SIDETRACKED ELECTRONICS

TURNOUT CONTROLLER – 8S
USER MANUAL

INDEX

† LEDS (Light Emitting Diodes)

1. WHAT YOU SHOULD HAVE

1 x Sidetracked Electronics Turnout Controller – 8S (TC-8S).
2 x 25 way "D" connector assemblies. Each assembly consists of the following:
- 1 x 25 way male "D" connector.
- 1 x 25 way "D" connector backshell.
- 1 x Cable clamp.

1 x 2 way power connector.
2 x 9 way solenoid connectors.
1 x User manual.
Turnout motors, toggle switches, LEDs and resistors are not included in this kit.

2. FEATURES OF THE TC-8S

- Controls eight solenoid turnout motors.
- Controls indicator lights on your control panel.
- Controls signal lights on your layout.
- Simplified, low voltage wiring for your control panel switches.
- Synchronise feature to ensure that your turnouts are set according to your control panel.
- Sequencing of turnout solenoids to reduce excessive current consumption.
- Multiplexed lighting to reduce current consumption.
- Inbuilt capacitor discharge unit.

3. WARRANTY

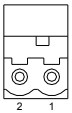
There is a twelve month warranty on defects and workmanship on your TC-8S. Any damage caused by incorrect installation or powering of your TC-8S is not covered. Please retain your receipt as proof of purchase.

4. ABOUT THIS MANUAL

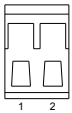
Text written in *Italics* in this manual represents text as it is written on the TC-8S.

5. CONNECTORS AND PIN DESCRIPTIONS

	Caution: When unplugging any of the connectors from the TC-8S, please take care and ensure that you pull the connector directly away from the unit. If the connectors are rocked from side to side to loosen them, then it is possible that the pins on the TC-8S or connector could be bent.



FRONT VIEW
THIS SIDE PLUGS INTO THE TC-8S

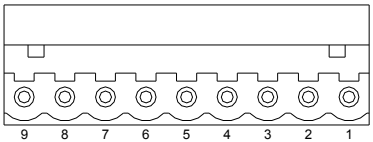


BACK VIEW
SCREW WIRES INTO THIS SIDE

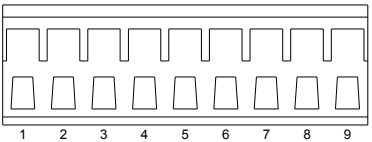
Diagram 1: 2 Way Power Connector

POWER (2 WAY POWER CONNECTOR)

PIN No.	TC-8S LABEL	PIN DESCRIPTION
1	*AC OR DC IN*	TC-8S POWER IN. CAN BE 12 TO 18 VOLTS AC OR 15 TO 25 VOLTS DC. IT DOES NOT MATTER WHICH WAY AROUND PINS 1 AND 2 ARE CONECTED.
2	*AC OR DC IN*	TC-8S POWER IN. CAN BE 12 TO 18 VOLTS AC OR 15 TO 25 VOLTS DC. IT DOES NOT MATTER WHICH WAY AROUND PINS 1 AND 2 ARE CONECTED.



FRONT VIEW
THIS SIDE PLUGS INTO THE TC-8S



BACK VIEW
SCREW WIRES INTO THIS SIDE

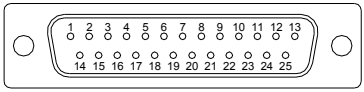
Diagram 2: 9 Way Solenoid Connector

SOLENOID DRIVERS 1 TO 4 (9 WAY SOLENOID CONNECTOR)

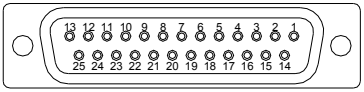
PIN No.	**TC-8S LABEL**	**PIN DESCRIPTION**
1	*T1 SOLENOID SW*	TURNOUT 1 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 1 INTO THE SWITCH POSITION.
2	*T1 SOLENOID ST*	TURNOUT 1 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 1 INTO THE STRAIGHT POSITION.
3	*T2 SOLENOID SW*	TURNOUT 2 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 2 INTO THE SWITCH POSITION.
4	*T2 SOLENOID ST*	TURNOUT 2 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 2 INTO THE STRAIGHT POSITION.
5	*T3 SOLENOID SW*	TURNOUT 3 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 3 INTO THE SWITCH POSITION.
6	*T3 SOLENOID ST*	TURNOUT 3 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 3 INTO THE STRAIGHT POSITION.
7	*T4 SOLENOID SW*	TURNOUT 4 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 4 INTO THE SWITCH POSITION.
8	*T4 SOLENOID ST*	TURNOUT 4 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 4 INTO THE STRAIGHT POSITION.
9	*SOLENOID COMMON*	COMMON PIN THAT GOES TO ALL THE SOLENOIDS WIRED TO THIS CONNECTOR. CONNECTED TO *SOLENOID COMMON* ON THE *SOLNOID DRIVERS 5 TO 8* CONNECTOR WITHIN THE TC-8S.

SOLENOID DRIVERS 5 TO 8 (9 WAY SOLENOID CONNECTOR)

PIN No.	**TC-8S LABEL**	**PIN DESCRIPTION**
1	*T5 SOLENOID SW*	TURNOUT 5 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 5 INTO THE SWITCH POSITION.
2	*T5 SOLENOID ST*	TURNOUT 5 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 5 INTO THE STRAIGHT POSITION.
3	*T6 SOLENOID SW*	TURNOUT 6 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 6 INTO THE SWITCH POSITION.
4	*T6 SOLENOID ST*	TURNOUT 6 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 6 INTO THE STRAIGHT POSITION.
5	*T7 SOLENOID SW*	TURNOUT 7 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 7 INTO THE SWITCH POSITION.
6	*T7 SOLENOID ST*	TURNOUT 7 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 7 INTO THE STRAIGHT POSITION.
7	*T8 SOLENOID SW*	TURNOUT 8 SOLENOID DRIVER-SWITCH. USED TO MOVE TURNOUT 8 INTO THE SWITCH POSITION.
8	*T8 SOLENOID ST*	TURNOUT 8 SOLENOID DRIVER-STRAIGHT. USED TO MOVE TUROUT 8 INTO THE STRAIGHT POSITION.
9	*SOLENOID COMMON*	COMMON PIN THAT GOES TO ALL THE SOLENOIDS WIRED TO THIS CONNECTOR. CONNECTED TO *SOLENOID COMMON* ON THE *SOLNOID DRIVERS 1 TO 4* CONNECTOR WITHIN THE TC-8S.



FRONT VIEW
THIS SIDE PLUGS INTO THE TC-8S



BACK VIEW
SOLDER WIRES TO THIS SIDE

Diagram 3: 25 Way Male "D" Connector

LAYOUT SIGNALLING (25 WAY MALE "D" CONNECTOR)

PIN No.	**TC-8S LABEL**	**PIN DESCRIPTION**
13	*GROUND*	GROUND FOR THE SIGNALLING LEDS ON YOUR LAYOUT. CONNECTED TO *GROUND* ON THE *CONTROL PANEL* CONNECTOR WITHIN THE TC-8S.
25	*T1 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 1 IS IN THE SWITCH POSITION.
12	*T1 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 1 IS IN THE STRAIGHT POSITION.
24	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
11	*T2 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 2 IS IN THE SWITCH POSITION.
23	*T2 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 2 IS IN THE STRAIGHT POSITION.
10	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
22	*T3 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 3 IS IN THE SWITCH POSITION.
9	*T3 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 3 IS IN THE STRAIGHT POSITION.
21	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
8	*T4 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 4 IS IN THE SWITCH POSITION.
20	*T4 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 4 IS IN THE STRAIGHT POSITION.
7	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
19	*T5 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 5 IS IN THE SWITCH POSITION.
6	*T5 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 5 IS IN THE STRAIGHT POSITION.
18	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
5	*T6 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 6 IS IN THE SWITCH POSITION.
17	*T6 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 6 IS IN THE STRAIGHT POSITION.
4	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
16	*T7 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 7 IS IN THE SWITCH POSITION.
3	*T7 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 7 IS IN THE STRAIGHT POSITION.
15	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.
2	*T8 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 8 IS IN THE SWITCH POSITION.
14	*T8 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 8 IS IN THE STRAIGHT POSITION.
1	*NOT USED*	DO NOT WIRE ANYTHING TO THIS PIN.

CONTROL PANEL (25 WAY MALE "D" CONNECTOR)

PIN No.	**TC-8S LABEL**	**PIN DESCRIPTION**
13	*GROUND*	GROUND FOR THE SIGNALLING LEDS ON YOUR CONTROL PANEL. CONNECTED TO *GROUND* ON THE *LAYOUT SIGNALLING* CONNECTOR WITHIN THE TC-8S.
25	*T1 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 1 IS IN THE SWITCH POSITION.
12	*T1 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 1 IS IN THE STRAIGHT POSITION.
24	*T1 CNTL*	TURNOUT 1 CONTROL. WHEN UNCONNECTED TURNOUT 1 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 1 IS SWITCHED.
11	*T2 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 2 IS IN THE SWITCH POSITION.
23	*T2 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 2 IS IN THE STRAIGHT POSITION.
10	*T2 CNTL*	TURNOUT 2 CONTROL. WHEN UNCONNECTED TURNOUT 2 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 2 IS SWITCHED.
22	*T3 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 3 IS IN THE SWITCH POSITION.
9	*T3 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 3 IS IN THE STRAIGHT POSITION.
21	*T3 CNTL*	TURNOUT 3 CONTROL. WHEN UNCONNECTED TURNOUT 3 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 3 IS SWITCHED.
8	*T4 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 4 IS IN THE SWITCH POSITION.
20	*T4 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 4 IS IN THE STRAIGHT POSITION.
7	*T4 CNTL*	TURNOUT 4 CONTROL. WHEN UNCONNECTED TURNOUT 4 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 4 IS SWITCHED.
19	*T5 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 5 IS IN THE SWITCH POSITION.
6	*T5 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 5 IS IN THE STRAIGHT POSITION.
18	*T5 CNTL*	TURNOUT 5 CONTROL. WHEN UNCONNECTED TURNOUT 5 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 5 IS SWITCHED.
5	*T6 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 6 IS IN THE SWITCH POSITION.
17	*T6 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 6 IS IN THE STRAIGHT POSITION.
4	*T6 CNTL*	TURNOUT 6 CONTROL. WHEN UNCONNECTED TURNOUT 6 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 6 IS SWITCHED.
16	*T7 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 7 IS IN THE SWITCH POSITION.
3	*T7 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 7 IS IN THE STRAIGHT POSITION.
15	*T7 CNTL*	TURNOUT 7 CONTROL. WHEN UNCONNECTED TURNOUT 7 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 7 IS SWITCHED.
2	*T8 LED SW*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 8 IS IN THE SWITCH POSITION.
14	*T8 LED ST*	CONNECTS TO THE POSITIVE SIDE OF THE LED SIGNALLING TURNOUT 8 IS IN THE STRAIGHT POSITION.
1	*T8 CNTL*	TURNOUT 8 CONTROL. WHEN UNCONNECTED TURNOUT 8 IS STRAIGHT. WHEN CONNECTED TO *GROUND* TURNOUT 8 IS SWITCHED.

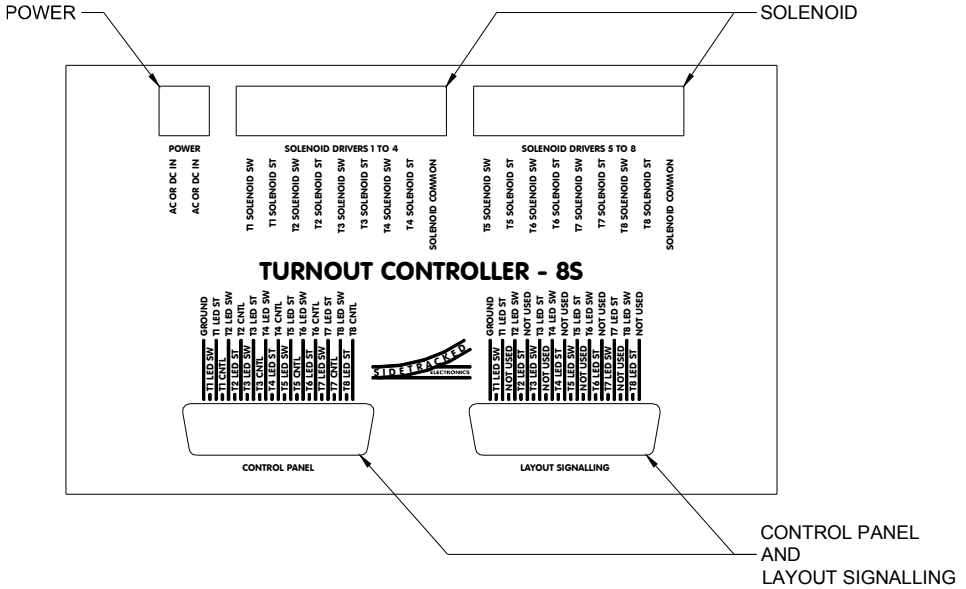
6. WIRING

There are five connectors on your TC-8S. Do not connect wires directly to any of the them. All connections going to the TC-8S are wired to the connectors provided which then plug into the TC-8S.

The wiring for the TC-8S is grouped into the three following categories. The recommended wire size is also listed in both AWG and NCA (nominal conductor area) for each category.

- Control Panel and Layout Signalling. (Use low current hook-up wire. 27AWG, 0.11mm² NCA.)
- Solenoid. (Use wire capable of carrying a minimum of 2 amps. 24AWG, 0.20mm² NCA.)
- Power. (Use wire capable of carrying a minimum of 2 amps. 24AWG, 0.20mm² NCA.)

	Caution: It is very important that the three groups of connections specified above are not mixed. Each group carries a different voltage and is therefore wired to a different shape connector to avoid accidentally plugging it into the wrong place. If the groups are mixed then it may cause permanent damage to your TC-8S.



6.1. CONTROL PANEL AND LAYOUT SIGNALLING WIRING

The TC-8S uses 5 Volts DC to power your control panel switches as well as the signalling LEDs on your control panel and layout. All these connections are made through the two 25 way "D" connectors along the bottom of your TC-8S. The one on the left (*CONTROL PANEL*) is for connecting to your control panel switches and signalling LEDs, and the one on the right (*LAYOUT SIGNALLING*) is for connecting to the signalling LEDs on your layout.

	Note: All wires going to the *CONTROL PANEL* and *LAYOUT SIGNALLING* connectors are to be soldered to the 25 way Male "D" connectors provided and then plugged into the TC-8S. Once wiring is completed the cable clamp can be placed around the wires and then the backshell can be screwed back onto the "D" connector.

6.1.1. CONTROL PANEL SWITCHES

	Note: When wiring your control panel you must use toggle switches and not momentary push buttons.

To control your turnouts, you wire from the *GROUND* pin on the *CONTROL PANEL* connector to the common on the toggle switch. Then wire from the other side of the toggle switch back to the control pin of the turnout you wish to operate. (i.e. *T1 CNTL* for turnout 1). If you may have more than one TC-8S on your layout, please ensure that whichever connector a switch is wired to, that it uses the *GROUND* pin on that same connector.

When the control pin is connected to *GROUND*, the turnout is moved to the switch position. When the control pin is not connected to anything, the turnout will be moved to the straight position.

In the example layout below, the *GROUND* wire from the *CONTROL PANEL* connector is wired to all 5 toggle switches. Turnout 1, 2 and 3 are all controlled by individual switches, each having a wire returning to *T1 CNTL, T2 CNTL* and *T3 CNTL* respectively. In this example turnout 4 is not used, so it is just a matter of leaving *T4 CNTL* unconnected. Turnouts 5 and 6 have been grouped together as have turnouts 7 and 8. You can group as many turnouts as you like by simply wiring their control pins together and connecting them to a single toggle switch. Whenever there is more than one turnout connected to a single toggle switch, the turnouts don't change simultaneously, but sequentially in numerical order. i.e. turnout 5 then turnout 6.

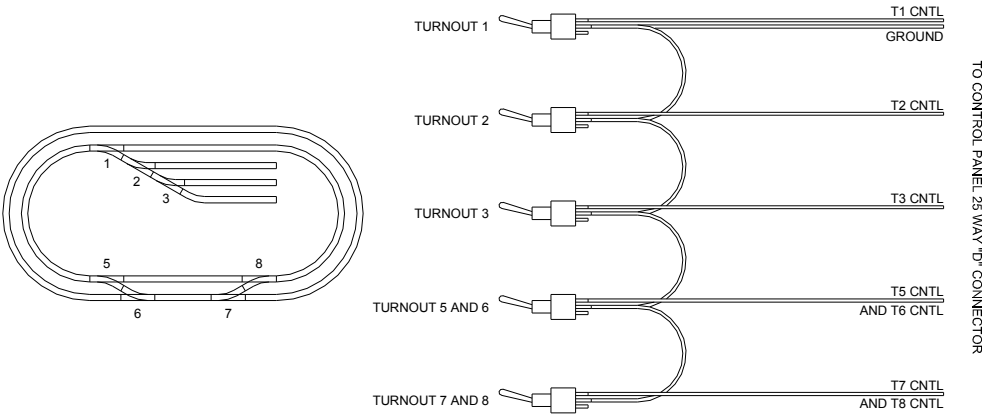


Diagram 5: Wiring for control panel switches

6.1.2. SIGNALLING LEDS

	Note: It is not necessary for you to have signalling LEDs on your control panel or layout, in order for the TC-8S to function correctly.

There are sixteen different signalling pins on the TC-8S. These are *T1 LED ST* through to *T8 LED ST* and *T1 LED SW* through to *T8 LED SW.* The LEDs connected to these pins directly reflect the position of their associated turnout. On the example layout in Diagram 6, if turnout 1 was in the straight position so that the train would continue around the inside loop, then the LED connected to *T1 LED ST* would be on, and the LED connected to *T1 LED SW* would be off. If, on the other hand, turnout 1 was in the switch position so that the train would go off into the yard, then the LED connected to *T1 LED SW* would be on and the LED connected to *T1 LED ST* would be off.

All signalling LEDs are wired to the two 25 way "D" connectors along the bottom of the TC-8S. Use the one on the left (*CONTROL PANEL*) for connecting to the signalling LEDs on your control panel, and the one on the right (*LAYOUT SIGNALLING*) for connecting to the signalling LEDs on your layout. You will notice that the labels *GROUND*, *T1 LED SW* through to *T8 LED SW* and *T1 LED ST* through to *T8 LED ST* are labelled the same on both connectors. These pins function exactly the same as one another and are joined to each other within in the TC-8S.

Signalling LEDs are arranged into sets. A set can contain between 1 and 16 LEDs. Each set must have only one LED connected to each of the signalling pins on the TC-8S. The TC-8S can support up to 4 sets so if you require two or more LEDs to be connected to the same signalling pin, each one must belong to a different set. Every set of LEDs must have their negative/cathode pins (see section 8 "AN INTRODUCTION TO LEDs") joined together and then wired to a *GROUND* pin via a 270 ohm resistor. If you may have more than one TC-8S on your layout, please ensure that whichever connector a LED is wired to, that it uses the *GROUND* pin on that same connector.

The LEDs controlled by the TC-8S are multiplexed. This means that out of the sixteen signalling pins on the TC-8S, only one is on at any one time. The LEDs connected to these pins are switched on and off at a speed that makes them appear to be constantly on. This technique reduces the power consumption of your TC-8S.

If the LEDs on either your control panel or layout are not bright enough, it could be that they are physically mounted too far away from the TC-8S. This can be easily fixed by reducing the value of the 270 ohm resistor in the affected set. First start with a 220 ohm resistor, if the LEDs are still too dim try the following values 150, 120, or 100 ohm. Do not use anything less than an 100 ohm resistor.

6.1.2.1. CONTROL PANEL SIGNALLING LEDS

Diagram 6 shows how to wire a set of LEDs for your control panel. Connect all the negative/cathode pins of the signalling LEDs on your control panel together and then wire them to the *GROUND* pin on the *CONTROL PANEL* connector via a 270 ohm resistor. The positive/anode side of the LEDs should be connected to the appropriate pin on the *CONTROL PANEL* connector. Make sure the set has only one LED connected to each of the signalling pins on the TC-8S.

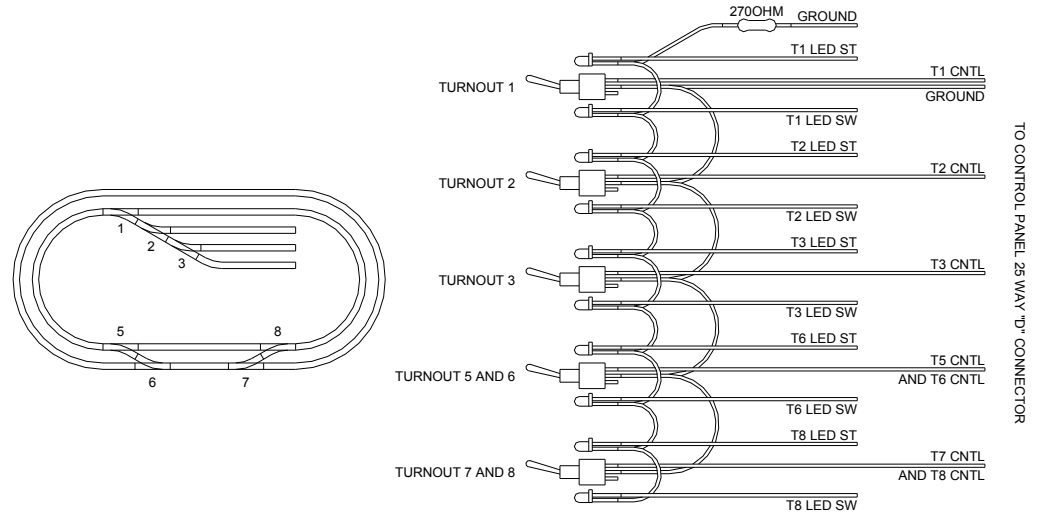


Diagram 6: Wiring for control panel signalling LED's

Note: If a second set of signalling LEDs is required on your control panel, then it is simply a matter of duplicating the LED wiring as previously described. However, you must use a different 270 ohm resistor going to *GROUND* for each additional set of LEDs.

6.1.2.2. LAYOUT SIGNALLING LEDS

The layout signalling LEDs function exactly the same way as the control panel LEDs. Wiring is also exactly the same except the LEDs are wired to the *LAYOUT SIGNALLING* connector instead of the *CONTROL PANEL* connector.
Diagram 7 shows how to wire a set of LEDs for your layout. Connect all the negative/cathode pins of the signalling LEDs on your layout together and then wire them to the *GROUND* pin on the *LAYOUT SIGNALLING* connector via a 270 ohm resistor. The positive/anode side of the LEDs should be connected to the appropriate pin on the *LAYOUT SIGNALLING* connector. Make sure the set has only one LED connected to each of the signalling pins on the TC-8S.

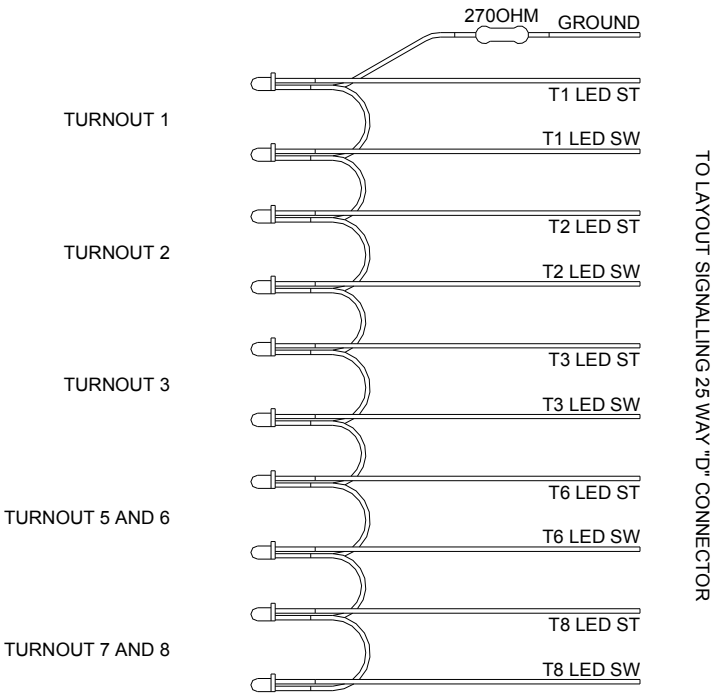


Diagram 7: Wiring for layout signalling LEDs

	Note: If a second set of signalling LEDs is required on your layout, then it is simply a matter of duplicating the LED wiring as previously described. However, you must use a different 270 ohm resistor going to *GROUND* for each additional set of LEDs.

6.2. SOLENOID WIRING

Connections to the solenoids in your turnout motors are made through the two 9 way solenoid connectors along the top of your TC-8S. The wiring has been arranged into 2 connectors, *SOLENOID DRIVERS 1 TO 4* and *SOLENOID DRIVERS 5 TO 8*. Each connector drives 4 turnouts (8 solenoids) and has its own *SOLENOID COMMON*. The *SOLENOID COMMON* on both connectors are exactly the same as one another and are joined within the TC-8S. They have up to 25 Volts DC connected to them when the TC-8S is powered up, so care must be taken not to connect these pins to the wrong place.

	Note: All wires going to the *SOLENOID DRIVERS 1 TO 4* and *SOLENOID DRIVERS 5 TO 8* connectors are to be screwed into the 9 way solenoid connectors provided and then plugged into the TC-8S.

	Note: On the example layout in Diagram 5, turnout 5 and 6 are controlled from the one toggle switch, however, they must be driven by separate solenoid drivers as indicated in Diagram 8. Each solenoid driver output is designed to drive only one solenoid.

Each turnout motor has two solenoids. One to pull the rails to the switch position, and the other to pull them to the straight position. In Diagram 8, the solenoid used to move turnout 5 into the switch position is wired to *T5 SOLENOID SW*. The solenoid used to move turnout 5 into the straight position is wired to *T5 SOLENOID ST*. Solenoids for the other turnouts are wired the same way. Whichever connector a solenoid is driven from, it should use the *SOLENOID COMMON* on the same connector.

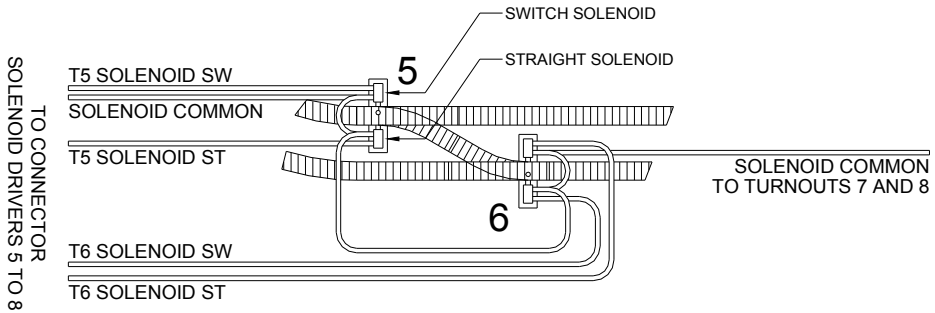


Diagram 8: Wiring for solenoids

6.3. POWER WIRING

The power for your TC-8S is supplied through the 2 way power connector in the top left of your unit. It can accept 12 to 18 Volts AC or 15 to 25 Volts DC. If you go any lower than the minimum specified voltage the electronics of the TC-8S may still function perfectly, but you may find there is not enough power to activate your solenoids. Do not exceed the maximum specified voltages as it may cause permanent damage to your TC-8S.

	Note: All wires going to the *AC OR DC IN* connector are to be screwed into the 2 way power connector provided and then plugged into the TC-8S. It does not matter which way around you connect the wires to this connector.

7. INITILISATION

When you first power up your TC-8S it goes through an initilisation process which ensures that all turnouts are set according to your control panel. Regardless on how your switches are set, the TC-8S will sequentially move all connected turnouts to their switch position, then to their straight position and then set them according to the settings on your control panel.

If you have signalling LEDs on your control panel or layout they will change during the initilisation process to reflect the position of their associated turnout.

8. AN INTRODUCTION TO LEDS

LED's 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 negative pin is easily identified as it is either the shorter of the two pins and/or its marked by a flat spot on the body of the LED. Please ensure you connect them the right way round.

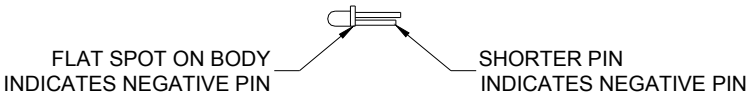


Diagram 9: LED pin identification

9. MOUNTING

If you have no alternative but to screw your TC-8S to your layout framework then please refer to Diagram 10. The only place to insert screws into the TC-8S is through the bottom of the box. There is a 10mm gap between the bottom of the enclosure and the electronics inside the TC-8S. Please ensure that the screws do not enter the underside of the box by more than 10mm. If the screws touch any of the components inside the box you may do permanent damage to your TC-8S.

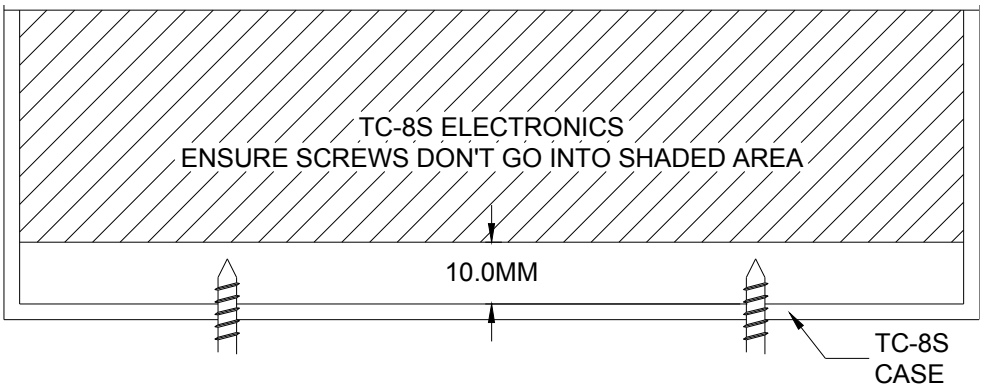


Diagram 10: Cross sectional view of TC-8S

10. SPECIFICATIONS

AC Input Voltage:	Minimum = 12 Volts AC	Maximum = 18 Volts AC
DC Input Voltage:	Minimum = 15 Volts DC	Maximum = 25 Volts DC
Solenoid driver output voltage AC input:	Minimum = 15.3 Volts DC	Maximum = 23.8 Volts DC
Solenoid driver output voltage DC input:	Minimum = 13.8 Volts DC	Maximum = 23.8 Volts DC
Current Consumption Idle*:	Maximum = 7mA	
Current Consumption Switching*:	Maximum = 800mA	
Signalling LED output voltage:	Maximum = 5 Volts DC	
Signalling LED output current:	Maximum = 100mA	
Dimensions:	158 x 95 x 53mm	
Weight:	300grams	

*Current specifications are without signalling LEDs.
Add 10mA per LED set when using a 270 ohm resistor.

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