

**Non-DCC Operation**

Provided that the TT 300 has not had the configuration variable CV2 changed under DCC programming, it will operate using "traditional" power, without DCC, as follows:-

**Power Supply**

As shown in fig. 5, a power supply must be connected to the "D1" and "D2" terminals through a double-pole-double-throw (DPDT) switch as shown in fig. 6. The characteristics of the power supply are:-

- It must produce *smooth direct current* (DC).
- Normal voltage between 9 to 18 volts. **DO NOT EXCEED 25 VOLTS UNDER ANY CIRCUMSTANCES !!**
- Available current 0.1amp (100mA) for each TT 300 supplied.

Examples of suitable power sources are:-

- "Maplin Electronics" wall plug supply – stock code GS75S or L82BF.
- "Rapid Electronics" – stock code 85-2902 or 85-2915.
- Gaugemaster – stock code T1 DC (requires case and wiring).

Examples of suitable switches are:-

- "Maplin Electronics" – stock code FH04E or FH39N.
- "Rapid Electronics" – stock code 75-0097 or 75-0213.
- Gaugemaster – stock code GM506.

**Point Control**

Simply change the switch position and the TT 300 will drive to the opposite state. You can reverse the "D1"/"D2" connections from the switch, or change the orientation of the switch in your control panel, if you need to reverse the operating sense.

Consult the Full User Guide (troubleshooting section) if point control can not be satisfactorily obtained.

**Notes on operating sense and "Live Frog" Wiring**

Fig. 7 shows the *point state* markings, "A" and "B", on the TT 300 PCB.

In the *original* (as supplied) operating sense, the NORMAL (or "closed") point state corresponds to "A" and REVERSED (or "thrown") corresponds to "B".

In the *alternative* operating sense, the NORMAL (or "closed") point state corresponds to "B" and REVERSED (or "thrown") corresponds to "A".

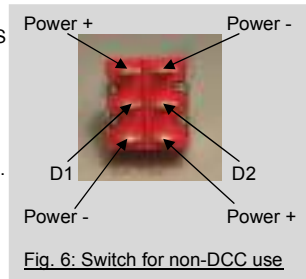
Regardless of your chosen operating sense, the point stock rail above the "A" mark is ALWAYS denoted "rail A" and the stock rail above the "B" mark is ALWAYS denoted "rail B".

Referring to the main connector terminals:-

"A" is internally connected to "F" when the drive pin is held in the "A" direction (either at the end of its slot in the PCB or when a point blade meets its respective stock rail).

"B" is connected to "F" when the drive pin is held in the "B" direction.

This completes the Basic Guide.  
The TT 300 has several extra features which are described in the "Advanced Features" section of the Full User Guide (available from your Traintronics dealer).



**WARNING**

- The human body can generate static electricity which can damage electronic equipment – AVOID TOUCHING THE TOP OF THE TT 300 CIRCUIT BOARD!
- For INDOOR use only.
- The TT 300 is not suitable for use by children under 14 years of age unless supervised by an adult.

**GETTING STARTED**

**Refer to fig. 1**

The TT 300 will operate a model railway point (turnout), of up to GAUGE 1 size, using either *digital command control* (DCC) or "conventional" operation using a direct-current (DC) power supply.

Once correctly installed, the unit requires NO mechanical adjustment as the end of travel of the point is automatically detected and the point *blades* are held against the *stock rails* with a moderate force.

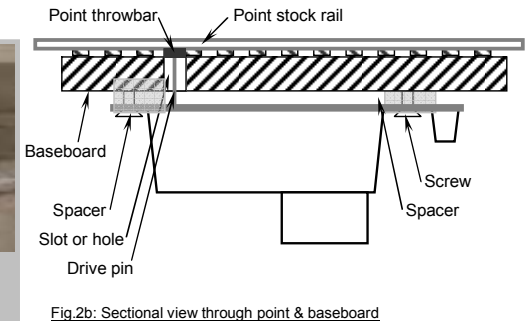
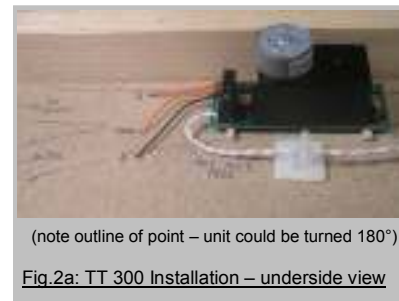
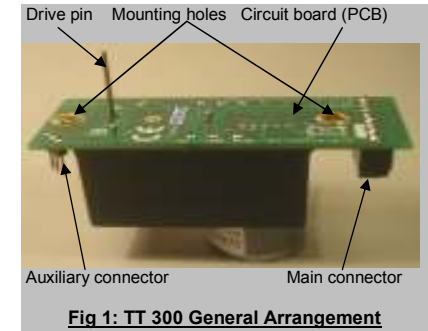
**Installing the unit – also see notes on page 5**

The TT 300 is usually mounted to the underside of the *track bed*, directly underneath the point, using two 3.5mm screws provided as shown in fig. 2a. This provides the simplest mounting arrangement as the drive pin directly engages with the throw bar on the point as shown in fig.2b.

Use the two spacers provided and positioned as shown in fig. 2, to provide stability and clearance as the mounting screws are tightened.

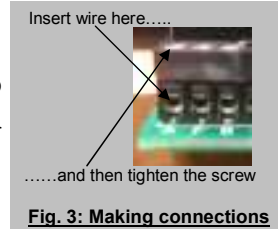
**WARNING**

- **DO NOT** apply power to the TT 300 if the drive pin is not fitted (or internal damage may result)!
- The unit **MUST NOT** make contact with any electrically-conductive parts!
- **DO NOT OVERTIGHTEN** the mounting screws. **Under no circumstances must the circuit board be flexed or distorted!!**



## Wiring

Fig. 3 shows how to make electrical connections to the **main** connector of the TT 300. Use stranded insulated wire, of 7/0.2mm size, with about 6mm of insulation stripped from the end. However, for scales larger than OO (or HO) gauge, we recommend using 16/0.2mm wire for the "A", "B" and "F" (frog supply) connections as the wire will need to carry a larger current. Your Traintronics dealer should stock suitable wire. **MAKE FIRM CONNECTIONS BUT DO NOT TRAP THE WIRE INSULATION!**



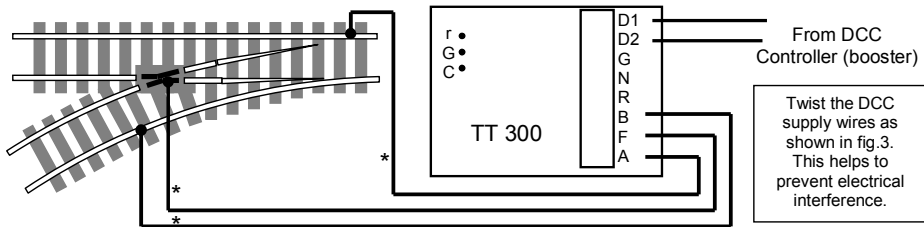
**Fig. 3: Making connections**

**Wiring Information** – (terminals labelled in white on the PCB).

The <i>main</i> terminals are:		"D1" - Power, or <b>DCC</b> , input
		"D2" - Power, or <b>DCC</b> , input
		"G" - <b>Ground</b> or <i>common return</i> for indicators
		"N" - <b>Normal</b> indicator (LED) output (see full User Guide)
		"R" - <b>Reversed</b> indicator (LED) output (see full User Guide)
		"B" - Rail <b>B</b> power input (for live frog power – see page 4)
		"F" - Output supplying live <b>frog</b> (see page 4)
		"A" - Rail <b>A</b> power input (for live frog power – see page 4)
The <i>auxiliary</i> terminals are:		"r" - Output indicating "point <b>reversed</b> " (see Full User Guide)
		"G" - <b>Ground</b> or <i>common return</i> for "C" input
		"C" - Remote <b>Control</b> input (see Full User Guide)

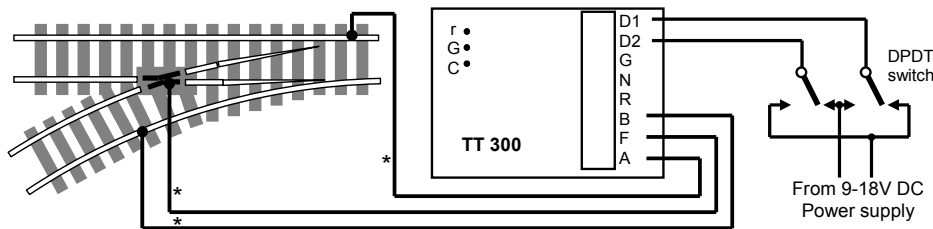
The TT 300 will draw very little current from your layout – no more than 20mA (0.02A) when *idling* and less than 100mA (0.1A) when driving between *normal/reversed (closed/thrown)* positions.

Fig. 4 shows a basic configuration for operation under DCC where the point state (i.e. normal/closed or reversed/thrown) is selected by sending *accessory* instructions from your DCC *command station*.



**Fig. 4: Wiring for DCC control** (wires marked "\*" are for "live" frogs and are optional – see page 4)

Fig. 5 shows operation **without DCC**, using DC power and a *double-pole/double-throw (DPDT)* switch. In this case, the point state is determined by the *polarity* of the DC power supply – if the "D2" terminal is *positive*, the TT 300 will drive towards "A" (marked on the PCB in white) and it will drive to "B" when "D2" is *negative*.



**Fig. 5: Wiring for use without DCC** – (wires marked "\*" are for "live" frogs and are optional – see page 4)

## OPERATING

### DCC Operation

This section assumes that you have a DCC system – including a *command station, booster and decoder programmer* (often combined in one unit) – which is fully compliant with the *National Model Railroad Association (NMRA)* DCC Standards and Recommended Practices. As all DCC systems vary in their exact operating methods, please read the following instructions in conjunction with your DCC system manual.

#### Initial testing

With the unit wired as shown in fig. 4, turn on the DCC controller.

Refer to your DCC system manual and perform the following actions:-

- Select *accessory* ("point", "switch" or "turnout") NUMBER 1 on the controller.
- Send a single "POINT NORMAL" (or "turnout/switch" "closed/on") command.

The TT 300 should drive its output pin towards the "A" mark on the PCB and then stop. If the unit is already installed, then the point blades should be driven in the "A" direction until one blade is closed firmly against its associated stock rail. (This assumes that the drive pin is initially centred – see page 5)

See the "Troubleshooting" section in the Full User Guide if the above action does not occur.

#### Changing the point address

By re-programming *configuration variable (CV)* 1 the *address* of the point can be changed. CV1 may be set to any number between 1 and 255 inclusive (See "Advanced Features" in the Full User Guide to set higher values of address).

Again, refer to your DCC system manual for details. The programmer – or the programming output of a combined command station and programmer – should be connected to the "D1" and "D2" terminals of the TT 300.

NOTE: Some DCC system instructions refer to decoder *registers* rather than *CV numbers*. In this case, the point address is set in **register 1** and a value between 1 and 255 (inclusive) is, again, allowed.

#### Controlling the point

In order to change the point state, perform the following actions:-

- On the DCC controller, select the *accessory* ("point", "switch" or "turnout") number corresponding to the value programmed into *CV1* (or *register 1*).

- Send a "POINT NORMAL" (or "closed/on") command to drive in the "A" direction.

Or:-

- Send a "POINT REVERSED" (or "thrown/off") command to drive in the "B" direction.

#### Changing the operating sense

Depending upon whether your point is left or right hand, and depending upon the orientation of the TT 300, you may need to change the *operating sense*. This means that a "POINT NORMAL" (or "closed/on") command will drive the unit in the "B" direction and a "POINT REVERSED" (or "thrown/off") command will drive in the "A" direction.

Increasing **CV2** by 128 gives this *alternative* operating sense (and reducing by 128 restores the *original* sense).

See the "Advanced Features" section of the Full User Guide for further information.

## INSTALLATION TIPS

We recommend that the following advice and photographs are followed to ensure trouble-free installation and operation:-

### 1 Centre the drive pin.....



Move the drive pin to within about a millimetre of the centre of its slot, holding the pin as close as possible to the PCB.

You may or may not hear the internal gears moving. (The internal parts are pressed together and the tightness of fit varies between units).

Centring the drive pin ensures that there is adequate movement available in both directions.

Ensure that the baseboard has a hole or slot cut under the point throwbar and that the TT 300 drive pin has sufficient clearance within this hole.

### 2 Align the TT 300 and drill the mounting holes.....



Insert the drive pin through the slot in the baseboard and then into the point *throwbar*. Once the drive pin is engaged in the throwbar, move the TT 300 sideways slightly aiming to centre the point blades mid-way between the stock rails.

Hold the TT 300 against the baseboard ensuring that its drive pin slot is aligned parallel to the line of the point throwbar (see picture).

"Spot through" the mounting holes with a pencil, as shown, to mark their positions on the baseboard.

Remove the TT 300 and drill a *pilot hole*, at the centre of each pencil mark, using a 2.5mm drill bit.

NOTE: The drive pin can be cut to length at this stage – do not forget to add 3mm to allow for the spacers!

### 3 Install and secure the TT 300.....



Remove the unit from the baseboard and clean away any sawdust or other debris.

Re-install the TT 300, adding the 3mm spacers, and secure in position using two woodscrews. DO NOT OVER-TIGHTEN THE SCREWS!

NOTE – The TT 300 may be mounted the opposite way round to that shown if your baseboard structure, or track layout, demands it. You can change the *operating sense* of the unit as described on page 3 (and in the Full User Guide).

Don't forget the spacers !! Note. This diagram shows balsa wood strips as an alternative to plastic spacers. The plastic spacers provided should be sufficient.