



# **LHB (WSP) Wheel Slide Protection**

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# WHAT IS WSP ?

- • A Brake Cylinder pressure regulation device.
- • Adjusts the braking force to the wheel-rail friction (adhesion)  
*so as to make optimum use of available adhesion*
- To optimize the braking distance and
- To prevent wheel sliding.
- • For 160 kmph & above WSP is recommended as requirement.

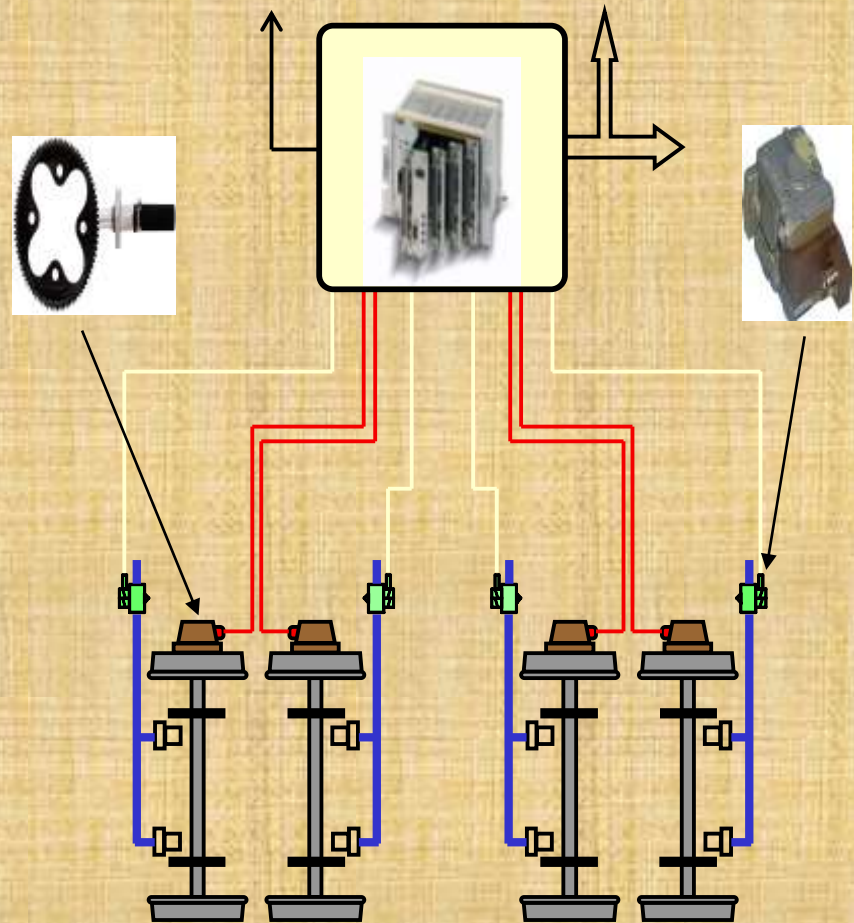
# WSP

- **Requirement:**  
Poor Adhesion.
- Because of high speed the adhesion could be insufficient to sustain the brake rate demanded during emergency breaking, especially when the surface of the rail is wet and slippery.

# Wheel slide Protection System

## ***Advantages:***

- Safe protection of all wheel sets from locking
- Optimal use of the wheel/rail adhesion
- Short stopping distances
- Low air consumption
- Low power consumption

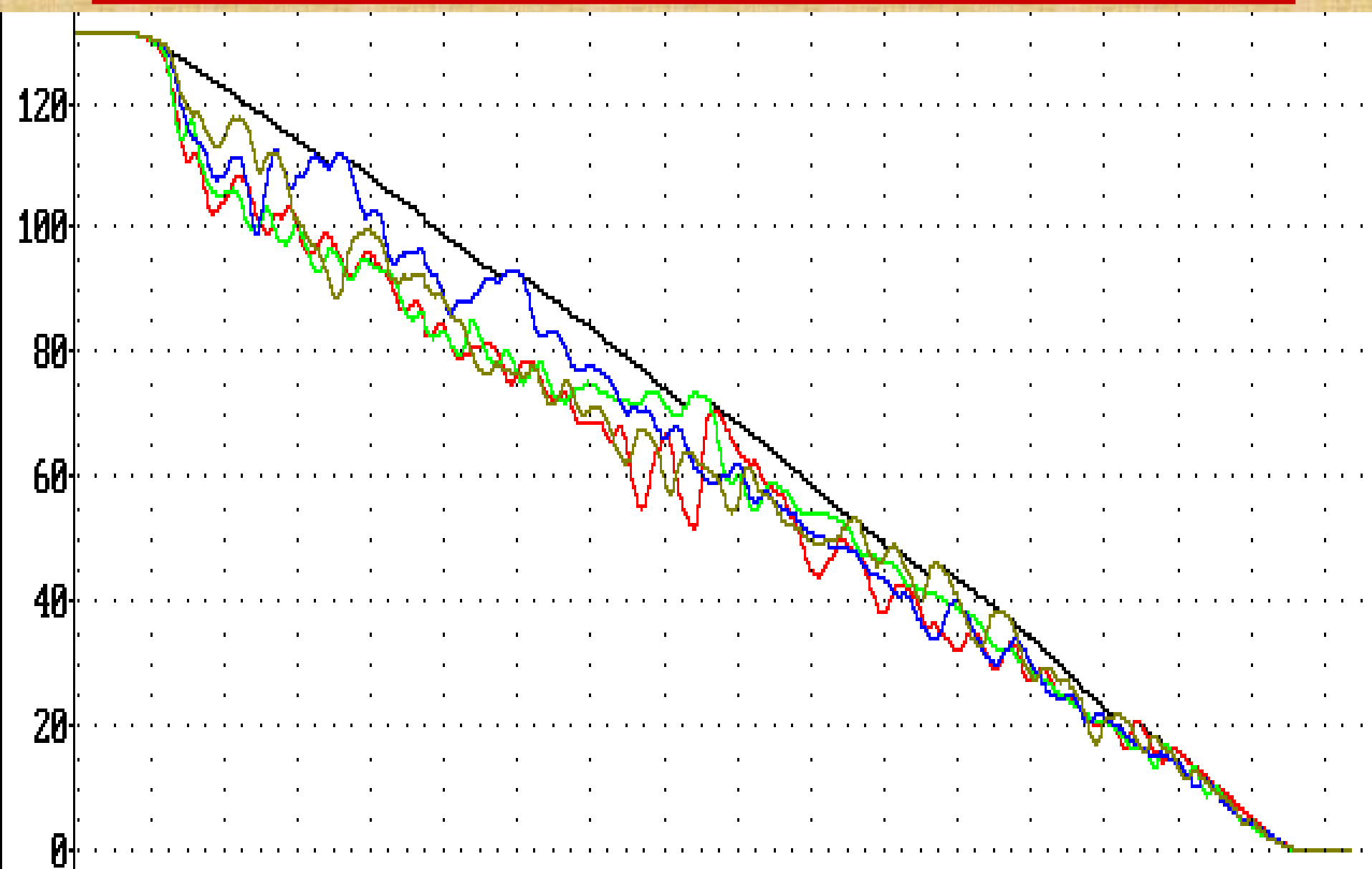


# PRINCIPLE OF WSP

- The rotation of each axle is constantly measured and compared with a reference speed for that coach. (The rotation of the fastest axle of the coach).
- In case there is a variation in rotation among the axles, WSP automatically releases or applies the brakes accordingly, so that the speeds of all the axles become uniform.

# Wheel Slide Protection Equipment

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# **The Main Components for WSP**

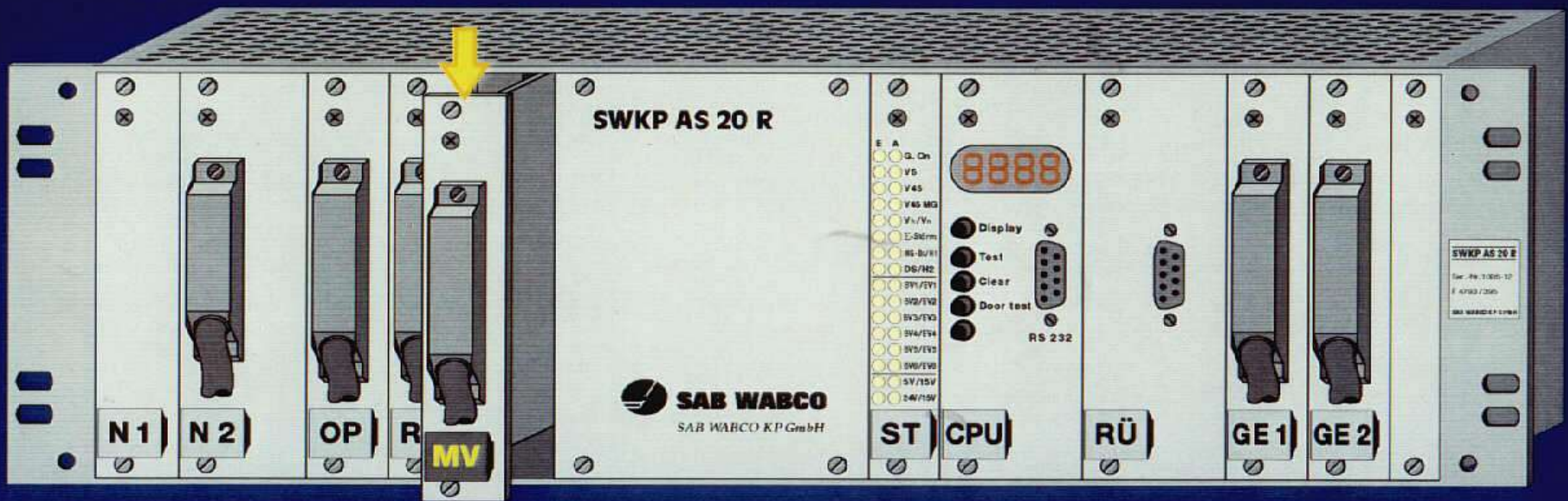
## **(per coach)**

- **1) Microprocessor** (1 no.)
- **2) Set of connector** (1 no.)
- **3) Phonic / Toothed wheel** (4 nos)
- **4) Speed Sensor** (4 nos)
- **5) Junction box for speed sensor** (4 nos)
- **6) Junction box for Dump Valve** (2 nos)
- **7) Connectors** (4 nos)
- **8) Anti skid valves / Dump Valves** (4 nos)
- **9) Pressure switch** (1 no.)



# Micro Processor

## MV – Dump valve amplifier:



- 4 dump valves each amplifier board
- 4 independent safety circuits
- both-sides switch-off of solenoids in the case of the watchdog time-out

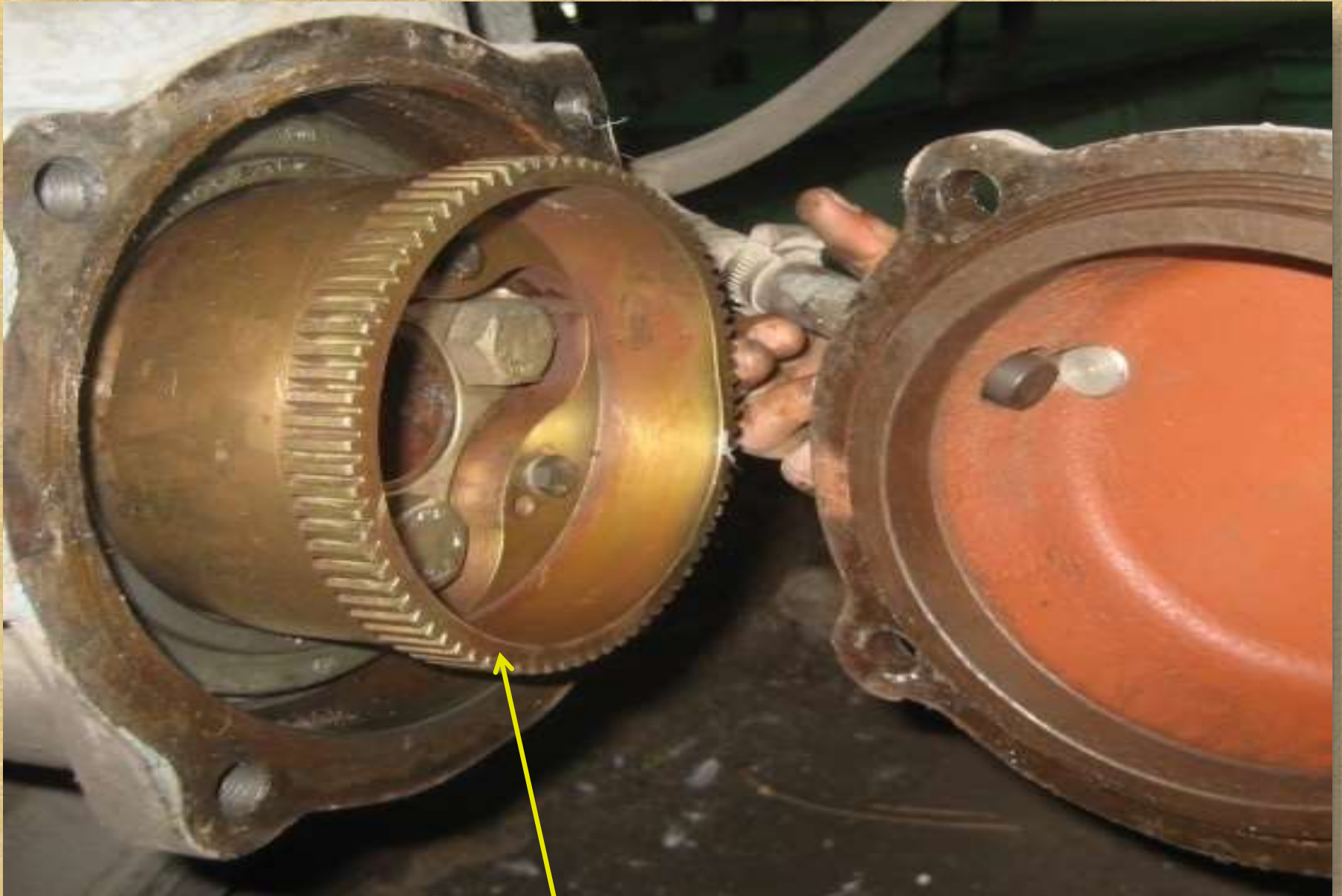
- protection against revers polarity and short circuit proof
- circuit-brake detection
- 24 V supply voltage for solenoids, independent on different board voltage

# SPEED SENSOR

- The speed sensors are fixed on one end of the axle box cover with the help of two bolts.

During fitment the gap between sensor probe & phonic wheel plays vital role. The gap can be adjusted with the help of shims & measured through the peephole in axle box cover. The other end of the speed sensor i.e. cable is connected to junction box in car.





**PHONIC/POLE WHEEL**

Knorr Bremse = 0.9 to 1.4 mm  
Faiveley = 1.5 +/- 0.5 mm

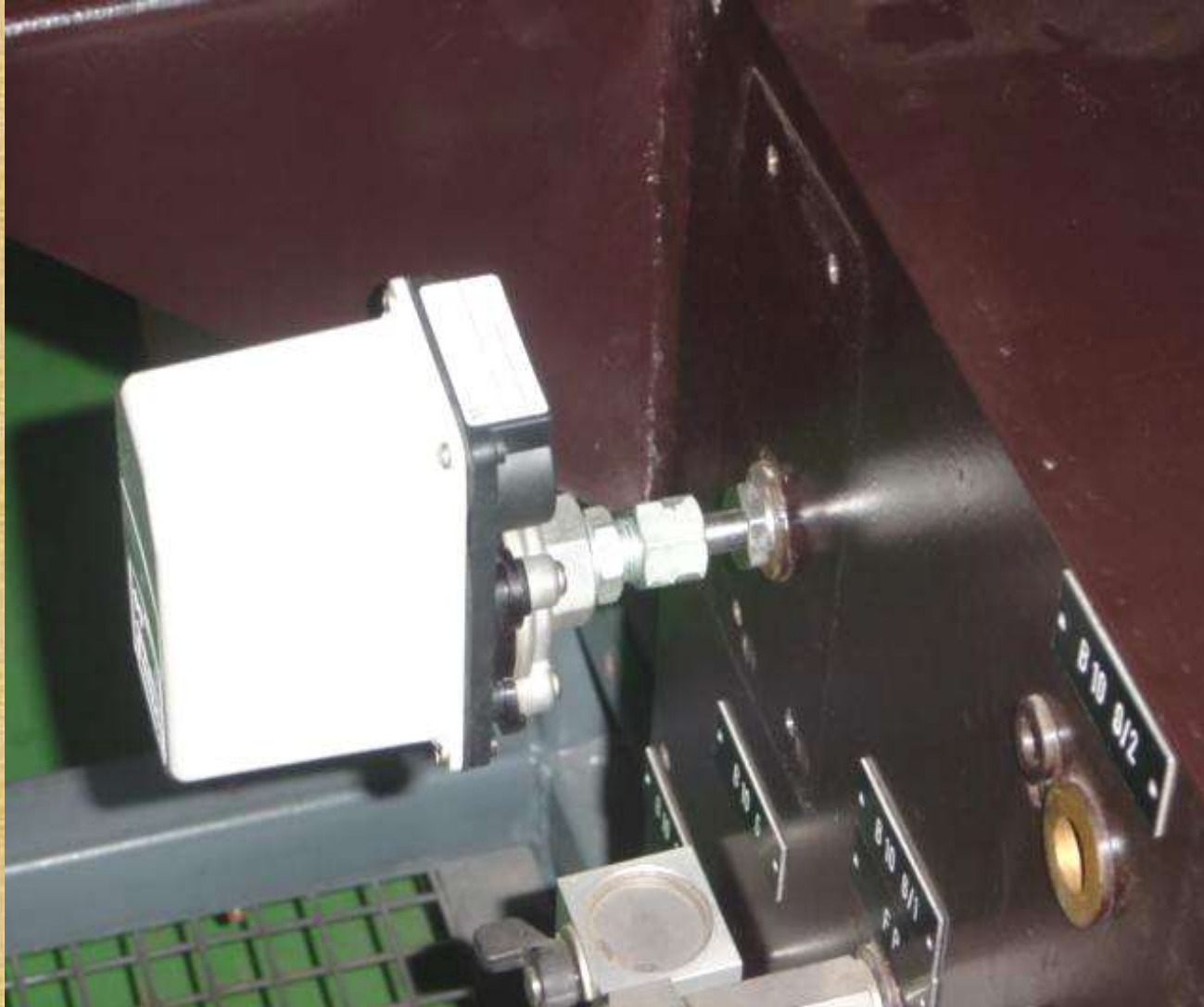


Knorr Bremse = 0.9 to 1.4 mm  
Faiveley = 1.5 +/- 0.5 mm





# PRESSURE SWITCH



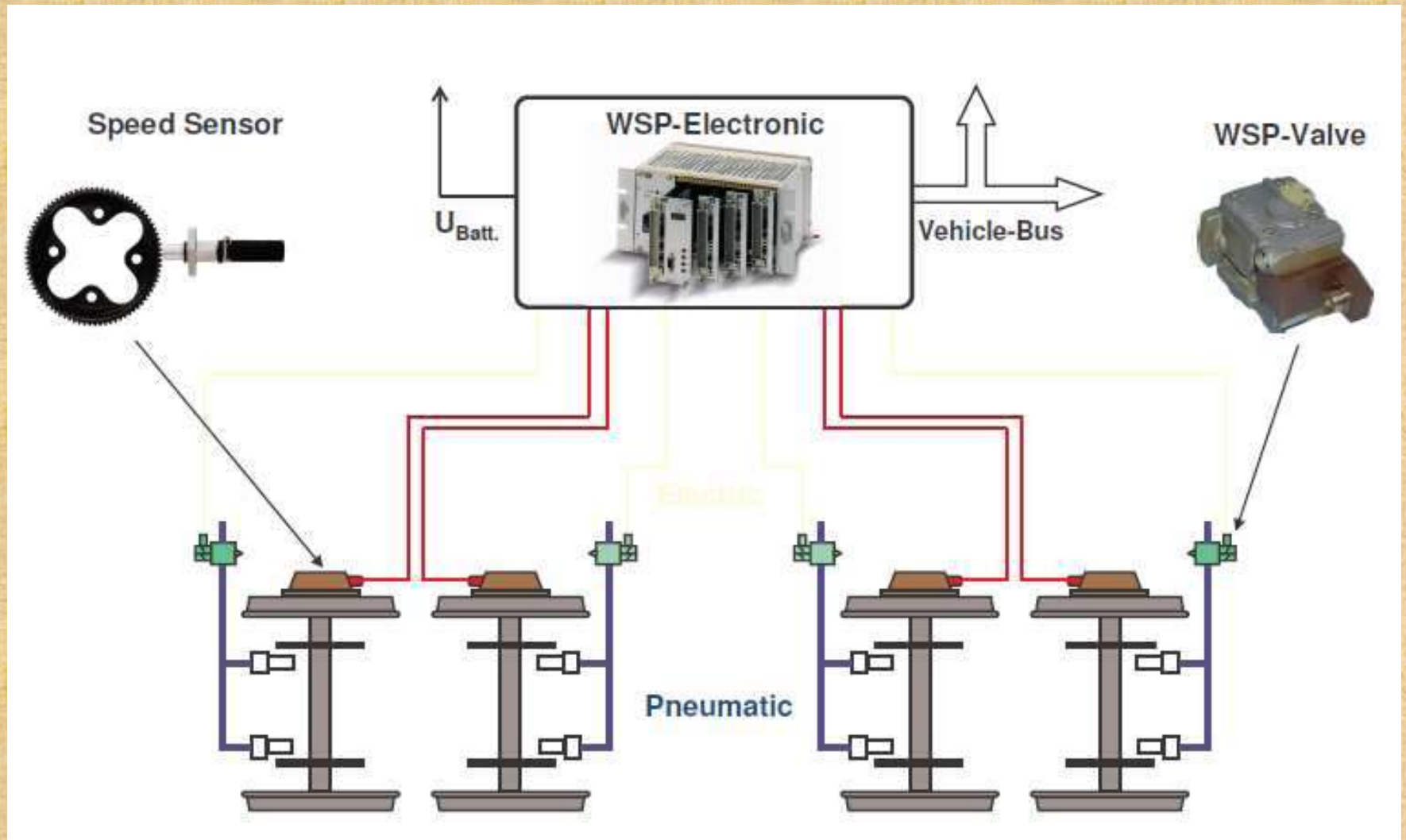
# PRESSURE SWITCH

Pressure switch is provided on brake control panel. The purpose of pressure switch is to activate (i.e. to switch on) the WSP when the pressure reaches as given below.

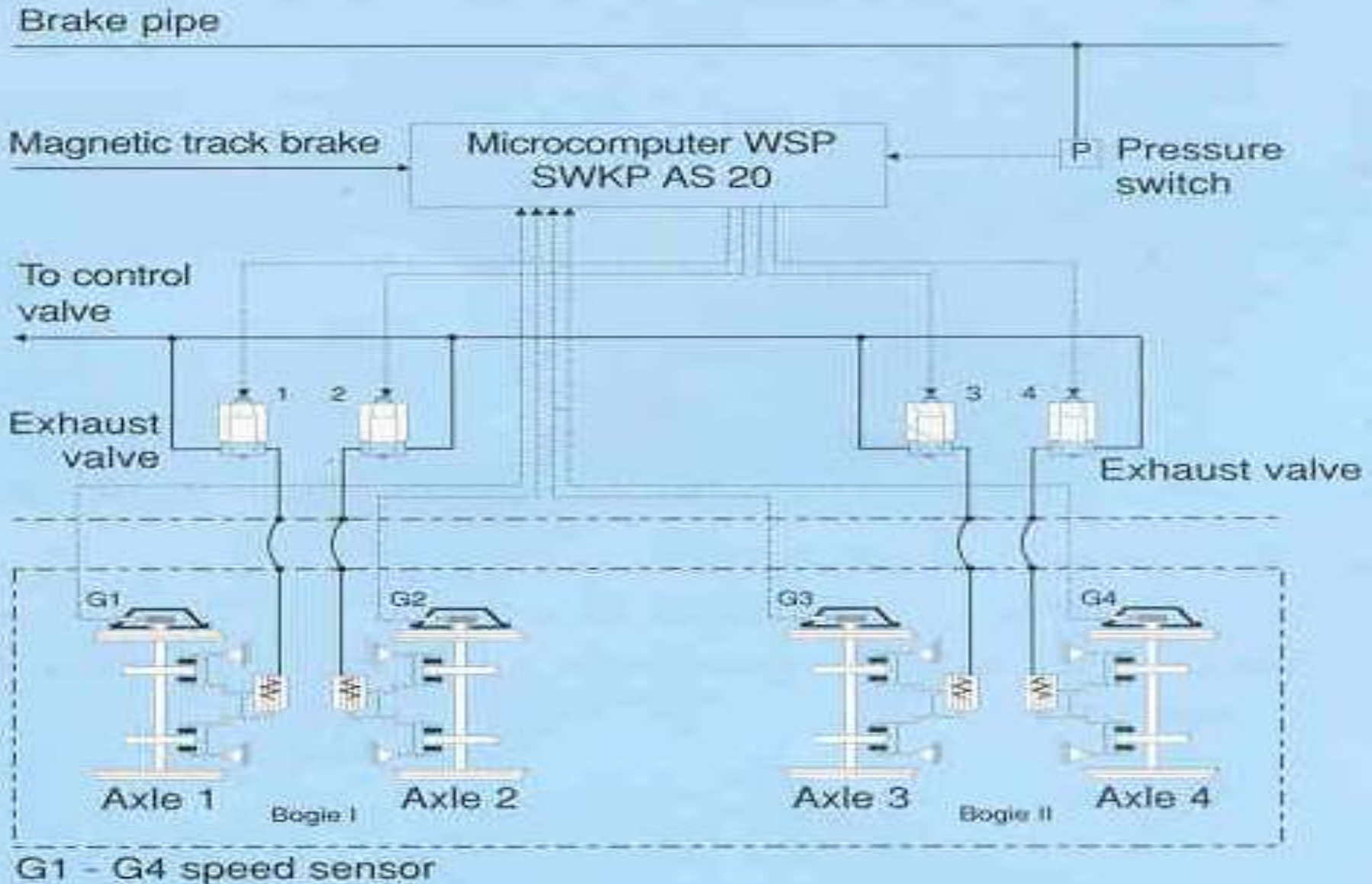
<b>System make</b>	<b>Working on pressure</b>	<b>Pressure range</b>
Knorr Bremse	BP Pressure	0.2 Kg/cm <sup>2</sup> – 0.5 Kg/cm <sup>2</sup>
Faiveley	FP Pressure	1.5 Kg/cm <sup>2</sup> – 1.7 Kg/cm <sup>2</sup>



# Functioning of WSP system



# Working of WSP



# Faiveley Based WSP System

It is separated into various components such as:

## N1 Power Pack

Input Voltage= 16.8 to 150 VDC

Output Voltage= 24 +/-3% VDC

## N2 Power Pack

Input Voltage= 16.8 to 150 VDC

Output Voltage= 24 +/-3% VDC



# Faiveley Based WSP System

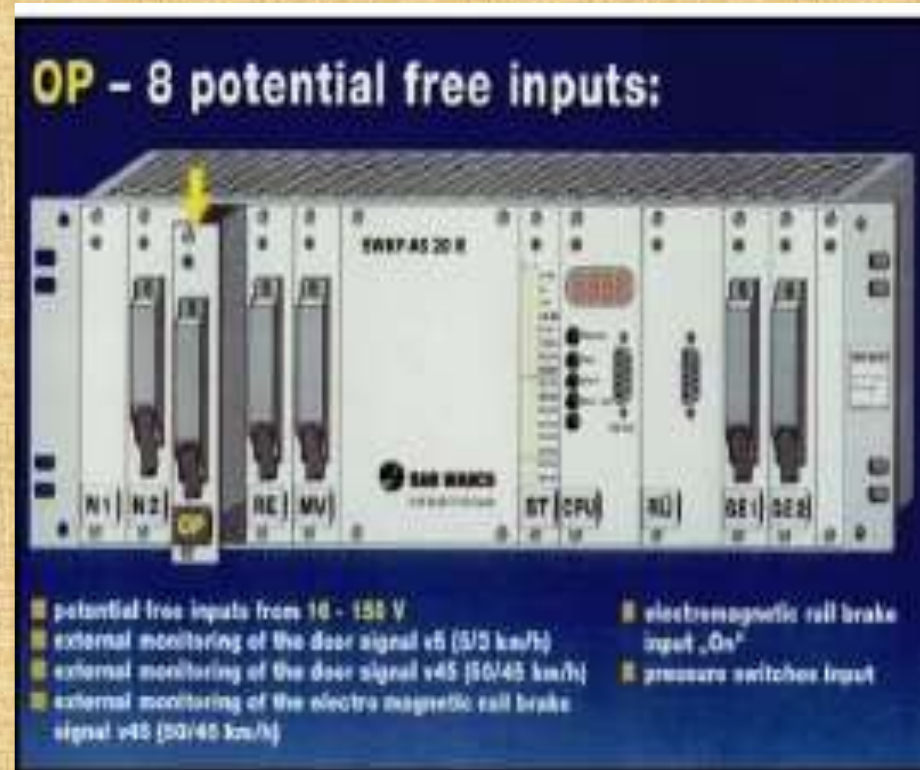
It is separated into various components such as:

OP (Opt coupler input)- Not in Use

8 Potential free Input Voltage  
= 16 to 150 VDC

RE (Relay Output)

6 Potential free Input Voltage  
= 16 to 150 VDC



# Faiveley Based WSP System

It is separated into various components such as:

## MV (solenoid amplifier):

Four solenoid amplifiers per assembly.

Constant voltage supply of 24 volts for solenoids irrespective of battery voltage.

This module is used for controlling the dump valves via bipolar output amplifier.



# Faiveley Based WSP System

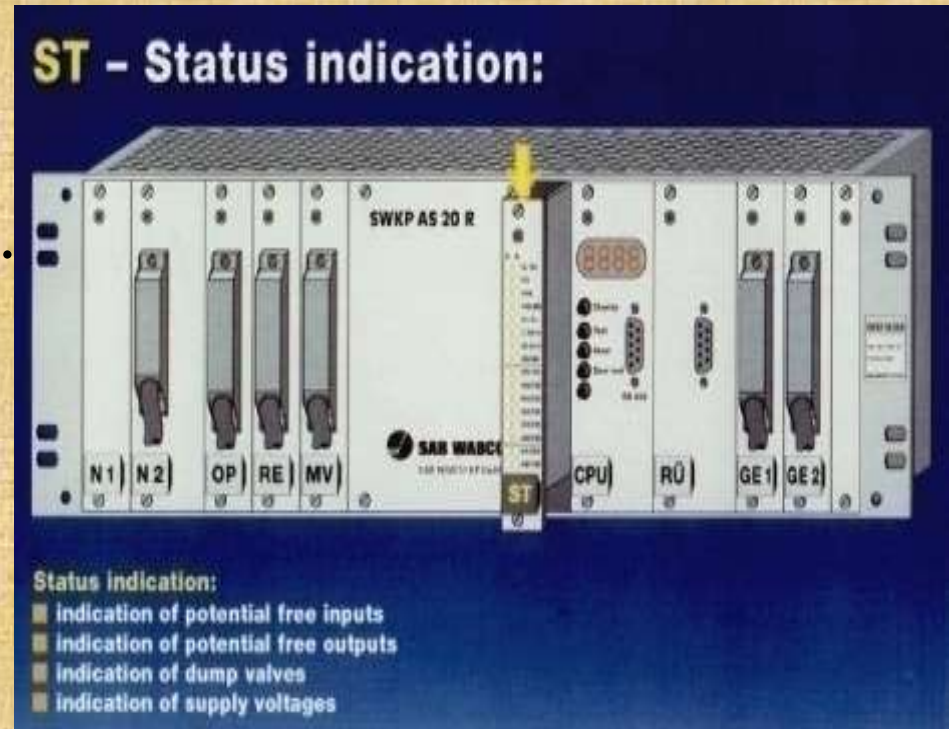
**ST (Status display):**

Used for monitoring of all  
Inputs & outputs (OP & RE).

Used for monitoring dump  
valves and four supply  
voltages

(BV= charging of BC

EV= exhausting of brake cylinder).



# Faiveley Based WSP System

It is separated into various components such as:

## **CPU (Central processing unit):**

Selective regulation of brake cylinder pressure of the wheel set.

Date received & is stored permanently for diagnostic purpose.

Error recording with date, time & frequency.

4-digit 7-segment display for service & maintenance.



# Faiveley Based WSP System

It is separated into various components such as:

## GE (Speed recording):

Energy supplier for the speed sensors.

Analogue output of reference speed.

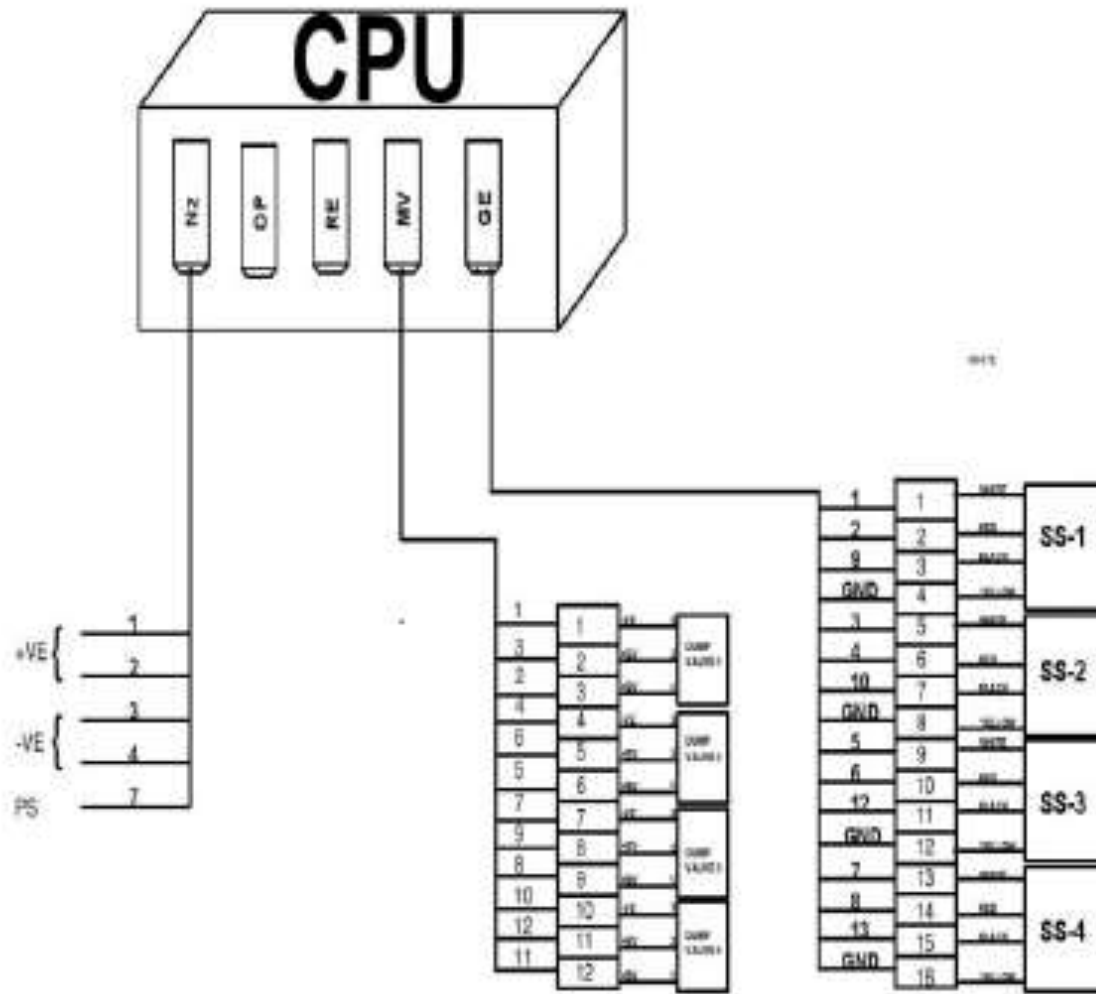
The GE module acquires the speed sensor data.

The sensors are supplied & tested continuously by this module.





# Faiveley Based WSP System



# STATIC TESTING AND FAULT CODES



- CPU board has 5 Push button
- Push Button 1 to read the Diagnostic fault code
- Push Button 2 for test purposes.
- Push button 3 to clear the history of fault code.
- Push button 4 to check all the door control
- Push button 4 to check total km run.

# Faiveley Based WSP System

## Testing Procedure:

### Step 1: Test

Push button 2 (Test) to be pressed for at least 3sec. The indication “89” appears and following functions take place:

- All the brake cylinders of axles 1 - 4 are vented in succession.
- The correct alignment of dump valve and speed sensor of all the axles starting.

# Faiveley Based WSP System

## Testing Procedure:

### Step 2: Diagnostic of Faults

- As push button 1 is pushed & the code displayed is different to 99 (ie. 95 or 72 or 73).
- Push button 1 to be pressed at least 3sec, the faults can be displayed.

The following functions also take place:

- • Indication “88” for 3 sec (7-segment LED test)
- • Indication of all faults in a sequence of 3 sec.

# Faiveley Based WSP System

## Testing Procedure:

### **Step 3: Clearing of failure memory**

By pressing the push button 3 for minimum 3 sec.

The following function takes place:

- • Indication of “cLr”
- • Clearing of all historical faults.

### **Step 4: Door Test** (*Not in use*)

### **Step 5: X/ Kilometer counter**

By pressing the push button for minimum 3 sec, the distance will be shown on the display.

# Faiveley Based WSP System

## Testing Procedure:

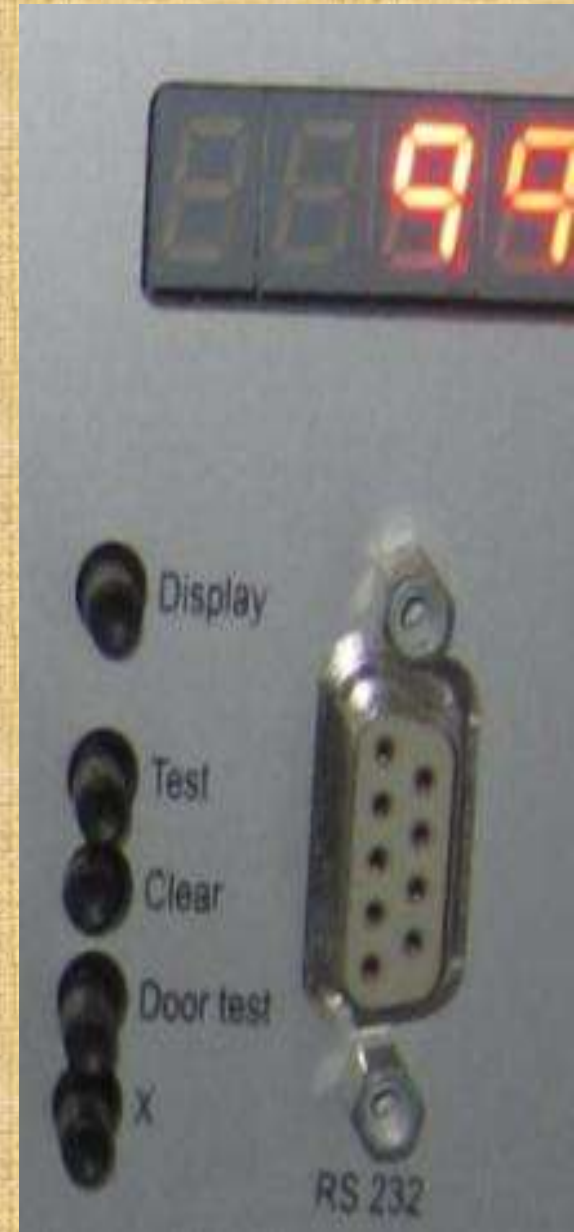
**Step 1: Test**

**Step 2: Diagnostic of Faults**

**Step 3: Clearing of failure  
memory**

**Step 4: Door Test**

**Step 5: X/ Kilometer counter**



# Faiveley Based WSP System

## Defects & Trouble Shooting (Faiveley):

Code in Display	Failure code	Failure cause	Corrective action
72/73	10	Hardware watchdog of solenoid valve of axle 1 is triggered.	Acknowledge the failure, continue the operation.
72/73	11	Short circuit or interruption of speed sensor of axle 1	Check the wires for short circuit or interruption
72/73	13	Short circuit of solenoid valve of axle1	Wires or solenoid of the dump valve should be checked for short circuits, acknowledge the failure.
72/73	14	Interruption of solenoid valve of axle 1	Wires or solenoid of the dump valve should be checked for interruption, acknowledge the failure.
72/73	20	Hardware watchdog of solenoid valve of axle 2 is triggered.	Acknowledge the failure, continue the operation.
72/73	21	Short circuit or interruption of speed sensor of axle 2	Check the wires for short circuit or interruption
72/73	23	Short circuit of solenoid valve of axle2	Wires or solenoid of the dump valve should be checked for short circuits, acknowledge the failure.
72/73	24	Interruption of solenoid valve of axle 2	Wires or solenoid of the dump valve should be checked for interruption, acknowledge the failure.
72/73	30	Hardware watchdog of solenoid valve of axle 3 is triggered.	Acknowledge the failure, continue the operation.

# Faiveley Based WSP System

## Defects & Trouble Shooting (Faiveley):

Code in Display	Failure code	Failure cause	Corrective action
72/73	31	Short circuit or interruption of speed sensor of axle 3	Check the wires for short circuit or interruption
72/73	33	Short circuit of solenoid valve of axle 3	Wires or solenoid of the dump valve should be checked for short circuits, acknowledge the failure.
72/73	34	Interruption of solenoid valve of axle 3	Wires or solenoid of the dump valve should be checked for interruption, acknowledge the failure.
72/73	40	Hardware watchdog of solenoid valve of axle 4 is triggered.	Acknowledge the failure, continue the operation.
72/73	41	Short circuit or interruption of speed sensor of axle 4	Check the wires for short circuit or interruption
72/73	43	Short circuit of solenoid valve of axle 4	Wires or solenoid of the dump valve should be checked for short circuits, acknowledge the failure.
72/73	44	Interruption of solenoid valve of axle 4	Wires or solenoid of the dump valve should be checked for interruption, acknowledge the failure.
95	10	Hardware watchdog of solenoid valve at axle 4 is triggered.	Acknowledge the failure, continue the operation.



# Faiveley Based WSP System

## Defects & Trouble Shooting (Faiveley):

Code in Display	Failure code	Failure cause	Corrective action
95	11	Short circuit or interruption of connection between speed sensor at axle 1 and WSP	1. Check the wires for short circuit or interruption. 2. Replace speed sensor
95	13	Short circuit at solenoid valve of axle 1.	1. Check the wires and valve for short circuit, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.
95	14	Interruption of solenoid valve of axle 1	1. Check the wires and valve for interruptions, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.
95	20	Hardware watchdog of solenoid valve of axle 2 is triggered.	Acknowledge the failure, continue the operation.
95	21	Short circuit or interruption of connection between speed sensor of axle 2 and WSP	1. Check the wires for short circuit or interruption. 2. Replace speed sensor, acknowledge the failure.
95	23	Short circuit at solenoid valve of axle 2.	1. Check the wires and valve for short circuit, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.

# Faiveley Based WSP System

## Defects & Trouble Shooting (Faiveley):

Code in Display	Failure code	Failure cause	Corrective action
95	24	Interruption of solenoid valve of axle 2.	1. Check the wires and valve for interruptions, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.
95	30	Hardware watchdog of solenoid valve of axle 3 is triggered.	Acknowledge the failure, continue the operation.
95	31	Short circuit or interruption of connection between speed sensor of axle 3 and WSP	1. Check the wires for short circuit or interruption. 2. Replace speed sensor, acknowledge the failure.
95	33	Short circuit at solenoid valve of axle 3.	1. Check the wires and valve for short circuit, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.
95	34	Interruption of solenoid valve of axle 3.	1. Check the wires and valve for interruptions, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.

# Faiveley Based WSP System

## Defects & Trouble Shooting (Faiveley):

Code in Display	Failure code	Failure cause	Corrective action
95	40	Hardware watchdog of solenoid valve of axle 4 is triggered.	Acknowledge the failure, continue the operation.
95	41	Short circuit or interruption of connection between speed sensor of axle 4 and WSP	1. Check the wires for short circuit or interruption. 2. Replace speed sensor, acknowledge the failure.
95	43	Short circuit at solenoid valve of axle 4.	1. Check the wires and valve for short circuit, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.
95	44	Interruption of solenoid valve of axle 4	1. Check the wires and valve for interruptions, acknowledge the failure. 2. Replace solenoid valve, acknowledge the failure.

# Knorr Bremse Based WSP System

It is separated into various components such as:

## Power Board

This board supplies the voltage for powering the boards, actuators and speed sensors. For powering the Dump valve a 24 V source is used from MGS2 control unit.

Input Supply voltage –  
24V + 30% DC to 110 + 30% DC.



# Knorr Bremse Based WSP System

It is separated into various components such as:

## **Boards MB04**

Wheel Slide Control

(i.e. acceleration & slip control)

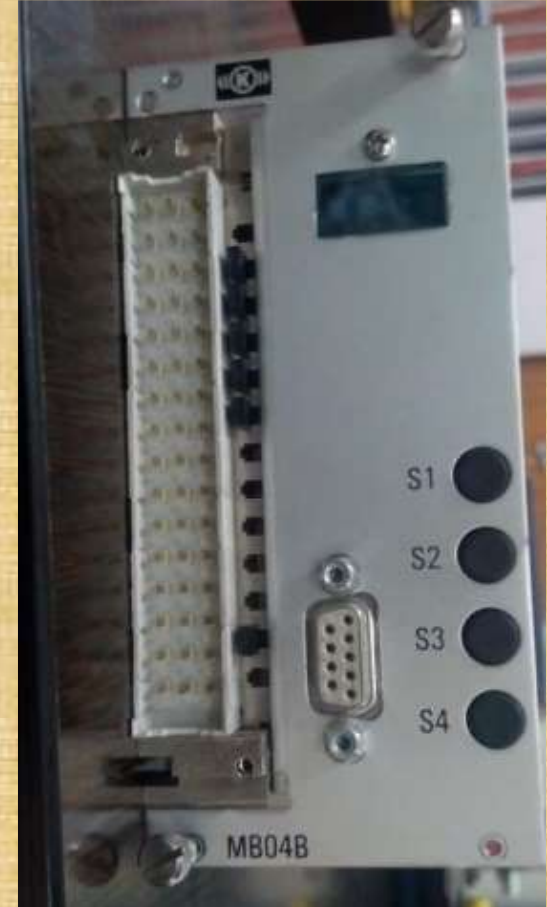
is implemented entirely on board

MB04.

MB04 board has a man-machine interface (MMI) integrated in its front panel.

MB04 supply 24 V DC to all the Dump valve.

Micro controller monitoring & fail safe mode.



# Knorr Bremse Based WSP System

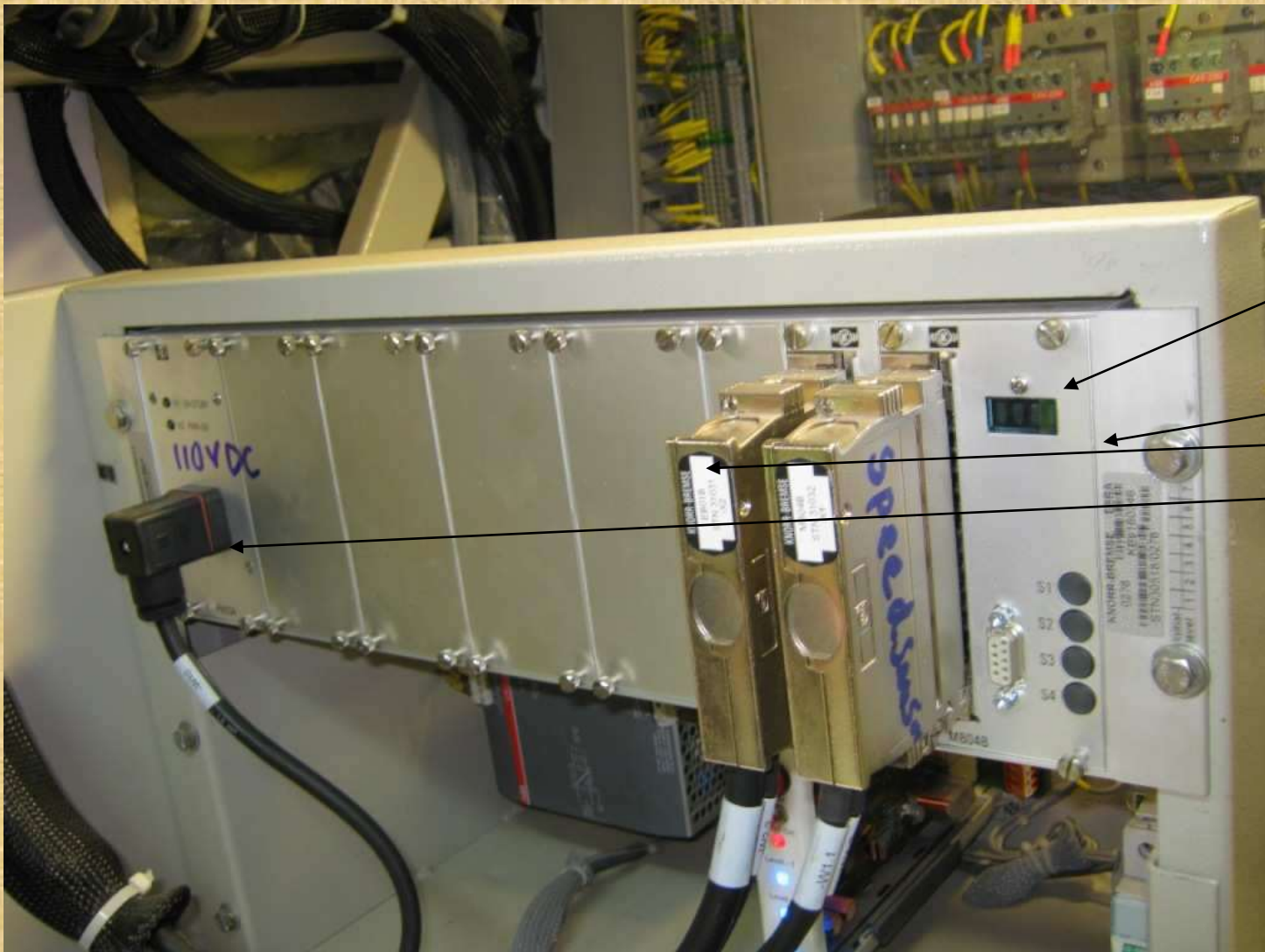
It is separated into various components such as:

## **Board EB01**

It is an extension board in MGS2 control unit.

It provided digital inputs & outputs which are utilized for supplementary functions such as door control, toilet criteria.





**Display**

**MB 04 Card**

**EB 01 Card**

**PB 03 Card**

**S1 Display Button**

**S2 Test Button**

**S3 Clear Button**

# Knorr Bremse Based WSP System

## Testing Procedure:

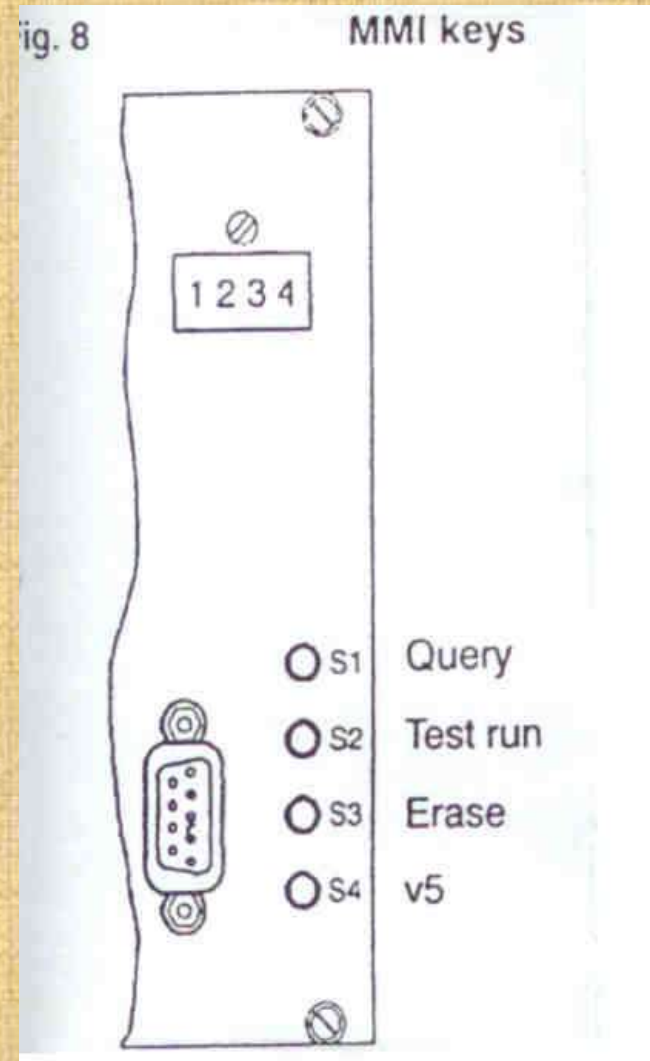
### Step 1:

Press key “S1” to start the query.

To begin with, the display reads “8888”.

All current faults are displayed for three seconds each.

The display subsequently reads “95” & then shows the volatile faults.





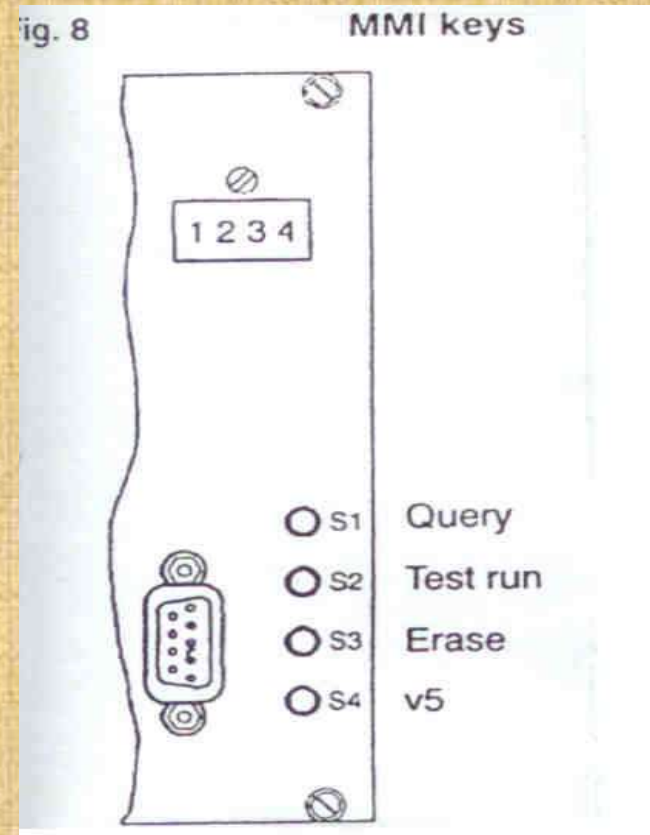
# Knorr Bremse Based WSP System

## Testing Procedure:

### Step 2: “Valve Control” Test Run

By pressing the key “S2” on MMI for about one sec, the valve control test run starts. The display will show “8888” for the first three seconds & then switches to “89”. Faults found and following functions take place:

All the brake cylinders of axles 1 - 4 are vented in succession. The correct alignment of dump valve and speed sensor of all the axles starting.

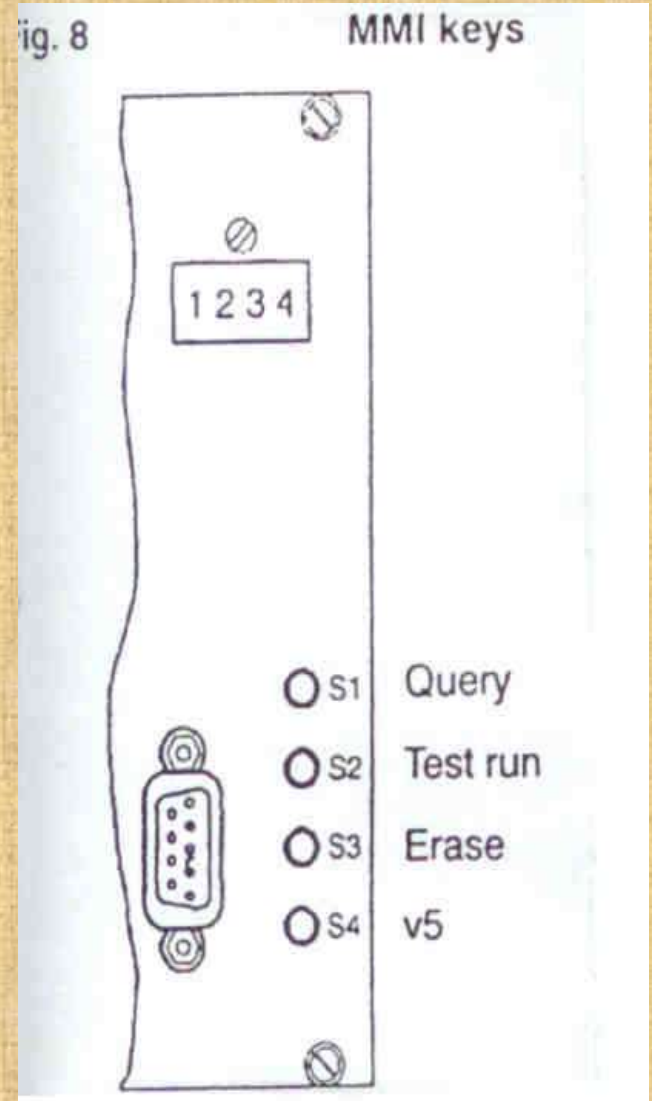


# Knorr Bremse Based WSP System

## Testing Procedure:

### Step 3: Erasing faults from memory

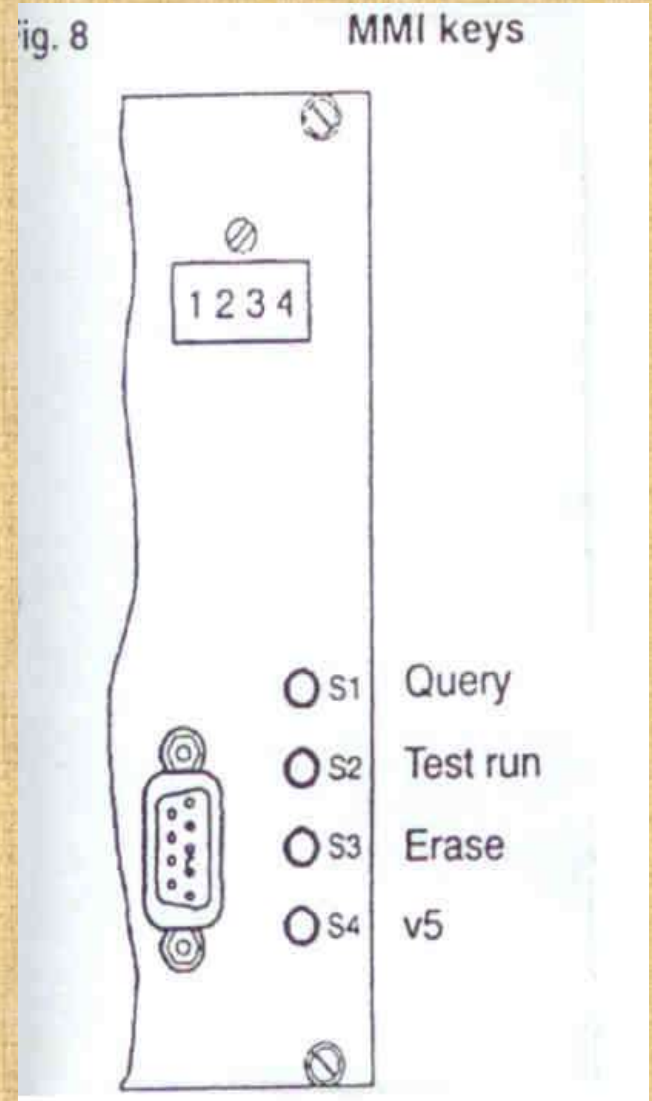
The fault memory is erased when the erase key “S3” is pressed for about one second. Faults will be entered instantly again in the fault memory.



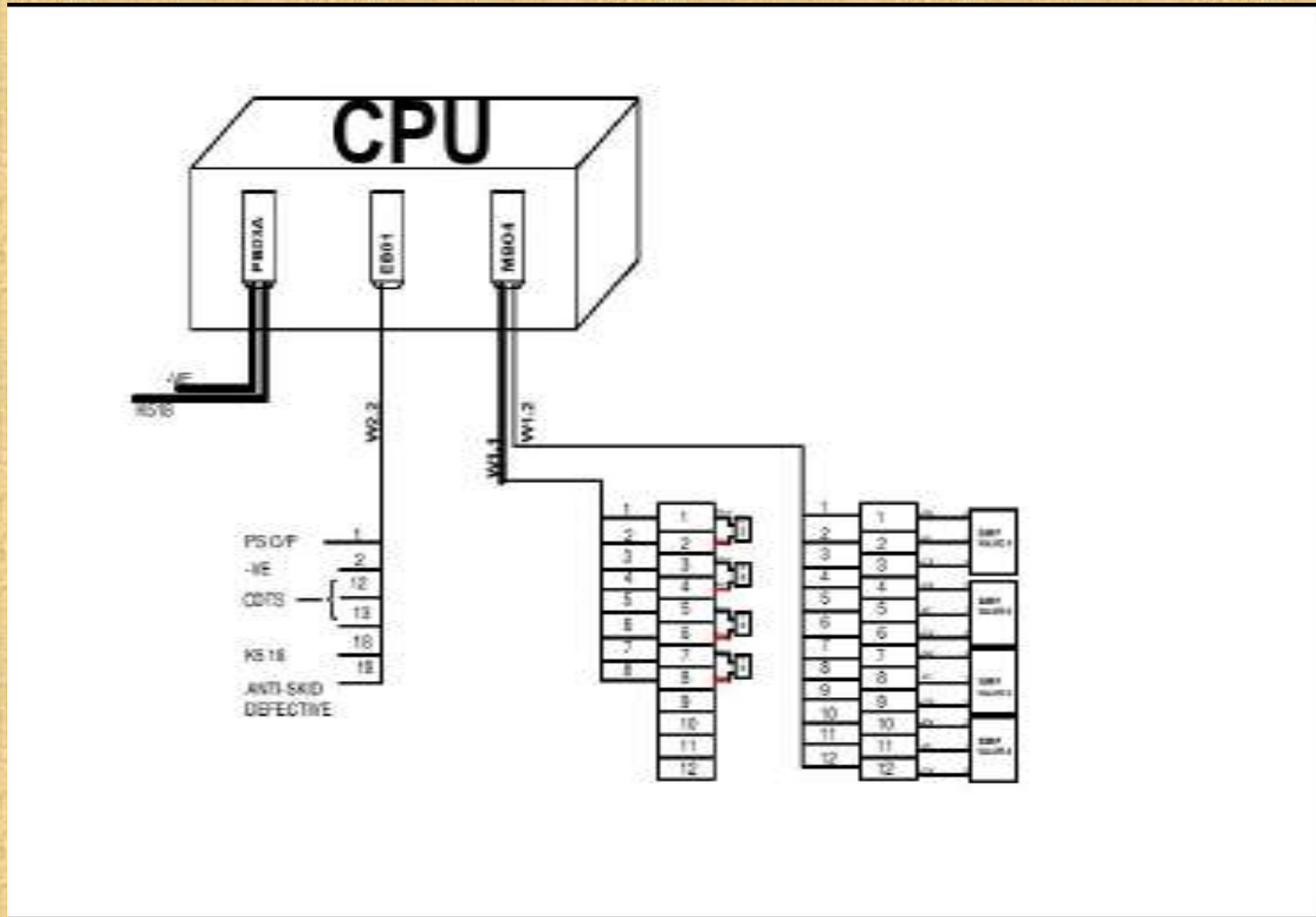
# Knorr Bremse Based WSP System

## Testing Procedure:

**Step 4: “Door control” test run  
(Not in use)**



# Knorr Bremse Based WSP System



**SIMPLIFIED CIRCUIT DIAGRAM OF MAIN COMPONENTS OF KNORR BREMSE**

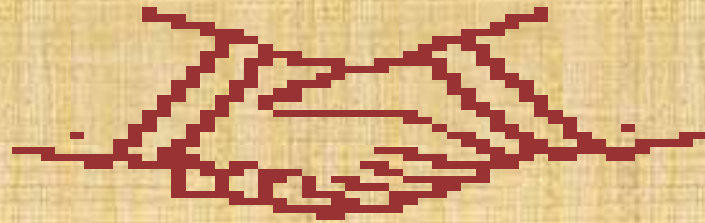
# Knorr Bremse Based WSP System

## Defects & Trouble Shooting:

Display	Fault	Problem Source	Connected with
02	Digital I/Os	Board EB01A	
03	Central processing unit	Board MB04A	
10	Time out	Board MB04A	Wheelset 1
11	Short circuit / open circuit	Speed sensor 1/feeder	
12	Signal error	Speed sensor 1/feeder	
13	Short circuit	Dump Valve 1/feeder	
14	Open circuit	Dump Valve 1/feeder	
15	Safety monitor defective(test run)	Board MB04A	
20	Time out	Board MB04A	Wheelset 2
21	Short circuit / open circuit	Speed sensor 2/feeder	
22	Signal error	Speed sensor 2/feeder	
23	Short circuit	Valve 2/feeder	
24	Open circuit	Valve 2/feeder	
25	Safety monitor defective(test run)	Board MB04A	
30	Time out	Board MB04A	Wheelset 3
31	Short circuit / open circuit	Speed sensor 3/feeder	
32	Signal error	Speed sensor 3/feeder	
33	Short circuit	Valve 3/feeder	
34	Open circuit	Valve 3/feeder	
35	Safety monitor defective(test run)	Board MB04A	

# Knorr Bremse Based WSP System

Display	Fault	Problem Source	Connected with
40	Time out	Board MB04A	Wheelset 4
41	Short circuit / open circuit	Speed sensor 4/feeder	
42	Signal error	Speed sensor 4/feeder	
43	Short circuit	Valve 4/feeder	
44	Open circuit	Valve 4/feeder	
45	Safety monitor defective(test run)	Board MB04A	
70	Speed signal fault, door control	Board EB01A	
71	Speed signal fault, electromag track brake		
72	Fault at one wheelset		
73	Fault at several wheelsets	Board MB04A	
74	Safety monitor fault		
c8	Activation fault, cumulative fault signaling	Board EB01A	
S2	Connector defect board EB01A	Board EB01A	
S3	Connector defect board MB04A	Board MB04A	
8888	Display test		
89	Test running		
95	Volatile faults		
99	System good		



**Thank You**











# WSP Fault Codes diagnosis

- Display – **99** means System OK.
- Display – **95** means System OK, but some previous fault codes has
- logged (Volatile – can be erased by pressing S3 button on MB 04 Card).
- Display – **7201** means fault in one wheel set.
- Display – **7301** means fault in several wheel set.
- Display – **8888** Display Test (Shows in sequence of diagnosis / testing) .
- Display – **89** Testing Mode (Dump Valve self testing in progress).
- Display – **0301** means fault noted / sourced / related to MB 04 Card
- (Shows in sequence of diagnosis).
- Display – **0201** means fault noted / sourced / related to EB 01 Card
- (Shows in sequence of diagnosis)

# WSP Fault Codes diagnosis

- Note down fault code (displayed after 0301/0201 after pressing S1 button).
- Fault code display in four digit. Ignore last two digit (01).  
Eg. If connector of
- dump valve 3 broken or cut during run then display will show 7201. After
- pressing S1 button display will show in following sequence  
:
- 8888-7201-0301-3401-7201. Thus fault code is 34.
- In fault code first digit indicate axle number (1, 2, 3 & 4).  
Second digit indicate
- the fault number. Fault number described follows:
  - 1 – Speed Sensor Open / Short Circuit.
  - 2 – Speed Sensor Signal Error.
  - 3 – Dump Valve Short Circuit.
  - 4 – Dump Valve Open Circuit.
- To understand fault code please refer the table in next

# WSP Fault Codes diagnosis

	Axle 1	Axle 2	Axle 3	Axle 4
Speed Sensor Open / Short Circuit	11	21	31	41
Speed Sensor Signal Error	12	22	32	42
Dump Valve Short Circuit	13	23	33	43
Dump Valve Open Circuit	14	24	34	44

# WSP Fault Codes diagnosis

Display	Fault	Source	Connected with:
02	Digital I/Os	Board EB01A	
03	Central processing unit	Board MB04A	
10	Time-out	Board MB04A	Wheelset 1
11	Short-circuit/open circuit	Speed sensor 1/feeder	
12	Signal error	Speed sensor 1	
13	Short-circuit	Valve 1/feeder	
14	Open circuit	Valve 1/feeder	
15	Safety monitor defective (test run)	Board MB04A	
20	Time-out	Board MB04A	Wheelset 2
21	Short-circuit/open circuit	Speed sensor 2/feeder	
22	Signal error	Speed sensor 2	
23	Short-circuit	Valve 2/feeder	
24	Open circuit	Valve 2/feeder	
25	Safety monitor defective (test run)	Board MB04A	
30	Time-out	Board MB04A	Wheelset 3
31	Short-circuit/open circuit	Speed sensor 3/feeder	
32	Signal error	Speed sensor 3	
33	Short-circuit	Valve 3/feeder	
34	Open circuit	Valve 3/feeder	
35	Safety monitor defective (test run)	Board MB04A	
40	Time-out	Board MB04A	Wheelset 4
41	Short-circuit/open circuit	Speed sensor 4/feeder	
42	Signal error	Speed sensor 4	
43	Short-circuit	Valve 4/feeder	
44	Open circuit	Valve 4/feeder	
45	Safety monitor defective (test run)	Board MB04A	
70	Speed signal fault, door control		
71	Speed signal fault, electromag. track brake	Board EB01A	
72	Fault at one wheelset		
73	Fault at several wheelsets		
74	Safety monitor fault	Board MB04A	
c8	Activation fault, cumulative fault signalling	Board EB01A	
S2	Connector defect, board EB01A	Board EB01A	
S3	Connector defect, board MB04A	Board MB04A	
8888	Display test		
89	Test running		
95	Volatile faults		
99	System good		

# **WSP CHECKING PROCEDURE AT SHED / YARD**

- **Check WSP display (in MB04 Card at WSP rake placed in power panel of coach) before**
- **start of maintenance.**
- **WSP display ‘99’ means system is healthy. Other testing need to be followed (Dump Valve**
- **Self Test by pressing ‘S2’ switch), if required.**
- **WSP display ‘95’ means present status is healthy but system has logged previous fault and system is serviceable. To check the previous fault please follow following steps :**
- **Press ‘S1’ switch display for less than 3 Sec. Display will show in following sequence :**
- **8888-95-7201(/7301)-0301-A1F101-A2F201-.....-95. Note down the failure code coach wise and date wise. Take corrective measure in respective areas.**
- **Proceed with other testing (Dump Valve Self Test by pressing ‘S2’ switch).**
- **DON’T press ‘S3’ switch (to clear volatile fault memory) and let the coach run with 95 code.**
- **But ensure that the required repairs is done for the fault which is showing / logged.**
- **Follow the same procedure in next maintenance or testing. Record & check**

# **WSP CHECKING PROCEDURE AT SHED / YARD**

- **WSP display '7201' or '7301' means there are some current fault logged in system. To check faults follow these steps:**
- **Press 'S1' switch for less than 3 sec. The display will show in following sequence :**
- **8888-7201 (/7301)-0301- A1F101-A2F201-.....-7201 (/7301). Note down the failure code coach wise and date wise in log book. Rectify according to fault code (A1F1 , A2F2 etc.).**
- **For fault code please refer Knorr-Bremse WSP / ESRA manual.**
- **Check the display whether 95 or 7201 (/7301). If 95 then proceed with further testing. If fault still exists then rectify accordingly.**
- **DON'T press 'S3' switch (to clear volatile fault memory) and let the coach run with 95 code. But ensure that the required repairs is done for the fault which is showing.**
- **Follow the same procedure in next maintenance or testing. Record and check if any new fault is showing / logged.**
- **Note : If 'S1' switch pressed for more than 3 sec then fault code will be displayed one by one by pressing S1 each time.**



## **Card Failures & precautions**

- **Card failures mostly take place because of the following :**
- **1) High surges in the electric power supply especially because of welding & other equipments which draw very high current. Ensure electric supply to control unit is off while using such equipments.**
- **2) Disconnecting cards when power is ON & display is “LIVE”. Ensure fuse 63 & 65 are removed so that no power supply goes to control unit before removing, loosening or replacing any of the cards in the board.**
- **3) In case download is being taken by using an additional SB03A ( part no.STN28328) service board / can connector, ensure power is off or fuse is removed before fitting or removing the Can card.**
- **4) Short circuit in the control panel or connecting wrong wires during repair of any other equipment in the control panel which has relevance to control unit provided by Knorr Bremse. Railway electricians to take precautions.**
- **5) Loose connections resulting into sparkings & short circuit of card. Railway electricians to ensure proper connections.**

## **Speed Sensor failures & precautions**

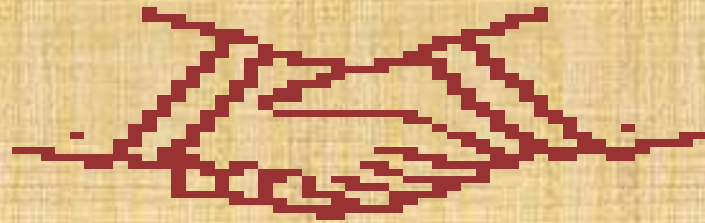
- **In general the speed sensor Gap should be checked every quarter or whenever the fault 12, 22, 32, 42 is showing in the WSP display. It can be corrected by addition or removal of shims.**
- **The gap has to be maintained between 0.9 mm to 1.4 mm.**
- **In case of damage of the speed sensor, it needs to be replaced. It is not recommended to repair the damaged sensor. Kindly use only Knorr make speed sensor. Other make of speed sensors may not provide proper input for correct functioning of our WSP.**
- **In case of open or short circuit of the speed sensor fault 11,21,31,41 will show in the display. Kindly check the wirings & repair the same. If not repairable then replace the sensor.**

## **Phonic wheel failures & precautions**

- **1) Inadequate tightening torque observed. ( As per Alstom manual, Tighten to 21 NM )**
- **2) Improper Quality of Screws & washers. (As per RDSO instructions to all Zonal Railways , M8 size screw to IS 1367 Pt.III Class 10.9 along with spring washer to the IS 3063 type-B should be used for securing phonic wheel.**
- **LOCTITE 243 or equivalent glue should be used to ensure rigid connection between internal and external thread. )**
- **3) Wheel speed sensor Gap not maintained (Kindly maintain the gap of 0.9 mm to 1.4 mm. Less gap can result in touching of wheel sensor with phonic wheel & more gap can result into incorrect signal from sensor to Control unit )**
- **4) Use of improper tools for tightening / removal.**

# **Anti skid valve & connector failures & precautions**

- **1) Wires of Anti skid valve open / short circuited mostly due to hits / loose connections. Examiner to ensure that wires are not loose /open / short circuited & accordingly repair / replace.**
- **2) Damage to dump valves due to ballast hits resulting into damage to pins, dump valves, connectors. Visual checking needs to be done. Replacement of damaged parts is necessary.**
- **3) Improper fitment / tightening of connector on dump valve resulting in damage to pins & threading. Railways to correctly fit the connector during fitment / installation.**
- **4) Wires from speed sensor junction box to control panel & from control panel junction box to Anti skid valve get damaged due to ballast. These need to be checked & monitored regularly**



**Thank You**

