BUES 2000

YOUR SYSTEM INTEGRATOR FOR DIGITAL SIGNALLING SYSTEMS

SCHEIDT&BACHMANN

Your system integrator for digital signalling systems

/ Thinking ahead *THIS HAS BEEN A CENTRAL THEME OF THE SCHEIDT &*

SCHEIDT&BACHMANN

Signalling systems

Scheidt & Bachmann is among the world market leaders of innovative system solutions for mobile life. We are proud to support transportation systems at home and abroad with our products, and to keep millions of people on the move daily.

Our signalling system business area provides comprehensive track solutions with a standardised hardware configuration, a standardised service concept, standardised operation control and a centralised control and monitoring for smooth running and customer-friendly operations. Our extensive sales and service network throughout our subsidiaries and agencies, ensure that we are always present nationally and internationally.

BACHMANN COMPANY THROUGHOUT ITS ENTIRE HISTORY.

Other areas in which Scheidt & Bachmann operates:

Parking and access systems

The Scheidt & Bachmann entervo product provides integrated modular systems solutions for parking management and also cashier and access control systems for leisure centres. Customised and flexible solutions attract a wide range of clients worldwide.

Fare collection systems

Scheidt & Bachmann is a market-leading supplier of integral system solutions for all manner of fare collection systems. For more than 30 years, we have been implementing flexible solutions which we adapt to suit your individual requirements, whether for local or regional transport companies.

Fuel retail solutions

Our integrated solutions designed for the future-proof operation of petrol stations are founded on more than 80 years of experience in this field. Scheidt & Bachmann is the leading supplier of automated systems to petrol stations in Germany and a leading European supplier of system solutions.

Facts & Figures

- Founded in 1872
- About 3,000 employees
- Grew from a mechanical engineering firm into an international system vendor
- Market leader in central areas of modern mobility
- Innovative product and production solutions

INTELLIGENT SYSTEM SOLUTIONS

/ A new standard has been defined on the

/ *THE USE OF PROCESSOR-CONTROLLED SUB*

Ensuring the flow of traffic represents a huge challenge, especially at crossings, because the demands on the safety and availability of technical equipment are very high.
Level crossing systems represent a component of railway signalling equipment and are responsible for reliable control of crossing points in road and rail transport.

After the further development using NFA, Lo, Fü, BÜS D and EBÜT 80, a new standard has been defined on the market for level crossing safety systems with the computer-controlled BUES 2000 and electronic field components such as:

- Road signals, (yellow/red light signals, flashing lights and double flashing lights, ...)
- Monitoring signals
- Axle counters
- Train detection sensors
- Barrier drives

With more than 4,000 installed BUES 2000 systems throughout the world, the flexibility and expertise of Scheidt & Bachmann is proven in the area of level crossing safety technique.

market for level crossing safety systems.

ASSEMBLIES, ENABLES THE INTELLIGENT FIELD LEVEL.

The networking

Through the logical use of processor-controlled subassemblies within the control system core, the passing on of information for diagnostic and control purposes via modern and intelligent communication paths also becomes possible.
Additionally, this enables the transferring of special control tasks directly to the particular activating field element so that an intelligent field level can be used - this being capable of processing and passing on significantly more information than was possible with a classical system.
Using public, private or cable-bound communication connections, maintenance and diagnosis tasks can be centralised and supported by PC.
In addition digital data connections like SCI (Standardised Communication Interface for level crossing) through RASTA (Rail Safe Transport Application) via a secured IP based network can be created without any problem so that intelligent linking to neighbouring control systems (e.g. level crossing systems or inter locking systems) becomes possible. Modern exchange of information with the vehicle is also possible without any problems since all data can be inputted and outputted intelligently per telegram. Therefore there is practically no limit to the quantity of information.

A VERSATILE SOLUTION FOR EVERY COUNTRY

At the beginning of the development of fully electronic signalling technology, Scheidt & Bachmann decided to technically realize the signalling products with a platform strategy. Thus, already in 1991, a future oriented foundation was laid for the level crossing system BUES 2000 and later also for the electronic interlocking system ZSB 2000.

This platform, with the name PSB (Platform Scheidt & Bachmann) enables a nearly hardware independent use in different markets and in different areas of utilisation.

The platform, consisting of
- potential hardware modules,
- respective Firmware,
- operating systems and
- basic software components,

is always identical and jointly used for both the level crossing system BUES 2000 and the electronic interlocking system ZSB 2000.

In this way spare part and stock management within the frame of an obsolence strategy as well as approvals in different markets is easier and cost optimized. The required and often very diverse functions in the different markets can to a great extent be designed through software configuration.

With this platform strategy, Scheidt & Bachmann has optimizied its preparation for compliance with market specific requirements. The delivery of the level crossing system BUES 2000 in more than 15 countries, without any country adapted circuit boards, is proof of this strategy's success.


Netherlands


Luxembourg

/ THE INSTALLATION OF MORE THAN 4,000 BUES 2000 SYSTEMS IN MORE THAN 15 COUNTRIES WORLDWIDE IS PROOF OF THE SUCCESFUL PLATFORM STRATEGY PSB 2000.

Norway

Denmark

Poland

Czechia

Slovakia

Germany

Austria

Hungary

Switzerland

Slovenia

Israel

THE RIGHT SYSTEM SOL
FOR ANY LEVEL CROSSING

Scheidt & Bachmann products for the central management level

Diagnosis and maintenance concepts for technical systems are increasing in importance. As early as the arrival of portable personal computers, Scheidt & Bachmann started on the development of a diagnosis and maintenance concept for relay systems of the EBÜT 80 electronic level crossing system generation under the name IDIS (Intelligent Diagnosis and Information System). Refined and extended this is available today as IDISplus as a relay diagnosis system. Through the introduction of computing techniques within the control, this concept could be extended and furnished with a significantly greater depth of information, this being reflected in the diagnosis and maintenance concept for BUES 2000 systems with the name CADS (Computer Assisted Evaluation and Diagnosis System).

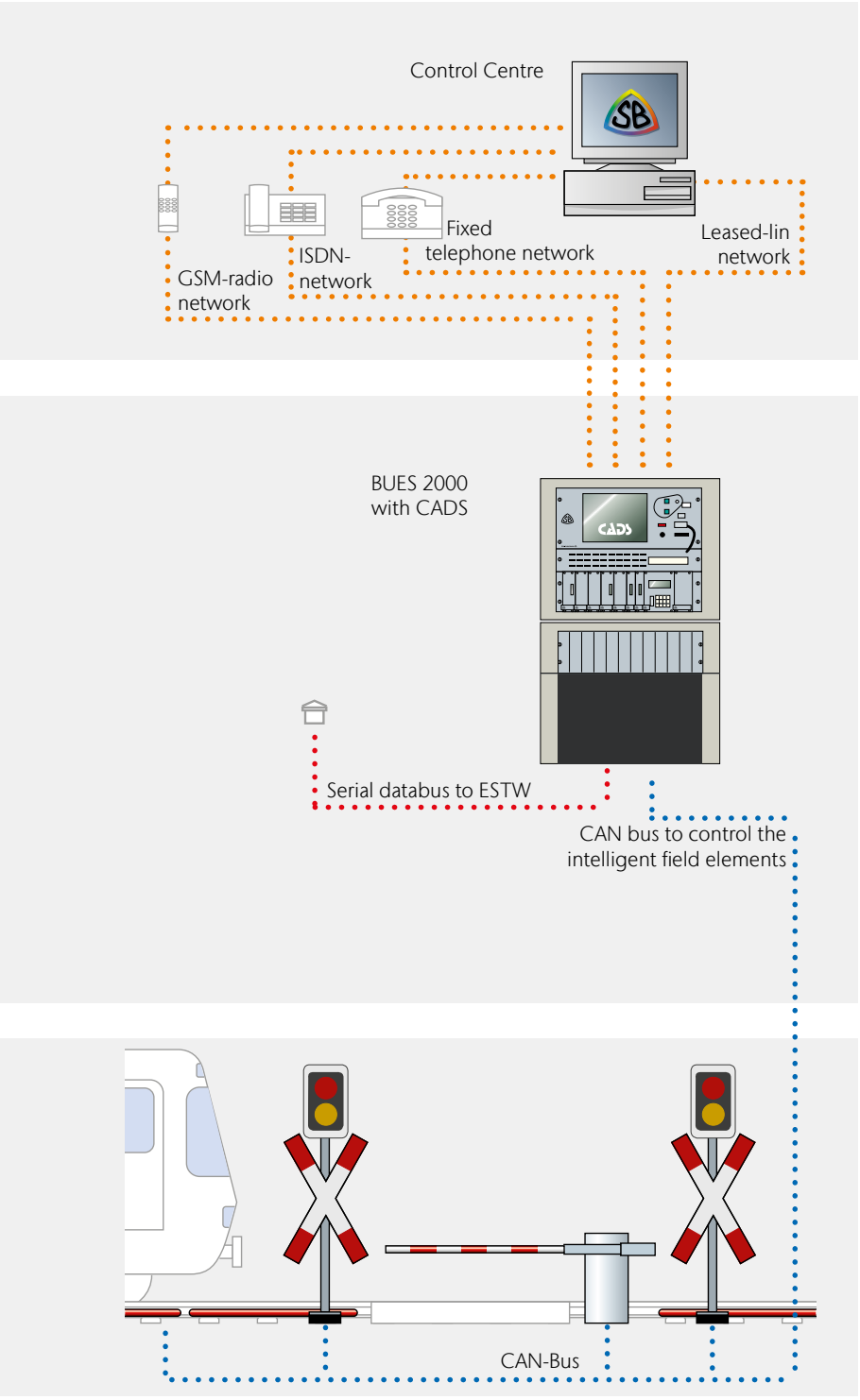
Scheidt & Bachmann products for the control

All processes at the level crossing involving reliable recording, processing, evaluating and passing on information coupled with detailed information for a diagnosis interface are realised with this system exclusively with electronic components. Taking into account the different monitoring and application variants required at individual level crossings, the practice-proven modularity of the EBÜT 80 has been appropriately refined whereby individual subassemblies can be configured by software parameterizing. With the BUES 2000 customer-specific functions are parameterised and realised exclusively in the software.
As a result the hardware modules are identical not only for all monitoring and application variants but also for all markets and customers. This brings about very considerable simplification in the areas of stockholding, type-support, spare particular guarantee times and service. Thanks to its processor-controlled system core, the parameterizing and configuring of a BUES 2000 system can be realised with personal computers. With the assistance of a software tool – the BÜ-Konfigurator – especially developed for projecting tasks, the user is put in a position of being able to configure and test a safety system himself without requiring any specific electronic data processing knowledge. After the user has entered the level crossing data, the BÜ-Konfigurator selects from a table, in which all the possible parameters for the different forms of execution of a level crossing are listed, the suitable ones and makes it possible for the data for these to be transferred to the BUES 2000.

Scheidt & Bachmann products for the intelligent field level

With the introduction of Scheidt & Bachmann‘s FSSB vehicle sensor, electronic field elements came into use for the first time in railway signalling systems. Since this time this path has been followed in a consequent manner at Scheidt & Bachmann and has led to the development of the intelligent field level which – in addition to its pure activating functions – possesses an intelligent evaluation and supervision function too.

UTION


Control Centre
Fixed
telephone network
Leased-lin
network
ISDN-
network
GSM-radio
network
BUES 2000
with CADS
Serial databus to ESTW
CAN bus to control the
intelligent field elements
CAN-Bus

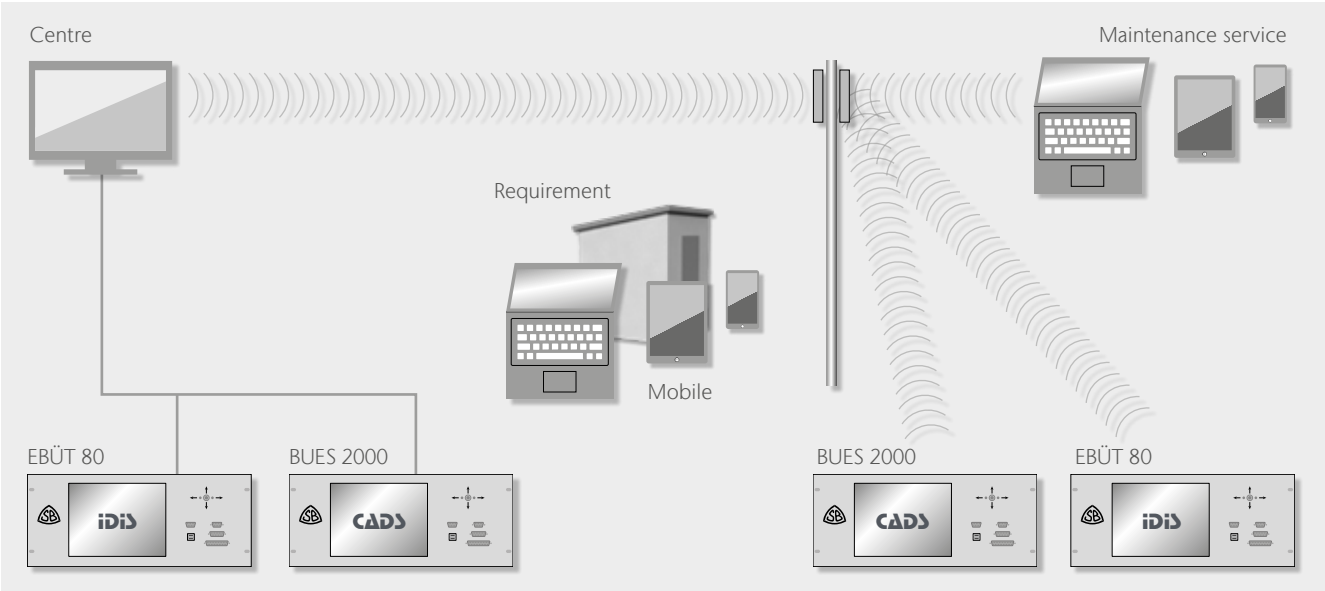
COST SAVING COMMUNICATION

Today the networking of different traffic systems is an important, future-oriented task. Thus level crossing management is today no longer an isolated task restricted to a particular location as was the case with signalling systems with a large mechanical component.

Today's ways of thinking on open communication in the area of signalling, which go hand in hand with a marked degree of central scheduling, control and maintenance as well as decentralised actuation, require new components for intelligent systems. These make it possible for system information to be collected and prepared prior to it being transferred to and recorded and evaluated at respective central points. All the tasks resulting out of it can be carried out or, as the case may be, co-ordinated at the points where the particular responsible employees and specialists are located. Scheidt & Bachmann's level crossing maintenance and service concept provides support in all the service areas connected with level crossing systems whereby we make use of proven standards, open systems and modern technologies. Various transmission media can be used for exchanging data between the individual level crossings and the central maintenance and service location.

Data recording and evaluating

By the integration of a diagnosis system which is connected with the system core of the BUES 2000 level crossing system via a reaction-free interface, it becomes possible to record and evaluate data locally. In the diagnosis software the data can be represented either in text form or graphically whereby special software tools are available for the evaluation. In addition to the event, interruption and error data, statistical data is also available to permit optimal maintenance and service activity.



Event-oriented data exchange
If a public network (internet, telephone network, GSM network) is available for the exchanging of data, a normal commercially available hardware can be used. In the case of an error or interruption, a link with the central maintenance and service post is built up and a data transfer actuated.
In addition to such an event-triggered data transmission, a location-independent inquiry of the current data is possible at any time. For this the relevant data are built up as HTML pages via the web-server functionality installed in the diagnosis processor, whereby these pages can then be called and handled with a normal commercially available internet browser. An alarm function via SMS or e-mail is also possible.

Leased-line-oriented data exchange
Leased-line or network variants can also be used for the centralised recording of data. For this a leased-line modem for Cu or fibre-optic cable connections or a network card for LAN connections is adapted for connection to the diagnosis PC.
All the level crossings linked to this connection are polled cyclically for information from a diagnostic centre with the corresponding software. In the case of an error or interruption, a detailed data transmission is triggered at the next interrogation cycle. In interruption-free mode, changes of the status at the level crossing are transmitted.

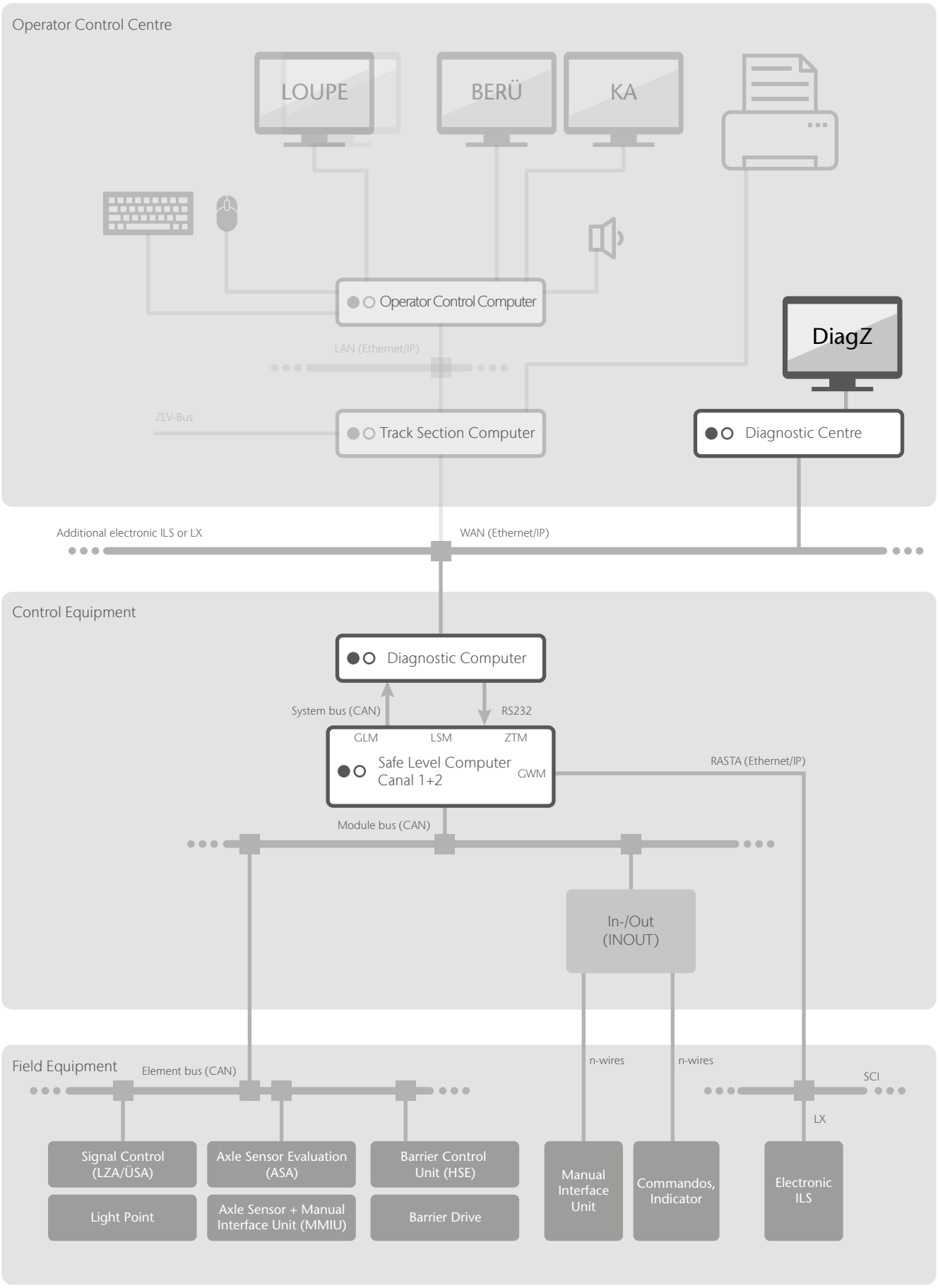
The monitoring centre
All the level crossings assigned to the monitoring centre can be monitored in accordance with the particular data exchange variant in a software-modified manner. The data is issued not as code but in clear text form or graphically.
As a result no special knowledge is required for the evaluation and independence of the particular system types connected is achieved. Also in this area exclusively normal commercially available hardware components are used, these consisting essentially of a personal computer and the appropriate modem. The software of the diagnostic centre is a Windows-based application program optimised for the requirements of the service and upkeep work. Thus, for example, an alarm function via SMS or e-mail is possible.

Hotline service
In addition to the verbal telephone support by maintenance and service personnel, remote diagnosis can also be carried out by Scheidt & Bachmann within a network structure with the aid of PC-supported data exchange.

MODULAR STRUCTURE

The safety level of the BUES 2000 electronic level crossing system represents the secure data-processing centre of the BUES 2000 level crossing.

It consists as a rule of 3 modules (central-, light-, barrier and track modules), each with a doubled processor system. In addition a service keyboard and a doubled program and system data store are provided in the safety level. Exclusively data is processed in the safety level and no currents are set. The releasing of energy is carried out locally in the particular actuating element.


Operator Control Centre
LOUPE
BERÜ
KA
Operator Control Computer
LAN (Ethernet/IP)
DiagZ
ZLV-Bus
Track Section Computer
Diagnostic Centre
Additional electronic ILS or LX
WAN (Ethernet/IP)
Control Equipment
Diagnostic Computer
System bus (CAN)
RS232
GLM
LSM
ZTM
Safe Level Computer
Canal 1+2
GWM
RASTA (Ethernet/IP)
Module bus (CAN)
In-/Out
(INOUT)
Field Equipment
Element bus (CAN)
n-wires
n-wires
SCI
LX
Signal Control
(LZA/ÜSA)
Axle Sensor Evaluation
(ASA)
Barrier Control
Unit (HSE)
Manual
Interface
Unit
Commandos,
Indicator
Electronic
ILS
Light Point
Axle Sensor + Manual
Interface Unit (MMIU)
Barrier Drive

USING TOMORROWS TECHNOLOGY TODAY

The BUES 2000 is a control system for level crossings which for the first time consists solely of electronic components. Through a multi-processor system which has a consistent duplicated safety structure with information doubling and an intelligent bus system (CAN), a safety structure is built up which enables the controlling of all processes such as reliable recording, processing, evaluating and outputting of information as well as providing a detailed diagnosis interface for maintenance and service purposes.

Thanks to the modular system structure, matching to the particular monitoring and application variants required as well as to the customer-specific functions of each level crossing can be executed rapidly.

Monitoring variants

- Fü Remote monitoring
- Aut Automatic mode without monitoring
- Hp Station signal monitoring
- ÜS Monitoring with supervision signal for the train driver
- ÜSOE Monitoring with supervision signal and optimal activation time
- Vk Availability controlled
- Bed Operator monitored

Of course, combinations of these monitoring principles are also possible (e.g. Station signal monitoring with remote monitoring; station signal monitoring with signal monitoring).

Application variants

- Road signal amber/red
- Road signal blinking light
- Road signal double blinking light
- Half-way barrier
- Complete stop with 2 half-way barriers
- Full barrier
- Pedestrian barrier (side path barrier)
- Pointsman-operated on-call barrier
- On-call barrier with self-service facility

Form of execution variants

The actuation and monitoring of all active elements at a level crossing is carried out fully electronically. Thanks to the compatibility of old and new system components, the BUES 2000 can be used not just as a complete new system but also in combination with existing level crossing installations. In the basic version the following form of execution variants are possible:

- 32 light signals (amber/red with main and back-up filaments)
- 64 blinking lights (red with main and auxiliary filaments)
- 32 barrier drives
- 8 pedestrian acoustic systems
- 2 tracks (with track sensors, signalling, manual switching keys)
- Interlocking interface
- Radar scanner (Radar sensor system for automatic level crossing free detection)
- Realisation of special switching cases such as deactivating switch-on-point, temporary activation of switch-on-points etc.
- Timed control of barriers (half-way barrier, Complete stop with 2 half-way barriers, full barrier) and light signals (Light signal amber/red, preceding light signal, blinking, double blinking), pedestrian acoustics and gate dependencies
- Controlling of special light programs such as interface to traffic-light-systems
- ...

Technical design

The system core of the BUES 2000 is divided in 3 logical levels:

- Management level
- Safety level
- Field level

Within the levels with safety relevant signalling tasks (control level and field level), tasks are distributed to different modules.

Differentiation is made between

- Central module — Co-ordination and control of the level crossing process as well as of the level crossing relevant functions such as interlocking interfaces
- Light/barrier module — Control and monitoring of light points (light signal, preceding light signal, blinking), light programs, pedestrian acoustics, barriers and Radarsensor system for automatic level crossing free detection
- Track module — Recording and passing on of all information coming in from the track and information relating thereto

whereby a change in the number of modules is fundamentally possible depending on the system structure. Each module represents in principle a duplicated processor unit, the active components of which are linked via an intelligent field level and can communicate with one another safely via the CAN bus.

Data transmission by means of CAN bus

Communication between the individual levels and within the modules is carried out via the CAN bus. CAN stands for Controller-Area-Network and is a serial data transmission system with its own intelligence. This system possesses a number of fault-recognition measures:

These include:

- Bit error check
- 15 bit CRC block check
- Format check ...

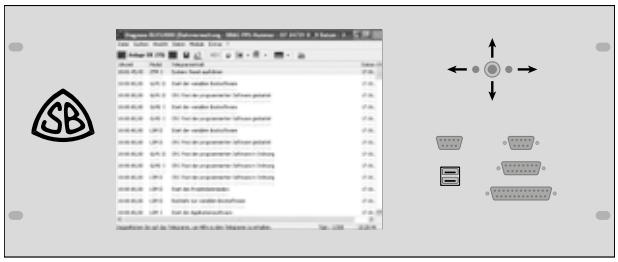
To increase the safety, polling has been introduced into the duplicated systems. Designated with polling is a procedure that is employed in multi access systems to interrogate the individual participants periodically and at the same time to carry out the transportation of information.

MODERN SERVICE CONCEPT

For diagnosis each BUES 2000 level crossing has a diagnosis module that is connected with the safe system core on the one hand in a reaction free manner and on the other hand via an interface.
For diagnosis the CAN telegrams transmitted on the system bus are read and can be displayed optionally using a graphic or text-based interface.

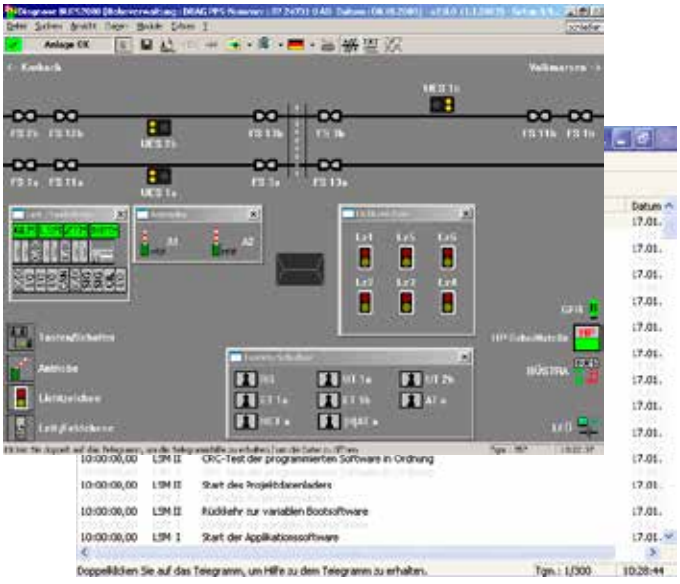
Diagnosis processor

A Windows-based diagnosis program is installed on the local PC. This decodes and stores the BUES 2000 telegrams received. With the aid of appropriate data management functionality, faults and disruptions are prepared and stored for the service and maintenance personnel. The subassembly is identical with the diagnosis subassembly in the ZSB 2000 interlocking system.



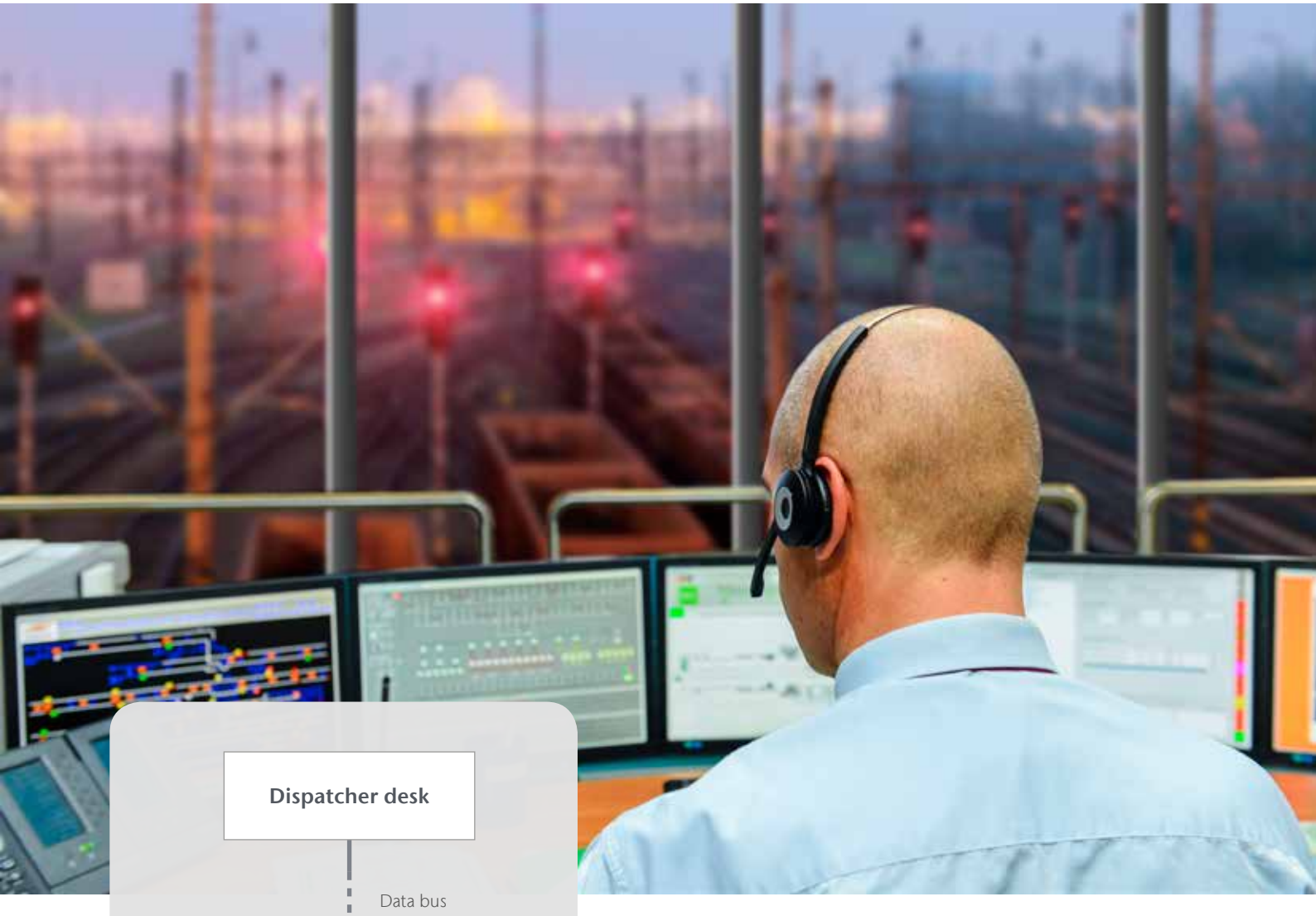
Diagnosis user interface

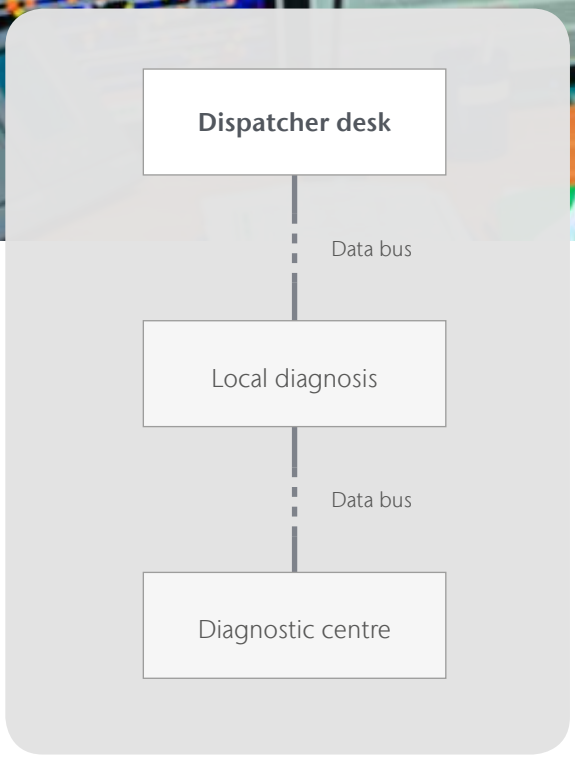
The graphic interface of the diagnostic system provides a topographically illustrated overview in an unique global map with the function, module and field element statuses of the respective full system. Alongside the display of active condition change, like opening and closing of barriers or activation of train detection system, faulty elements are visualised also clearly as well as in real time. Furthermore, they are stored in a circulating buffer in plain text whereby they are given a time stamp. This means the latest 1,000 events can be called up in plain text to display in a window. With the aid of menus the stored data can also be displayed and evaluated. There are special analysis tools available as well as the online assistant for analysis.

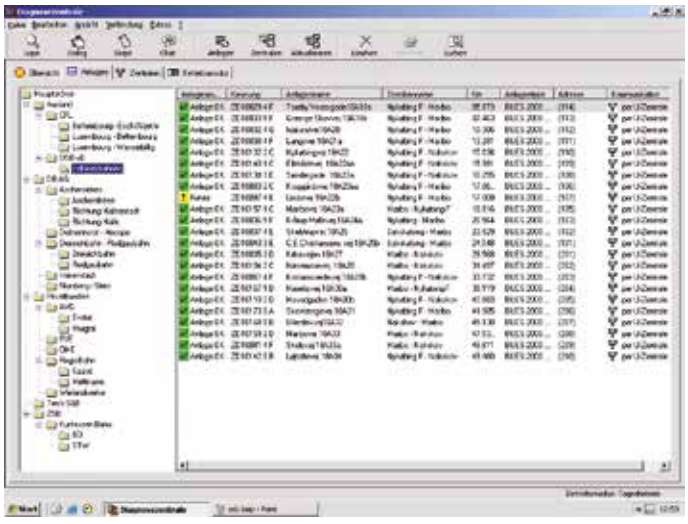


Leased-line modem

Each level crossing can be connected to the diagnostic centre via a leased-line modem. Data, which is stored in the local diagnosis systems, can then be transferred to the diagnostic centre. International standards are employed for the transmission and standard protocols such as TCP/IP are used.







Graphical user interface of diagnostic centre

APPROPRIATE OPTICAL SIGNALLING

A variety of light and other signals are used to provide information for traffic participants on the situation at a railway level crossing, the selection being based on the basis of the relevant regulations. Thus, for example, road traffic participants may be made aware of the approach of a train with a light signal with red/amber or white optics. For these applications the SSB 200 (filament bulb version) and the SSB 200L light signal (LED version) were developed.

These systems are constructed following a modular design principle and thus can be supplied in single aspect and two-aspect versions. In addition to the signalling purely by colour, coloured disks with symbols (e.g. directional arrows) or acoustic warning devices can also be added when required.

SSB 200L signalling device, LED version

Due to the transferring of control tasks directly to the field element, the BUES 2000 permits the use of processor-controlled LED signalling devices which function with their own intelligence and communicate with the BUES 2000 per data telegram via the CAN bus (Controller Area Network). The design of the LED signalling device provides the activation of a number of LED chains without reflectors whereby the LEDs of one chain are distributed over the complete surface of the optical system. As a result the breakdown of one chain only reduces the illumination level of the signal by an insignificant extent. The advantages provided by such a LED light signal compared to conventional signalling with bulbs lie in the significantly longer lifetime, the reduction in maintenance effort, the simpler structure, the increase in the angle of the emitted beam and the higher lighting efficiency.

Furnishing:

Modular design with the following part systems, each of which can be replaced on site:

- UV-resistant plastic housing
- 200mm LED panel (red/amber or white)
- Control electronics (light signal system subassembly) with intelligent control logic due to the use of a safe microprocessor control in Euro-card format and integrated CAN interface for a red/amber or white light signal
- 200mm light point consisting of 64 LEDs each with a separate lens, the LEDs being arranged in 8 chains of 8 LEDs, all simultaneously monitored and activated

Further characteristics:

- Failure monitoring due to checking of the LED chains by software procedures
- Fall back management in the case of breakdown of the communication
- CRC check, RAM test and CPU tests ensure safe functioning of the software
- Automatic read in and calibrate to applied voltage
- Automatic calibration following power failure

LED light signal device

Light signal system subassembly

APPROPRIATE SIGNALLING WITH LED TECHNOLOGY

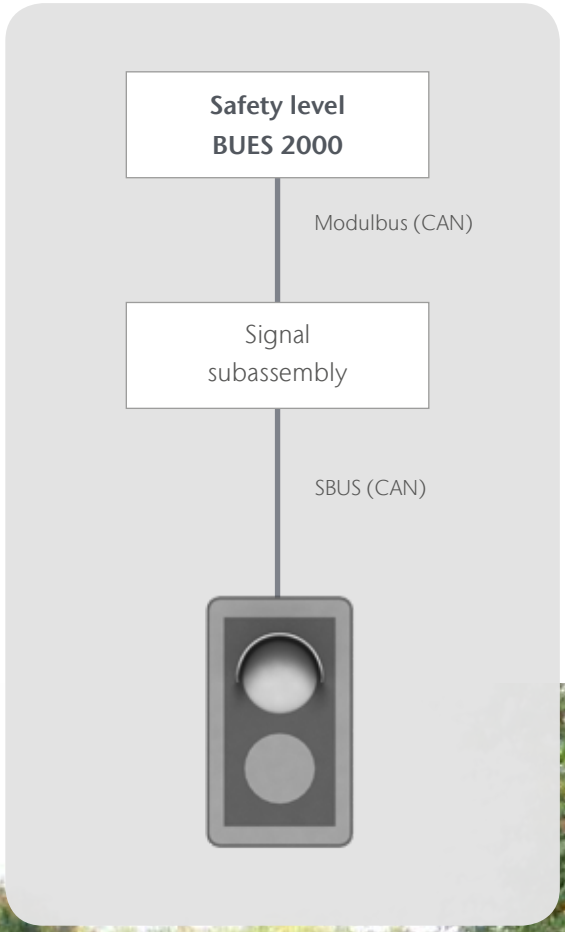
Level crossing systems which are realised with the supervision signal, supervision signal with optimised switching on or availability controlled supervision variants, it is necessary that the proper condition of the system is displayed to the train driver.
For this appropriate supervision, corresponding repeater signals are selected in accordance with the customer‘s requirements.

Supervision signals
It is also important that the illuminated display of the supervision signals for the train driver can be clearly recognised in all conditions. Through a variety of design features, a high light output and good recognisability are achieved with the different variants even at relatively large distances. These can be equipped respectively without active marker lights, i.e. with reflecting yellow posts or with active yellow lights. The CAN bus or current-monitored controlling of the LED lights points ensures the allowable indication.

Furnishing variants:
- Supervision signal (separate stop and go aspect)
- Supervision signal (go aspect)
- Railway crossing supervision signal
- Combination signal
- ...

with
- 200mm LED signal (white or yellow)
- Available with/without active 136mm LED marker lights (yellow)
- Control of the light points can be realised via CAN-BUS. Failure monitoring is ensured by a software check on the light controls
- Control using setting currents. Failure monitoring is ensured by safe control electronics (SIGNAL-BG)

Further characteristics:
- Optical system for consistent area illumination
- Wide beam, super-low-phantom optics according to EN 12368
- Signal-Screen-Types:
  - Metal housing (KS 200 square)
  - Ultraviolet light (UV) resistant plastic housing


Safety level
BUES 2000
Modulbus (CAN)
Signal
subassembly
SBUS (CAN)


BÜ IV
(BÜ III)
BÜ IV
BÜ III

APPROPRIATE ACOUSTIC SIGNALLING

In addition to the information provided by the light signals, acoustic transducers are also used depending on the requirements to warn road users (primarily pedestrians and cyclists) about an approaching train.

Acoustic Warning-Device Dynamic (AWD) from Scheidt & Bachmann have been developed to automatically guarantee the correct volume to meet the respective conditions for the time of day. Automatic volume adjustment takes place to adapt the acoustic conditions at the railway crossing. These digital railway crossing acoustics represent the unification of innovative further development and a continued availability of spare parts for existing systems.

Clear audibility of the acoustics under all conditions including loud surrounding noises is important. However, the sound level should not have a disturbing effect on the area around the level crossing (e.g. on residents at night).

In order to fulfil this task, the acoustic transducers, designed as loud speakers, can be used to establish the surrounding noise level at the level crossing (optional mode). The measurement data averaged over a fixed period of time serves as the reference value for volume adjustment for the next activation.

Using two microcontrollers which monitor each other and the emitted signal, different sounds can be emitted depending on the country of use and place of use. The information for generating the different sounds is read-in via wave audio files.

These files can be conveniently loaded and activated via an USB interface into the internal data memory of the BÜ acoustics. Due to the fact that lots of acoustic components are doubled, the sound is still emitted on the other two loud speakers if a component fails (e.g. microcontroller or amplifier).

Further features:

- Compatible with the assemblies used with EBÜT80 and BUES 2000
- 4 loud speaker per acoustic device
- Individual sound and time delay signal output possible per acoustic transducer
- 256 different sounds available
- Sound files playback (WAV format)
- USB interface
- Independent failure recognition
- Additional error output via separate channel
- CAN bus interface

Environment and vandalism resistance loud speaker

Computer- and Power Unit of acoustic subassembly

APPROPRIATE PROTECTION

The use of the BUES 2000 as a modern, fully electronic level crossing safeguarding system makes it possible for control tasks to be transferred directly to the particular field element.

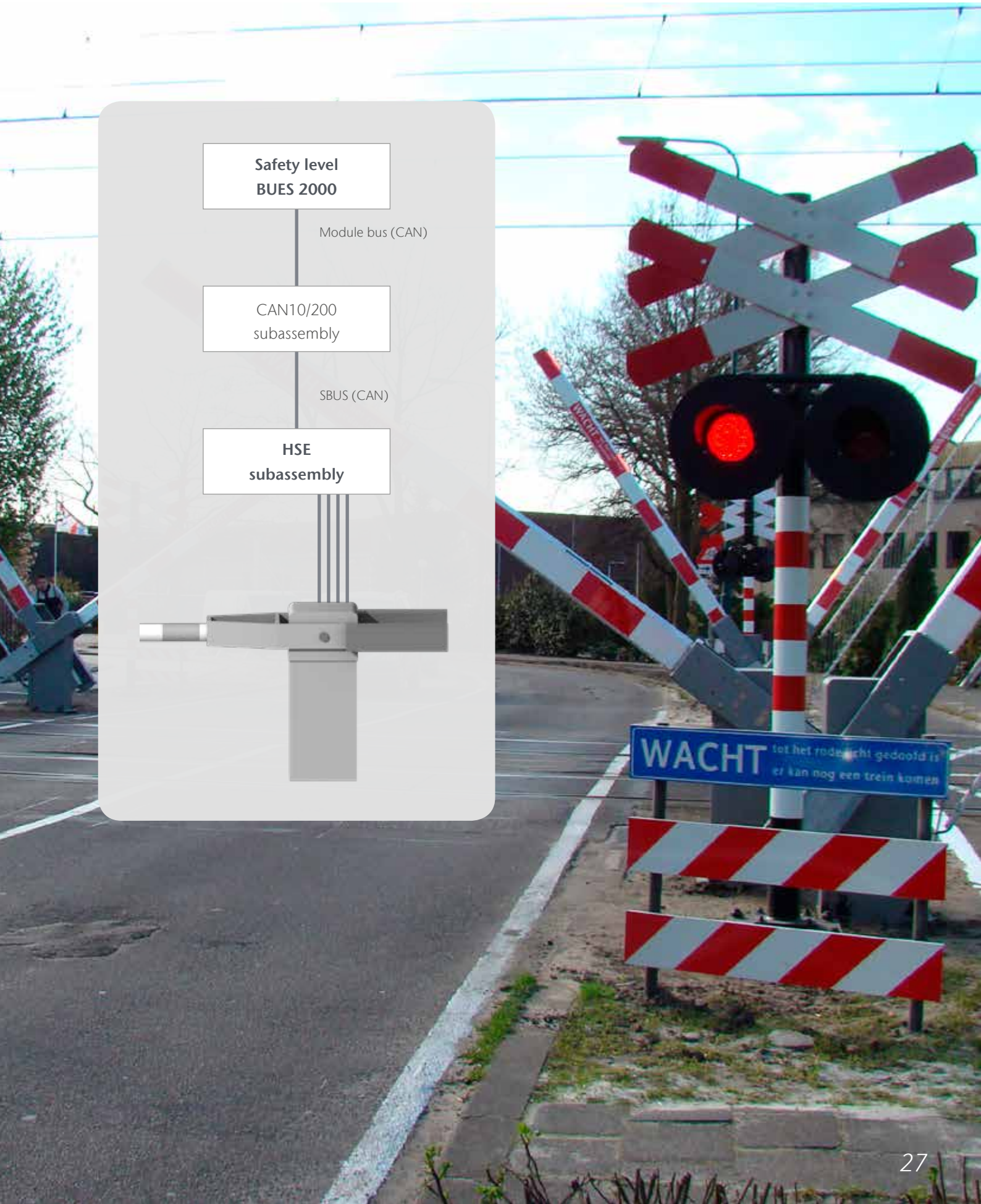
Making use of this facility, the HSM 10E (hydraulic barrier drive with modular structure for barrier lengths up to 10 metres, electronically controlled) works with its own intelligence and communicates with the BUES 2000 per data telegram via the CAN bus (Controller Area- Network). This makes the amount of information that can be exchanged significantly greater and thus also enables the outputting of diagnosis data.

Furnishing:

- Modular structure with system parts which can be replaced on site: housing, barrier shaft, drive unit and control electronics (HSE subassembly)
- Hydraulic drive unit as hose-less unit in environmentally friendly compact mode of construction, the aggregate requiring no service work on the system (maintenance free)
- Intelligent control logic using a microprocessor control in Euro-card format with integrated CAN interface as well as LCD display for outputting of program and error code
- Three-phase asynchronous motor as hydraulic pump drive
- Use of a frequency converter for the generating of a variable frequency rotary field from the battery voltage
- Continuous and contact less recognition of the position of the barrier beam via an inductive sensor in the piston-rod
- Hydraulic valve control via a rotary valve activated by a stepping motor
- Load-limiting of the hydraulic system through the use of a bypass valve in the pump; additional electronic overload monitoring of the current drawn by the asynchronous motor

Further characteristics:

- Selection of different timing programs on the drive module automatically by software or with a keypad
- Software-realised speed control to ensure slow starting up and abrasion of the barrier beam and to optimise the starting current behaviour
- Compact and highly reliable hydraulics prevent closing failure through top-heavy design and fallback closing spring assist
- The fallback closing function integrated in the rotary slide valve replaces the inserted keep-alive magnetic used so far and is checked by the software each time before the level crossing is opened
- Erroneous activation processes are excluded through software-realised checking of the control inputs for Open/Close for opposed sense
- CRC check, RAM test and CPU test ensure safe functioning of the software
- Automatic reading in and adjusting to the input voltage
- Automatic calibration after power failure


Safety level
BUES 2000
Module bus (CAN)
CAN10/200
subassembly
SBUS (CAN)
HSE
subassembly
WACHT

INTELLIGENCE FOR TRACK SENSORS

The use of the BUES 2000 as a modern, fully electronic safety system for level crossings has made it possible for control tasks to be transferred directly to the field element.

Using this possibility and based on the experience acquired with the Scheidt & Bachmann axle sensor in the ZSB 2000 interlocking system, the spectrum of application for the BUES 2000 has been extended by the axle sensor variant whereby the same hardware is used. This unit operates as an intelligent system component and communicates with the BUES 2000 via the CAN (controller area network) bus by means of data telegrams. Switching on and off is an integral component of the BUES 2000 logic and is brought about not by a separate function and hardware unit but as "software" which activates the BUES 2000 field elements. The number of axle sensors depends on the mode of monitoring. With supervision-signal-systems, one axle sensor is installed for activation. For remote monitoring systems an appropriate hardware redundancy has to be provided. The deactivation is carried out in each case via one axle counter section with two sensors whereby an automatic monitoring process can correctly counting differences by using the information of the counter of the activation sensor passed by the train driving away from the level crossing. Each axle sensor is evaluated by a safe processor, the ASA subassembly, which in turn passes on the axle that has been captured and its direction per telegram to the control level of the BUES 2000 via the element bus (EBUS). Thus the actual activation and deactivation of the level crossing is carried out solely in the control level of the BUES 2000.

Axle sensor in the track

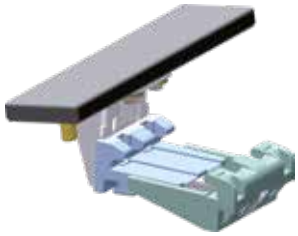
The axle sensor consists of 2 small inductive loops which are integrated in a compact housing which can be fastened to the rail and which by reason of their longitudinal extension are evaluated in an axle-sensitive manner. The axle sensor is identical with that used in the ZSB 2000 interlocking system.

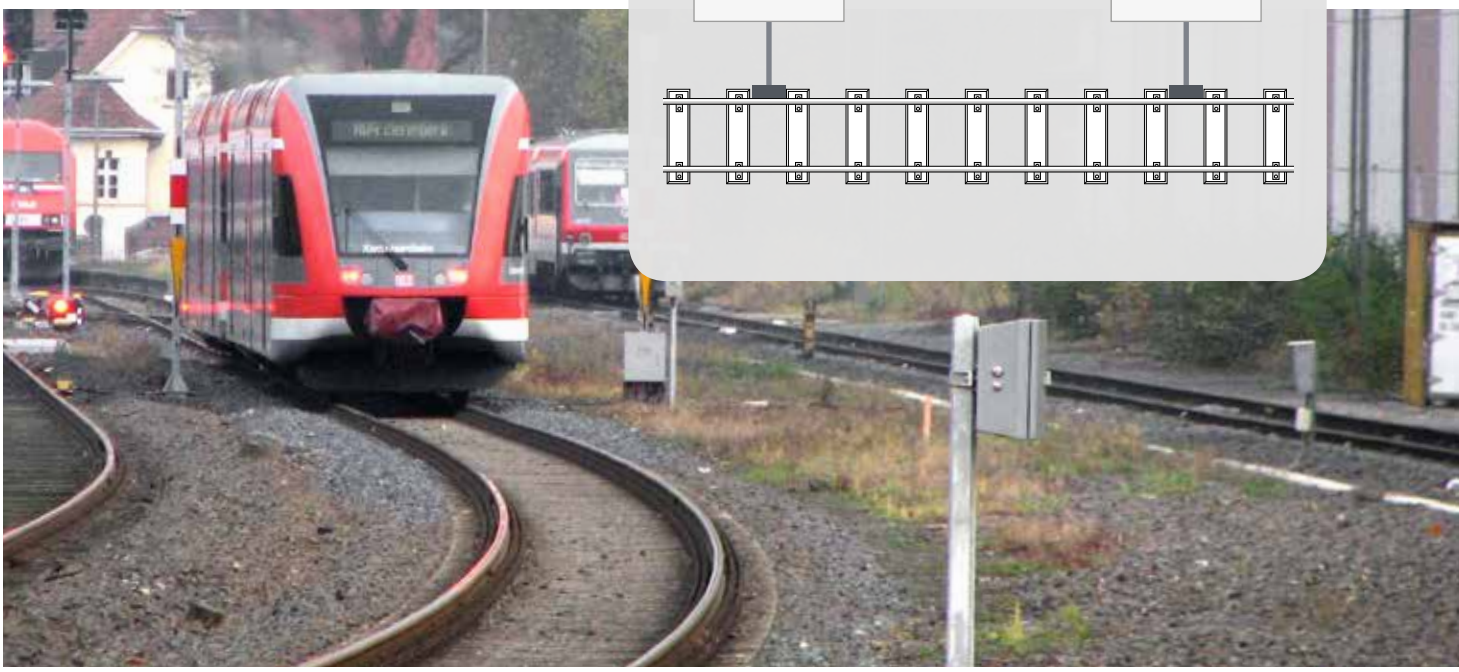
Axle sensor evaluation subassembly ASA

The axle sensor evaluation subassembly evaluates the axle sensor and transmits each axle that is recorded together with its direction of movement via the CAN bus that is connected to it. The counting of the axles is carried out in the BUES 2000 control level. This subassembly is identical with that used in the ZSB 2000 interlocking system.

Axle sensor with universal fastening system

The axle sensor consists of an impact resistant and waterproof welded housing with a universal fastening system for clamping to the rail.





Scheidt & Bachmann's axle counting sensor system (AZSB 300) for the activation and deactivation of level crossings always consists in hardware terms of a number of:

- Axle counting sensors AS
- Axle sensor evaluation subassembly (ASA-BG)

Furnishing:

- Axle counting sensor AS as double induction loop
- Impact-resistant and waterproof welded plastic housing
- Universal mounting system for clamping to the rails
- Rail connection housing with connection distributor board, junction plate, axle sensor evaluation subassembly and cable entry
- Axle sensor evaluation ASA subassembly for activation and evaluation of the axle sensor signals and for communication with the control level of the BUES 2000 via the element bus (CAN)

Further characteristics:

- Small longitudinal extension in the track
- Maintenance-free system
- Universal fastening independent of the rail types
- No new adjustment necessary after disassembling of the axle counting sensor (e.g. due to tamping work)
- Independent of the track superstructure and thereby independent of the sleepers
- Simple installation without drilling in the rails
- Continuous and intelligent evaluation through the axle sensor evaluation subassembly directly at the track with automatic recalibration
- Connection of a number of activation points via four wires (2 x power, 2 x CAN bus)
- Self-diagnosing system with automatic alarm message
- Connection of manual switching keys (UT) directly at the activation point possible

NOTHING GETS LOST

In order to make it possible for information to be passed to all traffic participants in a reliable condition and at the right time, free-of-doubt knowledge of the location of railway vehicles must be ensured.

Available for this purpose is Scheidt & Bachmann's practice-proven and maintenance-free FSSB 60/80 vehicle sensor. This permits direction-dependant locating even at high vehicle speeds.

This modern locating system is based on the design principle of „simple sensor, intelligent evaluation" and combines the advantages of a simple inductive sensor with the possibilities provided by microprocessor technology. Induction loops in the track and microcomputers for processing the information form the basic elements of the systems are used.

Furnishing:

- Induction loops in the form of an "8" (2 x 5 railway sleeper compartments)
- Double-oscillator subassembly (DOZ-BG) for activation and preparation of the signals from 2 induction loops
- Weather-resistant aluminium housing with protection against rain for the double-oscillator subassembly
- Housing for vehicle sensors in order to ensure tamping machine-proof rail mounting
- Rail-flange connection clamps of stainless steel for different rail types

Further characteristics:

- Galvanic separation of rail and loop
- Electrodynamic decoupling from the rail through opposed sense winding of the two loop halves
- No influencing of the loop through rail currents since the induced currents in the two loop halves have the same magnitude but are phase-displaced one to the other by 180°
- Isolatable track superstructure; wooden and concrete sleepers are needed only in the direct vicinity of the loop
- No short-circuit bridge or insulated rail joints are necessary for the effect
- Independence of axle shunt circuit (bypass) because damping is brought about by the iron mass of the vehicle
- No influencing through magnetic or eddy-current brakes via special cable

Evaluation:

- Application for switching on and off level crossings
- Connection to:
  - EBÜT 80 systems (EGL subassembly)
  - EBÜT vB systems (EGL subassembly)
  - BUES 2000 systems (IN/OUT subassembly)
- General applications
- Connection to:
  - Level crossing occupied status signal (MDC-BG)
  - Approach status signal (MDC subassembly)

EFFECTIVE POWER SUPPLY

The quality of the power supply to level crossings has a direct influence on their availability. The capacity of the power supply could be significantly reduced by the use of modern technology.

The substitute for the network is fully fed from one battery for all elements. A corresponding battery charge rectifier is used for the basic supply and maintenance of the battery. With the Digitrans II, Scheidt & Bachmann is continuing the tradition of a modern, highly functional battery charge rectifier. The compact type, low weight, high efficiency level and energy-saving measures characterise this innovative product.

Equipment:

- 1000 to 1400 Watt battery charge power supply for secondary voltages of 18V, 24V, 30V, 36V or 60V
- Functions according to the principle of the primary clocked switch power pack with active power factor correction (135kHz switch frequency). This results in a very compact type, low weight and high effectiveness level (typically 90%)
- Control of the temperature-dependant charge characteristics is performed by a microcontroller which reads and processes voltage, current and temperature values via an analogue-digital converter
- The current, voltage and temperature values as well as operator guidance for entering control values are displayed via an alpha-numerical LC display (4x20 characters) with white background lighting
- Entries are made using a decimal film keypad. The arrow buttons are for easier operation in the menus
- Full compatibility with the Digitrans I

Additional features:

- Adjustable maximum power limit
- Adjustable charging time for gassing voltage
- Battery voltage display including in the event of power failure
- Network failure counter
- Temperature display
- Issue of failures via relay
- Option for cascading several DIGITRANS II in the event of increased power requirements (Multi-Slave-Mode)
- Active power factor correction in the input circuit
- Two additional relays as external interfaces e.g. voltage monitoring (remote charge monitoring)
- External CAN-bus connector (including diagnostics)
- Additional version type 30V/24A
- 1kW class unit without active fans

Battery Charge Rectifier Digitrans II

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