

## SSC

Train control solution  
for the RFI rail network  
in Sardinia



GE  
Transportation

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SSC, the advanced train control solution developed by GE - Transportation, brings to regional rail networks the same high level of safety and performance that RFI (Rete Ferroviaria Italiana) and Trenitalia, a Ferrovie dello Stato Group company, provide to high-speed and main rail lines.

The Sardinia rail network is the first in Italy to install the SSC train control solution. This upgrade to automatic train protection will gradually roll out across regional sections of the entire RFI network, covering a total of nearly 6,000 kilometres.

#### Fast, efficient installation

The SSC project was designed, developed and implemented in record time across 438 kilometres of the Sardinia line, from May 2005 to June 2006. The inherent simplicity of the SSC solution plus a close collaboration among RFI, Trenitalia and GE - Transportation contributed to the speed and efficiency of this installation.

The SSC Train Control Solution was deployed into service in three phases.

- **Phase 1**, March 2006:  
Oristano-Chilivani, 120 km  
Decimomannu-Siliqua-Carbonia-Iglesias, 60 km
- **Phase 2**, April 2006:  
Sanluri-Oristano, 50 km  
Chilivani-Porto Torres, 67 km
- **Phase 3**, June 2006:  
Cagliari-Sanluri, 45 km  
Chilivani-Golfo Aranci, 96 km



## System architecture

A model of simplicity, the SSC solution consists of two main components: the wayside component and the carborne component. Diagnostic, positioning (GPS) and radio transmission (GSM) systems are integrated into the SSC solution.

### Wayside component

Wayside components of SSC are installed on the right of way at each signal. The wayside installation consists of an encoder and a microwave transponder to transmit signals to the on-board component. Power is derived from existing signal lamps, thus requiring no additional cabling.

### Carborne component

The SSC carborne component assures that the train is continuously controlled with respect to the signalling status it receives from the wayside. Warning is given to the train driver when the speed is approaching the maximum permitted or when more restrictive orders are in force. The driver is required to acknowledge such situations by pushing the appropriate button on the SSC interface installed in the cab. If the driver does not comply, the carborne component enforces train braking. Train braking is also enforced immediately if a signal showing danger is passed.





## System design

The innovative modular design of the SSC train control solution was created not only to guarantee maximum safety, but also to optimise the entire operating life cycle, from installation to commissioning and ongoing service.

SSC system advantages of low installation and maintenance costs apply to both wayside and carborne components.

The on-board system (for a two-cabin locomotive) is comprised of four SSC antennas, a GSP/GSM antenna, two driver interfaces, on-board computer, plus cabling and interfaces. Downtime is minimal, with complete installation taking trains out of service for only two days.

Trackside installation is simple as well. The SSC component does not require cables to be installed between rails. The entire wayside component is installed at the signal and requires only local connections, a simple and fast process that results in only minimal interruption of service.



## Support for drivers

Drivers were a vital part of the design of the SSC solution, providing consultation on the system's safety and ergonomic features.

In operation, the SSC solution provides support for drivers by continuously monitoring train running conditions and issuing alarms when necessary. It does this without changing operational rules and current procedures in place and without requiring constant attention.

As a result, the learning curve to operate the SSC solution is short and acceptance is straightforward. No major re-training of railway staff is required.





- Phase 1 March 2006
- Phase 2 April 2006
- Phase 3 June 2006

## SSC and the Sardinia rail network

The flexibility and adaptability of the SSC solution capably met the requirements of the highly varied Sardinia rail network. The track line encompasses single and dual track, electrified and non-electrified segments, some automatic interlock sections, and level crossings with signals. Wayside signals ranged from single lamp/multiple aspects RS type of signal heads to multiple aspect/multiple dichroic lamp types, with pole, cantilever and portal mountings. The locomotive fleet is comprised of 95 diesel vehicles of various types.

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Line section	Distance	Number of stations	Station signals	Information points in block	Level crossings	Automatic block signals	Total information points
Cagliari-Oristano Decimomannu-Iglesias-Carbonia	155	16	169	12	3	13	204
Oristano-Chilivani	120	10	105	2	13	0	149
Chilivani-Porto Torres	67	5	46	0	8	0	68
Chilivani-Golfo Aranci	96	7	71	1	7	0	92
<b>Totale Sardegna</b>	<b>438</b>	<b>38</b>	<b>391</b>	<b>15</b>	<b>31</b>	<b>13</b>	<b>513</b>

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*GE - Transportation employs more than 8,000 people worldwide. The European headquarters are in Florence, Italy, one of GE's worldwide centres of excellence for integrated signalling systems.*



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**GE Transportation Spa**  
Via Pietro Fanfani 21  
50127 Firenze

[www.getransportation.com](http://www.getransportation.com)