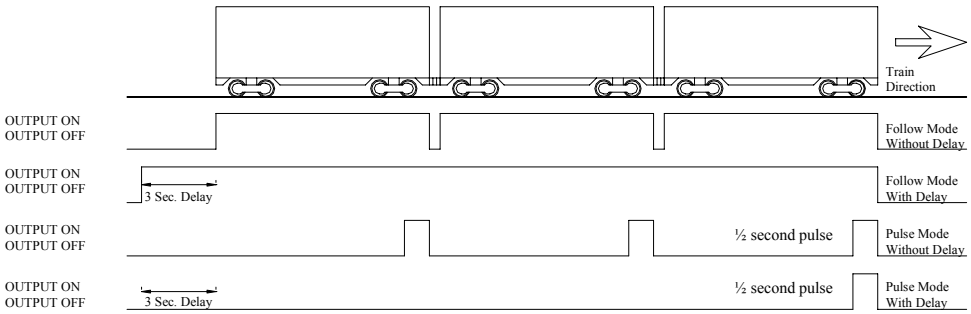
INFRA-RED DETECTOR (IRD & IRD-R)

The Infra-Red Detector (IRD) and Infra-Red Detector with Relay (IRD-R) are electronic devices that use infra-red light to detect trains. They are ideal for giving the operator a visual indication when a train has reached a certain location on your layout that is obscured from view, or to automatically stop a train when it has reached the end of the track in a hidden yard.
When a train passes over the sensor an infra-red beam is reflected off the bottom of your train causing the LED to be turned on and the relay to be activated (IRD-R only). This relay can be used to interface with other electronic devices.
There is no tracks to cut or modifications to rolling stock, simply mount the detector at the required location underneath your track.
The word "detector" in this manual refers to both the IRD and the IRD-R.

Operation

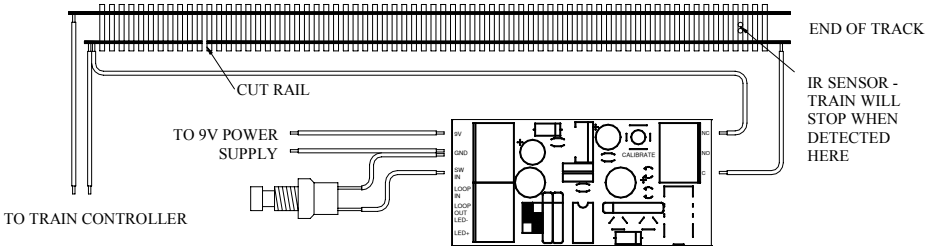
The detector has three modes of operation.
1) Follow: the output follows the infra-red (IR) sensor. i.e. the output only turns on while a train is detected. Without the delay set it is possible for the output to be switched off at the gaps between rolling stock as the train passes over the IR sensor. With the delay set the IR sensor must be clear for three seconds before the output turns off.
2) Pulse: when a train is detected the output is pulsed on for half a second and then off again. Without the delay set it is possible for the output to be pulsed at the gaps between rolling stock as the train passes over the IR sensor. With the delay set the sensor must be clear for three seconds before the output can be pulsed again.
3) Toggle: in this mode two detectors need to be wired together for their outputs to function like a toggle switch. Wire the *LOOP OUT* terminal on the first detector to the *LOOP IN* terminal on the second. Then wire the *LOOP OUT* terminal on the second detector to the *LOOP IN* terminal on first. When a train is detected by detector 1 its output is turned on and the output of detector 2 is turned off. Then when a train is detected by detector 2 its output is turned on and the output of detector 1 is turned off. When first powered up both detectors could come on in the same state (i.e. both outputs off) until a train is detected by one of them.



Automatic Stopping

To stop a train automatically at the end of a track, set your IRD-R up in follow mode with delay. Cut the rail to isolate the end section of track as indicated. Ensure your locomotive will completely fit in the isolated section when detected. Wire power to the isolated rail through the *C* and *NC* terminals on the IRD-R and a momentary push button switch between the *GND* and *SW IN* terminals. Install the IRD-R at the end of the track where you would like the train to stop.

When the train is detected at the end of the track the IRD-R cuts power to the rail and stops the train. When you are ready to bring the train out, simply push the button and power will be supplied to the rail again. Be aware that you will have to manually change the direction of the train so it doesn't continue off the end of the track.

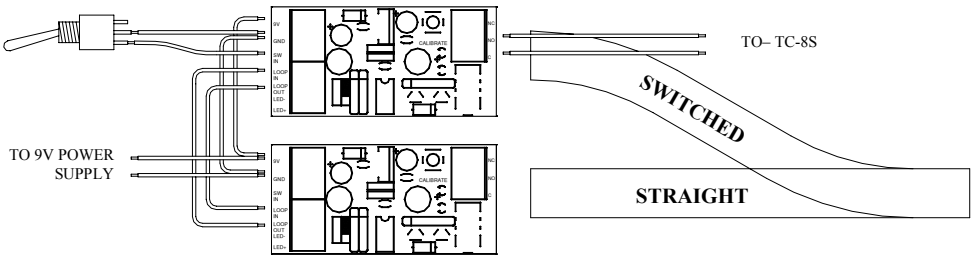


Automatic Turnout Control

Any turnout being controlled by a TC-8S can use two detectors set up in toggle mode to automatically control its position. The two detectors can be used in place of, or in conjunction with an existing toggle switch. Position the detectors underneath the two tracks that approach the turnout. When a train is detected on either track approaching the turnout, the turnout will be set to the correct position automatically. It is important that an IRD-R is placed underneath the track on the switched side of the turnout and that all the connections made to the TC-8S and toggle switch are made from this unit.

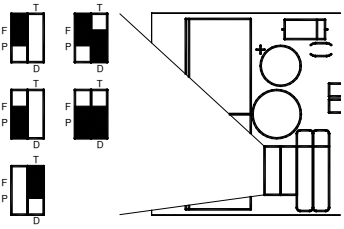
Wire the two detectors together as described in the toggle mode section. Wire the *NO* terminal on the IRD-R to the turnout control pin on the TC-8S *CONTROL PANEL* connector. Make sure you disconnect any previous connections to this pin first. Connect the *C* terminal on the IRD-R to the *GROUND* pin on the TC-8S *CONTROL PANEL* connector. If required, wire a toggle switch between the *GND* and *SW IN* terminals on the IRD-R.

When a detector automatically switches the turnout, the toggle switch may not reflect the correct turnout position. Likewise when the toggle switch changes the position of the turnout, the indicator LEDs on the detectors may not reflect the correct turnout position. For a true indication of the turnout position the LEDs on the TC-8S should be used.



Mode Selection

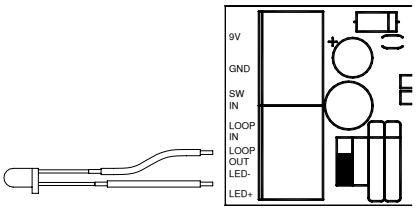
The detector operating mode is selected by positioning the shorting links provided according to the diagram below. You must turn the power off then on before the new mode settings take effect.



Follow without delay: top left
Follow with delay: top left and bottom right.
Pulse without delay: bottom left.
Pulse with delay: bottom left and bottom right.
Toggle: top right

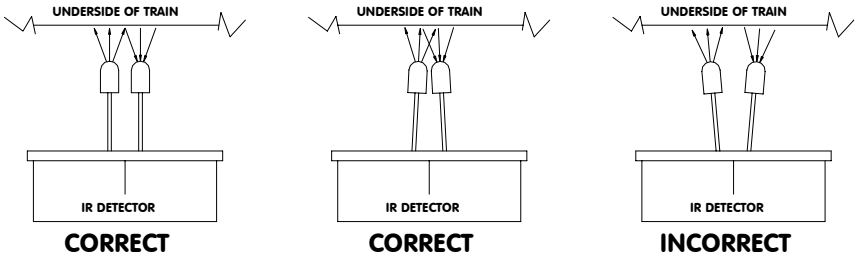
Wiring an Indicator LED

A LED can be mounted remotely and then wired to the detector. To connect an indicator LED, wire the cathode of the LED to the *LOOP OUT/LED-* terminal and the anode to the *LED+* terminal. No resistor is required. Whenever a train is detected, the LED will illuminate and the output relay turns on (IRD-R only) . A 3mm red LED is provided.

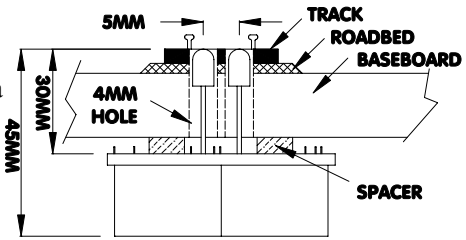


Installing IR Detectors

There is two parts to the IR sensor on your detector, a transmitter and a receiver. When mounting the detector make sure that these two components are pointing directly up or slightly bent in towards each other. The train acts like a reflector when it passes over the IR sensor so if they are pointing away from each other the train may go undetected. Avoid installing detectors where they can be exposed to direct sunlight as it may cause false triggering.



It is recommended that the detectors are mounted under your layout and pushed up between the rails in your track. Drill two 4.0mm(5/32 inch) holes 5mm apart or make a 4.0mm x 9.0mm slot, being careful not to damage the track. Screw the detector into place, adding a spacer so that the top of the IR sensor sits level with the top of your ballast or sleepers. Make sure nothing covers the top of the IR sensor.



DETECTOR LABEL	DESCRIPTION
9V	Connects to the positive wire on your DC power supply.
GND	Connects to the ground wire on your DC power supply.
SW IN	Toggle switch connects to this terminal when in toggle mode. Momentary push button switch connects to this terminal when in follow mode.
LOOP IN	Connects to *LOOP OUT* on second detector when in toggle mode.
LOOP OUT / LED-	Connects to *LOOP IN* on second detector when in toggle mode. Connects to cathode of indicator LED.
LED+	Connects to anode of indicator LED.
NC (IRD-R only)	This is the normally closed contact on the relay. When there is no train detected this terminal is connected to the common *"C"* terminal. When a train is detected the connection is broken.
NO (IRD-R only)	This is the normally open contact on the relay. When a train is detected this terminal is connected to the common *"C"* terminal. When there is no train detected the connection is broken.
C (IRD-R only)	This is the common contact on the relay.

Calibrating

When you calibrate a detector it measures its surrounding light and uses it as a reference. This procedure only needs to be preformed once after the detector has been installed, unless lighting conditions change considerably. To calibrate, make sure there is no train covering the sensor then press the calibrate button. If a LED is connected to the output it will flash two times to indicate that calibration has been completed.
Best results are achieved when the detector is calibrated in a fully lit room.

Specifications

Dimensions:	65mm (width) x 32mm (depth) x 45mm (height)
Input Voltage:	9 to 12 Volts DC
Maximum Current Consumption (with LED):	20mA(IRD) 45mA(IRD-R)
Maximum Relay Current:	2A (IRD-R only)
Maximum Relay Voltage:	30VDC (IRD-R only)

Sidetracked Electronics
PO Box 7085, Safety Bay Western Australia, 6169
Phone: +61 8 9528 5344
Email: enquiries@sidetracked-e.com
Website: www.sidetracked-e.com
Revision 0.01