

ZTC 335 Dual Track Detector Installation Manual

WARNING

If you fail to read the installation instructions properly it is possible that you could accidentally damage your ZTC unit. Such damage is **NOT** covered by our guarantee. So to prevent avoidable and potentially expensive mistakes, please take the time to read these instructions before attempting to install your equipment

The ZTC System is only intended for controlling model railways by experienced modellers over the age of 14 .
It should only ever be operated by young persons under competent adult supervision.

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1 ZTC 335 Product Description.

- 1.1 The Dual Track Detector Module (DTDM) can be used in a number of different ways, none of which require any special decoders or additions to your locomotives. They even work on locomotives without a decoder fitted, running as loco 0 on your layout.
- 1.2 First as a Dual Block Occupancy Detector (DBOD) to signal to the operator the track position of any locomotive, or suitably equipped wagon, coach, or even a Guard's van (to mark the end of a train) in section.
- 1.3 Secondly with an external 5 Volt to 24 Volt DC relay (ZTC 336), as an Dual Auto-Stop Detector, (ASD). Automatically bringing a locomotive to a stop at a pre-determined position on your layout.
- 1.4 Thirdly as a Dual Block Section Signalling Detector (BSSD). Again using a separate 5 Volt to 24 Volt DPDT (double pole double throw) DC relay (ZTC 336). In this case both the signals and track power can be individually controlled to protect your locomotives in a prototypical manner, with protected block section operation.
- 1.5 There are many other uses for the ZTC 335 Dual Track Detector Module (DTDM), which works on the principal of sensing the current flowing through the track section (or Block) occupied by a vehicle on the track.
- 1.6 Any number of ZTC 335 may be used on a layout, either deriving their power from the DCC track Power Bus, the track itself or from a separate isolated DC supply.

2 ZTC 335 Specification.

Number of Individual Optically Isolated sensors.	2 (Totally isolated)
Track sensor Isolation	Galvanic isolation.
Galvanic Isolation rating	2,000 Volts AC/DC
Range of DCC current sensing.	0.5mA to 5Amps. (5 decades)

- | | |
|---|-------------------|
| 1) Power supply internally derived from track | 10 to 24 Volts AC |
| 2) Power supply Externally derived. | 5 to 24 Volts DC |

Output Voltage from internal supply. (Dependant on track voltage)	9 to 24 Volts DC
Output current from internal supply.	0.25 Amps DC max
Output Inductive load protection.	Internal Diode.
Sensor output drive current	125mA maximum.
Visual, Section (Block) Occupied Indicators	2 Red, LED's

2.1 The ZTC 335 is not suitable for operating in damp conditions such as outside in the garden as it will result in incorrect operation. Please contact ZTC Controls who can advise you if you require external operation.

2.2 Errata.

2.3 Please note that despite our best efforts, an error has crept in on the ZTC 335 product label. Pin 6 of SK2 should be labelled "Detector A, O/P" not as shown on the label, Detector B, O/P.

3 ZTC 335 Basic Installation.

3.1 The basic connection to the DCC Power Bus for ZTC 335 Dual Track Detector Module, is shown in figure 1.

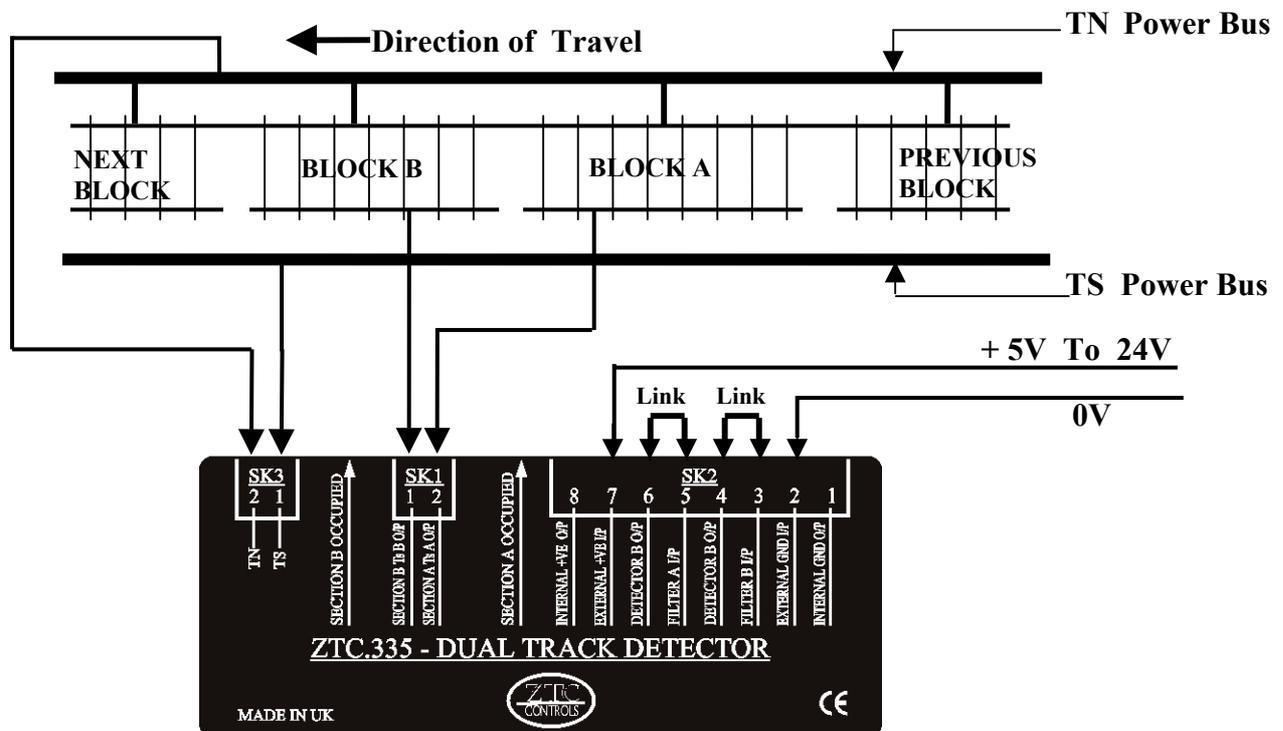


FIGURE 1

- 3.2 It is important, that for the ZTC 335 to operate, that the track is broken up into a minimum number of two sections, which is also shown in Figure 1. When installing more than one ZTC335 on a layout, it is only necessary to cut one of the rails, but it must be the same rail on the same side of the track for the whole layout, cut only TN or TS rails each time and not a combination of TN and TS as this will breach the optical isolation in the unit.
- 3.3 For every two sections you have on your layout you will need to fit one ZTC 335 Dual Track Detector Module. Section signalling of the whole of your layout adds yet another dimension to locomotive control, but it is unnecessary to divide all of your layout into separate sections at one time. Start by fitting ZTC 335's only at the locations that you want to know are occupied, with locomotives or rolling stock, such as hidden sidings etc.

- 3.4 Power for the input side of the module is always derived from the track Power Bus via the socket marked SK3, with Pin 1 connected to the TS Power Bus and Pin 2 connected to the TN Power Bus. The TS power is now supplied to each of the Track or Block sections via the socket marked SK1 with pin 1 feeding Block Section B and pin 2 feeding Block Section A.
- 3.5 The current flowing through this connector to the track and then to the locomotive is measured by the detector circuit and used to operate the outputs. The input circuitry is separated from the output circuitry by a device called an Opto-coupler. This is used to maintain total electrical isolation between the input and outputs of the ZTC 335. To maintain this isolation a separate power supply must be connected to pins 2 & 7 of socket marked SK2. The positive supply should be connected to Pin 7 and 0 Volt supply should be connected to Pin 2. (See Figure 1)
- 3.6 To simplify the installation however the ZTC 335 does have its own internal power supply which may be used to power the module and any external lamps or relays up to a maximum of 250mA. But optical isolation will be breached. This is achieved by linking Pins 1 & 2 and Pins 7 & 8 of SK2 together, see figure 2. In addition it should be remembered that if power is taken from the Power Bus in this way then you will be using power that would normally be used to power locomotives.

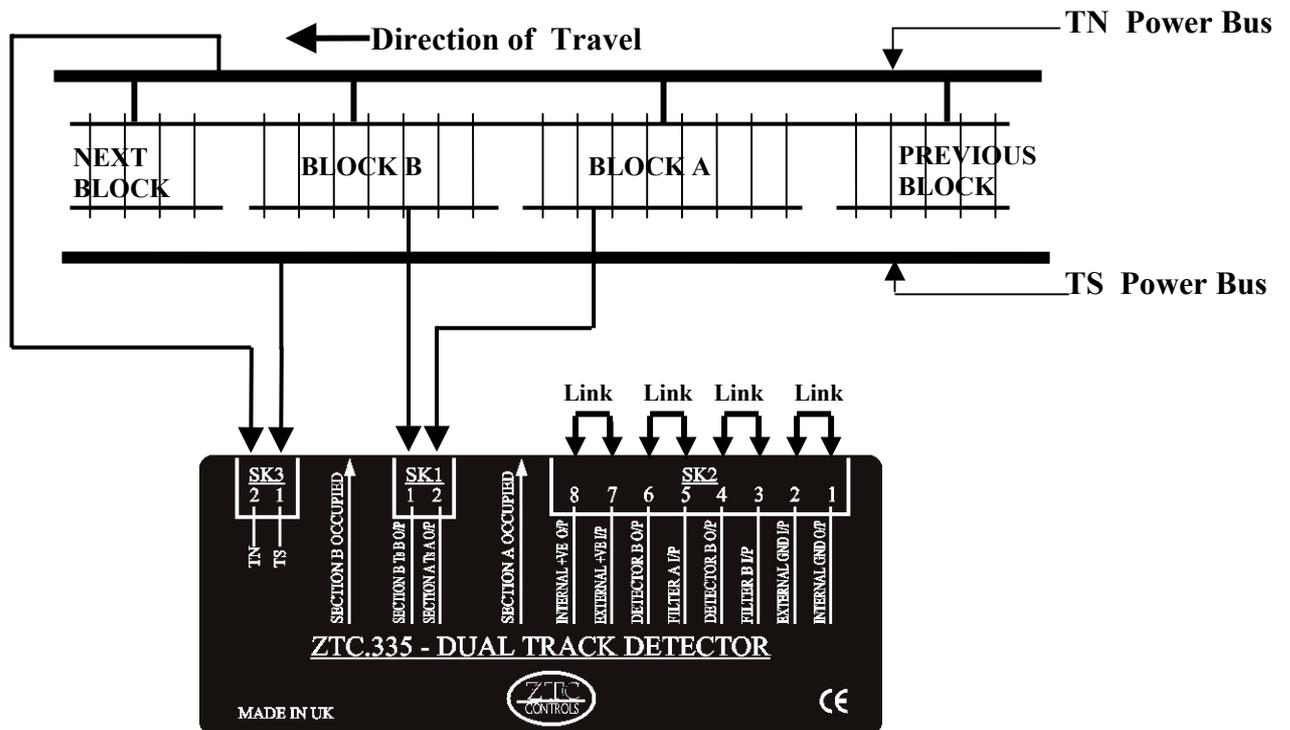


FIGURE 2

- 3.7 Using an external power source can be beneficial on a layout where a great number of ZTC 335's are installed. It also allows you to test the ZTC 335 at the time of installation by placing a loco on the track. You should see the relevant LED each side of SK1 illuminate. This test can still be used with internal power supply, but the track must be powered.
- 3.8 When installing the ZTC 335 it is also important that the Output Filters are connected by linking Pins 3 & 4 and Pins 5 & 6 on SK2 together, as shown in all Figures. If they are not fitted then the test LED's and your indicators will flash erratically and intermittently. The ability to remove the filter links is provided for use with a future option.
- 3.9 You are now ready to configure the outputs of the ZTC 335, the following sections describe configuring the ZTC 335 as a;

Dual Block Occupancy Detector	Section 4.0
Dual Auto Stop Controller	Section 5.0
Dual Block Signalling Detector/Controller	Section 6.0

The versatility of the ZTC 335 is only limited by your imagination

4 Wiring the ZTC 335 as a Dual Block Occupancy Detector.

- 4.1 Connect SK3 of the ZTC 335 module to the Power Bus as shown in section 3.0 before proceeding any further.
- 4.2 The circuit in Figure 3, shows either Lamp or LED indication of an occupied track section. When using LED indicators, a resistor is required to limit current, a ZTC154 resistor pack provides 10 resistors of the correct value for 12V operation. Only one resistor is required per LED.

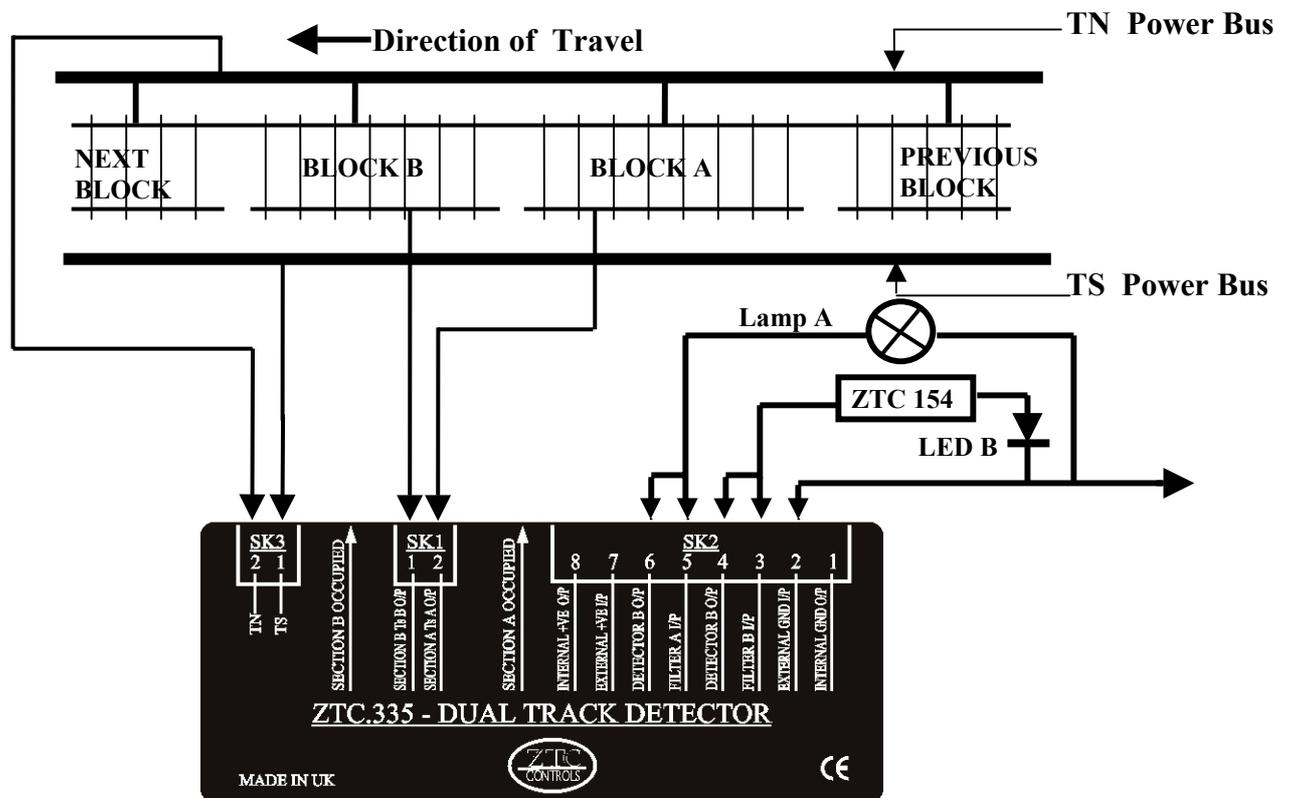
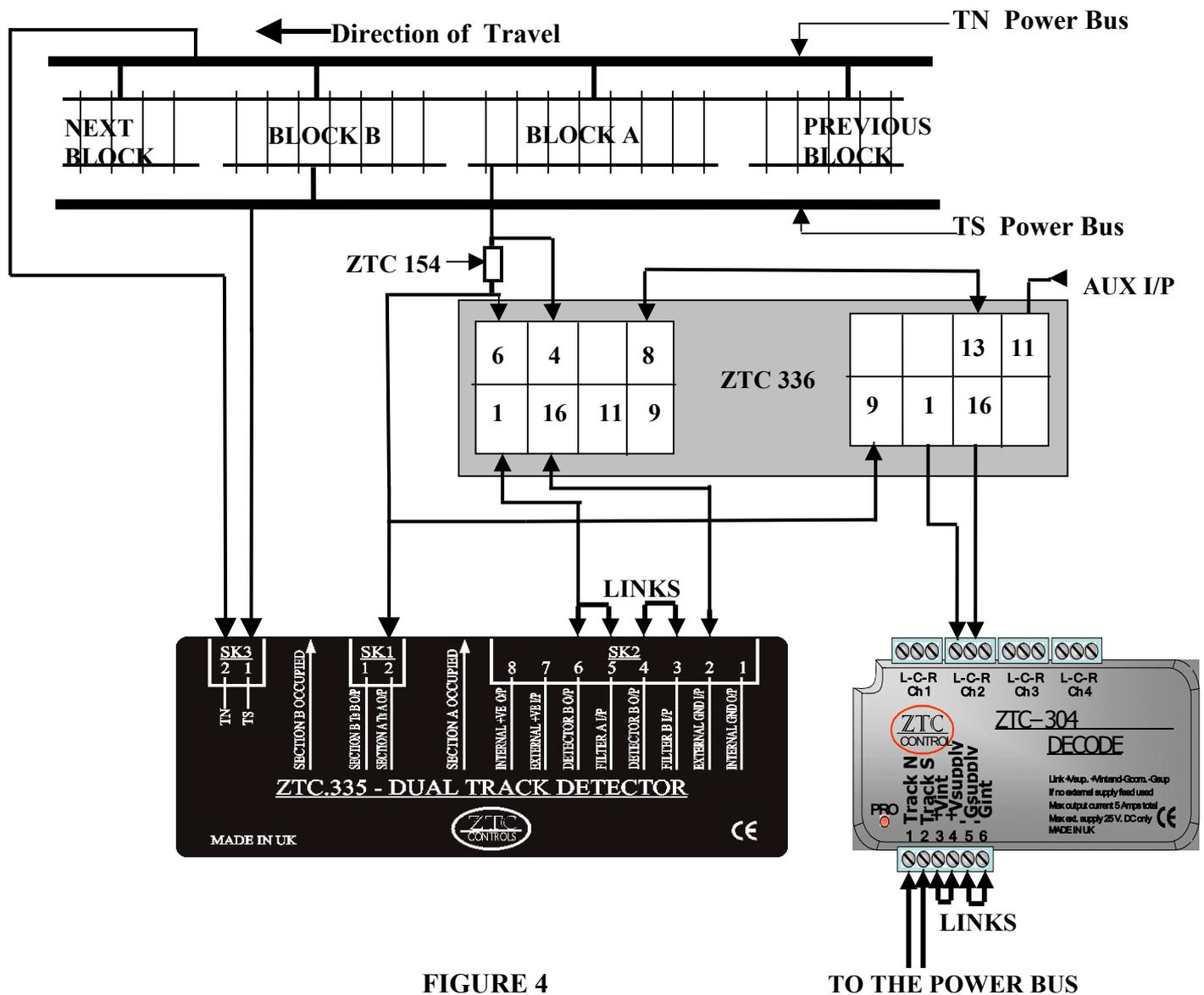


FIGURE 3

- 4.3 If you do not wish to use LED's, then small incandescent filament lamps, such as "Grain of Wheat" bulbs may be used as indicators, providing they do not draw more than 50 mA of current. ZTC 163 contains two such bulbs for 12V operation. Resistors may be needed to limit current if the supply voltage exceeds 12V.
- 4.4 The indicators will draw their power from the ZTC 335 as required and turn on whenever a locomotive or modified piece of rolling stock is within the block.
- 4.5 The maximum wire length between the indicator and the ZTC 335 Module should not exceed 10 metres.

5 Wiring the ZTC 335 as a Dual Auto-Stop Controller.

- 5.1 Connect SK3 of the ZTC 335 module to the Power Bus as shown in section 3.0 before proceeding any further.
- 5.2 Using Figure 4 as a guide, proceed as follows to install an Auto stop facility on Block Section A of the track-work. This is achieved by using a relay switching kit, (Part number ZTC 336) in the position shown. The pin-out details for the Relay included with your ZTC336.



- 5.3 The DCC Power feed to the track is interrupted by Relay 1, bringing any locomotive to a halt that enters Block A. The Resistor is fitted to provide a bleed current to any DCC decoder in the section and keep it actively awake and accepting commands. When running locomotives with coreless motors (RG4/RG7) it may be necessary to use two ZTC 154 Resistor connected in series. The locomotive will stop very quickly when it hits the Auto Stop section (dependant on inertia of the loco), this is not very elegant, but the Auto stop is intended as a safety device.
- 5.4 To move the locomotive away from the Auto-Stop controlled section of track, the relay RL2 must be operated until the locomotive has moved to Block B. RL2 can be driven from one of the outputs of a ZTC 304 as shown in Fig 4. This enables the locomotive to be released by the ZTC 511 control panel without the addition of extensive wiring on the layout.
- 5.5 If a ZTC 304 is used to release the auto-stop, the output of the ZTC 304 is controlled in a similar manner as a point. Set up the ZTC 304 output for a 5-10 sec pulse, when operated the auto-stop will release and the locomotive can be driven off. At the end of the pulse the auto-stop will be re-armed ready to stop the next train. Refer to the ZTC 304 manual for programming details.
- 5.6 This auto-stop preset can be included in a route setting on the ZTC 511 for semi-automatic running.
- 5.7 Output B of the ZTC 335 Dual Track Detection Module can be wired in a similar manner using a second ZTC336 kit to drive another block section on which you want to install an Auto-Stop facility.

6 Wiring the ZTC 335 as a Block Section Signalling Unit.

- 6.1 Connect SK3 of the ZTC 335 module to the Power Bus as shown in section 3.0 before proceeding any further.
- 6.2 Using Figure 5 as a guide, install the circuitry to provide a modified Auto Stop facility on Block sections A, B, NEXT BLOCK etc. of the track-work. This is achieved by again using a Relay Switching kit, (Part number ZTC 336) in the positions shown.
- 6.3 In this case the modified Auto Stop creates a protected (Dead) block section immediately behind the occupied block section. The locomotive can only be moved on when the Block/Section in front is no longer occupied.
- 6.4 Additional switching, using pins 4, 6 & 8 of the block section Relays, can be used to operate track side signals and/or drive a mimic display board.
- 6.5 The sequence of events is as follows. A locomotive or train travelling from Right to Left of Fig 5 moves from the previous Block to Block A. Providing no locomotive is present in Block B then the locomotives movement will not be halted. The locomotive can continue to move into each successive Block.
- 6.6 If a locomotive is present in Block B then the track detector will operate the proceeding relay removing power from Block A. Any locomotive entering Block A will stop. As the locomotive in Block B drives off, Block A will have power restored.
- 6.7 The distance that a loco will penetrate into a protected Block will depend on a number of factors,
 - 1) The inertia of the locomotive/Train, both mechanical and electrical.
 - 2) The speed that the locomotive is travelling.
 - 3) The length of the wheels that pickup power from the track.
- 6.8 For this reason it is important to make each Block section long enough to accommodate the longest train, with the highest inertia at the highest expected speed.

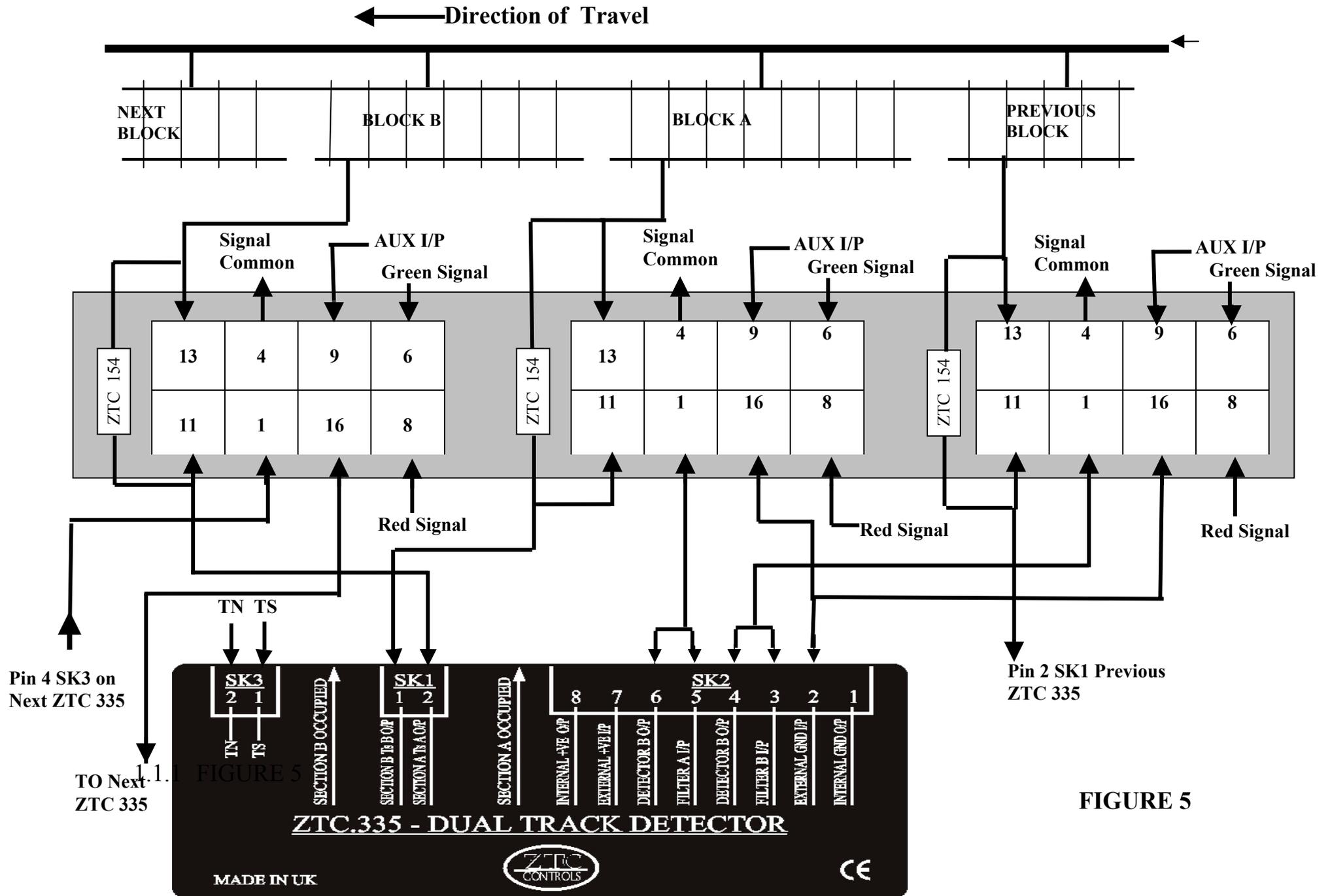


FIGURE 5

7 Aux I/p Connection.

- 7.1 In Figure 4 pin 11 of RL1 and in Figure 5 pin 9 of each relay shows an Auxiliary (Aux) connection. This allows for alternative methods of bringing a Locomotive/Train to a controlled halt. Alternative power sources such as Breaking or Stopping generators can be used in this instance. The main advantage of this style of controlled stopping is that providing the Block section is long enough, the train driver can ignore the locomotive once it is set in motion. Relying on the breaking control system to automatically bring the locomotive to a controlled slow stop. Once the road is free, the Breaking generator will allow the Locomotive/Train to accelerate away, all without driver intervention.

8 Modifying Rolling stock.

- 8.1 When operating long trains of rolling stock it is often desirable to know where each end of a given train is located. In addition it very important to know that no rolling stock has been lost or left on the main line, which can and has cause an accident. This also allows further protection by providing one safe Block behind the lasted vehicle of the train.
- 8.2 This can be achieved by fitting a 10K ohm resistor across the wheels of a guards van or the last wagon of a train.