

**Suggested Materials List (Based on a 4 Lane Track)**

Component	Quantity	Comments	AllElectronics.com Part #	Qty
10K ohm, 1/4W Resistor	8	For reference voltage and sensor connection	10K-1/4	\$0.50 / 10
2.2K ohm, 1/4W Resistor	4	On output of chip	2.2K-1/4	\$0.50 / 10
330 ohm, 1/4W Resistor	6	Optional for power, lane, start indicator LED's	330-1/4	\$0.50 / 10
47 ohm, 1/2W Resistor	4	For IR LED's	47-1/2	\$0.50 / 10
100 µF Capacitor	1	For Voltage Regulator	100/16VR	\$0.15 ea
10 µF Capacitor	1	For Voltage Regulator	10/16VR	\$0.10 ea
100 ηF Capacitor (0.1 µF)	1	For Voltage Regulator	SA-104	\$0.10 ea
7805 5V Voltage Regulator	1	Voltage Regulator	7805T	\$0.50 ea
Heat Sink	1	For Voltage Regulator	HS-125	\$0.40 ea
LM339 Quad Comparator	1	IC Chip	LM339	\$0.60 ea
14 Pin IC Socket	1	Chip Socket	ICS-14	\$0.20 ea
IR Phototransistor	4	For detecting finish	PTR-1	2x \$1.30 / 2
IR LED	4	Provides IR light for above	ILED-8	2x \$1 / 3
Red LED (can be any colour)	6	Optional, for lane, power & start status	LED-1	\$1 / 10
Panel Mount LED Holders	8	to secure indicator LED's to finish line frame	HLED-4	\$1.20 / 10
Printed Circuit Board	1	Radio Shack Part # 276-170		\$3.29 ea
Stand-Offs	4	6-32 thread by .69"	SP-152	\$1.25 / 10
18 AWG red and black power cable	7'	for power from board to plug and start switch	WRB-18	\$1.50 / 10'
22 AWG Solid Wire Assortment	1 pkg		JW-140	\$6.25 / pkg
Heat Shrink Tubing	1	Optional but a good idea	HUG-316B	\$1.60 / 4' pc
25 Pin D-Type Connector	1	For parallel port connection	DB-25P	\$0.69 ea
CAT 5 Jack	2	For finish line connections		
CAT 5 Cable 25' - 40'	1	For finish line connections		
1/8" Phone Jack - Open Circuit Type	1	For start switch connections	PMP	\$0.40 ea
1/8" Phone Plug	1	For start switch connections	MJW-11	\$0.25 ea
Co-axDC Power Jack 2.5mm	1	For power supply to circuit	DCJ-25	\$1.25 ea
Power Supply for Circuit Board	1	9VDC 500mAmp	DCTX-952	\$3.50 ea
Solenoid Start Gate System				
Power Supply for Solenoid	1	24VDC 600mA 2.1 mm co-ax	DCTX-2460	\$4.50 ea
Co-ax DC Power Jack 2.1mm	1	for supply power for solenoid	DCJ-21	\$1.20 ea
Solenoid	1	For computer release of gate	SOL-128	\$4 ea
Power Mosfet	1	Power Mosfet to switch Solenoid	IRF740	\$1.50 ea
Tools and Supplies				
Solder - Rosin Core, 0.032" diameter	1	110" in a tube	TS-110	\$1.25 / pkg
Desolder Braid	1 pkg	For removal of solder	SWK	\$1 / 5'pkg
Soldering Heat Sink	1	Optional, to protect sensitive components during soldering		

ITEM/Section	Description	Location
Power In	Supply 8-18VDC +	A1
	Supply 8-18VDC -	Y1
Resistor	330 ohm	E1-G2
Resistor	330 ohm	G1-J2
LED	Power on	J1-Y2
Voltage Regulator	5V	A2,3,4
Capacitor	100 uF	D2-D3
Capacitor	10 uF	H4-I5
Capacitor	.1uF	E4-G4
Jumper		B1-B2
Jumper		C4-X5
Jumper		E3-F4
Jumper		J4-Y4
Jumper		F5-D4
IC Chip		
Quad Comparitor 339	Pin 7	E15
Quad Comparitor 339	Pin 14	F21
Jumper	+Feed	A19-X19
Jumper	-Feed	J19-Y19
Referece Voltage		
Jumper		X10-A10
Jumper		E10-F10
Jumper		E11-F11
Jumper		J11-Y11
Jumper		D15-D17
Jumper		G16-G18
Resistor	10K ohm	B10-B15
Resistor	10K ohm	C11-C15
Resistor	10K ohm	H10-H16
Resistor	10K ohm	I11-I16
Lane Sensor Feeds		
Resistor	Lane 1 10K ohm	B18-B23
Resistor	Lane 2 10K ohm	C16-C23
Resistor	Lane 3 10K ohm	G10-G15
Resistor	Lane 4 10K ohm	I17-I23
Jumper		X25-A23
Jumper		E23-F23
Lane Sensors		
Lane 1	Phototransistor	A18-Y
Lane 2	Phototransistor	A16-Y
Lane 3	Phototransistor	J15-Y
Lane 4	Phototransistor	J17-Y
Start	Switch	J32-Y
Lane Output		
Resistor	Lane 1 2.2K ohm	A21-X23
Resistor	Lane 2 2.2K ohm	D20-D23
Resistor	Lane 3 2.2K ohm	H21-H23
Resistor	Lane 4 2.2K ohm	G20-G23
Jumper	Lane 1	C21-I29
Jumper	Lane 2	A20-I28
Jumper	Lane 3	J21-I27
Jumper	Lane 4	J20-I26
Optional Lane Output LED's		
LED	Start	F31-E31
LED	Lane 1	F29-E29
LED	Lane 2	F28-E28
LED	Lane 3	F27-E27
LED	Lane 4	F26-E26
Resistor	Start 330 ohm	C31-X31
Resistor	Lane 1 330 ohm	C29-X29
Resistor	Lane 2 330 ohm	C28-X28
Resistor	Lane 3 330 ohm	C27-X27
Resistor	Lane 4 330 ohm	C26-X26

Connector/Function	pin #	Wire Colour	
8 pos CAT 5 on box and Track Finish Line			
L 4	1	Wh/Gn	J17
L 3	2	Gn	J15
L 2	3	W/Or	A16
5V+	4	Bl	J10
Ground	5	Wh/Bl	Y13
L 1	6	Or	A18
Start Ground	7	Wh/Br	Y28
Start	8	Br	I32
Start Tree	DB9		DB25
Ground	1	Wh/Br	18-25
Optional Start	2	Br	J32
Prerace	3	Bl	3
Yellow	4	Wh/Bl	4
Yellow	5	Or	5
Yellow	6	Wh/Or	6
Green	7	Gn	7
Red	8	Wh/Gn	8
Parallel Interface	DB25		
Lane 1	10	Wh/Or	J29
Lane 2	11	Or	J28
Lane 3	12	Wh/Bl	J27
Lane 4	13	Bl	J26
Start Switch	15	Gn	J31
Start Solenoid	2	Wh/Gn	J33
Ground	18-25	Wh/Br	Y33
Connect Br from DB9 to Br from J32			

Optional: Add a SPDT 3 position switch at G or H 31,32,33 for swithing between start switch and start solenoid  
You can also do this with a jumper.  
For a switch jumper G31 to G32 for a solenoid G32 to G33  
NOTE:  
Start switch or solenoid can be connected to any of the finish gate, main circuit box or start light tree.