


## STM-DK Subrack

### Maintenance manual

	Verified		Adress Banedanmark Carsten Niebuhrs Gade 43 1577 København V DANMARK	Designer Siemens Mobility A/S Borupvang 9 2750 Ballerup
	Replaces			
	Approved by Banedanmark			
	1. Issue Dette and Initials	Latest issue Date and Initials	Drawing name <b>STM-DK Subrack</b> Maintenance Manual	
Prepared by	23-01-2012 ALM	02-02-2022 FAL		
Checked by	23-01-2012 STN	02-02-2022 PPS		
Approved by	23-01-2012 STN	02-02-2022 PBO		
© Copyright Banedanmark	Language EN	Issue <b>1.04 02.02.2022</b>	Drawing no <b>VN 655.00 Q2961</b>	Page/of pages 1 (29)

## Change Log

Issue / date Design	Concerned Pages	Description	References
1.00 / 23.01.2012	All	First final edition	
1.01/ 18.10.2013	All	Updated after installation in MR train	
1.02/ 02.12.2014	All	Updated after DK-STM upgrade to baseline 3.0	
1.03/22.02.2015	Page 17	Antenna height changed	
1.04/02.02.2022	All	Minor changes and update for CPU card VE6. (English version of document)	

## Contents

<b>CHANGE LOG .....</b>	<b>2</b>
<b>1 INTRODUCTION .....</b>	<b>5</b>
1.1 OVERALL STM-DK SUBRACK LAYOUT.....	5
1.2 INTERFACES.....	7
1.3 VALIDITY .....	8
1.4 REFERENCES.....	8
<b>2 MAINTENANCE .....</b>	<b>9</b>
2.1 REQUIRED TRAINING OF MAINTENANCE PERSONNEL.....	9
2.2 THE TASKS OF THE MAINTENANCE PERSONNEL .....	9
2.3 TOOLS .....	10
2.4 REPAIR .....	11
2.5 REPLACEMENT OF STM-DK SUBRACK .....	11
2.6 START-UP TEST.....	11
2.7 CONNECTION OF EXTERNAL EQUIPMENT .....	11
<b>3 DIAGNOSE VIA LED ON CIRCUIT BOARD.....</b>	<b>12</b>
3.1 SIMIS TCC CPU .....	12
3.1.1 SIMIS TCC VESA, CPU .....	12
3.1.2 SIMIS TCC VE6, CPU.....	13
3.2 SIMIS TCC PROFIS.....	15
3.3 SIMIS TCC TASSE5, TELEGRAM RECEIVE BOARD .....	16
3.4 SIMIS TCC UBEGEN5, GENERATOR KORTET .....	17
3.5 SIMIS TCC SV5, POWER SUPPLY.....	18
<b>4 DIAGNOSIS VIA PC.....</b>	<b>19</b>
4.1 TOOLS FOR DIAGNOSIS .....	19
4.2 CONNECTION FOR DIAGNOSE PC.....	19
4.3 DIAGNOSE .....	20
<b>APPENDIX 1 MAINTENANCE PROTOCOL.....</b>	<b>22</b>
1. CLEANING.....	22
2. INSPECTION OF THE STM-DK SUBRACK .....	22
3. MEASUREMENT OF ANTENNA HEIGHT .....	23
4. TIGHTENING THE ANTENNA PLUG .....	23
5. GROUNDING CONNECTIONS .....	24
6. ANTENNA TUNING.....	25
7. TEST OF BRAKES, TRACTION CUT OFF AND ANTENNA CONNECTIONS.....	27
8. LITRA NO. VERIFICATION: .....	28
<b>APPENDIX 2 OUT OF SERVICE FORM .....</b>	<b>29</b>

## List of tables

Table 1 STM-DK Subrack boards .....	6
Table 2 Application rules.....	6
Table 3 STM-DK Subrack boards component number .....	8
Table 4 References .....	8
Table 5 VE6 LEDs .....	13

## List of figures

Figure 1 Layout of STM-DK Subrack .....	5
Figure 2 Interfaces for the STM-DK Subrack .....	7
Figure 3 LED indications on CPU board, SIMIS TCC VE5A.....	12
Figure 4 CPU board, SIMIS TCC VE6 .....	13
Figure 5 CPU board, SIMIS TCC VE6, LED states .....	14
Figure 6 LED indications on the Communication Board, SIMIS TCC PROFI5.....	15
Figure 7 LED indications on the Telegram receive board SIMIS TCC TASSE5 .....	16
Figure 8 LED indications on the generator board, SIMIS TCC UBEGEN5 .....	17
Figure 9 LED indications on the power supply, SIMIS TCC SV5.....	18

# 1 Introduction

This document is the maintenance manual for the STM-DK Subrack, which is a sub component in an ETCS system.

At least once pr year maintenance shall be performed according to Appendix 1 Maintenance protocol.

Maintenance or repair shall be performed by qualified personnel, who are used to work with maintenance of mobile train control systems in railway vehicles.

## 1.1 Overall STM-DK Subrack layout

The layout of the STM-DK Subrack is seen in Figure 1. See Table 1 for short description of boards.

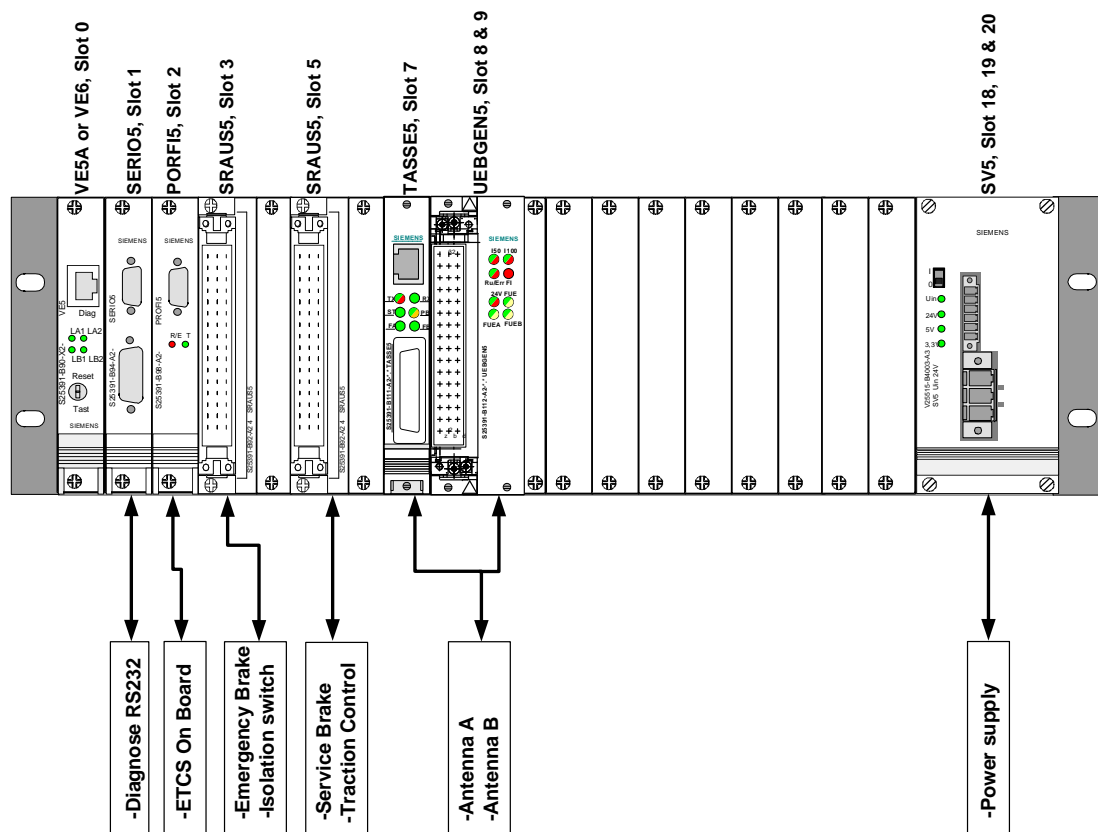


Figure 1 Layout of STM-DK Subrack

STM-DK Subrack boards:

Slot.	Board	Function
0	SIMIS TCC VE5/VE6, CPU	STM-DK Subrack CPU
1	SIMIS TCC SERIO5	Diagnose interface
2	SIMIS TCC PROFI5	Communication with ETCS-Onboard
3	SIMIS TCC SRAUS5	Relay interface for emergency brake
5	SIMIS TCC SRAUS5	Relay interface for service brake and traction cut-off
7	SIMIS TCC TASSE5	Antenna telegram receiver board
8 & 9	SIMIS TCC ÜBGEN5	50 and 100 kHz interface for antennas
18,19 & 20	SIMIS TCC SV5	Power supply

Table 1 STM-DK Subrack boards

Table 2 is an overview of maintenance relevant application rules. It is shown in which section the application rules are handled

See ref. /5/ for application rules.

AppRule	Maintenance manual section
AppRule_12	Section 2
AppRule_37	Section 2.6
AppRule_41	Section 2.7
AppRule_38	Section 2.4
AppRule_43	Section 2 & Appendix 1 Maintenance protocol section 6
AppRule_54	Section 2.7
AppRule_55	Section 2.7
AppRule_56	Section 2.7
AppRule_77	Section 4
AppRule_110	Section 2
AppRule_174	Section 2
AppRule_190	Section 2.4
AppRule_192	Section 2.7
AppRule_194	Section 2.4
AppRule_195	Section 2.5

Table 2 Application rules.

## 1.2 Interfaces

Figure 2 shows the context for the STM-DK Subrack and the connection to the overall train control system.

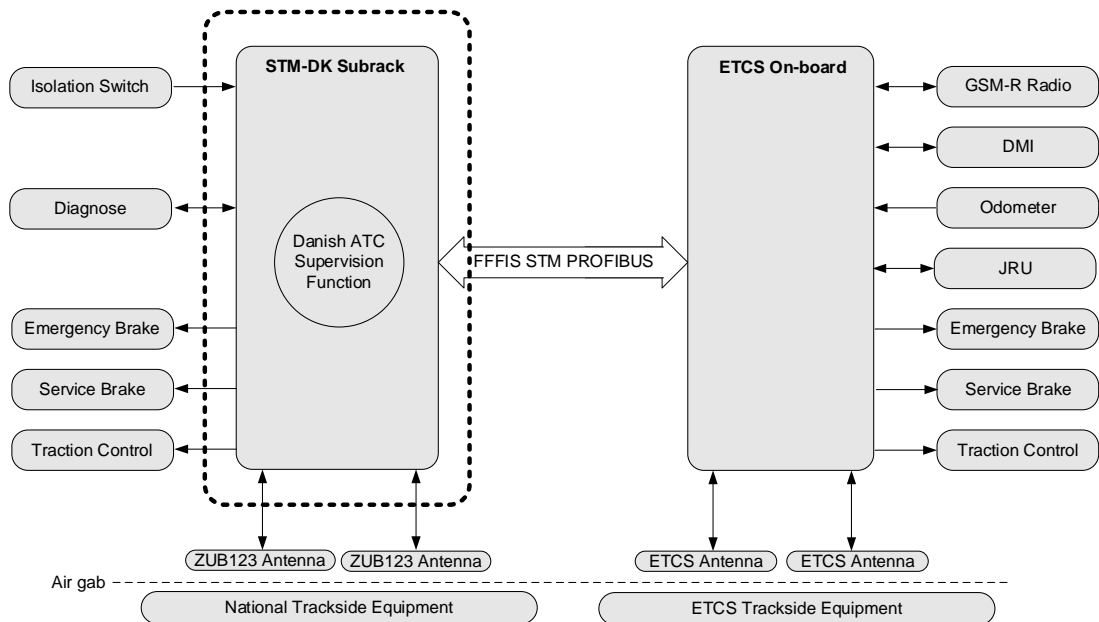


Figure 2 Interfaces for the STM-DK Subrack

The STM-DK Subrack is a part of the overall ETCS Onboard system. The interface to STM-DK Subrack is defined at the front connectors of the different boards.

The STM-DK Subrack provides interfaces for

- Emergency brake
- Service brake
- Traction cut off
- ZUB123 antenna(s)
- ETCS Onboard unit (Profibus)
- Power supply
- Diagnose (only for maintenance)

The STM-DK subrack is connected to the ETCS On-Board via a PROFIBUS connection.

Brake commands and Traction Cut-off commands are sent to the ETCS by the Profibus-connection.

Error data, balise data, train data etc. are sent to the JRU by the Profibus-connection.

The STM-DK is operated by the DMI of the ETCS Onboard system.

The STM-DK gets odometerdata from ETCS

See ref. /1/, /2/ for further information.

See ref. /6/ for use of DMI and failure code descriptions.

### 1.3 Validity

This maintenance manual is valid for the STM-DK Subrack, which consist of the following components:

Slot	Board	Component number
00	SIMIS TCC 19" Rack	S25160-C2001-A1-.*
0	SIMIS TCC VE5A CPU	S25391-B90-X23-.*
	SIMIS TCC VE6, CPU	S25391-B90-X26-.*
1	SIMIS TCC SERIO5	S25391-B94-A2-.*
2	SIMIS TCC PROFI5	S25391-B98-A2-.*
3	SIMIS TCC SRAUS5, 24 V	S25391-B92-A2-.*
	SIMIS TCC SRAUS5, 110 V	S25391-B92-A24-.*
5	SIMIS TCC SRAUS5, 24 V	S25391-B92-A2-.*
	SIMIS TCC SRAUS5, 110 V	S25391-B92-A24-.*
7	SIMIS TCC TASSE5	S25391-B111-A2-.*
8 & 9	SIMIS TCC ÜBGEN5	S25391-B112-A2-.*
18,19 & 20	SIMIS TCC SV5, 24 V	S25515-B4003-A3-.*
	SIMIS TCC SV5, 72 - 110 V	S25515-B4003-A4-.*

Table 3 STM-DK Subrack boards component number

If there are more variants in slot in Table 3 one is used, depending on the supply voltage.

ATC-antenna types:

- Component no. S25441-M1-A3
- Component no. S25441-M1-A4
- Component no. S25441-M2-A3
- Component no. S25441-M2-A4

### 1.4 References

If document version is not part of Table 4 "Document identification" it is the latest valid version that is valid.

Reference	Document title	Dokument identification
/1/	STM-DK Subrack, Installation manual	IN 655.00 Q2962 V 1.11
/2/	DK-STM, System description	KN 655.00 Q2959 V 3.00
/3/	Beschreibung der ATC-Diagnose-Schnittstelle	G81001-E3117-U001-C
/4/	DK-STM, Dokumenteret slutafprøvning	AN 656.00 Q4446 V 1.14
/5/	Application rules	G81001-X3107-L005-10 Baseline 5.0, 2022-01-27
/6/	STM-DK user manual	SN 655.00 Q2960

Table 4 References



## 2 Maintenance

Once per year an inspection of the STM-DK Subrack and connections shall be performed. See Figure 1 and Figure 2 for STM-DK Subrack and STM-DK Subrack connections.

The maintenance personnel shall use ESD wrist wrap when working with the STM-DK Subrack.

Access to the STM-DK Subrack is for maintenance personnel only.

When performing i.e antenna tuning, train parameter setup etc. in the STM-DK maintenance menu in the DMI the litra code shall be noted before and after using the maintenance menu. This shall ensure that the litra code did not change during the maintenance, this is safety critical.

It shall, at any time, be ensured that no HW-interface on the STM-DK Subrack are subject for higher voltages than 60 V, unless the installation allows for this (i.e. for 110 V DC STM-DK Subrack installations). This shall also be ensured for i.e. faulty equipment and connections.

Antenna tuning shall be performed after any replacement, repair and/or adjustment of the antenna installation. This includes antenna, antenna cables/connectors/connection boxes and exchange of the STM-DK Subrack.

See Appendix 1 Maintenance protocol point 6 for further information about antenna tuning.

### **2.1 Required Training of Maintenance Personnel**

The maintenance personnel shall possess the by BDK required technical qualifications and have completed the course "Maintenance of STM-DK" arranged by Siemens or BDK.

### **2.2 The tasks of the Maintenance Personnel**

The maintenance personnel evaluates the actual safety condition of the STM-DK Subrack and perform inspection and troubleshooting on STM-DK Subrack and connections.

The maintenance personnel general tasks are summed up in the following points:

1. Cleaning.
2. Visual inspection of STM-DK Subrack, connections, antennas, connection cables, connection boxes and grounding connections.
3. Measurement and adjustment of antenna heights and tuning of antennas
4. Repair or replacement of STM-DK Subrack, antennas, cables etc.

5. After maintenance, repair or replacement, test according to ref. /4/. shall be performed

## 2.3 Tools

The necessary tools for maintenance of the STM-DK Subrack are:

1. PC with a serial RS232 COM Port
2. DB26-DB9 service cable. (For use of diagnose interface on SERIO5)
  - a. Siemens service cable G-number: G81002-E3134-H500-A.
3. Terminal program (For use of diagnose interface on SERIO5)
4. 46 mm torque wrench, 40 Nm, for antenna plug
5. Ruler
6. Tools (wrenches, torque wrenches, screw drivers etc.) for poss. adjustment of antenna height
7. A test-balise (braking test)

The text below shows a test balise that via a single balise activates a brakw test (BZBPR). The brake test at first activates the service break and a traction cut-off so when the user has deactivated the service brake and the traction cut-off, the emergency brake and traction cut-off are activated after app. 10 seconds.

#5;	Telegram Number
% 0;	Keine Rueckmeldung des Fahrzeugs
000;	GK 8 ( Int.Betr.Kdo. )
01;	AGKS eine GKS
0;	STB7 GKS ohne Schleife
00;	FR Keine Umschaltung
0100;	VRRED Keine reduzierte Geschwindigkeit
0;	ZKORR Keine Wegkorrektur durchfuehren
0 1000 0001;	" Z1/ZU0 Entfernung = 1310
0 0111;	" Durchrutschweg = 95
0;	" Z1 Korrektur
1;	BATC Ueberwachung auf SBE3 einschalten
0;	LZBG Kein LZB-Bereich Anfang
0;	" Kein LZB-Bereich Ende
0;	" Kein Signalstandort
0 1000 0001;	" Zielentfernung = 1310
00 0100;	" LZB-Schleifennummer = 4
01;	LZBEI Kein LZB-Telegrammauswertung
00;	RADPR kein Raddurchmesser Pruefung durchfuehren
01;	Bremskontrolle durchfuehren
0;	LZBPR keine LZB Pruefung
010;	UEBUM Keine Umschaltung der s
00;	TA kein TA-Relais ansteuern
00;	ANGKS Anmelde GKS
0000;	SCHLNO Schelife-nummer
000000;	Reserve

## **2.4 Repair**

Replacement and/or repair of the printed circuit boards in the STM-DK Subrack shall be performed by a Siemens authorised repair shop.

The STM-DK Subrack shall not be powered during replacement of STM-DK Subrack or by replacement/repair of components/cables which are connected to the STM-DK Subrack.

## **2.5 Replacement of STM-DK Subrack**

The new installed STM-DK Subrack shall be configured and the antennas shall be tuned. A description of how to configure the STM-DK Subrack can be found in the installation manual ref. /1/.

Please note that the storage life of the STM-DK Subrack (SV5) is limited to 10 years.

## **2.6 Start-Up Test**

After STM-DK Subrack installation, replacement or maintenance the STM-DK Subrack shall be restarted and it shall be verified that the STM-DK Subrack starts up correctly. After start-up the STM-DK shall be tested according to ref. /4/.

## **2.7 Connection of external equipment**

A Diagnosis-PC shall not be connected to the STM-DK Subrack, when the STM-DK Subrack is responsible for the safety. It can be used for troubleshooting and test.

Connection of Diagnosis-PC to VE6, VE5A or TASSE5 are reserved for authorized Siemens personnel.

(See AppRule\_54 and AppRule\_55 for using UNILINK-interface on VE6/VE5A. See AppRule\_56 for using TASSE5 diagnose. See AppRule\_192 for using Uport interface on VE6)

## 3 Diagnose via LED on circuit board

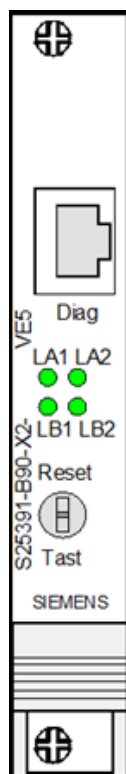
Troubleshooting of STM-DK Subrack is done via LEDs on the front of the circuit boards. The following describes what can be done to identify errors.

### 3.1 SIMIS TCC CPU

There are 2 variants of the SIMIS TCC CPU. Version VE5A and VE6. See section 3.1.1 and 3.1.2 for details.

#### 3.1.1 SIMIS TCC VE5A, CPU

Figure 3 shows the VE5A CPU board with the LEDs and their meaning.



The LEDs LA2 and LB1 indicates supervision of the internal voltage supply and safety disconnect.

**(1) Red:** Restart or internal voltage error

**Yellow:** Supply voltage OK and safety disconnect due to internal error.

**Green:** Supply voltage ok and running.

The LEDs LA1 and LB2 indicates status for synchronisation between the channels.

**(2) LEDs off:** Computer start-up

**Green:** The two CPU-channels are synchronised

**Red:** The two CPU-channels are not synchronised

LED blinks in normal operation when internal test is performed.

Figure 3 LED indications on CPU board, SIMIS TCC VE5A

(1) In case that LED LA2 and LB1 are yellow or red after a restart, restart the STM-DK Subrack again. If restart does not help, replace STM-DK Subrack. If LED LA2 and LB1 are red, the internal supply voltages can be checked on the SV5's LED.

(2) In case the two CPU-channels are not synchronised, restart the STM-DK Subrack. If restart does not help, replace the STM-DK Subrack.

### 3.1.2 SIMIS TCC VE6, CPU

Figure 4 shows the CPU, the V6 board. Table 5 shows the meaning of the LEDs. Figure 5 shows the LED states.

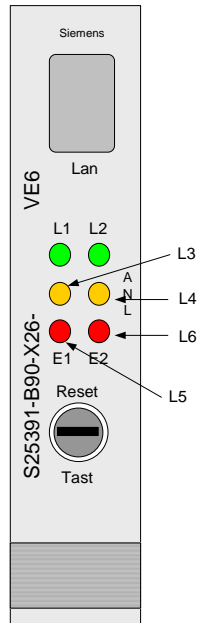


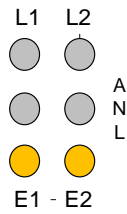
Figure 4 CPU board, SIMIS TCC VE6

LED	State	Meanin
L1	Green	Programmable via channel a ( <b>L1</b> )
L2	Green	Programmable via channel a *) ( <b>L1</b> )
L3	Green / Red	State for disconnection signals for channel A (RKFSa);
L4	Green / Red	State for disconnection signals for channel B (RKFSb);
L5	Yellow / Green / Red	Startup surveillance / Error channel A (Error LED)
L6	Yellow / Green / Red	Startup surveillance / Error channel B (Error LED)

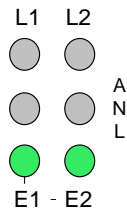
Table 5 VE6 LEDs

LED L1 and L2 can also be flashing red. This may be the case if the switch is in "TAST" position for more than 7 seconds.

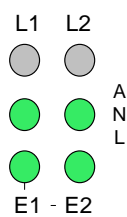
\*) This LED is not controlled by channel B.



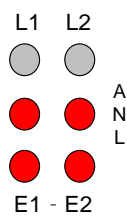
State at upstart or reset



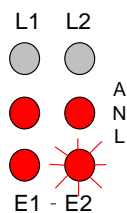
State at synchronization of channel A and B



State when channel A and B are synchronized



State at error



State at error  
E1 and E2 can also be flashing

Figure 5 CPU board, SIMIS TCC VE6, LED states

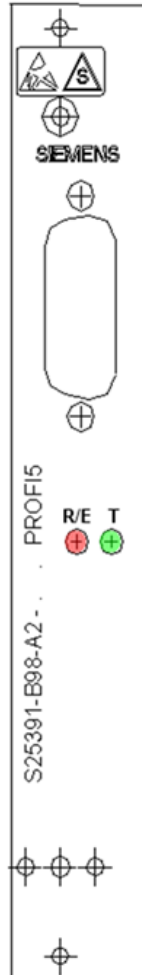
E1 or E2 error flashing pattern:

Supply failure: \_\_\_\_\_  
Watchdog-failure: \_\_\_\_\_

In case of error or channel A and B cannot be synchronized, the STM-DK Subrack shall be restarted. If restart does not correct the error, then the STM-DK Subrack shall be replaced.

### 3.2 SIMIS TCC PROFI5

Figure 6 shows the communication board, PROFI5 with LED indications and their meaning.



LED Red "R/E"	LED Green "T"	Operating condition
(1) On	Off	- Restart or internal voltage error - Configuration error - System error
Off	(2) On	- Normal state (Token)
Off	(2) Off	- Normal state (No Token)

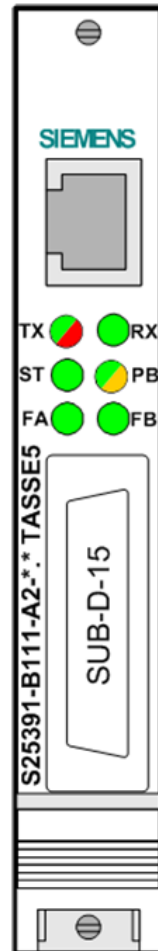
Figure 6 LED indications on the Communication Board, SIMIS TCC PROFI5

(1) Attempt to restart the STM-DK Subrack. If a restart does not help, replace the STM-DK Subrack. If R/E lights red, the internal supply voltages can be checked on SV5's LED.

(2) Token is a condition in relation to profibus-transmission (permission to send).

### 3.3 SIMIS TCC TASSE5, Telegram receive board

Figure 7 shows the telegram board, TASSE5 with the LED indications and their meaning.



Description	Indications description	LED
TX (1)	Error in send-state Send-state OK	Red Green
RX (2)	Telegramreceivel	Green
ST	Telegram START received	Green
PB (3)	Internal test-state External test-state	Green Orange
FA	Antenna A active	Green
FB	Antenna B active	Green

Figure 7 LED indications on the Telegram receive board SIMIS TCC TASSE5

- (1) For the transmission circuit TX an error in the Transmission condition will cause that the diode lights red. This means that the STM-DK Subrack must be replaced.
- (2) The RX diode lights green during telegram reception.
- (3) For the self-test circuit PB, the LED will light green during the internal test conditions and light orange during the external test condition. The LED only shows that a test is ongoing, but does not indicate anything about errors on the board.





### 3.5 SIMIS TCC SV5, power supply

Figure 9 shows the power supply board SV5 with the LED indications and their meaning. It is the 24 V DC variant that is shown on Figure 9 there is also a 72 – 110 V DC variant.

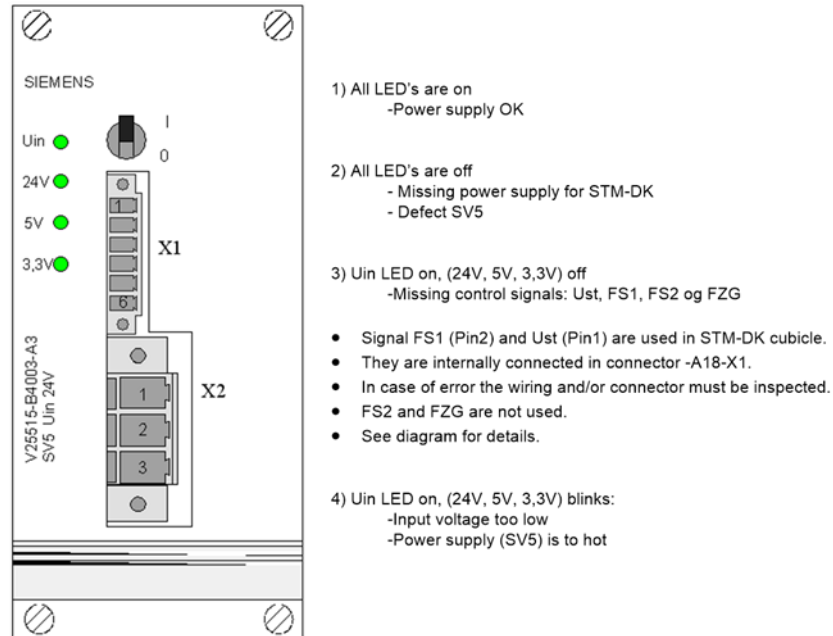


Figure 9 LED indications on the power supply, SIMIS TCC SV5

2) A defect SV5 can be due to a previous overvoltage on the input

## 4 Diagnosis via PC

In case of an error it is possible to perform troubleshooting via the diagnosis connection on the SERIO5 board on the STM-DK Subrack.

The STM-DK Subrack shall be turned off when connecting the diagnose PC to the SERIO5-board.

The RS232 diagnose connection on the SERIO-board shall only be used for troubleshooting and shall not be used when the STM-DK Subrack is responsible for the safety.

Note: If the diagnosis interface is used when the STM-DK Subrack is responsible for the safety, the national authorities shall give their acceptance and the exact conditions shall be agreed upon.

When using the diagnosis connection the diagnose-PC shall be isolated from the train battery in accordance with EN 50124-1 – basic isolation.

Hint: Fulfilled by a laptop PS.

The relevant information in the terminal program may be information about antenna tuning or received balisedata. The terminal program is only for troubleshooting purposes. For STM-DK Subrack in normal use, information from the DMI and the JRU (EVC) is enough.

The standard EIA RS232 shall be complied to for connection to the RS232 serial interface of the SERIO-board.

How to perform diagnosis can be found in ref. /3/ and see ref. /1/ section 7 and 13 for further information.

### 4.1 Tools for diagnosis

To perform troubleshooting via diagnosis the following equipment and software is needed.

1. Laptop with serial COM Port
2. DB26 pin high density SUB D - DB9 service cable
3. Terminal program

### 4.2 Connection for Diagnose PC

The terminal program shall use following parameters to communicate with the diagnosis interface of the SERIO5.

1200 Baud  
8 Databit  
Odd parity  
1 Stopbit

### 4.3 Diagnose

The diagnose for the STM-DK Subrack is identical to the diagnose of the ZUB123/LZB-DSB diagnose.

The following is an example of data from the diagnosis interface.

- 1) 1.87074<0xff01> ZUB123/LZB-DSB Ausgabestand:137
- 2) 1.87074<0xff01> ZUB123 STM Version 1.39
- 3) 1.87074<0xff01> Copyright (c) SIEMENS AG Mobility
- 4) 1.87074<0xff01> Loktyp links: 2 MZ III
- 5) 1.87074<0xff01> Loktyp rechts: 0
- 6) 1.87074<0xff01> Raddurchmesser: 0611 mm
- 7) 1.87074<0xff01> Ausgabe an Funk /EIN
- 8) 1.87074<0xff01> Ausgabe an TC /EIN
- 9) 1.87074<0xff01> Ausgabe an Havarilog /EIN
- 10) 1.87074<0xff01> NeueFehlAnz (RestwegZ1)/AUS
- 11) 1.87074<0xff01> Z1-Ueberwachung /EIN
- 12) 1.87074<0xff01> V\_Ist\_UnkorrigiertamFST/EIN
- 13) 1.87074<0xff01> SchlupfKorrektur /AUS
- 14) 1.87075<0xff01> FstAVorwaertsRichtung1 /EIN
- 15) 1.87075<0xff01> DSB-Fernbahn

Only 4, 5, 7 and 9 is relevant for the STM-DK Subrack. The other parameters are internal.

Meaning of data:

- |  |                               |
|--|-------------------------------|
| 1) ZUB123/LZB-DSB SW-version               | (actual)                      |
| 2) ZUB123 STM SW-Version                   | (actual)                      |
| 3) Copyright                               | (text)                        |
| 4) Configured litra type, 1st digit + name | (Configuration)               |
| 5) Configured litra type, 2nd digit        | (Configuration)               |
| 6) Wheel diameter                          | 611mm (Not selectable)        |
| 7) MSR3 radio (enabled/disabled)           | enabled (Configuration)       |
| 8) TC togcomputer                          | enabled (Fixed configuration) |
| 9) Havarilog (enabled/disabled)            | enabled (Configuration)       |
| 10) Simplified error                       | OFF (Fixed configuration)     |
| 11) Z1-surveillance                        | ON (Fixed configuration)      |
| 12) Speed, wheel spin correction           | OFF (Fixed configuration)     |
| 13) spin correction                        | OFF (Fixed configuration)     |
| 14) Direction forward                      | ON (Fixed configuration)      |
| 15) DSB-Fjernbane (Costumor name)          | (text)                        |

4) and 5): Text "2 MZ III" respectively "0" means litra type "20" = MZ III.

The diagnosis menu can be entered by typing:

LOGIN<space><Return>

The following will be shown in the terminal program:

01) FIFO Informationen. . . .[YN]	02) Dekodierte Streckentel. .[YN]
03) LA Informationen. . . .[YN]	04) GKS Informationen. . . .[YN]
05) BetriebsZustandsWechsel .[YN]	06) BetriebsZustandsDaten . .[YN]
07) Richtungsbearbeitung. . .[YN]	08) ZugdatenAnzeige . . . .[YN]
09) ZugdatenTask Messages . .[YN]	10) FST-Anzeigen bei Wechsel.[YN]
11) FST-Anzeigen zyklisch . .[YN]	12) Bremsverursacher Info . .[YN]
13) V_BB, V_ZB, Restweg . . .[YN]	14) ZKS-Anschaltung . . . .[YN]
15) WISIR Informationen . . .[YN]	16) GleitSchleuderProtkl. .[KMYN]
17) Interruptinformationen. .[YN]	18) FahrzeugTelegrammProtkl .[YN]

The meaning of the different menu points are described in ref. /3/.

The wanted diagnosis information is selected and then the diagnosis for this selection is shown on the screen.

# Appendix 1 Maintenance protocol

Litra Type. \_\_\_\_\_

Train. no. \_\_\_\_\_

STM-DK Subrack serial nr. \_\_\_\_\_

In connection with maintenance of the STM-DK Subrack the following points must be followed

## 1. Cleaning

There must not be voltage on the STM-DK Subrack, when cleaning is carried out.

Inspect the STM-DK Subrack and elements for dust and contamination. In case of dust and contamination, dust and contamination shall be removed.

Antennas and connectors are cleaned if needed.

Date	Technician's Initials:	Notes

## 2. Inspection of the STM-DK subrack

1: Check the STM-DK Subrack for damages.

2: Check the wire and cable connections:

Are there any damages on wires and cables?

Have cables and wires been correctly fastened and mounted?

Date	Technician's Initials:	Notes

### 3. Measurement of antenna height

Measure the vertical distance between the antenna's underside and the track's SO level.

Antenna type: S25441-M1-A3 and S25441-M1-A4

Allowed Distance During Check		130-180 mm	
Date	Technician's Initials:	Comments and measured Distance (after poss. Adjustment) in mm	
		Antenna A	
		Antenna B	

Antenna type: S25441-M2-A3 and S25441-M2-A4 (Low profile antenna)

Allowed Distance During Check		108-177 mm	
Date	Technician's Initials:	Comments and measured Distance (after poss. Adjustment) in mm	
		Antenna A	
		Antenna B	

### 4. Tightening the antenna Plug

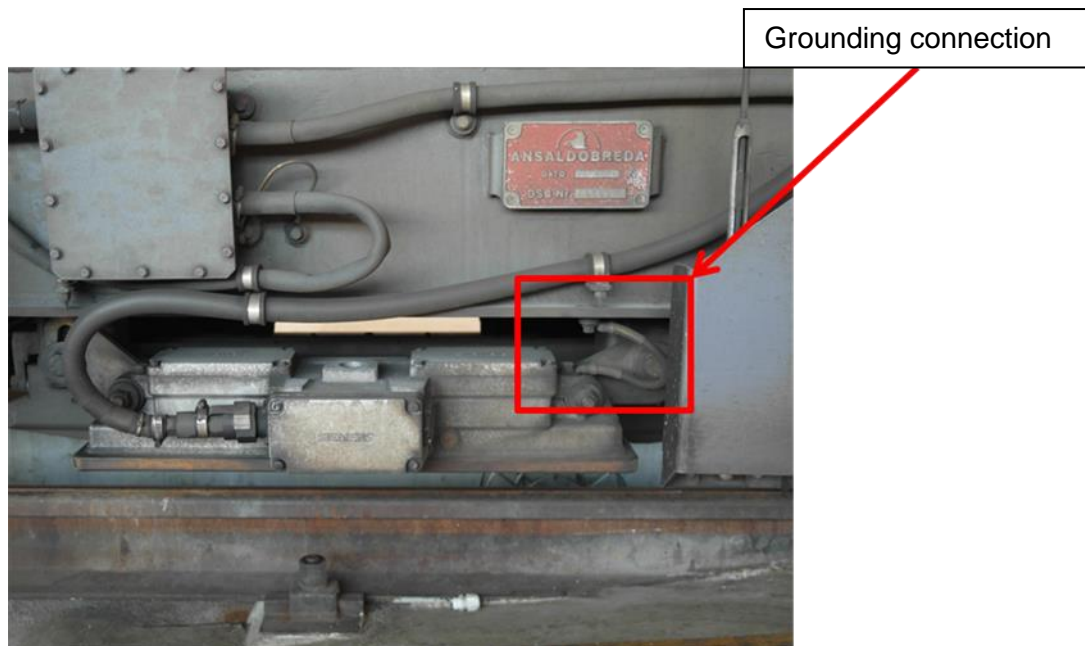
Tighten the antenna plug with torque wrench with 40 Nm.

Date	Technician's Initials:	Comments
		Antenna A
		Antenna B

## 5. Grounding connections

Following grounding connections are checked:

1. Cable shielding for connections to STM-DK Subrack.
2. Grounding connection for EMC-filter.
3. ATC antennas.
4. The grounding connection between rail vehicles (if this connection is a condition for grounding of cables in both ends).
5. Grounding connection at bogie and car body.



Date	Technician's Initials:	Comments



## 6. Antenna tuning

In connection with the maintenance work on the STM-DK Subrack, antenna tuning must be carried out.

The antenna tuning must always be carried out after work with train antenna/connections between train antenna and STM-DK Subrack.

Before antenna tuning can be carried out, it must be ensured that the antennas are at least 2 metres away from a balise or loop. Furthermore there must not be any metal of bigger extent than normally at a normal railway track.

The vehicle shall be in thermal equilibrium with the surroundings. The temperature shall be in the interval between  $-10^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$ . *To ensure the thermal equilibrium, the vehicle can be placed in the specified temperature interval for approximately 4 hours.*

The STM-DK Subrack shall be powered for at least 5 minutes, before performing antenna tuning.

In the Data Entry position, the Maintenance window is selected by writing 3112 in Maintenance code. Following tuning of antennas can be selected by CAB A or CAB B.

The tuning of the antenna at Cab A is initiated from Cab A, and the antenna at Cab B is initiated from Cab B.

Definition: By Alstom Cab A is the Cab closest to the EVC.

Caption: "Antenna Tuning"

Type: pick-up list

Values:

"no" no tuning will be performed (preset value)  
"Cab A" tune antenna of cab A  
"Cab B" tune antenna of cab B

Tuning takes app. 1 minute.

After tuning has been selected following text appears: "running A" or "running B", dependent of the selected antenna.

By pressing the "enter-button" on the DMI after 1 minute, the result of the tuning will be shown on the DMI.

The result will be one of the following:

1. FF555: selected antenna has been tuned, OK
2. FF590: selected antenna B has been tuned OK, but antenna A still needs to be tuned
3. FF591: selected antenna A has been tuned OK, but antenna B still needs to be tuned
4. FF592 tuning of 100 kHz failed
5. FF593 tuning of 50 kHz failed

6. In all other cases: FF556: selected antenna has been tuned, NOT OK

FF591 will be shown as OK result at tuning of antenna on train with only one antenna, as this antenna will be installed as antenna in the A-end.

In order to finish the tuning, the "X" button is pressed on the DMI.

After the antenna tuning the STM-DK Subrack shall be restarted.

Tuning af antenna A

Date	Technician's Initials:	Comments

Tuning af antenna B

Date	Technician's Initials:	Comments

## 7. Test of brakes, traction cut off and antenna connections

The system is brought into DataAvailable (DA) with STM-DK Subrack active from Cab A.

The purpose of this check is to check the antenna connections, brake functions and traction cut-off.

Procedure:

STM-DK is brought in DataAvailable (DA) with STM-DK Subrack active from driver's cab A.

The test balise with telegram BZBPR (brake test) is kept under the train's antenna in the A end of the train – the distance between train antenna and test balise must be between 150 and 200 mm according to IN 655.00 V1260. There must not be big metal objects close to the test balise when the test is carried out.

When the train antenna is presented to the test balise with telegram BZBPR, the indicator on DMI must indicate "SERVICE BRAKE".

When indicator "SERVICE BRAKE" is active on DMI, it must be observed that the service brake is active. Release the service brake.

App. 10 seconds after the service brake is released, the emergency brake must be activated.

When the indicator "Emergency brake" is active on DMI, it must be observed that the emergency brake is active. Release the emergency brake.

It must be observed that traction cut-off is active by activation of service brake and emergency brake.

When check has been carried out for driver's cab A, the same test is carried out for driver's cab B. (ATC direction to "B" in DMI DE mode)

Test Cab A antenne A

Date	Technician's Initials:	Comments

Test Cab B antenne B

Date	Technician's Initials:	Comments

If error, the following can be tried.

Case: the brake should have been activated, but the brake is not activated.

The brake test balise has just been kept under the train's antenna, but an activation of the service brake and/or emergency brake could not be found.

Via indication on the diagnosis terminal, it can be verified if balise-data has been received.

If this is not the case, the error must be found in the antenna, the cable to the antenna or around the TASSEE5 and UEBGEN5 boards. If necessary, check the LED's on UEBGEN5 and TASSE5.

If telegram data is received, but the brake is not activated, then the error might be in the activation of the brakes.

### **8. Litra no. verification:**

After completed maintenance, e.g. execution of antenna tuning in the maintenance menu, it is checked that the train's litra no. has not changed unintentionally. The set litra no. is available in the STM-DK maintenance menu.

In Data Entry position the maintenance menu is selected by typing **3112** for maintenance code.

<b>Litra No. (Before Maintenance)</b>		<b>Litra No. (After Maintenance)</b>	
Date	Technician's Initials:	Comments	

# Appendix 2 Out of Service Form

Litra type \_\_\_\_\_ Train. no. \_\_\_\_\_

STM-DK Subrack serial nr. \_\_\_\_\_

Describe the errors. Note all the LED's indications and how the error otherwise displays itself.

---

---

---

---

---

---

---

---

---

---

---

Date	Technician's Initials: