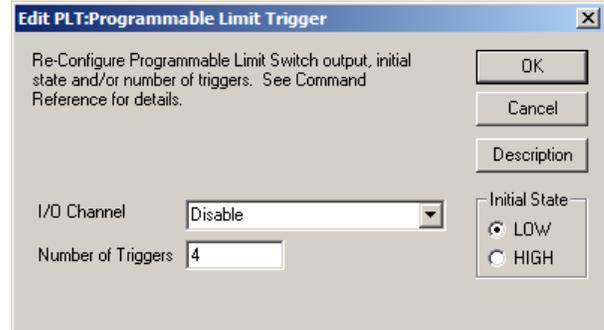
1) Select the same or a different I/O to trigger. Set "IO Line #" to 0 to turn off triggering.

2) Select the same or different initial state.

3) Select the same or different number of trigger points. The starting base register remains the same.

See "PLS – PLT ON OFF.qcp" for example.