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ITALIAN STATE RAILWAYS TO ADOPT EUROPEAN RAIL TRAFFIC MANAGEMENT SYSTEM INTERMITTENT ATP

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Italian State Railways (FS) has awarded contracts for the installation of automatic train protection equipment on 150 km between Milano and Torino, and on the Milano Junction, based on the latest European data transmission standards.

Faced with increasing difficulties in the construction of new lines, Italian State Railways has launched a series of projects to increase its existing trunk lines, the quality of service and at the same time to improve the safety of operations.

One of the most significant improvements which have been carried out this year is installation of automatic train protection (ATP) on routes around Milano at a cost of 93 bn lire. The ATP installation will meet a number of FS strategic purposes.

Running safety is guaranteed by continuous supervision of the driver's actions with automatic emergency braking whenever the speed limit is passed.

Punctuality will no longer be determined by environmental or seasonal factors, increasing reliability of services.

Reduction in operating costs is achieved through the potential to operate trains with only a single driver where two had previously been required.

Intermittent ATP provides a significant advance in train running protection and control systems on the FS network. At present FS has some lines equipped with Continuous Cab Signaling (CCS) and others fitted with Coded Current Automatic Block, which offers full speed control. Intermittent ATP is designed to be easily integrated with these different systems, and offers a powerful channel for transmitting data from line to train. This can be used not merely for train running and protection against driver errors, but also for auxiliary

functions to optimize train operations. On-board equipment will interface with the existing four-code CCS, which will in future only be able to access the various peripheral elements – driver display panel, traction and braking interfaces, and so on – via the intermittent ATP processor. The basic on-board unit comprises three main elements. The heart of the system is the ALA processor, which manages all data coming from both the intermittent and continuous channels. It also controls the peripheral elements such as the emergency air brake control, traction effort control and the driver display panel.

A balise is an electronic beacon or transponder placed between the rails of a railway as part of an Automatic Train Protection (ATP) system. The French word "balise" is used to distinguish these beacons from other kinds of beacon.

Balises are used in the KVB signaling system installed on main lines of the French railway network, other than the high-speed Lignes a Grande Vitesse.

Balises constitute an integral part of the European Train Control System, where they serve as 'beacons' giving the exact location of a train. The ETCS signalling system is being gradually introduced on railways throughout the European Union.A balise which complies with the European Train Control System specification is called a Eurobalise.

The Balise Transmission Module and pick-up antenna are capable of operating on lines equipped with 12-bit or 180-bit balises. The antenna is also designed for future operation with 1023-bit balises.

Equally innovative is the Man-Machine Interface (MMI), which combines image processing with a colour graphic display, pushbuttons and function keys. These are used to enter train data and to allow the driver to respond to the indications on the display panel. The MMI also provides a diagnostics terminal for the entire system.

When operating in functional ATP mode, the display shows the maximum allowed speed, braking curve, the distance to any restrictive signal, future speed limits or train stopping points, and auxiliary information, such as the location of work teams, level crossings and other stations. In CCS mode the display shows vital indications for the signal aspects represented by the line codes being picked up. Intermittent ATP trackside equipment is based on the so-called “Information Points” which have one or more fixed or programmable 180-bit balises. These are installed close to signals and at specific points along the line where data must be transmitted to the train. The balises are installed in the centre of the track and can

be used to transmit different data to trains running in each direction. The interface between the signaling and the balises is provided by a series of encoders, which are installed in the station equipment rooms, or in cabinets along the line. These encoders are able to control balises up to 3 km away through serial connections, allowing the control equipment to be centralized at the stations.

This has considerable advantages to provide greater reliability and facilitate checks and maintenance. To establish the allowable speed at any instant, the on-board ATP processor takes out data from a variety of lineside and on-train sources. Lineside information includes fixed route characteristics such as the line speed limit and gradients, semi-fixed data such as

temporary speed limits due to works in progress, and 30 variable data including signal aspects, approaching station stops or speed reductions for diverging routes.

In other countries there is also, a system of control of their speed trains and other technical parameters. For example, in Japan the most advanced such system of monitoring the trains.

At present control of high-speed trains is semi-automatic since they are automatically forced to comply with permissible speeds at any instant. Stops at station platforms are under the driver's control.

The whole line in Japan, for example, is directly controlled from Tokyo and for this purpose is divided into four systems. The state of the line is continuously surveyed and information is transmitted at high speed to the control centre. Each train automatically identifies itself by generating a unique frequency as it passes fixed ground equipment and the information is displayed on the control panel at Tokyo. Trains entering stations automatically set the points system according to classification, i.e. whether super express, express or freight.

One interesting but simple safety feature enables the operator on the line to stop the train in an emergency. It consists of push-button switches placed at intervals of 50m. Operation of the switch completes the circuit, and the consequent indication in the driver's cab of an approaching train causes the brakes to be applied automatically when at an appropriate distance from the danger position. All the circuits are fail-safe, and the possibility of an accident due to human error has been virtually eliminated.

Great work is being carried out in order to improve circuits performance. It means introduction of such techniques as programmed control, obstacle detection by a guided radar, controlled braking to a fixed point and centralized computer control. Extensive research is under way in our country to utilize television technique in industry, science and agriculture. Some years ago one of the research institutes of our country designed a television apparatus which is now used in railway transport to record the serial numbers of freight cars arriving at a station. As a train pulls in at a station, somewhere at a distance of ten kilometers an operator sees this train on a screen of his television set. The operator reads aloud the serial number of the freight cars and they are recorded by a tape recorder. On another television set the operator can see all the railway lines in a station. The operator only has to press the button and another station will appear on the screen. These 19 installations are used in classifications yards for shunting operations.

The Central Research Institute of the Railways Ministry is designing a new television apparatus which will enable engine drivers “to see” the condition of the freight car even when it is dark.