INFRARED SINGLE TRAIN SHUTTLE UNIT WITH STATION STOP (ITS1-SS)

The Infrared Single Train Shuttle Unit with Station Stop (ITS1-SS) is used to continually run a single train from point to point on your layout without operator intervention. The ITS1-SS comes with four Infrared (IR) sensors allowing it to also be configured to allow for an extra station stop between the two endpoints.

Status LEDs can be wired to the ITS-SS and then remotely mounted on your control panel to indicate when a train is travelling forward , backward or stopped.

The ITS1-SS is not designed to work with DCC.

What you should have
1 x Infrared Single Train Shuttle Unit with Station Stop (ITS1-SS).
4 x Infrared (IR) sensors
1 x User manual.
4 x Mounting screws and standoffs

About this manual
Text written in *ITALICS* in this manual represents text as it is written on the ITS1-SS.

Operation
The ITS1-SS has a red *STATUS* LED that turns on when a train is detected over any of the IR sensors. Each IR sensor has its own set of functions to perform when it detects a train, each one slightly different from the other. Refer to the table below for function details.
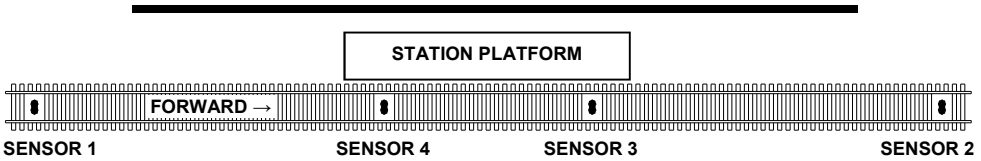
IR Sensors 1 and 2 must be used to detect the train at either end of the track that the train is to be shuttled along. IR Sensors 3 and 4 are only used for the additional station stop between the two endpoints.

FUNCTION IR SENSOR	STOPS TRAIN FOR DELAY SET BY	CHANGES TRAIN DIRECTION TO	NOTES
IR SENSOR 1	TIMER 1	FORWARD	Must be placed at one end of the track.
IR SENSOR 2	TIMER 1	BACKWARD	Must be placed at one end of the track.
IR SENSOR 3	TIMER 2	FORWARD	Used for additional station stop only.
IR SENSOR 4	TIMER 2	BACKWARD	Used for additional station stop only.

Track Configurations

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SENSOR 1   SENSOR 2

1. Train arrives at IR sensor 1. Train stops for delay set by *TIMER1*. Train direction is set to forward.
2. Train arrives at IR sensor 2. Train stops for delay set by *TIMER1*. Train direction is set to backward.

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│   STATION PLATFORM   │
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SENSOR 1   SENSOR 4   SENSOR 3   SENSOR 2

1. Train arrives at IR sensor 1. Train stops for delay set by *TIMER1*. Train direction is set to forward.
2. Train arrives at IR sensor 3 (IR sensor 4 is ignored). Train stops for delay set by *TIMER2*. Train direction is set to forward.
3. Train arrives at IR sensor 2. Train stops for delay set by *TIMER1*. Train direction is set to backward.
4. Train arrives at IR sensor 4 (IR sensor 3 is ignored). Train stops for delay set by *TIMER2*. Train direction is set to backward.

Installing IR Sensors

There is two parts to each IR sensor, a transmitter and a receiver. When mounting an IR sensor 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.

CORRECT   CORRECT   INCORRECT
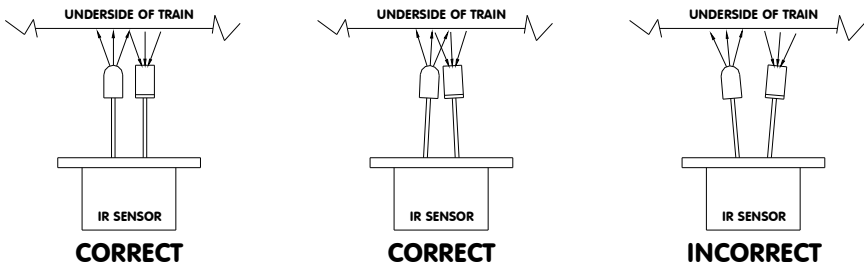
It is recommended that the IR sensors are mounted under your layout and pushed up between the sleepers in the centre of your track. Drill two 4.0mm (5/32 inch) holes with 5mm between their centres or make a 4.0mm x 9.0mm slot, being careful not to damage the track. Screw the IR sensor in place, adding a spacer if necessary so that the top of the IR sensor sits level with the top of your ballast or sleepers.

IMPORTANT: Make sure nothing covers the top of the IR sensor and that the rubber tubing that surrounds one of the sensors stays intact once the IR sensor has been installed. Do not apply any heat to the rubber tubing as it my distort and affect the operation of the sensor.
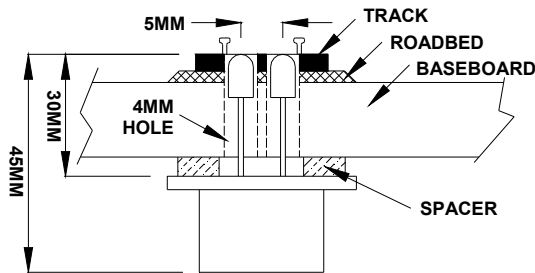
Wiring IR Sensors to the ITS1-SS

The ITS1-SS can have up to four IR sensors connected to it, each one requires three wires. Pins *1*, *2* and *3* on the sensor terminal blocks on the ITS1-SS must be wired to pins *1*, *2* and *3* on each IR sensor respectively.

Wiring the Track to the ITS1-SS

Connect two wires from the track output on your transformer to input terminals *IP1* and *IP2* on the ITS1-SS. Connect two wires from output terminals *OP1* and *OP2* on the ITS1-SS to the track. If the ITS1-SS is not turned on then you can manually operate your train as normal. When you wire power to the track ensure that power will reach all sections of track used by the ITS1-SS at all times.

Wiring Power to the ITS1-SS

You require a 9V DC power supply capable of supplying a maximum of 80mA for each ITS1-SS unit you have connected to it. Ensure that you connect the 9V (+ positive) wire from your power supply to the *9V* terminal on your ITS1-SS and the ground (- negative) wire from your power supply to the *GND* terminal.

Powering Up the ITS1-SS

Ensure that a train is positioned over a sensor before powering up the ITS1-SS. The train will start off in a direction depending on which sensor it is positioned over. If a train is not detected over any sensor when the ITS1-SS is powered up then the train will start in a forward direction by default.

Wiring Status LEDs to the ITS-SS

Two LEDs can be wired to the ITS-SS and mounted on your control panel to show the status of the ITS-SS. If the LED connected to *OP4* is on then the train will be travelling in a forward direction. If the LED connected to *OP5* is on then the train will be travelling in a backward direction. If both LEDs are off then the train has stopped at a sensor.

LEDs have to be connected in a certain way in order for them to work. They are polarised, meaning they have a positive (anode) and a negative (cathode) pin. The cathode pin is easily identified as it is either the shorter of the two leads and/or its marked by a flat spot on the body of the LED.

Connect a wire from the *GND* terminal on the ITS-SS to one side of a 270 ohm resistor. From the other side of the resistor wire to the cathodes on your two status LEDs. Then wire from output terminal *OP4* to the anode on the first LED, and from output terminal *OP5* to the anode on the second LED. This circuit must be duplicated and wired to the same terminals on the ITS-SS for every set of status LEDs you require.
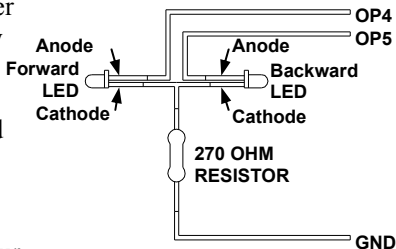
Controlling Train Speed and Direction

The ITS1-SS does not control the speed of the train, this is done by an external DC train speed controller connected to input terminals *IP1* and *IP2* on the ITS1-SS.
The ITS1-SS simply turns the power to the track on and off and sets the direction depending on which sensor last detected the train.
The ITS1-SS is not designed to work with DCC.

Adjusting Timer Delays

The ITS1-SS has two separate timers which control the length of time the train is stopped for once it has been detected. These timers can be adjusted for delays between 0 and 327 seconds (5min 27secs). If you set the delay to 0 seconds the train will not stop when detected, but its direction will still change.
Timer 1 is used when a train is detected at either IR sensor 1 or 2. Timer 2 is used when a train is detected at either IR sensor 3 or 4. By winding the *TIMER1* control in a clockwise direction you increase the time delay of timer 1 and by winding it in an anti-clockwise direction you decrease it. Timer 2 works in the same manner.

Specifications

Dimensions:	68mm (width) x 86mm (depth) x 30mm (height)
Supply Voltage:	9V DC
Supply Current:	80mA
Maximum Relay (Track) Voltage:	30V
Maximum Relay (Track) Current:	2A

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