


DK-STM

Maintenance Manual

Cubicle

	Verified	Address Banedanmark Amerika Plads 15 2100 København Ø	Designer Siemens A/S Borupvang 9 2750 Ballerup	
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Change Log

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1.00 / 26.03.2015	All	First final version	
2.00 / 21.04.2015	All	New drawing in Figure 1, drawing of connector plate inserted – figure 3 and minor textual changes	
3.00 / 09.06.2016	All	Maintenance manual for rack and cubicle have been combined	
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3.02 / 02.11.2020	Appendix 1 / Antenna Tuning	The interval for tuning temperature is changed to -10°C and +40°C	
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1 Introduction

This document makes up the maintenance manual for cubicle and rack edition of DK-STM, which is a sub component in an ETCS system.

It is prescribed that at least once a year an inspection of the system is carried out in accordance with the maintenance form of Appendix 1.

The inspections and maintenance assignments must be carried out by qualified personnel, who are used to working with maintenance of mobile train control systems in railway vehicles.

1.1 Overall Construction of DK-STM

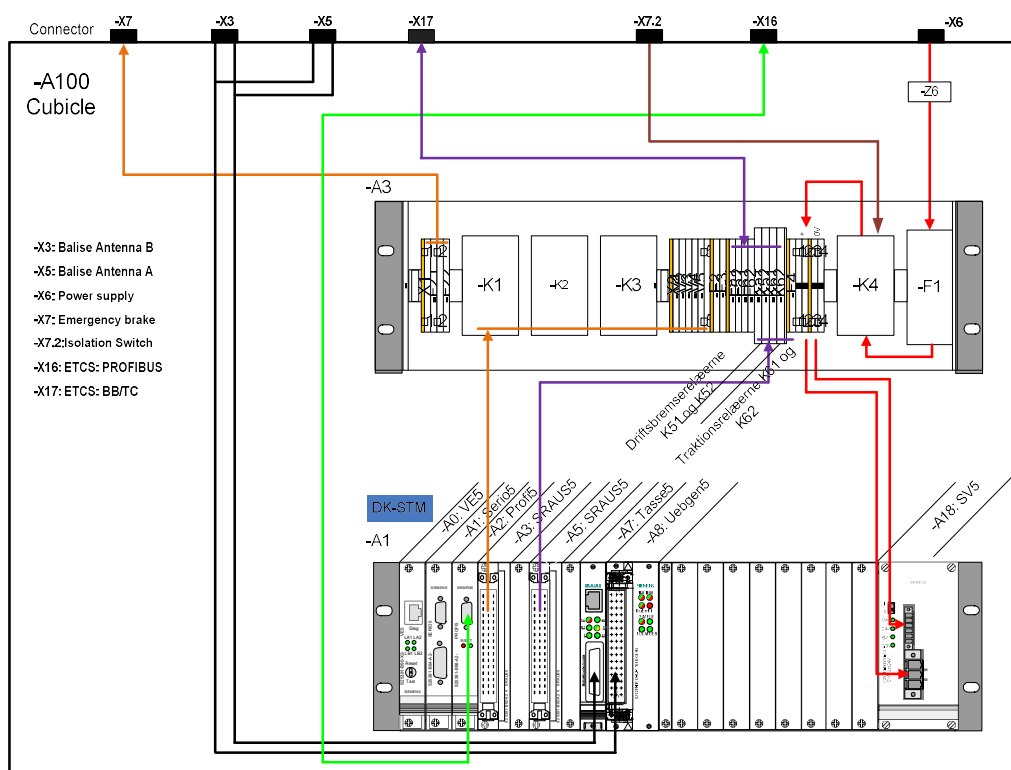


Figure 1 DK-STM Cubicle Construction

The cubicle consists of following LRU (Lowest Replaceable Unit) components:

- Connector plate
- TIU (relay plate), -A3
 - Emergency brake relays K1, K2 and K3
 - Bypassing relay K4
 - Traction relays K61 and K62
 - Service brake relays K51 and K52
- Cubicle, -A100
- Door
- DK-STM sub rack, -A1, see Figure 2

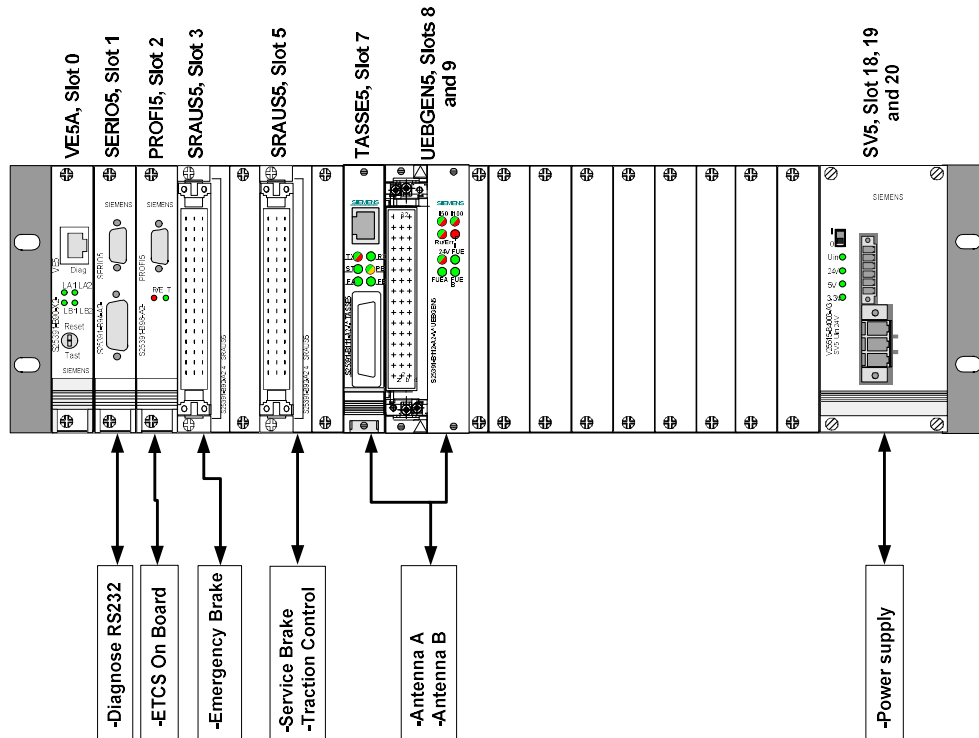


Figure 2 DK-STM sub rack

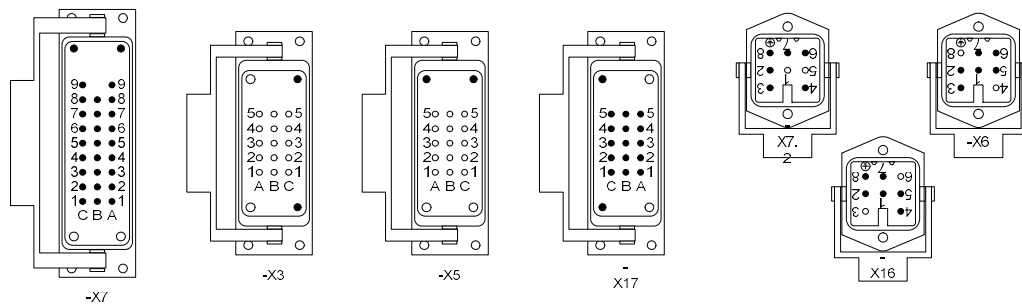


Figure 3 Connector plate seen from above

Scope

Figure 4 shows how DK-STM is a part of the total concept for the train control system.

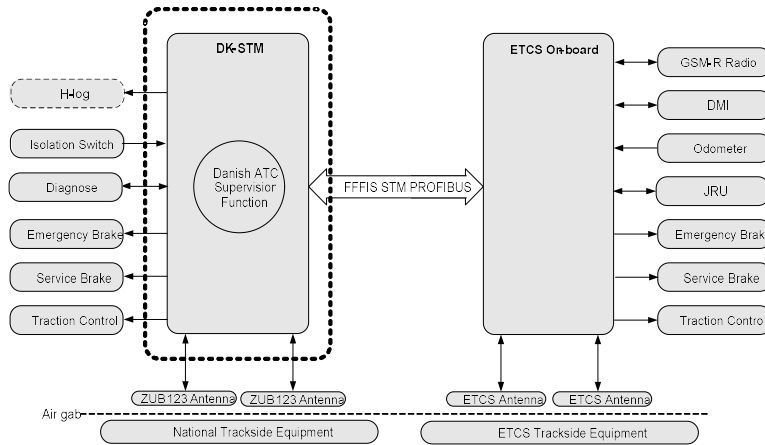


Figure 4 DK-STM Environment

As it can be seen from Figure 4 DK-STM is connected directly to brakes, traction control, ATC-antennas and power supply.

It is possible to configure H-log to it, but this is however not used in BL3. Configuration of DK-STM has been described in the Installation Manual to DK-STM and is not mentioned further here.

Furthermore the DK-STM is connected to the ETCS On-Board equipment via a PROFIBUS connection.

Brakes and traction commands are at the same time sent to ETCS through the PROFIBUS-connection.

Operation of DK-STM takes place via DMI.

DK-STM receives odometer-data from ETCS.

Error data, balise data, train data etc. are always sent to JRU and the Havari log (damage log), if this is connected and configured.

1.2 Validity

The maintenance manual is applicable to a system consisting of STM-DK cubicle with connection to ATC-antennas, traction cut-off, service- and emergency brake and ETCS system. As indicated on figure 4.

DK-STM sub rack consists of the following components:

- 00 SIMIS TCC 19" Rack
Component no. S25160-C2001-A1-.*.
- 01 SIMIS TCC VE5A, CPU
Component no. S25391-B90-X23-.*.
- 02 SIMIS TCC SERIO5
Component no. S25391-B94-A2-.*.
- 03 SIMIS TCC PROFI5
Component no. S25391-B98-A2-.*.
- 04 SIMIS TCC SRAUS5-24V
Component no. S25391-B92-A2-.*
- 05 SIMIS TCC SRAUS5-110V
Component no. S25391-B92-A24-.*
- 06 SIMIS TCC TASSE5
Component no. S25391-B111-A2-.*.
- 07 SIMIS TCC ÜBGEN5
Component no. S25391-B112-A2-.*.
- 08 SIMIS TCC SV5, 24 Volt
Component no. S25515-B4003-A3
- 09 SIMIS TCC SV5, 72-110 Volt
Component no. S25515-B4003-A4

Valid ATC-antennas:

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

Valid STM-DK cubicle versions:

- G81002 -E3134-H024-* for configuration 24V DC
- G81002-E3134-H072-* for configuration 72V DC
- G81002-E3134-H110-* for configuration 110V DC

LRU = Least Replaceable Units

	Configuration 24V DC	Configuration 72V DC	Configuration 110V DC
STM-DK-cubicle	1	1	1
STM-DK-cubicle Door	1	1	1
STM-DK-cubicle Connector plate	1	1	1
STM-DK-cubicle TIU (Train Interface Unit)	24V DC	72V DC	110V DC
STM-DK-Subrack	24V DC	110V DC	110V DC

Before LRU is replaced, it must be verified that LRU can be inserted in the configuration and version in question.

1.3 References

Reference	Document Title	Document Identification
/InstManual/	DK-STM, Installation Manual	IN 655.00 Q2962
/InstManualCubicle/	DK-STM, Installation Manual Cubicle	IN 655.00 Q4432
/System Description/	DK-STM, Systembeskrivelse	KN 655.00 Q2959
/ATC-Diagnose- Schnittstelle/	Description of ATC-Diagnosis Interface	G81001-E3117-U001-C
/DebugTermUserManual/	User's Manual for Debug Terminal DK-STM	G81001-X3107-U537
/Completion test/	The DK-STM Dokumenteret Slutafprøvning	AN 656.00 Q4446
/CubicleDiagram/	Diagram for the cubicle	G81002-E3134-S5151
/Application Rules/	DK-STM Application Rules	G81001-X3107-L005-*

2 Maintenance

It is prescribed that an inspection of the DK-STM cubicle and connection is carried out at least once a year. Following an upstart test and documented completion test has been carried out, according to /Completion test/.

2.1 Required Training of Maintenance Personnel

The maintenance personnel must possess the by BDK required technical qualifications and be used to work with maintenance of mobile train control systems in railway vehicles. Furthermore the maintenance personnel must have completed the course "Maintenance of DK-STM".

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

2.2 The Tasks of the Maintenance Personnel

The maintenance personnel must carry out general maintenance and repair assignments that are summed up in the following points:

1. Cleaning.
2. Visual inspection of DK-STM of:
 - DK-STM cubicle
 - DK-STM sub elements
 - Antennas
 - Connection cables
 - Connection boxes
 - Grounding connections
3. Measurement and poss. adjustment of antenna heights and trimming of antennas
4. After maintenance the in this manual described tests are carried out
5. Repair or replacement of LRU
6. After repair or replacement of LRU documented completion test, /Completion test/, is carried out

2.3 Tools

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

1. PC with a serial COM Port
2. DB26-DB9 service cable. I.e. a cable from the computer's 9 poled male plug to the 26 poled male plug on the SERIO board in slot 1 in the DK-STM sub-rack
3. Terminal program – DebugTerminalDK-STM
4. A square key for the locks in the lid of the cubicle
5. Normal tools for use at replacement of LRU
6. 46 mm torque wrench, 40 Nm, for antenna plug
7. Ruler
8. Tool for poss. adjustment of antenna height
9. Test connector for X7 and X17 for test of the cubicle

Connectors with LEDs that indicate if the relays for emergency brake, service brake or traction have been pulled or released

10. A test-balise (braking test)

Below standing shows a test balise that via a single balise activates a braking test (BZBPR). The braking test at first activates the service break and a traction cut-off so that 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 Pr
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

Repair or replacement of the printed circuit boards must be carried out on a by Siemens authorised repair shop.

This document only describes replacement of components on LRU level, Lowest Replaceable Unit. The LRU components have been described in the above standing chapter 1.1

At replacement of components, the DK-STM must be dead.

2.5 Replacement of LRU

After replacement of LRU Documented Completion Test, /Completion test/, is carried out, i.e. carry out Banedanmark's requirements to commissioning of the train.

Replacement

**NB: BE AWARE OF
ESD.
USE WRIST BAND**

2.5.1 Cubicle

Replacement STM-DK Cubicle *dismantling*

Presuppositions before dismantling:

1. -S1 STM – MAIN SWITCH must be in position "0"

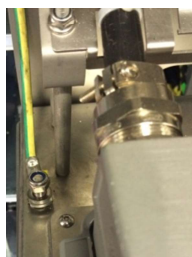


Dismantling:

2. Connectors and cables on STM-DK cubicle are dismantled



3. Grounding strap dismantled (is placed in the top left side of the STM-DK cubicle next to the connector plate and grounding bar)



4. M8 bolts for mounting of STM-DK cubicle are unscrewed.
- Option 1: 6 bolts in the bottom and possibly a couple of bolts in each side of the STM-DK cubicle.
 - Option 2: 6 bolts in each side of STM-DK cubicle.



5. STM-DK cubicle can be dismantled.

Replacement STM-DK Cubicle *mounting*

Presuppositions before mounting:

1. -S1 STM – MAIN SWITCH must be in position "0"



Mounting:

2. STM-DK cubicle is placed on shelf.



3. STM-DK cubicle is bolted firmly with M8*18 bolts with torque 12 Nm +/- 1,5 Nm: (Minimum solution A or solution B)
 - A. 6 bolts in the bottom of STM-DK cubicle.

B. 6 bolts in each side of the STM-DK cubicle.



4. The grounding strap is mounted on the STM-DK cubicle grounding bolt and fastened.



5. Cables and connectors are connected to the STM-DK cubicle.



6. -S1 STM – MAIN SWITCH is set to position "1".



7. STM-DK is configured.
8. A completion test is carried out with reference to AN 656.00 Q4446.
9. -S1 STM – MAIN SWITCH is sealed in position "1".

2.5.2 Subrack DK-STM

Replacement STM-DK Subrack dismantling

Presuppositions before dismantling:

1. -S1 STM – MAIN SWITCH must be in position "0"

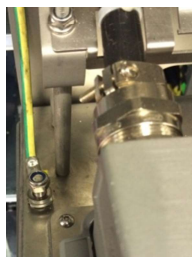


Dismantling:

2. Connector and cables on the STM-DK cubicle are dismantled.



3. Grounding strap is dismantled (is placed in the top left side of the STM-DK cubicle next to the connector plate and grounding bar)



4. M8 bolts for mounting of the STM-DK cubicle is unscrewed.
- Option 1: 6 bolts in the bottom and possibly a couple of bolts in each side of the STM-DK cubicle.
 - Option 2: 6 bolts in each side of the STM-DK cubicle.



5. STM-DK cubicle can be dismantled.

Replacement

STM-DK Subrack mounting

Presuppositions before mounting:

1. –S1 STM – MAIN SWITCH must be in position "0"



Mounting:

2. STM-DK sub rack is put in place in the STM-DK cubicle
3. The 4 bolts on STM-DK Subrack are mounted in the 4 mounting holes and fastened with 10 Nm +/- 1 Nm.
4. Following plug connections are mounted and fastened with 0,3 Nm +/- 0,1 Nm.
 - A. Plug –A2-X1 on cable 161 is connected to PROF15.
 - B. Plug –A7-X1 on cable 51 is connected to TASSE5.
 - C. Plug –A18-X2 on cable 63 is connected to SV5.
5. Following plug connections are mounted and fastened with 0,5 Nm +/- 0,2 Nm.
 - A. *Plug –A3-X1 on cable 72 is connected to SRAUS5, slot 3.
 - B. *Plug –A5-X1 on cable 172 is connected to SRAUS5, slot 5.
 - C. *Plug –A8-X1 on cable 31 is connected to UBEGEN5.
 - D. Plug – A18-X1 on cable 65 is connected to SV5.



6. Connectors are mounted on connector plate on the STM-DK cubicle.
7. STM-DK is configured.

8. A completion test is carried out with reference to AN 656.00 Q4446.
9. The door is mounted on the STM-DK cubicle.
10. -S1 STM – MAIN SWITCH is sealed in position "1".



The new DK-STM must be configured, the antennas are trimmed and documented completion test is carried out, /Completion test/.

2.5.3 TIU Train Interface Unit

Replacement

TIU (Train Interface Unit) *dismantling*

Presuppositions before dismantling:

1. -S1 STM – MAIN SWITCH must be in position "0"

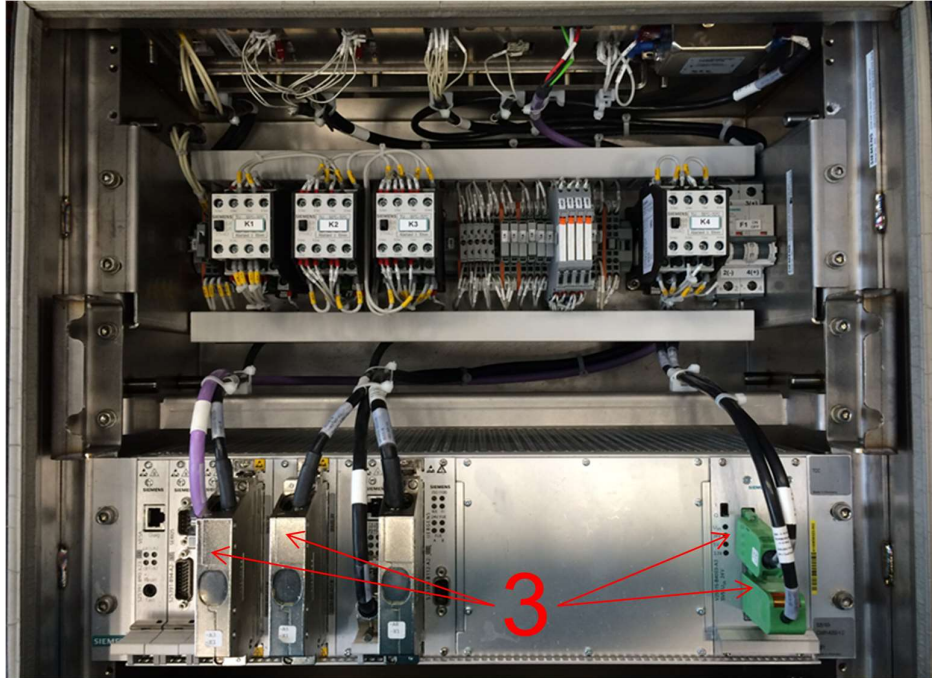


Dismantling:

2. Connectors mounted on the STM-DK cubicle connector are dismantled.

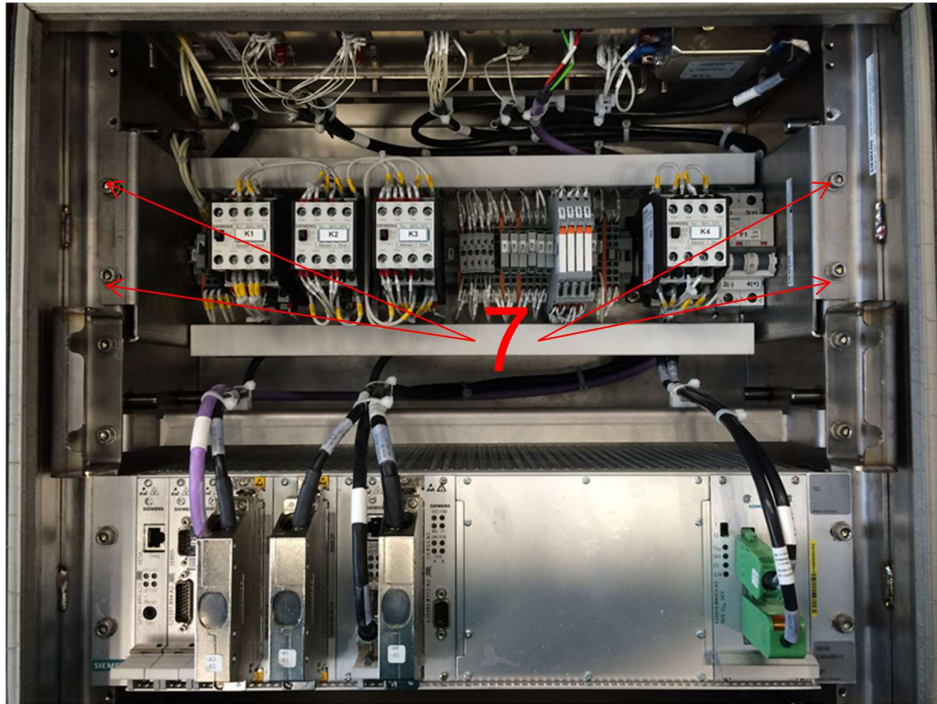


3. Plug that must be dismantled on the STM-DK Subrack
 - A. Plug –A3-X1 on cable 72
 - B. Plug –A5-X1 on cable 172
 - C. Plug –A18-X2 on cable 63
 - D. Plug –A18-X1 on cable 65



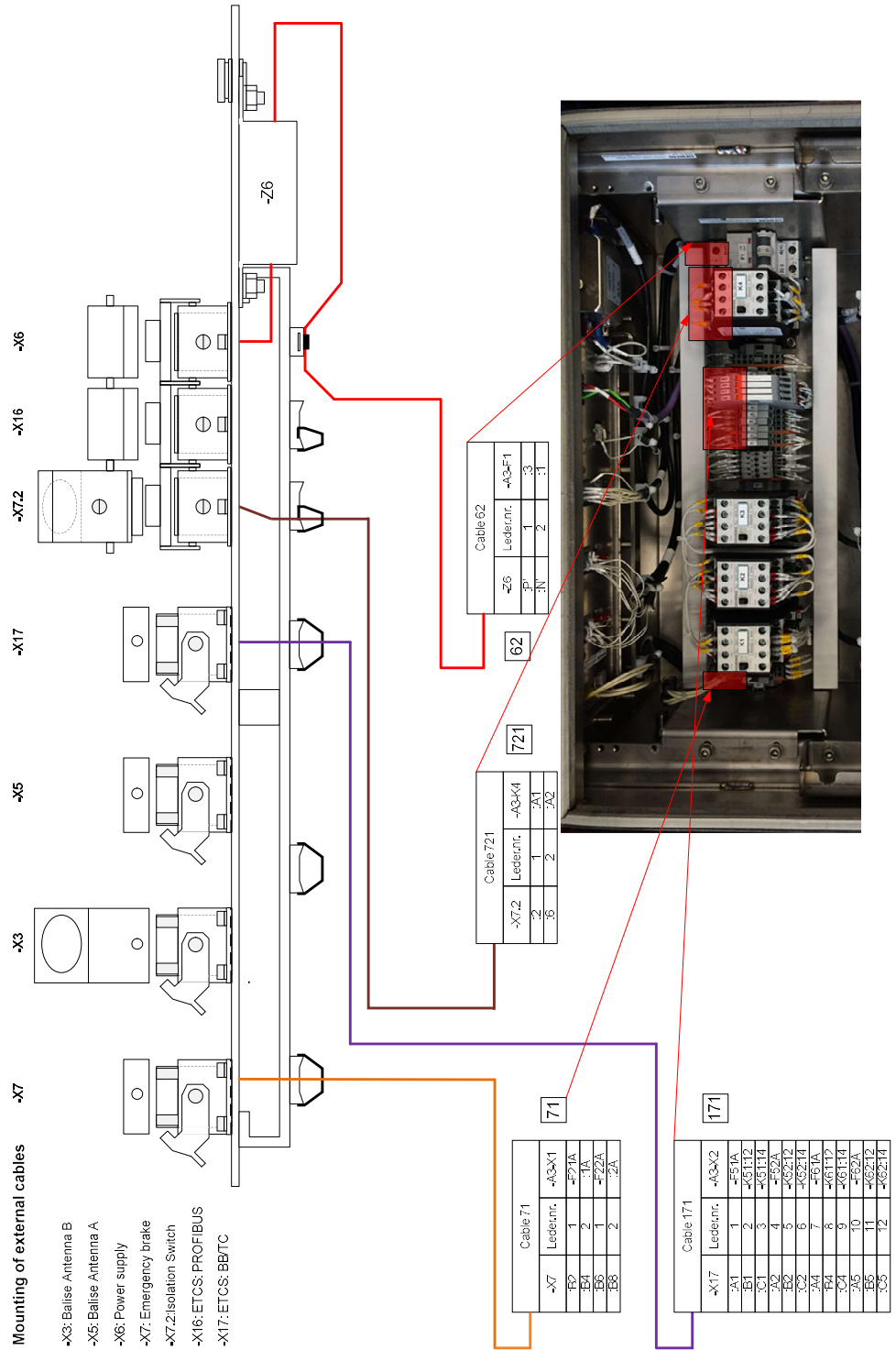
4. Strips for fastening cables that should be removed.
5. Cores in cables connected from connector plate to TIU must be dismantled at TIU (See slide 59):
 - A. Cable 71
 - B. Cable 171
 - C. Cable 721
 - D. Cable 62
6. Loose cables from connector plate are removed from the cable duct.

7. The 4 bolts for mounting of TIU are removed.



8. TIU is removed from the STM-DK cubicle.

Replacement TIU (Train Interface Unit)



Replacement TIU (Train Interface Unit) *mounting*

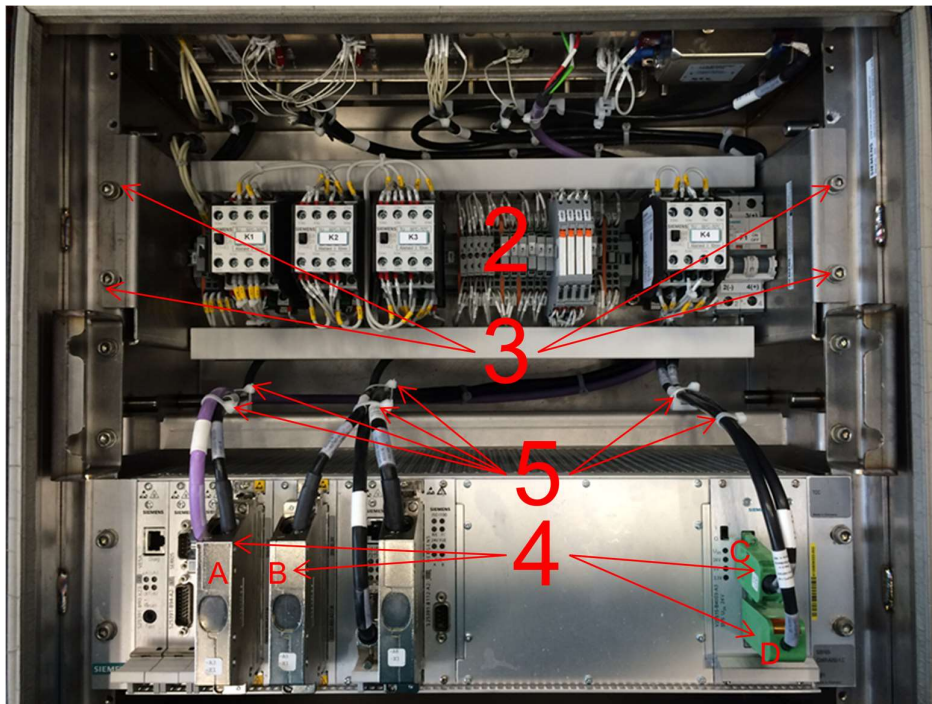
Presuppositions before mounting:

1. –S1 STM – MAIN SWITCH must be in position "0"



Mounting:

2. TIU is put in its place in the STM-DK cubicle.
3. The 4 bolts for mounting of TIU are mounted and fastened with 7 Nm +/- 1 Nm.
4. Plug that are mounted on STM-DK Subrack:
 - A. Plug –A3-X1 on cable 72 is connected to SRAUS 5, Slot 3 with 0,5 Nm +/- 0,2 Nm
 - B. Plug –A5-X1 on cable 172 is connected to SRAUS 5, Slot 5 with 0,5 Nm +/- 0,2 Nm
 - C. Plug –A18-X2 on cable 63 is connected to SV5 with 0,3 Nm +/- 0,1 Nm
 - D. Plug –A18-X1 on cable 65 is connected to SV5 with 0,5 Nm +/- 0,2 Nm
5. Cables that are connected to STM-DK sub rack are fastened with strips.



6. Cores in cables connected from connector plate to TIU that must be mounted at TIU (see mounting of external cables during dismantling):
 - A. Cable 71
 - B. Cable 171
 - C. Cable 721
 - D. Cable 62
7. Cable 171, Cable 721 and Cable 62 must be placed in cable duct.
8. Connectors are mounted on connector plate on the STM-DK cubicle.
9. STM-DK is configured.
10. A completion test is carried out with reference to AN 656.00 Q4446.
11. The door is mounted on the STM-DK Cubicle.
12. -S1 STM – MAIN SWITCH is sealed in position "1".



Documented completion test is carried out, /Completion test/.

2.5.4 Connector Plate

Replacement

STM-DK Connector plate *dismantling*

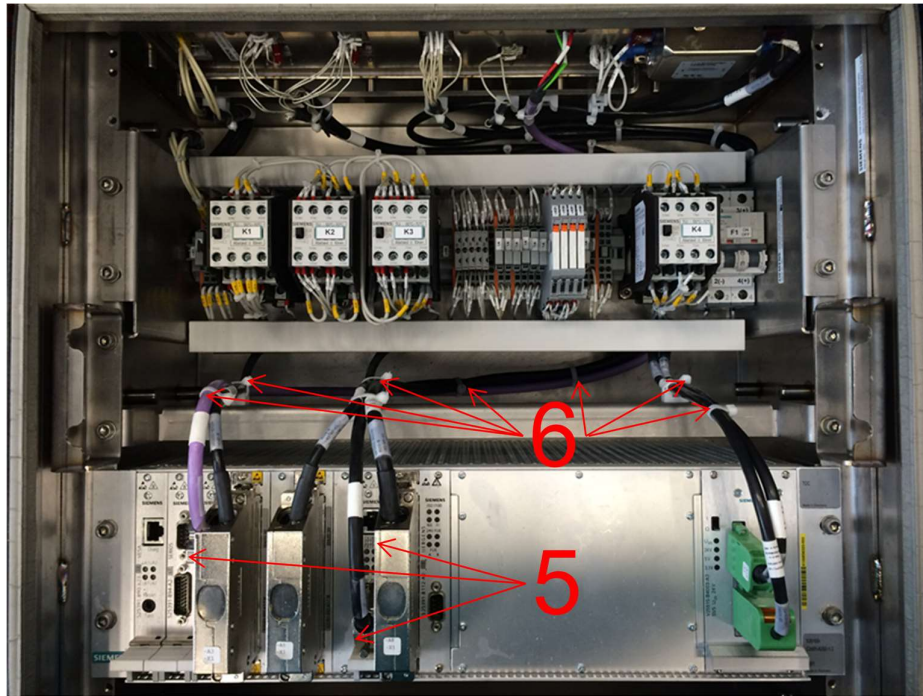
Presuppositions before dismantling:

1. -S1 STM – MAIN SWITCH must be in position "0"



Dismantling:

2. Connectors and cables mounted on STM-DK cubicle connector are dismantled.
3. The door on the STM-DK cubicle is dismantled.
4. Cables that must be dismantled from TIU (See slide 62):
 - A. Cable 71
 - B. Cable 171
 - C. Cable 721
 - D. Cable 62
5. Plugs that must be dismantled from STM-DK sub rack:
 - A. Plug –A2-X1 on cable 161 is connected to PROF15.
 - B. Plug –A8-X1 on cable 31 is connected to UBEGEN5.
 - C. Plug –A7-X1 on cable 51 is connected to TASSE5.
6. Relevant cable strips are removed.



7. Remember to release all cables and wires from cable ducts before the connector plate is removed.
8. 16 bolts for fastening the connector plate are unscrewed.
9. Connector plate with cables is removed.

See connections to connector plate under TIU.

Replacement STM-DK Connector plate *mounting*

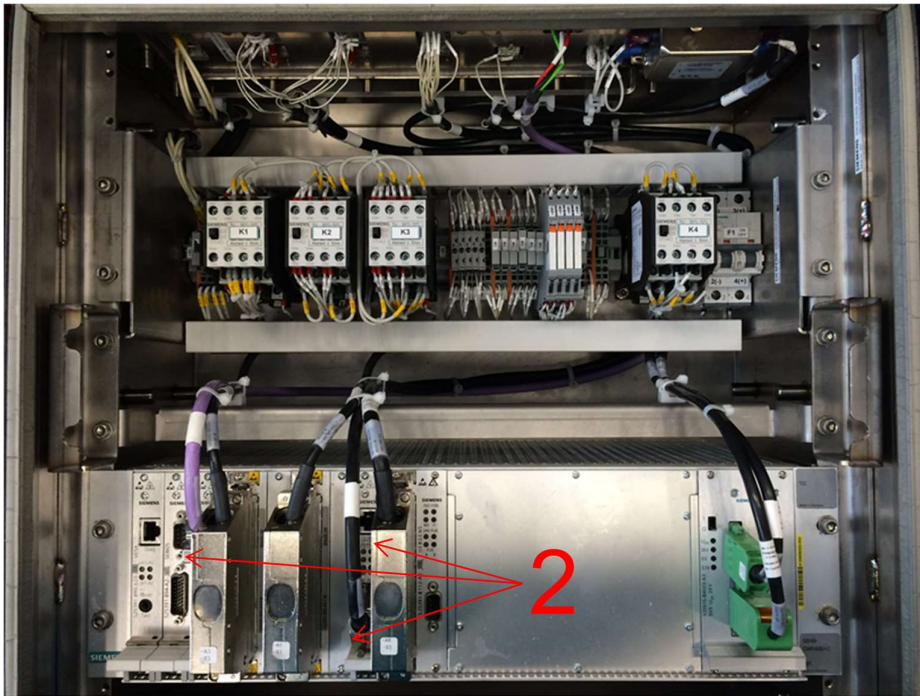
Presuppositions before mounting:

1. -S1 STM – MAIN SWITCH must be in position "0"

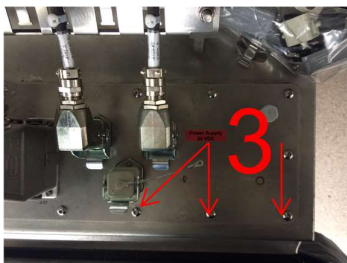


Mounting:

2. Connector plate with internal cables are mounted.



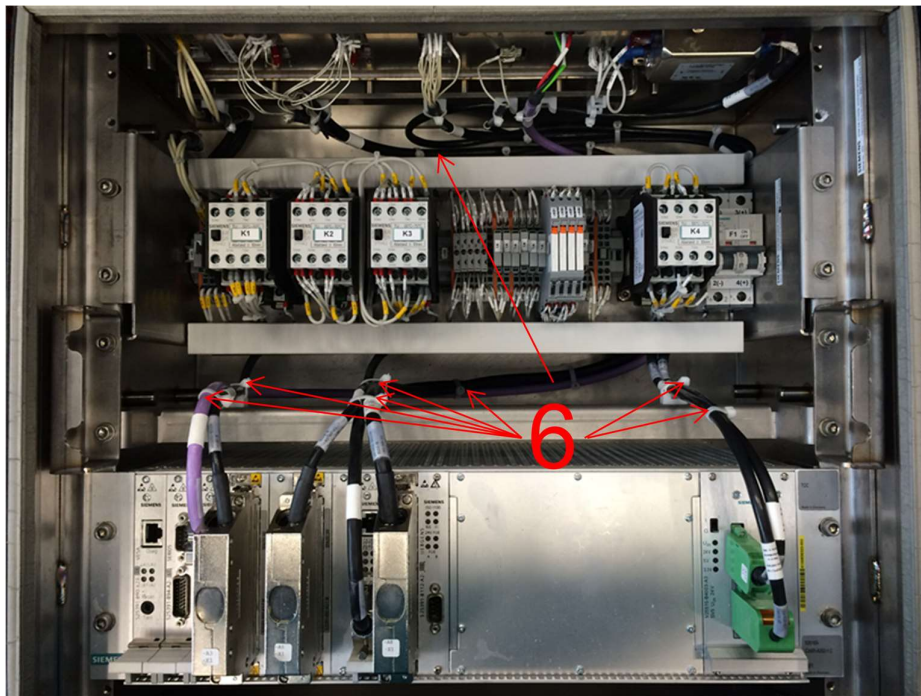
3. 16 bolts for mounting of connector plate is screwed in with 2,0 Nm +/- 0,4 Nm.



4. Plugs that must be mounted on the STM-DK subrack:
 - A. Plug –A2-X1 on cable 161 is connected to PROF15
 - B. Plug –A8-X1 on cable 31 is connected to UBEGEN5.
 - C. Plug –A7-X1 on cable 51 is connected to TASSE5.

Torque for fastening plug with 0,3 Nm +/- 0,1 Nm

5. Cables that must be mounted to TIU (See slide 62):
 - A. Cable 71
 - B. Cable 171
 - C. Cable 721
 - D. Cable 62
6. Cables are fastened with strips.



7. Connectors are mounted on connector plate on the STM-DK cubicle.
8. STM-DK is configured.
9. A completion test is carried out compare AN 656.00 Q4446.
10. The door is mounted on the STM-DK Cubicle.
11. -S1 STM – MAIN SWITCH is sealed in position "1".



Documented Completion test is carried out, /Completion test/.

Mounting of cables:

Cable mounting-

1 pc.

1 cable tie 1 cm from terminals on:
-X1:1A, -X1:F2 1A, -X1:2A,
-X1:F22A

2 pc. saddle cable tie mount
2 pc. on cables.

3 pc. On cables for wire duct,
3 pc. On cables for STM-DK Subrack.

2 pc.

2 cable ties 2/4 cm, from tube terminals on:
-X2:K5:1:4+11,
K52:14+11
-X2:K6:1:4+11,
K62:14+11

1 pc. on saddle cable tie mount.
3 pc. On cables
2 pc. On cables behind the TIU.

Cable 721 wire for K4:A2 is routed from upper wire duct and down between -K4 and -F1.

Mt 0.3 Nm \pm 0,1 Nm

Mt 0.5 Nm \pm 0.2 Nm

Mt 0.5 Nm \pm 0.2 Nm

Mt 0.3 Nm \pm 0,1 Nm

Cable connectors for the STM-DK Subrack is mounted after isolation test.

- Cables shall be parallel and may not be twisted.
- Cable ties is mounted with a distance of 10 cm apart.
- Cable between cable relief and connectors/wire ducts may not be strained.
- All cables shall be at least 1 cm. Under the front edge of the cubicle.

2.6 Start-Up Test

After DK-STM mounting, replacement or maintenance, the DK-STM must be restarted and it must be checked that the DK-STM starts up correctly, i.e. that DK-STM enters the DA conditions and the “Valg”- button is shown.

2.7 Connection of External Equipment

Diagnosis-PC cannot be permanently connected to the DK-STM. It can be used for trouble shooting and test.

2.8 Shipment of DK-STM

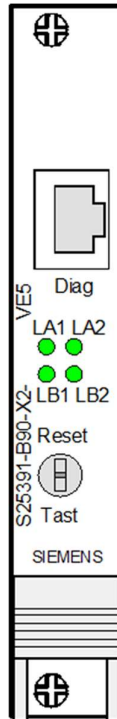
When shipping the DK-STM cubicle it must be ensured that all plugs in the connector plate are protected with a plastic cap in order to prevent dust from penetrating.

3 Diagnosis via LED on Circuit Board

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

3.1 SIMIS TCC VE5A, CPU

Figure 5 shows the CPU, the VE5A board with the LEDs and their meaning.



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

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

Yellow: Supply voltage OK and safety decoupling 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.

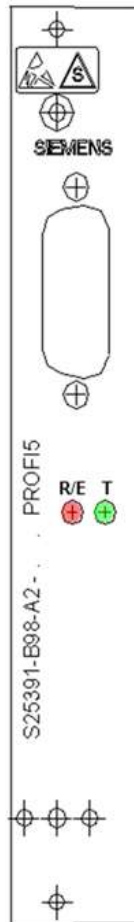
Figure 5 LED Indications on the CPU board, SIMIS TCC VE5A

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

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

3.2 SIMIS TCC PROF15, Profibus Communication

Figure shows the communication board, PROF15 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)

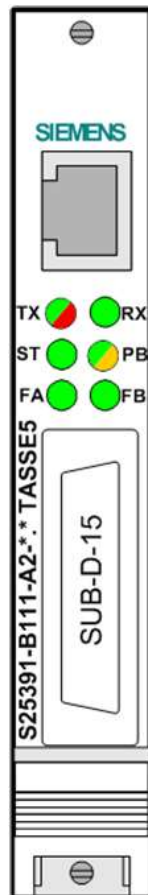
Figure 6 LED Indications on the Communication Board, SIMIS TCC PROF15

(1) Attempt to restart DK-STM. If a restart does not help, replace the DK-STM. 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 Receives the 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	Red
	Send-state OK	Green
RX (2)	Telegramreceived	Green
ST	Telegram START received	Green
PB (3)	Internal test-state	Green
	External test-state	Orange
FA	Antenna A active	Green
FB	Antenna B active	Green

Figure 7 LED Indications on the Telegram 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 DK-STM 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 say anything about errors on the board.

3.4 SIMIS TCC UBEGEN5, the Generator Board

Figure 8 shows the generator board, UBEGEN5 with the LED indications and their meaning.

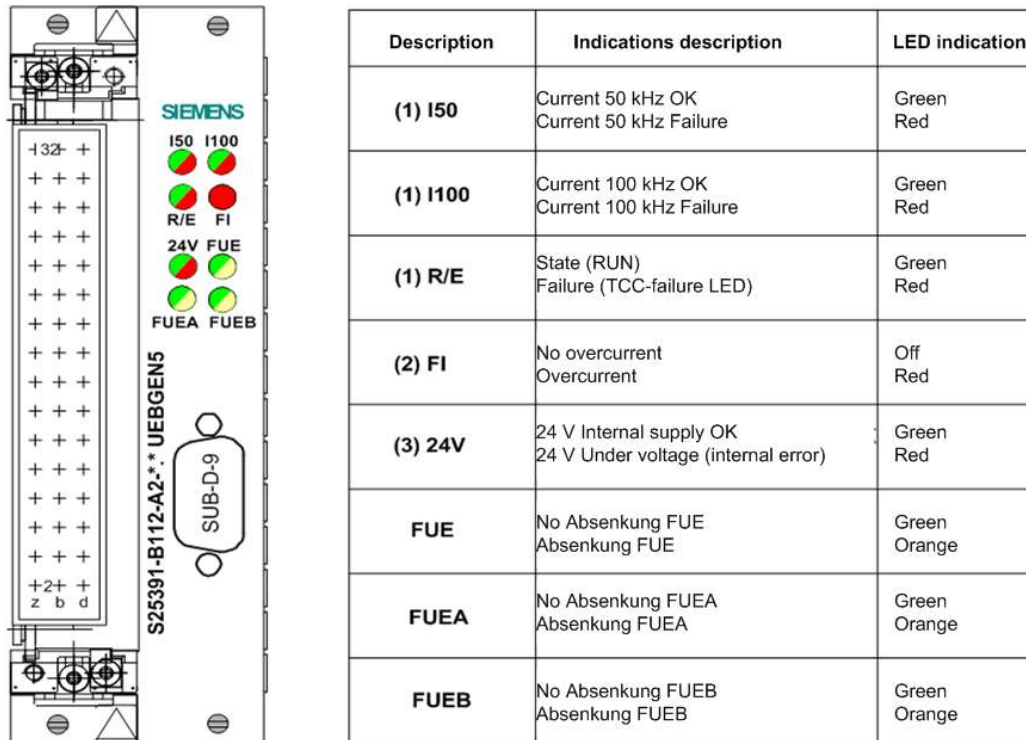


Figure 8 The LED Indications on the Generator Board, SIMIS TCC UBEGEN5

- (1) Error on I50 and I100 can possibly be repaired by tuning the antenna. In case tuning does not help, the DK-STM must be replaced.
- (2) When the FI diode lights red (excess current), it means that there is an error in the 50 kHz or 100 kHz circuit to the antenna, e.g. error in the antenna or the antenna cable. In this case the circuits must be troubleshooted.
- (3) In case 24V lights red, the DK-STM must be replaced. If 24V lights green, the internal supply voltages can be checked on the SV5's LED.
- (4) FUE, FUEA og FUEB:
Indication by passing a balise
(50 kHz circuitry).

3.5 SIMIS TCC SV5, Power Supply

Figure 9 shows the power supply board SV5 with the LED indications and their meaning.

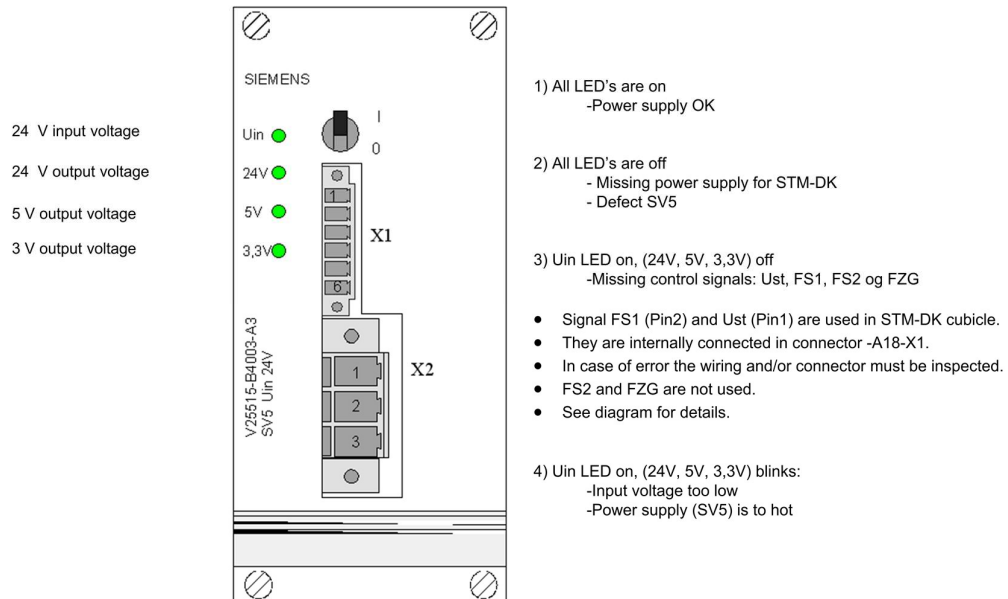


Figure 9 The LED Indications on the Power Supply, SIMIS TCC SV5

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

4 Diagnosis via PC

PC with DebugTerminalDK-STM is connected and operated as described in /DebugTermUserManual/.

Appendix 1 Maintenance-Form

Litra Type _____ Train. No. _____

DK-STM Cubicle G-No. _____

DK-STM Cubicle Serial No. _____, Subrack Serial No. _____

In connection with maintenance of cubicle for DK-STM, following points must be examined:

Cleaning

Presuppositions:

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

Inspect the STM-DK cubicle and elements in the STM-DK cubicle for dust and containment.

In case of unreasonable amounts of dust and containment, dust and containment is removed.

Dust can be removed by vacuum cleaning.

Cleaning can be made with a dry cloth.

NB: Be aware of danger from static electricity.

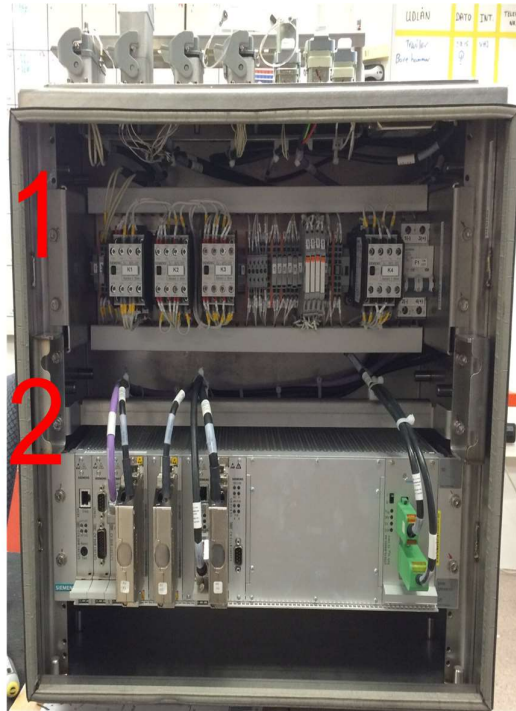


Date	Technician's Initials:	Comments

Inspection of DK-STM Cubicle and Rack

NB: Be aware of danger from static electricity.

- 1: Check STM-DK cubicle and elements in STM-DK cubicle for damages.
- 2: Check internal wire and cable connections:
Are there any damages on wires and cables?
Have cables and wires been correctly fastened and mounted?



3: Check external cable connections:

Are cables correctly grounded and fastened on the STM-DK cubicle's grounding bar?

Are all plugs correctly connected to STM-DK's cubicle connector?



Date	Technician's Initials:	Comments

Test DK-STM Power Supply

First step of the test of the cubicle is to test that it is correctly power supplied. This is tested via LED on the power supply, which is placed to the right of the DK-STM sub rack. See Figure 10 below.

In case that not all LEDs on the power supply light, troubleshooting takes place with reference to Appendix 3.

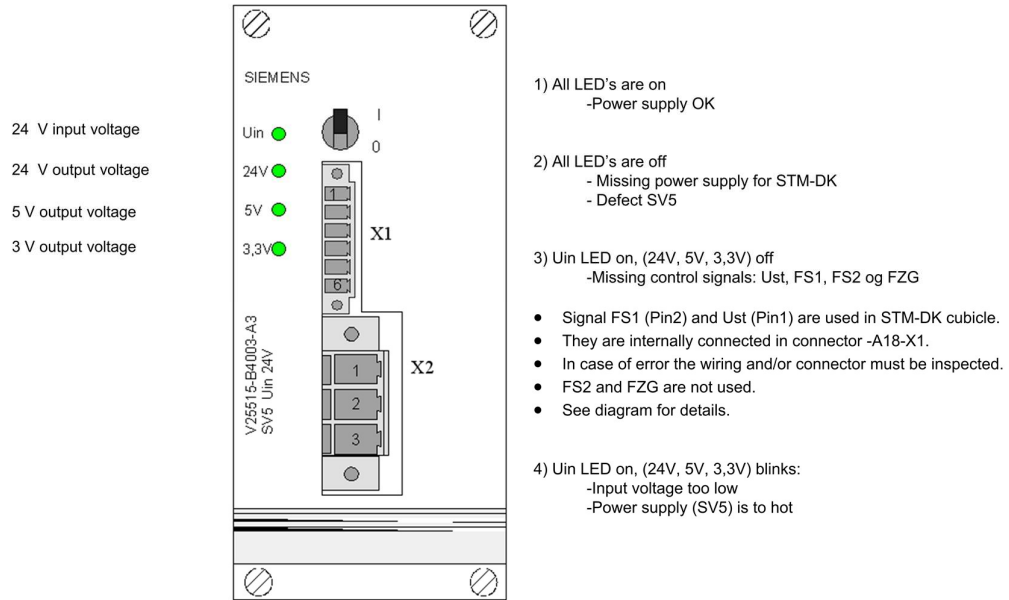


Figure 10 LED Indications on the Power Supply, SIMIS TCC SV5

Date	Technician's Initials:	Comments

Test DK-STM Profibus Connection

Is there communication via the Profibus to EVC and DMI, which is the case if you from DMI can enter train data, enter DataAvailable (DA), and see the "Valg" - button on the DMI.

Date	Technician's Initials:	Comments

If this is not the case, troubleshooting takes place as described in Appendix 4.

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	Measured Distance (after poss. Adjustment)	mm
Date	Technician's Initials:	Comments	

Antenna Type: S25441-M2-A3 and S25441-M2-A4 (Low Profile Antenna)

Allowed Distance During Check	108-177 mm	Measured Distance (after poss. Adjustment)	mm
Date	Technician's Initials:	Comments	

Tighten the Antenna Plug

Tighten the antenna plug with torque wrench with 40 Nm.

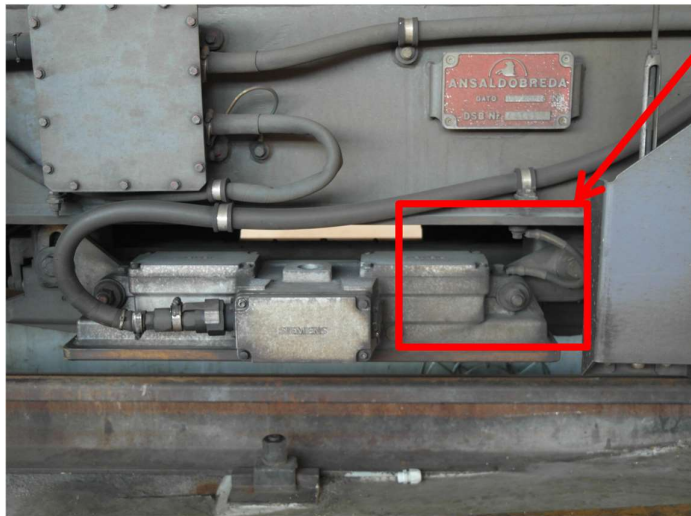
Date	Technician's Initials:	Comments

Check Grounding Connections

Following grounding connections are checked:

1. Cable shieldings for front plug on STM-DK
2. The grounding connecting on net filter
3. Poss. 24 V power supply
4. ATC antennas
5. The grounding connection between rail vehicles (if this connection is a condition for grounding of middle vehicle cables in both ends.)
6. Grounding connection at bogie and rail vehicle.

Ground connection



Date	Technician's Initials:	Comments

Antenna Tuning

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

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

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°C and +40°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 as this antenna will be installed as antenna in the A-end.

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

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

Tune Antenna A and B

Date	Technician's Initials:	Comments

Test and Stimulation of Antenna A

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

The DebugTerminal is connected to the 26 poled connector on the SERIO board. See Figure 2, and Menu 2 is activated For more details see /DebugTermUserManual/.

The balise BZBPR (brake test) is kept under the train's antenna in this end of the train – the distance cannot be less than 15 cm.

It must be observed that the service brake is activated physically, and after it has been released via key activation on the DMI and app. 10 seconds after the emergency brake is activated.

If this cannot be observed, troubleshooting is carried out as described in Appendix 5.

Date	Technician's Initials:	Comments

Test and Stimulation of Antenna B

The system is brought in DataAvailable (DA) with DK-STM active from Cab B,

Follow the points in: "Test of Stimulation of Antenna A".

Date	Technician's Initials:	Comments

Test of Brakes, Traction and Antenna Connections

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

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

Procedure:

STM-DK is brought in DataAvailable (DA) with STM-DK 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 indicator "Emergency brake" is active on DMI, it must be observed that the emergency brake is active. Release the emergency brake.

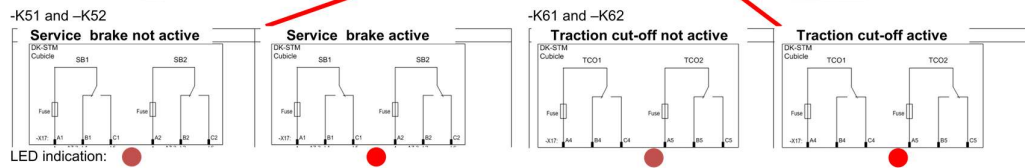
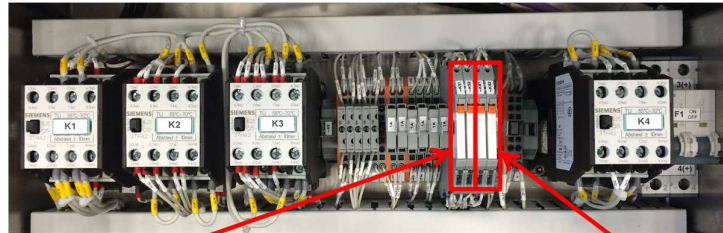
It must be observed that traction cut-off is active by activation of service brake and emergency brake.

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)

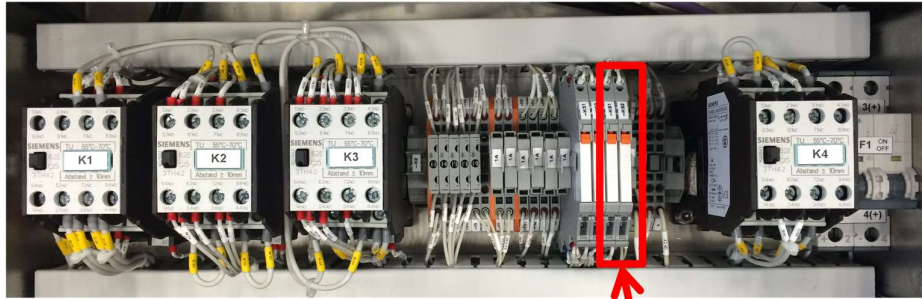
Service brake and traction cut-off - STM-DK cubicle relay observation.

Relay –K51 and –K52 must be active at service brake, this is checked by LEDs on relays being turned on.

Relay –K61 and –K62 must be active at traction cut-off, this is checked by LED son relays being turned on.

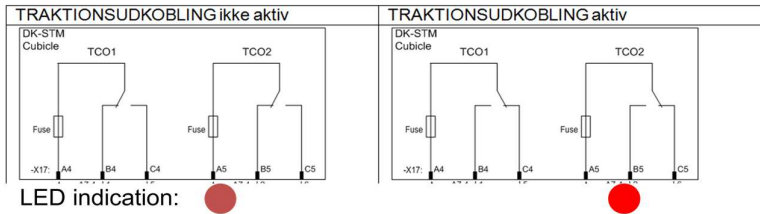


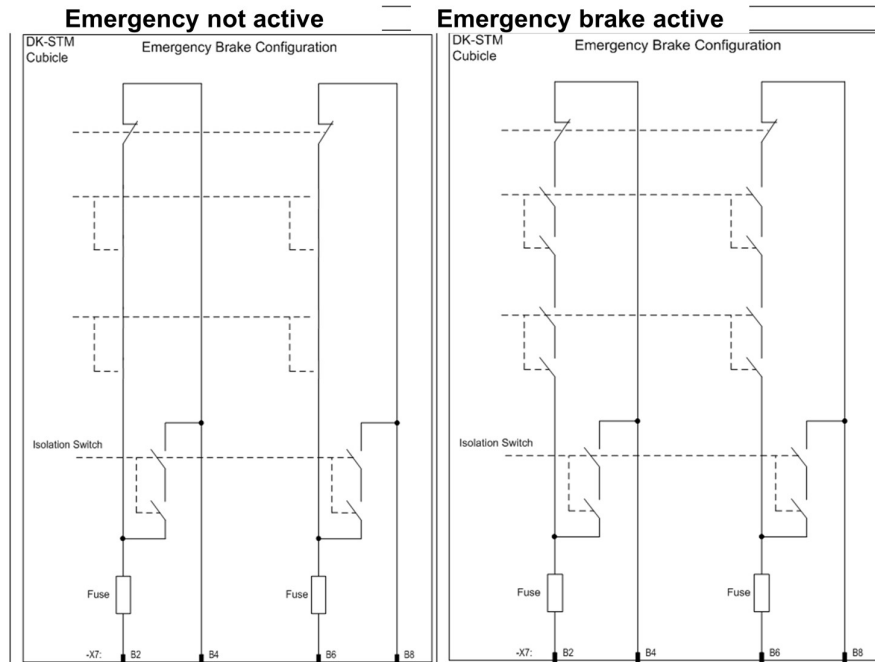
Train type and configuration of train varies. It requires technical knowledge of the train type and the train's configuration before it can be determined if the train's emergency brake and traction cut-off are active.



Traction cut-off shall be active

-K61 and -K62





If the brake test does not show the above standing, reference is made to Appendix 5 "Brake Troubleshooting Instructions".

Date	Technician's Initials:	Comments

Close Door to Cubicle Carefully

In order to uphold IP54, the door to the cubicle must be close safely. It must be ensured that the gasket is intact and that all 6 locks are closed carefully.

Date	Technician's Initials:	Comments

Check of Litra No.:

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 seen in the diagnosis output. Execution of diagnosis is described in chapter 4.

Set Litra No. (Before Maintenance)		Set Litra No. (After Maintenance)	
Date	Technician's Initials:	Comments	

Appendix 2 Out of Service Form

Litra Type _____ Train No. _____

DK-STM Cubicle G-No. _____

DK-STM Cubicle Serial No. _____, Subrack Serial No. _____

Describe which errors the DK-STM has. Note all the LED's indications and how the error otherwise displays itself.

Date	Technician's Initials:

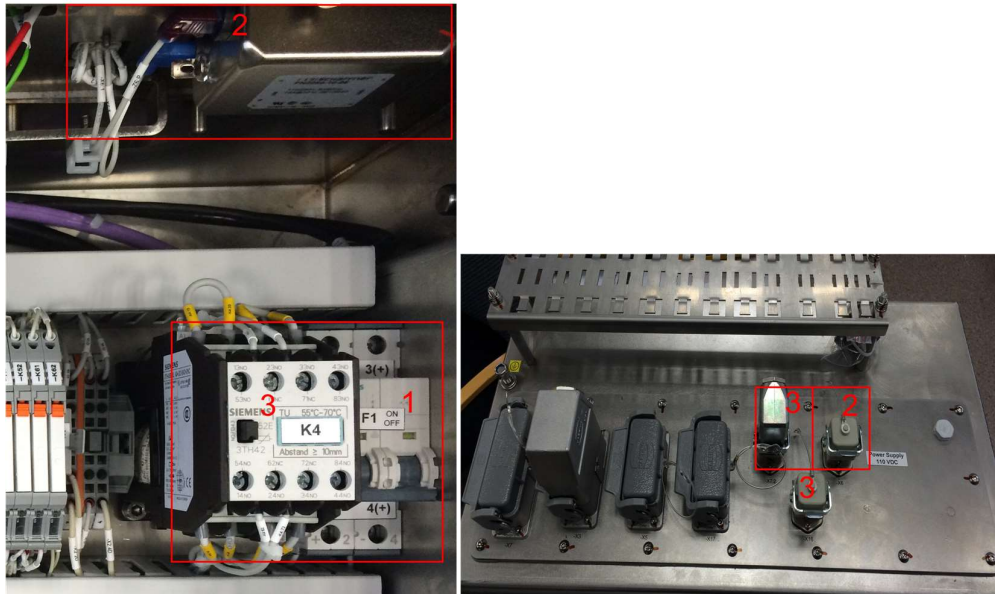
Appendix 3 Trouble Shooting Voltage Supply

Scenario: Missing Voltage Supply for Cubicle DK-STM

The points are suggestions that can be following if STM-DK is not voltage supplied.

Following should be checked:

1. Is the circuit breaker (F1) in the top of the cubicle in ON-position?
2. Is there voltage on the supply cable to the STM-DK cubicle, if necessary check relevant breakers. When voltage supply is made on cables connected to connector –X6, the cable must be dismantled and there is a measurement on pins in the plug on the cable.
3. Is the bypass relay K4 active?
Is it active, it must be examined why –K4 is activated via the plug -X7.2.





4. Is the connector plate and cable to the power supply OK?
If this is not the case, the connector plate must be replaced.

If the answers to these questions are confirmative, we have an error situation that is not treated in this document.

Appendix 4 Troubleshooting Profibus Connection

Scenario: DMI on EVC Reports Error for DK-STM

The system's DMI reports an error and it is assumed that this is due to a communication error on the Profibus between STM-DK and EVC. Following tests are suggested:

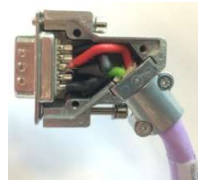
Verify that the 4 LEDs on the CPU board (slot 0) are switched on and that the green T LED on the Profibus board (slot 2) has turned on.

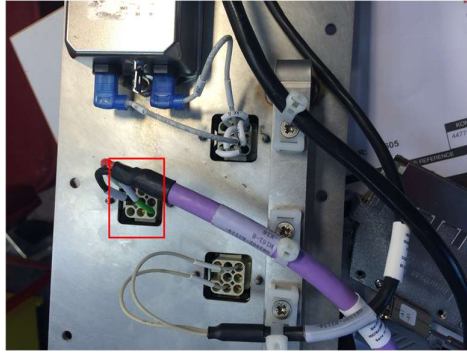
If the CPU board is OK, but not the Profibus board, then it is suggested to check the front plug on the Profibus board and the Profibus wiring in the cubicle. Be aware that there are resistors in the front plug that are connected to the Profibus board.

If this is okay, the wiring to the STM-DK cubicle plug –X16 on the connector plate is checked.

Disconnect the voltage to STM-DK, dismantle the connector on the -X16 plug, and check the connection in the cable. The cable is if necessary ohmed through.

If cables and wiring have been correctly carried out and the CPU-board and/or Profibus board do not show the correct indications, no indications or in any other way are suspected of being faulty after repetitive attempts, the STM-DK Subrack must be replaced.





Appendix 5 Brake Troubleshooting Instruction

Scenario: The brake should have been activated, but it was not

Presupposition

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.

Test 1:

Via indication on the DebugTerminal, 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 data has been received, but the brake has not been activated, the error must be found in activation of the brakes. If DK-STM has activated the service brakes, LED on K51 and K52 must light up and the traction must be cut off – i.e. LED on K61 and K62 must light up.

With regards to the emergency brake it is as follows:

Relay K1	Relay K2	Relay K3	Meaning
Released	Pulled	Pulled	Normal situation. Emergency brake not activated
Pulled	Released	Released	Emergency brake activated

If this is not the case, the voltage to the system shall be cut off and the melting fuses in the emergency brake circuit, service brake circuit and the traction circuit is checked. It must be noted that K4 can bypass the emergency brake circuit.

If all these things are OK, the X7 connector is replaced with the TestConnectorX7 and the X17 connector with TestconnectorX17, and the test is repeated.

If one or both test connectors indicate errors, then either the TIU and/or connector plate must be replaced.

If none of the connectors indicate errors, the error must be found in the train's other installations and it is not treated in this document.