

APPLICATION NOTE

How to Manage Multiple Active Decoders on the Two-Wire TW/WM Series

The two-wire TW/WM series of decoders by Tonick has been designed to replace the TW2 Mk 1 Watermation decoder. The original signalling system precluded more than one decoder active at a time on the same cable. The mechanism causing this restriction was the interference by the on-solenoid of the 'flat' at mains zero crossing. The inductive stored energy in the solenoid, displaces what should be zero volts which prevented the zero-crossing detector from registering the 'flat'. The Tonick TW/WM series decoders are adjusted to ignore any such displacement up to about 7V. Additionally and crucially, the Translator has an active zero-volt clamp to help absorb the stored energy from any active solenoids. This allows the Translator and TW/WM decoder combination to have more than one decoder active on the same cable.

The technical limitation to this method arises when there is significant resistance between the Translator and active decoders. At supply zero-voltage crossing, the residual current in the inductor of the solenoid passes through this resistance, generating a voltage pedestal at the decoder, so displacing what should be a zero-volt flat.

It has been found from experience that it is possible to turn on an adjacent second solenoid about 1000 – 1200m from the Translator when using 2.5mm² cable. Solenoids nearer the Translator have a lesser effect, so more can be turned on together. However the Translator is not designed to turn on more than four solenoids on one cable.

In the Rainmaker, these limitations are learned during normal operations. If a decoder will not turn on when others are already active, it is marked as '1st On'. Thereafter it is turned on as the first in a group. Thus the controller gradually learns which decoders can be turned on with which.

Another technique is to assign elevated load factors to the decoders that are furthest away from the Translator. The very furthest are assigned a 'load factor' of 4, i.e. apparently 4 solenoids. The Translator will therefore only turn that decoder on by itself. Nearer to the Translator, a load factor of 3 allows one far decoder to be combined with a near one with a load factor of 1. Nearer still, assigning a load factor of 2, allows one 2 with perhaps two 1s. Finally, decoders only a few hundred metres away can be assigned a load factor of 1, which allows four on together.

Of course, lowering the cable resistance reduces the effect. Making a loop can do this or using a 'main' cable of, say, 4mm² or 6mm², with spurs of 2.5mm².

If multiple solenoids on together are crucial to the design, consider using the Tonick TW/TOR range of decoders. The 3 wire signalling system does not suffer from the above limitation. Moreover their quiescent current is only 4mA rather than the 7mA for the TW/WM series. Note however that only 99 separate addresses can be accommodated with the TW/TOR series, rather than 127 with the TW/WM.