

Data-logger Connectivity for EIs at Major Yards

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Abstract

Protocol converters are being used to Interface EIs with data-loggers in the Indian Railways. It has been observed that the data logging is not correct at times because of inability of Protocol Converters to process large inputs. This article provides a method to overcome this limitation of protocol converters.

1 Introduction

Electronic Interlocking (EI) is a computer based interlocking system, used for controlling points, signals, level crossing gates etc. through a centralized control panel or through a VDU¹. Microprocessor or Micro controllers are used in EIs. All the internal relays that were used in relay based interlocking system are replaced by logic bits in EI. Only external and output relays only provided in EI.

Many interlocking relays like UYR, JSLR, and RJPR etc. need slow-to-release arrangements like RC circuits in RRI. These slow-to-release function is achieved by 2 additional relays in EI. As a result, the number of relays (including both physical and logical bits) are more in EI than in RRI for a given lay out. Status of these bits are communicated to central location for data logging and further analytics. Protocol Converters are used to interface data loggers to Electronic Interlocking systems.

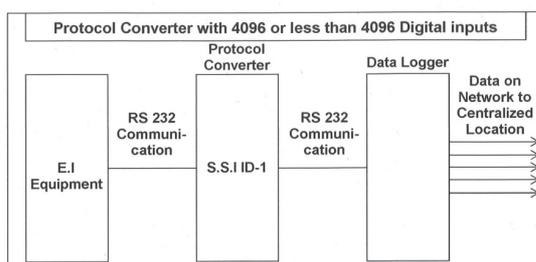


Figure 1: Protocol Converter Function for the Digital Inputs

Figure 1 shows the typical interaction of a protocol converter with an EI system. This is the arrangement when the digital inputs are less than 4096.

¹Visual display unit

EI will send its logged data to Protocol converter through RS-232 communication. Protocol Converter processes the received data from EI and adds the data logger compatible frames to match the transmission requirement in accordance with data logger network protocols. When the numbers of inputs are less than 4096, the Protocol Converter will not apply any check mechanism, and sends the processed data to data logger network directly. The received data will then be processed by CMU² at Test room/Central location.

2 Problems in simulation

When Thiruchirapalli(TPJ) Station in Southern Railway was replaced with EI, the total number of logic bits increased to 6413. The data-logger provided at TPJ is of Sarveen make. It was observed that the simulation of data either online or offline was not smooth. If fact, the simulation was not providing correct logical conclusion. When M/s Sarveen (OEM of data logger) and M/s Efftronics (OEM of CMU) were consulted, it was informed that the existing configuration of Protocol Converter with one SSI ID cannot handle input data more than 4096 bits. As the input data was 6413 bits, there was a problem in simulation.

It was also seen the simulation was not reflecting the actual yard status. It was also observed that some operations happened without showing the actuated relays. This made simulation a total chaos, unreliable and unacceptable. This is depicted in figure 2 where signal clear indication is shown without route being lit.

3 Solution

Figure 4 shows the solution to this problem. EI will send its logged data to Protocol converter through RS-232 communication. Protocol converter processes the received data from EI and adds the data logger compatible frames to match the overall data logger network compatibility.

The Protocol converter will apply the check mechanism based on its internal configurations, splits into

²Central Monitoring Unit



Figure 2: Signal Cleared but no route indication



Figure 3: Signal along with route indication when connected with two SSI ID

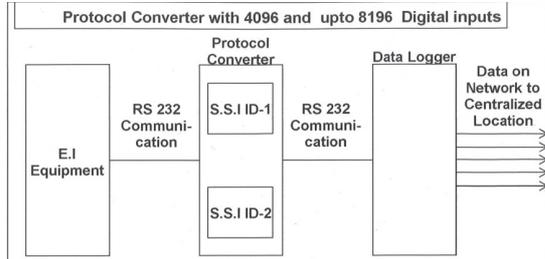


Figure 4: Signal along with route indication when connected with two SSI ID

two EI IDs and sends the data on to data logger network in case the number of digital events are more than 4096 and less than 8192.

The received data will be processed by CMU at Test room/Central location and applies the data merging algorithm while representing the Yard simulation, other standard reports and faults.

Thus, the problem of the data-loggers not showing correct results because of protocol converters not handling more than 4096 inputs logical bits can be solved. Same TPJ yard layout for same signal after modification is shown in fig 3 where one can see cleared signal along with route indicator.

The information / views expressed in this paper is of the authors and are based on their experience. Comments / observations may be sent to the author at ps2@iriset.railnet.gov.in

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