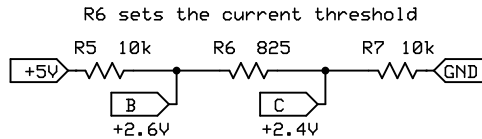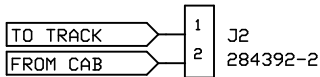# DC Model Train Block Occupancy Detector
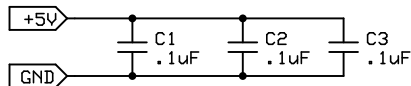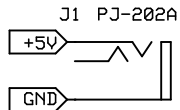
Minimum Current Detected = +100mA and -100mA
Time to Detect a Train = .1 Second

J1 PJ-202A

+5V
GND

+5V
GND
C1 .1uF
C2 .1uF
C3 .1uF

TO TRACK
FROM CAB
1
2
J2
284392-2

R6 sets the current threshold

R5 10k   R6 825   R7 10k
+5V —WWW—•—WWW—•—WWW— GND
         B   C
       +2.6V   +2.4V

R6 Value - Current Threshold
825 - 100mA
619 - 75mA
412 - 50mA
165 - 20mA
82.5 - 10mA not recommended without
       adding hysterisis

Offset Adjustment

R8 10k   R9 1k   R10 10k
+5V —WWW—•—WWW—•—WWW— GND
         A
         C4
         .1uF
      GND
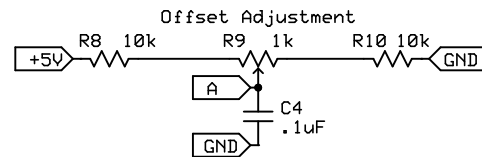
Disconnect track power from J2 and adjust R9
until the voltage at D is halfway between B and C.

Hall Effect Transducer

U1 ACS723LLCTR-05AB-T

TO TRACK
FROM CAB
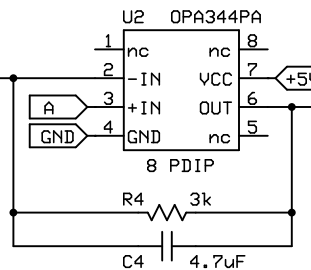1 IP+   VCC 8 +5V
2 IP+   VOUT 7
3 IP-   BW 6 +5V
4 IP-   GND 5 GND

SOIC-8
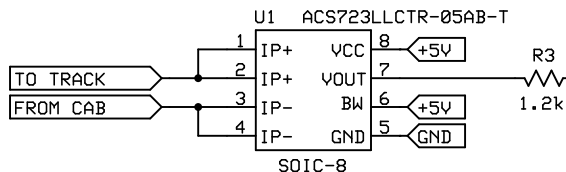
.4V/A HALL EFFECT IC
Vout = 0.5V when Iin = -5A
Vout = 2.492V when Iin = -20mA
Vout = 2.5V when Iin = 0A
Vout = 2.508V when Iin = +20mA
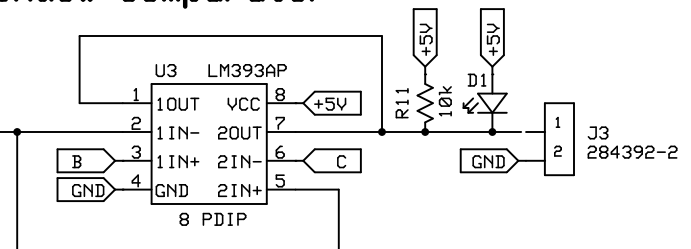Vout = 4.5V when Iin = +5A

x-2.5 Amplifier

R3 1.2k

U2 OPA344PA

1 nc   nc 8
2 -IN   VCC 7 +5V
A 3 +IN   OUT 6
GND 4 GND nc 5

8 PDIP

R4 3k
C4 4.7uF

X-2.5 GAIN OP AMP
Final Conversion Ratio = 1V/A
R4-C4 form a 11.3Hz LPF
Transient Response = .1 Second
Vnoise = 370uVrms in 11.3Hz BW

Window Comparator

D

U3 LM393AP

1 1OUT   VCC 8 +5V
2 1IN- 2OUT 7
B 3 1IN+ 2IN- 6 C
GND 4 GND 2IN+ 5

8 PDIP

R11 10k
D1
GND
1
2
J3
284392-2

OPEN COLLECTOR VOLTAGE COMPARATOR

This output floats high until a train is detected.
A train is detected when amplifier output is > than B OR < than C.

Chaz

Train Detector

V4
3/31/2019