

Track-to-Train / Platform-to-Train CCTV Transmission System STIVIS

The STIVIS system has been designed for train drivers to check out their own trains. The video signals from the cameras installed on the platforms will be transmitted wireless and in real time to the driver's cab with the help of directed infrared radiation, so that video images of the platform situation can be displayed on one or several monitors in the driver's cab.

Not only does the system enhance passenger safety, it also provides economic benefits, because it reduces the personnel required for dispatching the trains, especially in times of a high train density.

As the **first railway of the world**, the suspension railway in Wuppertal was equipped with an ASAS infrared video transmission system (IR-SITRAIL) in 1996.



Fig. 1 • Suspension railway in Wuppertal

The configuration of the STIVIS system ensures the flexible adjustment to the most diverse requirement of train operations. The application covers:

- the transmission of signals from the train's stop position within an area that is determined by the tolerances for the stopping accuracy, usually within the range of at least $-6\text{ m} / +4\text{ m}$,
- the transmission from different stop positions for short or long trains into the driver's cab, which can usually be ensured by one transmitter, and
- the continuous image transmission over longer track sections by the cascade arrangement of the transmitters, e.g. before the platform area is approached, during the dispatch procedure and until the train has completely left the station.

Particular attention has been paid during the development that the required equipment on the railroad vehicle itself can be kept to a minimum and that different types of vehicles can be easily re-equipped. The installation of the IR video receiver is absolutely simple: It is so small that it can be installed immediately behind the windscreen in the windscreen wiper area. As it has a depth of only 52 mm (!), it may even be put between the sunblind and the windscreen.

The installation in the windscreen wiper area will ensure that an impairment of the transmission quality caused by environmental influences, such as air and water pollution, layers of snow etc., can be safely excluded. Moreover, the movements of the windscreen wiper itself during rain or snowfall will in no way affect the transmission quality.



Fig. 2 • S-Bahn Berlin GmbH line S1
driver's cab with IR receiver and two TFT monitors
(receiver upside the driver)



Fig. 3 • S-Bahn Berlin GmbH line S1
IR transmitter immediately next to the track

If required, up to four different switching or identification signals can be transmitted from the train to the platform through an optimal reverse channel between receiver and transmitter, of which the (ASAS) IR transmission system for the KLIA Express Rail Link in Kuala Lumpur is a good example:

The project included the short-term implementation of a specific solution for transmitting video signals into the train. In addition to that, switching and identification signals are transmitted in the reverse direction, i.e. from the train to the platforms. They control the screen doors on the express train platforms at the ERL terminals, which the driver is now able to operate from the train. An identification signal "short train/long train" ensures that the right number of doors on the platform will be operated.



Fig. 4 • Kuala Lumpur Aiport terminal - ERL
door control signals are transmitted
from the train to the platform



Fig. 5 • Express Rail Link KLIA in Kuala Lumpur
IR receiver between the headlights



Fig. 6 • Express Rail Link KLIA in Kuala Lumpur
IR transmitter immediately next to the track

The STIVIS system can be adapted to the specific operating conditions without any problems (as the above example shows) by configuring the scope of equipment and functions accordingly. A number of additional system components is available to extend the scope of functions provided:

- **the application of Multiplexers (MUX) and Demultiplexers (DEMUX) for the transmission of two video signals onto two monitors**
- **a self-test of the vehicle equipment**
The train can be equipped with a self test routine for checking the reliable functioning of all components, to be started manually by the train driver or the maintenance personnel. The test result will be displayed on the monitor (color codes) for a subjective assessment, if the functions are found to be in good working order. The duration of the displayed test pattern can be defined by the operator.
- **a self-test of the platform equipment**
The functioning of all IR transmission IREs in the transmitters will be monitored when the self test routine is activated. The existence of the HF component and of the video signal in the emitted IR radiation will be checked.
- **cascading two or more transmitters**
If images are to be continuously transmitted from heavily bent track sections, it may be necessary to use two transmitters for reasons of the transmitter geometry, in order to ensure the transmission to several possible train stop positions. The same applies when the transmission is required over longer track sections, during the check-out at the train stops and until the train has left the station completely. The cascaded transmitter arrangement will be controlled by an optional cascading module.



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