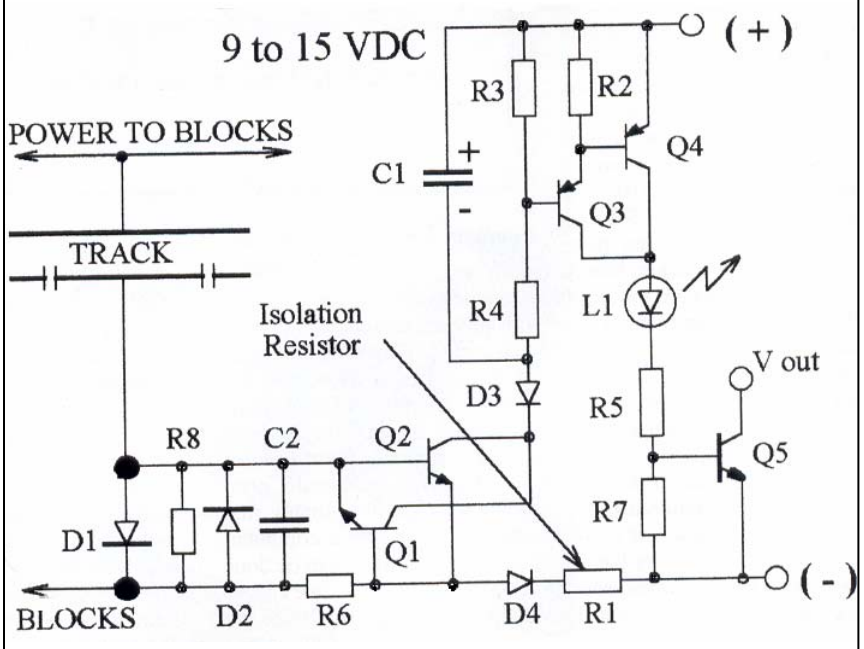
PARTS LIST

Qty.	Symbol	Radio Shack	Description
2	R1,R2	271-1347	100K, 1/4W resistor (brown, black, yellow)
2	R3,R4	271-1345	470K, 1/4W resistor (yellow, violet, yellow)
2	R5,R6	271-1115	470, 1/2W resistor (yellow, violet, brown)
2	R7,R8	271-1312	1K, 1/4W resistor (brown, black, red)
2	D1,D2	276-1661	6 Amp, 50 PIV diode
2	D3,D4	276-1620	10 ma, 50 PIV diode
1	C1	272-1012A	4.7 uf, 35 V elect. Cap
1	C2	272-1069	0.1 uf, capacitor
1	Q1,Q2	276-1617	NPN transistor Hfe:200
1	Q3,Q4	276-1604	PNP transistors.
1	Q5	276-2017	NPN power transistor
1	L1	276-1622	Diffused LED



BLOCK OCCUPANCY *with 100K Isolation*

Fig. 1 Block Occupancy Detector Schematic with 100K Isolation

by Robert Frey

With DCC train control, there are two wires with AC power applied to each track and a common bus between all boosters. If signaling is going to be used, then there is a need for isolation between blocks, booster, control bus and the SIGNAL COMMON. Thus occupancy circuit isolation has been generally done in the form of relay contacts, opto-isolators, or current-sensing pulse-transformers inputs. Another form of isolation is the Block Occupancy Circuit of Fig. 1 with 100K resistance Isolation. Even with +/- 40 Volts applied between the Block side and the SIGNAL side there is no operation.

To obtain an operation, a track current greater that +/- 1 ma. must flow through the diodes D1 or D2. This will produce a voltage across capacitor C1 that can be amplified to produce a DC current through the LED and operate the power transistor Q5 for a steady state output. The output remains ON for about 3 or 4 seconds after the track current is removed. Only a very small amount of current actually leaks through the 100K isolation resistor R1 during operation. The DC power for this block occupancy detector does not have to be regulated. Even rectified power with no filter can be used as a DC supply.

The circuit can be built on a 2" x 1 ¼" IC-spacing perfboard with standard .100" grid pattern. The leads of the components are soldered together to form the circuit. The leads of the Diode D1 & D2 can be used as the block current inputs, and the leads of the two 100K resistors R1 & R2, standing on the perfboard can be use as the "+" & "-" power terminals. It is important that the NPN transistors Q1 & Q2 have high gain. This can be checked with a 9-Volt battery using the LED and a 470 ohm resistor as a load. Take a 470 K ohm resistor and connect one end to the "+" terminal of the battery and with the other end inject a very small amount of current into the base of the transistor. If the LED load shows nearly the same brilliance as when operated at 9 volts, then this transistor is considered to have very high gain.

After completion of the circuit, the operation can be checked by using a 9-Volt battery as a DC supply and another 9-Volt battery with a 1 K resistor as the input block current of +/- 9 ma. The LED must light when this current is applied in either direction, and go off in 3 or 4 sec. after the input current is removed.

This in not a super sensitive type of block occupancy detection circuits. While is may not detect the wheels of a car with a resistance path connected across one axle, it will detect a locomotive equipped with a DCC receiver. Best of all, it uses low cost components and they are all available right off the shelf of you nearby Radio Shack Store. And YES, it also does operate with regular DC operated trains!