DK-STM

Maintenance Manual

Cubicle

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Change Log

Version / date Design	Concerned Pages	Description	References
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	
3.01 / 10.11.2017	Page 6 Appendix 1 / Antenna Alignment	Kontext diagram updated Specifiying the CAB,when tuning antennas	
3.02 / 02.11.2020	Appendix 1 / Antenna Tuning	The interval for tuning temperature is changed to -10°C and +40°C	
3.03 / 20.06.2022	All	Minor changes and update for CPU card VE6.	

Content:

1 Introduction

This document is the maintenance manual for the DK-STM Cubicle edition, 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 Cubicle

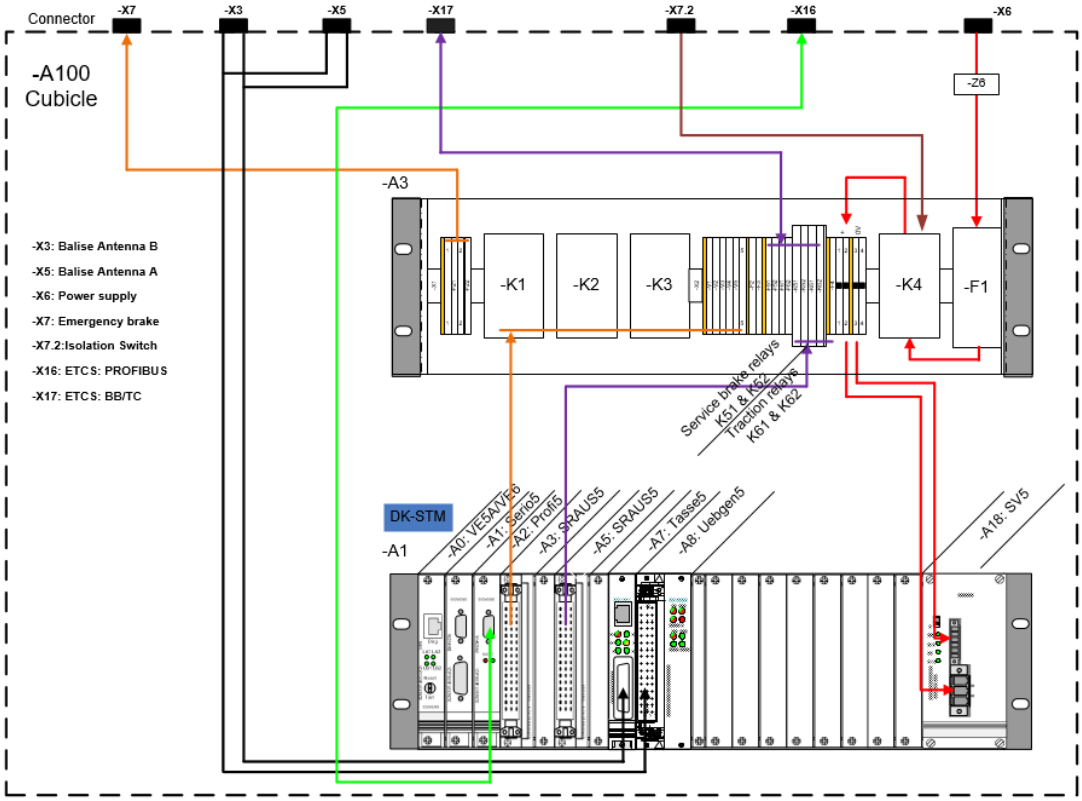


Figure 1 DK-STM Cubicle Construction

The DK-STM Cubicle consists of the 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

- STM-DK Sub rack, -A1, see Figure 2

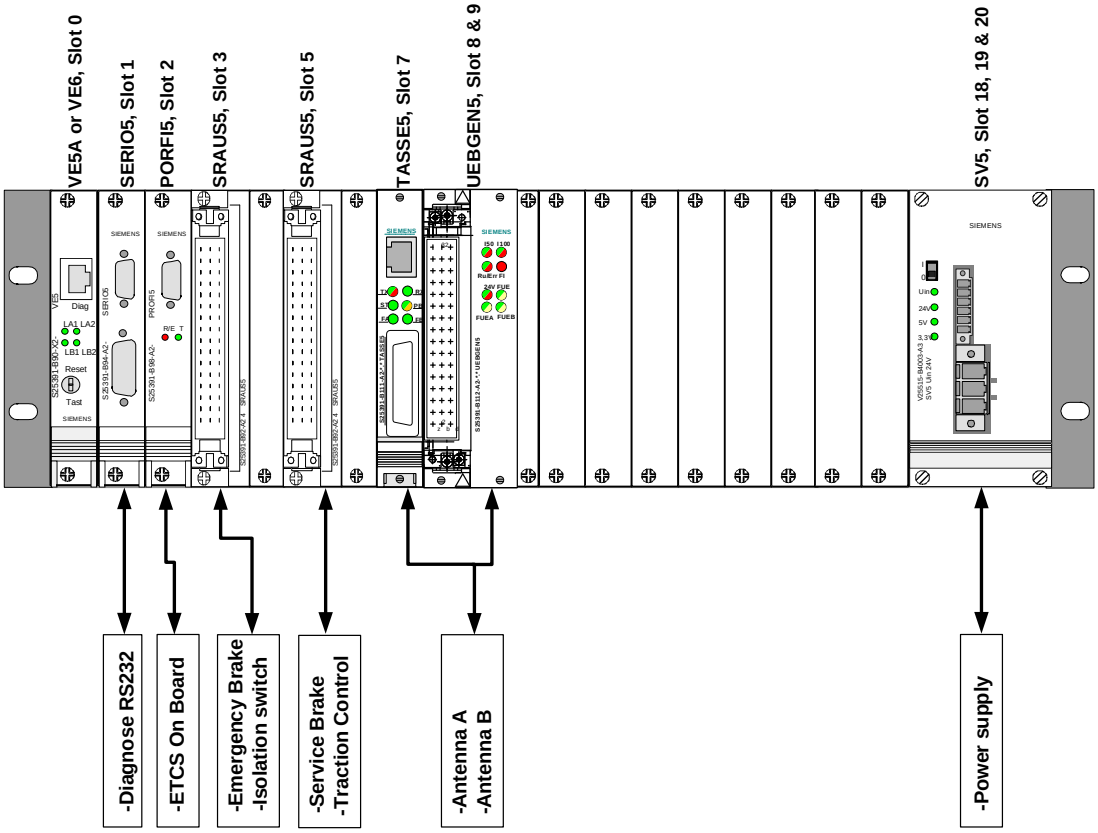


Figure 2 STM-DK Sub rack

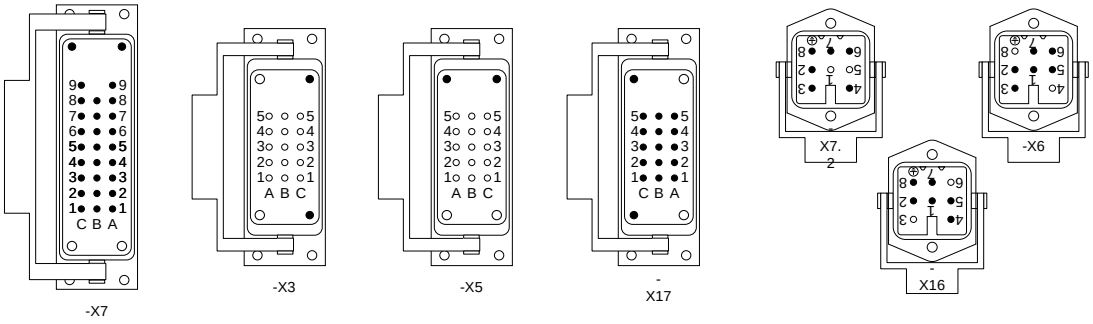


Figure 3 Connector plate seen from above

STM-DK Subrack boards:

Slot.	Board	Function
0	SIMIS TCC VE5A/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. /ApplicationRules/ for application rules.

AppRule	**Maintenance manual section**
AppRule_37	Section 2
AppRule_43	Section 2 & Appendix 1 Maintenance-Form
AppRule_174	Section 2 & Appendix 1 Maintenance-Form
AppRule_187	Section 2
AppRule_188	Section 2
AppRule_192	Section 2
AppRule_206	Section 2 & 4
AppRule_210	Section 2
AppRule_213	Section 2
AppRule_217	Section 2
AppRule_221	Section 2
AppRule_223	Appendix 1 Maintenance-Form
AppRule_224	Section 2
AppRule_225	Section 2
AppRule_226	Section 2
AppRule_227	Section 2
AppRule_228	Section 2 & 3

Table 2 Application rules.

1.2 Scope

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

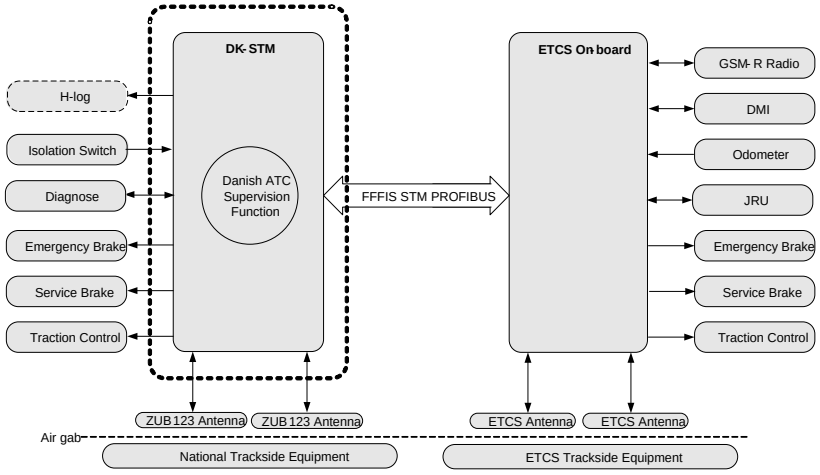


Figure 4 DK-STM Cubicle Environment

As it can be seen from Figure 4 the DK-STM Cubicle is connected directly to the 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 Cubicle has been described in the Installation Manual for the STM-DK Subrack /InstManualSubrack/, and is not mentioned further here.

Furthermore the DK-STM CUBICLE 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 the DK-STM CUBICLE takes place via DMI.

The DK-STM CUBICLE 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.

1.3 Validity

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

The STM-DK Subrack 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-.*.
or
SIMIS TCC VE6, CPU
Komponent nr. S25391-B90-X26-.*

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 DK-STM 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 Unit

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

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

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	Document Identification
/InstManualSubrack/	DK-STM, Installation Manual	IN 655.00 Q2962 V 1.11
/InstManualCubicle/	DK-STM, Installation Manual Cubicle	IN 655.00 Q4432 V 3.03
/System Description/	DK-STM, Systembeskrivelse	KN 655.00 Q2959
/ATC-Diagnose-Schnittstelle/	Description of ATC-Diagnosis Interface	G81001-E3117-U001-C
/Dokumenteret Slutafprøvning/	The DK-STM Dokumenteret Slutafprøvning	AN 656.00 Q4446
/ApplicationRules/	DK-STM Cubicle Application Rules	G81002-E3134-L001-C
/IN655.00V1260/	ATC Strækningsudrustning Installationsnorm for ATC-balise	IN 655.00 V1260
/EN50124-1/	Railway applications Insulation coordination Part 1 Basic requirements	EN 50124-1

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 /Dokumenteret Slutafprøvning/.

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 the DK-STM CUBICLE 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 CUBICLE 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, /Dokumenteret Slutafprøvning/, is carried out

2.3 Tools

The necessary tools for maintenance of the DK-STM Cubicle 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 STM-DK Subrack.
   Siemens service cable G-number: G81002-E3134-H500-A.

3. Terminal program – DebugTerminalDK-STM

4. A square key for the locks in the door of the DK-STM 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 DK-STM 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/ZUO 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 š
00;             TA        kein TA-Relais ansteuern
00;             ANGKS     Anmelde GKS
0000;           SCHLNO    Schelife-nummer
```

```
000000;         Reserve
```

2.4 Repair/Replacement general notes

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

The DK-STM Cubicle shall be powered off, before replacing any LRU.
Please note that even when removing the power supply cable, some circuits within the DK-STM Cubicle may still be under power, e.g. the emergency brake circuit
The LRU STM-DK Subrack can be powered on/off by using the switch on the LRU STM-DK Subrack/SV5.

Repair of LRU's and/or replacement of the printed circuit boards must only be carried out by a Siemens authorised repair shop.

When changing the LRU STM-DK Subrack, it shall be ensured that the new STM-DK Subrack has the identical data/software as the old one. Only then the DK-STM Cubicle/STM-DK Subrack can be used for operation

The storage life of the LRU STM-DK Subrack is limited to 10 years because of the components used.
This shall be taken into account for the DK-STM Cubicle and for the LRU STM-DK Subrack.

Please note that under special circumstances the internals of the DK-STM Cubicle may have a high temperature.

Replacement

NB: BE AWARE OF ESD.
USE WRIST BAND

2.5 Test after Repair/Replacement of LRU

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

2.5.1 DK-STM Cubicle

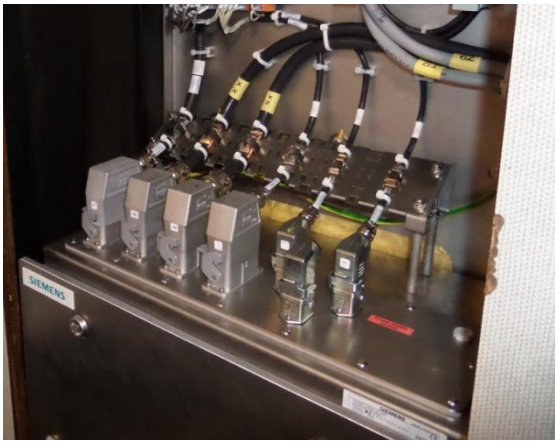
Replacement
DK-STM Cubicle *dismantling*

Presuppositions before dismantling:

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

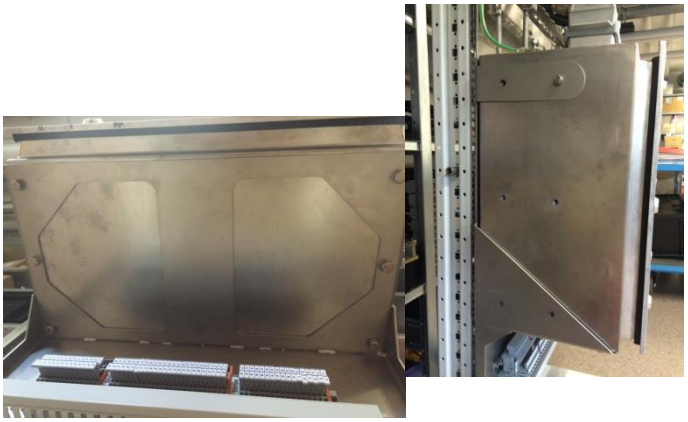
Dismantling:

2. **Connectors and cables on DK-STM Cubicle are dismantled**



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

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



5. **DK-STM Cubicle can be dismantled.**

Replacement
DK-STM Cubicle *mounting*

When changing the LRU STM-DK Subrack, it shall be ensured that the new STM-DK Subrack has the identical data/software as the old one. Only then the DK-STM Cubicle/STM-DK Subrack can be used for operation

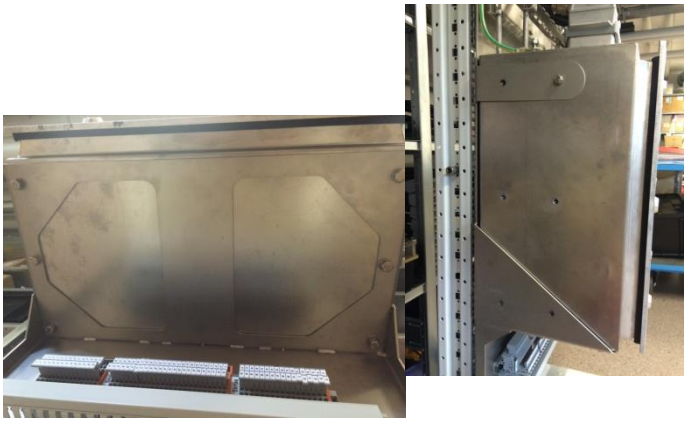
Presuppositions before mounting:

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

Mounting:

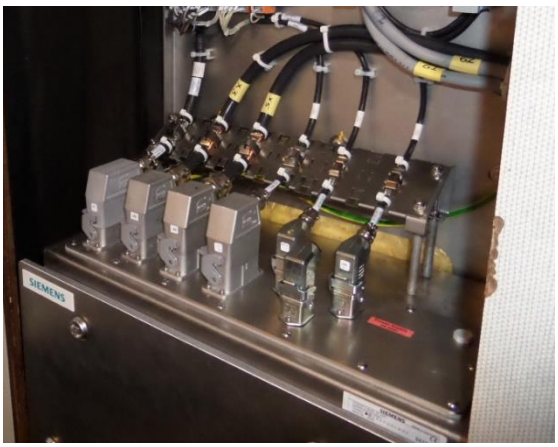
2. DK-STM Cubicle is placed on the shelf.

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



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

5. Cables and connectors are connected to the DK-STM 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 /Dokumenteret Slutafprøvning/.
9. -S1 STM – MAIN SWITCH is sealed in position ”1”.

2.5.2 STM-DK Subrack

Replacement
STM-DK Subrack dismantling

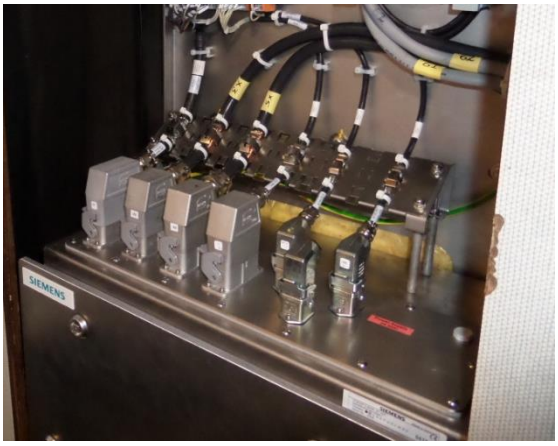
When changing the LRU STM-DK Subrack, it shall be ensured that the new STM-DK Subrack has the identical data/software as the old one. Only then the DK-STM Cubicle/STM-DK Subrack can be used for operation.
Please note if replacing a LRU STM-DK Subrack containing a VE5A CPU-board with a LRU STM-DK Subrack containing a VE6 CPU board, then the sharpened installation requirements apply, see /ApplicationRules/APPRU_228.

Presuppositions before dismantling:

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

Dismantling:

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



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

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

5. DK-STM 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 Subrack is placed in the DK-STM 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 PROFI5.
    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 DK-STM Cubicle.
7. DK-STM Cubicle is configured.

8. A completion test(incl antenna tuning) is carried out with reference to /Dokumenteret Slutafprøvning/.
9. The door is mounted on the DK-STM Cubicle.
10. -S1 STM – MAIN SWITCH is sealed in position ”1”.

2.5.3 TIU Train Interface Unit

Replacement
TIU (Train Interface Unit) *dismantling*

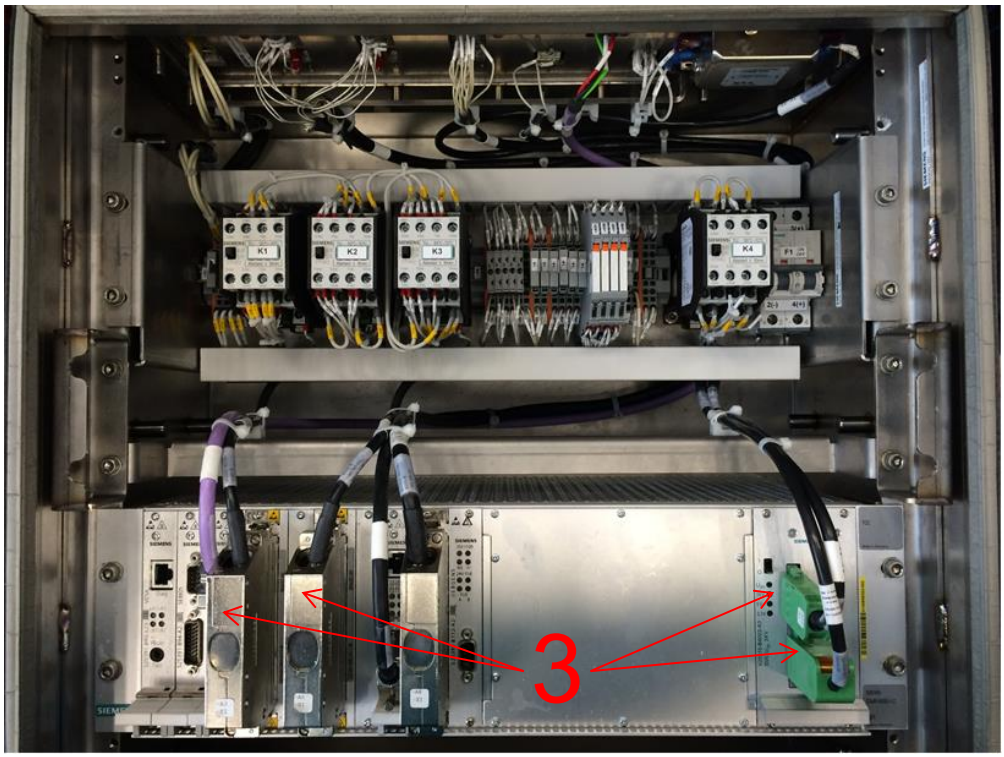
Presuppositions before dismantling:

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

Dismantling:

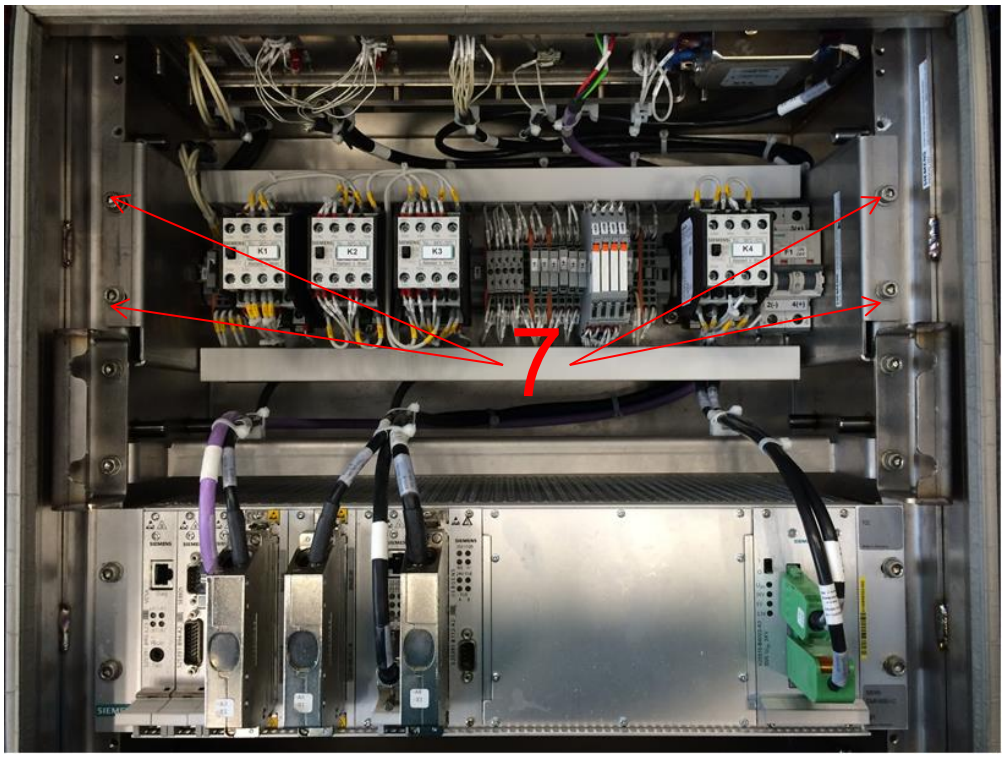
2. Connectors mounted on the DK-STM Cubicle connector are dismantled.

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



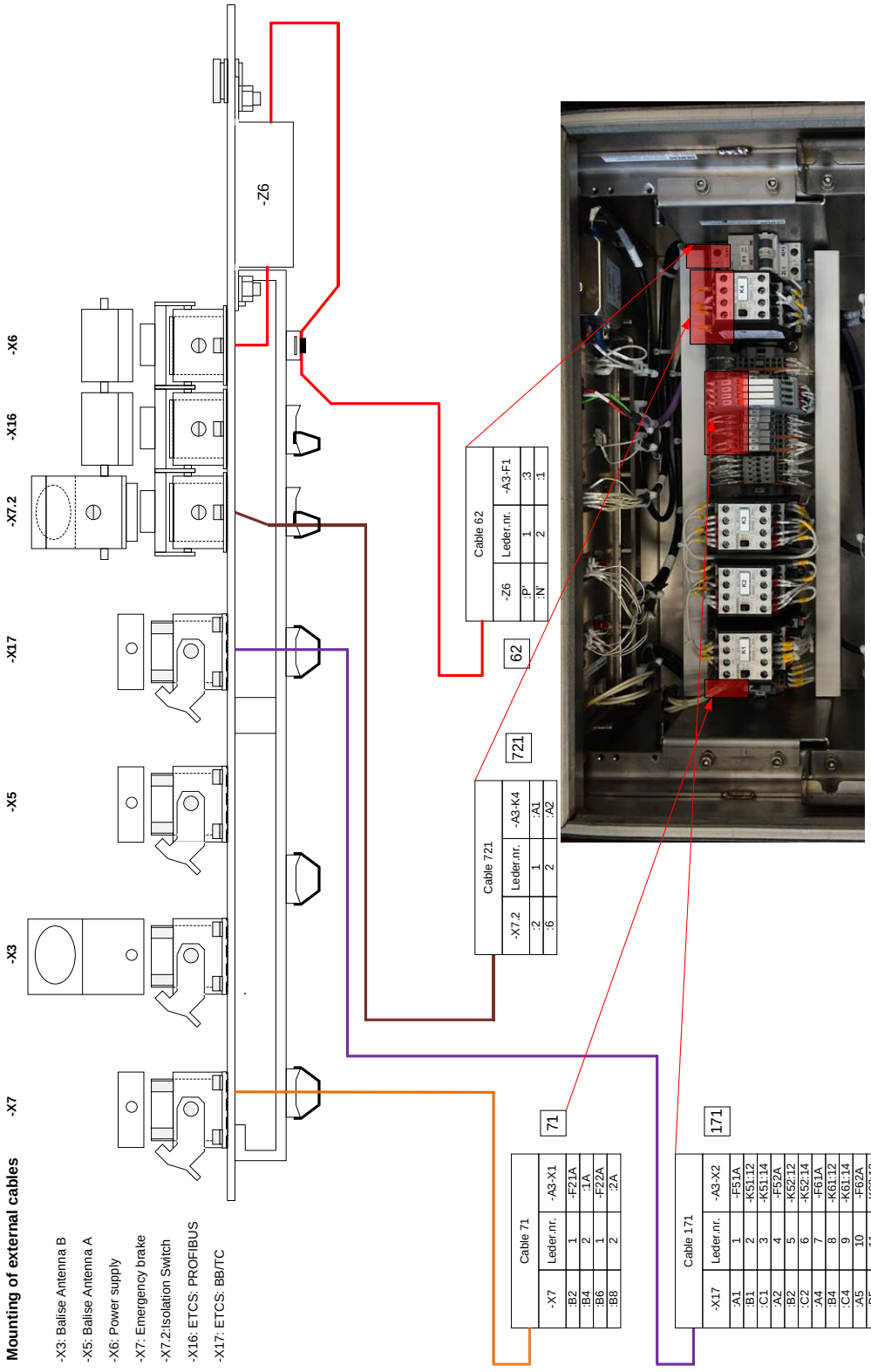
4. Strips for fastening cables that should be removed.
5. Cores in cables connected from connector plate to TIU must be dismantled at TIU (See slide 59):
    A. Cable 71
    B. Cable 171
    C. Cable 721
    D. Cable 62
6. Loose cables from connector plate are removed from the cable duct.

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



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

Replacement
TIU (Train Interface Unit)



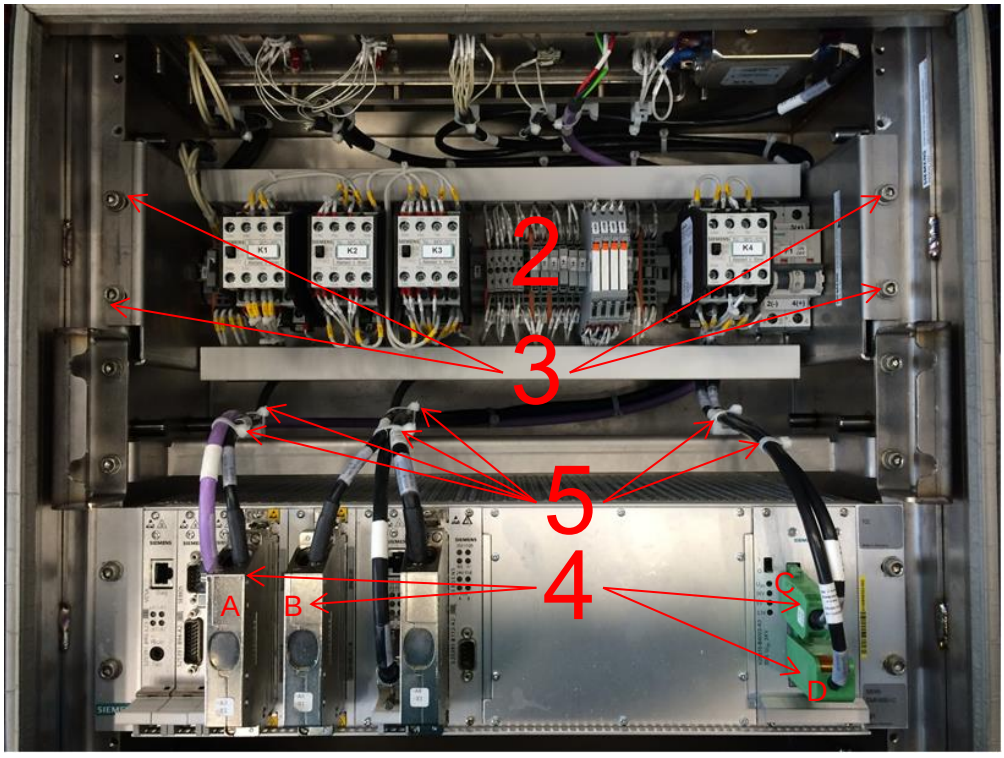
Replacement
TIU (Train Interface Unit) *mounting*

Presuppositions before mounting:

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

Mounting:

2. TIU is put in its place in the DK-STM 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 DK-STM Cubicle.
9. STM-DK is configured.
10. A completion test is carried out with reference to /Dokumenteret Slutafprøvning/.
11. The door is mounted on the DK-STM Cubicle.
12. -S1 STM – MAIN SWITCH is sealed in position ”1”.

2.5.4 Connector Plate

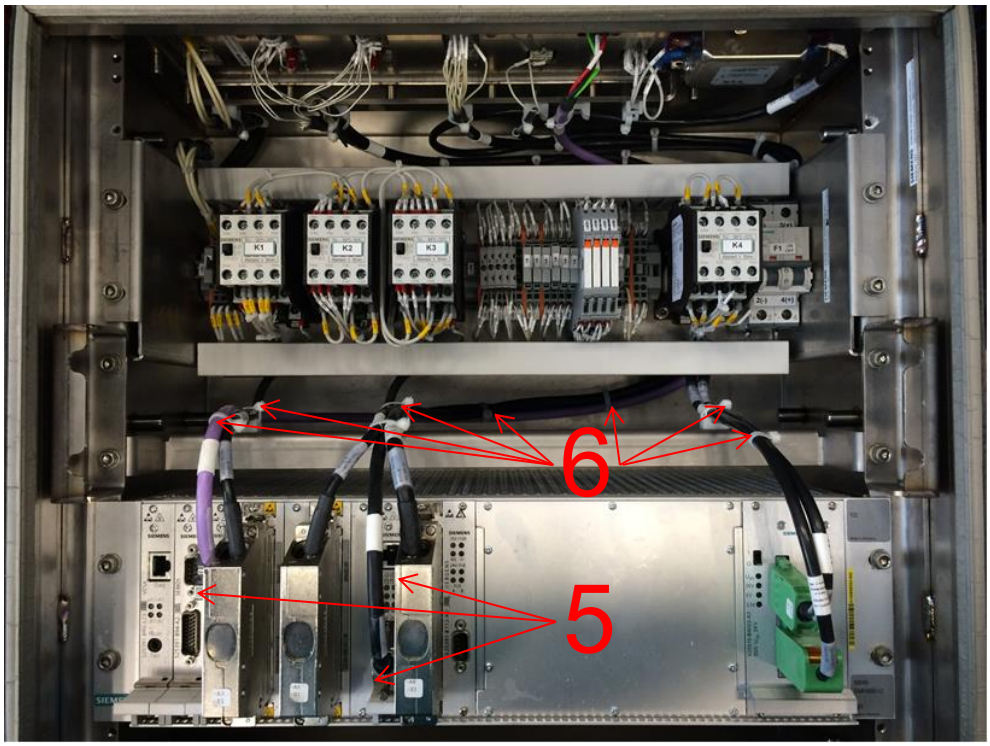
Replacement
STM-DK Connector plate *dismantling*

Presuppositions before dismantling:

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

Dismantling:

2. Connectors and cables mounted on DK-STM Cubicle connector are dismantled.
3. The door on the DK-STM 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 PROFI5.
    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.

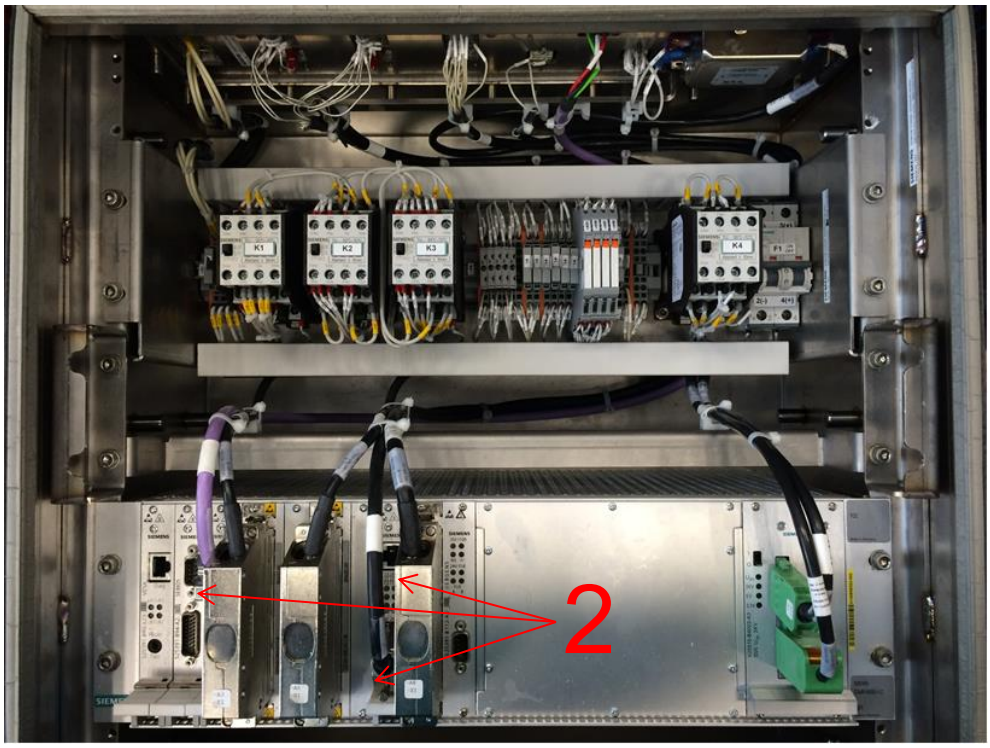
Replacement
STM-DK Connector plate *mounting*

Presuppositions before mounting:

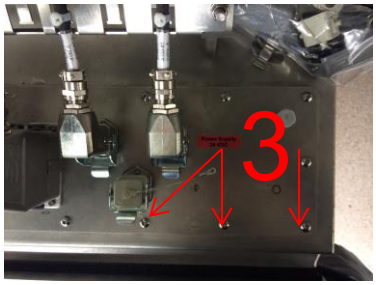
1. –S1 STM – MAIN SWITCH must be in position ”0”

Mounting:

2. Connector plate with internal cables are mounted.



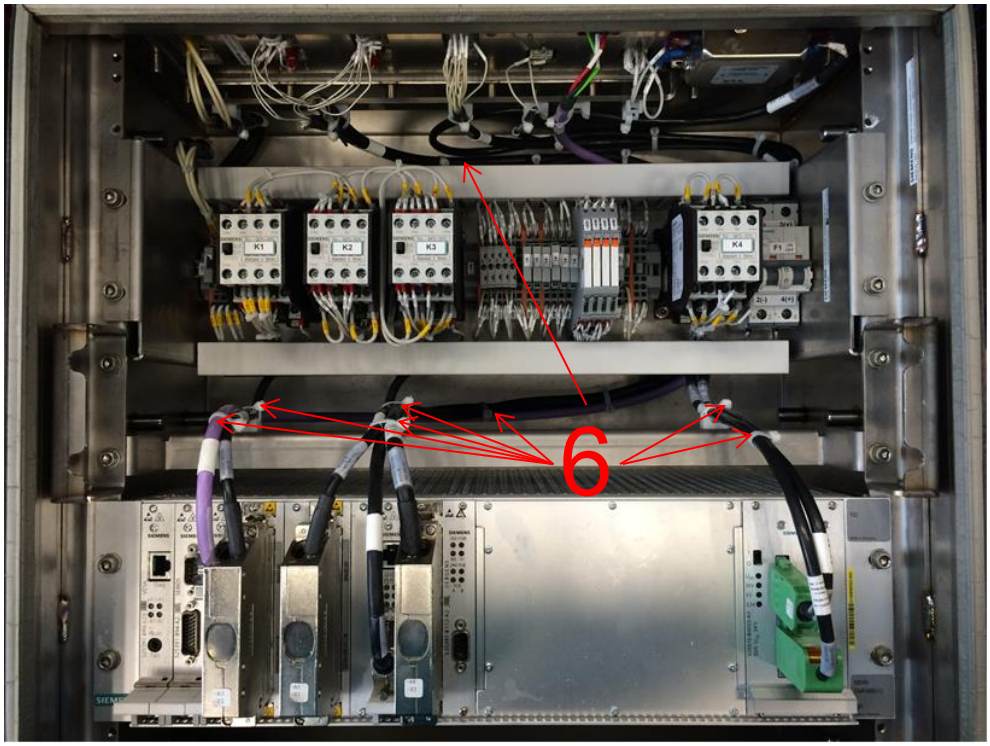
3. 16 bolts for mounting of connector plate is screwed in with 2,0 Nm +/- 0,4 Nm.



4. Plugs that must be mounted on the STM-DK subrack:
    A. Plug –A2-X1 on cable 161 is connected to PROFI5
    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.

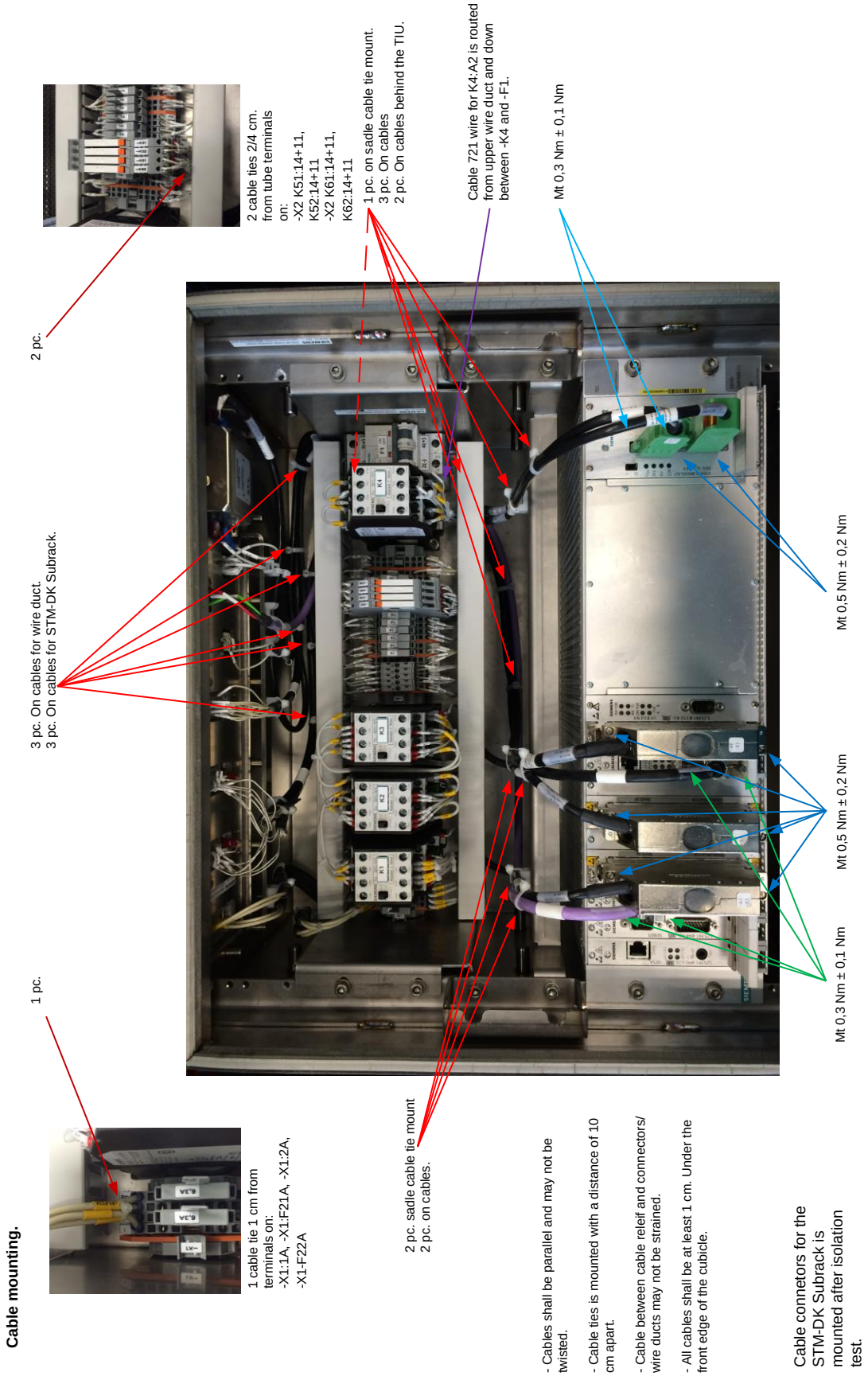


7. Connectors are mounted on connector plate on the DK-STM Cubicle.
8. STM-DK is configured.
9. A completion test is carried out with reference to /Dokumenteret Slutafprøvning/.
10. The door is mounted on the DK-STM Cubicle.
11. -S1 STM – MAIN SWITCH is sealed in position ”1”.

If only one antenna is used, Ant-A shall be used, and Ant-B shall be covered by an environmental cap(EMC version), protecting the interior of the DK-STM Cubicle against dust.

If isolation switch function is not used, the connector “-X7.2” shall be covered by an environmental cap(EMC version), protecting the interior of the DK-STM Cubicle against dust.

Mounting of cables:



Cable mounting.

2.6 Start-Up Test

After DK-STM Cubicle installation, replacement or maintenance the DK-STM Cubicle shall be restarted and it shall be verified that the DK-STM Cubicle starts up correctly. After start-up the DK-STM Cubicle shall be tested according to ref. /Dokumenteret Slutafprøvning/.
Before applying power to the DK-STM Cubicle, check that the version of the DK-STM Cubicle is suited for the applied supply voltage (i.e. 24 VDC, or 72 VDC or 110 VDC).

2.7 Connection of External Equipment

A Diagnosis-PC shall not be connected to the STM-DK Subrack, when the DK-STM Cubicle is responsible for the safety. It can be used for troubleshooting and test.
It must be ensured that no higher voltages that 60V can be applied to the diagnose interfaces even in case of failure of the connected equipment.

See section 4 for using the Diagnosis-PC.

Connection of Diagnosis-PC to VE6, VE5A or TASSE5 are reserved for authorized Siemens personnel, or personnel authorized by Siemens.
(The Diagnosis-PC shall not be connected to the STM-DK Subrack, when the DK-STM Cubicle is responsible for the safety.
For VE6: When using the UPort interface on the VE6 board, the connected Diagnosis-PC shall be CE marked, and have its cable secured against unauthorized access.)

2.8 Shipment of DK-STM Cubicle

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

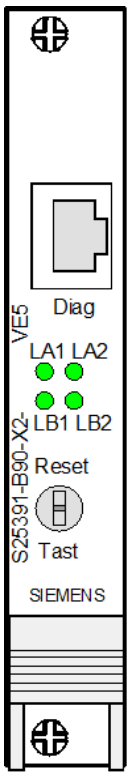
Troubleshooting of DK-STM Cubicle is made via LED's on the front of the circuit boards in the LRU STM-DK Subrack.
The following describes what can be done to identify errors.

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 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 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 syncronisation between the channels.

(2) LEDs off: Computer start-up

Green: The two CPU-channels are syncronised

Red: The two CPU-channels are not syncronised

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 are yellow or red after a restart, attempt to restart the STM-DK Subrack again. If restart does not help, replace the STM-DK Subrack(or DK-STM Cubicle).
If 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(or DK-STM Cubicle).

3.1.2 SIMIS TCC VE6, CPU

Figure 2 shows the CPU, the V6 board. Table 3 shows the meaning of the LEDs. Figure 3 shows the LED states.

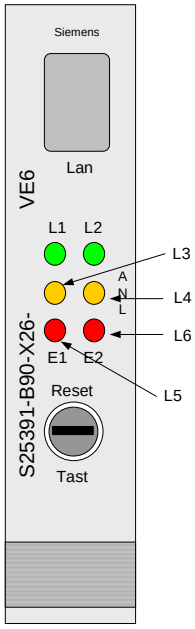


Figure 2 CPU board, SIMIS TCC VE6

LED	State	Meanin
L1	Green	Programmable via channel a (**L1**)
L2	Green	Programmable via channel a *) (**L1**)
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 3 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.

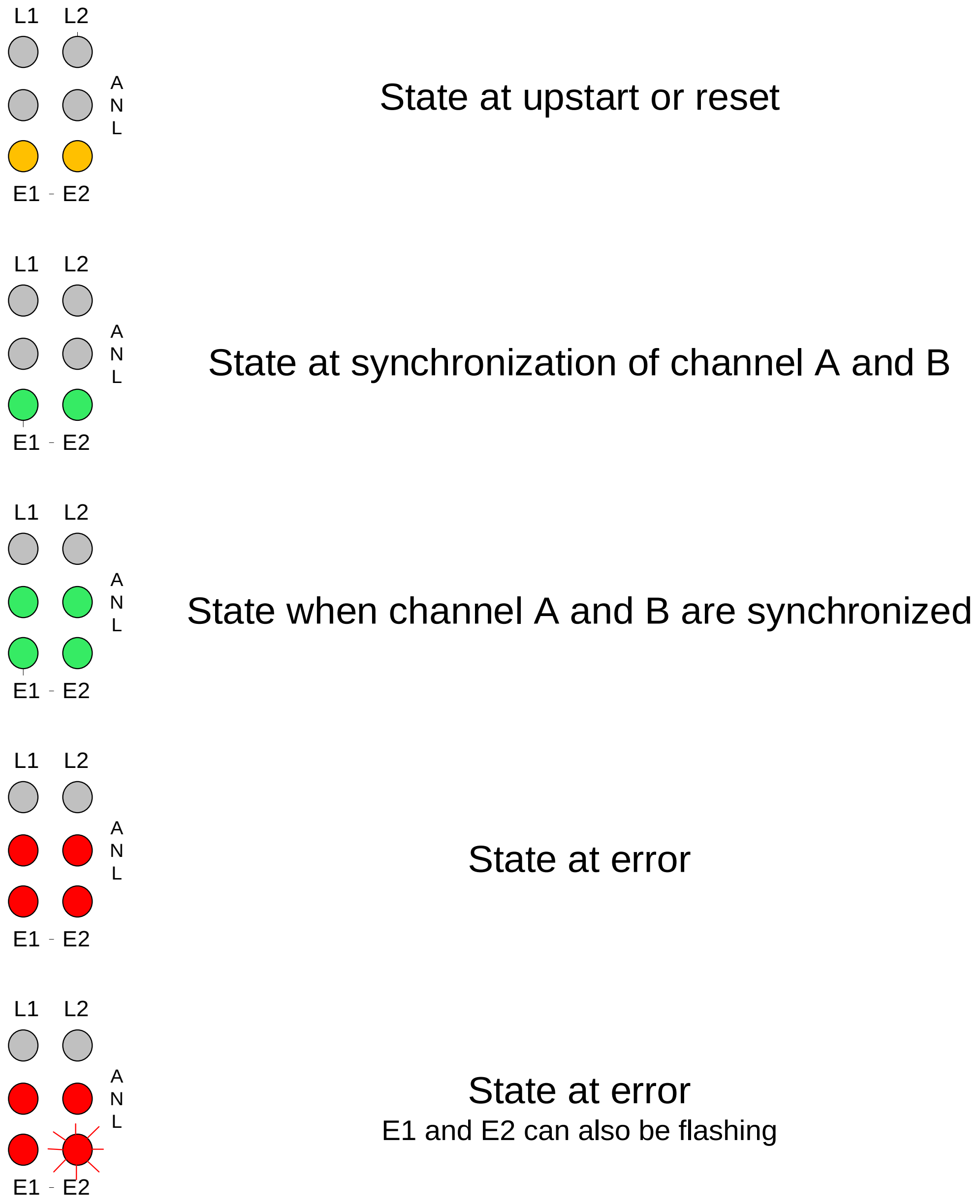


Figure 3 CPU board, SIMIS TCC VE6, LED states

E1 or E2 error flashing pattern:

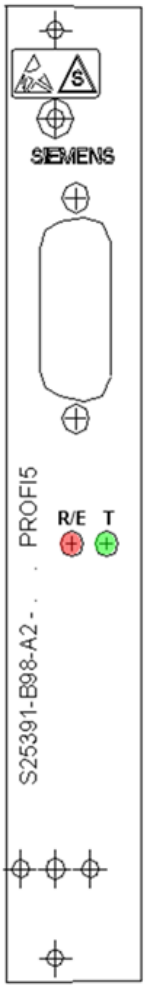
Supply failure:
Watchdog-failure:

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 (or DK-STM Cubicle).

Please note if replacing a DK-STM Cubicle/LRU STM-DK Subrack containing a VE5A CPU-board with a DK-STM Cubicle/LRU STM-DK Subrack containing a VE6 CPU board, then the sharpened installation requirements apply, see /ApplicationRules/APPRU_228.

3.2 SIMIS TCC PROFI5, Profibus Communication

Figure 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)

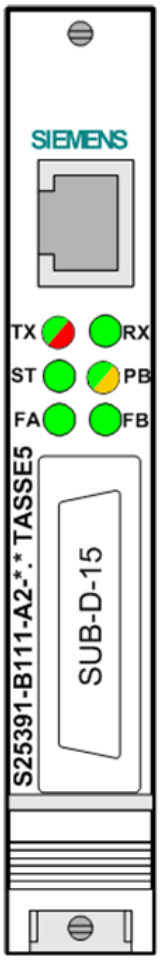
Figure 6 LED Indications on the Communication Board, SIMIS TCC PROFI5

(1) Attempt to restart LRU STM-DK Subrack. If a restart does not help, replace the LRU STM-DK Subrack (or DK-STM Cubicle). 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 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 Board SIMIS TCC TASSE5

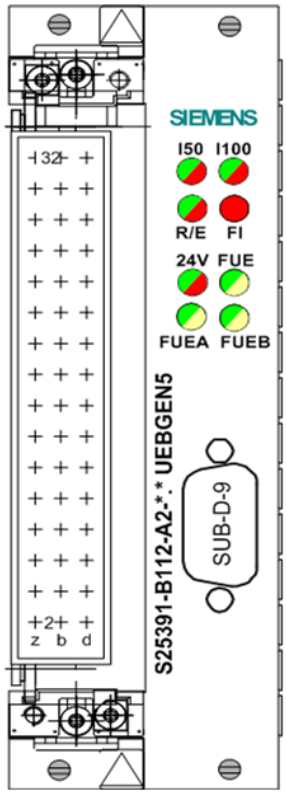
(1) For the transmission circuit TX an error in the Transmission condition will cause that the diode lights red. This means that the DK-STM must be replaced.

(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.



Description	Indications description	LED indication
(1) I50	Current 50 kHz OK Current 50 kHz Failure	Green Red
(1) I100	Current 100 kHz OK Current 100 kHz Failure	Green Red
(1) R/E	State (RUN) Failure (TCC-failure LED)	Green Red
(2) FI	No overcurrent Overcurrent	Off Red
(3) 24V	24 V Internal supply OK 24 V Under voltage (internal error)	Green Red
FUE	No Absenkung FUE Absenkung FUE	Green Orange
FUEA	No Absenkung FUEA Absenkung FUEA	Green Orange
FUEB	No Absenkung FUEB Absenkung FUEB	Green Orange

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.

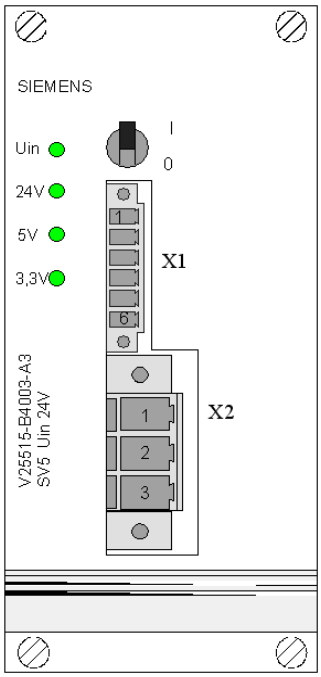
(2) When the FI diode lights red (excess current), it means that there is an error in the 50 kHz or 100 kHz circuit to the antenna, e.g. error in the antenna or the antenna cable. In this case the circuits must be troubleshooted.

(3)In case 24V lights red, the LRU STM-DK Subrack (or DK-STM Cubicle) must be replaced. If 24V lights red, 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.



1) All LED's are on
   -Power supply OK

2) All LED's are off
   - Missing power supply for STM-DK
   - Defect SV5

3) Uin LED on, (24V, 5V, 3,3V) off
   -Missing control signals: Ust, FS1, FS2 og FZG

- Signal FS1 (Pin2) and Ust (Pin1) are used in STM-DK cubicle.
- They are internally connected in connector -A18-X1.
- In case of error the wiring and/or connector must be inspected.
- FS2 and FZG are not used.
- See diagram for details.

4) Uin LED on, (24V, 5V, 3,3V) blinks:
   -Input voltage too low
   -Power supply (SV5) is to hot

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

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

The LRU 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 /EN50124-1/ basic insolation.

> Hint: Fulfilled by a laptop PS.

It must be ensured that no higher voltages that 60V can be applied to the diagnose interfaces even in case of failure of the connected equipment.

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 LRU 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. /ATC-Diagnose-Schnittstelle/ and in ref. /InstManualSubrack/ 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 LRU 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-survaillance	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 is described in ref. /ATC-Diagnose-Schnittstelle/.

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

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 the DK-STM Cubicle, the following points must be examined:
Please note that under special circumstances the internals of the DK-STM Cubicle may have a high temperature.

Cleaning

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

Inspect the DK-STM Cubicle and elements in the DK-STM Cubicle for dust and containment.
Dust and containment shall be removed.
Dust can be removed by vacuum cleaning.
Cleaning can be made with a dry cloth.

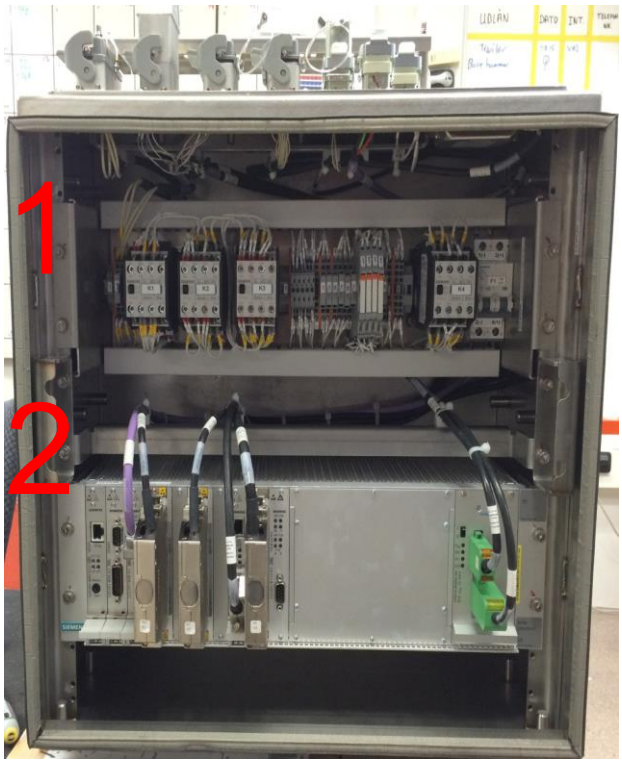
NB: Be aware of danger from static electricity.

Date	Technician's Initials:	Comments

Inspection of DK-STM Cubicle and Rack

NB: Be aware of danger from static electricity.

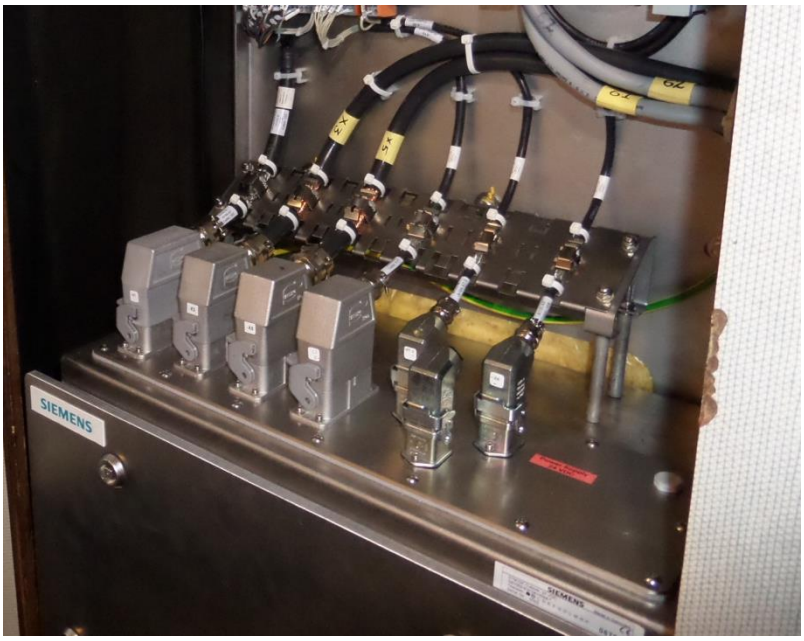
1: Check DK-STM Cubicle and elements in DK-STM Cubicle for damages.
2: Check internal wire and cable connections:
Are there any damages on wires and cables?
Have cables and wires been correctly fastened and mounted?



3: Check external cable connections:

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

Are all plugs correctly connected to the DK-STM Cubicle connectors ?

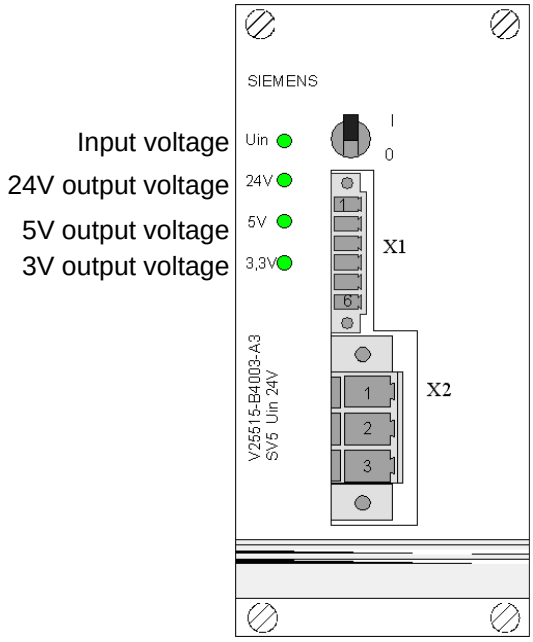


Date	Technician's Initials:	Comments

Test DK-STM Cubicle Power Supply

First step of the test of the DK-STM 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 STM-DK Subrack. See Figure 10 below.

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



1) All LED's are on
-Power supply OK

2) All LED's are off
- Missing power supply for STM-DK
- Defect SV5

3) Uin LED on, (24V, 5V, 3,3V) off
-Missing control signals: Ust, FS1, FS2 og FZG

- Signal FS1 (Pin2) and Ust (Pin1) are used in STM-DK cubicle.
- They are internally connected in connector -A18-X1.
- In case of error the wiring and/or connector must be inspected.
- FS2 and FZG are not used.
- See diagram for details.

4) Uin LED on, (24V, 5V, 3,3V) blinks:
-Input voltage too low
-Power supply (SV5) is to hot

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

Date	Technician's Initials:	Comments

Test DK-STM Cubicle's 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

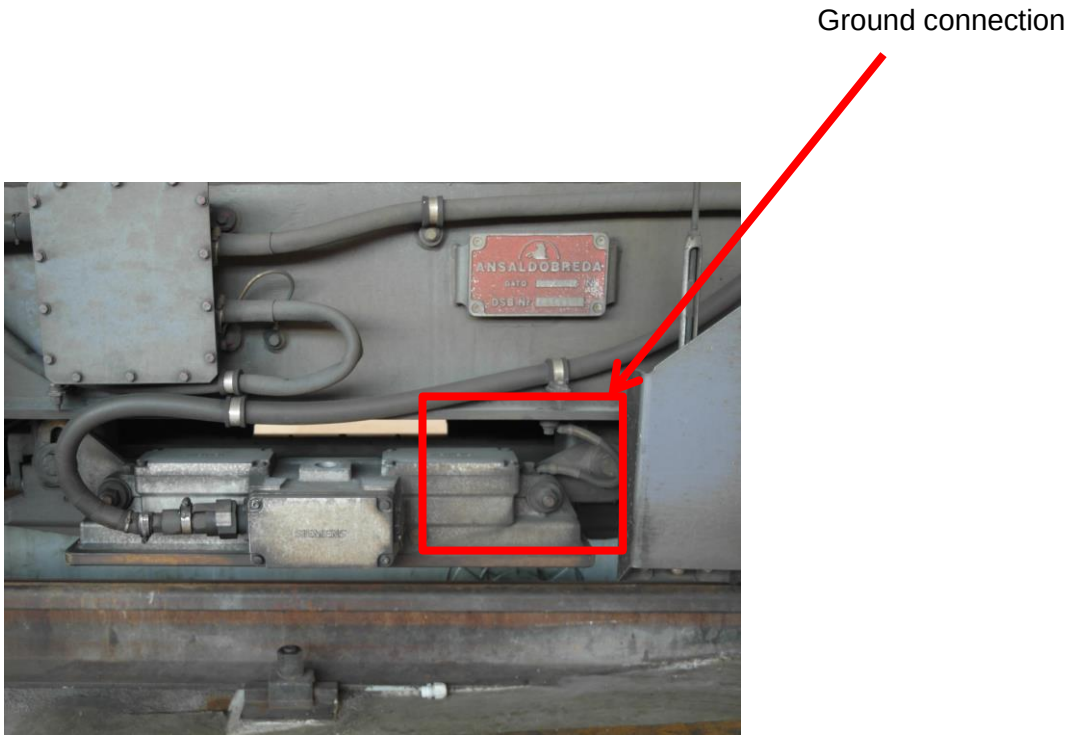
Tighten the antenna plug with torque wrench with 40 Nm.

Date	Technician's Initials:	Comments

Check Grounding Connections

Following grounding connections are checked:

1. Cable shieldings on the grounding bar for the cables connecting to the DK-STM Cubicle
2. ATC antennas
3. The grounding connection between rail vehicles (if this connection is a condition for grounding of middle vehicle cables in both ends.)
4. Grounding connection at bogie and rail vehicle.



Date	Technician's Initials:	Comments

Antenna Tuning

In connection with the maintenance work on DK-STM Cubicle, 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 Cubicle.

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 DK-STM Cubicle (incl. 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 the 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 complete the tuning, the ”X” button is pressed on the DMI.

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

Tuning of antenna A

Date	Technician’s Initials:	Comments

Tuning of antenna B

Date	Technician’s Initials:	Comments

Test of Brakes, Traction and Antenna Connections

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

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

Procedure:
DK-STM Cubicle is brought in DataAvailable (DA) with DK-STM Cubicle 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 /IN655.00V1260/. 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)
If this cannot be observed, troubleshooting is carried out as described in Appendix 5 Brake Troubleshooting Instruction.

Test Cab A antenna A

Date	Technician's Initials:	Comments

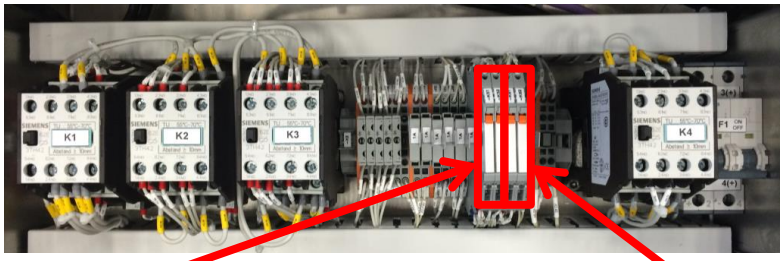
Test Cab B antenna B

Date	Technician's Initials:	Comments

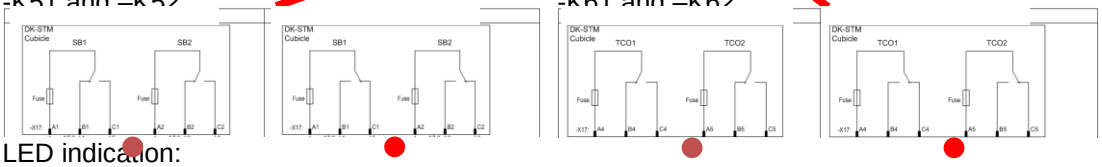
Service brake and traction cut-off - DK-STM Cubicle relay observation.

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.

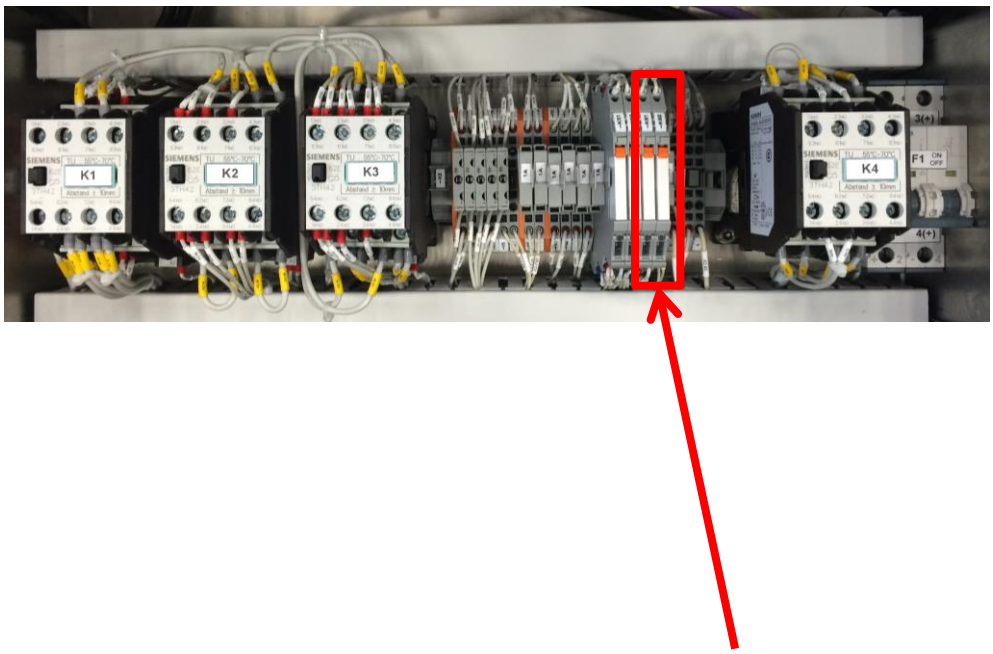


-K51 and –K52 -K61 and –K62



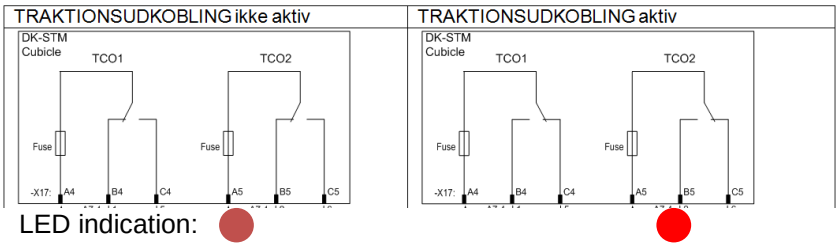
LED indication:

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.

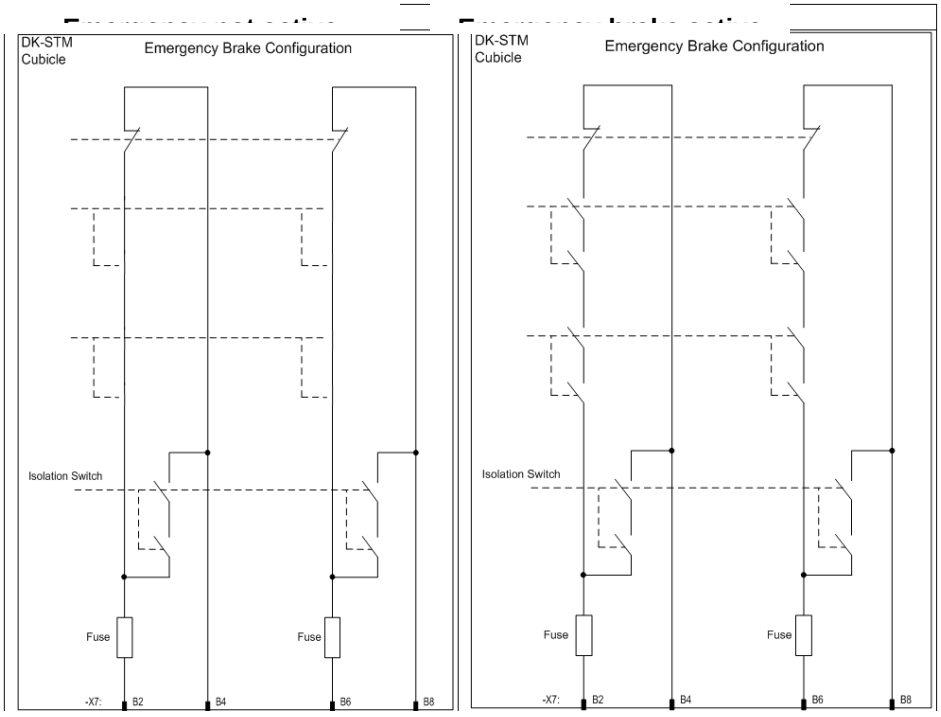


Traction cut-off shall be active

-K61 and –K62



LED indication:



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. Diagnosis is described in section 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 Cubicle has. Note all the LED's indications and how the error otherwise displays itself.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Date	Technician's Initials:

Appendix 3 Trouble Shooting Voltage Supply

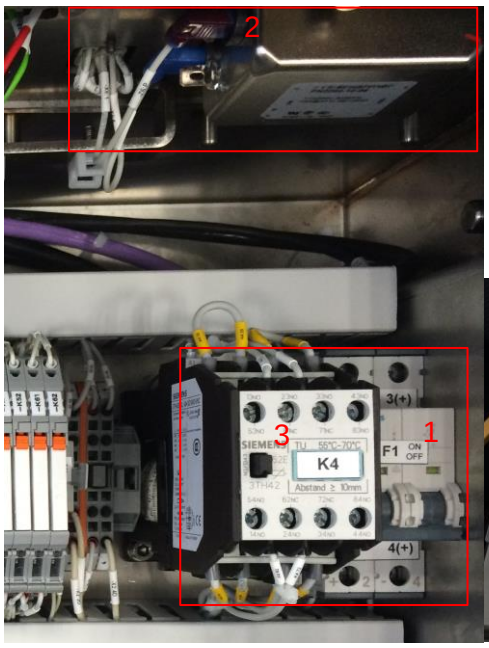
Scenario: Missing supply voltage for the DK-STM Cubicle

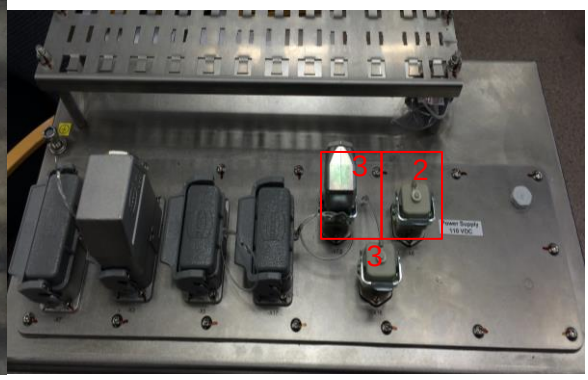
The following points are suggestions that can be followed if the DK-STM Cubicle is not supplied with power.

Following should be checked:

1. Is the circuit breaker (F1) at the top of the DK-STM Cubicle in ON-position ?
2. Is there voltage on the power supply cable to the DK-STM Cubicle (-X6) ?
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 SV5 power supply OK?

If this is not the case, the connector plate(or DK-STM Cubicle) must be replaced.
Is the switch on SV5 in position “1” ?

If the answers to these questions are confirmative, there is an error situation that is not described in this document.

Appendix 4 Troubleshooting Profibus Connection

Scenario: DMI on EVC Reports Error for DK-STM Cubicle

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

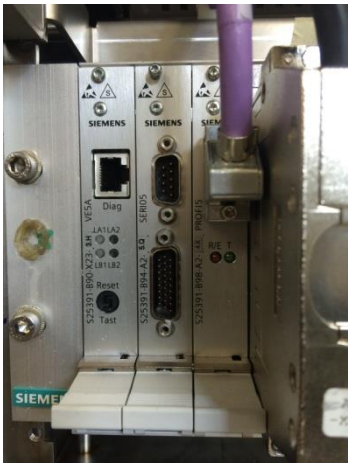
Verify that the 4 LEDs on the CPU board (slot 0) are switched on and that the green T LED on the Profibus board (slot 2) has turned on.

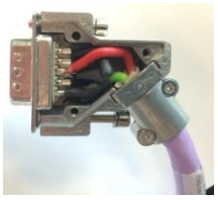
If the CPU board is OK, but not the Profibus board, then it is suggested to check the front plug on the Profibus board and the Profibus wiring in the cubicle. Be aware that there are resistors in the front plug that are connected to the Profibus board.

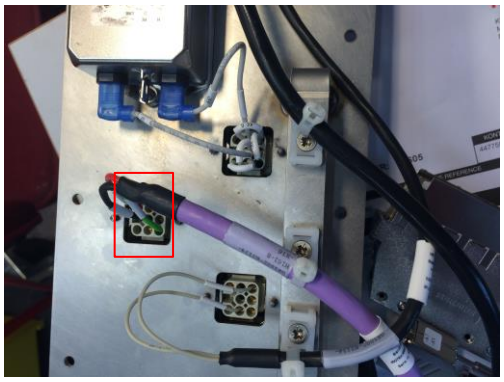
If this is okay, the wiring to the DK-STM Cubicle plug –X16 on the connector plate is checked.

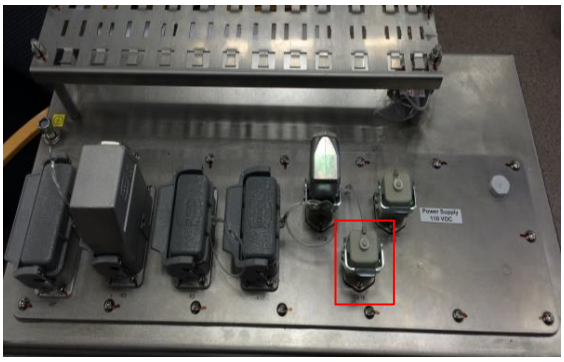
Disconnect the voltage to STM-DK Cubicle, dismantle the connector on the -X16 plug, and check the connection in the cable, and if necessary, do an end to end test of the cable.

If
cables and wiring have been checked with positive result and
the CPU-board and/or Profibus board do not show the correct indications, or there are no indications
or if they are being suspected of being faulty after repetitive attempts,
the STM-DK Subrack(or DK-STM Cubicle) 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 Cubicle 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 supply voltage to the system shall be cut off and the melting fuses in the emergency brake circuit, service brake circuit and the traction circuit must be checked.
Please note 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 (or the DK-STM Cubicle).

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