

Is it a bird? Is it a
plane? No, it's a
Supertram!



The Stagecoach Supertram in Sheffield, South Yorkshire gradually opened in phases. Now thanks to intelligent use of portable memory, which enables a greater level of automation, the tram is measuring up to its superhero name. Here, Michael Barrett, operations and engineering director at Nexus explains how the rugged memory tokens have streamlined the automation process.

Memory tokens with a serial interface help these incredible vehicles accurately navigate the busy streets of Sheffield. For the past three years, the technical team at Orion Projects, the company responsible for the upgrade of the Supertram Vehicle Identification System, has been using Datakey Electronics' Electrically Erasable Programmable Read-Only Memory (EEPROM) devices supplied by Nexus.

The Stagecoach Supertram serves the city of Sheffield with three light rail routes, covering a total of 29km. The tram network links five park and ride sites with the busy city centre and provides easy access to the mainline rail station, shopping areas including Meadowhall, both of Sheffield's prestigious universities, the Cathedral, the city's sports arenas and many new popular entertainment venues.

The Supertram plays a key part in the city's infrastructure and as half of the system is located on streets running with mixed traffic, the Orion team tasked with upgrading the tram to track communication system had its work cut out.

The Vehicle Identification Systems (VIS) system manages the routes, signalling, stops and priority levels for the tram, helping it to integrate seamlessly with urban traffic. Because accurate communications are paramount for the efficient functioning of the tram, the team looked for a memory solution that would provide flexibility, as well as safe and rugged data storage.

Datakey Electronics' serial interface token was chosen to store configuration data. This configuration data is uploaded onto the token by the Orion team and then plugged in at trackside boxes.

In order for the trams to safely and efficiently negotiate Sheffield's traffic, we needed a robust memory product that would still be flexible enough to allow multiple data uploads" explained Roger Burrige, Director at Orion Projects.

The memory token will ultimately be used to store configuration data at 59 trackside locations. This data is used for controlling trackside traffic controllers points and signals and because each location is unique, individual controls need to be used for each token employed.

A set of inductive loops lie hidden underneath the tracks and act as a sensor for the tram, providing continuously updated status concerning tram location to the trackside equipment and the Operational Control Centre. The trackside hardware reads the information stored on the memory token and based on the signals it receives from the loops, sets the appropriate output information.

The tokens contain a variety of possible responses called up from data tables and the right option is chosen for individual locations.

“The tokens supplied by Nexus are used to determine the operation of relay outputs which help direct traffic controllers and trackside control equipment. Traffic controllers are located at every major junction and their aim is to effectively control traffic lights and vehicle priorities. The data table stored on the token is used by the trackside equipment to signal the traffic controller so that trams get priority in mixed traffic, alongside cars and buses” Roger Burrigge added.



This technique allows a tram to cross the network of tracks in Sheffield and ensure it does so as quickly as possible - thanks to the priority arrangement input into the traffic signal.

“In the past we have used fixed embedded memory to manage tram configuration table, but that presented us with flexibility issues” Roger Burrigge recalled. “The benefit of using the Datakey Electronics’ tokens is that they are removable and most importantly, very robust. Having a token that you can literally plug and play has significantly streamlined tram communications. This means that when required, a new memory token can be programmed at headquarters and then a trackside engineer can just plug it in after removing the old one. Furthermore, the tokens are reliable and easy to reconfigure – they can be used time and time again. The fact that they are reprogrammable helps keep the costs down as well” said Roger Burrigge.

Reliable receptacles that help read the information uploaded onto the token are perhaps the most critical aspects of the Datakey system. Nexus offers a range of field-proven mating receptacles from Datakey Electronics for each data-carrier system.

Nexus distributes the full range of Datakey Electronics’ memory systems. They are available with SPI, I²C, Microwire, USB and SD interfaces. Memory capacities run from 1Kbit to 64GByte allowing easy customisation that fits particular application requirements. These products are ideally suited for data-logging, parameter and configuration upload, data storage and access control.

Since we started working with Nexus and Datakey Electronics’ products, several years ago we have experienced more streamlined and effective communications. We cannot afford systems failures and tram traffic disruptions, so only a reliable device that can be easily tailored, would do” concluded Roger Burrigge.

In recent years, the Sheffield Supertram has become an emblem for its native city, just like the iconic cathedral or the university campuses. Much like these two institutions, the tram has become an integral part of urban life, sustaining crucial activities. Guided by Datakey Electronics’ muscular memory, Sheffield’s Supertram has more than earned its superhero status: always on time, connecting communities and making life better for the city of Sheffield!