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प्राप्तांक
Marks Awarded :

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Date : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

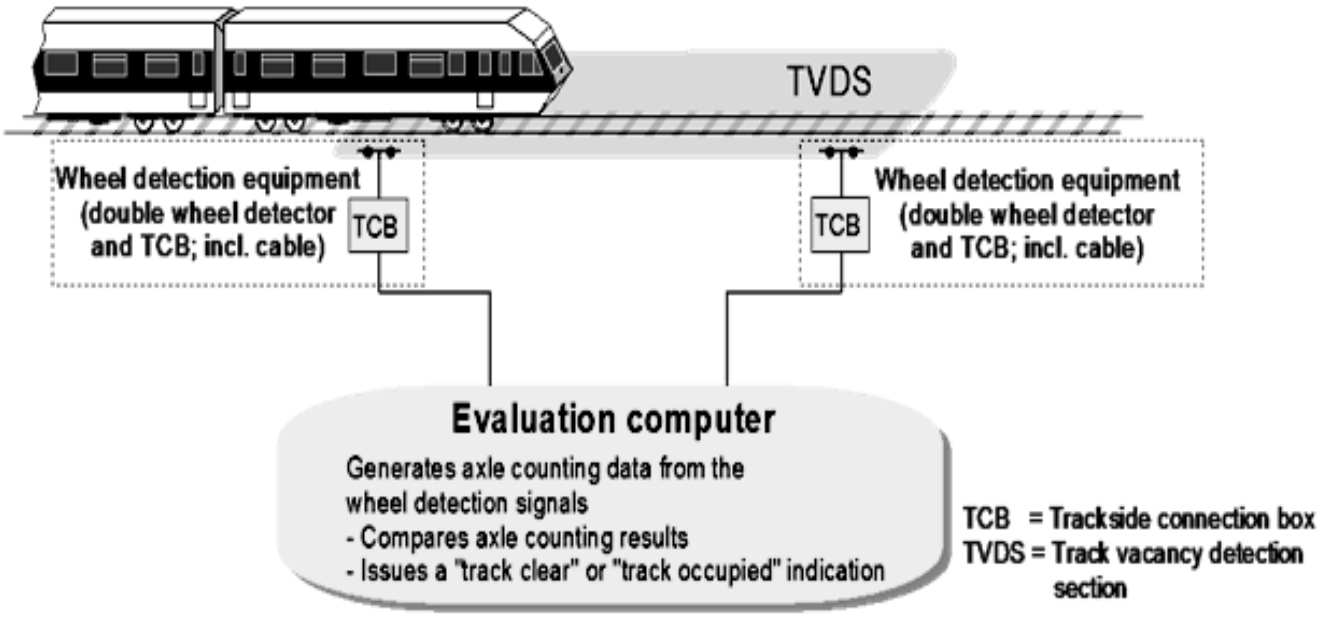
अनुदेशक के आद्यक्षर
Instructor Initial :

Multi Section Digital Axle Counter Siemens S350U

(RDSO / SPN / 176 / 2013)

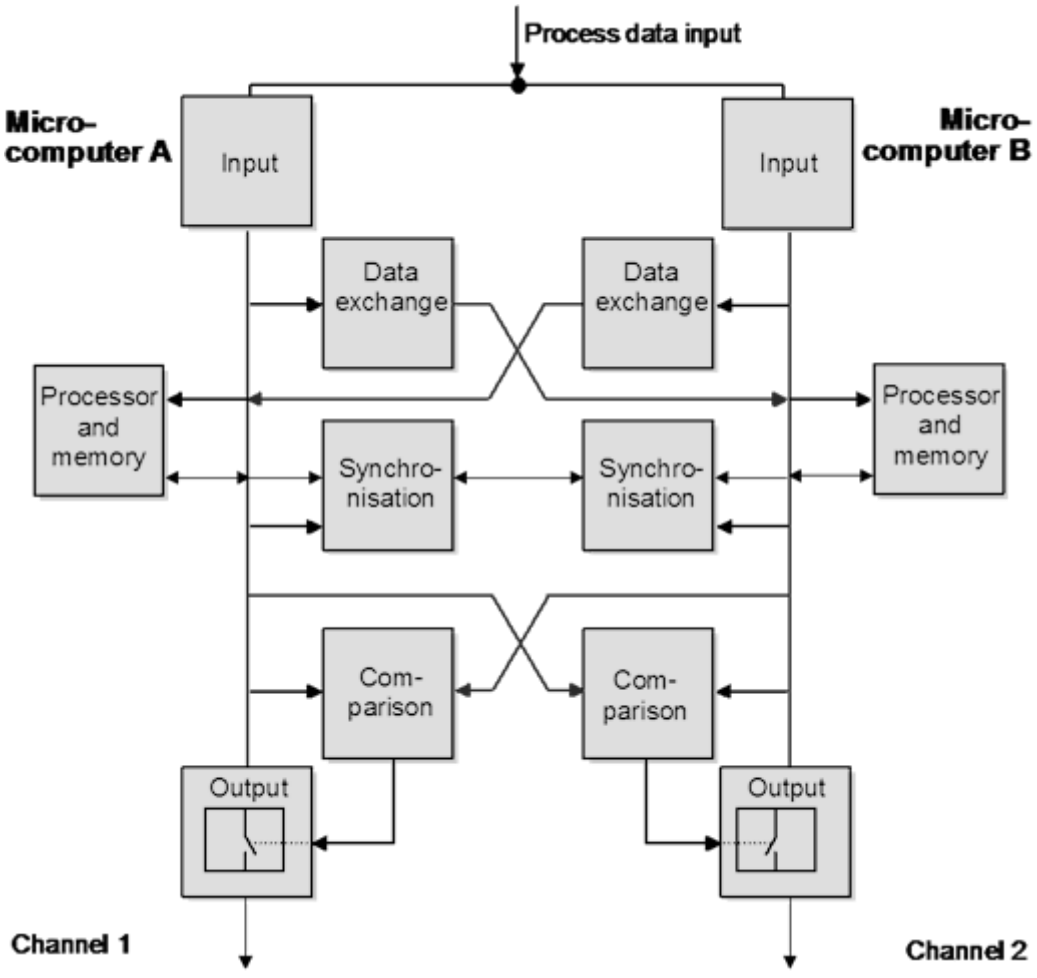
Purpose:

1. Identification of Sub-systems / Cards
2. Study of Indications on Sub-systems/ Cards
3. Study of 3DP-3S Configuration
4. Study of Reliable Communication
5. Study of Resetting
6. Downloading of Errors & Events
7. Maintenance Log Sheet
8. Measure Receiver Voltage and Frequency on calibration settings

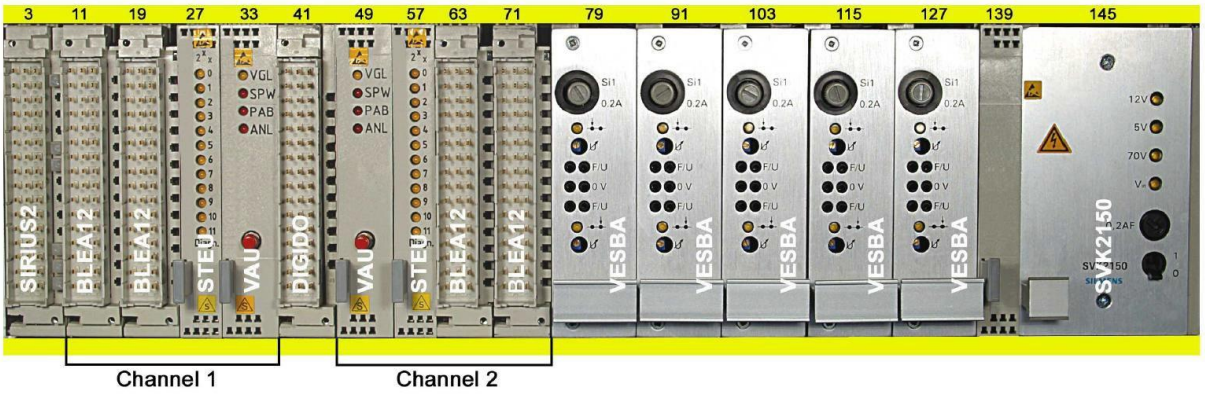


SIMIS – Fail-safe microcomputer system from Siemens:

- Two independent microcomputers of identical layout
- Two independent comparators only permit data to be output if the results match
- Fail-safe axle counting system Fail-safe computer in a 2-out-of-2 configuration
- Flexible axle counting system Evaluation computers - any number of AzS 350 U systems can be linked ("cascading"); Configuration via DIP-Switches
- Fail-safe exchange of wheel detector data, user defined and status information of remote counting heads
- Fault-tolerant evaluation of the pulse count through multiple-axle counting method.
- Bi-directional transmission of up to 24 items of user-defined operator-specific information by modem
- Reset of the track vacancy detection sections by immediate axle count reset (AzGrT) or preparatory axle count reset (vAzGrT)



EVALUATIONCOMPUTER– (EC):



Front view of Az S 350 U evaluation computer (including slot numbers)

Quantity	Short designation of board	Description
1	MF	Mounting frame
2	VAU	Processing and monitoring board
2	STEU	Control and diagnostics board
2 or 4	BLEA12	Block input/output board
0 or 1	SIRIUS2	Serial computer interface universal board
0 to 5	VESBA	Amplifier, trigger and band-pass filter board
0 or 1	DIGIDO	Digital double-usage board
1	SVK2150	Power supply board

STEU BOARD:

The control and diagnostic board buffers the signals transmitted by the counting heads. Due to the dual-channel layout of the evaluation computer, there is one STEU board per channel. The LEDs on this board display the following:

- **Normal Display**: display of operating states of the four track vacancy detection sections(TVDS) (during operation; operating state display)
- **Statistics Display** (diagnostics): display of operating states for a certain counting head or track vacancy detection section (switchover/selection via AzGrH button).
- **Display after Emergency Shutdown**: display of operating states in case of emergency shutdown.

BLEA12 BOARD:

The BLEA12 board is the input/output interface of the AZS350U. It has 12 floating relay outputs and 12 floating optocoupler inputs. Inputs and outputs are made via a 48-pin connector on the front panel of the board.

The BLEA12 is a single-channel board. This is why the dual-channel AzS350U system uses two boards of this type, one in channel 1 and one in channel 2 (first pair of BLEA12 boards). A maximum of four track clear/occupied indications with the associated reset restriction (RR) and reset acknowledgement (RA) can be output. The remaining inputs and outputs can be used for freely configurable, operator-specific information (e.g. block information).

The BLEA12 board has a MES80 bus port, which is used for exchange of data with the VAU board. The BLEA12 board also provides the port for the SCSI internal switch-off control signal, which can be used to switch off the power supply of the output relays.

The BLEA12 board executes the following functions:

- Output of track clear/occupied indication (CI and ¬CI) of up to four TVDS
- Output of reset restriction(RR) of evaluation computer for each TVDS
- Output of reset acknowledgement (RA) on successful axle counter set for each TVDS
- Input of immediate or preparatory axle counter set (by actuating the AzGrT or vAzGrT button) for each TVDS of the evaluation computer.
- Input of cancellation of reset restriction (RR) by actuating the AzGrH button for each TVDS via optional front connector.
- Configuring by means of 96DIP switches.
- Block inputs/outputs for freely configurable, operator-specific information.

The relay output system for the output of the track clear/occupied indications is of dual-channel design, i.e. the output data is generated and output on each of the two computer channels. Each computer channel has two relays. The relay contacts are linked to form two contact chains.

SIRIUS2 BOARD:

Serial computer interface universal board. For controlling the transmission system (data transmission between evaluation computers), the AzS350U has a SIRIUS2 board. The SIRIUS2 board provides two serial, bidirectional interfaces for data transmission, each of them being equipped with a V.24 output. One of these V.24 interfaces has two control signals (RTS1 and CTS1).

The SIRIUS2 board contributes to fail-safety by providing reliable electrical isolation between peripherals and hardware core. For the transmission of fail-safe data, the procedure protected data transmission procedure FASIT (fail-safe, single-channel transmission of status information) issued.

On the front panel, there is a 48-pin connector providing the connection for all interface signals.

VESBA BOARD:

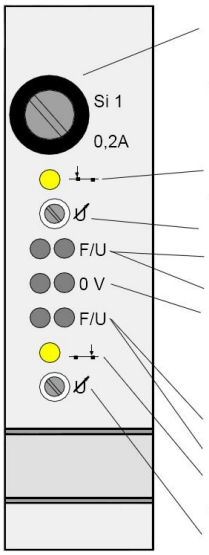
Amplifier, trigger and band-pass filter board.

The functions of the VESBA amplifier trigger and band-pass filter board are as follows:

- Connection of ZP 43E/V wheel detection equipment (counting heads)
- Forwarding of power supply (from SVK2150) to counting heads

The VESBA board provides electrical isolation between outdoor equipment (counting head) and indoor equipment. It splits the signal frequencies f1 and f2 into two independent channels and filters, amplifies, rectifies and evaluates (trigger) the data transmitted from the counting head.

The front panel incorporates measuring sockets for fault diagnosis, LEDs for displaying the traversal state and potentiometers for adapting to different cable lengths and setting the transmission levels. Please read(f1=3.50kHz& f2= 6.37kHz) for IR.



Counting head fuse (0.2 A)

Counting head (systems 1 and 2 of double wheel detector)
System 1

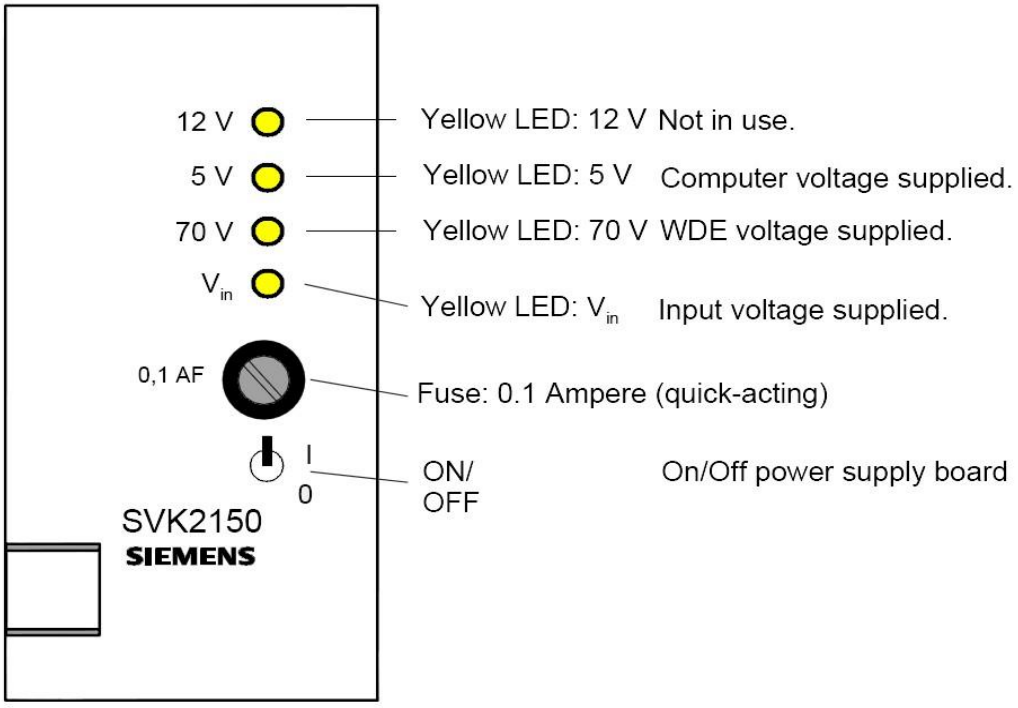
LED (yellow) lights up if system 1 of double wheel detector is being traversed or occupied (or V_1 < 1.3 V DC)
Potentiometer for voltage adjustment V_1 = 3.0 V DC ± 0.10 V
Measuring socket for signal frequency f_1 = 3.60 kHz ± 0.05 kHz (frequency adjusted at CH)
Measuring socket for voltage V_1 = 3.0 V DC ± 0.10 V
0 V measuring sockets for both systems

System 2

Measuring socket for signal frequency f_2 = 6.52 kHz ± 0.10 kHz (frequency adjusted at CH)
Measuring socket for voltage V_2 = 3.0 V DC ± 0.10 V
LED (yellow) lights up if system 2 of double wheel detector is being traversed or occupied (or V_2 < 1.3 V DC)
Potentiometer for voltage adjustment V_2 = 3.0 V DC ± 0.10 V

Front view of VESBA board

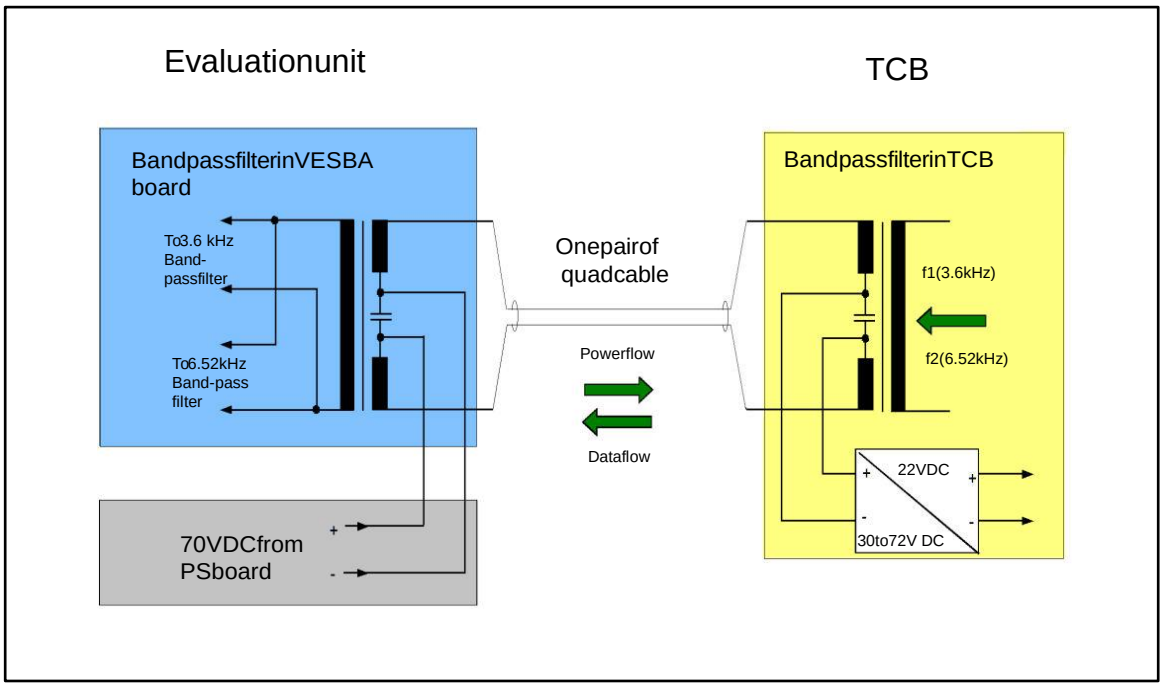
SVK 2150POWER SUPPLYBOARD



Front panel of the power supply board SVK2150

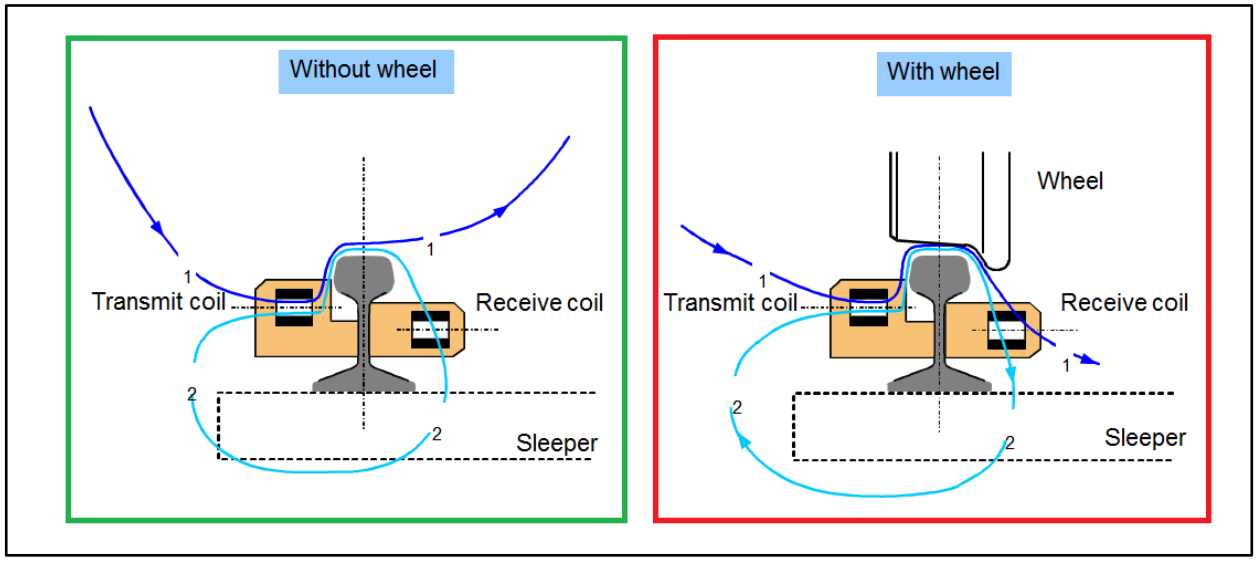
CABLINGBETWEEN TCB AND EU:

In between TCB and EU, the Superimposition of data and power on same pair of conductors of quad cable is achieved by the arrangement as shown in block diagram given below.



If a wheel enters the sensing range of the double wheel detector, the increased magnetic coupling between transmitter and receiver makes the receive voltage rise above the quiescent voltage (voltage when no wheels are passing). The voltage-frequency converter reacts by increasing the frequency beyond the upper band limit of the band-pass filter. The band-pass filter attenuates the signal. This corresponds to the occupied state of the double wheel detector. The subsequent transformer combines the signals of both channels and feeds them into the signaling cable.

In addition, the transformer separates the supply voltage received (coming from the interlocking/relay room) from the signals to be transmitted to the evaluation computer.



Magnetic coupling at receiver coil without wheel and with wheel.

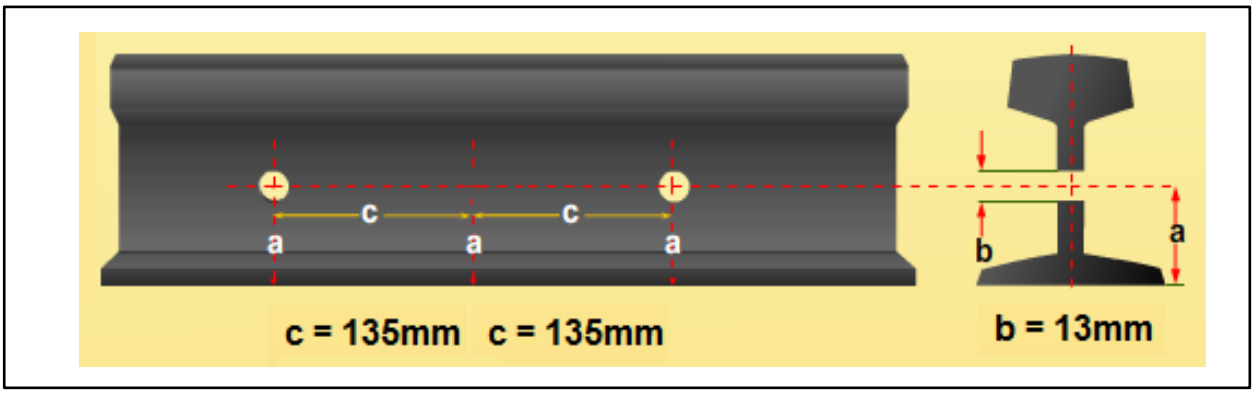
DIMENSIONS FOR INSTALLING THE DEK43 IN THE CENTRE OF A SPACE BETWEEN SLEEPERS:

Mark out the holes to be drilled in the rail web according to the dimensions given in Fig below and dot their centers using a centre punch.

For drilling the holes (Ø13mm), a drilling jig (C25326-A28-A1) can be used.

When installing the DEK43 Electronic Double Wheel Detector over a sleeper, remove the rail fastening accessories on both sides of the rail.

Rail profile ⇨	60 Kg. Rail	52 Kg. Rail	90R Rail
Distance **a** [mm] ± 1.5 mm	85 mm	69 mm	56 mm



DO's and DON'Ts:

DO's

1) Always use recommended tools.
2) Selection of Installation Point on rail shall be strictly followed as per manual.
3) Adjustments and measurements shall be strictly done with OEM tool kit only.
4) Reset Box Connection shall be strictly followed as per manual.
5) For bank switch setting of BLEA12 please take the help of installation document.

DON'Ts

6) Never practice any self made guide line which is not recommended in manual.
7) Tools other than those recommended in the manual can cause damage to the system and hence is not recommended.
8) Never bypass mandatory recommendation as stated in the manual.
9) Recommendation if not followed can damage the sensitive electronics.
10) Never use inferior/unreliable power source.

S.No.	Display	Measured quantity	Set point	Tolerance range	Actual Values
1	U60=	WDE Voltage	60 V DC	30 V to 72 V	
2	U24=	Operating Voltage	24 V DC	21.3 V to 22.4 V	
3	FS	Transmitter frequency of the double wheel detector	43 KHz	42.8 KHz to 43.2 KHz	
4	F1	Signal frequency 1	3.60 KHz	3.55 KHz to 3.65 KHz	
5	F2	Signal frequency 2	6.52 KHz	6.42 KHz to 6.62 KHz	
6	Ur1=	Rectified voltage 1	5.5 V DC	5.3 V to 6.0 V	
7	Ur2=	Rectified voltage 2	5.5 V DC	5.2 V to 5.9 V	
8	uE1	Receiver voltage 1	AC	60 mV to 150 mV observe note in Section 9.4.3.8	
9	uE2	Receiver voltage 1	AC	60 mV to 150 mV observe note in Section 9.4.3.8	
10	UL	WDE output voltage with direct supply	$\geq$ 1.0 V AC	0.48 V to 1.8 V	
		with external supply	$\geq$ 1.0 V AC	0.7 V to 2.7 V	

1. Draw the functional block diagram Field Detection Point

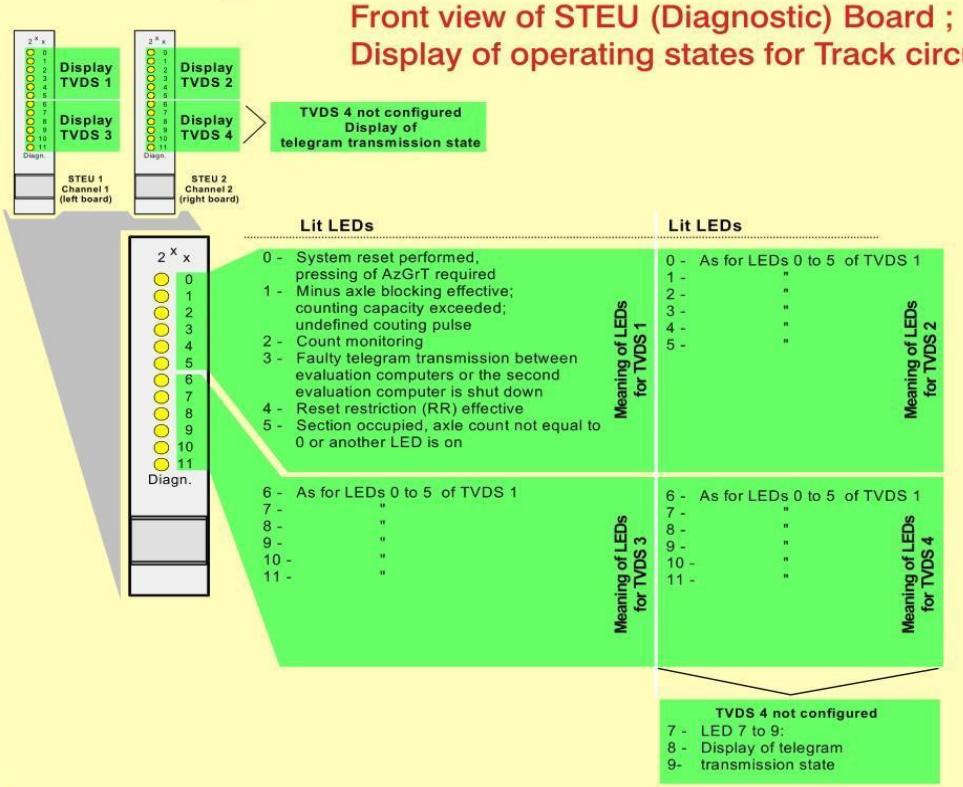
2. Draw the functional block diagram Evaluator

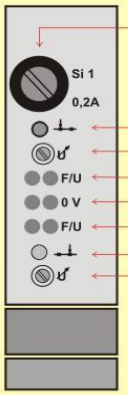
Date: Signature of the Trai**nee**

Annexure 1

Fault Diagnostic Chart

Front view of STEU (Diagnostic) Board ; Display of operating states for Track circuit 1 to 4





Counting head fuse (0.2 A)

Counting head (systems 1 and 2 of double wheel detector)

System 1

LED (yellow) lights up if system 1 of double wheel detector is being traversed or occupied (or , < 1.3V DC)

Potentiometer for voltage adjustment V, = 3.0V DC ± 0.10V

Measuring socket for voltage Vi = 3.0V DC ± 0.10V

0 V measuring sockets for both systems

System 2

Measuring socket for voltage V2= 3.0V DC ± 0.10V

LED (yellow) lights up if system 2 of double wheel detector is being traversed or occupied (or V; < 1.3V DC)

Potentiometer for voltage adjustment V; = 3.0V DC ± 0.10V

FAULT FINDING ANALYSIS

OUTDOOR CHECKING TO BE DONE AT THE DETECTION POINT

- Check if the frequencies
  FS = 43 KHZ (should be as close as possible to 43 KHZ)
  F1 = 3.50 KHZ
  F2 = 6.37 KHZ & all other parameters are in the given range
- If the frequencies are not in the given range, check the Transmitter / Receiver Sensors fitted on the rail.
- If the Sensors are loose, tighten the sensors nut/bolt with the torque wrench applying a force of 75 Nm.

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INDOOR CHECKING TO BE DONE IN THE RELAY ROOM :

- If the Red LED PAB lit on the VAU card then switch off and switch on the evaluation computer using the switch on the power supply card.
- If the yellow LED on the VESBA card is continuously lit (ie no wheel on the detection point)
  - On the VESBA card, check if the voltage V1 & V2 is in the range 2.9 V DC to 3.1 V DC
  - Check the fuse (200 mA) on the VESBA card in the relay room.
  - Check the outgoing Voltage to the Detection point on the K-Rack

Power Supply Card

- If V_{in} on the Power Supply card is not lit, check the fuse on the fuse strip (on top of the relay rack)
- If V_{in} is lit& the Power Supply card switch is on, then 5V, 70V & 12 V should also be lit.
- If V_{in}, 70 V, 12 V are not lit, check the fuse (200 mA) on the Power Supply card.

NOTE : The meaning of LED 4 (reset restriction) is only applicable in Hard Reset mode. In Preparatory mode LED 4 is permanently off. EC = Evaluation Computer

Meaning of LEDs on the STEU (Diagnostic Board)

LED display ● = steady l. ◘ = flashing	MEANING	CAUSE	EFFECT	REMEDY
LED 0 = ●	**System Reset**	Hardware reset : Red Reset buttons on VAU boards have been pressed	EC in permanently occupied state	• Obtain track clear indication via visual inspection
		Power supply switched on		• Initiate Reset Operation from SM room
LED 0 = ◘	**Program-controlled emergency shutdown**	EC fault resulting in asynchronous operation of the two channels	Program-controlled shutdown of EC results in permanently occupied state	• Remove cause of fault
				• Carry out hardware reset
		Asynchronism of block information	On both VAU boards, the LEDs "VGL" are switched off and the LEDs "PAB" are switched on	• Reset EC by switching OFF and then switching ON the power supply module.
LED 1 = ●	**Minus axle blocking effective**	At least one axle more counted out than has been counted in	Permanently occupied state caused by minus axle blocking	Obtain track clear indication via visual inspection
				Initiate Reset Operation from SM room
	Counting capacity exceeded (max. 32,767 axles)	• Incorrect programming of counting direction of a counting head	Permanently occupied state	Remove cause of fault
		• Counting head counting out is faulty		Obtain track clear indication via visual inspection
		• Counting head maladjusted		Initiate Reset Operation from SM room
	Undefined counted pulse	• Inexplicable pulse detection by counting head	Permanently occupied state	Obtain track clear indication via visual inspection Initiate Reset Operation from SM room
LED 2 = ●	**Count monitoring** double wheel detector traversed on one channel only (e.g. shunting movement)	–	Permanently occupied state without counting Occupied state and display are maintained until next complete traversal of double wheel detector or next Reset operation	Initiate Reset operation from SM room
	Count monitoring counting head fault due to spurious pulse	Double wheel detector detected pulses on one channel	Counting error leading to a permanently occupied state	Check counting head concerned including cable
		Double wheel detector detected a non-countable pulse	No counting error; if at least one axle follows after the cause, the track clear indication will be given after the train has passed, display is switched off	Obtain track clear indication via visual inspection Initiate Reset Operation from SM room
		Double wheel detector, without a traversal, detected pulses due to spurious pulse	Occupied state without a train; occupied state and display are maintained until next traversal with track clear indication or until next Reset operation	Correct counting of min. one axle past affected counting head
LED 3 = ●	**Telegram transmission faulty or switched off**	Data transmission between ECs is faulty	As long as the connection is interrupted or faulty data is received, the TVDS with "remote" counting heads remain in the occupied state Occupied state and display are maintained until next complete traversal of double wheel detector or next Reset operation (DIP switch TELFM set to Off)	Check connection between the ECs
		Second EC has been switched off		Check whether second EC has been switched off or is in an emergency shutdown state (restart)
		Second EC is in emergency shutdown state		Reset EC by switching off and then switching on the power supply button
		Data transmission between ECs was faulty (DIP switch TELFM is set to Off and double wheel detector detected no pulses)		Wait for train run; if TVDS remain occupied, perform the measures above
LED 4 = ●	**Reset restriction (RR)**	One counting head of the TVDS detected pulses There are axles in the TVDS	RR effective and section is occupied	Initiate Reset Operation from SM room
LED 5 = ●	**Section occupied**	There is a train in the section which has not yet been counted out (axle count ≠ 0)	–	Obtain track clear indication via visual inspection
				Initiate Reset Operation from SM room
	Section remains occupied	Axle count ≠ 0 e.g. due to counting error	–	Initiate Reset Operation from SM room
LED 6 = ● to LED 11 = ●	**Meaning as for LED 0 to LED 5**	See above	See above	See above

Meaning of LEDs on the STEU 2 board, slot 57, if TVDS 4 is not configured (normal display)

LED display ● = steady l. ◘ = flashing	MEANING	CAUSE	EFFECT	REMEDY
LED 7 = ●	**Telegram transmission via interface 1 is faulty**	Cause as for LED 9, relating to interface 1	Effect as for LED 9, relating to interface 1	Remedy as for LED 9, relating to interface 1
LED 8 = ●	**Telegram transmission via interface 2 is faulty**	Cause as for LED 9, relating to interface 2	Effect as for LED 9, relating to interface 2	Remedy as for LED 9, relating to interface 2
LED 9 = ●	**Telegram transmission is faulty**	General: Data transmission between ECs is faulty	As long as the connection is interrupted or faulty data is received, the TVDS with "remote" counting heads remain in the occupied state Occupied state and display are maintained until next complete traversal of double wheel detector or next Reset operation (DIP switch TELFM set to Off)	Only necessary if a TVDS is affected:
				Check connection between the ECs
		Second EC has been switched off		Check whether second EC has been switched off or is in an emergency shutdown state (restart)
		Second EC is in emergency shutdown state		Reset EC by switching off and then switching on the power supply button
		Data transmission between ECs was faulty (DIP switch TELFM is set to Off and double wheel detector detected no pulses)		Wait for train run; if TVDS remains occupied, perform the measures above

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DO's and DON'Ts

DO's
- Check that the voltage U60 at the counting head is more than 30V DC. If not, check the quad cable from the central evaluator to the counting head.
- Check that all electrical parameters are within the specified range If not, adjust only the 3 frequency values, 43 kHZ, 3.50 kHz & 6.37 kHz
- Check that the bolts of the wheel detector are tight (Use only a torque wrench of 75 Nm to do this)
- Check the above only if no fault is found at the Central Evaluator, and, otherwise, only once in 3 6 months. Adjust the frequency values only if they are outside the permissible range specified

DON'T's
- Do not use any tools other than those provided, specifically for tightening the bolts on the wheel detector
- Do not tighten the bolts after the frequency values have been adjusted within the specified range; these values can change after tightening the bolts