

# THE PAIN TRAIN

*Two trains operating on oval tracks share a common track segment. We'll refer to one train as the outer loop train and the other as the inner loop train. You are to design a logic controller to operate the trains. Logic level signals will be available to indicate when a train is entering and exiting the common track segment. Using relays, your logic can control when a track segment has power applied. Additionally, when a train is approaching the common track segment, you need to properly signal a track selector rail switch that will then allow the train to pass through the common segment. Since the speed of the trains is controlled externally, the trains may travel at different speeds. Therefore, you need to configure the common track segment with the appropriate power to maintain the speed of the train. Your goal is to avoid a collision of the trains!*

## INPUTS

Name	Active	Sticker #	Altera Side #	Altera Pin #
Outer Left	High	1	15	4
Inner Left	High	2	17	6
Inner Right	High	3	19	9
Outer Right	High	4	21	11

NOTE: Directions (left or right) from facing the front of the train board.

## OUTPUTS

Name	Active	Sticker #	Altera Side #	Altera Pin #
Inner Track Power	High	1	27	20
Outer Track Power	High	2	29	22
Common Track Power Enable	High	3	31	25
Common Track Power Select	High-Outer Low-Inner	4	33	28
Train Selector Switch	High-Outer Low-Inner	5	35	30
Train Selector Switch Pulse	High	6	37	33

NOTE: Train Selector Switch Pulse should be active for ~ 0.1 sec.

## Assumptions

- One train per track
- Trains traveling from left to right
- Trains will be traveling at arbitrary speeds
- Neither train will start in common area