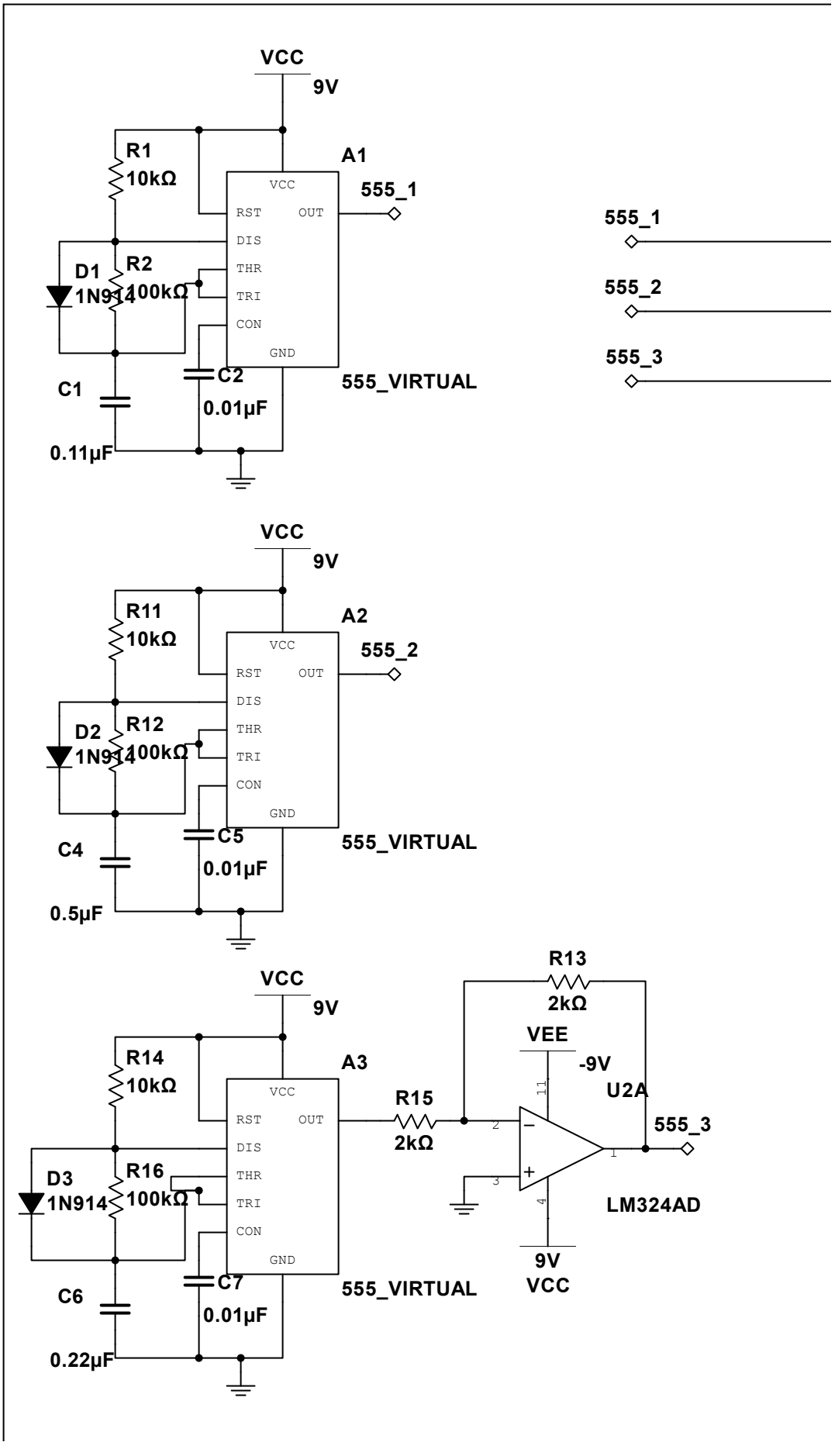
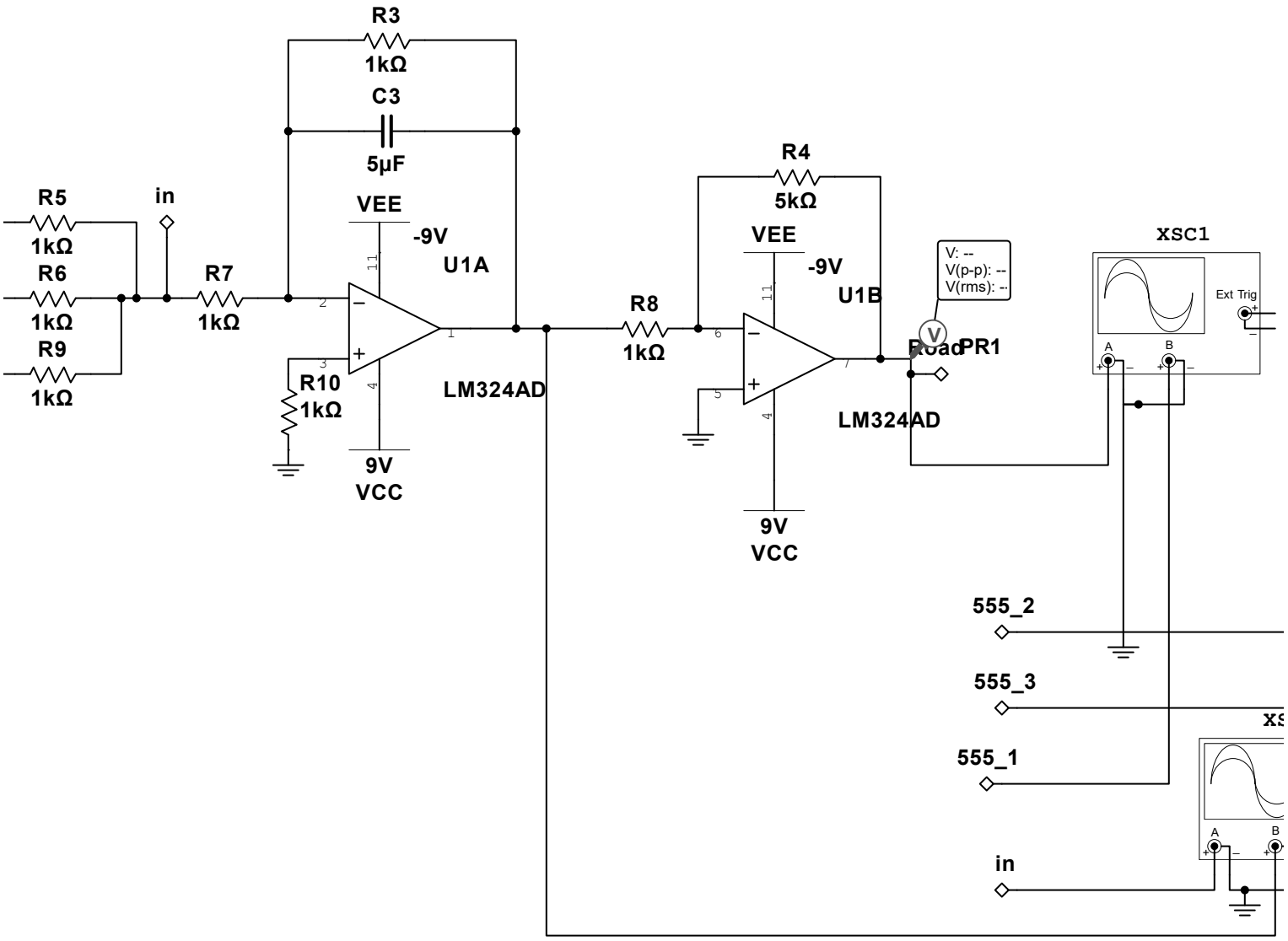
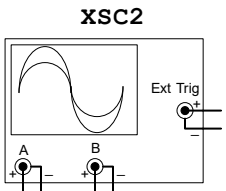

VCC
9V
R1
10kΩ
A1
VCC
555_1
RST
OUT
DIS
THR
TRI
CON
GND
D1
1N914
R2
100kΩ
C1
0.11µF
C2
0.01µF
555_VIRTUAL
555_1
555_2
555_3
VCC
9V
R11
10kΩ
A2
555_2
D2
1N914
R12
100kΩ
C4
0.5µF
C5
0.01µF
555_VIRTUAL
R13
2kΩ
VCC
9V
VEE
-9V
R14
10kΩ
A3
R15
2kΩ
U2A
555_3
D3
1N914
R16
100kΩ
LM324AD
C6
0.22µF
C7
0.01µF
555_VIRTUAL
9V
VCC

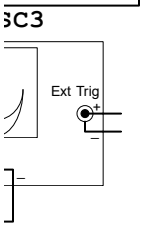


The road circuit generates a windy path of voltages that can be shown on the road display circuit. This is create square waves generated with three 555 timer circuits. These signals are summed up into one input signal which integrator circuit. This integrator smooths out the input signal and outputs a windy path. This output signal is in inverting gain op amp with a gain of 5. This increases the output of the signal allowing it to be more readily dete display circuit.

The final generated road can be seen in oscilloscope XSC1.

Road Circuit

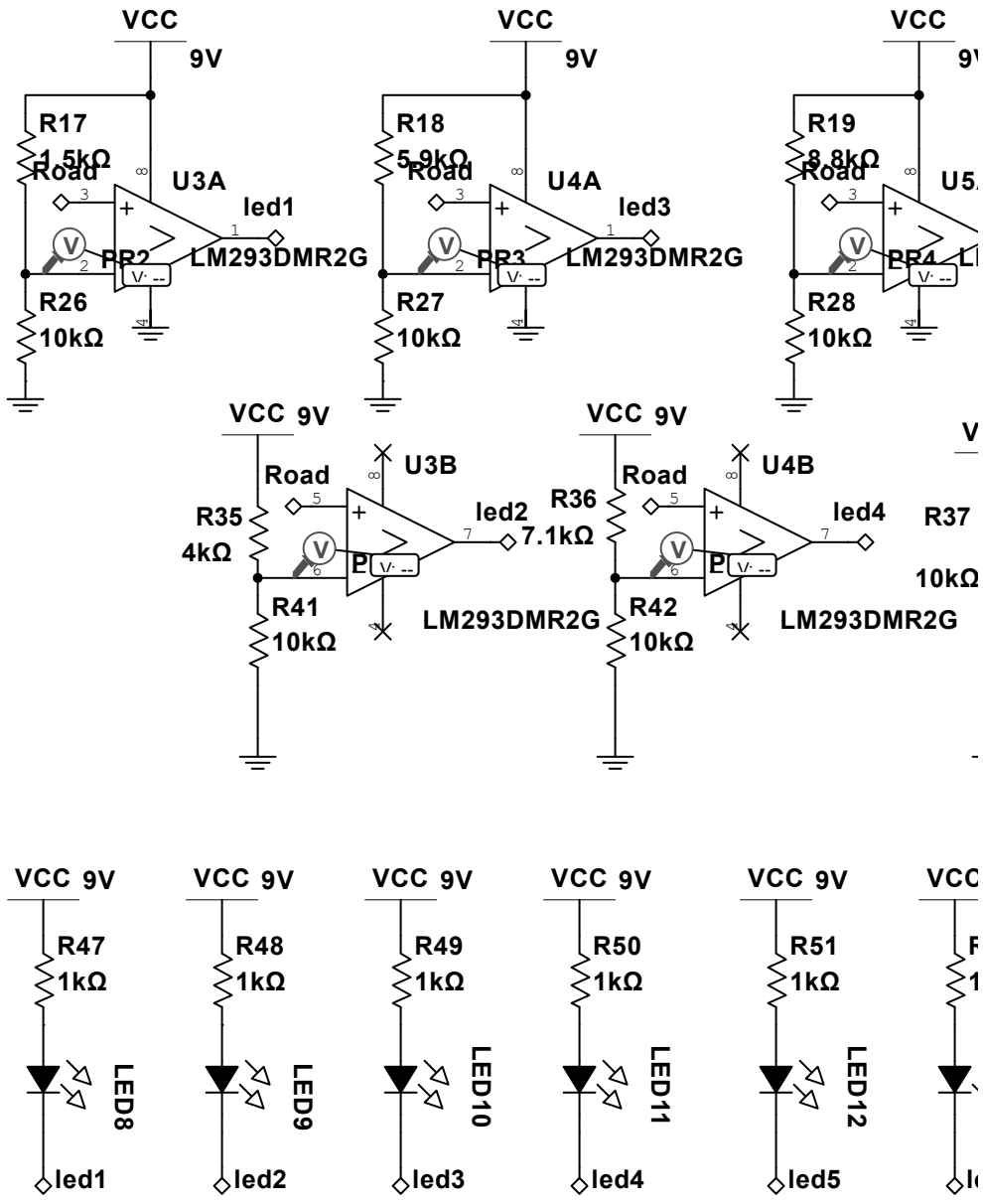




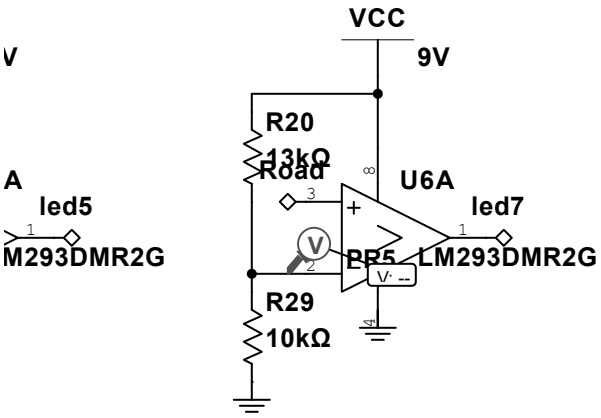
ed via 3 different
n is fed into an
putted into an
ected by the road

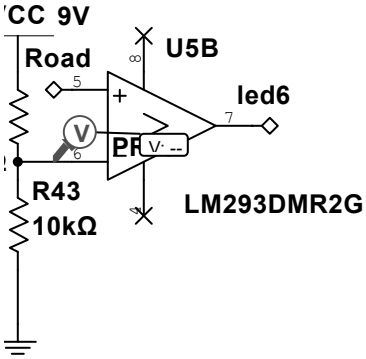
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	

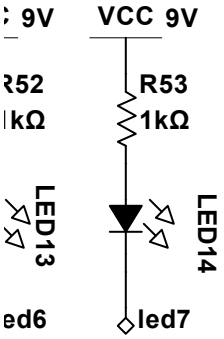
Road Display

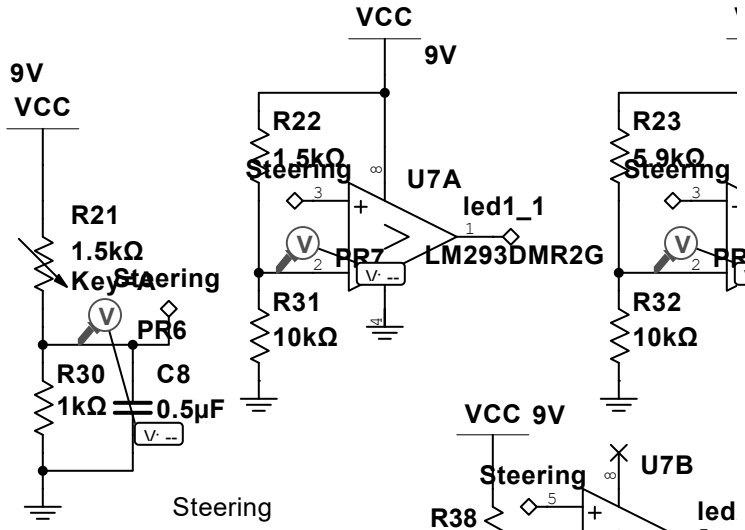


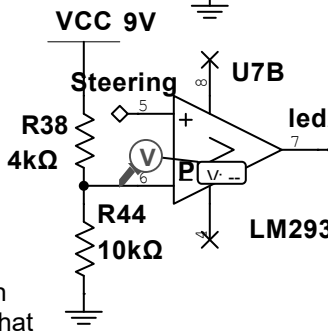
The status circuit display what the difference between the road anc
If all of the lights are on, the car is on the road and is "winning." As
drifiting off of the road. Due to circuit lag and how much the road v
and has a slow start up time when the simulation is turned on.



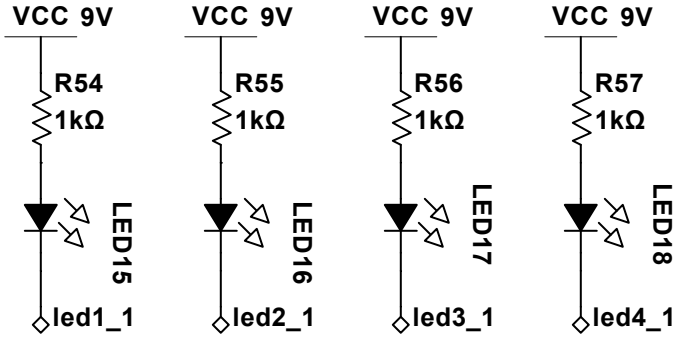








This voltage divider serves as a steering wheel for the car. The outputted voltage is compared with reference voltages to determine what direction the car is pointing. The added capacitor serves as a lag feature to increase diffcultly of steering.



The leds represent which direction the car is driving. If no l
all the way left. If all 7 leds are on, the car is pointing all th
the car is driving straight forward.

The leds are separated from their respective comparators h

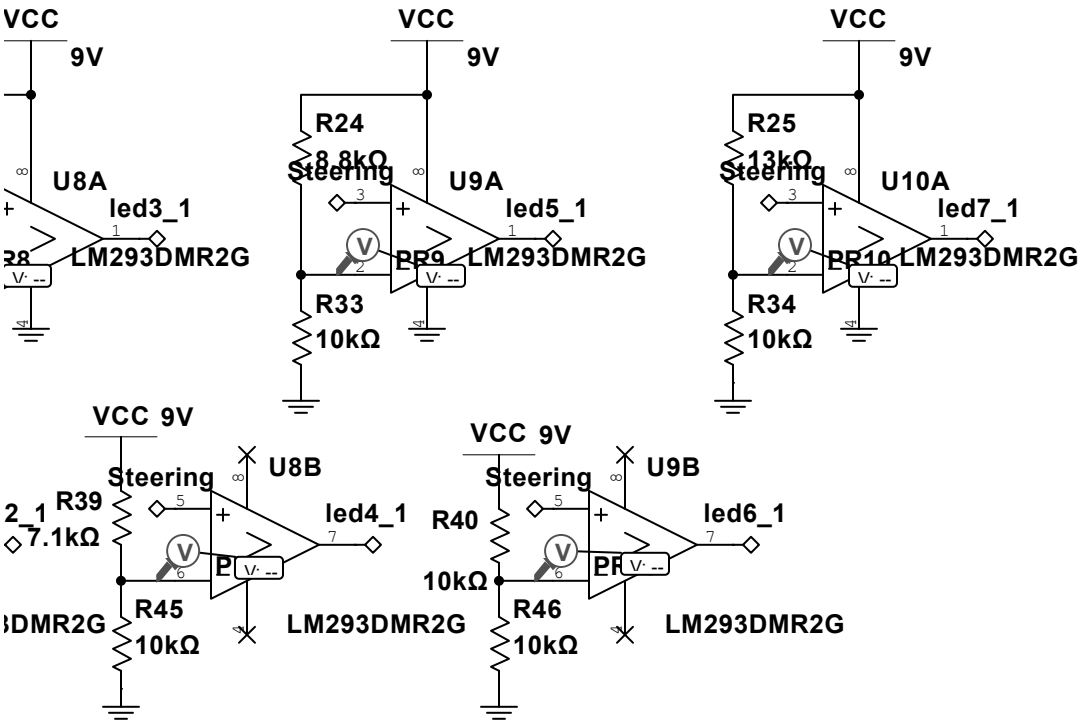
Steering Wheel
100 %

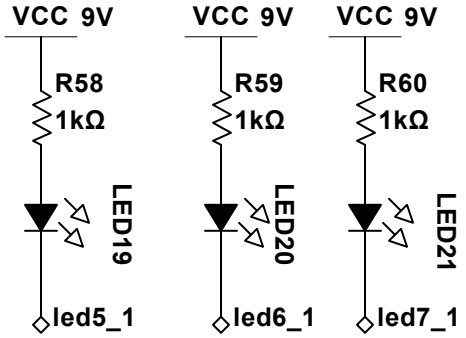
l the steering position is.
s the lights turn off, the car is
varies this is not entirely accurate

Status

Subtractor Circuit

Steering





10% - led 1 on
30% - led 2 on
40% - led 3 on
50% - led 4 on
60% - led 5 on
70% - led 6 on
90% - led 7 on

leds are on, the car is pointing
e way right. If 4/7 leds are on,

here to better illustrate this guage effect.

K

L

M

N

O

P

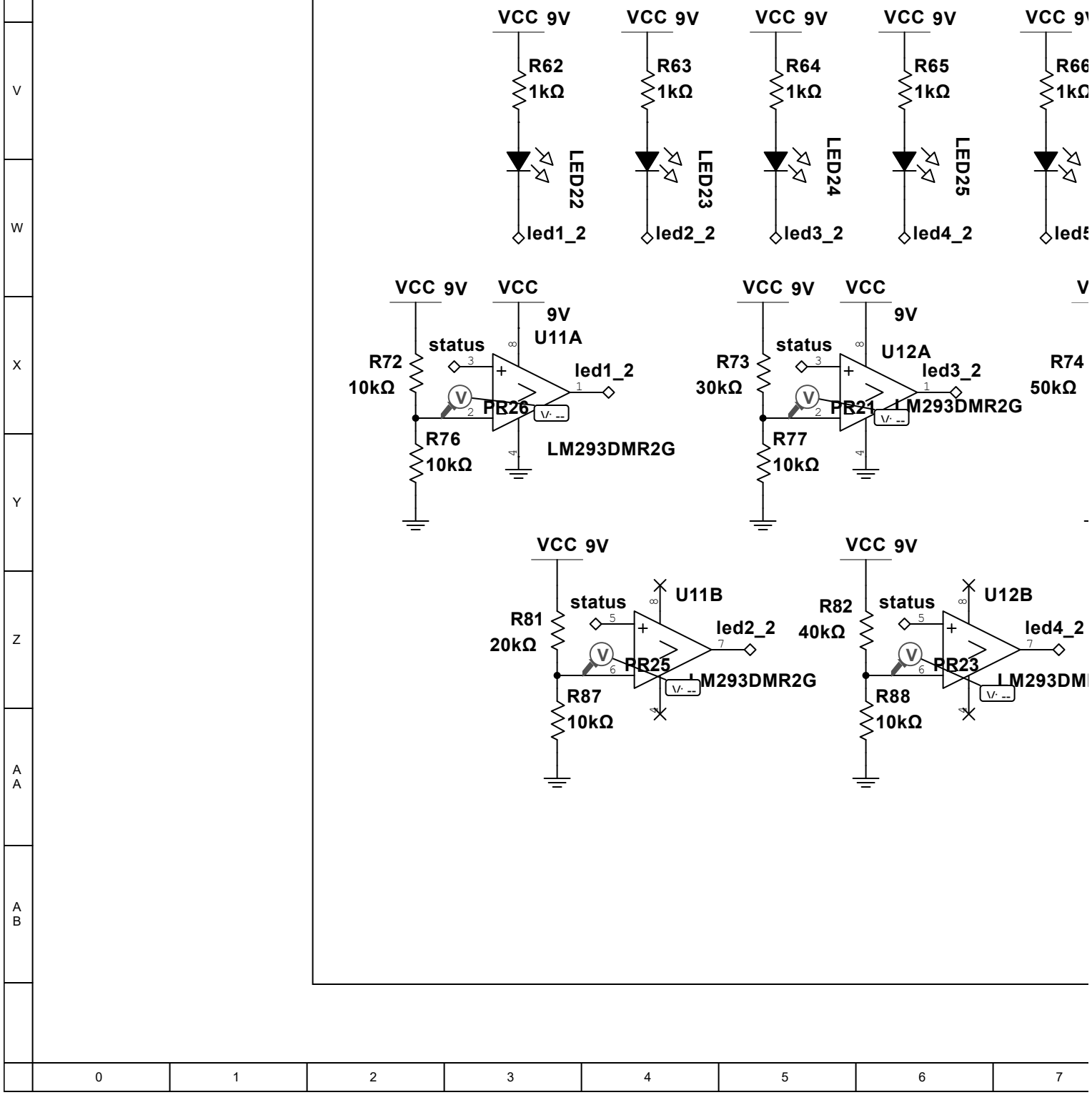
Q

R

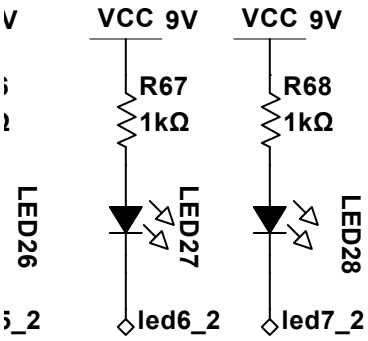
S

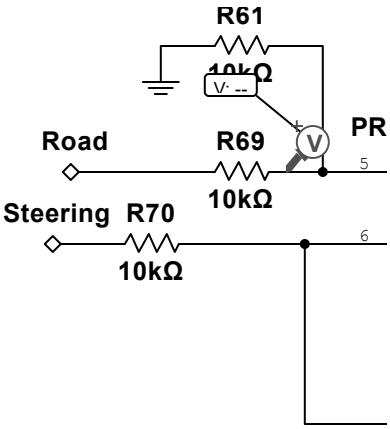
T

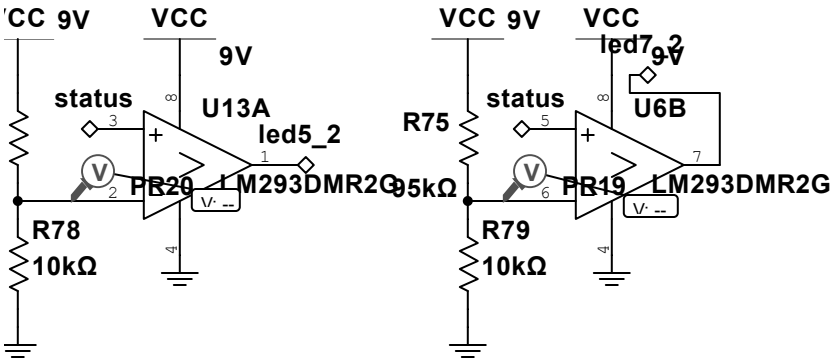
U


VCC 9V
R62
1kΩ
LED22
led1_2
R63
1kΩ
LED23
led2_2
R64
1kΩ
LED24
led3_2
R65
1kΩ
LED25
led4_2
R66
1kΩ
led5
VCC
9V
U11A
status
R72
10kΩ
led1_2
PR26
R76
10kΩ
LM293DMR2G
U12A
R73
30kΩ
led3_2
PR21
R77
10kΩ
R74
50kΩ
LM293DMR2G
U11B
R81
20kΩ
led2_2
PR25
R87
10kΩ
LM293DMR2G
U12B
R82
40kΩ
led4_2
PR23
R88
10kΩ
LM293DM

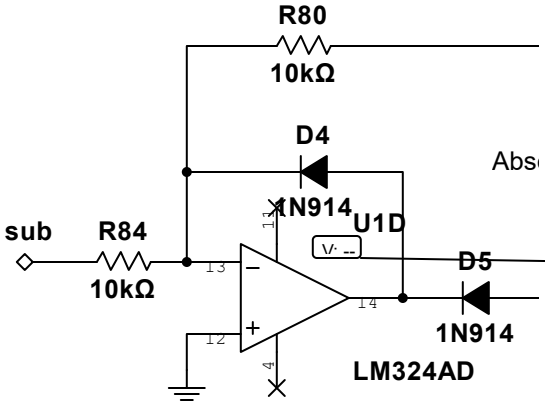
	0	1	2	3	4	5	6	7

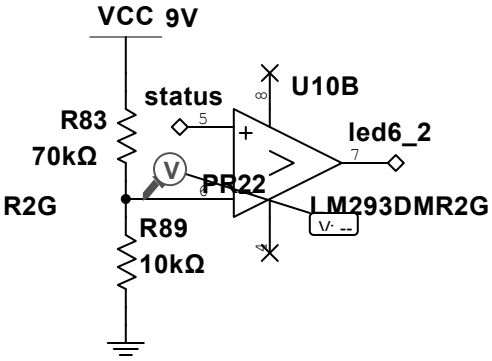






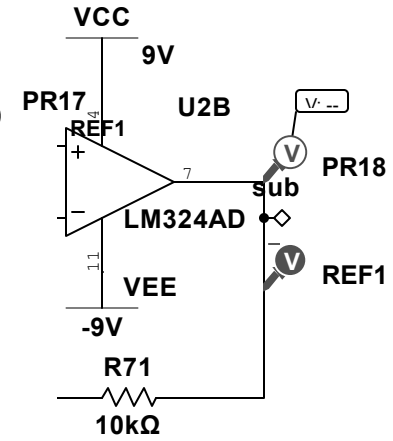
A subtractor circuit to determine the dif
Vout = Road - Steering





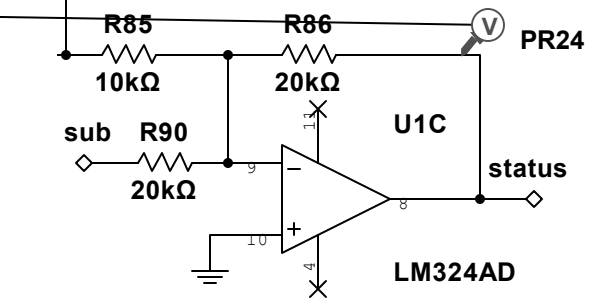
An absolute value circuit that performs the
The output from this will be used to deterr

	8	9	10	11	12	13	14	15



ference between the road voltage and the steering voltage.

olute Value Circuit



e operation Vout = |sub| = |Road - Steering|
nine how far from the intended direction the car is steering in (i.e. is it crashing).

	16	17	18	19	20	21	22	

V
W
X
Y
Z
AA
AB