ITC2100-BOS

Operation and Service Manual

History

Date	Version	Remark	Editor
12.02.2009	1.01	First edition	P.Nagele
12.03.2009	1.02	Additional hint in chapter 7.6	P.Nagele
08.01.2014	1.03	Additional cards	P.Nagele

References

Date	Version	Title

Content

Abbreviations

AC	Alternating Current
BSC	Base Station Controller
COM	Communication Port
CPU	Central Processing Unit
DFSK	Digital Frequency Shift Keying
EC	European Community
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Standards Institute
EU	European Union
HD	Hard Disk
HF	High Frequency
HW	Hardware
IDE	Integrated Drive Electronics
ITC	Intelligent Transceiver Controller
LAN	Local Area Network
LED	Light Emitting Diode
PE wire	Polyethylene wire
POCSAG	Post Office Code Standardisation Advisory Group
PS	Power Supply
PWR	Power
RAM	Random Access Memory
RF	Radio Frequency
R&TTE	Radio and Telecommunications Terminal Equipment
Rx	Receiver
SINAD	Signal to Noise and Distortion
SW	Software
TCP/ IP	Transmission Control Protocol/ Internet Protocol
TRx	Transceiver
Tx	Transmitter
U	Height Unit (1U = 44.45mm)
USB	Universal Serial Bus
VAC	Voltage Alternative Current
VDC	Voltage Direct Current
VGA	Video Graphics Array
VHF	Very High Frequency

1 Introduction

1.1 Purpose

This manual describes the set-up, configuration, operation and maintenance to service level 2 (module exchange basis) of the ITC2100-BOS.

1.2 General Information

This manual is intended for experienced technicians with the skills required for installing these systems.

Note: During the lifecycle of the ITC2100-BOS, software or hardware modifications are possible at any time. Such modifications will be taken into account with later versions of the manual.

This manual describes the software release: V3.13 and V4.2.2

1.3 Use of the System

The ITC2-100-BOS is a base station that receives and retransmits synchronised digital POCSAG alarm messages in a radio network. This base station can be used for the construction of a synchronised radio paging network.

2 Safety Instructions

Important:

Only personnel trained and certified by Swissphone are allowed to open the ITC2100-BOS!

The manufacturer accepts no responsibility whatsoever for damage or injuries which occur due to non-compliance with this safety notice or through improper handling of the appliance!

2.1 General Safety Measures to be Observed

- Do not put the emitter into operation if someone is located in the immediate proximity of the antenna (min. Distance 2m).
- Service to any item of the equipment is to be carried out exclusively by qualified service technicians.
- Commissioning of the base station may only be carried out by the company SWISSPHONE or by its contract or sales partners or by any person who has been duly authorised by the company SWISSPHONE.
- Only commission the base station when all open connections have been correctly terminated and the high frequency connections are linked.
- The appliance is to be installed or mounted in a rack so that in case of emergency all poles can be separated from the network. The network plug or the appliance plug must be accessible. An additional option would be a switch in the indoor installation near to the appliance.
- Ensure that all appliances which are to be connected to the outlets of the ITC2100-Repeater meet the required safety standard (EN 60950-1:2001).
- The appliance is designed to operate in a network with a 90V-260VAC, 50-60Hz mains supply.
- The ITC2100-BOS is designed to operate inside buildings where it is protected from lightning, water and direct sunlight.
- Do not open the appliance when power is switched on unless you have been trained and authorised to carry out such work by Swissphone.
- Ensure that no moisture, steam or liquid can enter the appliance. Consequently no liquids are to be placed in its vicinity. Do not use any liquid cleaning materials which can damage the appliance or possibly cause an electric shock.
- Do not install the appliance near heating units or appliances.
- Only use original parts or parts which have been recommended by your supplier in order to prevent risk of damage to your appliance or risk of injury to persons. Non-compliance with this warning terminates the appliance guarantee. Adjustments and repairs may only be carried by qualified specialists.

2.2 Precautionary Measures when Handling the Rechargeable Batteries

2.2.1 General

- Do not dispose of rechargeable batteries in a fire.
- Ensure that the battery connections cannot become shorted.
- Do not open the rechargeable batteries.
- If, after damage to a rechargeable battery, diluted sulphuric acid should comes into contact with the skin or clothing, immediately wash off the skin or clothing with water. If diluted sulphuric acid comes into contact with the eyes, immediately spray the eyes copiously with water and consult a doctor.
- Please read the related instructions before using the rechargeable batteries.
- It is recommended to replace the batteries at the latest every 3 years.
- Always use the battery type recommended by Swissphone

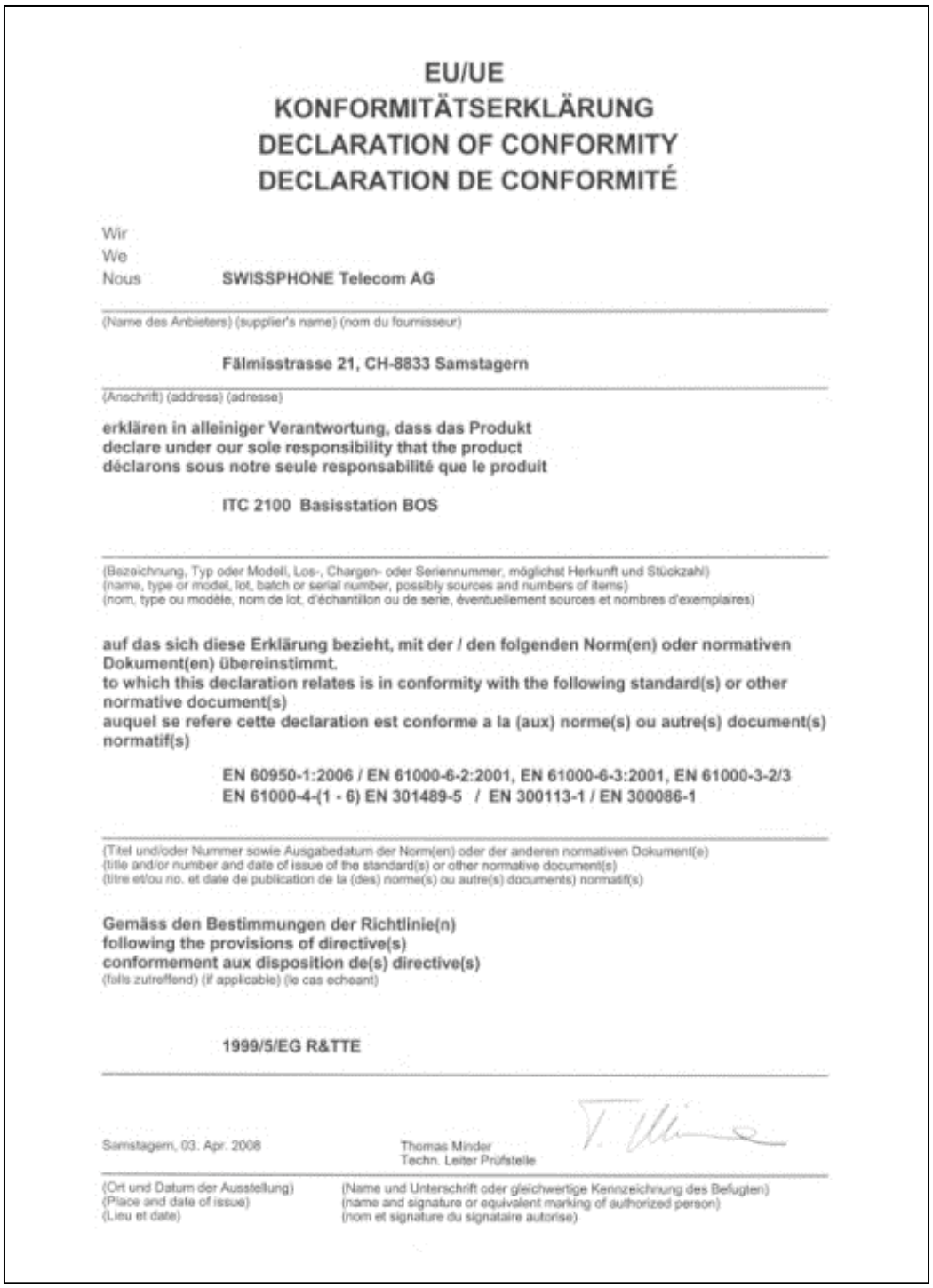
2.2.2 Storage of Batteries

- Never store the rechargeable battery near to a fire.
- In general, lead acid batteries self-discharge approximately 3% to 5% per month. The discharge curve of the used pbq 12-12 batteries remains relative flat until 20% has been discharged, after which the discharge rate increases. It is not advisable to permit a self-discharge level below 60% of the capacity. When no load is connected and the battery has a 60% capacity its voltage is approximately **12.6V. When this condition is reached, recharge the battery.**
- In general, stocked batteries should be measured and recharged at least **every 6 months**. Recharge the batteries as soon as possible if they become discharged.
- If a battery is not to be used for a long period, store it in a cool location where the temperature will not fall below 0℃!
- Do not store partly discharged batteries, as they will lose capacity. This is an irreversable process.

Note: If the ITC2100-BOS is to be stored, it is recommended by Swissphone to disconnect the battery from the ITC2100-BOS in order to prevent fast battery discharge.

3 EU Declaration of Conformity

The ITC2100-BOS meets the harmonised ETSI standards of the European R&TTE Directive 99/5/EC.



EU/UE
KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITÉ

Wir
We
Nous **SWISSPHONE Telecom AG**

(Name des Anbieters) (supplier's name) (nom du fournisseur)

Fälmisstrasse 21, CH-8833 Samstagern

(Anschrift) (address) (adresse)

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seule responsabilité que le produit

ITC 2100 Basisstation BOS

(Bezeichnung, Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl)
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)
(nom, type ou modèle, nom de lot, d'échantillon ou de serie, éventuellement sources et nombres d'exemplaires)

auf das sich diese Erklärung bezieht, mit der / den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt.
to which this declaration relates is in conformity with the following standard(s) or other normative document(s)
auquel se refere cette declaration est conforme a la (aux) norme(s) ou autre(s) document(s) normatif(s)

EN 60950-1:2006 / EN 61000-6-2:2001, EN 61000-6-3:2001, EN 61000-3-2/3
EN 61000-4-(1 - 6) EN 301489-5 / EN 300113-1 / EN 300086-1

(Titel und/oder Nummer sowie Ausgabedatum der Norm(en) oder der anderen normativen Dokument(e)
(title and/or number and date of issue of the standard(s) or other normative document(s)
(titre et/ou no. et date de publication de la (des) norme(s) ou autre(s) documents) normatif(s)

Gemäss den Bestimmungen der Richtlinie(n)
following the provisions of directive(s)
conformement aux disposition de(s) directive(s)
(falls zutreffend) (if applicable) (le cas echeant)

1999/5/EG R&TTE

Samstagern, 03. Apr. 2008

Thomas Minder
Techn. Leiter Prüfstelle

(Ort und Datum der Ausstellung)
(Place and date of issue)
(Lieu et date)

(Name und Unterschrift oder gleichwertige Kennzeichnung des Befugten)
(name and signature or equivalent marking of authorized person)
(nom et signature du signataire autorise)

Fig. 3-1: Declaration of Conformity for the ITC2100-BOS

4 Notices for Customers in the U.S.A and Canada

NOTICE:

This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC WARNING:

Changes or modifications made to this equipment not expressly approved by Swissphone may void the FCC authorization to operate this equipment.

FCC Radio Frequency Interference Statement:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Class A digital device: A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

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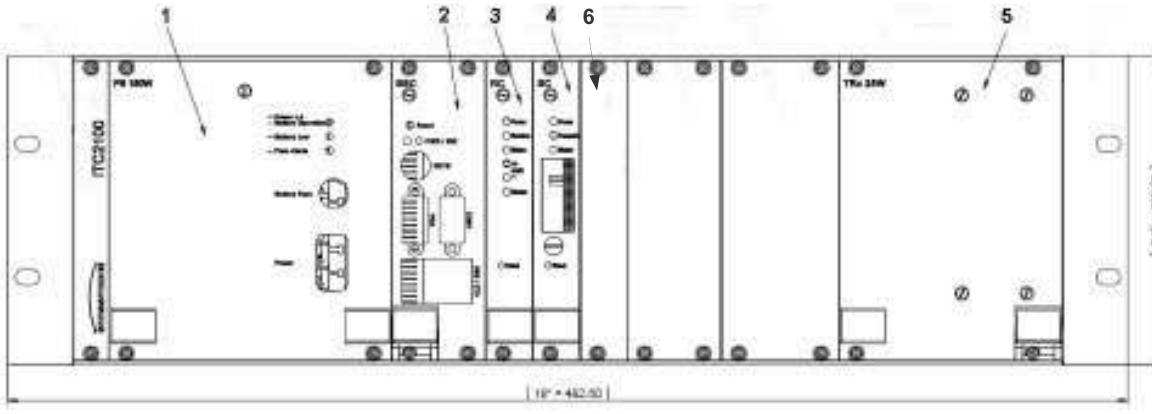
5 System Description

5.1 ITC2100-BOS Hardware

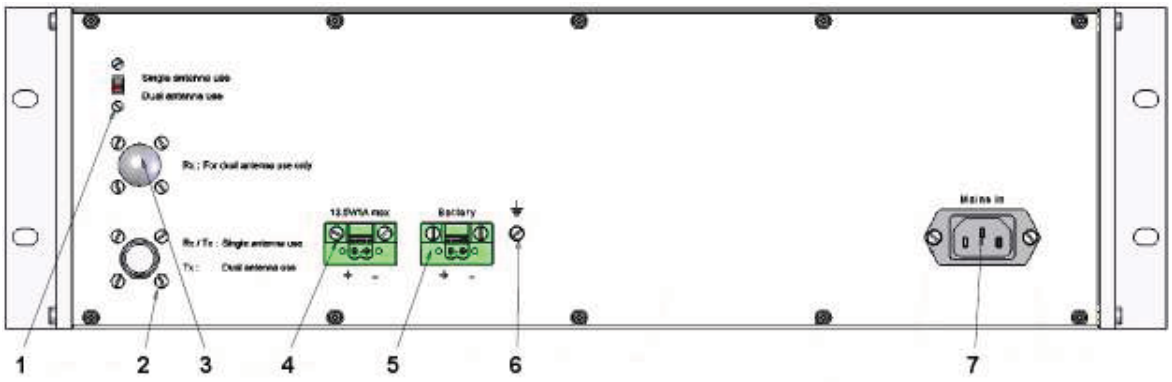
5.1.1 Front side



The ITC2100-BOS consists of the following moduls:

1) Power supply module (PS 150W)
2) Controller module (BSC)
3) POCSAG decoder card (RC or RC09)
4) Synchro card (SC)
5) Transceiver module (TRx 25W)
6) Slot for an optional plug-in module, such as:
   - I/O card
   - Interface card (S-Com) or GPS receiver card (GPS) to connect the GPS antenna (for multi-master operation)

5.1.2 Back side



The back side of the ITC2100-BOS consists of the following connections:

1) Slide switch[1] for usage of one or two antenna connections
2) Coax N-type, 50 ohm, for combined transmitting (Tx) and receiving (Rx) antenna in case of single antenna use mode (standard) or for transmitting (Tx) antenna only in case of dual antenna use mode
3) Coax N-type, 50 ohm, for receiving (Rx) antenna in case of dual antenna use mode
4) Connection (screw connector) for powering external devices with 13.5V/1Amax
5) Battery connection Pb12V / 12Ah (screw connector)
6) Battery earthing
7) Mains 230V

5.2 Technical Data

Type:	ITC2100-BOS
Dimensions (WxHxD):	483mm (19" rack) x 134mm (3U) x 315mm
Weight:	8.5 kg
Protection class:	IP 20
Operating temperature range:	-25 to +55℃
Mains supply:	90-264VAC/ 47-63Hz
Mains fuse:	T4 A / 250V
Emergency power supply:	External battery 12V
Battery fuse:	T12.5A/ 250V
Battery operation:	3h at 15W transmit power and Tx:Rx = 1:4 (@12Ah battery)
Power consumption:	max.150W
Frequency band:	144-174MHz (different bands available)
Tx output power:	1-25W
Baud rates:	512 / 1200 / 2400 bps
Channel spacing:	12.5/20/25 kHz
Compliance with EU regulations:	ETS 300113, ETS 300086, EN 60950, EN 50081-2, EN 50082-2, EN 61000-3-2/3

[1] At ITC2100 models without slide switch the setting will be done via internal jumper

5.3 Functional Description of the ITC2100-BOS

5.3.1 Functional Interfaces

5.3.1.1 Master-ITC Interfaces

	ITC Input		ITC Output	
Purpose	**HW interface**	**Protocol**	**HW interface**	**Protocol**
Alerting / Monitoring	Ethernet RJ45	Swissphone protocol[2] over TCP/IP	N-type 50Ω	POCSAG over paging frequency
Alerting	RS232 D-Sub9	MIP11++[3]		

5.3.1.2 Slave-ITC Interfaces

	ITC Input		ITC Output	
Purpose	**HW interface**	**Protocol**	**HW interface**	**Protocol**
Alerting / Monitoring	N-type 50Ω	POCSAG over paging frequency	N-type 50Ω	POCSAG over paging frequency
Alerting (on next rings)	RS232 D-Sub9	MIP11++		

5.3.2 Wave Network Configuration

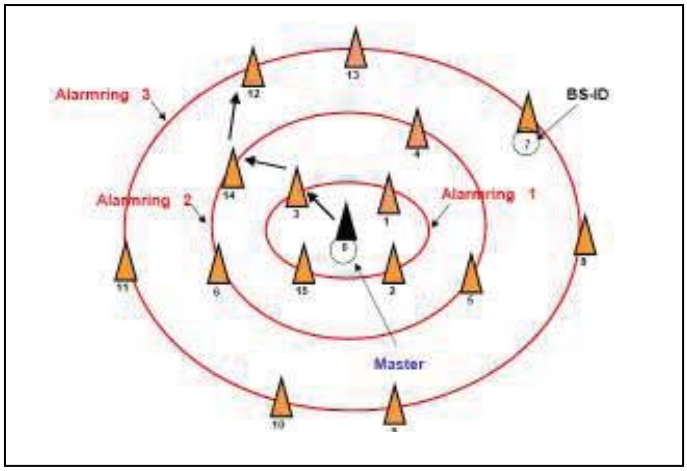


Fig. 5-1: Typical wave network with ITC2100-BOS

[2] Swissphone alerting software (i.e. Digicom) use this protocol. A command & control centre is able to transmit a paging message by communication with the Swissphone alerting software via the public Swissphone protocol TMIP.

[3] Swissphone public access protocol

The data to be transmitted is passed from a digital paging network controller directly to the Master-ITC (ITC 0) employing a TCP/IP protocol. The Master ITC retransmits the received alert messages. The digital pagers located in the radio coverage of the Master ITC are then alerted. At the same time the Slave ITC's in alarm ring 1 receive the alert message. As soon as the complete message has been received these ITC's then retransmit the message to each other fully synchronised.

The pagers located in the radio coverage area of the Slave ITC's are also alerted. At the same time the Slave ITC's in alarm ring 2 receive the alarm message and so on. In this way the alarm travels through the complete coverage area of the system.
In addition to alarm the complete system or any individual ITC can be polled and configured using specific system messages.

5.3.3 Multimaster Wave Network Configuration Using ITC2100-BOS

The basic concept of Multimaster networks is that they permit the alerting of large regions. Several interconnected sub-networks (e.g. several rural districts), each consisting of a wave network with a Master ITC, receive the synchronised alarm signal which is triggered by an interregional command and control centre. Due to multimaster operation, a large region consisting of a combination of sub-networks, can be simultaneously alerted with an alarm time that remains the same. The master ITC's in the sub-networks receive the alarm data at the same point in time from the command and control centre. The Master ITC's transmit their alarm messages bit synchronised at the prescribed transmission time which is synchronised using a time reference (e.g. via GPS).

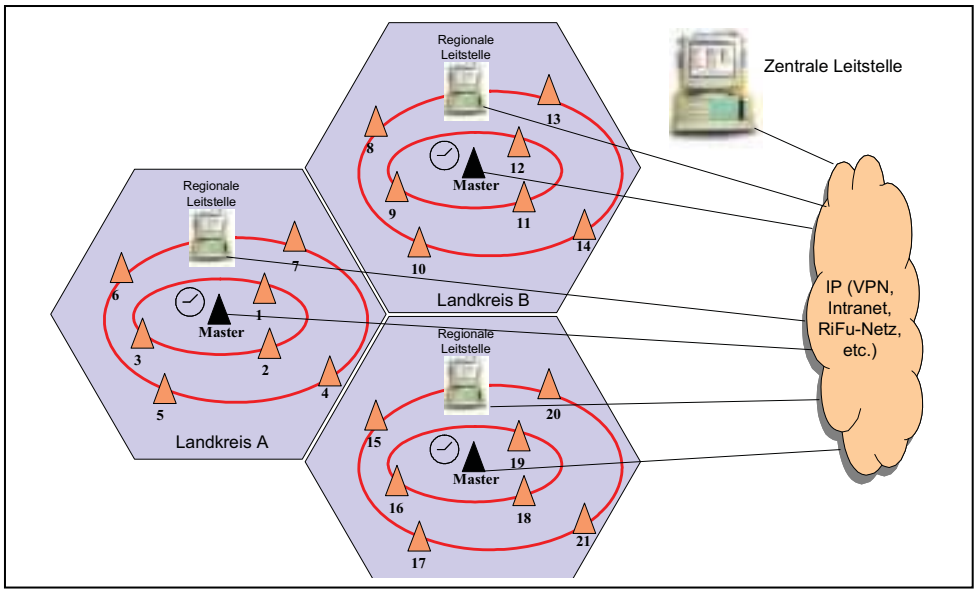


Fig. 5-2: Multimaster wave networks with ITC2100-BOS

5.3.4 Emergency Operation in Multimaster Wave Networks with ITC2100-BOS

If a failure occurs in the link from several Multimaster ITC's to the command and control centre or there is a fault in the time reference, the transmission over the complete system is carried out in an emergency mode via the remaining Master ITC links. In emergency mode the information is transmitted from the command and control centre to these Master ITC's

which then pass it on to Slave ITC's.

The Slave ITC's receive the alarm messages which were retransmitted for a particular alarm ring. Instead of simply retransmitting as in normal mode, when the received messages belongs to the assigned ring, the Slave ITC's also retransmit if the message is intended for a higher ring and they have not already transmitted this message. Because in emergency mode the number of rings is higher (1 –16), this means that the message is also dispersed in subnetworks which contain a failed Master ITC's.

Example:
Assumption as shown in figure 4-3 below: The Master-ITC's in rural district B und C cannot transmit time synchroned (link failure, time reference fault). The the message from the network alarm controller only reaches the Master ITC in rural distrct A. This master ITC transmits the alarm message with emergency information over the ring structure to its Slave ITC's (❶). The Slave-ITCs in the other rural districts B and C, which border rural district A, receive the signals via rural district A's Slave ITC's (❶+❷+❸), as if the station were in another ring. These Slave ITC's then retransmit the messages.

Information/Figure below:

- Rural district B has the situation that all Slave ITC's in ring 1 can "hear" Master A. Some of the Slave ITC's in ring 2 can also "hear" Master A, but ignore the message because it is intended for ring 1. The alarm in rural distruct B is put through as normal in rings which means that the alsm is distributed first of all in ring 1 and then to the Slave ITC's in ring 2.
- Rural district c has the situation that not all the Slave ITC's in ring 1 can "hear" Master A. The Slave ITC's in ring 1 which can receive the message from Master A transmit the alarm message to Slave ITC's in ring 2 and also to the Slave ITC's in ring 1 which could not "hear" directly from the Master. In this way all Slave ITC's which had not "heard" the forward the message.

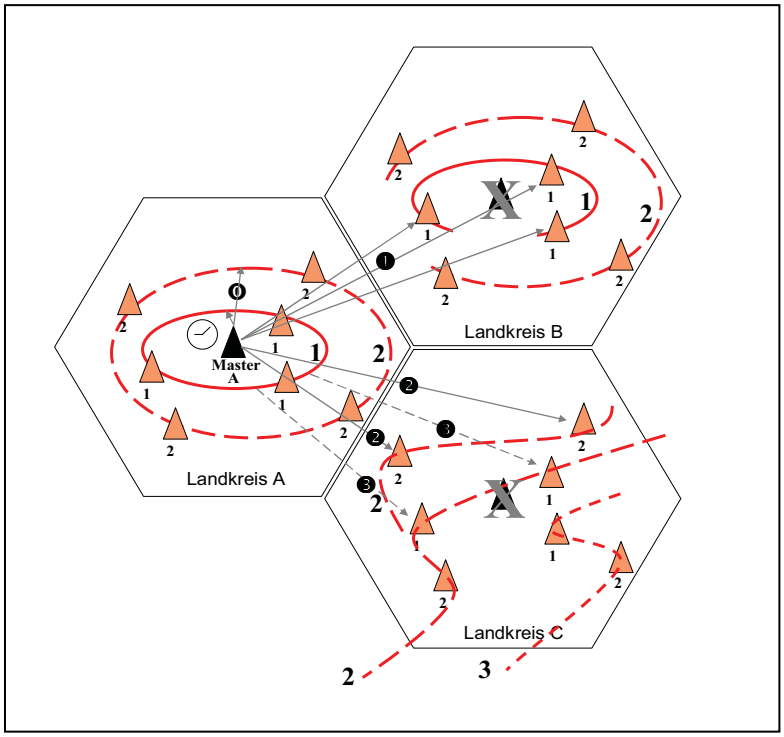


Fig. 5-3: Emergency operation in a Multimaster wave network

6 Installation

6.1 Switch on/off Procedure

Switching on the ITC2100-BOS:

1. Press the main switch to position 1
2. The ITC2100-BOS is fully run up as soon as all LED's on RC and SC cards light up twice one after the other.

Switching off the ITC2100-BOS:

The ITC2100-BOS can be shut down without the aid of the service web interface. Carry out the following steps:

1. Press the black button on the sync card for longer than 7 seconds and then release it.
2. The transmit and status LED on the sync card flash for a short time. If this is not the case, repeat step 1.
3. Wait until the transmit and status LED on the sync card light permanently. The ITC2100-BOS has now been shut down and it can be switched off.
4. Press the main switch to the 0 position.

6.2 First Steps

Safe and reliable operation of the base station necessitates proper installation and wiring. Installation and wiring must be carefully prepared. The ambient conditions at the location, the type of installation and the required tools and aids must be taken into consideration

Follow the installation steps below:

Step 1) Planning

- Plan installation and wiring allowing for the ambient conditions at the scheduled location. Bear in mind that there must be adequate ventilation and that earthing and lightning protection (see chapter 5.8) must be provided. If the system is to be installed in a rack, pay particular attention to ventilation.

Step 2) Prepare the ITC

- Check the consignment for completeness and damage.
- The power supply should be switched off before transportation.
- Equip the ITC with any optional modules that are needed:
    1. Insert the GPS interface card (S-Com card) if the ITC is to be used as a Multimaster ITC (see chapter 5.13).
    2. Insert the optional I/O card (see chapter 5.14).
- Activate the internal anntenna switch when a separate tranmitter/receiver antenna is to be used (see chapter 5.12). As standard the antenna switch is active (i.e. only the lower antenna connector Tx is active). which is the case when a combined transmitter/receiver antenna is used. This common antenna is then screwed to the lower Tx connector.
- As far as possible carry out the ITC configuration in the service web interface.

Step 3) Field installation

- When the ITC is used as Master ITC:
    1. Connect a high grade LAN cable (min. Cat5) to the RJ45 Ethernet interface of the controller for ITC and network control.
    2. Connect a GPS antenna to the GPS interface card, when the ITC is to be used as a Master ITC (see chapter 6.6)
- Make a connection (communication):
    3. Connect the input/output lines to the sync card or to the optional I/O card (see chapter 6.4 oder 6.7).
    4. When a local redundant network alarm controller is to be used, connect it to the controller's serial interface (communication protocol MIP11+)
    5. Connect the transmitter/receiver antenna coaxial cable (see chapter 5.12).
- Make power connections:
    6. Connect the fully-charged battery 5.10).
    7. Connect any external device whose power is to be provided by the ITC (see chapter 5.11).
    8. Connect the mains cable (ITC main switch off: position 0).
    9. Switch the ITC on (mains button set to position 1).
- Carry out the setting of the ITC end configuration in the service web interface.

Step 4) Functional test

10. The green LED's on the PS 150W RC and SC must all light.
    - If the red LED on the power unit flashes, check the battery fuse. First switch off the mains switch, check the battery fuse and, if necessary, replace it.
    - If the yellow LED on the power unit lights, the battery has insufficient power and must be recharged.
11. Check the status indicators in the ITC service web interface. On the status page, no other field should be red except for the field *Receiver (Rx).* This field changes it status to green as soon as the ITC is active in the network and it receives messages having sufficient field strength from a neighbouring ITC.
12. Transmit a test message to a local pager or a neigbouring ITC.

Warning:
Incorrect handling of the base station may lead to injury or damage to the system

6.3 Power Supply

The ITC2100-BOS requires 90-264 VAC power supply. The maximum power consumption is 150W and 1.7A (AC). Much higher currents can flow during switch-on owing to the switched-mode power supply unit. Follow the conventional wiring regulations for the country concerned. The ITC2100-BOS must be connected to the mains via a three-core cable and the PE wire must have a minimum cross-sectional area of 1 mm^2

6.4 Fuses

The ITC2100-BOS has two fuses, which should only be replaced by trained personnel. The mains fuse is located inside the power supply and can only be replaced by Swissphone. The battery supply has its own fuse located above the power supply switch on the front side of the ITC2100-BOS. The specifications of the individual fuses are as follows:

Mains fuse:	**T 4 A / 250 V (only replaceable by Swissphone)**
Battery fuse:	**T 12.5 A / 250 V**

6.5 Installation

As an option the ITC2100-BOS can be mounted in a 19" rack. The space required by the ITC2100-BOS is 3U[4] (~13.5cm). The width corresponds to a 19" plug-in module and the depth is 315mm.

6.6 Electrical Connections

The electrical connections have to be made after installing the ITC2100-BOS, i.e. in the rack. These electrical connections are as follows:

- Mains cable
- VHF coaxial antenna cable (50 Ω / N connector)
- At master ITC: min. cat. 5 cable
- At multi-master ITC: RS485 cable
- Cable for I/O contacts

6.7 Ambient Conditions

The ITC2100-BOS may be installed at any location suitable for electronic communication equipment. However, the following values are not to be exceeded:

Operating temperature range:	-25℃ to +55℃
Relative humidity:	max. 80%

[4] U=height unit

6.8 Earthing and Lightning Protection

Caution !
Correct earthing and a reliable lightning protection system are vital in order to prevent damage to the ITC2100-BOS.

Earthing and lightning are interrelated and have the following functions:

- Electrical earthing:
  This term refers to the earthing conductor which safely dissipates any fault current, e.g. from the housing, to the building wiring's equipotential bonding system.
- RF earthing:
  This refers to discharge of RF energy with respect to ground. One example of RF earthing relates to the shielding which prevents or reduces escape of RF radiation.
- Lightning conduction:
  A good lightning protection system is indispensable for safe and reliable operation of a communication system. This is closely linked to the building's equipotential bonding system.

This manual does not provide comprehensive recommendations and directives for earthing or lightning protection of communication systems. This information is summarised in relevant publications of various manufacturers. Please refer to these publications if necessary.

The following picture shows the grounding point at the ITC2100-BOS (i.e. to use in case of assembling into a wall-mount case):

Fig. 6-1: Grounding point at ITC2100-BOS

6.9 Maintenance Instructions

The base station has been manufactured in accordance with the latest state-of-the-art technology and features a software-based control. For this reason, virtually no regular maintenance is required.

Carry out the following steps:

- Wipe the station with a soft cloth
- Measure the transmit power
- Measure the frequency (carrier, frequency deviation)
- Check the status of the rechargeable batteries (after 10min battery operation: battery >12V)

  Note: It is recommended to replace the rechargeable batteries at least every 3 years (for battery replacement see chapter 5.10).
- Check the electrical connections (i.e. correct antenna connection)
- Check the status of the power supply (LED green)
- Check the battery fuse
- Check the controller status (LED green)
- Check the status of the synchro card (SC) and the decoder card (RC), (LED grün)
- Check the system status on the status page of the service web-interface

6.10 Connecting the Battery to the ITC

Connect the battery to the terminals (marked battery) on the back panel of the ITC21000-BOS. Ensure that the cross-section of the cable used is at least 1.5 mm^2. As standard Swissphone uses a 12 / 12Ah rechargable battery (pbq 12-12). The charging current is limited to 2A.

Important:

- Swissphone recommends using the following maximum battery capacity: 12V / 65Ah
- The battery voltage must never exceed 16V otherwise the elctronic circuits in the ITC could be damaged.
  The battery voltage should not be below 10.6V
- Never connect the battery under load. Always ensure that the power unit (PS150W) is switched off (switch set to position 0) when connecting the battery.

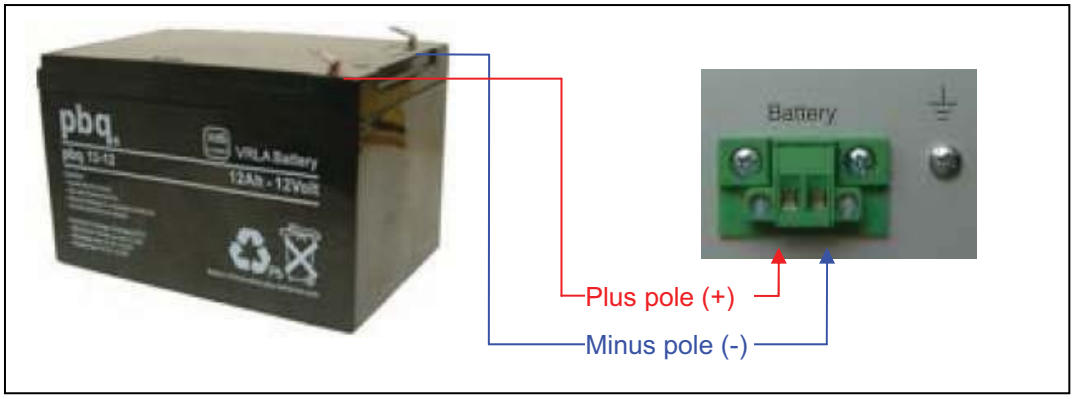


Fig. 6-2: Connecting the battery to the ITC2100-BOS

Operating mode:	ITC-power consumption at battery connections (DC):
Standby (only Rx)	9W
Tx 1W	24W
Tx 5W	37W
Tx 12W	50W
Tx 25W	75W

6.11 Power Supply to External Devices

External units can be supplied from the ITC power facilities. Connect the device to the terminals marked with the inscription 13.5/1A max. on the back panel of the ITC2100-BOS. The cross-section of the connecting cables used must be at least 1.5 mm2. The external unit can be supplied with a maximum of 13.5V / 1.5A.

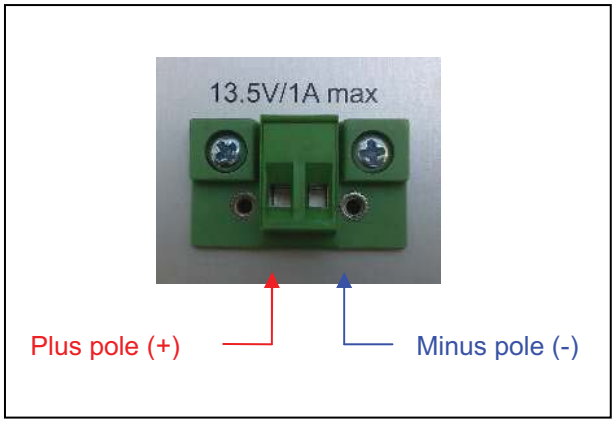


Fig. 6-3: Connecting to external device for power supply

NOTE: When an external unit is supplied from the ITC power facilities, during power failure the battery has an additional load. This will mean that the supply time from the battery will be correspondingly shorter.

6.12 Connection of One or Two Antennas.

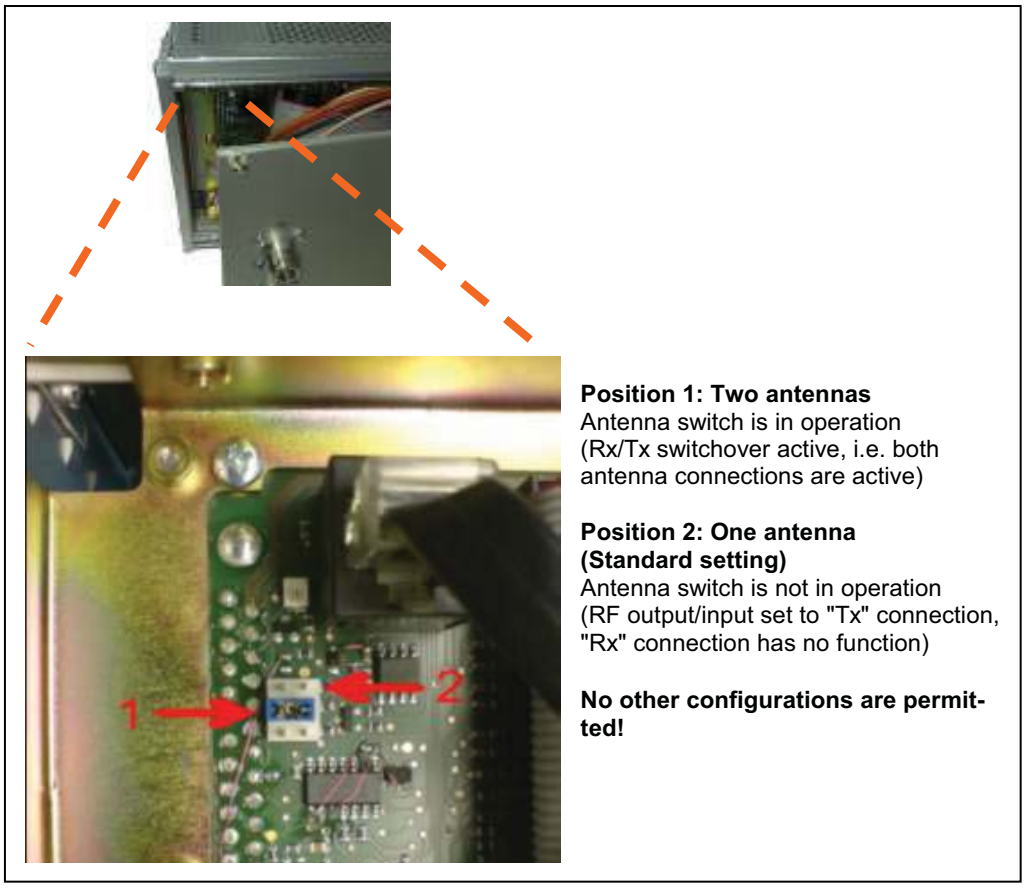
As standard the ITC is configured for a single antenna which is used for both transmission and reception. The connection is made to the lower transmit/receive antenna connector. If the ITC is to be equipped with a separate transmit and receive antenna, the unit has to be configured as follows.

6.12.1 ITC Version with Antenna Setting Made by Jumper

1. Switch the ITC off and disconnect the battery.
2. Loosen the 10 screws and remove the back panel from the ITC2100-BOS.

Fig. 6-4: Removing the ITC2100-BOS back panel

3. Carefully tip the back panel down.



Position 1: Two antennas
Antenna switch is in operation
(Rx/Tx switchover active, i.e. both antenna connections are active)

Position 2: One antenna (Standard setting)
Antenna switch is not in operation
(RF output/input set to "Tx" connection, "Rx" connection has no function)

No other configurations are permitted!

Fig. 6-5: Jumper setting for one or two active antenna connections

4. When two antenna connections are used set the jumpers to position 1 (see illustration above)
5. Refit back panel.
6. Reconnect mains cable, reconnect battery and restart operation.

6.12.2 ITC Version with Slide Switch for Antenna Setting

1. Switch the ITC off and disconnect the battery.
2. When two antenna connections are used set the slide switch to position 1 (se illustration below).

Position 1: Two antennas
Antenna switch is in operation (Rx/Tx-switchover active, i.e both antenna connections are active)

Position 2: One antenna (Standard setting)
Antenna switch is not in operation) (RF output/input set to lower antenna connection, upper antenna connection "Rx" has no function)

Fig. 6-6: Position of slide switch for one or two active antenna connections

3. When two antenna connections are used, remove the blue protection cap.
4. Switch the unit back on.

6.13 GPS-Alternative 1: Connection of GPS Antenna to Master-ITC

This alternative has the GPS receiver built into the antenna, i.e. this GPS reference receiver receives the GPS signal and forwards the decoded data to the GPS interface card via RS485 data cable.

Fig. 6-7: Connection of GPS antenna to Master-ITC

Inserting the GPS interface card in the ITC2100-BOS:

1. Ensure that the unit is switched off, disconnect mains cable and battery connections.
2. Unscrew and remove cover plate of the slot next to the sync card.
3. Insert the GPS interface card in the free slot and secure.
4. Reconnect the mains and battery and switch on again.
5. Check that the green LED lights.

When preparing the connection cable, ensure that the pin connections are correct (see chapter 7.6).

Connection of GPS antenna **to several Master-ITC's:**
The power line supples the GPS antenna with +12V. When the GPS antenna is to be connected to several Master ITC's at the same time it receives its power supply from a single Master. When preparing the connection cable with several D-sub9connectors for connection to the S-Com cards of the Master ITC's, the 12V supply must only be connected from one S-Com card.

Important: There must be no connection to pin 1 (+12V) on all the other S-Com cards.

6.14 GPS-Alternative 2: Connection of GPS Antenna to Master-ITC

This alternative contains the GPS receiver in the slot card. The GPS signal is received by the GPS antenna and forwarded to the GPS receiver card via coaxial cable.

Fig. 6-8: GPS receiver card with potential GPS antenna and fixture

Inserting the GPS card in the ITC2100-BOS:

1. Ensure that the unit is switched off, disconnect mains cable and battery connections.
2. Unscrew and remove cover plate of the slot next to the sync card.
3. Insert the GPS card in the free slot and secure.
4. Reconnect the mains and battery and switch on again.
5. Check that the green LED lights.

GPS-Antenna

We recommend the 3,3V or 5V Bullet III GPS antenna with TNC-connection by Trimble, and lightning protection by Huber+Suhner (Art.Nr. 3406.19.0003).

Fig. 6-9: GPS antenna by Trimble (l.) and lightning protection by Huber+Suhner (r.)

Important: The GPS antenna should fulfil the following conditions:

- Only active GPS antennas may be connected (no passive GPS antennas).
- The GPS antenna should be capable of operating at voltages of 3,3V or 5V.
- The maximum current draw of the GPS antenna may not exceed 35mA.
- No combined GPS/**GSM** antenna may be used.
- The antenna should have a bandwidth of 1575MHz +/- max. 5MHz (usually in the +/- 2MHz area).
- The GPS signal should have a minimum total gain of 5dB between GPS antenna and GPS receiver card.

The GPS antenna by Trimble has a TNC connection and the GPS receiver card has an SMA connection. The HF connection cable should therefore be assembled with an SMA and TNC connector.

Fixture

An antenna fixture such as that by Glomex may be used. It is made of stainless steel with thread for coupling nut 1" / 14 and is designed for horizontal and vertical antenna assembly for tubes between 30mm and 80mm diameter.

Fig. 6-10: Fixture (Non-binding photograph)

Selection of HF -cable

The recommended Trimble Bullet III, 5V GPS antenna has an LNA gain of 35dB. 22m RG-188 or RG316 cables have a damping of 22m*1.20dB/m=27dB.

35dB-27dB = 8dB total gain (minimum gain).

The cable type to be used results from the demanded cable length. In the case of RG-213/RG-217, the cable is so thick that an SMA plug cannot be mounted on and a TNC, BNC or N connector is necessary instead. Therefore, an adapter from TNC, BNC or N to SMA should be used here.

GPS antenna gain:	Trimble Bullet III, 5V		+35dB
Damping of the coaxial cable:	Cable type:	**Max. Länge:**	-30dB
	RG-316/RG-188 (1.20dB/m)	**25m**	
	RG-58 PE (0.95dB/m)	**31.5m**	
	RG-142 (0.65dB/m)	**46m**	
	LowLoss240flex (0.41dB/m)	**73m**	
	Only with adapter plug (Because of cable thickness):		
	RG-213 (0.34dB/m)	**88m**	
	RG-217 (0.25dB/m)	**120m**	
	1/4" Cellflex (0.18dB/m)	**165m**	
Minimum total gain			+5dB

6.15 Connection of the I/O Card to the ITC

The I/O card can be inserted in the free slot on the right next to the sync card or S-Com card.

1. Switch the ITC off and disconnect the battery.
2. Unscrew and remove the cover plate next to the sync card or the wide cover plate next to the S-com card (if used).
3. Unscrew the Sync card and pull it out by about 10 cm.
4. Connect the Sync card to the I/O using the flat cable.

Fig. 6-11: Connection of the I/O to the ITC2100-BOS

5. Carefully insert both cards (possibly remove the cover plate on the right to make insertion of the cards easier).
6. If the the wide cover plate was removed to install the S-com card, fit the narrow cover plate (left over when the S-com card was fitted).
7. Reconnect the mains and battery and switch the ITC on.
8. Check that the green LED lights.

The connector pin assignments for the I/O card are listed in chapter 7.7.

6.16 Connection of the OIC card to the DAU (for I.SITE II - connection)

The radio cover of the DAY can be extended by connecting the I. SITE II. The I.SITE II is a deported emitter which emits the same POCSAG notification synchronously with the DAU. In order for the I.SITE II to receive data from the DAU, the OIC card must be mounted in the DAU. The I.SITE II receives the emitter control and modulation data from the OIC card via a potential free serial RS422 connection.

Note: The I.SITE II emitter can be deported by a maximum of 1200m cable length (Twisted 0.6mm^2 Cu-wire).

The OIC-card can be mounted in the free slot to the right beside the SC card or S-Com card.

1. Device is switched off, power plug or battery is removed.
2. Unscrew and remove the cover plate beside the SC card or the wide cover plate beside the S-Com card (if assembled).
3. Unscrew SC card and completely pull out.
4. Remove wide ribbon cable from the SC card which leads to the TRx module. Then plug in the new ribbon cable provided with the OIC card into the SC-card and connect to the OIC card (see figure below).

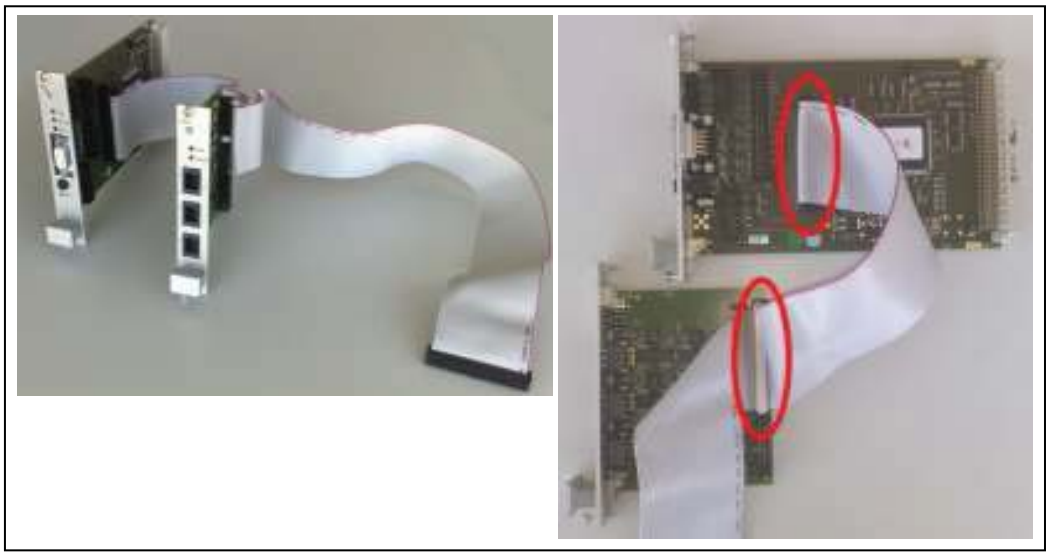


Fig. 6-12: Correct connection of the OIC card with the SC card

5. Assemble SC card and OIC card with one another (if necessary disassemble the right cover plates to simplify assembly). The long part of the wide ribbon cable should thereby lead to the rear towards the interface print of the TRx module, similarly to the old ribbon cable. Sometimes it is necessary to remove the top cover of the ITC2100-BOS to simplify assembly.

6. Removing the ITC2100-BOS rear panel by unscrewing the ten screws.

Fig. 6-13: Removing the ITC2100-BOS rear panel

7. Carefully pivot the rear panel downward. Unplug the old wide ribbon cable (connection from the SC card to the TRx module) which is attached to the interface print of the TRx module (see figure below).

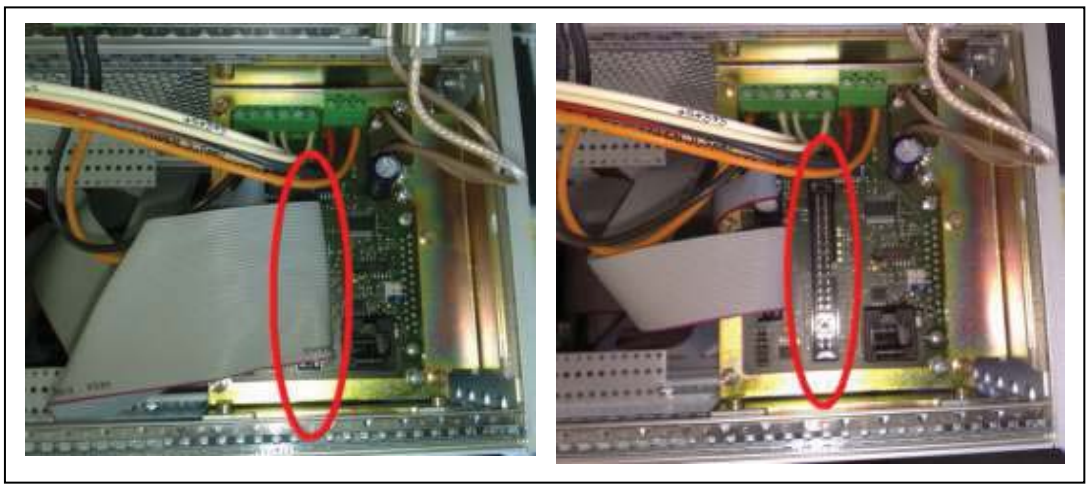


Fig. 6-14: Unplugging the wide ribbon cable from the interface print of the TRx module

8. Connect the new wide ribbon cable supplied with the OIC card to the interface print of the TRx module.
9. Re-attach rear wall.
10. Plug in power connector. Connect battery and put the DAU back into operation.
11. Check whether the green LED lights up.

Further information on the I.SITE II and OIC card, in particular the wiring, can be found in the I.SITE II and OIC service manuals.

7 Service Web-Interface of the ITC2100-BOS

The ITC2100-BOS programming is carried out using a web-interface, which can be accessed by any standard internet browser, such as Firefox or Internet Explorer. Connect a PC or Laptop using a crossover Ethernet cable with RJ45 plug (LAN) to the ITC's Ethernet connection. Then enter the repeater IP address in the browser window of the PC or Laptop. The browser then displays the access page of the programming interface.

7.1 General Operating Information

The language German is set by default. The user interface can be switched to English (see chapter 6.9.2.1).

Click on the button *Apply* to enter and update the setting that have been made.

Click on the button *Refresh* to request the current system operating mode and it will be displayed. Otherwise the status is periodically updated.

Click the button *Back* to return to the previous menu.

7.2 Installation and Setting Up the Laptop/PC

7.2.1 Hardware

The computer must comply with the requirements below to permit full configuration.

- Network card (10Base-T or 100Base-T)
- Crossover Ethernet cable with RJ45 plug

7.2.2 Software

No special software is required for configuration. Only a conventional Internet browser (e.g. Firefox 3 / Internet Explorer 6 / Internet Explorer 7[5]) is required.

7.2.3 Setting Up the Network Card

The two IP addresses must be in the same segment and on the same subnet mask in order to ensure communication between laptop/PC and ITC. As an example, in Windows XP these settings must be made in *Control Panel* with the *Network* program under *Local Area Connection*.

Select and open the item *Internet Protocol (TCP/IP)* and press the button *Properties*.

[5] Swissphone recommends to use Mozilla Firefox 3, Microsoft Internet Explorer 6 or 7. Different browser should work as well, but were not tested by Swissphone so far.

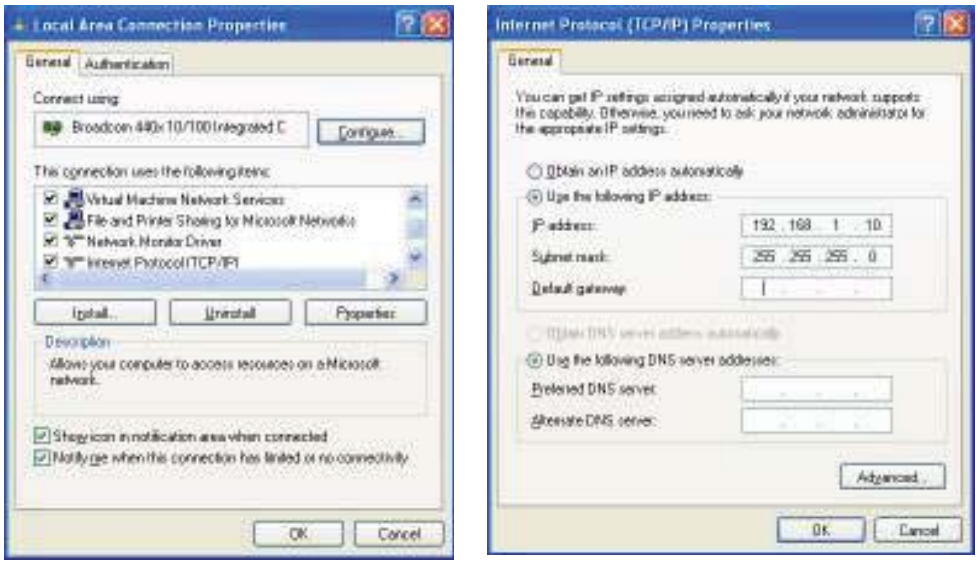


Fig. 7-1: Configuration of the IP address in Windows XP

Enter the values in the IP Address tab as shown in the drawing above:

IP address:	**192.168.1.10**
Subnet mask:	**255.255.255.0**

Then close all windows by clicking on the OK buttons. This completes set-up of the computer and configuration can be started.

7.3 Menu Structure

The web-interface menu structure of the ITC2100-BOS is shown below to permit easier navigation in the menus. After logging in on the ITC, five menus on the left are available for selection.

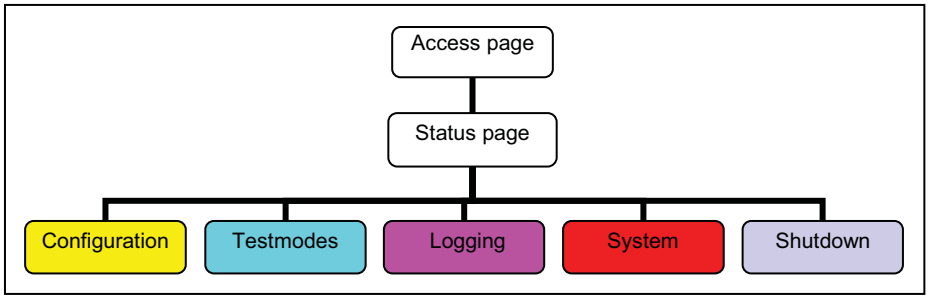


Fig. 7-1: Menu structure of the ITC2100-BOS web-interface

Overview of the menu *Configuration*:

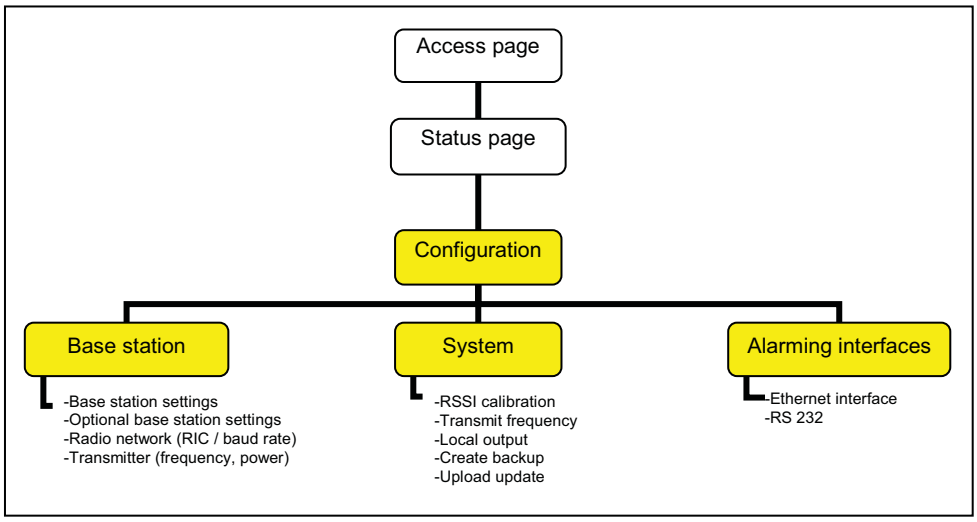


Fig. 7-2: Menu configuration

Overview of the menu *Logging*:

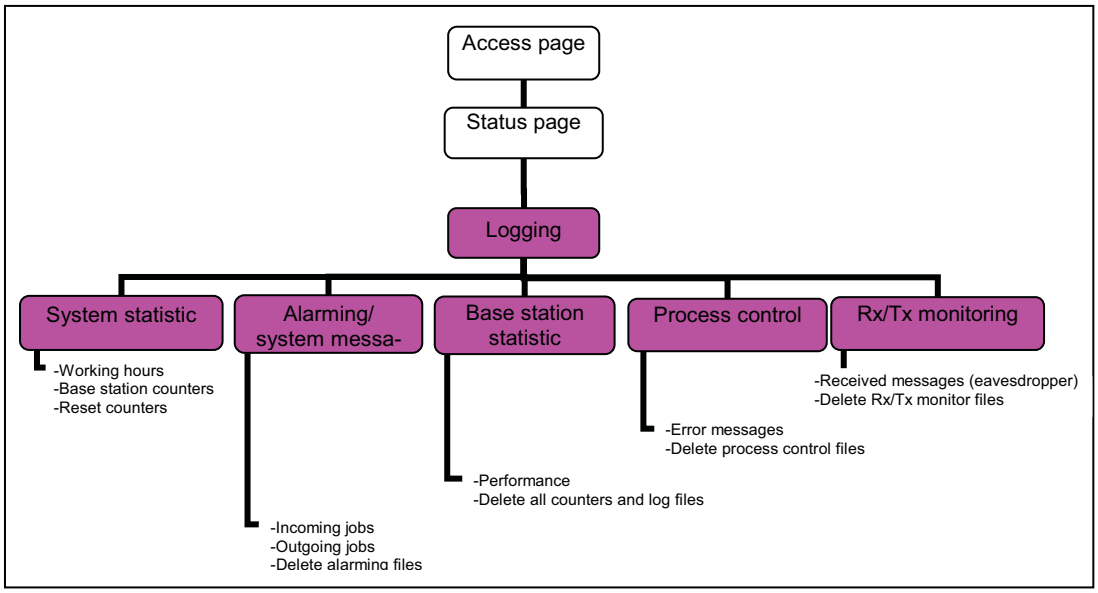


Fig. 7-3: Menu logging

Overview of the menus *Testmodes, System* and *Shutdown*:

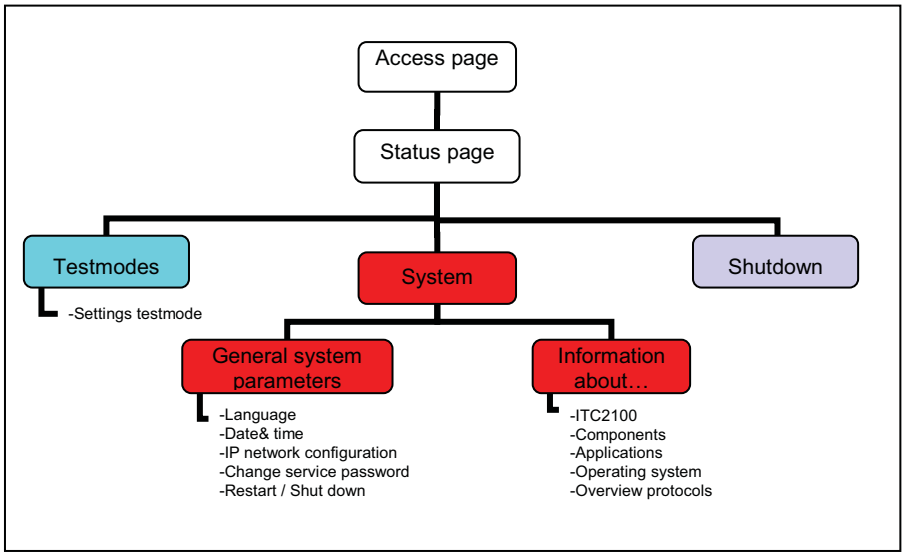


Fig. 7-4: Menus testmodes, system and shutdown

7.4 Access Page

To access the ITC2100-BOS page enter the default IP address, which is as follows:

http://192.168.1.1

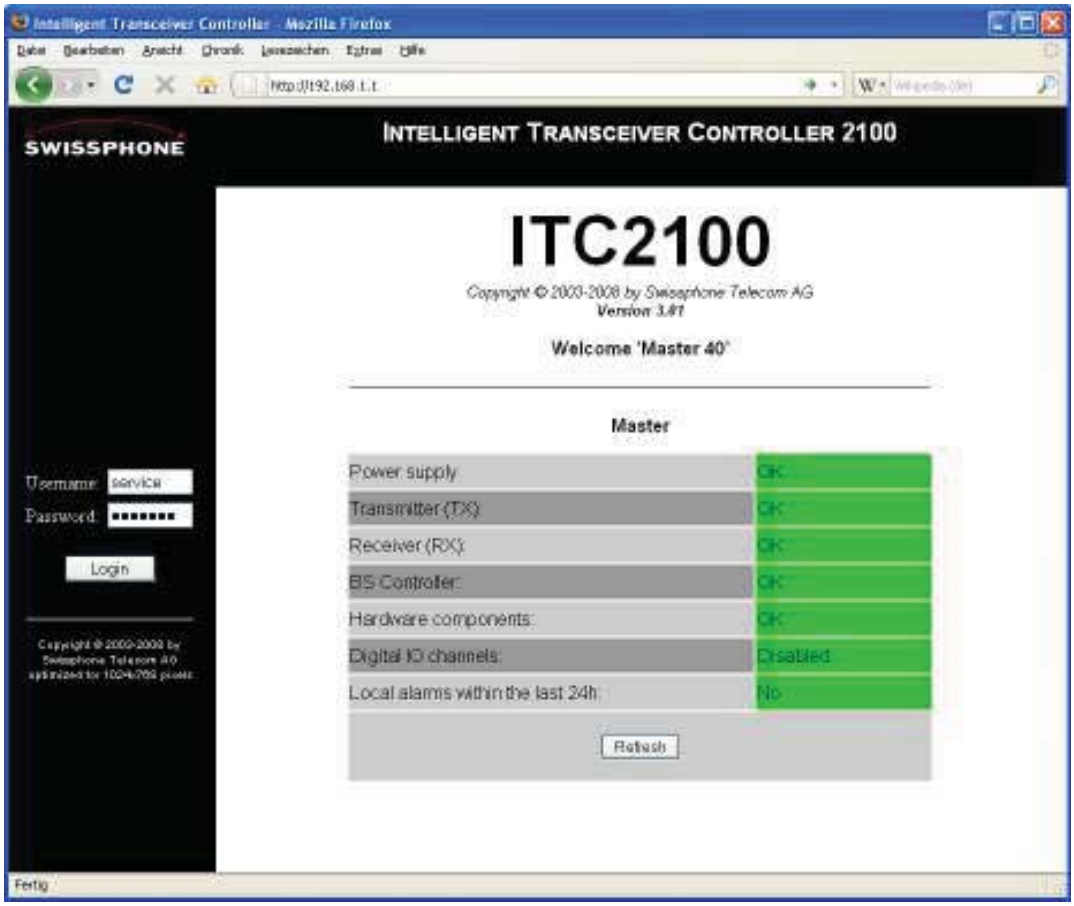


Fig. 7-5: Access page of the ITC2100-BOS web-interface

This page shows you the current statuses of transmitter, receiver, power supply unit, BS controller and local inputs etc. If all bars are green (OK), the base station is operating correctly. If the ITC has a problem, the bar will change colour to red and the text will change. The servicing technician has to log in with user name and password to learn more about the individual status of the components and to make configurations.

The user name and password are both "service".

Username:	service
Password:	service

Confirm the user name and password by clicking the "Login" button.

7.5 Status Page

The status page looks virtually the same as the access page. The only difference is that more information is available to the servicing technician, e.g. the base station name, alarm ring number and the position number. In addition, the servicing technician can view the status information in detail by clicking with the mouse but he or she cannot change or configure it. This is done in the *Configuration* page.

The various statuses are identified in colour. The following basically applies:

- Ok (green): The module is working correctly
- Check state (yellow): The module is working correctly but should be checked
- Error (red): The module is faulty

Note: As soon as the module error has been eliminated and the module is operating correctly, the status display can be set back to green (OK). This procedure is carried out via the menu *Logging* in *System statistic* via the link *Reset counters* (see chapter 6.8.2.2). The counter can also be requested and reset from a remote location via Digicom (Swissphone network alarm controller software).

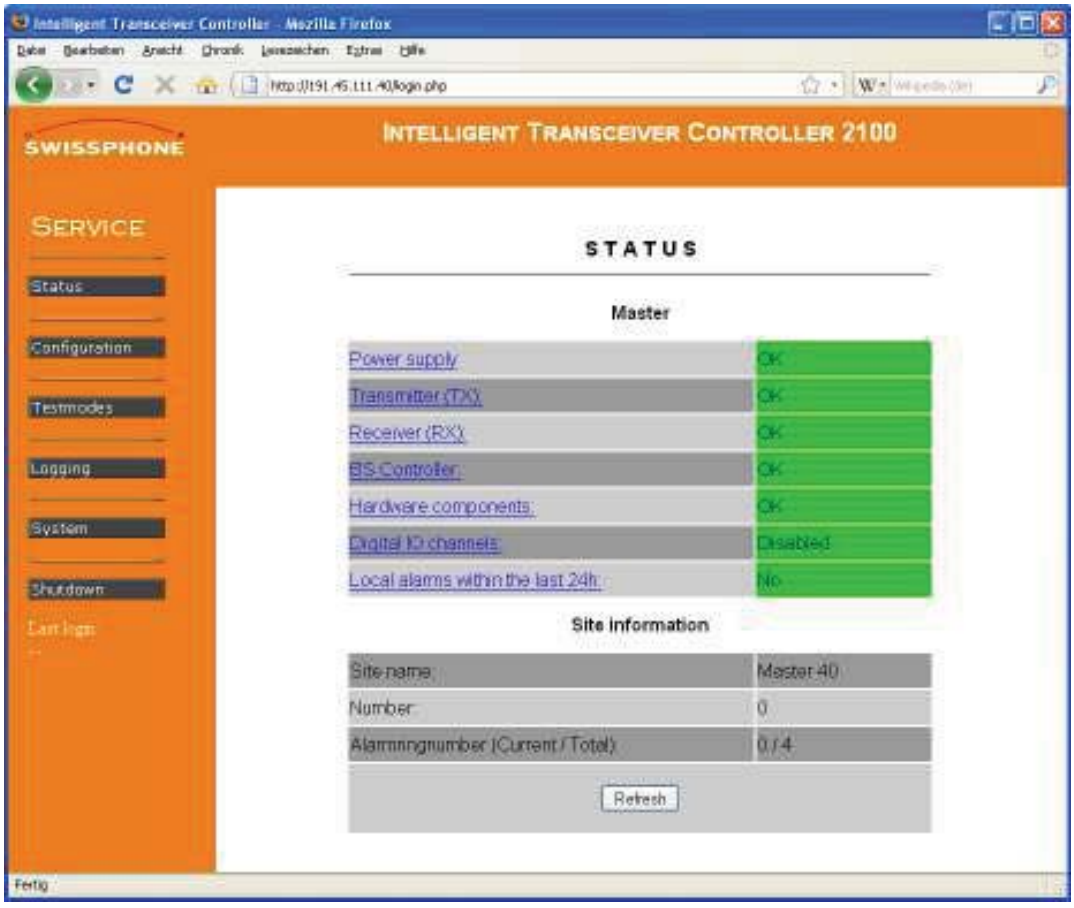


Fig. 7-6: Status page of the service web-interface

7.5.1 Power Supply

By clicking on the link *Power supply* on the status page a new window is displayed showing important information on the status of the two power supply sources (mains and battery). Normally, the ITC is powered via the 230 V mains. In this case, the status displays "Normal". If a battery is connected and the mains fails, the battery automatically provides the necessary power for the ITC and the status changes to "EPS since..h..min..s". If the battery voltage is too low (< 10,8V) the ITC goes into a secure mode in which it can no longer transmit. (see chapter 7.2.1). The ITC automatically transfers to normal operation as soon as the mains is available again.

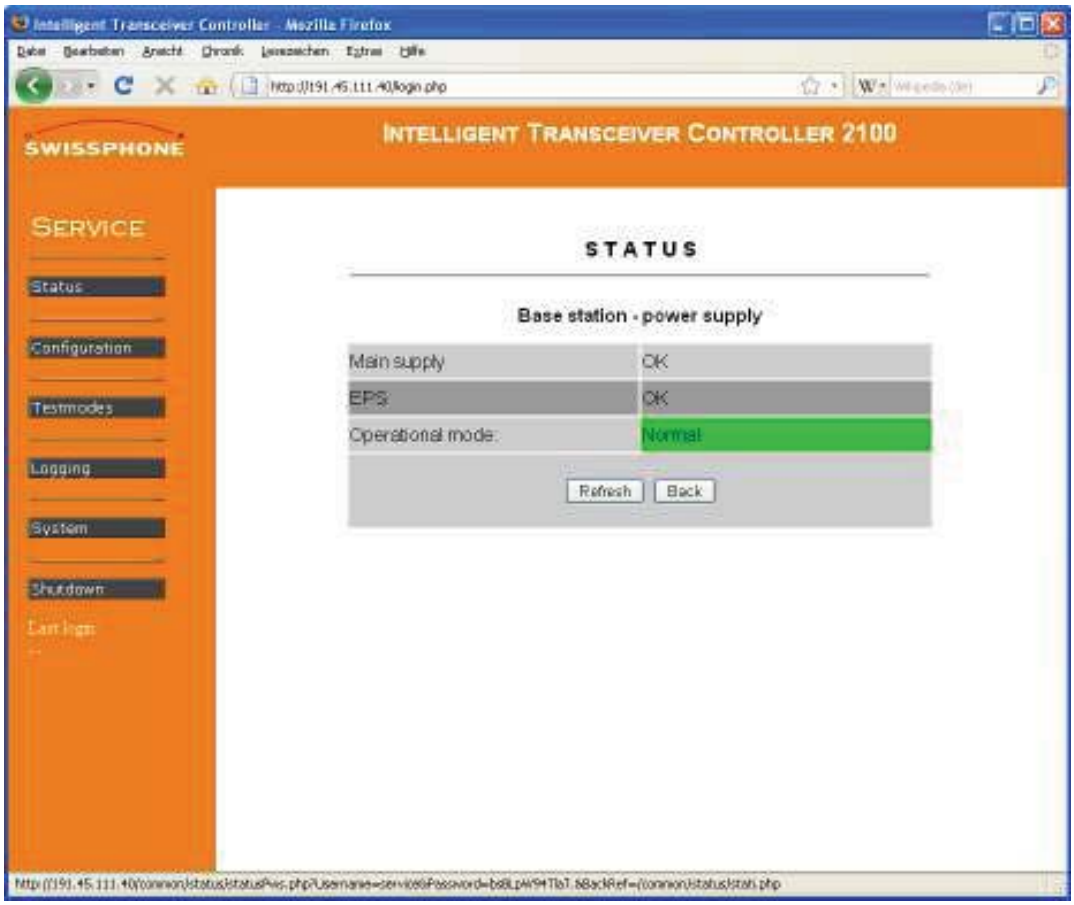


Fig. 7-7: Status page of the power supply

Field: **Operational mode**	**Description**
Normal	The ITC is powered by mains.
EPS since ..h ..min ..s	The ITC is operating normally and has been supplied by the battery since the displayed time. This information can also be call up from a remote location via Digicom (Swissphone network alarm controller software).

Field: Main supply	Description
OK	The ITC is supplied from the public power network
No main supply!	The ITC is not supplied by the public power network (mains failure).

Field: EPS	Description
OK	The battery is sufficiently charged and ready for service.
EPS too low!	The battery's voltage has fallen below the critical level of 10.8V. The battery cannot provide enough power for normal operation of the ITC. If the ITC is not supplied from the public power network, it is shut down 40 seconds after the critical battery voltage has been exceeded

7.5.2 Transmitter (TX)

The status of the transmitter part (Tx) of the transceiver module (TRx 25W) can be checked in detail via the link *Transmitter (TX)* on the status page.

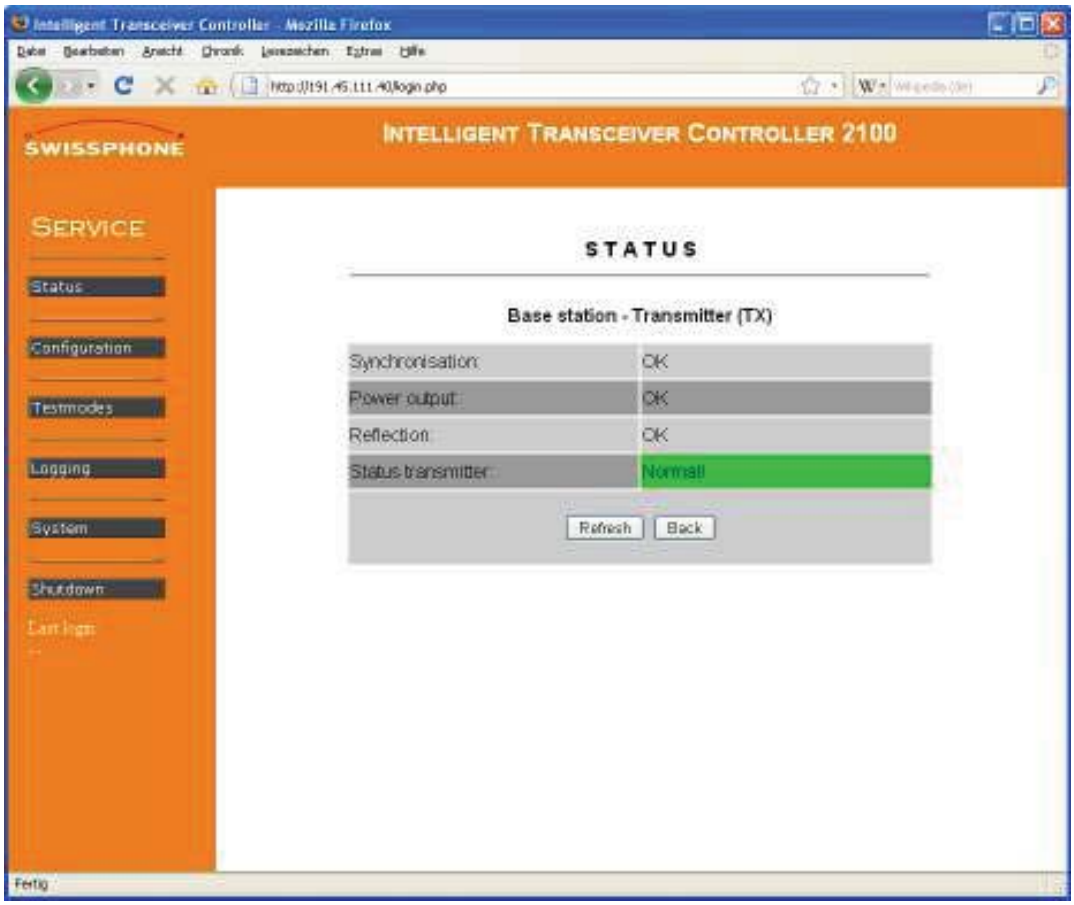


Fig. 7-8: Status page of the transmitter part (Tx)

Field: **Status transmitter**	**Description**
Normal!	The transmitter part (Tx) is working correctly.
Transmission limited!	The output power or the reflection power is not OK.
Error in Tx-system!	The output power and the reflection power are not OK.

Field: **Synchronisation**	**Description**
OK	The sync card (SC) is working correctly.
SC seems defect	Faulty sync card (SC). Because the time reference (quartz) required for a synchronised transmission is missing, no messages can be transmitted.

Field: Power output	Description
OK	The value of the output power correspond to the required value.
Inadequate output power	The transceiver module (TRx 25W) is defective and must be replaced. The required value and actual value of the output power does not correspond and this may lead to malfunctions.

Field: Reflection	Description
OK	The reflection power is small (within allowed range).
Excessive reflection power	If no load (antenna or artificial load etc.) is connected to the transmitter antenna, or if the load is defective (short-circuit), the output power is reflected and detected by the transceiver module (TRx 25W).

7.5.3 Receiver (RX)

The status of the receiver part (Rx) of the transceiver module (TRx 25W) can be checked in detail via the link *Receiver (RX)* on the status page.

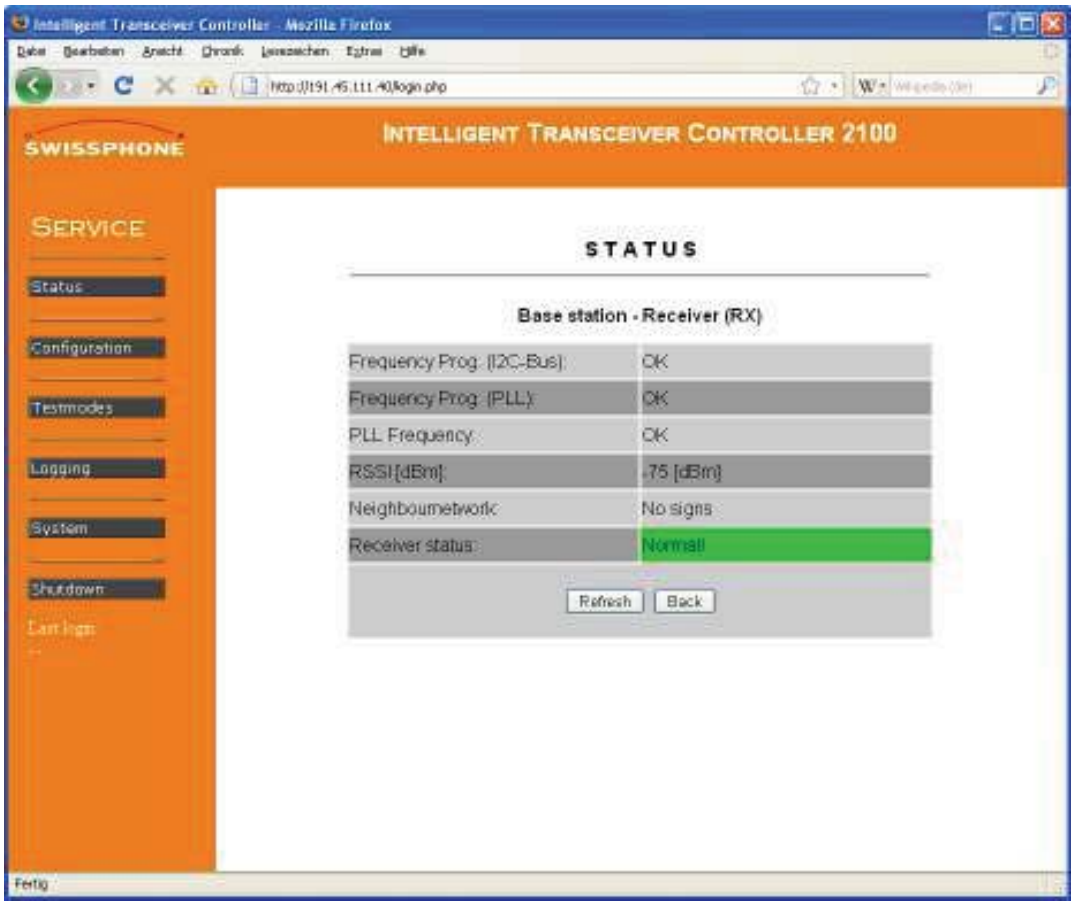


Fig. 7-9: Status page of the receiver part (Rx)

Field: **Receiver status**	**Description**
Normal!	The receiver section (Rx) is working correctly.
Temporary error in the Rx system!	The receiver is operating perfectly but was faulty recently (no access to I^2C-Bus or the frequency programmingng in the Rx chip was faulty.
Conflict in Rx system!	A neighbouring network is interfering with the reception (not yet implemented)
RSSI critical!	The received field strength (RSSI) is in a critical range (-90dBm .. -100dBm).
RSSI too low!	The received field strength (RSSI) is too low (<-100dBm).
RSSI not calibrated!	The receiver has not been properly aligned and therefore cannot display any value (in field "RSSI [dBm]" 0 [dBm] is displayed
Error in Rx system!	The receiver is faulty.

1) Field: Frequency Prog. (I^2C-Bus)	Description
OK	ITC2000: Access from the Controller BSC to the I^2C bus is functioning without any problems (i.e. communication from the controller card BSC to the I^2C bus controller chip on the RC card).
	ITC2100: Communication between the controller BSC and the transceiver TRx 25W is operating without any problems.
No access	ITC2000: The Controller BSC has no access to the I^2C bus.
	ITC2100: The Controller BSC cannot communicate with the radio transceiver.
No access before	ITC2000: Access from the Controller BSC to the I^2C bus is functioning perfectly, but the last attempt was unsuccessful.
	ITC2100: Access from the Controller BSC to the radio transceiver is functioning perfectly, but the last attempt was unsuccessful..

2) Field: Frequency Prog. (PLL)	Description
OK	ITC2000: The channel (frequency can be successfully programmed in the Rx chip and selected in the transceiver.
	ITC2100: The channel (frequency) can be successfully selected in the transceiver TRx 25W.
Error	ITC2000: Frequency programming in the Rx chip is faulty
	ITC2100The channel cannot be selected in the transceiver
Error before	ITC2000: The channel can be successfully programmed in the Rx chip and selected in the radio transceiver. At the last attempt frequency programming in the Rx chip was faulty.
	ITC2100: The channel can be selected in the radio transceiver TRx 25W. At the last attempt it was not possible to select the channel.

3) Field: PLL Frequency	Description
OK	ITC2000/ITC2100: The correct channel (frequency) is correctly set in the transceiver.
PLL unlocked	ITC2000/ITC2100: The correct channel(frequency) cannot be set.
PLL was unlocked	ITC2000/ITC2100: The correct channel (frequency) is successfully set, but at the last attempt the correct frequency could not be set.

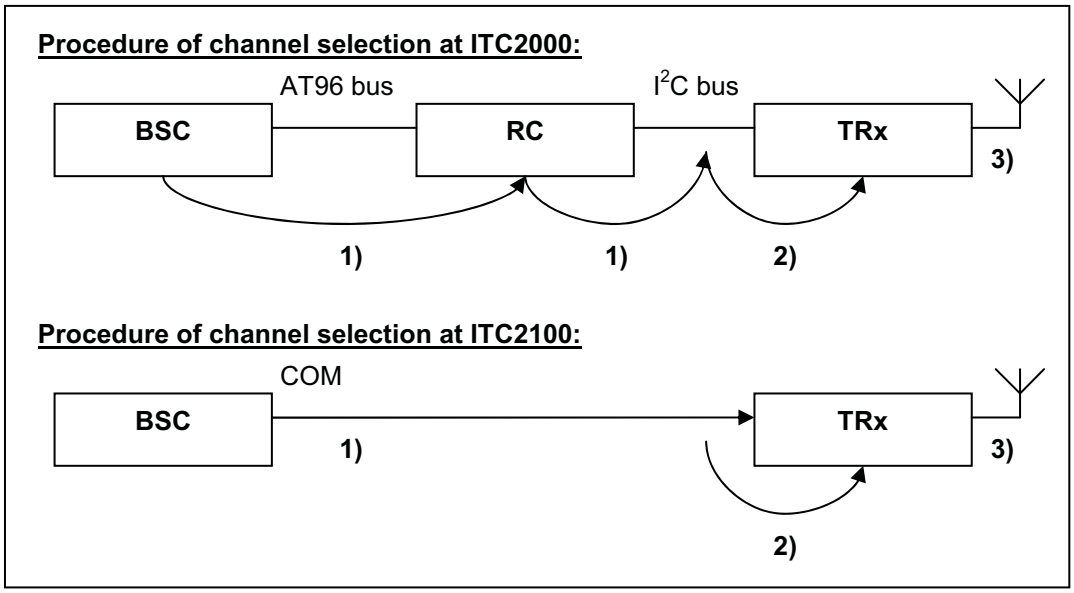


Fig. 7-10: Procedure of channel selection at ITC2000 and ITC2100

Field: RSSI [dBm]	**Description**
-48 [dBm]	The field strength from the last received message .was measured and is displayed: Good: > -90dBm Critical: -90dBm .. -100dBm Poor: < -100dBm The received field strength is indicated visually on the RC card by LED's (see chapter 7.5).
--- [dBm]	Since commissioning no signal has been received on the receiver frequency
0 [dBm]	The receiver has not been aligned yet and therefore no value can be displayed.

Field: Neighbournetwork	**Description**
Neighbournet recognised	Detection of a neighbouring network is not yet implemented.
No signs	

7.5.4 BS Controller

The status of the controller (BSC) can be seen on the status page via the link *BS Controller*. The status of the controller and the most important system counters are displayed. These counters can be reset via the menu *Logging*, link *System statistic* by clicking the link *Reset counters* (see chapter 6.8.2.2). These counters can be polled and reset via the Digicom (Swissphone alerting software) from a remote location.

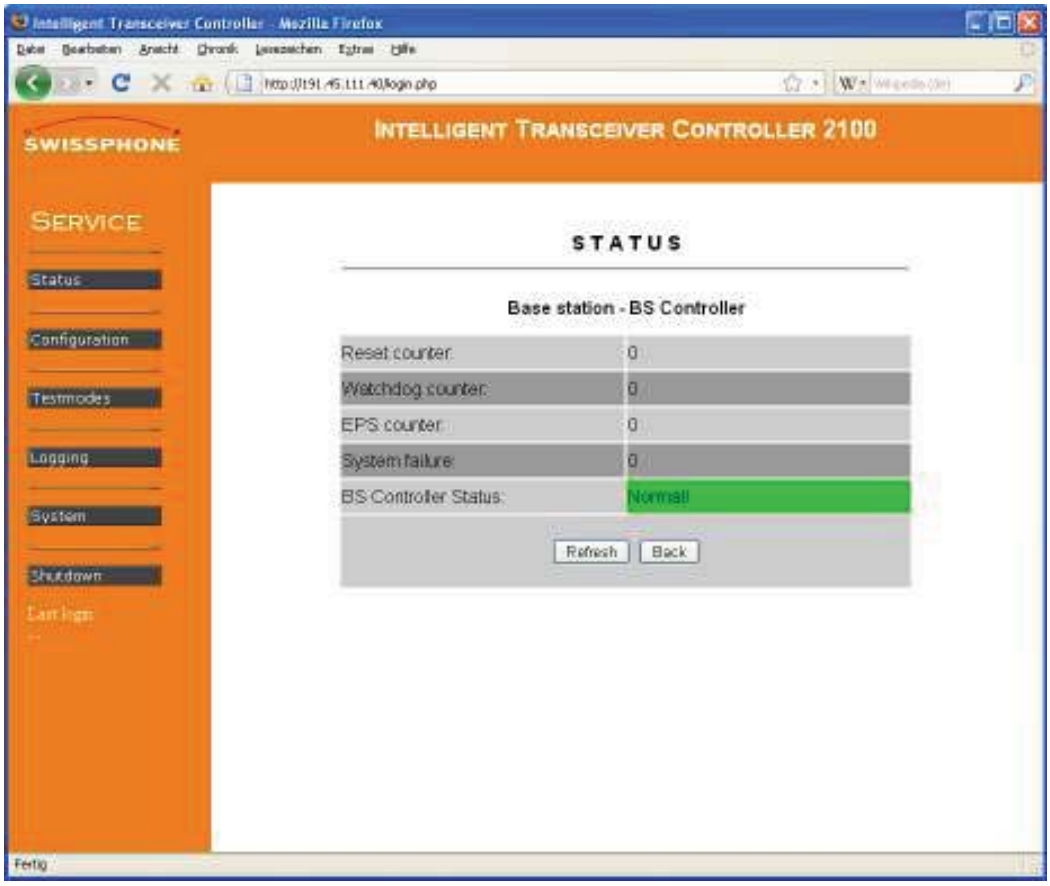


Fig. 7-11: Status page of the controller

Field: **BS Controller Status**	**Description**
Normal!	The controller is working correctly. All counters = 0.
Unexpected system mode!	The operation of the controller must be checked. counter > 0.

Field	**Description**
Reset counter:	Displays the number of restarted procedures.
Watchdog counter:	Displays how many times the ITC had to automatically restart internal process because of, for instance, a conflict with another process.
EPS counter:	Displays how many time the ITC has been supplied by the battery.
System failure:	Displays how many times the ITC was not available (e.g. due to power failure and battery voltage too low).

7.5.5 Hardware Components

Optional modules, such as I/O card or the GPS interface card, can also be inserted in the ITC2100-BOS. The GSM module (remote maintenance) is not yet implemented and therefore deactivated

The figure on the left below displays the hardware components in a Master ITC, a Standby ITC and a Slave ITC and the figure on the right below displays the hardware components of a Multimaster ITC (in the menu "Configuration" under the link "Optional base station settings", the field "GPS receiver" is set to "enabled").

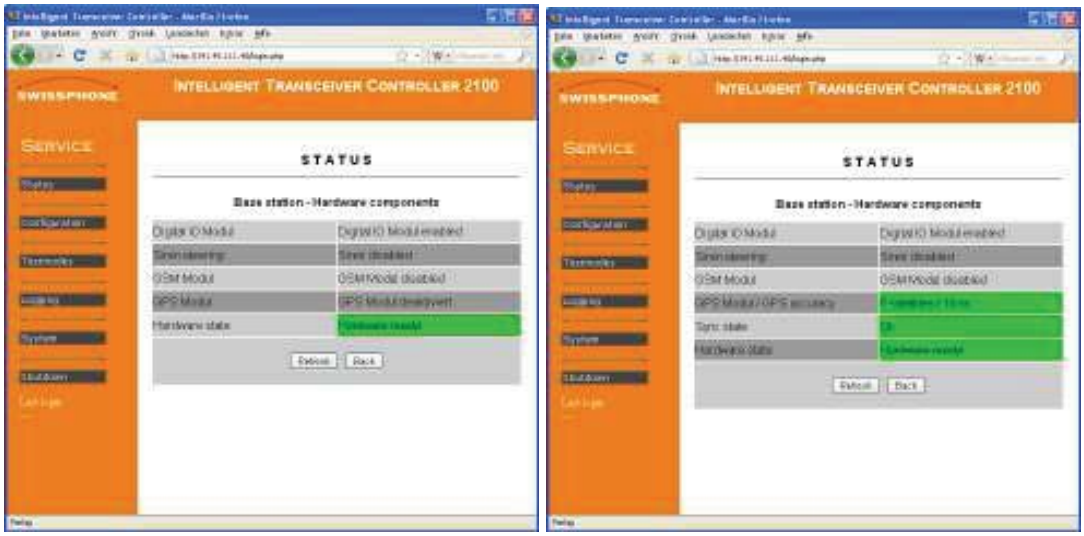


Fig. 7-12: Status pages of the hardware components in case of master (l.) and multi-master ITC (r.)

Field: **Hardware State**	**Description**
Hardware ready!	All HW componenten are ready for operation.
Hardware disabled!	None of the HW components quoted are enabled
Error in hardware!	One or more HW components is faulty. Each faulty HW components is displayed in its corresponding component field.

Field: **Sync state**	**Description**
Ok	Synchronous transmission between Masters is possible. The GSM time pulse (time reference signal) is being received regularly.
Timer in freerun	The GPS time pulse (time reference signal) is no longer being received. The Master's synchronisation is guaranteed via the current internal quartz time correction factor.
Timer high	The GPS time pulse (time reference signal) has not been received for 30 min. The Master's synchronisation is guaranteed via the current internal quartz time correction factor for a further 30 min (total 60 min.).
Timer exceeded	The GPS time pulse (time reference signal) has not been received for 60 min. The Master's synchronisation is no longer guaranteed and the corrected quartz time is not precise enough.

Field: GPS Modul/GPS accuracy	Description
4..12 satellites / …ns	The GPS signal is received from 4 to 12 satellites, i.e. the GPS data is very precise. In addition the accuracy of the GPS time is displayed.
3 satellites / …ns	The GPS signal is received from 3 satellites, i.e. the GPS data is just usable. In addition the accuracy of the GPS time is displayed
0..2 satellites / …ns	The GPS signal is received from 0 to 2 satellites, i.e. the GPS data is not usable. In addition the accuracy of the GPS time is displayed.
Bad accuracy	The GPS time pulse (time reference) is inaccurate. This can be for the following reasons: – Too few visible satellites – Unsuitable satellite position – Shortly after the ITC was switched on
Timeout / …ns	Das GPS time pulse is no longer being received (e.g. due to a thunder storm). Under certain circumstances it is possible that the S-com card or the GPS antenna has not been inserted.
Invalid data	The GPS time pulse is (still) not usable (normally 2 to 10 min. after the base station has been switched on).
No access/ 0xFFFFFFFF ns	GPS module is enabled, but access to the COM port is not possible.
GPS Modul disabled	GPS module is disabled, therefore synchronised mess age transmission from the Master is not possible. In the menu "Configuration" under the link "Optional base station" the field "GPS receiver" is set to "Disabled" (this field is visible when being configured as Master ITC or when the ITC is in standby mode).

Field: **Digital IO Module**	**Description**
Digital IO Module enabled	The digital inputs/outputs available in the SC card and I/O card are either enabled or disabled.
Digital IO Module disabled	
Error hardware	The I/O-Karte is faulty or an old sync card (SC) is inserted (see in chapter 6.6.1.2 which quotes the versions that can be used).

Field: **GSM Module**	**Description**
GSM Module enabled	The GSM module is enabled or disabled.
GSM Module disabled	
Error hardware	The GSM module is faulty.

Field: **Siren steering**	**Description**
Siren enabled	The actuation of the siren is enabled or disabled.
Siren disabled	
Siren not available	No access to the siren connection on the I/O module (I/O card or Sync card). The I/O card has possibly been removed.
Siren 1..3 activated	At the moment the siren is already wailing (actuated via the outputs 1 to 3).

7.5.6 Digital IO channels

On the configuration stage II version, the individual statuses of the I/O channels are displayed at this point. The inputs and outputs can be displayed using a drop-down menu.. Depending on the selected version "Value I" or "Value II" more or less one or two inputs or outputs are displayed, as shown in the following figures, on the left "Value I" (without I/O card), on the right "Value II" (with I/O card).

7.5.6.1 Digital Inputs

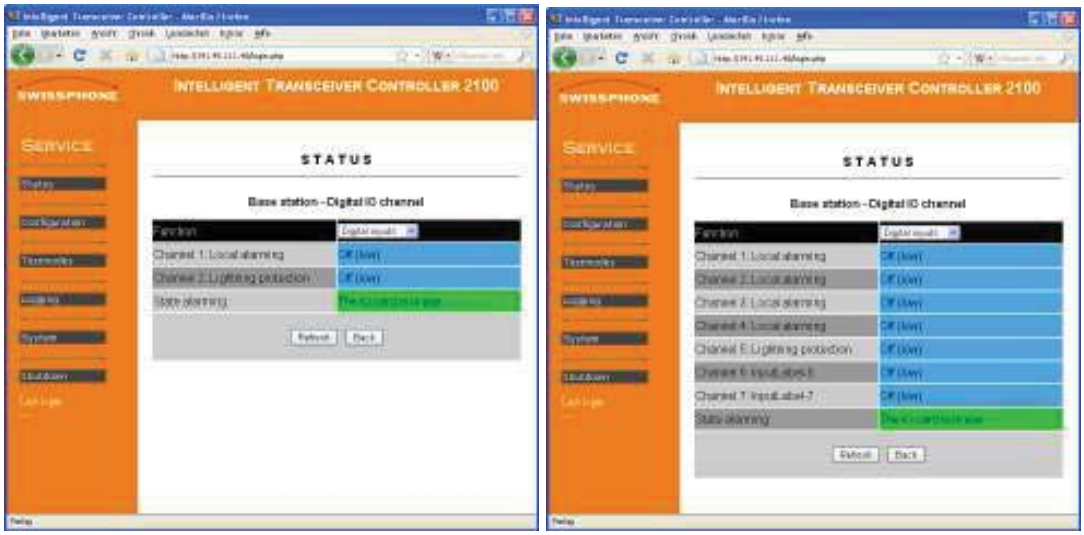


Fig. 7-13: Status page of the digital inputs without (l.) / with I/O card (r.)

Field (Digital inputs)	**Description**
Channel 1..4: Local alarming	Alarm inputs (local alarming) Indicates the status of the alarm inputs 1 to 4 or whether the corresponding input is active or inactive. A predefined POCSAG message (see chapter 6.6.1.2) can be transmitted over these inputs (e.g. via the triggering of a fire detector).
Channel 5..7: InputLabel-5..7	Inputs for remote inquiry (digital inputs) Indicates the status of the digital alarm inputs (on, off). This information can be requested by a remote network alarm controller (e.g. the status of an active lightning protector) In the configuration menu the input displayed here can be given a name, like for instance "Lightning protection".
State alarming	The operating mode of the digital I/O module is displayed. The mode can be active, non active or faulty.

7.5.6.2 Digital Outputs

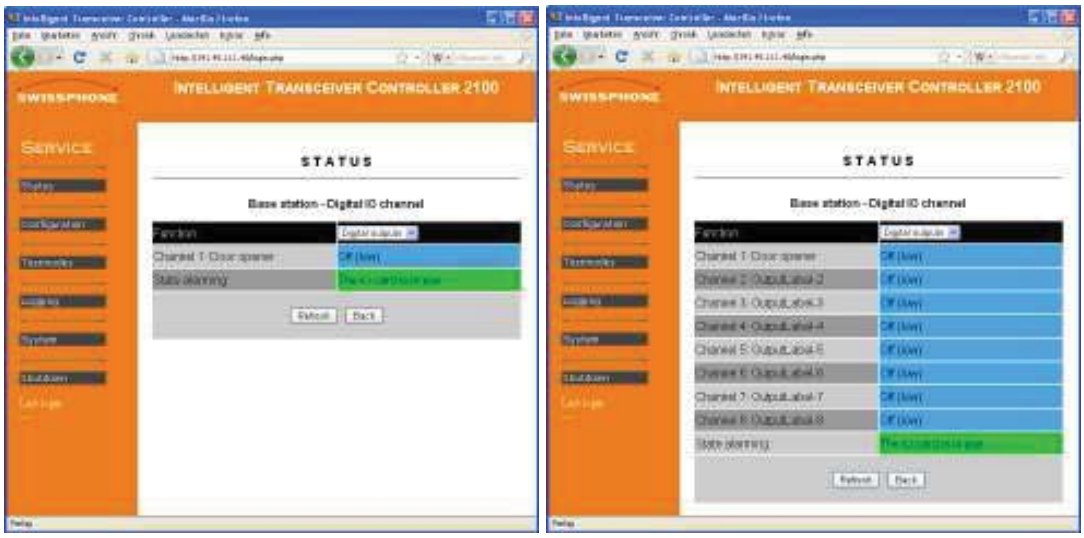


Fig. 7-14: Status of the digital outputs without (l.) / with I/O card (r.)

Fig. 7-15: Status of the digital outputs at activated siren control

Field (Digital outputs)	**Description**
Channel 1..3: OutputLabel-1..3	Relay output (digital outputs) - siren Indicates the status of the output (on/off). A siren can connected to this output. The siren can be switched remotely (using a special RIC address. This function must be enabled in the menu Configuration with the link "Optional base station settings" in the field "Siren support". Otherwise this output can be switched locally from the ITC.
Channel 4..8: OutputLabel-4..8	Relay outputs (digital outputs) Indicates the status of the output (on/off). This output can be switched locally from the ITC (e.g. open/close door).
Status alarm	The operating mode of the digital I/O module is displayed.

7.5.7 Local Alarms within 24h

This window displays the number of alarms tripped locally within the last 24 hours. These parameters can also be polled via the Digicom (Swissphone alert input software) from remote. The following figure on the left shows version I ("Value I") and on the right version II ("Value II", i.e. ITC2100 with optional I/O card).

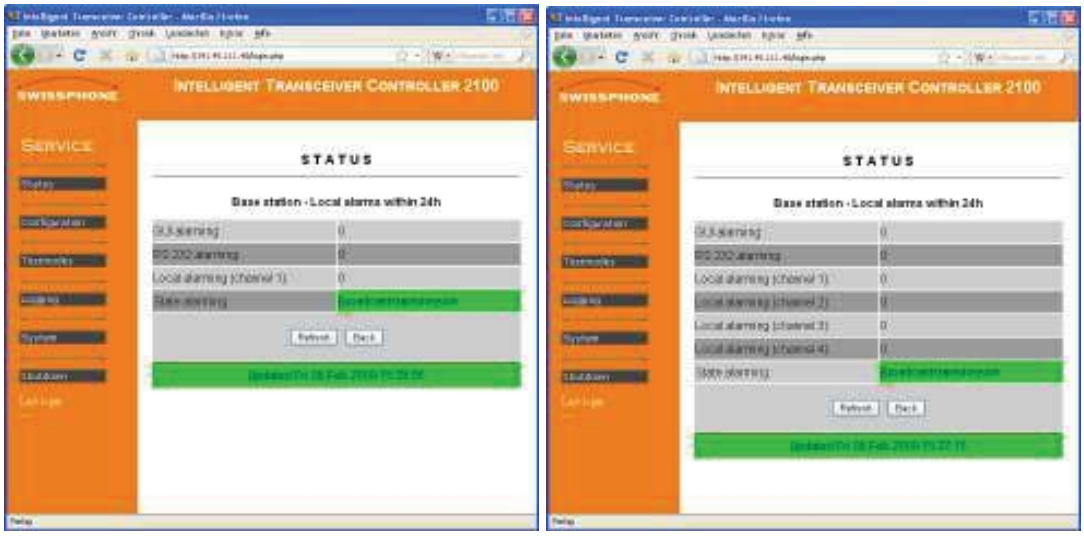


Fig. 7-16: Local alarms within 24h without (l.) / with I/O card (r.)

Fig. 7-17: Disabled transmission when the serial interface is used for a local task

Field	Description
GUI alarming:	The number of alarms during the previous 24 hours
RS 232 alarming:	The number of alarms via a local network alarm controller.
Local alarming (channel 1):	The number of local alarms via channel 1 input contact of the sync card (D-sub 9, pin 1 and 4).
Local alarming (channel 2..4)	The number of alarms via channels 2 to 4 input contacts of the I/O card.
State Alarming	Status display with ref. to successful or unsuccessful alarms.

7.6 Configuration

This chapter describes what settings can be made on the base station ITC2100-BOS.

Fig. 7-18: Configuration page of the service web-interface

7.6.1 Base Station

7.6.1.1 Base Station Settings

You can determine the type of base station in this sub-menu. If the base station is the Master base station or Standby base station, the number of alarm rings must be entered. By contrast, in the case of the Slave base station, it is also necessary to enter the position number and the current ring number. The maximum number of rings and the current position number can be modified with the Digicom (Swissphone alerting software) from remote (initialisation).

Perform the following steps:

1. Select the type (Master, Slave, Slave600, Standby), assign the location name
2. Assign the non-recurrent position number of a slave ITC in the network
   ITC2100/ ITC2000:
   - Field "Network number": Value between 1 and 127 (max. 127 slaves)
   - Field "Ring number": Value between 1 and 8 (max. 8 rings)

   ITC600:
   - Field "Netposition": Value between 1.1 and 5.7 (max. 35 slaves, max. 5 rings). The first and second digit are essential for the remote status check via Digicom (Swissphone alerting software). Those digits do not present the ring number and ring position.
3. Enter the max. number of rings of the network (ITC2100/ ITC2000: max. 8 rings, ITC600: max. 5 rings)

Type	Network Number	Net Position	Max. Number Rings	Ring Number	Description
Master	-	-	1 .. 8	-	ITC2100/ ITC2000 master
Slave	1..127	-	1 .. 8	1 .. 8	ITC2100/ ITC2000 slave
Slave600	-	1.1 .. 5.7	1 .. 5	1 .. 5 ("Alarming number")	ITC600 slave
Standby	-	-	1 .. 8	-	ITC2100/ ITC2000 standby (fall-back master ITC)

For multi-master networks (ITC2100 and ITC2000 only):

Field	Description
Max. # rings:	The number of rings of the largest sub-network (i.e. with the most rings). Therefore it indicates when the network is ready for the next transmission.
Max. # rings (multimaster):	The number of rings when the Multimaster is in emergency operation. Therefore it indicates when the network is ready for the next trans mission.

Configuration page for a slave ITC (ITC600 and ITC2100/ ITC2000)

The figure on the left shows the configuration page of the ITC2100/ITC2000 Slave and on the right the configuration page of the ITC600 Slave..

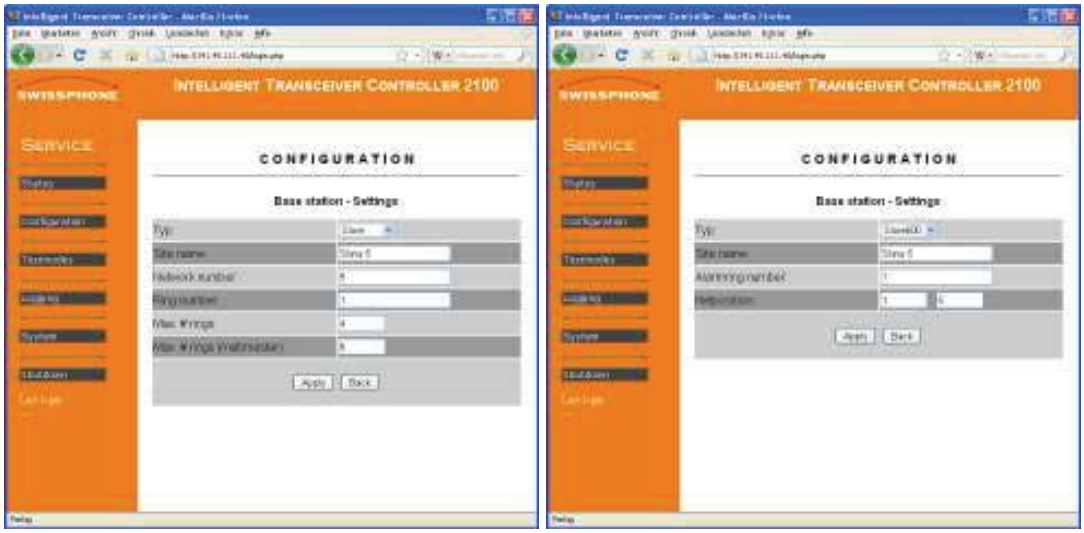


Fig. 7-19: Configuration page of the ITC2100 slave (l.) or ITC600 slave (r.)

Configuration page for a master ITC (ITC2100/ ITC2000 only)

The figure on the left shows the configuration page of the ITC2100/ITC2000 Master and on the right the configuration page of the ITC2100/ITC2000 standby.

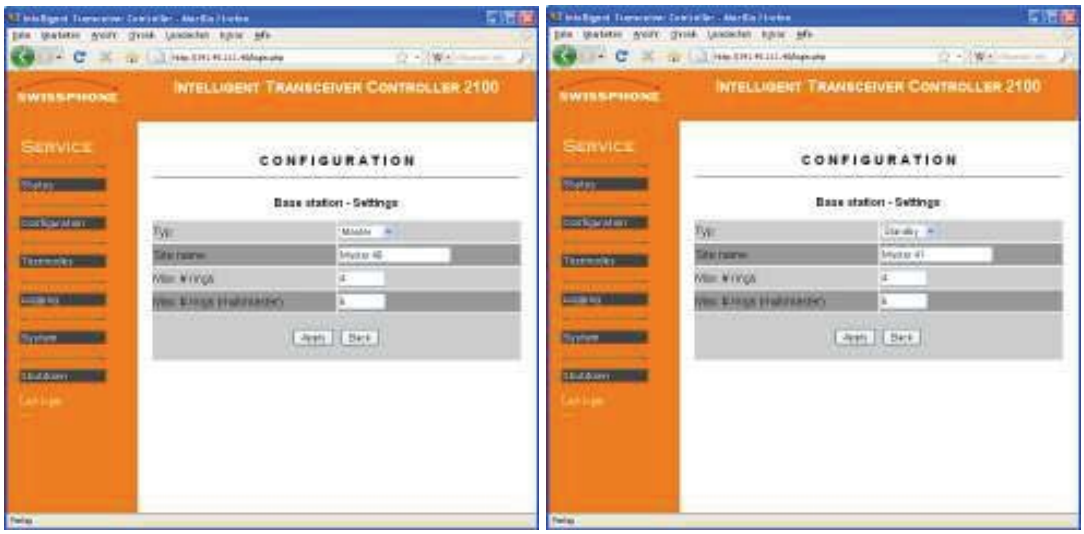


Fig. 7-20: Configuration page of the master (l.) or standby master (r.)

7.6.1.2 Optional base station settings

		ITC2100 - Version I	ITC2100 - Version II
Alarm inputs (local alarming) A POCSAG message is transmitted via the input (e.g. a POCSAG message can be transmitted from a fire detector connected to input 1)		**1x** (channel 1)	**4x** (channel 1 .. 4)
Sync card SC, D-Sub9 connector	Channel 1:	Pin 1: high (+) Pin 4: low (-)	
I/O card	Channel 2:	-	Pin 2: Opto IN 0 Pin 3: Opto GND 0
	Channel 3:	-	Pin 6: Opto IN 2 Pin 7: Opto GND 2
	Channel 4:	-	Pin 8: Opto IN 3 Pin 9: Opto GND 3
Inputs for remote polling (digital inputs) The status of the inputs (on, off) can be polled from a remote Network alarm controller (e.g. the status of an active lightning protector for the antenna output can be polled)		**1x** (Channel 5)	**3x** (Channel 5, 6, 7)
Sync card SC, D-Sub9 connector	Channel 5:	Pin 7: high (+) Pin 9: low (-)	
I/O card	Channel 6:	-	Pin 11: Opto IN 4 Pin 12: Opto GND 4
	Channel 7:	-	Pin 4: Opto IN 1 Pin 5: Opto GND 1
Relay outputs (digital outputs) A siren can be connected to the output (channel 1 to 3). This can be switched from a remote location (using a special RIC address). The remaining outputs can be enabled or disabled locally from the base station. (e.g. to open /close doors). For the future it would possible to switch these outputs remotely from the network alarm controller.		**1x** (Channel 1)	**7x** (Channel 1 .. 7) A siren can be switched via channels 1 to 3
Sync card SC, D-Sub9 connector	Channel 1:	Pin 6: high (+), OC Pin 8: low (-), GND	
I/O card	Channel 2:	-	Pin 1+2: Relais 0
	Channel 3:	-	Pin 3+4: Relais 1
	Channel 4:	-	Pin 5+6: Relais 2
	Channel 5:	-	Pin 7+8: Relais 3
	Channel 6:	-	Pin 9+10: Relais 4
	Channel 7:	-	Pin 11+12: Relais 5
	Channel 8:	-	Pin 13+14: Relais 6

Table 1: Overview of the available in and inputs and outputs

The difference between version I ("value I") and version II ("value II" i.e. ITC2100 with optional I/O card) is in the number of digital inputs and outputs. An ITC2100 can be upgraded by inserting the I/O card.

Note: The I/O card can only be used starting with the following versions:

ITC2100	SW state:	≥ V 2.00	(see *System -> Information about… -> ITC2100 BOS)*
Sync card	State Tx-FPGA:	> 1.6	(see *System -> Information about… -> Applications*)
	HW state:	≥ Index D0	(Connector ST101 fitted)

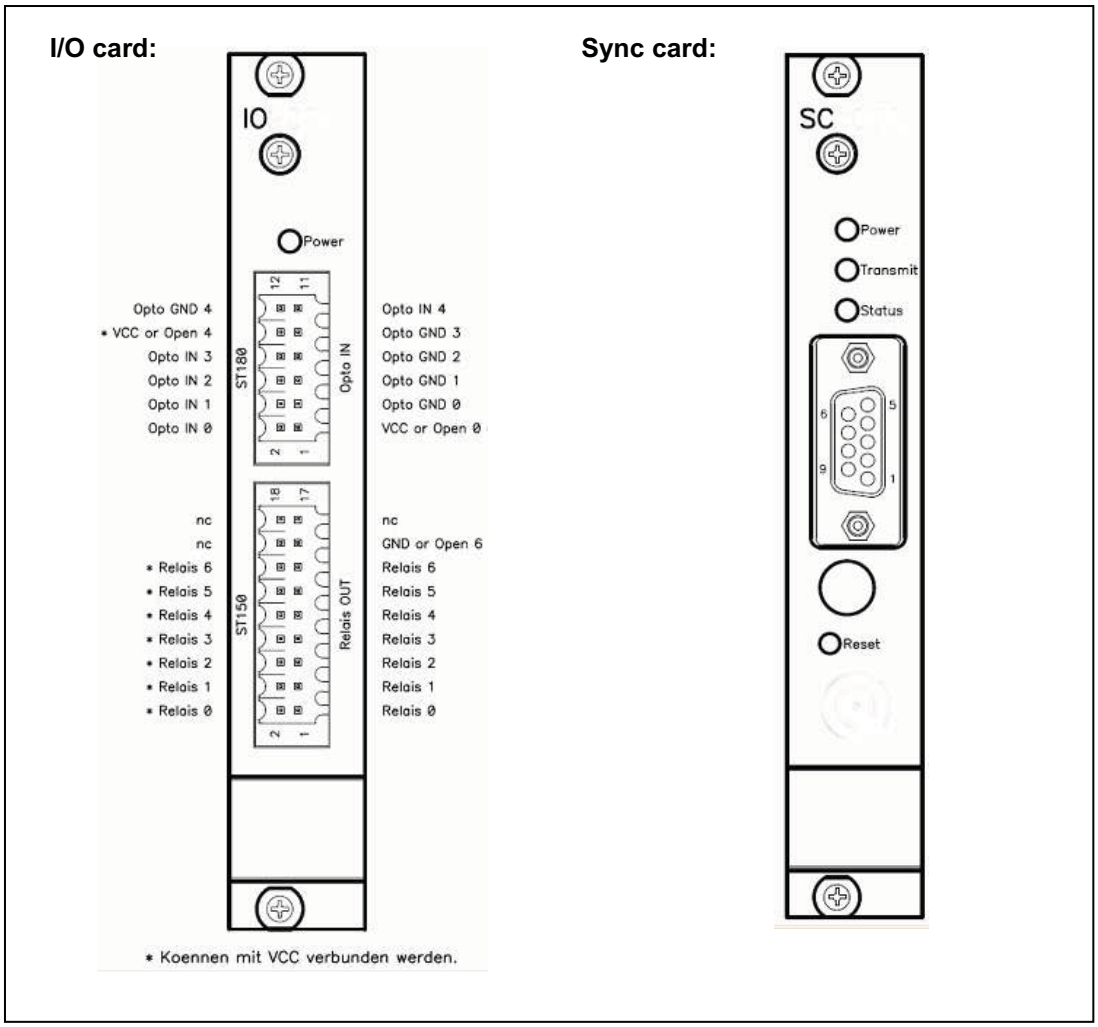


Fig. 7-21: Numbering and designation of pins on the I/O card and sync card

Configuration of the inputs and outputs:

The ITC2100 - Version I ("value I") has 2 optocouped inputs (1 alarm input + 1 input for remote polling) and 1 optocoupled output. These cannot be used for activating sirens.

The ITC2100 - Version II ("value II") has 7 optocoupled inputs (4 alarm inputs + 3 outputs for remoto polling) and 8 rely outputs. These can be used for activated sirens.

Select "enabled" in the field *Value* "Value I" or "Value II" and afterwards in the *Digital I/O card*. To configure siren actuation select "enabled" in the field *Siren support*.

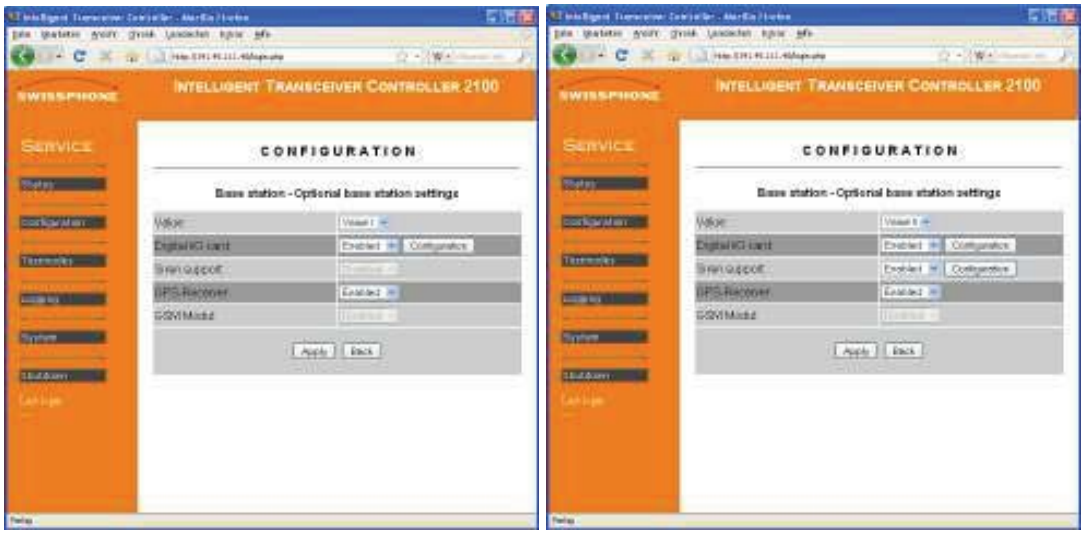


Fig. 7-22: Activation of the version I or II (Value I, Value II)

The inputs and outputs can be configured by clicking the *Configuration* button in the field *Digital I/O card*. A selection between "Local alarming", "Digital inputs" and "Digital outputs" can be made in the field *Function*.

Local alarming

Here a selection can be made whether a POCSAG pager message is to be transmitted on the leading or trailing edge of an input signal. The corresponding POCSAG message and also the RIC with subaddress can be defined in the fields *Channel local alarming 1*, *Channel local alarming 2*, etc. Channel local alarming 1 is located on the D-sub 9 plug of the sync card (Pin 1 and 4). Channel local alarming 2 to 4 are located on the digital I/O card.

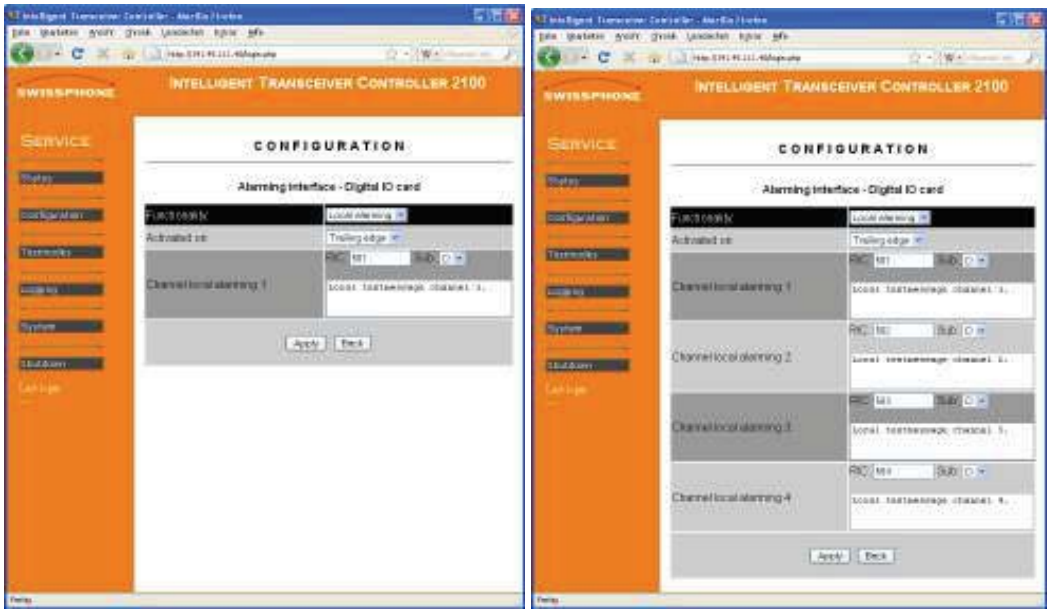


Fig. 7-23: Configuration of the local alarming without (l.) / with I/O card (r.)

Digital inputs

Here the names for the input contacts can be entered. Afterwards these names are displayed in the status menu (see *Status -> Digital I/O channels*). Channel 5 is located on the D-Sub 9 -connector of the sync card SC (pin 7 and 9). Channel 6 and 7 are located on the digital I/O-card.

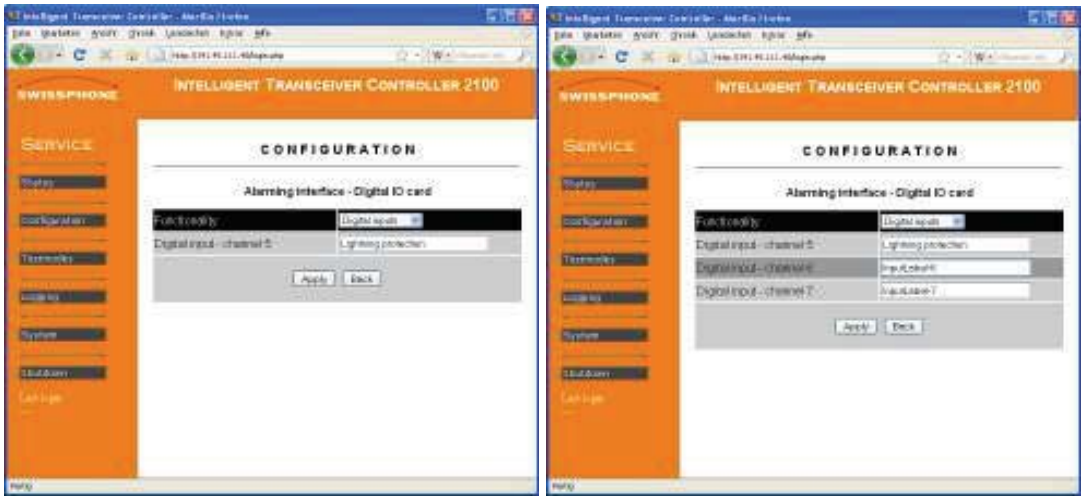


Fig. 7-24: Configuration of the digital inputs without (l.) / with I/O card (r.)

Digital outputs

Here the names for the output contacts can be entered. Afterwards these names are displayed in the status menu (see *Status -> Digital I/O channels*). The contact can be opened or closed locally by selecting "On" or "Off" and afterwards clicking the *Apply* button. Channel 1 is located on the D-Sub 9 connector of the sync card SC (pin 6 and 8). Channel 2 to 8 are located on the digital I/O card. If "On" is selected in the field *Siren steering* this is displayed for channels 1 to 3.

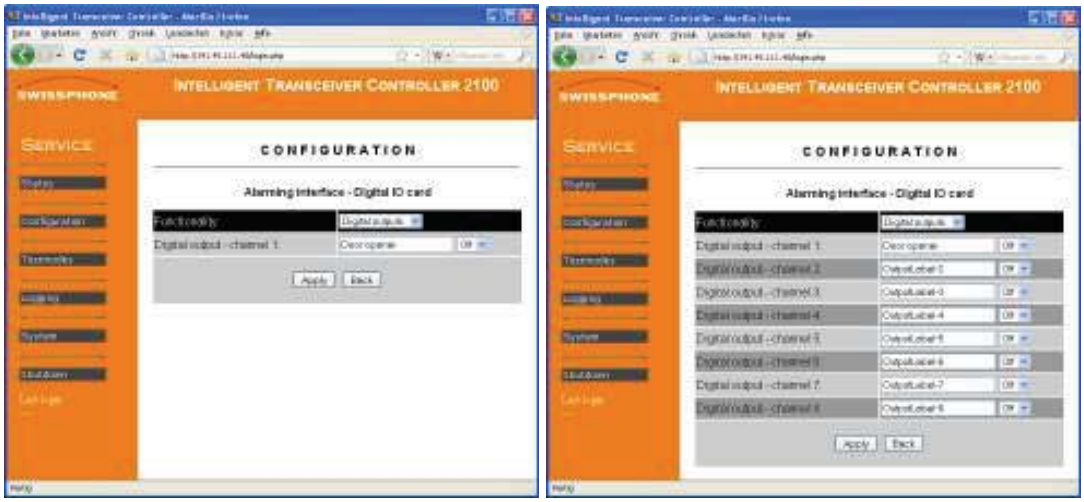


Fig. 7-25: Configuration of the digital outputs without (l.) / with I/O card (r.)

Fig. 7-26: Configuration of the digital outputs at activated siren control

Siren control:

After selecting "Enabled" in the field *Siren support* and then clicking button *Configuration* the following window is displayed:

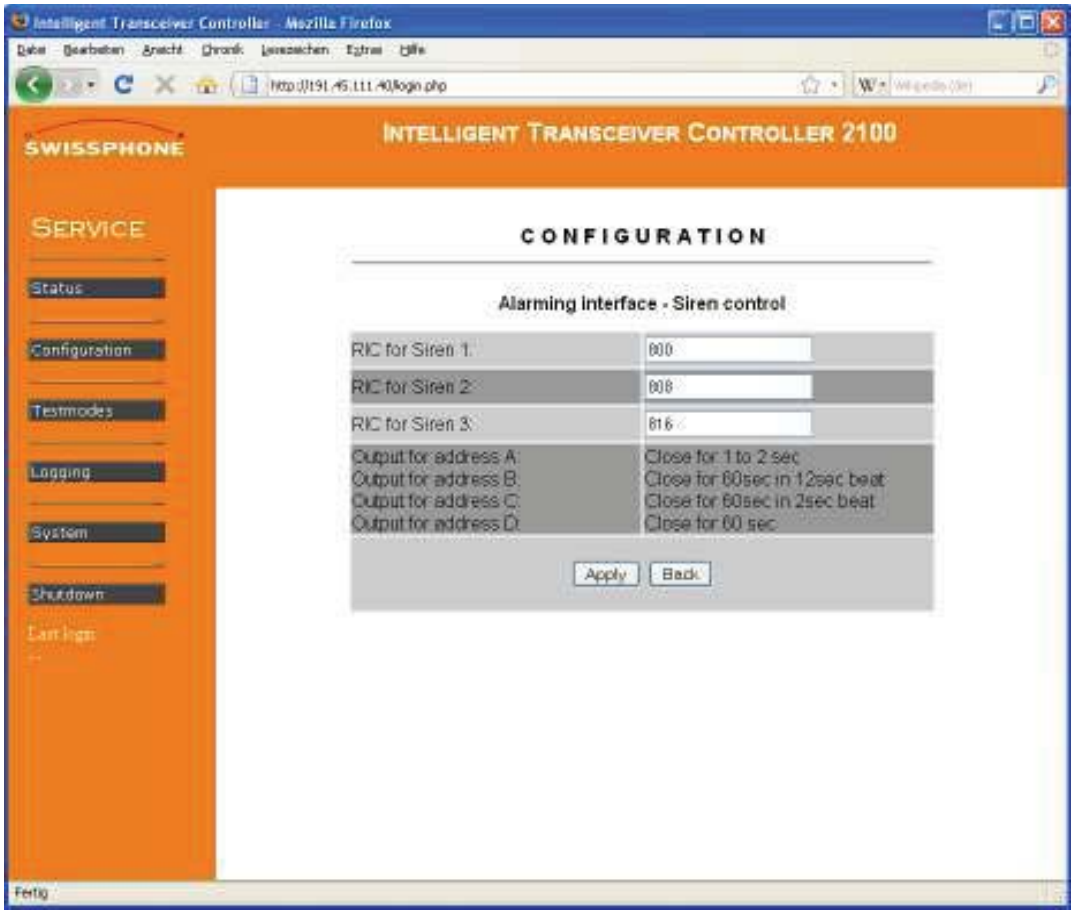


Fig. 7-27: Configuration of siren control

The RIC's for the sirens can entered in the fields *RIC for Siren 1*, *RIC for Siren 2* or *RIC for Siren 3.* The RIC's are sent from a remote network alarm controller to switch the sirens, which are connected to the relay of the digital I/O card / sync card. Depending on the subaddress A to D (these are the last two bits of the RIC) the relay switches the siren on or off according to a preset sound pattern.

Output for address A: Close for 1 to 2 sec
Output for address B: Close for 60sec in 12sec beat
Output for address C: Close for 60sec in 2sec beat
Output for address D: Close for 60sec

GPS antenna:

The GPS antenna's reference time is made use of when a synchronised message is to be transmitted by several Master ITC's. The field *GPS-Receiver* appears only when "Master" or "Standby" is set in the field *Type* which can be found in menu *Configuration* under the link *Base station settings*. The GPS antenna can be activated by changing the status from "Disabled" to "Enabled" in the field *GPS-Receiver*.

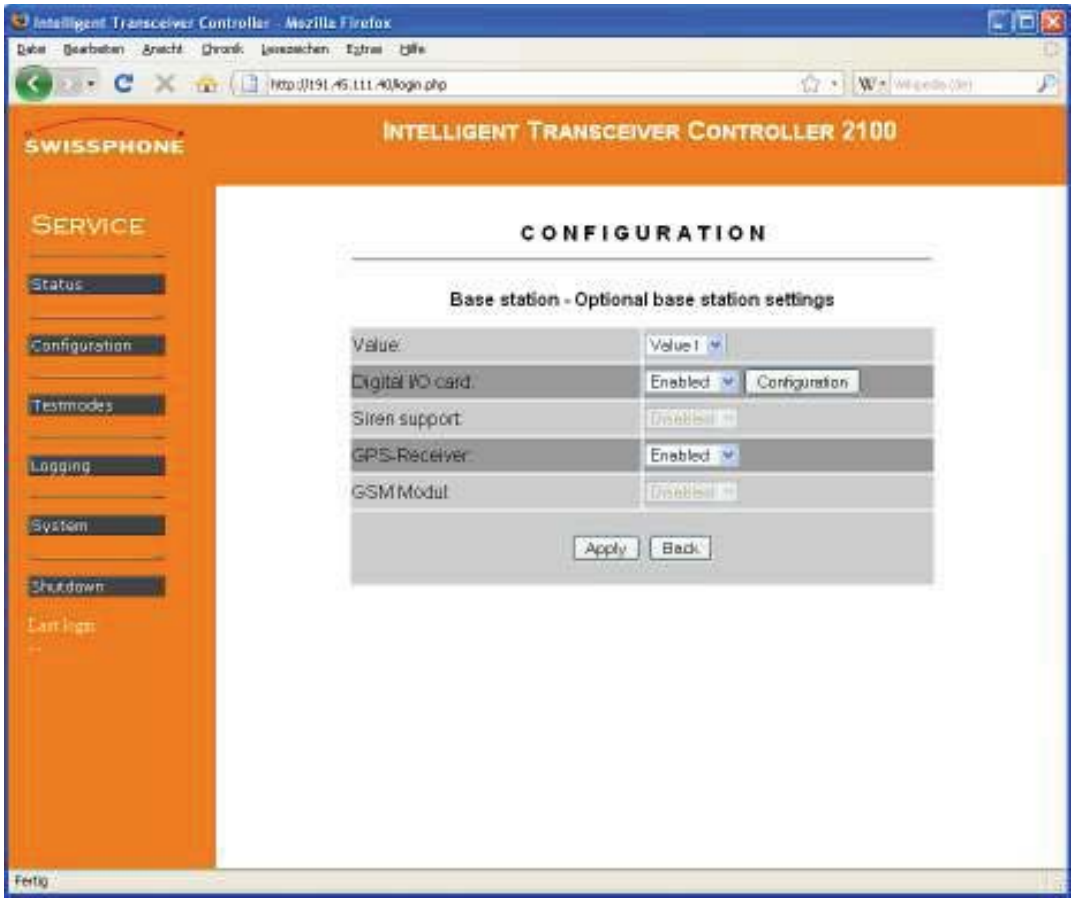


Fig. 7-28: Activation of the GPS antenna

7.6.1.3 Radio network (RIC / Baudrate)

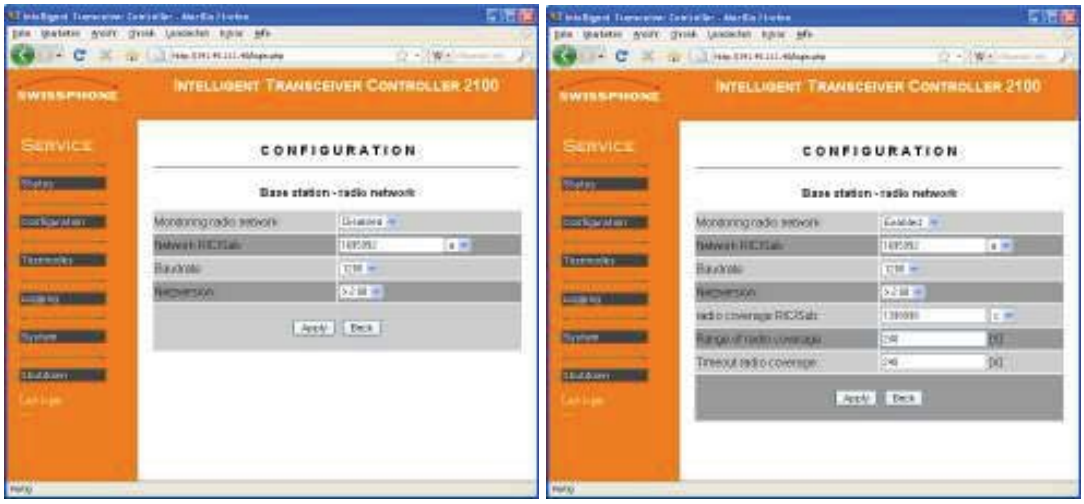


Fig. 7-29: Configuration of the radio network parameters

Field	Description
Monitoring radio network:	The field only appears for a Master ITC.. "Enabled": A numerical call is transmitted with the RIC set in the field *Radio coverage RIC/Sub* when the network alarm controller transamits after the timeout set in the field *Timeout radio coverage*. This transmission is carried out at regular intervals, as defined in the field *Range of radio coverage.* This continues until the network alarm controller instructs the ITC to transmit the radio coverage RIC.
Network RIC/Sub:	Enter the network RIC incl. the selection of the sub address a, b, c, d. The network RIC must be the same in all base stations in a network. This is because it serves to identify the home network, i.e. neighbouring networks must have different network RICs if they transmit on the same frequency. In this way the base stations know which messages to forward.
Baudrate:	Selection of the baudrate 512, 1200 and 2400.
Network version:	Selection of the network version > 2.00 or <1.30. The network version corresponds to the ITC2100 software version. All ITC2100-ITC's in a ring must have the same software version, to ensure that synchronised transmission is possible. If a base station in the same ring has old software (<V1.30), "<1.30" must be selected in the field *Netversion.* A ring containing base stations with different software versions, creates non-synchronised transmissions.
Radio coverage RIC/Sub:	Only with a Master ITC and when "Enabled" is selected in the field *Monitoring radio network*. Entry of the radio coverage RIC, incl. selection of sub-address
Range of radio coverage:	Only with a Master ITC and when "Enabled" is selected in the field *Monitoring radio network*. Entry of interval in seconds in which the cyclic transmission of the radio coverage RIC is carried out.

Field	Description
Timeout radio coverage:	Only with a Master ITC and when "Enabled" is selected in the field *Monitoring radio network*. Entry of the duration in seconds after which the cyclic transmission of the radio coverage RIC starts. Normally the Master ITC receives the command to transmit the radio coverage RIC from the Swissphone software Digicom. If the timeout entered here elapses without a further command to transmit (from Digicom) then the Master ITC transmits the radio coverage RIC into the network automatically on the assumption that the connection to the Swissphone software Digicom is not currently available.

7.6.1.4 Transmitter (frequency, power)

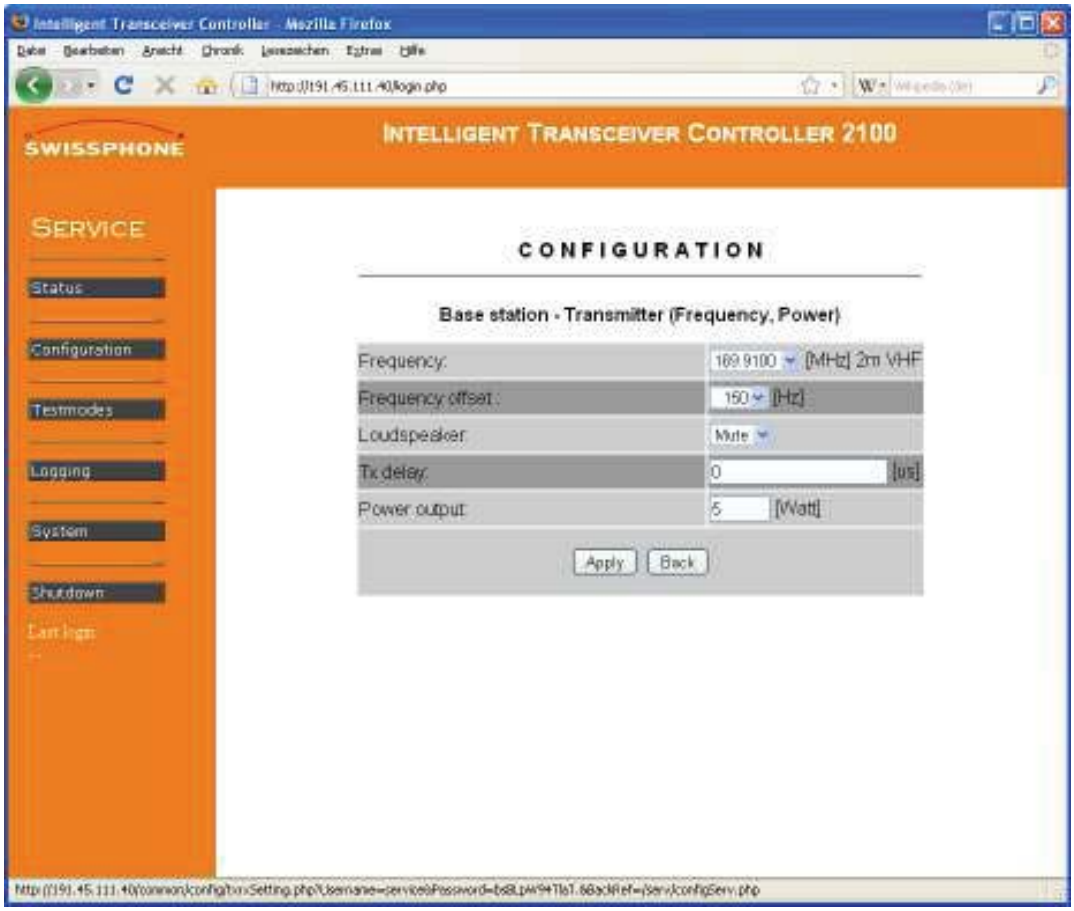


Fig. 7-30: Configuration of the transmitter parameters

Field	Description
Frequency:	Setting the frequency of the transmitter or receiver. If there is an asterisk (*) at the beginning of the frequency to be set, e.g. *173.5125, this frequency has been subsequently programmed automatically (see chapter 6.6.2.2).
Frequency offset:	Setting the carrier frequency offset in Hz.
Loudspeaker:	The ITC features a small loudspeaker which can be used for monitoring the received messages. This can be activated and deactivated in this menu.
Tx delay:	Depending on the locations of the base stations, delayed transmission is necessary in comparison with neighbouring base stations in the same ring. This delay ensures that in the defined border zones of neighbouring base stations overlapping signals are as far as possible synchronised.
Power output:	The transmitter has a maximum power of 25W which can be set in this field.

7.6.1.5 Simultaneous Alarm

Fig. 7-31: Configuration of alternative Baud rates/Frequencies and repetitions

Field	Description
Default frequency: Default Baud rate:	The baud rate and frequency that are used by default.
Alternative Baud rate: Alternative frequency:	The alternatively used baud rate and frequency.
Number of emissions:	Defines how many times the same alarm is to be repeated in the network. 1-4 emissions can be set.
Sends in emissions 1..4:	Depending on the location of the base station, a delayed emission may be required due to neighbouring base stations in order to avoid interferences. “Sends 1” is the first send, “Send 2” the one immediately following, etc. On: Emission occurs in the corresponding send. Off: No emission in the corresponding send.

7.6.2 System

7.6.2.1 RSSI Calibration

This page is subdivided into the sections *Field strength measurement*, *RSSI calibration* and *Input RSSI*. The current field strength can be measured in section *Field strength measurement*. Click on the *Measurement* button to activate measurement, and the current RSSI value is displayed after a few seconds. The receiver must be correctly calibrated in order for the ITC to display the correct RSSI values. This can be done in section *RSSI calibration*. First use a radio test set to generate -100 dBm and supply this to the receiver. Then click on the *Calibrate* button and the ADC[6] value is calculated and entered. Then follow the same procedure with -60 dBm and the second value is entered. The receiver is now calibrated correctly. However, since no radio test set is generally available in the field, these two ADC values can be read off on the rear panel of the receiver and entered in section *Input RSSI*.

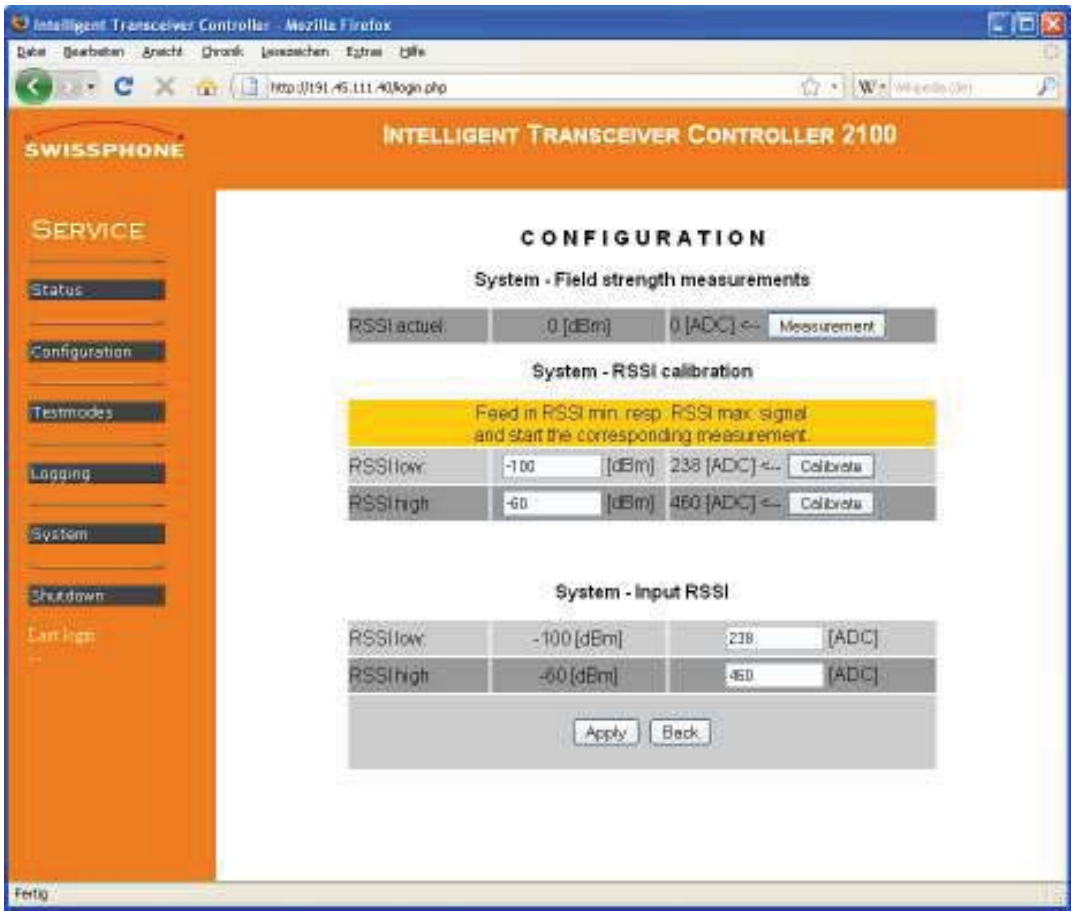


Fig. 7-32: RSSI calibration

[6] ADC = analog-digital conversion

7.6.2.2 Transmit Frequency

5 specific frequencies (channels 95 to 99) can be independently programmed. This is carried out in a separate programming sector. Programming is limited to channels 95 to 99. As soon as a channel has been programmed, the frequency should be entered in the appropriate field, e.g. when channel 95 has be programmed, enter the new freuqncy in the field "Channel 95". The frequency is immediately displayed for selection in the link "Transmitter (Frequency / Power)" in the field "Frequency" and is designated with an asterisk (*).

Important: Frequency programming is carried out exclusively in a separate programming sector. The newly programmed frequencies are entered in the fields "Channel 95 to 99" so that they are listed here in the service pages for selection.

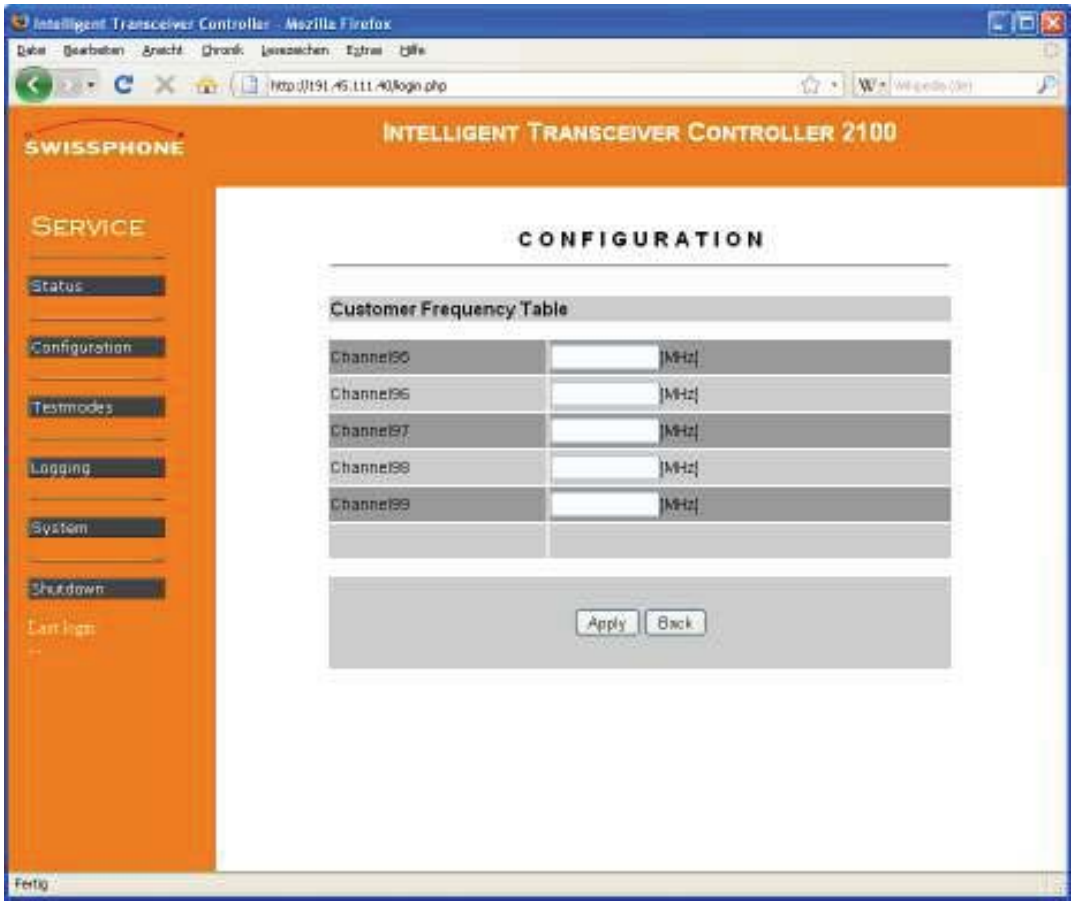


Fig. 7-33: Customer frequency table

7.6.2.3 Local Output

In order to print out or display the received data on a printer or monitor, there is an option of doing this via the serial port (COM1) of the controller module. The serial port must have the following setting:

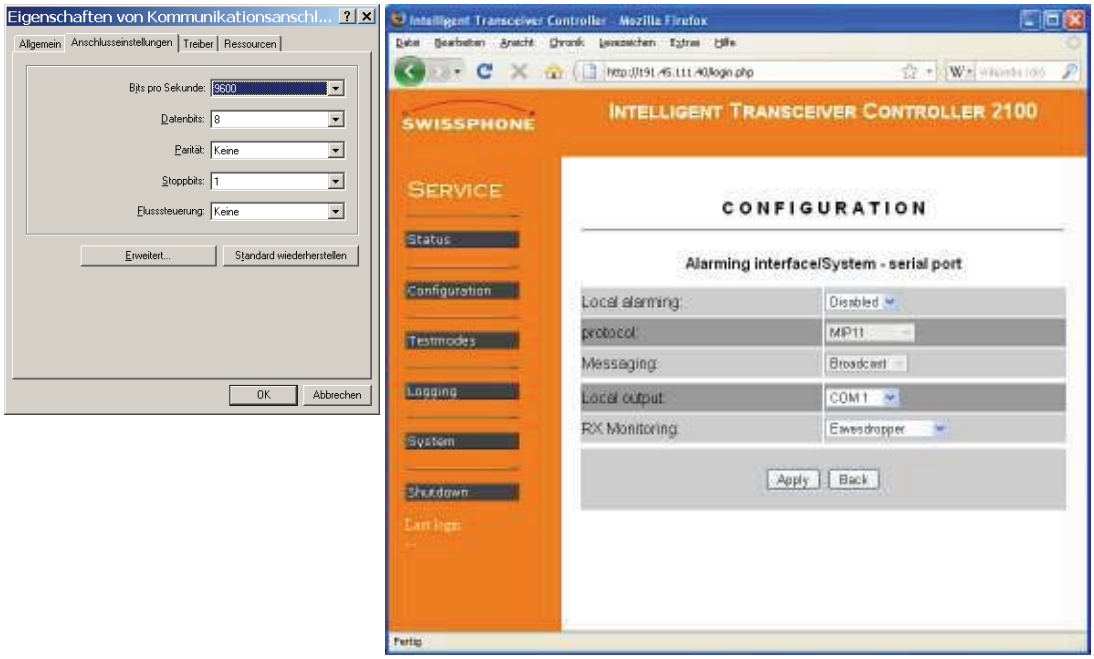


Fig. 7-34: Configuration of the local output

Field	Description
Local Alarming:	See chapter 6.6.3.2 Local Alarming.
Protocol:	See chapter 6.6.3.2 Local Alarming.
Messaging:	See chapter 6.6.3.2 Local Alarming.
Local output:	Switch on ("COM 1") or switch off ("Disabled") the local output. When switched on, received messages as defined in the field "Rx Monitoring" are forwarded.
RX Monitoring:	*Eavesdropper:* The complete POCSAG radio traffic is monitored and logged(also see Logging->RX/TX Monitoring). *Only base station*: The POCSAG data for this single ITC is monitored and logged (also see Logging->Alarming/System message).

Note: Because the Controller only has a single serial interface (COM 1) available, either the function "local alarming" or the function "local output" can be used.

7.6.2.4 Create Backup

All data on the flash disk can be downloaded to the PC/laptop via the *Create Backup* link. This data is encrypted and can be viewed only by the Swissphone Development Department. This file is very useful for error analysis.
Before entering the sub-menu, the following information window appears (confirm with OK).

By clicking on the link "Create backup" the back-up data can be saved in the required location.

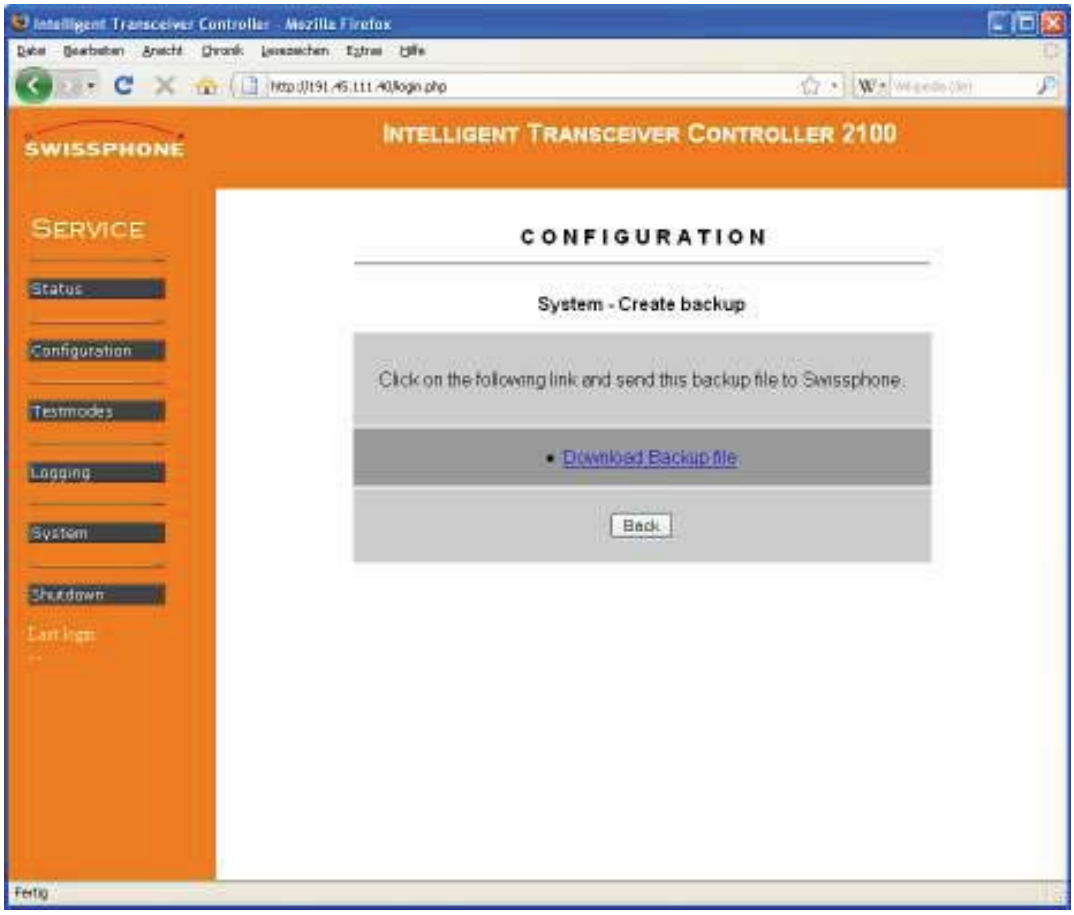


Fig. 7-35: Create backup

7.6.2.5 Upload Update

No messages should be sent from the master base station and the Digicom (Swissphone alarming input software) should not be started during loading of a new firmware release to the ITC2100. Otherwise, this could result in corrupt data during the update. Disconnect the antenna from the base station to prevent reception. After clicking the link "Update file upload" the system change in a deeper operating system level (run level). This change lasts approx. 10 seconds. The following window appears:

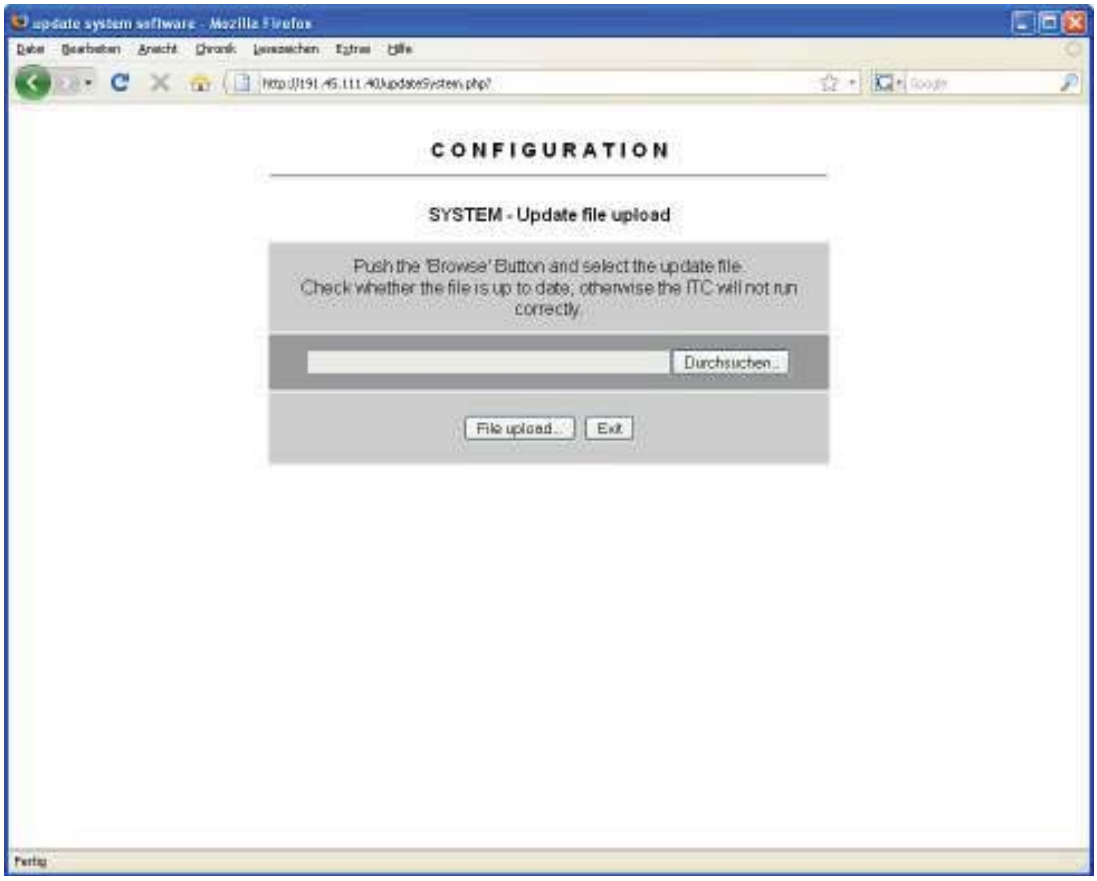


Fig. 7-36: Software update

Click the button "*Browse*" to select the update file (ZIP file) and then click "*File upload*" to upload the file. The ITC then conducts a soft reset and is ready for operation again after approx. 10 seconds. For base stations with SW version <1.30 **a new start must be carried out**. From version 1.30 a new start is carried out automatically after the update.

ITC2100 Firmware update to version 2.0:

Important information:

On version 2.0, timing to the air interface has been changed and it is no longer compatible with earlier versions. An existing network must therefore be completely updated or complete rings. If a new base station is to be installed in an existing network, in which the base stations run on versions earlier than V 2.0, the timing of the newly installed base station must be set to the earlier version under *Configuration* → *Radio network (RIC / Baudrate)* -> *Netversion*. However, the intention is to bring all networks to the latest software situation step by step.

Update procedure:

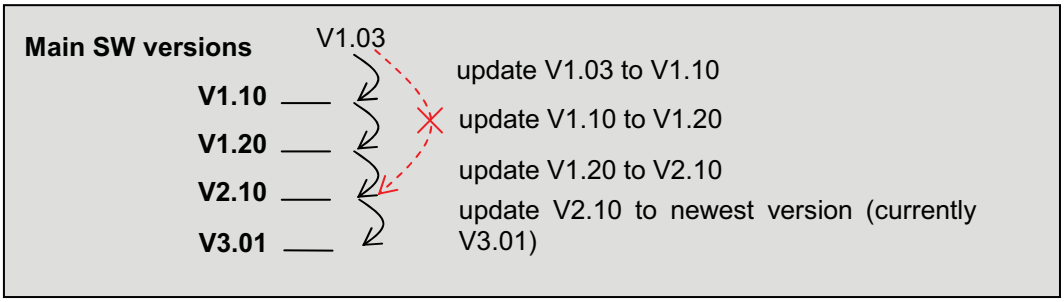
- See chapter 4.1 and chapter 4.2: Connect the laptop to the LAN connection ETH using a crossover cable. Enter the laptop's IP address 192.168.1.10 under network characteristics. In the browser make contact with the base station (http://192.168.1.1). User and password are both: ***service***.
- After logging in, select ***Configuration*** -> *Upload Update*.
- With ***Browse*** select directory and file ***update_x.xx.zip*** and then ***File upload….*** After the upload has been completed restart the base station.

Important for the ITC2100-BOS:

The ITC2100-BOS must run on a SW version ≥ V2.25, i.e. from Kernel version 2.4.10-1.2. It is not permitted to update a version earlier than V2.25 (see chapter 8.5).

Important: Please maintain the following update order!

A large update e.g. from V1.03 to V2.10 must be carried out in stages. This means first of all update to V1.10, then to V1.20 and finally to V2.10.



7.6.3 Alarming Interfaces

7.6.3.1 Ethernet Interface

The ITC2100-BOS is linked to the alarm input software via a LAN interface. The master or standby base station must be aware of the IP and port address of the alarm input software and this must be entered in the DiCal Host field. DiCal is a trademark of the Swissphone and means here the alarm input software.

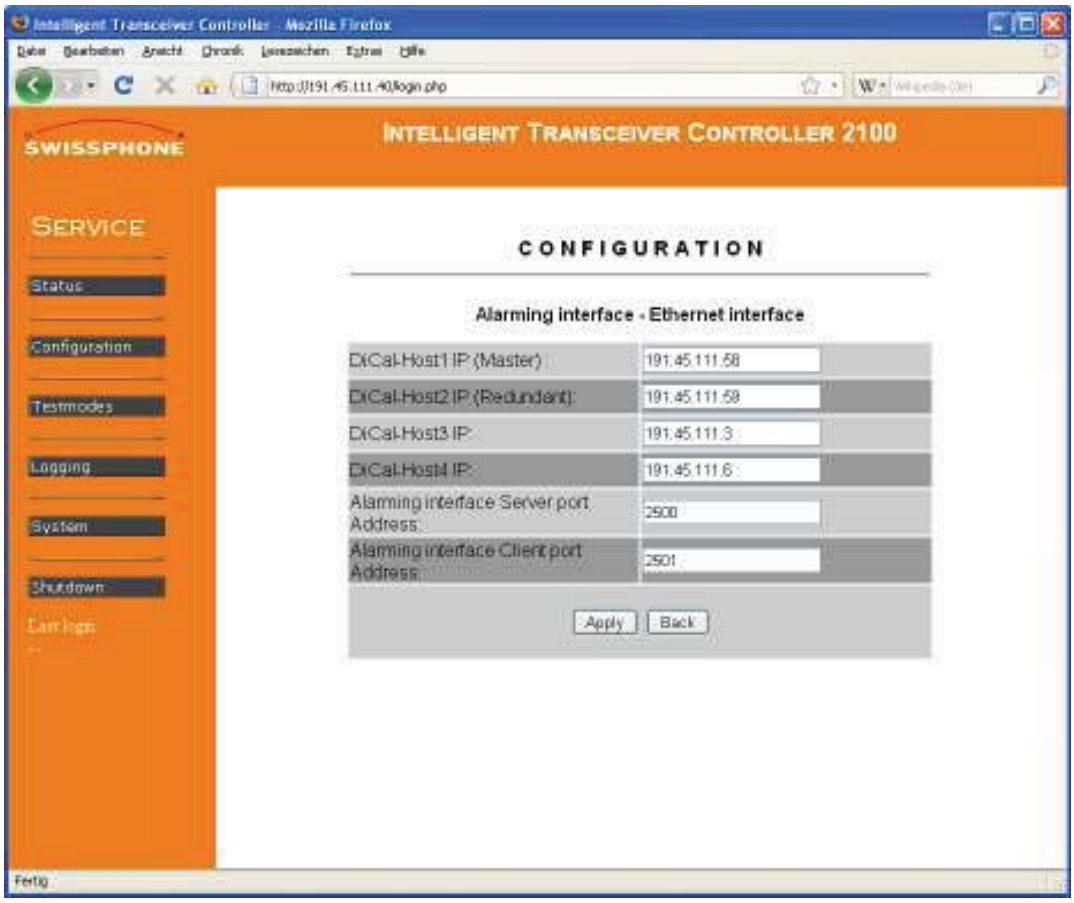


Fig. 7-37: Configuration of the host IP addresses

Field	Description
DiCal-Host1 IP (Master):	IP address of the supraregional network alarm controller (over several rural districts).
DiCal-Host2 IP (Redun-dant):	IP address of the redundant supraregional network alarm controller (over several rural districts).
DiCal-Host3 IP:	IP-Adresse des regional network alarm controller (over the local rural district).
DiCal-Host4 IP:	IP address of the redundant supraregional network alarm controller (over the local rural district)
Alarming interface Server port Address:	Port number of the network alarm controller server.
Alarming interface Client port Address:	Port number of the network alarm controller client .

7.6.3.2 RS 232

The serial port (COM 1) can be used for local alarming. However, local output (see chapter 6.6.2.3) cannot be enabled at the same time. This must be disabled.

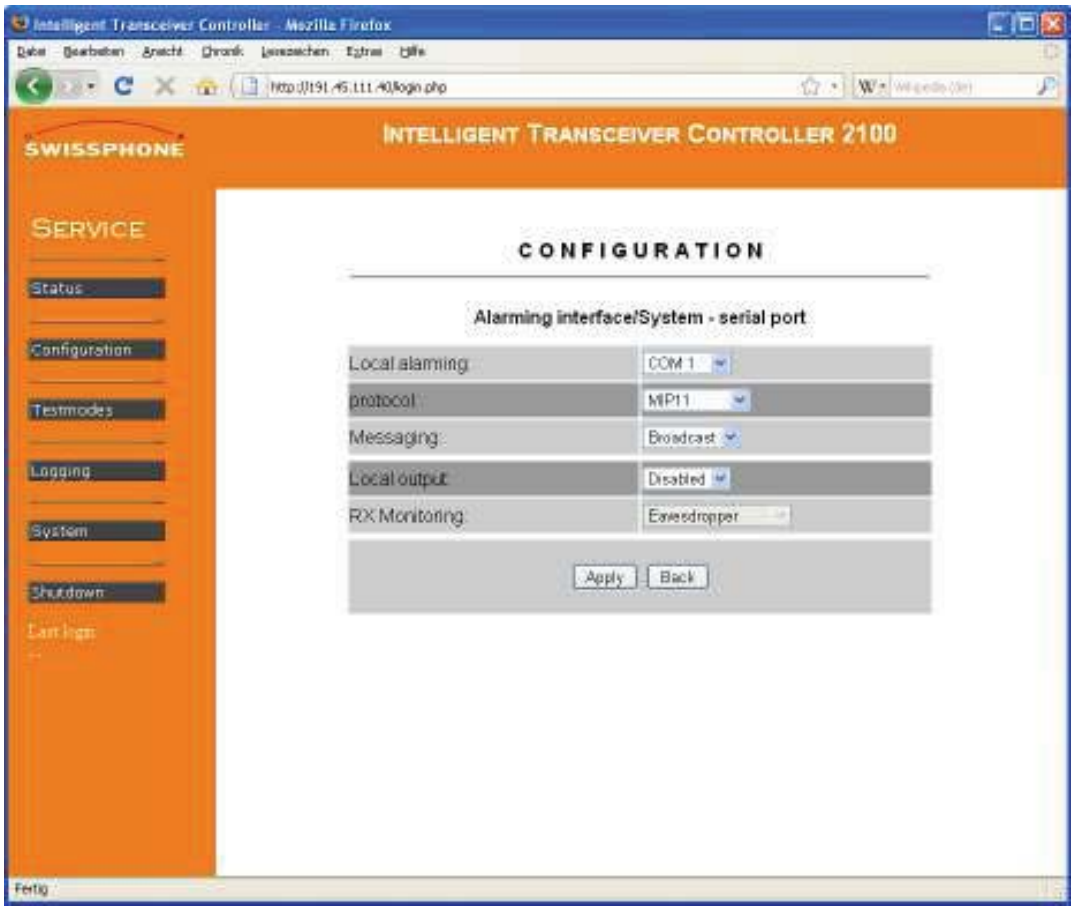


Fig. 7-38: Configuration of the local alarming interface RS232

Field	Description
Local alarming:	Switch on ("COM 1") or switch off ("Disabled) local alarm. When switched on, an alarm message can be forwarded via the Controller's serial interface
Protocol:	Selection of the communication protocol "MIP11" or "Sonnenburg" from the local network alarm controller to the ITC (Controller's serial interface). "MIP11" is Swissphone's freely available access protocol. "Sonnenburg" is used with a Sonnenburg network alarm controller.
Messaging:	Selection of the type of message transmission. Currently "Broadcast is the only possible setting. This means that the message is transmitted to the complete network.
Local output:	See chapter 6.6.2.3 Local output.
RX Monitoring:	See chapter 6.6.2.3 Local output.

Note: Because the Controller only has one serial interface (COM 1) available, either the function "Local alarm" or the "Local output" can be used.

7.7 Testmodes

The ITC features various test modes under the menu *Testmodes*. These different modes can be selected using the “Type testmode:” drop-down menu.

7.7.1 Settings testmode

Transmission of bit patterns:
The ITC can transmit various types of pattern (preamble and idle). The duration of the relevant pattern must be specified before it is executed so as to prevent a pattern monopolising the network continuously. The chosen pattern is transmitted by clicking the button *Execute*.

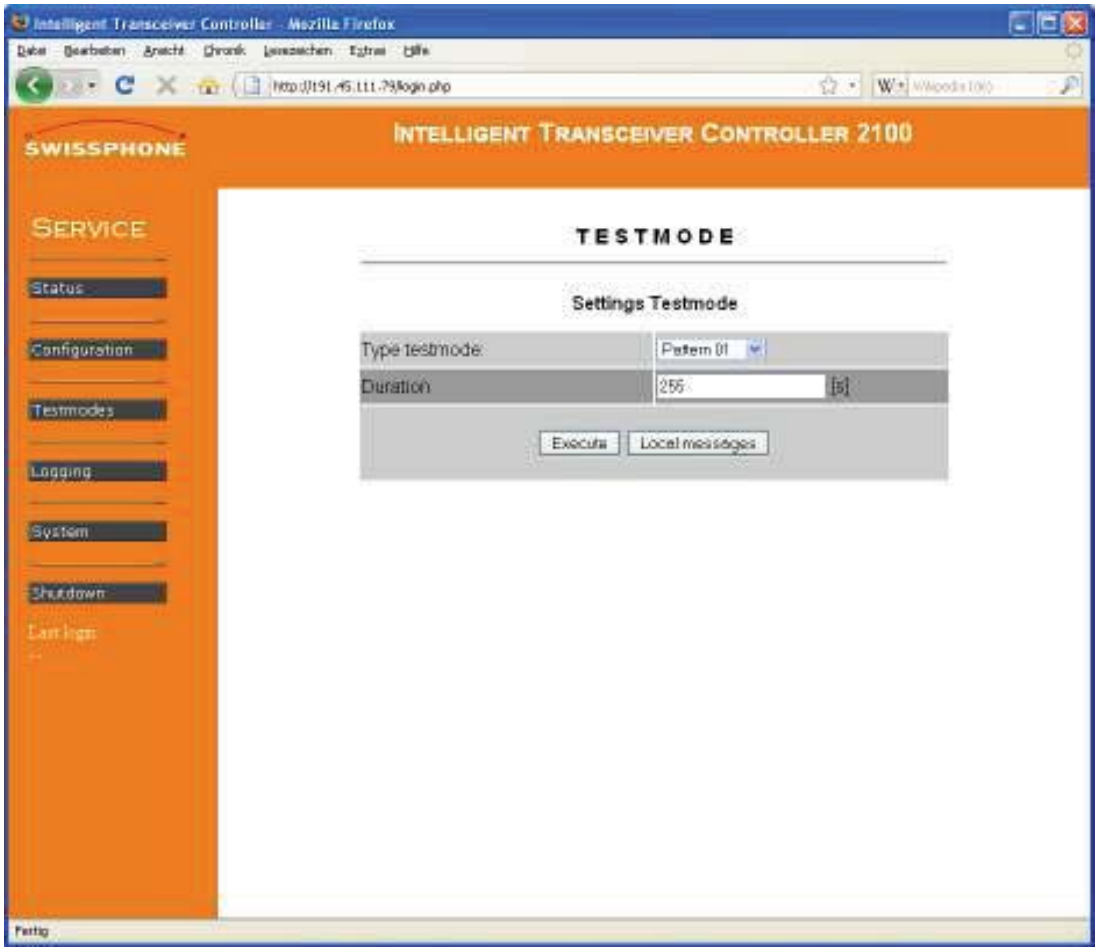


Fig. 7-39: Testmode page of the service web-interface

Field	Description
Type testmode:	Selection of the bit pattern to be transmitted. "Pattern 01" corresponds to the POCSAG preamble, i.e. alternating binary digits "0" and "1". "Idle" corresponds to POCSAG Idle codewords (defined sequence of binary digits "0" and "1"
Duration:	Setting the transmission duration in seconds of the selected bit pattern.

Transmission of local POCSAG messages:

Click the button "*Local messages*" to access the submenu *Settings local messages....* The figure below on the left shows the entry mask for setting single message transmission and the figure on the right for periodical message transmission. Message transmission can be started by clicking the button "*Start*" or "*Send*". When a message is being sent periodically, the transmission can be halted by clicking the button "*Stop*".

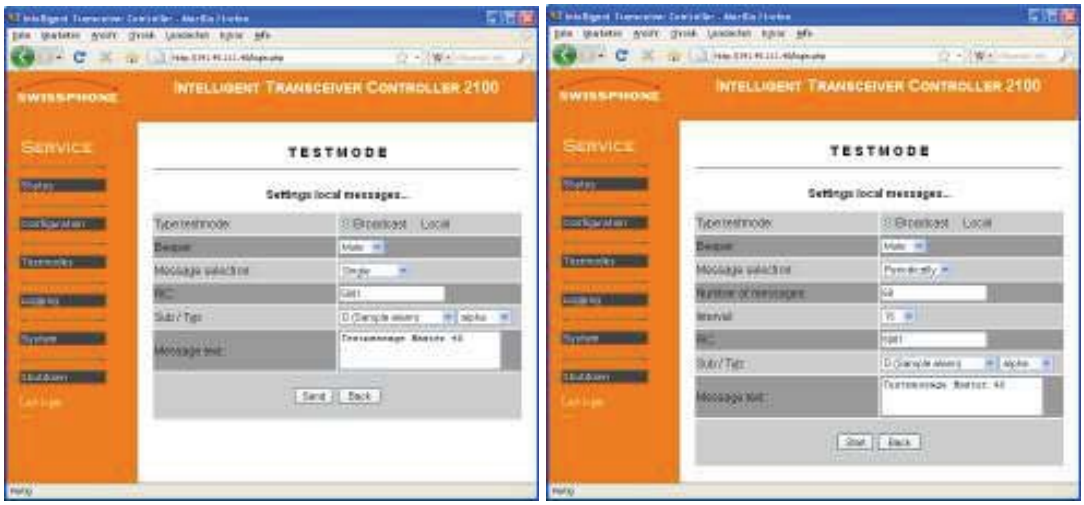


Fig. 7-40: Local transmission of a POCSAG message, once (l.) or periodically (r.)

Field	Description
Type testmode:	Select the type of message transmission. Currently only "Broadcast" is possible, i.e. the message is transmitted over the complete network.
Beeper:	Switch the receiver's loudspeaker on the decoder card (RC) either on ("Audio") or off ("Mute"). When switched on, the received signal sounds from the loudspeaker.
Message selection:	Set whether the message is to be transmitted once ("Single") or several times ("Periodically"). When "Periodically" is selected two more field appear: *Number of messages* and *Interval*.
Number of messages:	This field only appears when "Periodically" is selected in the field *Message selection.* Set number of times the message is to be sent (max. 255).
Interval:	This field only appears when "Periodically" is selected in the field *Message selection.* Set the gap between the repeated transmissions of the message (15sec, 30sec, 60sec, 300sec).
RIC:	Enter the address for the messages (RIC).
Sub/Typ:	Set the required sub-address A, B, C, D and the type of message alpha, numeric, tone.
Message text:	Enter the text for the message

Caution:

Setting periodical message transmission can block the network. With 255 transmissions and a max. interval of 300 sec., the network is blocked for 21h 15 min (300s x 255). Therefore take special care when setting periodical message transmission.

7.8 Logging

7.8.1 General

The following section specifies the original logfile messages of all ITC2100-BOS processes. The messages defined below can be displayed with the HTML user interface of the base station. All log files are designed as ring buffers and feature a specific size. If this size is exceeded, the least recent messages are deleted.

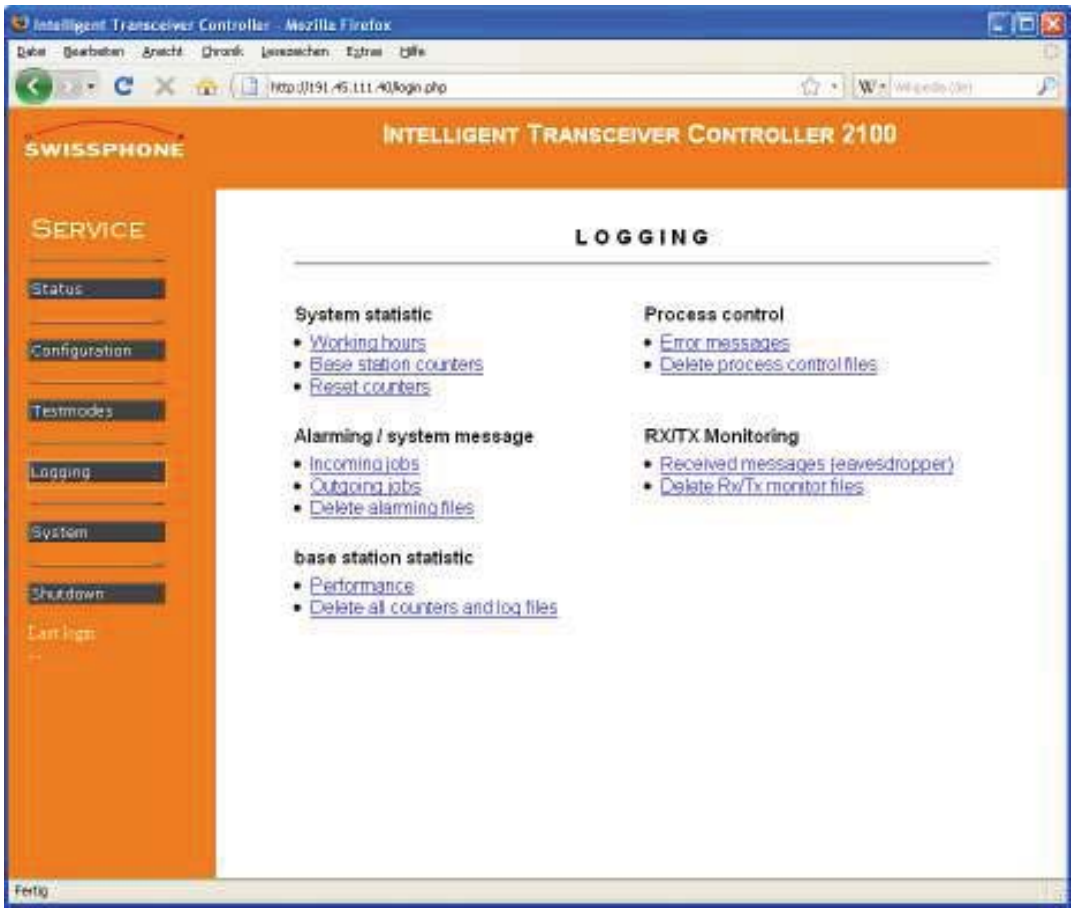


Fig. 7-41: Logging page of the service web-interface

7.8.2 System statistics

7.8.2.1 Working hours

This menu lists all base station operating hours counters. The button *Reset working hours* resets only the current hours counter under section "current working hours". The total operating hours counter under the section "total working hours counter" cannot be reset.

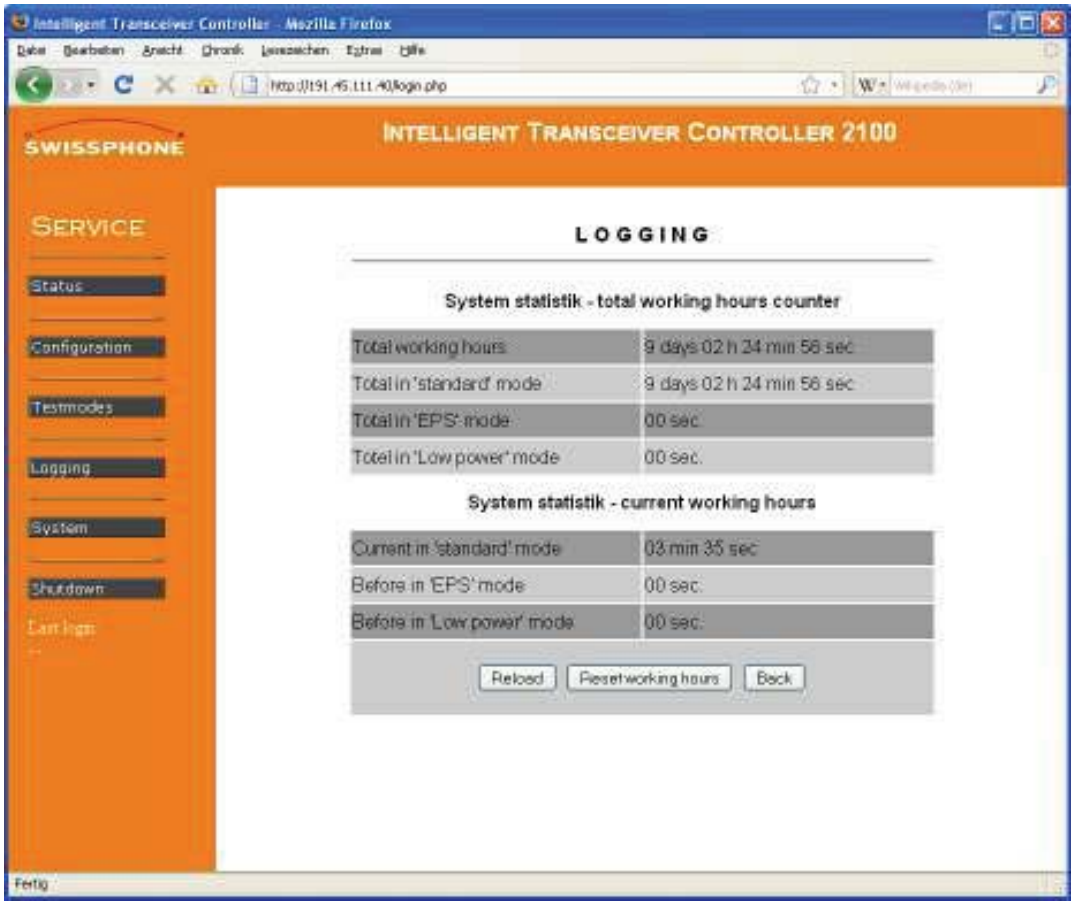


Fig. 7-42: Operating hours counter

Field	Description
Total working hours	Indicates the total operating hours of the base station. The "Total working hours" consists of the times *'standard' mode*, *'EPS' mode* and *'Low power' mode*.
Total in'standard' mode	Total time during which the ITC has been in standard mode.
Total in 'EPS' mode	Total time during which the ITC has been in battery mode.
Total in 'Low power' mode	Total time during which theITC has operated in "low power" mode.
Current in 'standard' mode	Time during which the ITC has been in standard mode (again).
Before in 'EPS' mode	Duration during which the ITC operated in battery mode (before it switched to normal mode).
Before in 'Low power' mode	Duration during which the ITC operated in "Low power" mode (before it changed back to normal mode).

7.8.2.2 Base station counters

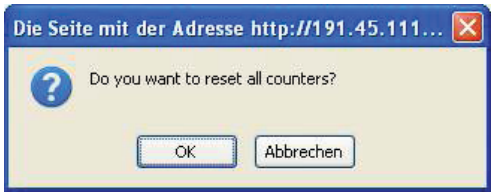
The base station counters are system counters which can also be polled through the air. These counters provide the alarm input software with information on the general status of the base station. The counters can also be reset via the alarm input software or via the air. To reset the counters click "*Reset base station counters*". Only the current counters are reset (first digit e.g. **0**/4), while the total number remains (second digit e.g. 0/**4**)

Fig. 7-43: Base station counters

Field	Description
Reset counters:	Specifies the number of new processes started.
EPS counters:	Indicates how many times the base station has already been powered by the EPS (battery).
System fault:	Indicates how many times the base station was no longer available or how many times it was in low-power mode.
Watchdog:	Specifies how many times the base station had to be restarted since, for instance, certain processes were no longer available.

7.8.2.3 Reset counters

When the link *Reset counters* is clicked all system counters in the section "System statistics" are reset. In order to prevent this being carried out by accident the following window appears. Clicking *OK* confirms that the counters are definitely to be reset.



7.8.3 Alarming / system message

7.8.3.1 Incoming jobs

The incoming alarm jobs are saved in a separate logging file and can be viewed at any time by clicking the link *Incoming jobs*. Various filter options are available. Clicking on the button "Delete file(s)" erases all log files. **Warning: The files are irrevocably deleted**.

From V4.2 on, the respective code word error rates are displayed. Example:

[-37dBm, CwER1=0/561 (0.0%), CwER2+=0/561 (0.0%)]

CwER1: Number of code words with only one bit error (100% correctible)

CwER2: Number of code words with bit errors above or equal to 2

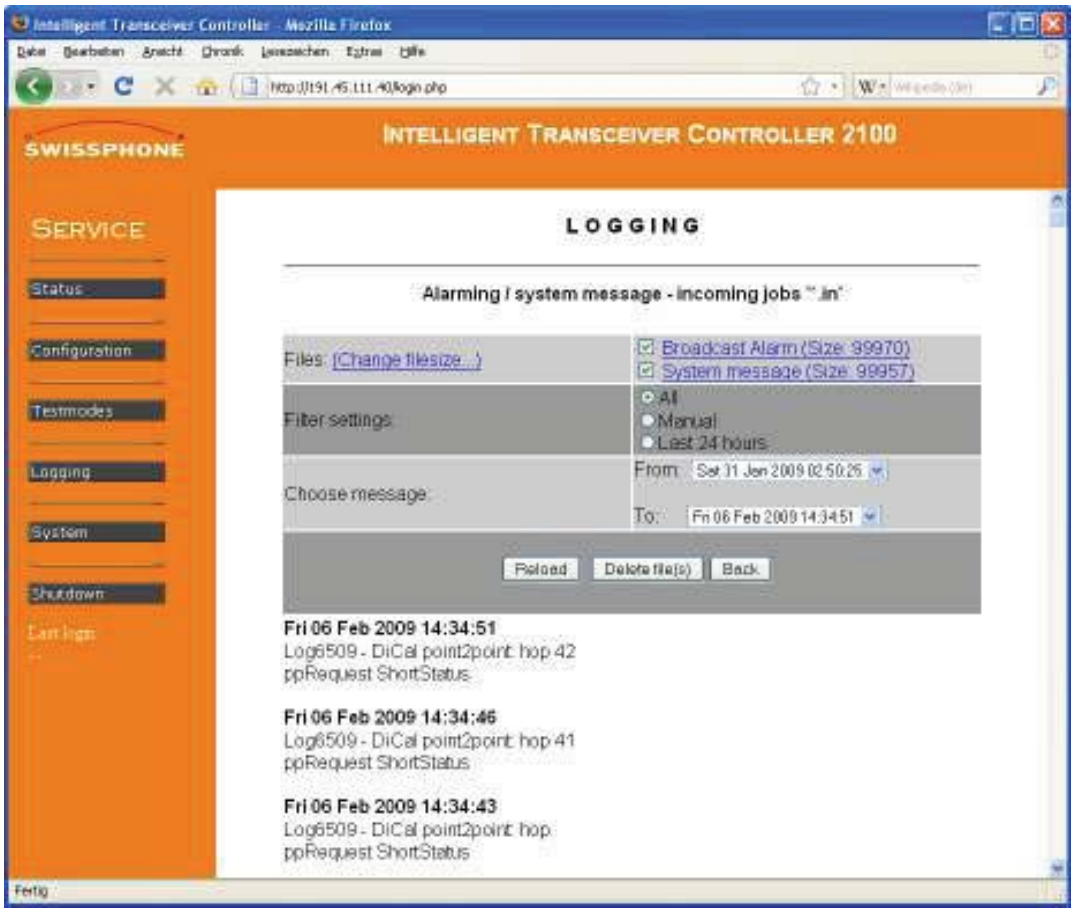


Fig. 7-44: Incoming jobs

Field	Description
Files:	By clicking on the link "Broadcast Alarm" or "System message" the corresponding log file can be viewed, The size of both log files can be modified by clicking the link "Change filesize…" (do not set above 10kB). By clicking on one of the small boxes (with a tick) and then on the button *Reload* the display (lower half of the screen) is limited to the log that was clicked.
Filter settings:	*All:* displays the total period of the logs selected in the field "Files" *Manual:* displays the logs selected in the field "Files" within the period defined in the field "Choose message:".

	Last 24 hours: displays messages logged during the last 24 h from the logs selected in the field "Files:".
Choose message:	The displayed logging period can be limited. "From indicates the starting time and "To" the end point.

7.8.3.2 Outgoing jobs

The transmitted alarm messages are saved in a separate logging file and can be viewed at any time by clicking the link *Outgoing jobs*. Various filter options available. All logging files are erased by clicking the button "Delete file(s)". **Warning:** the files are irrevocably deleted

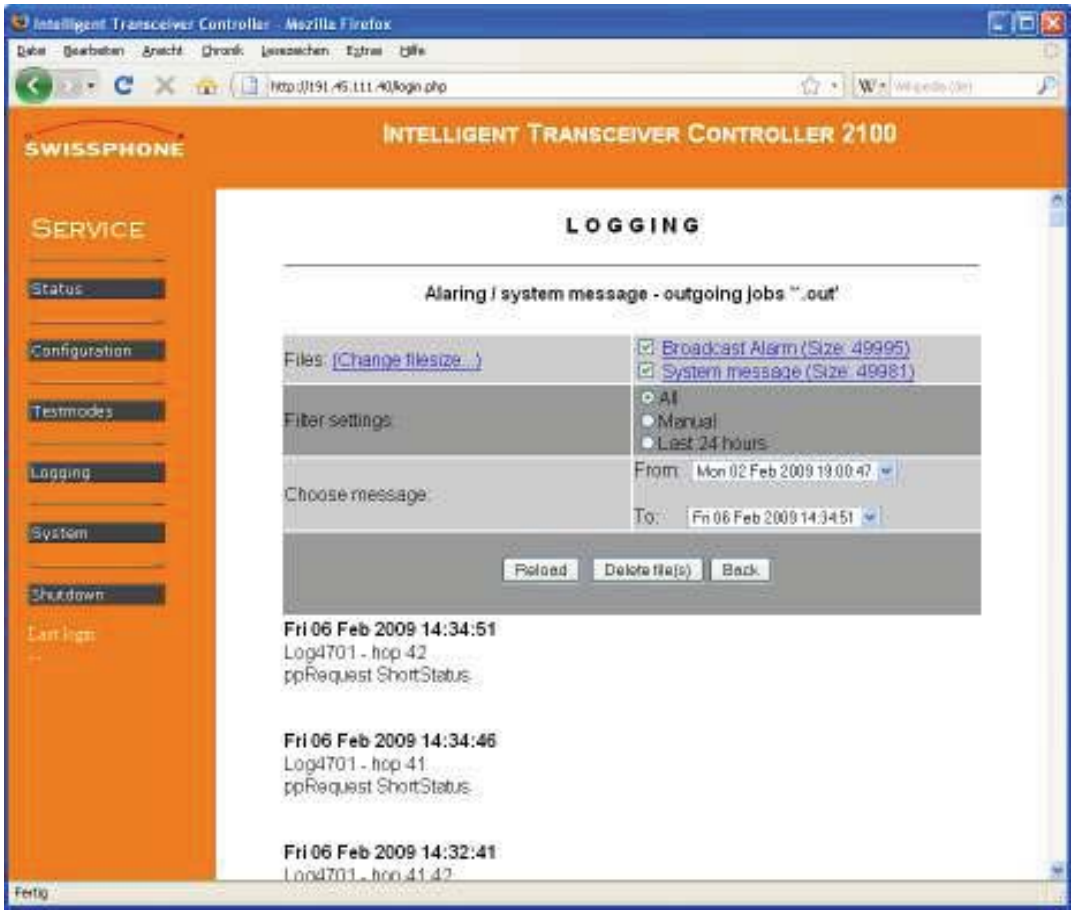


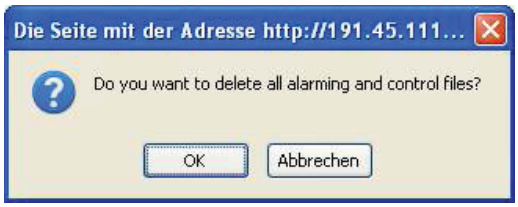
Fig. 7-45: Outgoing jobs

Field	Description
Files:	By clicking on the link "Broadcast Alarm" or "System message" the corresponding log file can be viewed. The size of both log files can be modified by clicking the link "Change filesize…" (do not set above 10kB).). By clicking on one of the small boxes (with a tick) and then on the button *Reload* the display (lower half of the screen) is limited to the log that was clicked.
Filter settings:	*All:* displays the total logged period of the logs selected in the field "Files" *Manual:* displays the logs selected in the field "Files" within the period defined in the field "Choose message:". *Last 24 hours*: displays mssages logged during the last 24 h from the logs selected in the field "Files:".
Choose mes-	The displayed logging period can be limited. "From" indicates the starting

sage:	time and "To" the end point.

7.8.3.3 Delete alarming files

When the link *Delete Alarming Files* is clicked all the logged alarm messages in the section "Alarming / system message" are erased. To prevent this being carried out by accident, the following window appears. Clicking *OK* confirms that the messages are definitely to be deleted.



7.8.4 Base station statistics

These statistics provide the user with the performance behaviour of the ITC2100 during the last 24 hours. The number of alarms received and transmitted is recorded in detail. The last three errors can be called up easily on the basis of the IDs.

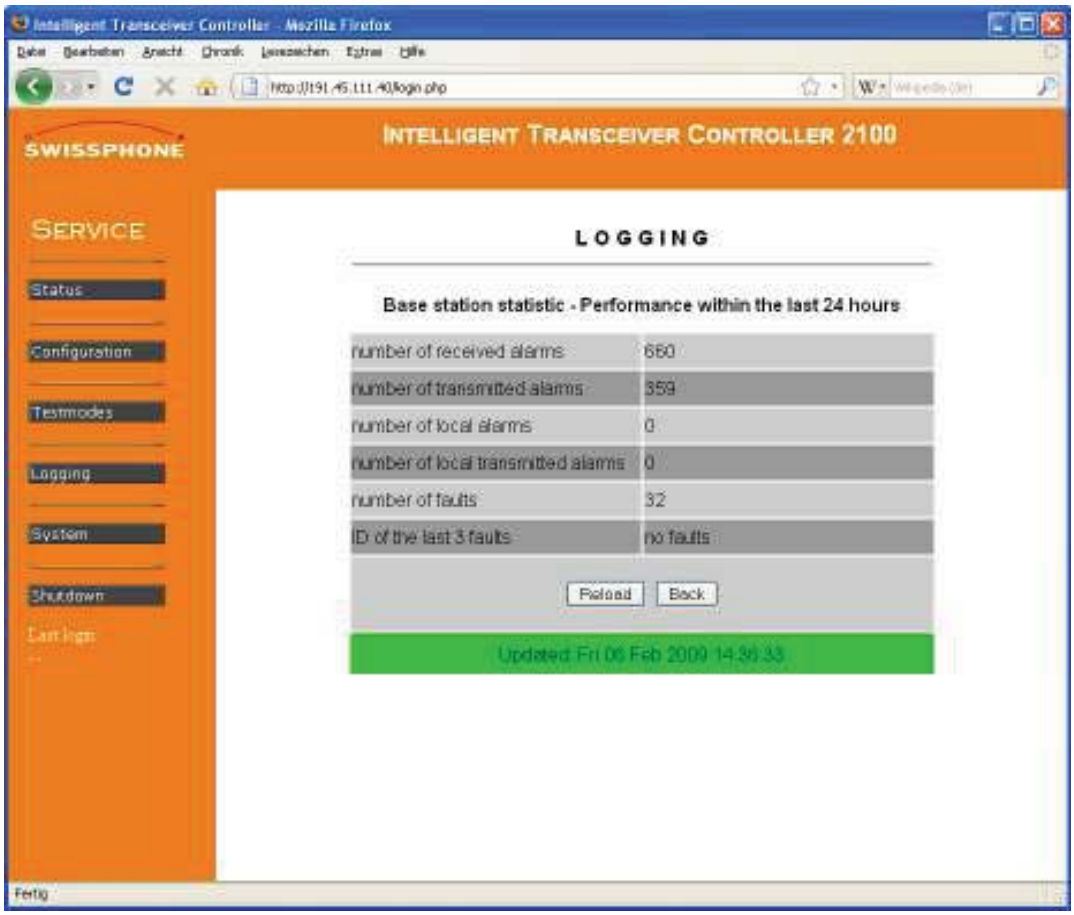


Fig. 7-46: Performance

Field	Description
Number of received alarms	Displays the number of received alarms by the ITC.
Number of transmitted alarms	Displays the number of transmitted alarms by the ITC.
Number of local alarms	Displays the number of transmitted local alarms by an ITC input contact.
Number of local transmitted alarms	Displays the number of times a local alarm was transmitted by the ITC, in all possible ways.
Number of faults	Displays how many times an error occurred in the ITC in connection with alarm messages (received/transmitted)
ID of the last 3 faults	Displays the last 3 types of error that occurred

7.8.4.1 Delete all counters and logfiles

When the link *Delete all counters and logfiles* is clicked all counters and error logs in the section "Basic station statistics" are reset and erased In order to prevent this function being carried out by accident the following window appears. Clicking *OK* confirms that the counters are definitely to be reset and deleted.

7.8.5 Process control

7.8.5.1 Error messages

Here all errors of the ITC2100 are displayed or logged. The user can display the files as required. There is an option for setting filters in order, for instance, to view only the error messages of the last 24 hours.

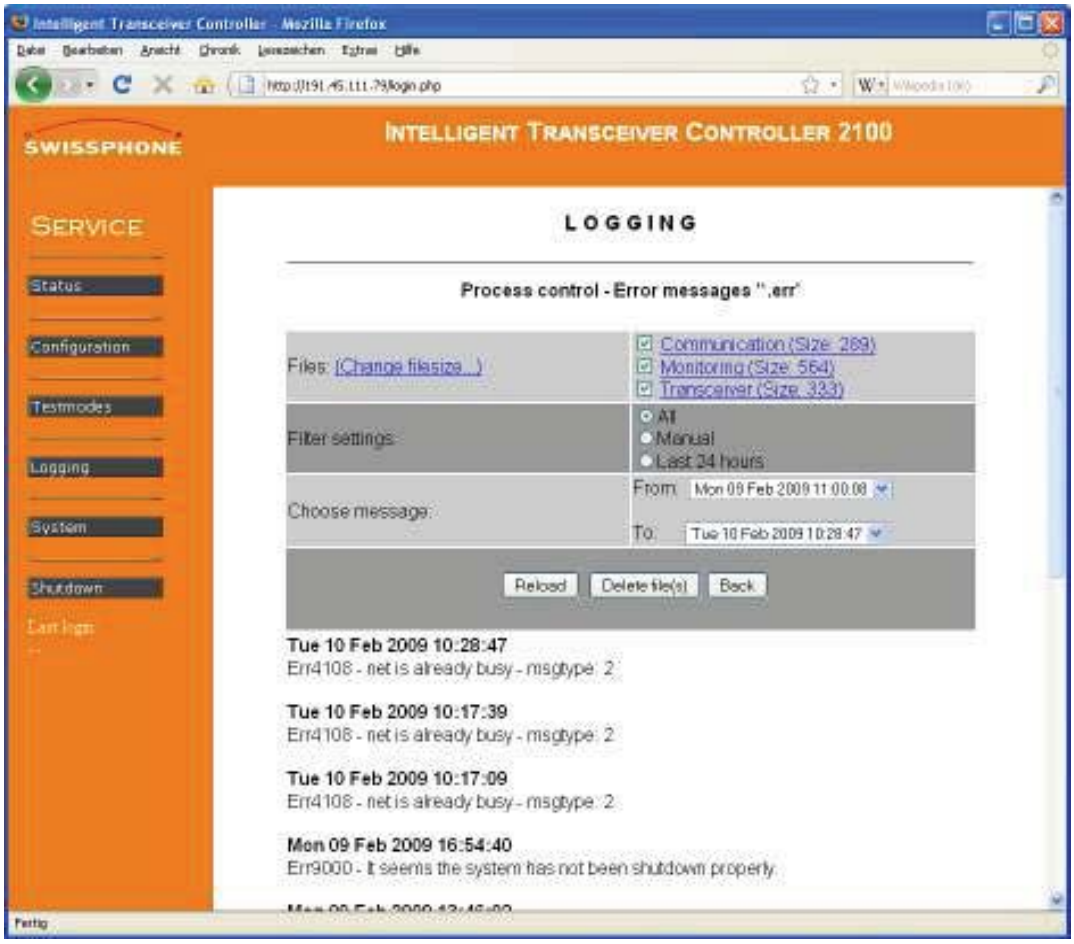
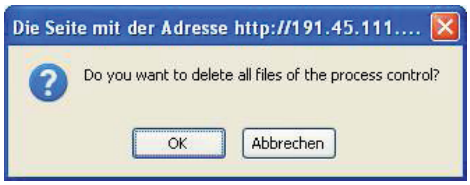


Fig. 7-47: Error messages

Field	Description
Files:	Click on the link "Monitoring", Communication", "Control", "User interface" or "Transceiver" to view the corresponding log. The size of both log files can be modified by clicking the link "Change filesize…" (do not set above 10kB). By clicking on one of the small boxes (with a tick) and then on the button *Reload* the display (lower half of the screen) is limited to the log that was clicked.
Filter settings:	*All:* displays the total period of the logs selected in the field "Files" *Manual:* displays the logs selected in the field "Files" within the period defined in the field "Choose message:". *Last 24 hours*: displays messages logged during the last 24 h from the logs selected in the field "Files:".
Choose message:	The displayed logging period can be limited. "From" indicates the starting time and "To" the end point

7.8.5.2 Delete process control files

When the link *Delete all process control files* is clicked logged error messages in the section "Process control" are reset and erased In order to prevent this function being carried out by accident the following window appears. Clicking *OK* confirms that all the messages are definitely deleted.



7.8.6 RX/TX monitoring

7.8.6.1 Received messages (eavesdropper)

All messages heard by the base station are recorded in this menu item. However, all messages heard are saved in this file (listener). This includes all messages from the system's own network and an external network (on the same frequency).

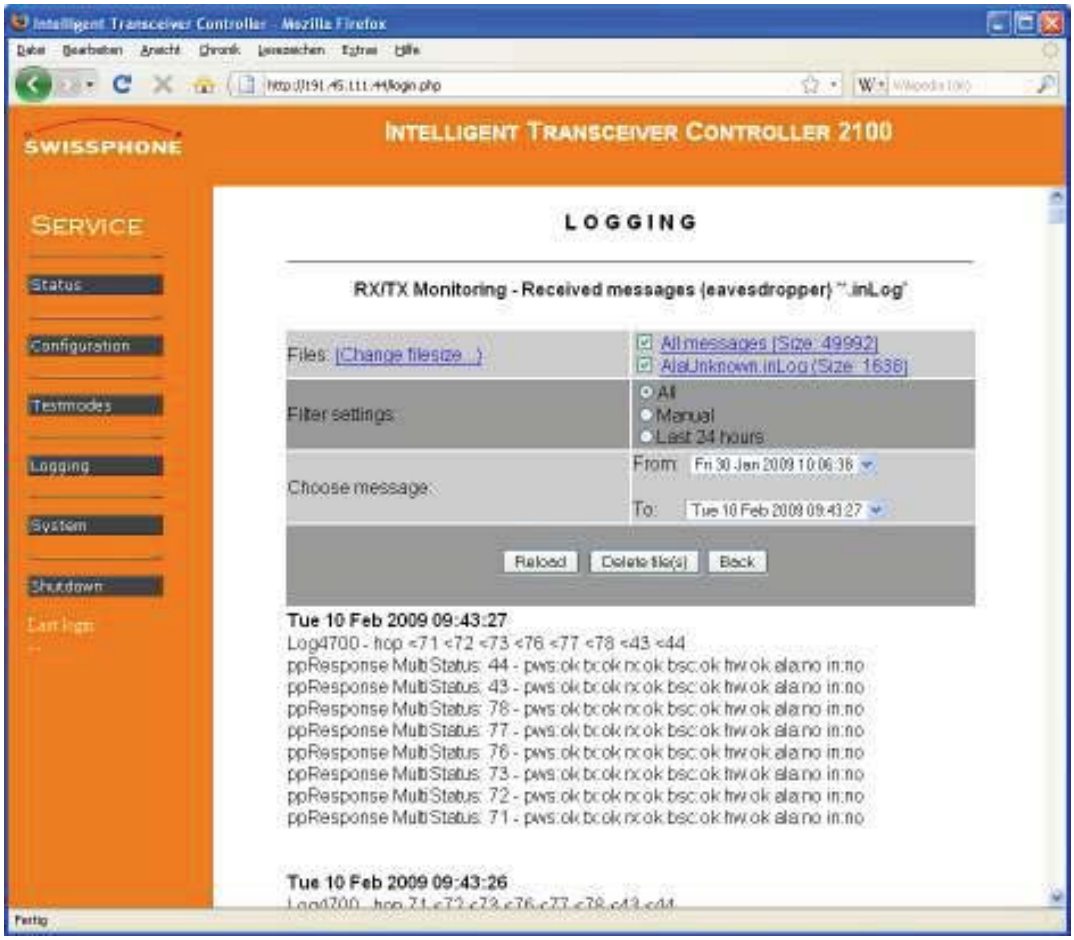
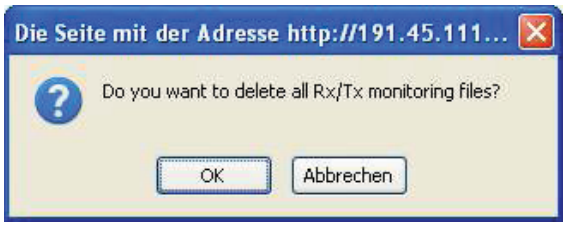


Fig. 7-48: Received messages (eavesdropper)

Field	Description
Files:	Click on the link "All messages", or "AlaUknown.inLog" to view the corresponding log. The size of both log files can be modified by clicking the link "Change filesize…" (do not set above 10kB). By clicking on one of the small boxes (with a tick) and then on the button *Reload* the display (lower half of the screen) is limited to the log that was clicked.
Filter settings:	*All:* displays the total period of the logs selected in the field "Files" *Manual:* displays the logs selected in the field "Files" within the period defined in the field "Choose message:". *Last 24 hours*: displays mssages logged during the last 24 h from the logs selected in the field "Files:".
Choose message:	The displayed logging period can be limited. "From" indicates the starting time and "To" the end point

7.8.6.2 Delete RX/TX monitor files

When the link *Delete Tx/Rx monitor files* is clicked logged messages in the section "Rx/Tx Monitoring" are reset and erased In order to prevent this function being carried out by accident the following window appears. Clicking *OK* confirms that all the messages are definitely deleted.



7.9 System

General system settings can be made on the one hand in the General System Parameter section. On the other hand, this page also shows the servicing technician what version of the applications and what operating system are installed on the base station.

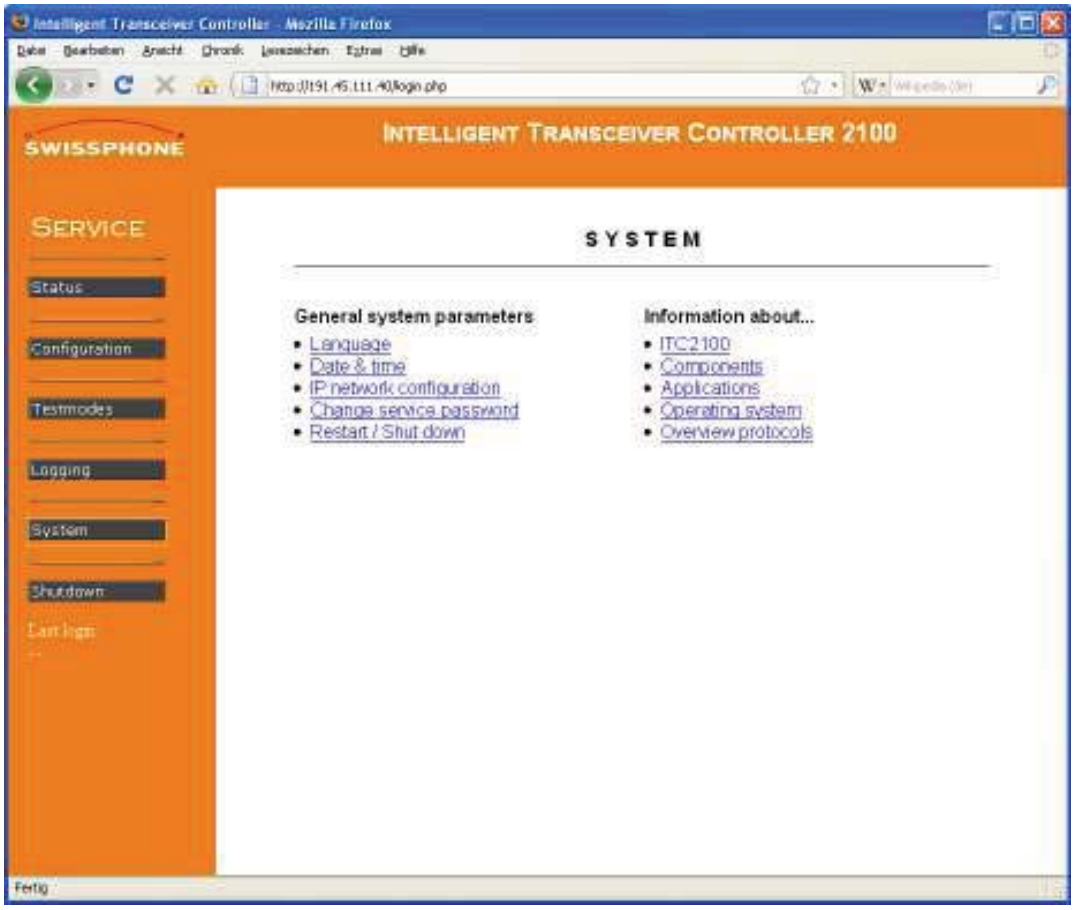


Fig. 7-49: System page of the service web-interface

7.9.1 Information about ...

7.9.1.1 ITC2100

This link shows the actual ITC2100 software version.

7.9.1.2 Components

The various modules in the ITC2100 are provided with a name and a serial number. This information can be viewed at this point.

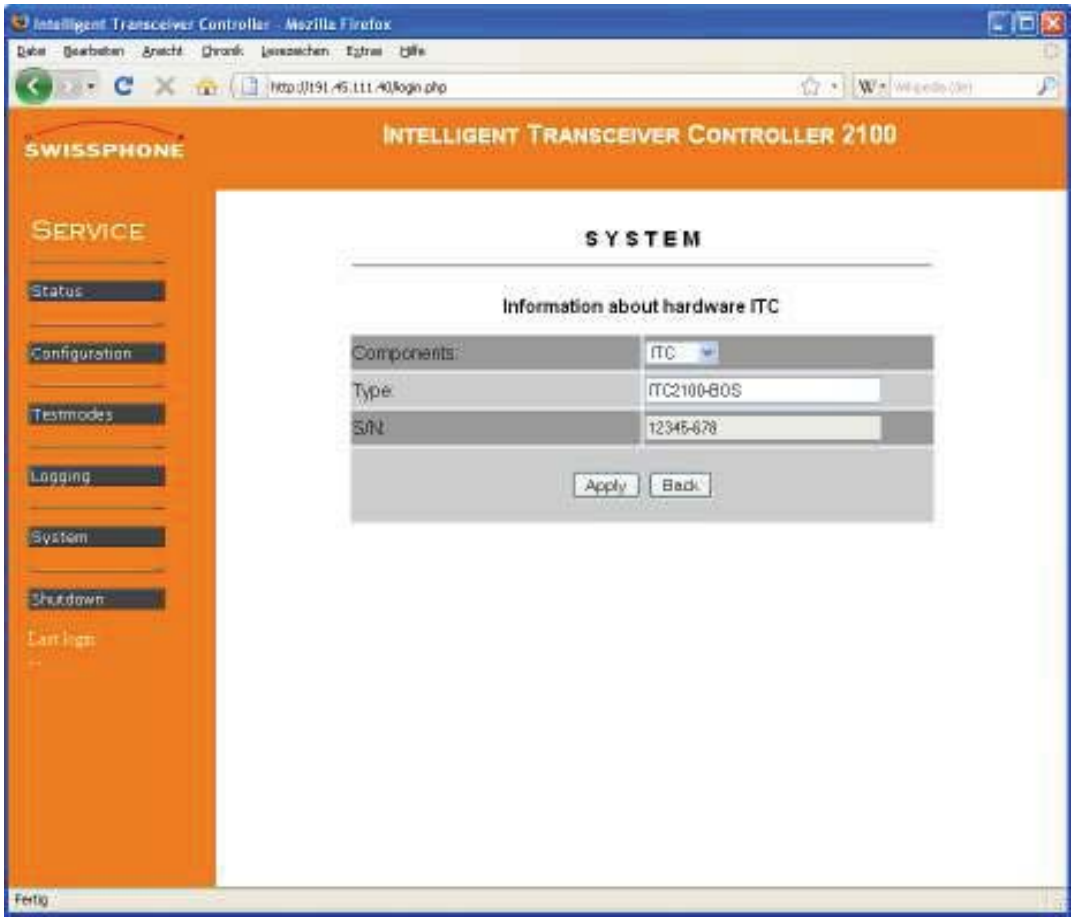


Fig. 7-50: Information about hardware modules

7.9.1.3 Applications

This link shows the various processes and hardware components installed on the ITC2100. This information may be helpful during fault-finding.

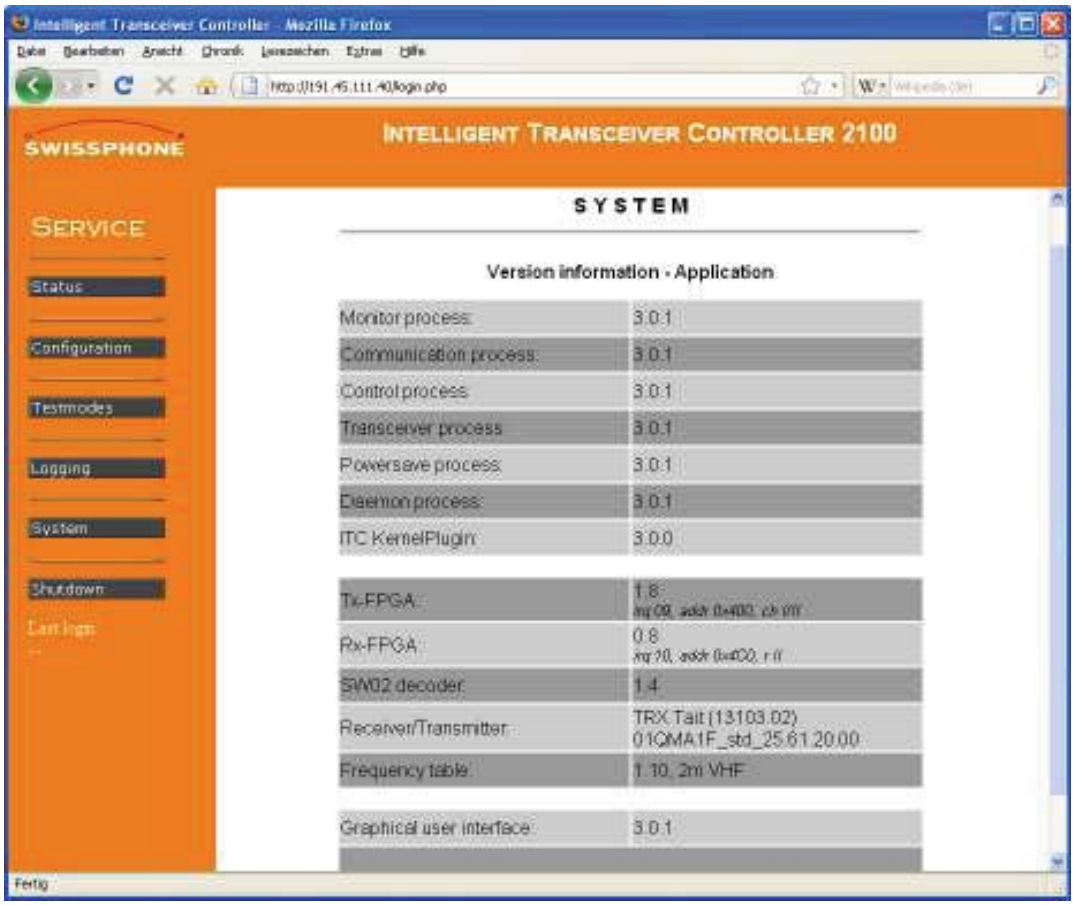


Fig. 7-51: Installed processes and hardware components

7.9.1.4 Operating System

This link shows operating system relevant information. The kernel is the heart of an operating system which makes the basic functions available. Basically, the ITC2100-BOS runs under the BlueCat Linux operating system, Release 4.0. A small web server is available for the user interface. This is based on an Apache server. The PHP (Personal Home Page) script language has been used to program the user interface.

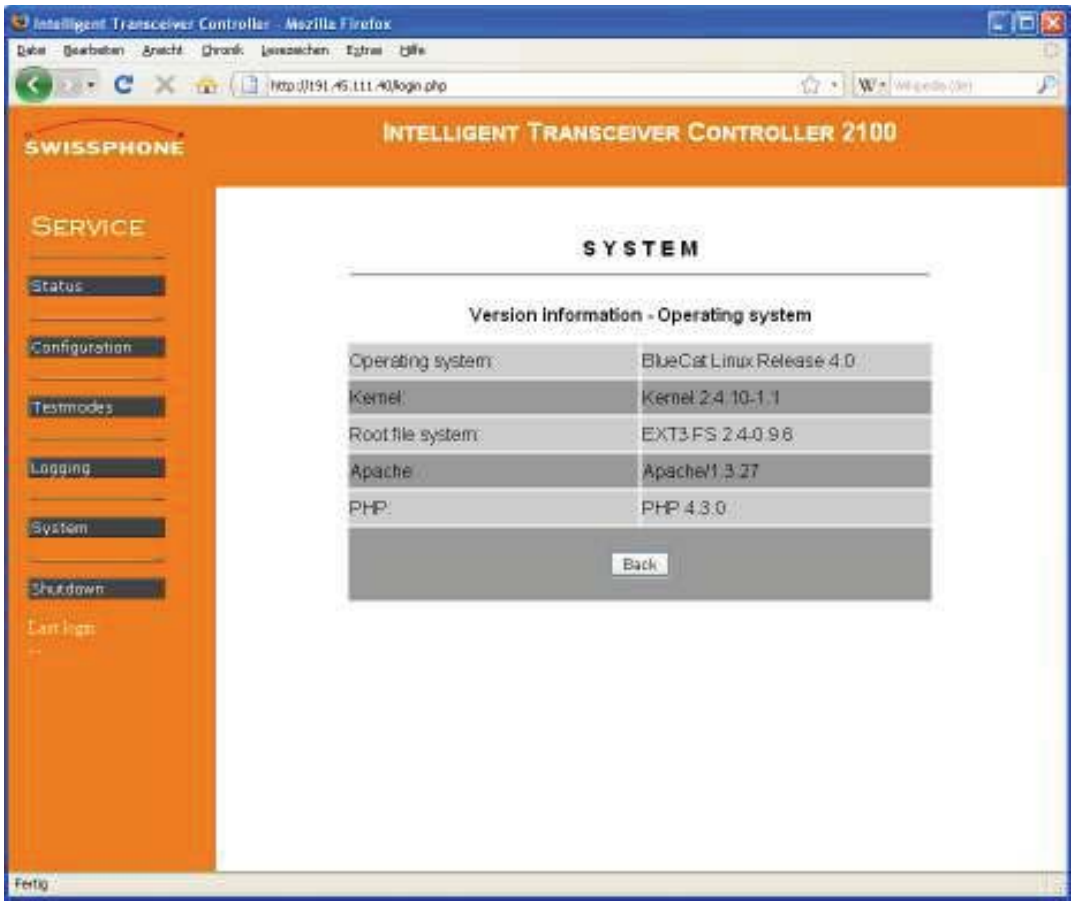


Fig. 7-52: Operating system

7.9.1.5 Overview Protocols

The log of the factory test can be viewed by pressing the "View"-button. This test is performed on each station before it leaves the factory.

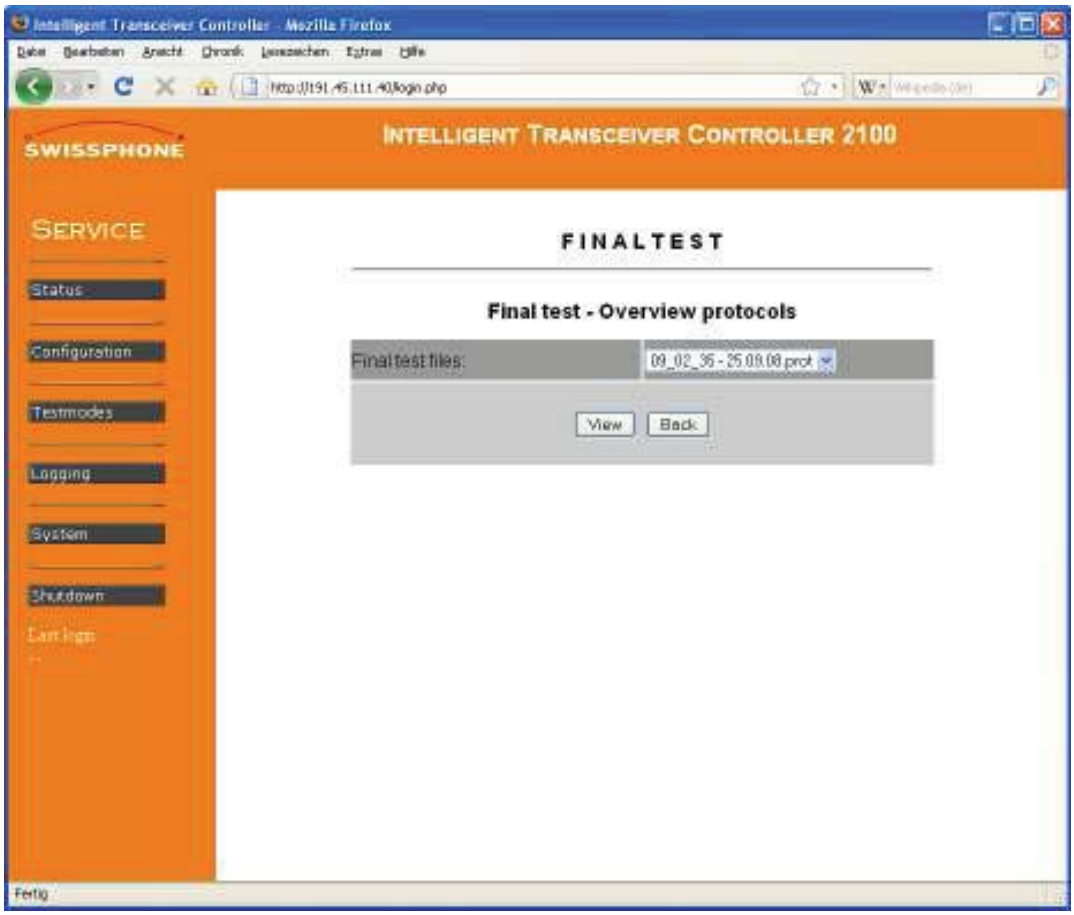


Fig. 7-53: Final test protocol

7.9.2 General System Parameters

7.9.2.1 Language

The user interface of the ITC2100-BOS can be set to different languages. German is set by default. The other languages available optionally is English and French.

To change the language from German to English enter the system page by pressing the "System" button on the left, then click link "Sprache" and choose "English" in the pull-down menu and confirm with "Übernehmen".

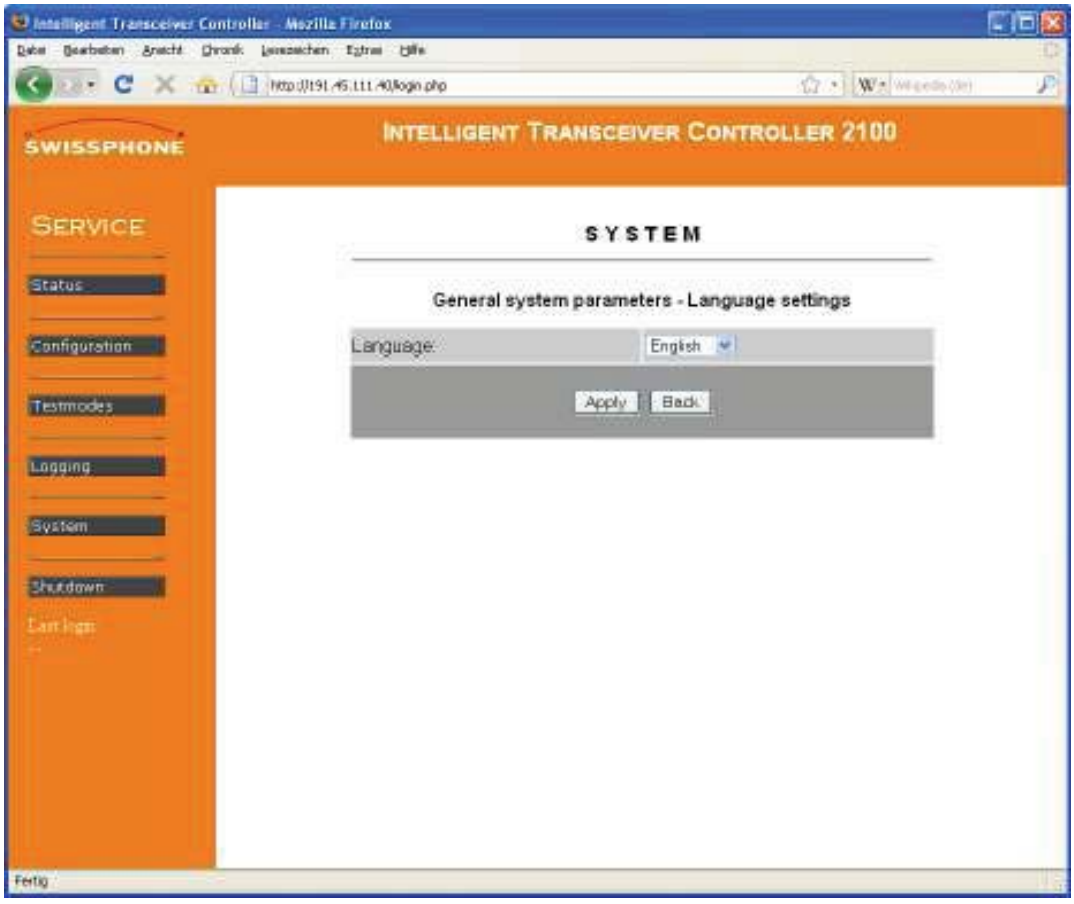


Fig. 7-54: Language setting

7.9.2.2 Date & Time

The date and time of the ITC2100-BOS can be set as shown in the window below.

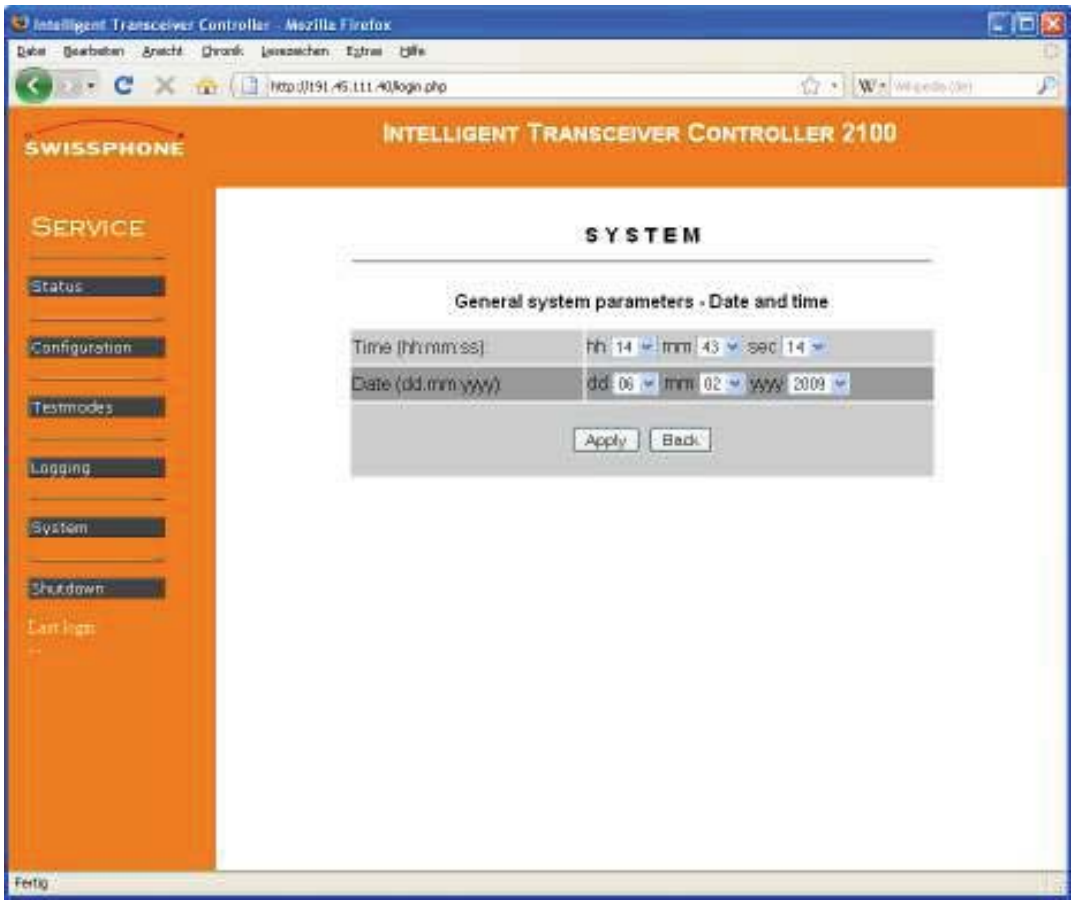


Fig. 7-55: Date & time

7.9.2.3 IP Network Configuration

Each ITC2100 is preconfigured with the following standard IP address by default:

192.168.1.1

If the ITC2100 is operated as a master base station, it will very probably be integrated in an existing LAN and the IP address must thus be adapted. If the LAN is linked to another LAN (containing the alarm input software) via a gateway, the IP address of the gateway must be entered.

CAUTION: If the "Apply"-button is pressed, the ITC can be accessed only with the set IP addresses. The ITC is shut down automatically in the background and the station is converted to this IP address.

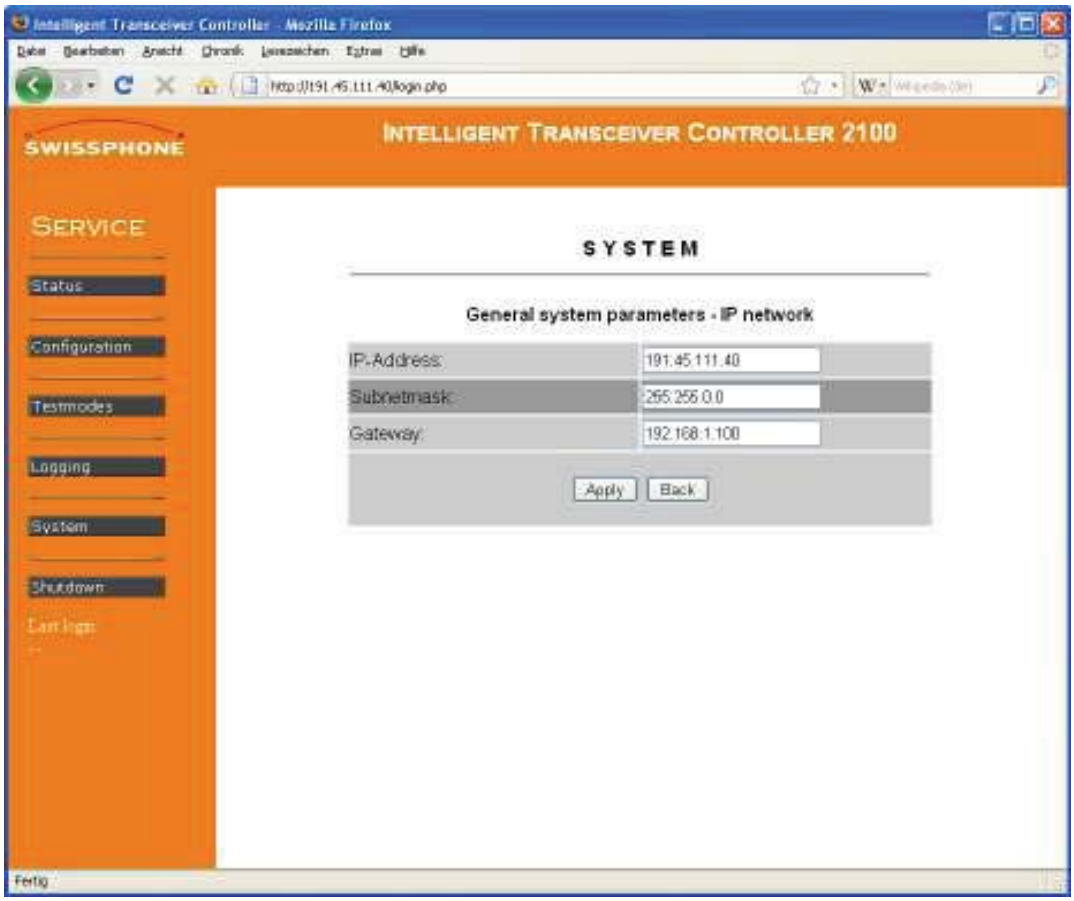


Fig. 7-56: IP network configuration

7.9.2.4 Change Service Password

The current pasword (works setting: "service") can be changed by entering a new password in the field "Password:" and the same again in "Retry password:" then click the button "Apply" to confirm the entries.

Important: For your own security we advise entering your own password instead of the works setting "service".

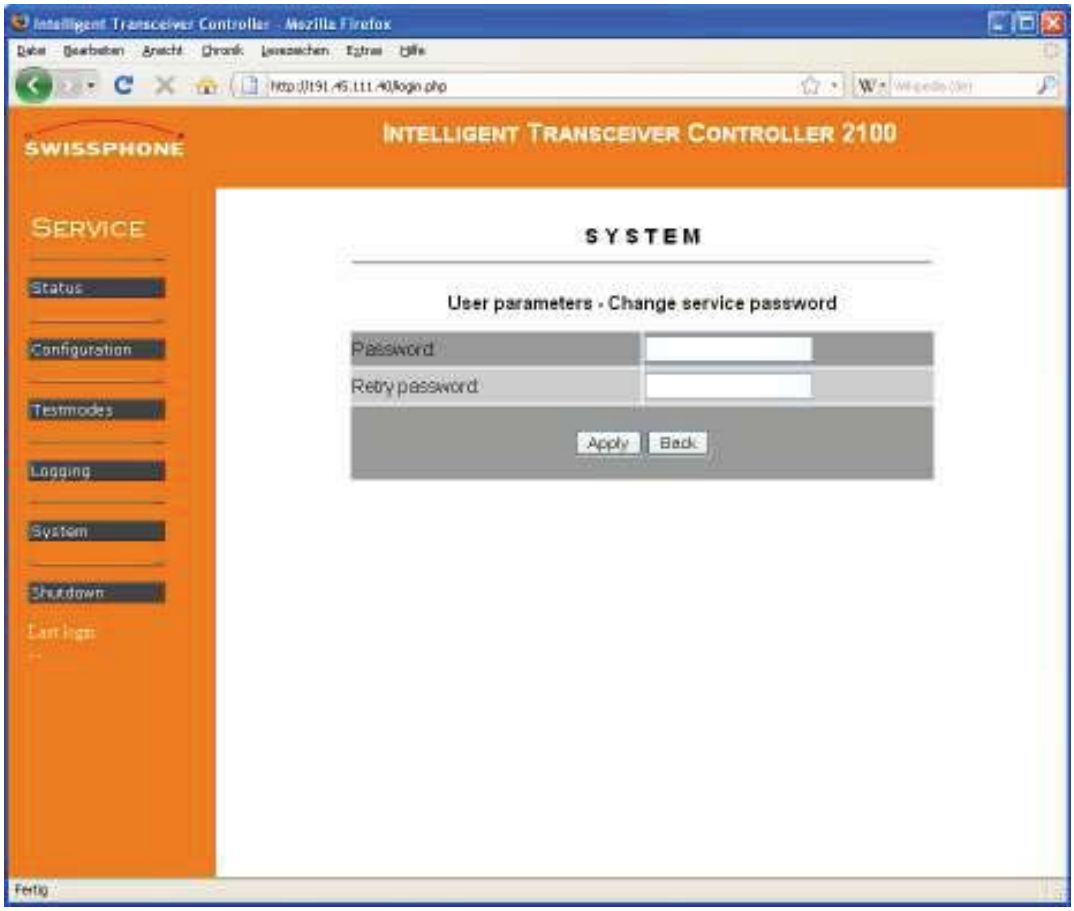


Fig. 7-57: Change service password

7.9.2.5 Reboot / Shutdown

Choose menu item "Reboot" to reboot the ITC. Confirm with the "Apply"-button. Use command "Shutdown" to correctly shut down the ITC. This command can be found at two locations. Firstly in this menu beneath the Reboot command. Secondly, there is a separate “Shutdown” button on the navigation bar which allows the ITC to be shut down.

The ITC2100 should always be shut down before switching it off!

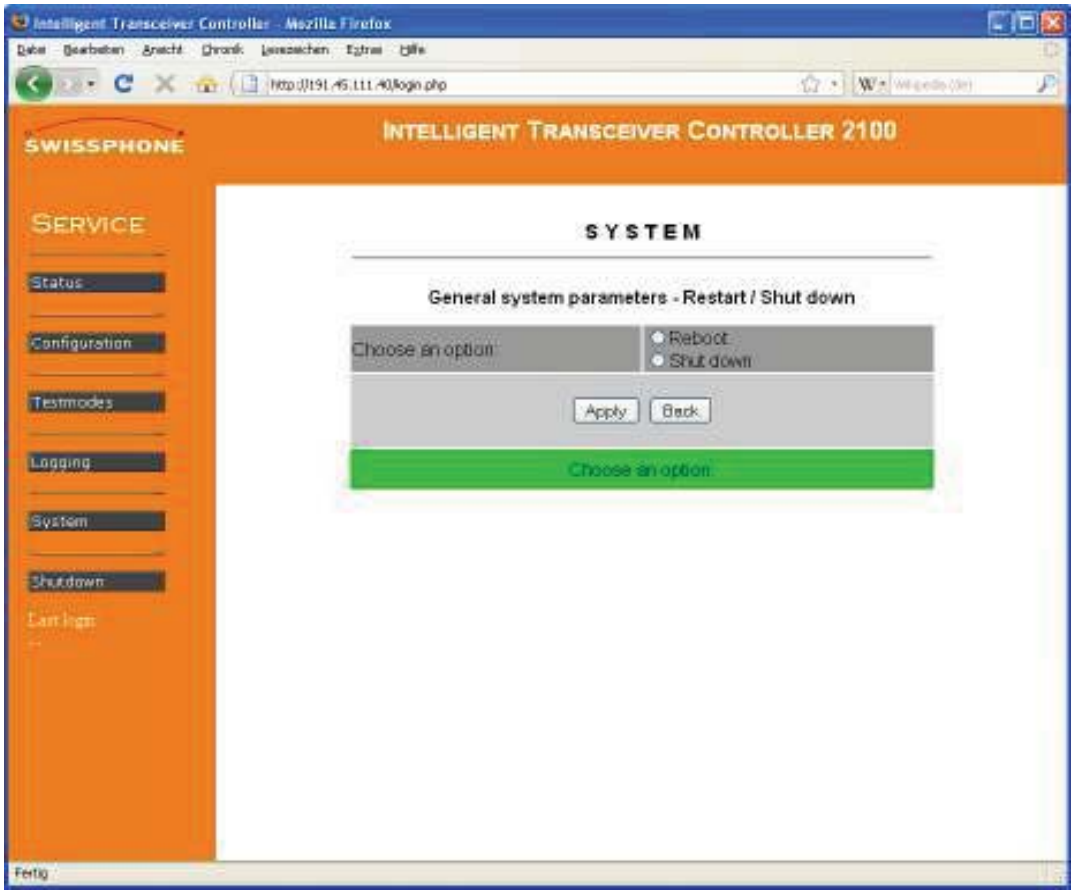


Fig. 7-58: Reboot / Shut down

7.10 Shutdown

The ITC2100-BOS should be shut down using this command. If you use the button on the navigation bar, you are prompted as to whether you really do wish to shut down the system (see window below).

After you confirm the prompt, the ITC shuts down. The station can be switched off after all three LEDs light on the sync card or after the following window appears.

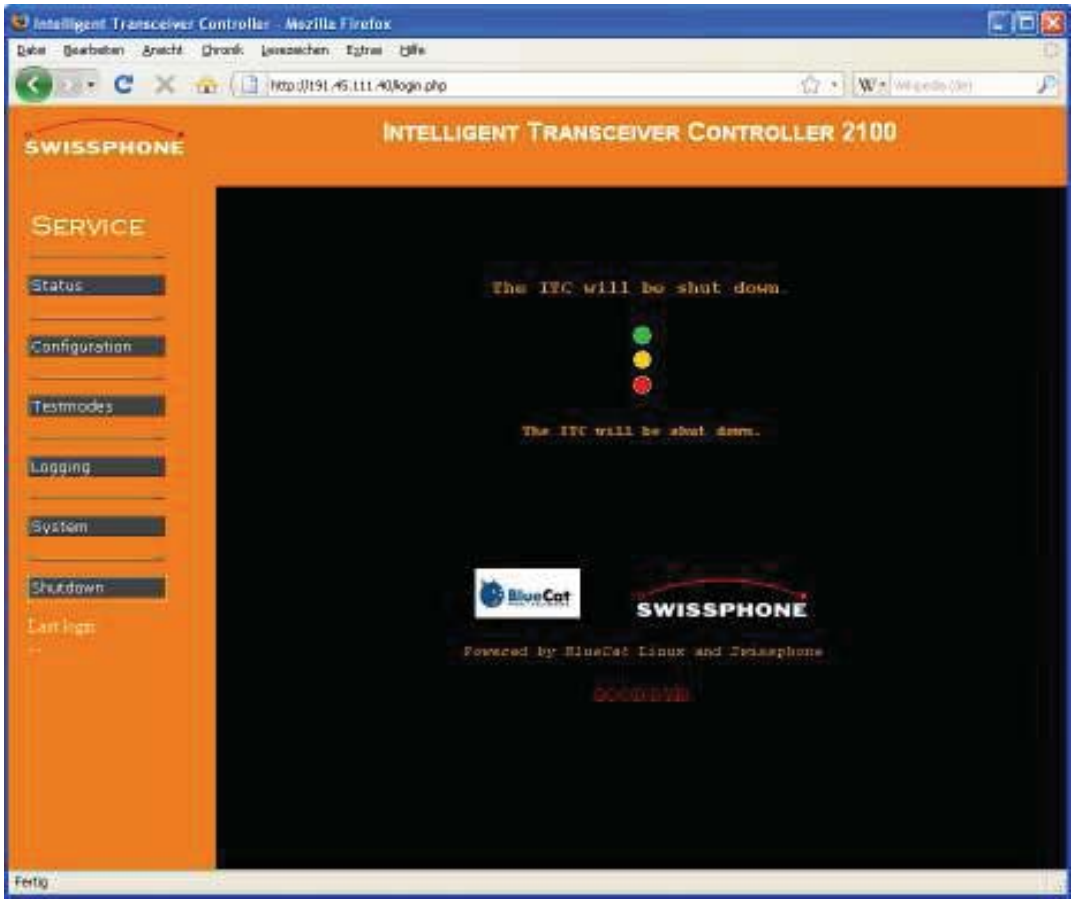


Fig. 7-59: Shutdown of the ITC

8 Functional Description of the Individual Components

The ITC2100-BOS modules and the modes of operation of these modules are described in brief in the individual sections.

8.1 Transceiver Module (TRx 25W)

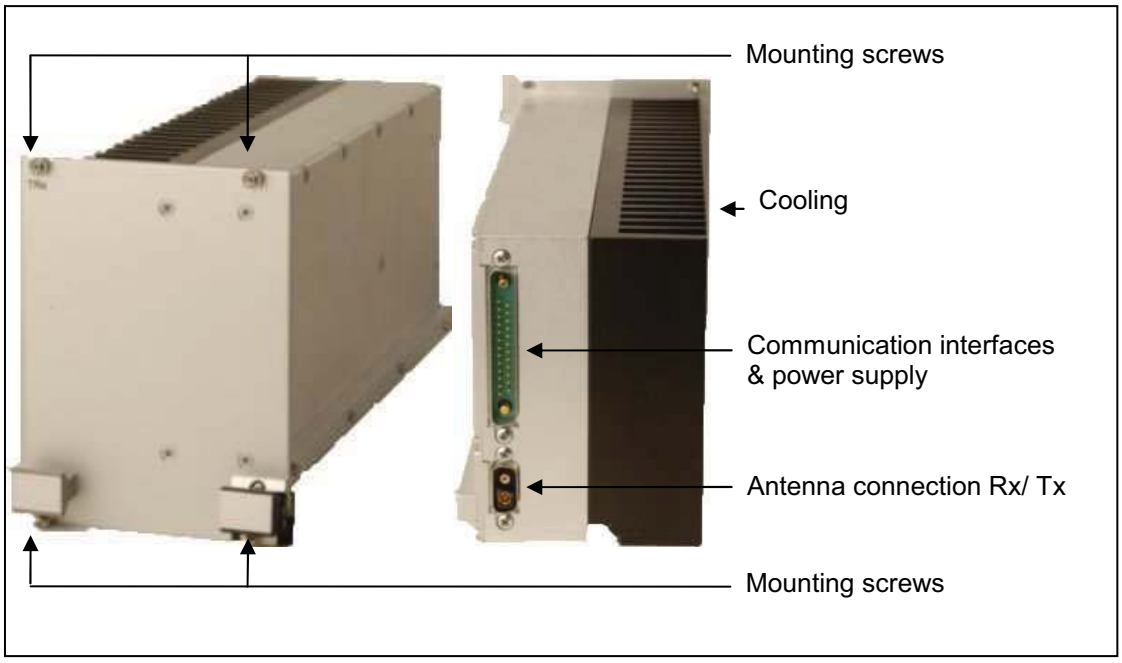


Fig. 8-1 Transceiver module (TRx 25W)

General radio data

Frequency bands (versions):	Standard: 144-174MHz On request: 66-88MHz / 174-225MHz / 216-266MHz / 400-470MHz / 450-530MHz
Frequency stability (carrier):	±1.5ppm
Number of channels (each frequency band):	99
Channel spacing:	12.5/20/25kHz
Type of modulation/demodulation:	DFSK ± max.2.5kHz (at 12.5kHz channel spacing) DFSK ± max.4kHz (at 20kHz channel spacing) DFSK ± max.5kHz (at 25kHz channel spacing) FM/PM 300 … 3000Hz
Switching bandwidth:	Whole frequency band
POCSAG data rate:	512, 1200 or 2400 baud
Antenna connection:	50 ohm coaxial N-type (1x Tx, 1x Rx)

Transmitter data (Tx)

Tx output power:	1-25 W, configurable in 1W-steps
Intermodulation attenuation:	> 40dB
Adjacent channel power:	< -70dB
Spurious emissions:	< 250nW (30MHz to 1GHz)

Receiver data (Rx)

Sensitivity:	<-110dBm at 12dB SINAD
Co-channel rejection:	> - 8dB
Adjacent channel selectivity:	> 70dB (at 20kHz channel spacing)
Spurious response rejection:	> 70dB
Blocking:	> 90dBµV (±1MHz to ±10MHz)
Spurious radiations:	< 2nW (30MHz to 1GHz)
Intermodulation response rejection:	> 70dB

The ITC features an antenna switch integrated in the receiver so that only one antenna needs to be installed for reception and transmission. The receiver is automatically switched off when the transmitter is booted up.

8.2 Power Supply Module PS150W

The power supply module is responsible for powering the entire base station ITC2100-BOS. The power supply module has the following technical data:

Input voltage:	90-264VAC / 47-63Hz
Power consumption:	Max. 150W
Max. output voltages/ currents:	13.8V / 8A and 5V / 5A
Efficiency:	80%, 10-15A typical charge
Autonomy (at battery operation):	>3h, with rechargeable battery Pb12V 12Ah (at Tx output power 25W and Tx:Rx=1:4min)
Battery low level protection:	Yes
Battery fuse type:	250V / 12.5AT
Mains fuse type:	250V / 4AT

Table 1: Technical data of the power supply module "PS 150W"

8.2.1 Power Supply Version PS150W, Art.No.0710046

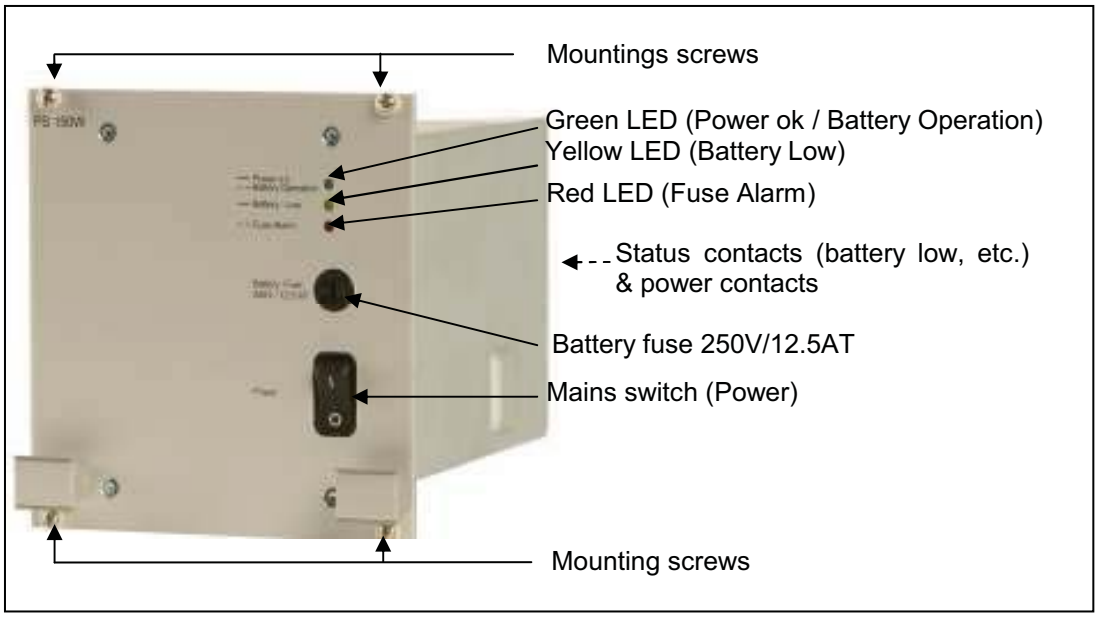


Fig. 8-2: Power supply (PS150W)

LED type		Description
Green	on	ITC is switched on and supplied by 90-264VAC (Power ok).
	blinking	Mains failure. Supply by batteries (Battery Operation).
	off	ITC is switched off.
Yellow	on	Battery voltage level has fallen below the critical value 10.6V (Battery Low) - Transmission of paging alert sequence is not possible anymore. 40 seconds after the yellow LED illuminates, the ITC shuts down its processes and switch off (LED's of controller, SC card, RC card, S-Com card and I/O card are switched off).
	off	Battery voltage level is ok (above 10.6V).
Red	blinking	Battery fuse has blown (Fuse Alarm).

Table 2: LED's of the power supply module "PS150W"

8.2.2 Power Supply Version PS150W-B, Art.No. 0710049

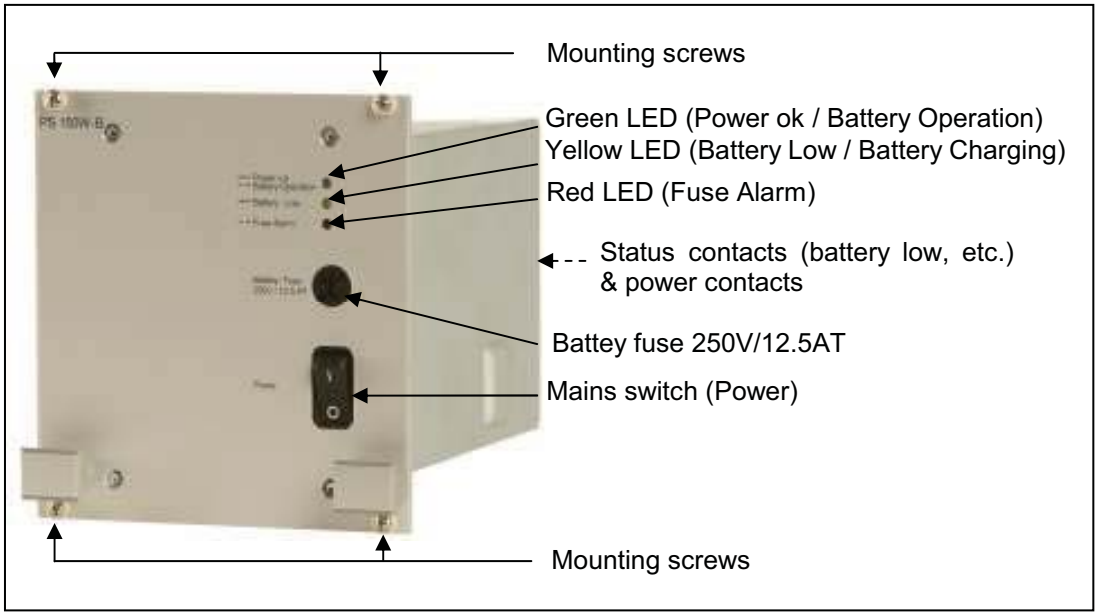


Fig. 8-3: Power supply (PS 150W-B)

LED type		Description
Green	on	ITC is switched on and supplied by 90-264VAC (Power ok).
	blinking	Mains failure. Supply by batteries (Battery Operation).
	off	ITC is switched off.
Yellow	on	Battery voltage level has fallen below the critical value 10.6V (Battery Low) - Transmission of paging alert sequence is not possible anymore. 40 seconds after the yellow LED illuminates, the ITC shuts down its processes and switch off (LED's of controller, SC card, RC card, S-Com card and I/O card are switched off). The yellow LED switches off as soon as the voltage level has fallen below 10.2V.
	blinking	Green LED is on: Supply by mains. Battery is charging. Green LED blinking: Supply of an unsufficiently charged battery. Previously, the battery was charging.
	off	Green LED is on: Battery voltage level is ok (above 10.6V) Green LED is off: Battery voltage level has fallen below 10.2V or power supply unit has been switched off.
Red	blinking	Battery fuse has blown (Fuse Alarm).

Table 3: LED's of the power supply module "PS 150W-B"

8.2.3 Battery Operation (No Mains)

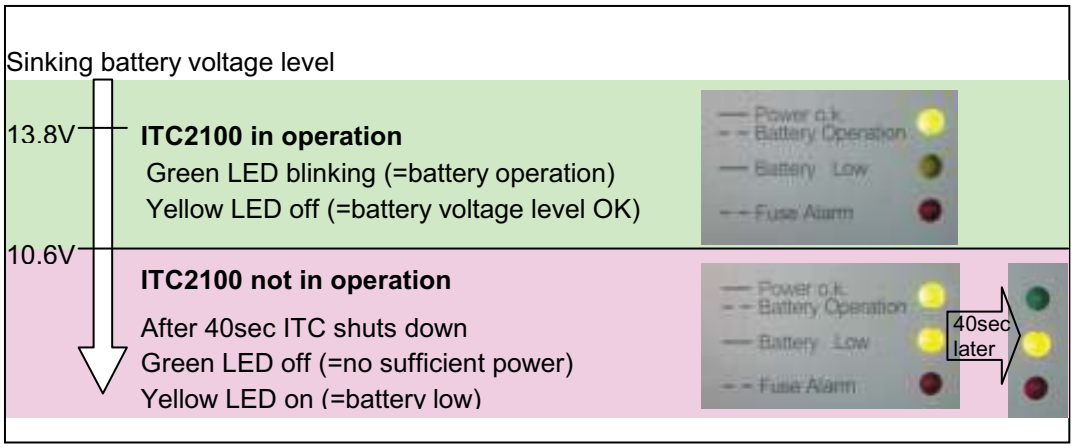


Fig. 8-1: ITC2100 operation when the battery voltage level sinks below a predetermined level

If the mains power fails the ITC2100 is supplied automatically by the batteries (if connected). If, during battery operation, the battery voltage falls below 10.6V, the ITC2100 is shut down until mains power returns.

As soon as the ITC has mains power again, the power supply unit is charging the batteries. 1.5 minutes later the ITC boots and continues charging the batteies.

If required (no mains and battery voltage level below 10.6V) the ITC2100 can be put back into operation by replacing the batteries (see chapter 5.10), whereas the voltage level of the new batteries needs to be at least 11.7V.

8.3 Controller (BSC)

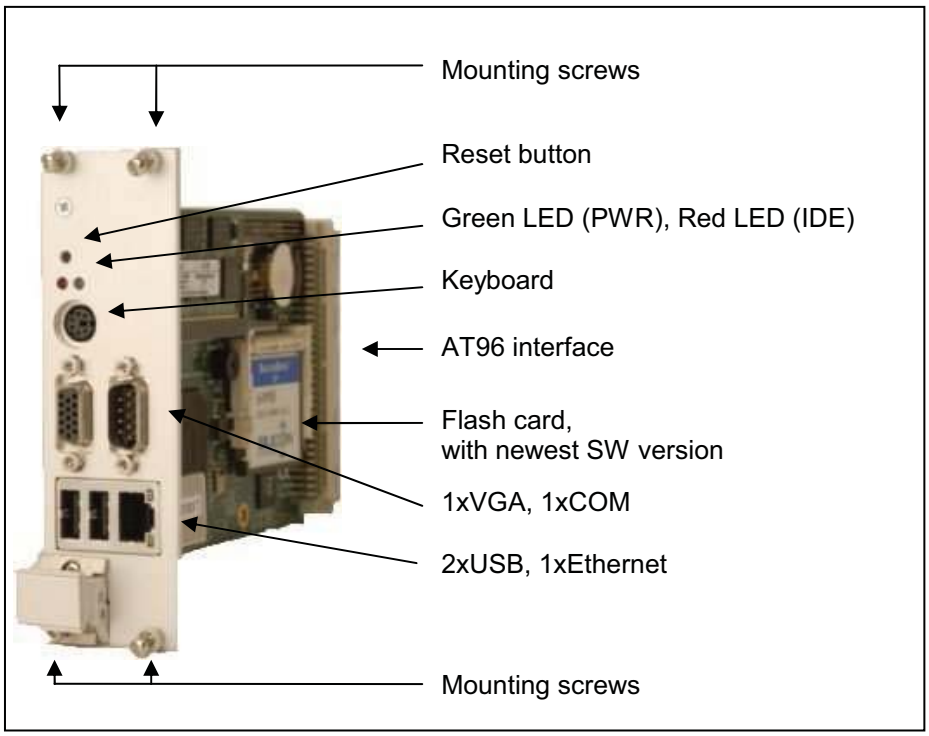


Fig. 8-4: Controller (BSC)

The BSC is a commercially available computer (single-board computer or embedded PC) which is equipped with a flash disk as memory medium. This computer processes the data, controls the inputs and outputs and also controls the interfaces. The BSC hardware features the following requirements:

CPU:	500MHz
RAM:	256 MB
Flash disk:	64 MB
Operating system:	Linux
Periphery connections:	1xCOM, 1xRJ45 (10/100 Base T Ethernet), 4xUSB (2xexternal, 2xinternal), PS/2-keyboard/mouse (Mini-DIN), VGA (DB15)
Reset button:	Yes

Visual function check as follows:

Status	Green LED (PWR)	Red LED (IDE)
Normal state	Ligths	Does not light or blinks (at hard disk access)
ITC switched off or BSC not powered with 5V	Does not light	Does not light

Table 4: Functional description of the controller LEDs

8.4 Sync Card (SC)

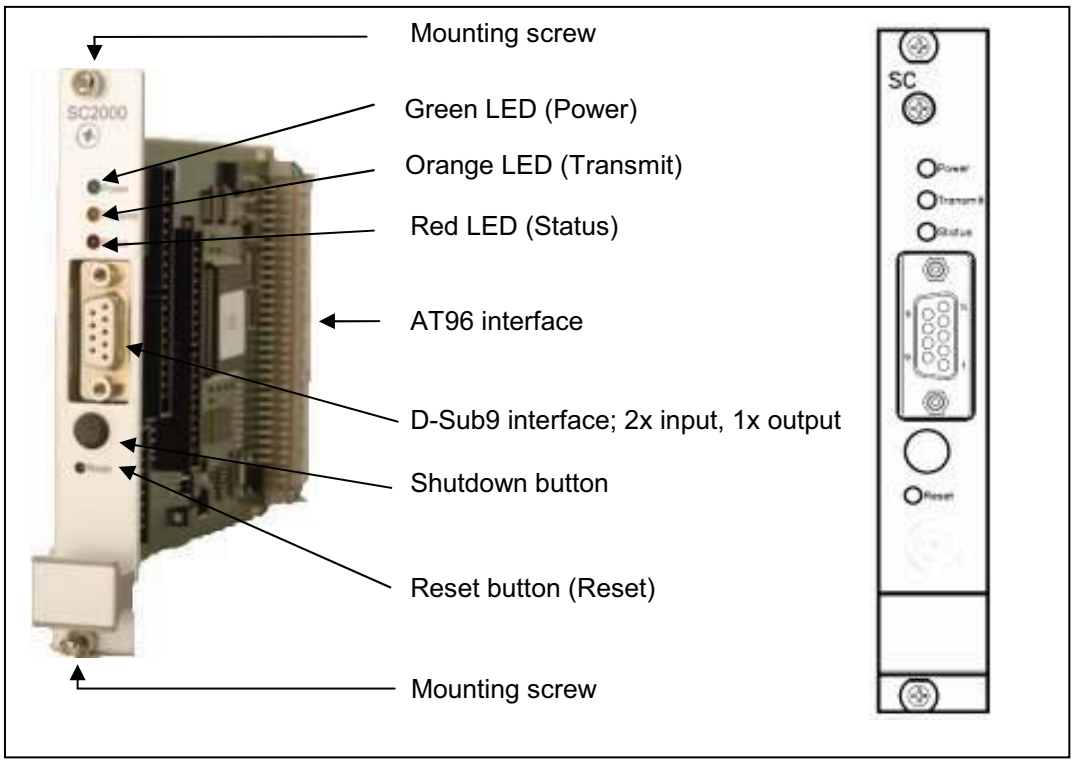


Fig. 8-5: Sync card (SC)

The sync card SC is responsible for forwarding the data time-synchronously to the transmitter. In addition, the following functions are integrated in the sync module:

- Sync pulse detection. A pulse for synchronisation of the data is transmitted by the RC card via the AT96 bus.
- Optocouplerr connection for the input/outut. Voltages beween 10V and 20V can be applied to the input.

The sync module essentially consists of a µs counter and a buffer for the transmit data. Standard components and FPGA logic have been used. The counter runs for 2^{28} us (approx. 4.5 minutes) and then restarts at zero. It can be polled via a register from the BSC. Various registers are available for setting start instants, stop instants and switchover reference instants. The transmit data memory has adequate capacity to allow at least one minute continuous transmission at 2400 bit/s per second. The sync module has Eurocard format (3 HE) and is plugged onto the AT96 bus. The following sockets, keys and indicators are located on the front panel:

- LEDs (Power on, Transmit, Status)
- Reset button: Resets all registers (but not the counter) and generates BSC interrupt
- Shutdown button (large black button). When this button is pressed and held down for longer then 7 seconds, , the ITC is shut down.
- 9 pole D-Sub interface (used as connection for the optocoupler!)

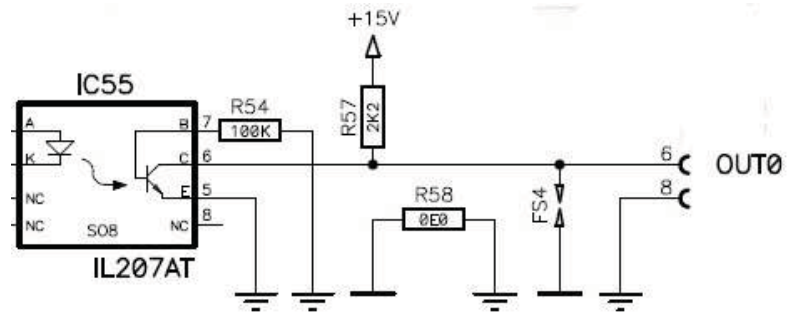
LED type	Description
Green LED (Power) lights	The sync card is powered.
Orange LED (Transmit) lights	Lights for as long as a message is being sent from the sync card to the transceiver module.
Red LED (Status) lights	Lights when a status of the ITC is not OK (e.g. low forward power, high reflection power, etc.)
Red LED (Status) blinks	The battery voltage has fallen below the critical value and the base station is switched to safety system status. (BSC runs down individual processes).
All LED's blink briefly	The ITC is fully booted up.
All LED's light	The ITC has been shut down fully and can know be switched off.

Table 5: Functional description of the SC card LEDs

The sync card has 2 inputs and 1 output. Together with the I/O card this extends the systems inputs to 7 and outputs to 8.

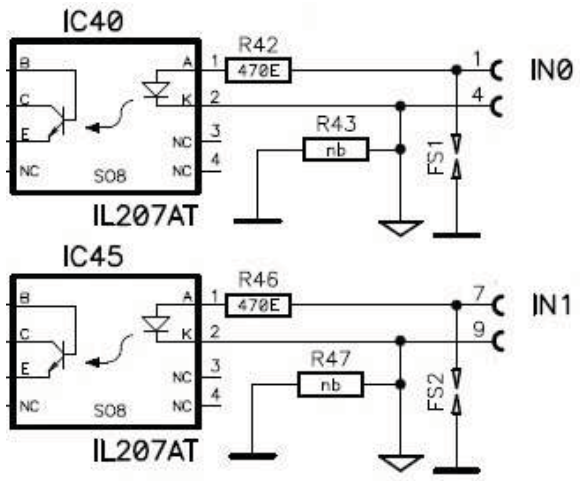
The sync card's inputs and ouputs meet the following specifications:

Number of inputs:	2
Current/voltage range of the opto-inputs:	5-25mA, 5-15V
Number of outputs:	1
Maximum current/voltage at the opto-output:	25mA, 13.8V
Type of connector:	D-Sub9
Cross-section of connection wires:	1mm^2



Designation in service web interfac	Pins	D-Sub9 connector onn SC card (output):	Description:
Channel 1	**6 / 8**	**Out 0 / GND:**	**Output with a voltage 13.8V. The resistor is connected as standard, between pin 8 and ITC chassis.**

Fig. 8-6: Pin connections of the optocoupler output to the sync card



Designation in service web interfac	Pins	D-Sub9 connctor on SC card (inputs):	Description:
Channel 1 **Channel 5**	**1 / 4** **7 / 9**	**IN 0 / GND 0:** **IN 1 / GND 1:**	**Galvanic isolated inputs, potential-free. As standard resistors R43 and R47 are not fitted.** Note: • **If R43 or R47 (0Ω) is fitted, GND 0 (pin 1) or GND 1 (pin 9) is connected to ITC chassis and therefore no longer potential-free.** • **Input 0 (pins 1/4) is used as "Local Alarm"** • **Input 1 (pins 7/9) is used as "Digital input".**

Fig. 8-7: Pin connections of the optocoupler inputs on the sync card

8.5 Digital Decoder Card (RC or RC09)

The “RC” decoder card can decode 512, 1200 and 2400 Baud. The “RC09” can additionally decode 4800 Baud and is capable of automatically recognizing the Baud rate.

Warning:

Please observe the following limitations.

Decoder-card-type	Useable SW	Remark
RC	Up to V3.xx	
RC09	From V4.xx	Multi-baud function

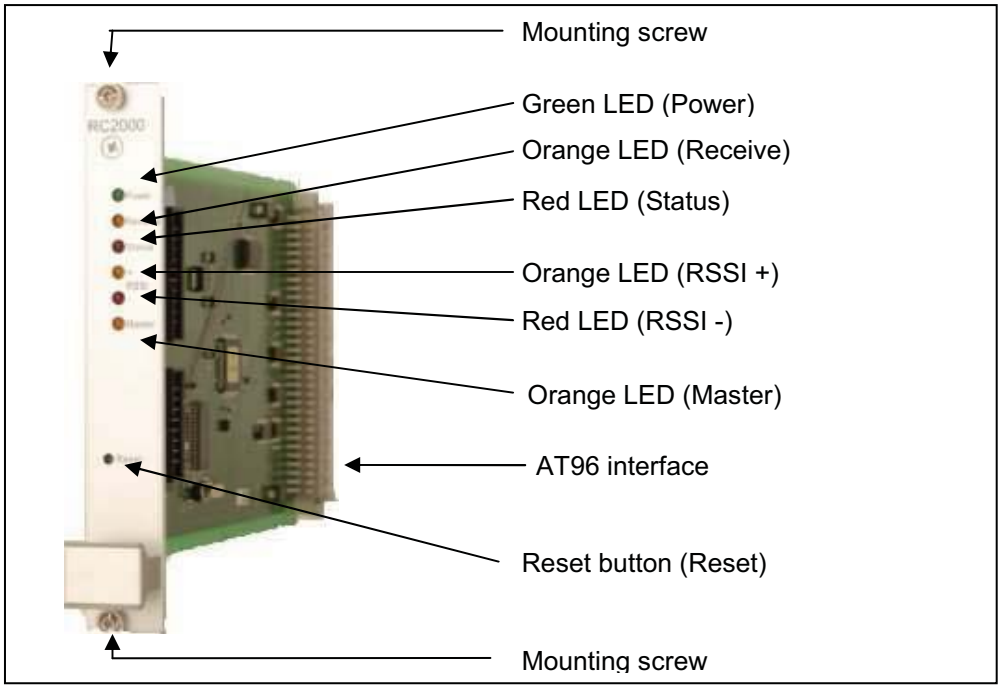


Fig. 8-8: Digital decoder card (RC or RC09)

The decoder card (RC or RC09) is responsible for decoding the received data and forwarding it to the BSC. In addition, the receiver is programmed via an I^2C connection. The RC card has Eurocard format (3 U) and is plugged onto the AT96 bus. The following indicators and keys are accommodated on the front panel:

- LEDs (Power, Receive, Status, RSSI, Master)
- Reset button: resets all registers and generates a BSC interrupt

LED type	Description
Green LED (Power) lights	The RC card is being powered.
Orange LED (Receive) lights	The receiver detects a sync word from the air.
Red LED (Status) lights	A status of the receiver is not OK (i.e.PLL not locked).
Orange LED (RSSI +) lights	If this LED lights, the receive field strength is OK, i.e. good to very good. If this value drops to a critical level, both RSSI LEDs light. The base station is still, admittedly, receiving correctly but the receiving equipment should be checked
Red LED (RSSI -) lights	If only this red LED lights, the receive field strength has dropped to an unacceptable level.
Orange LED (Master) lights	The base station is set as master.

Table 6: Functional descriptoin of the RC card LEDs

The LEDs for RSSI measurement (RSSI +, RSSI -) light in the case of a reboot only after reception of a broadcast message.

The field strength of a received message should be higher than –90dBm at the antenna connector. This is necessary to ensure that there is sufficient margin (min 20dB) over the transmission path. The value can be seen in the status page of the web-interface by clicking the link "Receiver (RX)".

Receive field strength		**LED "RSSI +"**	**LED "RSSI -"**
Good	**> -90dBm**	**On**	**Off**
Critical	-90dBm .. -100dBm	On	On
Bad	< -100dBm	Off	On

Table 7: Status indication RSSI-LED's

8.6 GPS Receiver card

The GPS receiver card is a 3HE-slot card which is connected to the controller card via the AT96 bus. It is equipped with a µBlox LEA-5H GPS chipset. All passive or active GPS antennas operating on +5V DC (max.100mA) can be connected using the SMA plug on the front plate. Together with the syncho-card, it is responsible for the synchronous (with neighbouring radio base stations) sending of the data to the radio emitter. The yellow Sync-LED blinks when the GPS chip generates a time impulse. The cable runtime compensation is configurable up to the nanosecond domain.

Fig. 8-9: GPS receiver card GPS

Technical data

Type:	Swissphone GPS-receiver card GPS	
Dimensions (WxHxD):	20.32mm (4TE) x 133.35mm (3HE) x 185mm	
Power supply:	5 VDC	
Antenna connection:	SMA plug	
GPS receiver:	uBlox LEA-5H	
	50 channels	
	GPS L1 Frequency, C/A Code	
	GALILEO Open Service L1 Frequency	
Time-To-First-Fix:	Cold start (Autonom)	29 s
	Warm start (Autonom)	29 s
	Hot start (Autonom)	<1 s
Sensitivity:	Tracking & Navigation	-160 dBm
	Acquisition	-160 dBm
	Cold start (Autonom)	-145 dBm
Horizontal position exactitude:	Autonom	< 2.5 m
	SBAS	< 2 m
Max navigation update rate:	4 Hz	

8.7 GPS Interface Card (S-Com) and GPS Antenna

Fig. 8-10: GPS interface card (S-Com) and GPS antenna

In order to permit as much flexibility as possible when determining the location of the GPS antenna, it is equipped with an RS422/RS485 interface that has a 200 meter long cable.The time pulse is fed over a differential cable of a similar length. For the supply over such a distance with a supply of 12V, the cable cross-sectional should be 0.25m^2. All inputs and outputs to the GPS antenna are protected against surge voltages. An 8 pin IEC 60 130-9 connecror is used for connection to the unit.

The GPS antenna is connected to the S-Com card via the Com4 connector..

Note: To ensure adequate overvoltage protection the GPS antenna must be correctly earthed (e.g connect the GPS antenna's aluminium housing to the building's earth). Moreover Swissphone recommends the connection of a series overvoltage protection to the GPS interface card.

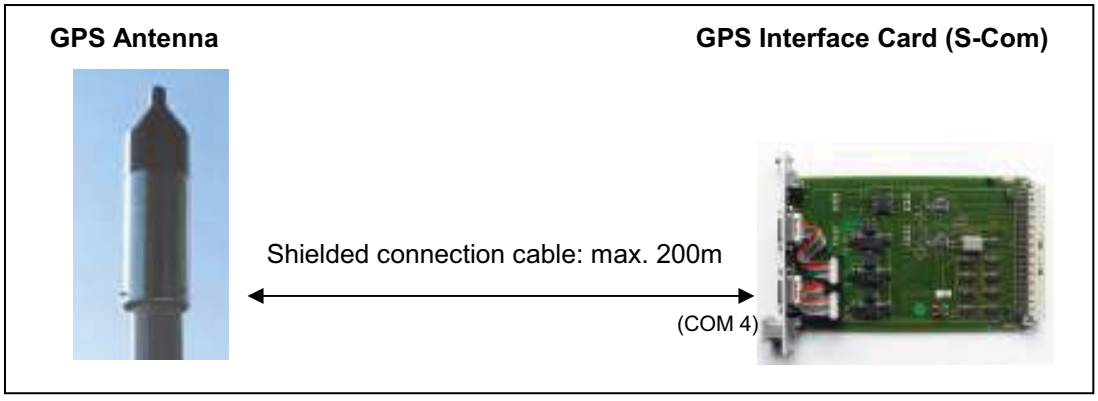


Fig. 8-11: GPS antenna connection to the S-Com-Karte

8.7.1 GPS Interface Card (S-Com)

The GPS interface card is only used in Master ITC's. It permits synchronised transmission to other Master ITC's which is provided by the GPS time reference pulse. The GPS antenna is connected to the COM4 connector.

Technical Data:

Supply voltage:	V_{DC} (5V)
LED:	Power, indicates that the card has power supplied
Dimensions BxHxT:	Europacard format (3HE)

Interfaces:

COM 3 (D-Sub9):	reserved free connection
COM 4 (D-Sub9):	RS485, connection for the GPS antenna
AT96:	Connection for the internal data bus

8.7.2 GPS Antenna

A professional reference GPS receiver with a timing pulse output is used to synchronise the transmissions from all Maste ITC's in a system. The receiver provides positioning and timing data as well as raw satellite data for assisted GPS services and differential GPS. A timing pulse is available at a separate differential output. This signal is fully configured for polarity, pulse length, repetition frequency as well as compensation for the cable delay time to nanosecond range.

The GPS antenna's housing has a robust and waterproof (IP65) construction made of plastic and aluminium. It has been designed to reduce the build-up of snow which can reduce reception quality. The unit has an operating temperature range between –40° to +85℃ and is designed to withstand the most extreme environmental conditions.

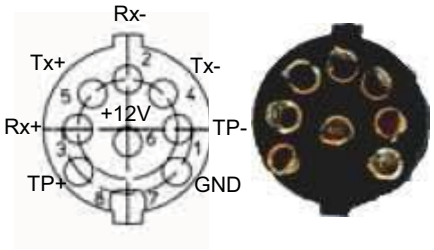
Technical Data:

Operating temperature range	-40..85 ℃
Storage temperature range	-40..105℃
Supply voltage:	7..12 VDC (standard)
Current consumption (Operation, type):	120 mA
Receiver type	u-blox TIM-LP 16 channel, L1-frequency (1575 MHz) SBAS (WAAS, EGNOS) support
Positioning signal rate:	max. 4 Hz
Interface type	1 x RS-422 full-duplex 1 x RS-422 output (TP)
Input voltage range	-7...+12 VDC
Interface bitrate	4800, 9600, 19200, 38400, 57600, 115200 bit/s
Protocol:	NMEA, ubx binary, RTCM
Time pulse accuracy:	50ns RMS, 99% within 100ns
Lightning protection (all connections):	IEC 61000-6-2 (2.3) / IEC 61000-4-5 ±10kV/2W @ 1.2/50ms ±1.5kV/2.5W @ 8/500ms
Fire hazard category UL94:	IEC 60695-11-10: V-0
Housing proection category:	IP 65
Weight:	approx. 355g
Dimensions (Ø x H):	52 x 188mm

8.7.3 Connector Pin Assignment of GPS Antenna and S-Com Card

The cable used for connecting the GPS receiver to the Master ITC's has the following pin connections:

GPS antenna:



Pin layout seen from **solder** side

Connector: IEC 60130-9 (female)

S-Com card (Com 4):

Pin layout seen from **solder** side

Connector: D-Sub9 (female)

GPS receiver pin connections	Pin designation	S-Com card (Com 4) pin connections
1	TP-	4
2	Rx-	3
3	Rx+	7
4	Tx-	2
5	Tx+	6
6	+12V	1
7	GND	5
8	TP+	8
	--	9

TP±: Time pulse (time reference) line for synchronisation
Rx±/Tx±: Communication line
+12V: Supply
GND: Earth

Fig. 8-12: Pin connections for the GPS antenna and S-Com card

8.8 I/O Card

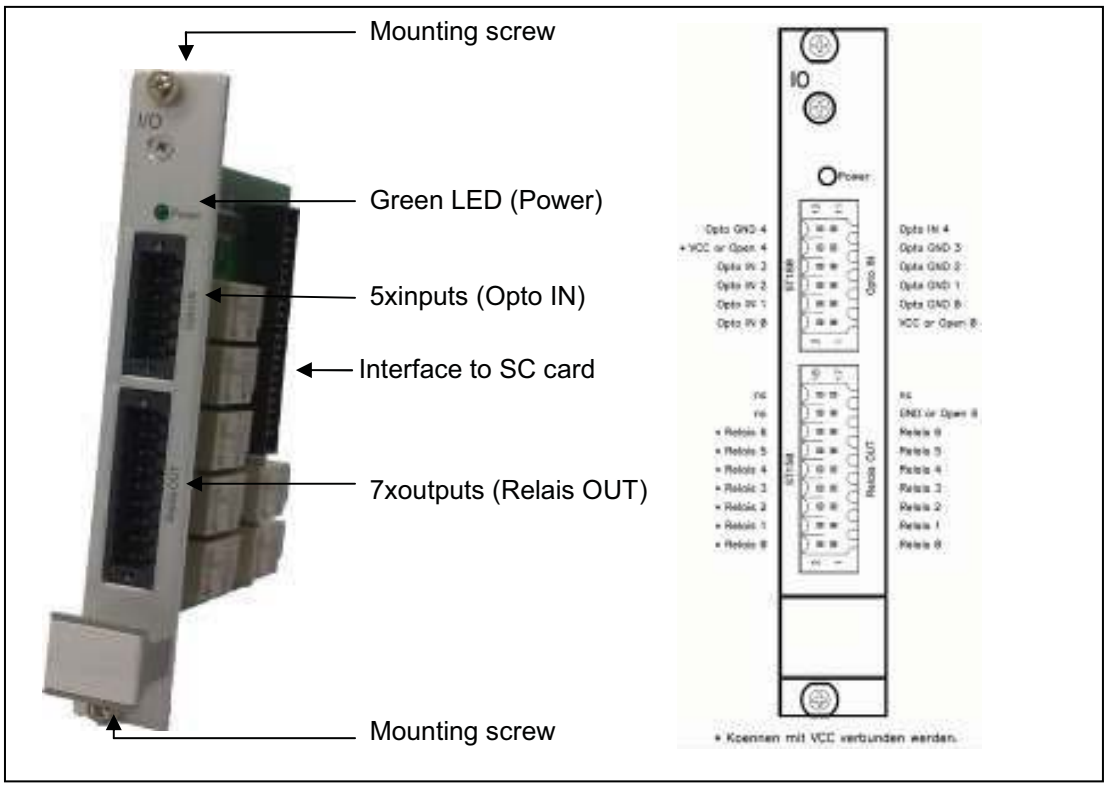


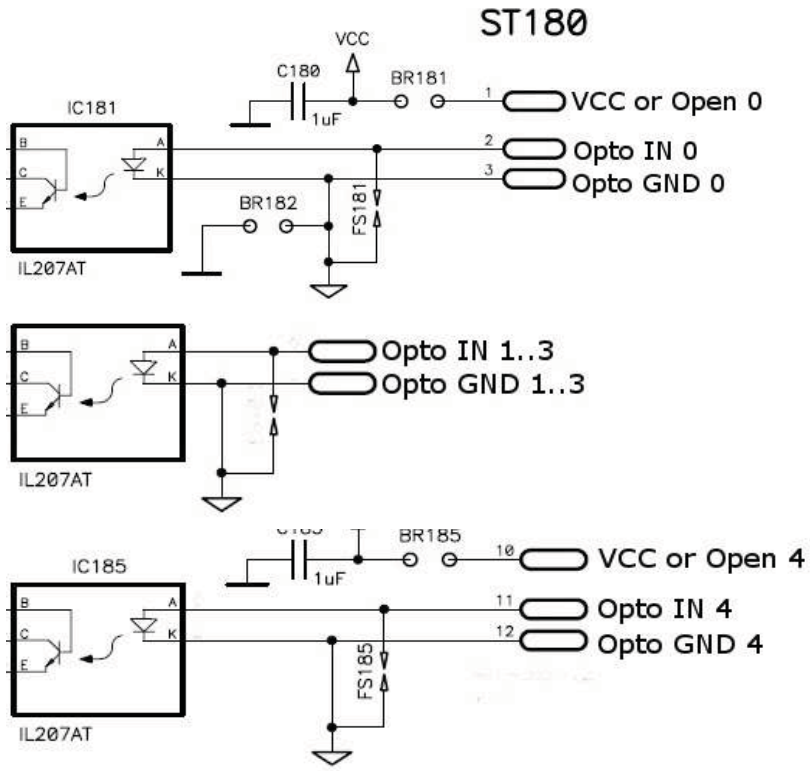
Fig. 8-13: I/O card

The I/O card has 5 inputs and 7 outputs. Together with the Sync card the number is extended to 7 inputs and 8 outputs.

The I/O card has the following technical specifications :

Number of inputs:	5
Current/voltage range on opto-inputs:	5-25mA, 5-15V
Number of outputs:	7
Nominal current /voltage on relay outputs:	40mA, 5VDC
Max. voltage on relay outputs:	6.5VDC
Type of connector:	Weidmüller S2L 3.5 - 18
Cross-section of connection wires:	1mm^2

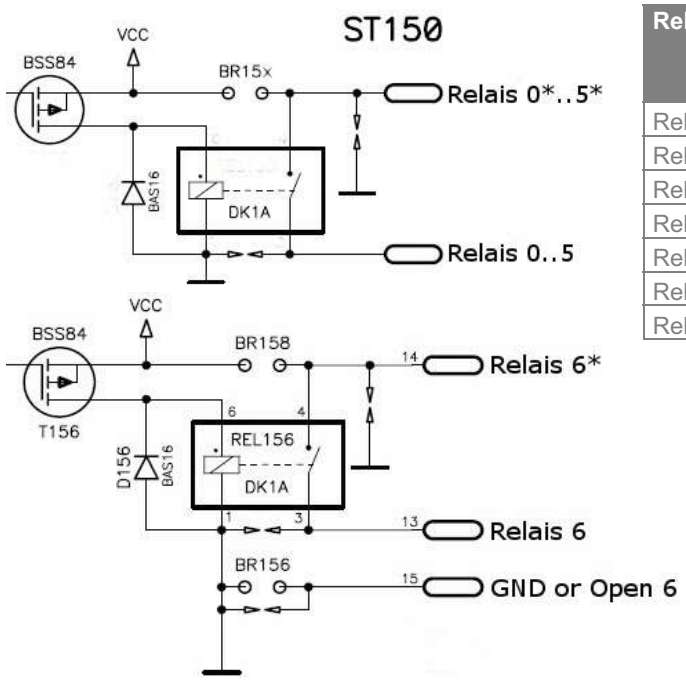
All inputs are equipped as indicated in the following description. A connection variation Opto IN 0 and 4 permits the I/O card's 13.8V supply to be used to operate an external circuit. The maximum cross-section of the connection wires is1mm^2.



Designation in service web interface	Pins	Connection at I/O card (inputs):	Description:
Channel 2 **Channel 7** **Channel 3** **Channel 4** **Channel 6**	**2 / 3** **4 / 5** **6 / 7** **8 / 9** **11/12**	**Opto IN 0 / Opto GND 0:** **Opto IN 1 / Opto GND 1:** **Opto IN 2 / Opto GND 2:** **Opto IN 3 / Opto GND 3:** **Opto IN 4 / Opto GND 4:**	**Galvanic isolated inputs, potential-free** Note: • **If VCC (13.8) or GND of the I/O card is used for an external circuit, the input is no longer galv. isolated.** • **If BR182 (0Ω) is fitted, Opto GND 0 to 4 (pins 3,5,7,9,12) are connected to ITC chassis. If not fitted, thse pins are potential-free.**
Channel 2 **Channel 6**	**2 / 1** **11/10**	**Opto IN 0 / VCC or Open 0:** **Opto IN 4 / VCC or Open 4:**	**As standard no function, i.e. pin 1 and 10 are open, BR181 and BR185 are not fitted.** **If BR18/1 BR185 are fitted pins 1/10 are connected to VCC (13.8V) and they are therefore no longer potential-free.**

Fig. 8-14: Opto-coupler input pin connecttions on the I/O card

All inputs are equipped as indicated in the following description. A connection variation on the relay outputs permits the I/O card's 13.8V supply to be used to operate an external circuit. A maximum of 10A can be supplied. The maximum cross-section of the connection wires is1mm^2.



Relais Pin	Bridge no. for VCC (as standard not fitted)
Relais 0*	BR153
Relais 1*	BR150
Relais 2*	BR154
Relais 3*	BR151
Relais 4*	BR152
Relais 5*	BR155
Relais 6*	BR158

Designation in service web interface	Pins	Connection at I/O card (outputs):	Description:
Channel 2 **Channel 3** **Channel 4** **Channel 5** **Channel 6** **Channel 7** **Channel 8**	**1 / 2** **3 / 4** **5 / 6** **7 / 8** **9 / 10** **11/12** **13/14**	**Relais 0 / Relais 0*:** **Relais 1 / Relais 1*:** **Relais 2 / Relais 2*:** **Relais 3 / Relais 3*:** **Relais 4 / Relais 4*:** **Relais 5 / Relais 5*:** **Relais 6 / Relais 6*:**	**Potential-free outputs. As standard BR15x is not fitted.** Note: • **If VCC 13.8V is used for external circuits (BR15x fitted), the output is no longer potential-free.**
Channel 8	**14/15**	**Relais 6* / GND or Open 6:**	**As standard no function, i.e. pin 1 and 10 are open, BR181 and BR185 are not fitted. If BR18/1 BR185 are fitted pins 1/10 are connected to VCC (13.8V) and are therefore no longer potential-free**

Fig. 8-15: Pin connections for the Optocoupler inputs of the I/O card

9 Module Replacement During Servicing (Only for Level 2 Service Partners!)

Note: This chapter describes the service activities at Service Level 2. These activities may only be undertaken by skilled staff trained to Level 2 by Swissphone**.**

9.1 Important Notes

The ESD guidelines for the protection of electronic components against electro-static phenomena must be observed in accordance with DIN EN 61340-5-1. Always touch the ITC2100 housing with one hand first before handling the relevant module. This discharges electrostatic voltage and so prevents damage to the electronic components.

Module replacement does not extend the existing guarantee or guarantee periods. The module replacement does not renew guarantees or guarantee periods which have already expired.

9.2 Replacing the Battery 12V 12Ah

9.2.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Disconnect the old battery from the ITC2100
5) Connect the new battery to the ITC2100 (see chapter 5.10)
   Warning: Ensure that the battery poles are correctly connected. The equipment is not protected against false polarity.
6) Connect the mains cable
7) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot
8) Function control
   - Green LED of the power supply is on (=mains ok)
   - Green LED of the controller card is on
   - Test battery operation by pulling out the mains cable. The ITC2100 should continue to funtion correctly.

9.3 Replacing the Power Supply Module (PS 150W / PS 150W-B)

The power supply PS 150W (part no.. 0710046) and PS 150W-B (part no. 0710049) are completely campatible with each other. It is recommended to use the newer model power supply PS 150W-B when replacing the power supply module.

9.3.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Disconnect the battery from the ITC2100
5) Remove "old" power supply
   - Release the 4 screws on the front panel
   - Pull the power supply module out of its slot
6) Insert the new power supply module
   - Insert the new power supply module into its slot
   - Tighten the 4 screws on the front panel
7) Connect the battery
   Warning: Ensure that the battery poles are correctly connected. The equipment is not protected against false polarity.
8) Connect the mains cable
9) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot
10) Function control:
    - Green LED of the power supply is on (=mains ok)
    - Green LED of the controller card is on
    - If in the status page of the web-interface the field "Power supply" shows OK, or if after clicking the link "Power supply" the field "Main supply" shows OK, the new power supply module is working correctly.

9.4 Replacing the Transceiver Module (TRx 25W)

9.4.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Disconnect the antenna coax from the ITC2100
5) Remove "old" transceiver module
   - Release the 4 screws on the front panel
   - Pull the transceiver module out of its slot
6) Note the RSSI data of the new transceiver module (RSSI low and "RSSI high) which can be found on the chassis (see figure 8-1, below). These values will be entered later in the service web interface.

Fig. 9-1: Note the values "RSSI tief" (=RSSI low) and "RSSI hoch" (=RSSI high)

7) Insert the new transceiver module
   - Insert the new transceiver module into its slot
   - Tighten the 4 screws on the front panel
8) Connect the antenna coax
9) Connect the mains cable
10) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot

11) Enter the RSSI values of the new Transceiver Module in the Service web interface

- Enter the RSSI voltage values (ADC) in the configuration page in link "RSSI calibration" in section "System - Input RSSI" into the fields "RSSI low:" and "RSSI high:". The values will be stored after clicking the button "Apply".

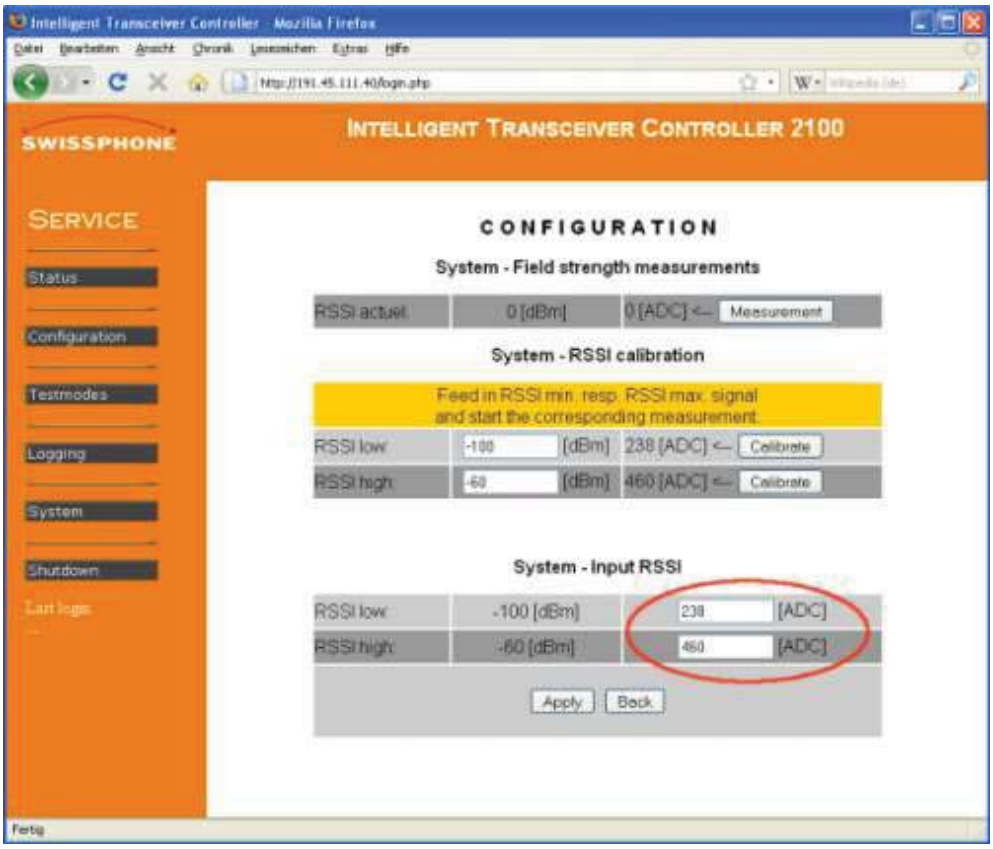


Fig. 9-2: Entering the RSSI voltage values for the new transceiver module

- Enter sending and receiving delay values in “configuration” in the “RxTx delay” link.

Fig 9-3: Enter the Rx/Tx delay values of the new transceiver module

11) Function control:
    - Green LED of the power supply is on (=mains ok)
    - Green LED of the controller card is on
    - In the status page of the web-interface the fields "Transmitter (TX)" and "Receiver (RX)" are green

9.5 Replacing the Controller Module (BSC)

The previous controller version (part no. 0720732), which was used in the ITC2000-BOS can also be used in the ITC2100-BOS. Swissphone recommends using the current Controller version (part no. 0720739) in the ITC2100-BOS because this unit is more efficient compared with the previous version. This latest version is described in chapter 7.3.

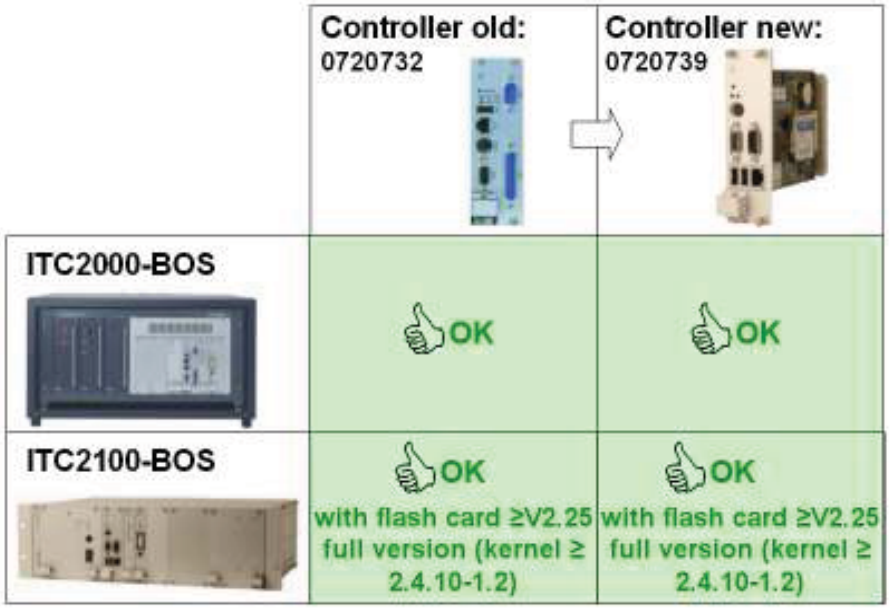


Fig. 9-4: Compatibility of the controller models

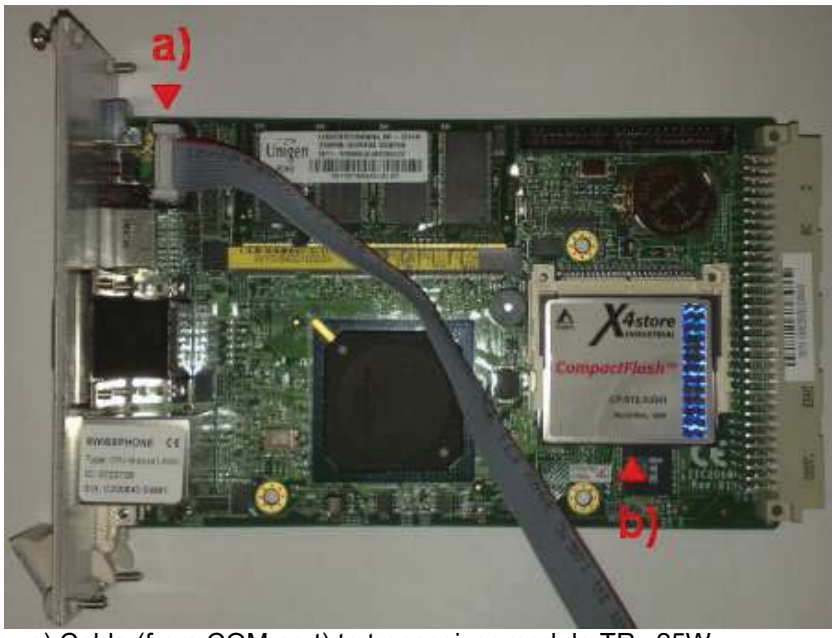
Important: If the latest controller version (part no. 0720739) is used, at the least the Kernel version 2.4.10-1.2 is required. If the Kernel version is lower, a flashcard with the latest software must be ordered from Swissphone and inserted. The Kernel version can be checked in der Service Web internet page "System" in link "Operating system" in the field "Kernel:" (see figure below).

Fig. 9-5: Checking the kernel version

9.5.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Remove the "old" controller module
   - Release the 4 screws on the front panel and pull the controller out of its slot
   - Disconnect the cable from the controller
   - Remove the flash card (if still intact)
5) Insert the new controller module
   - Insert the flash card into the controller. If necessary insert a new flash card (with the latest SW version, obtainable from Swissphone).

     Important: It is not permitted to use the flash card from the old controller version (part no. 0720732) in the new controller version (part no. 0720739). Always ensure the the new unit is fitted with a flash card having the latest software.
   - Connect the cable to the correct connector on the controller (see figure below).



a) Cable (from COM port) to transceiver module TRx 25W
b) Flash card

Fig. 9-6: Cabling of the controller module

   - Insert the new controller module into its slot and tighten the 4 screws on the front panel
6) Connect the mains cable
7) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot
8) Function control:
   - Green LED of the controller module is on
   - In the status page of the web-interface the field "BS Controller:" is green or yellow

9.6 Replacing the RC or RC09 card

Important: If the RC card is inserted in the ITC2100-BOS, at least the hardware index D and the FPGA version V0.8 are needed (see following figure).

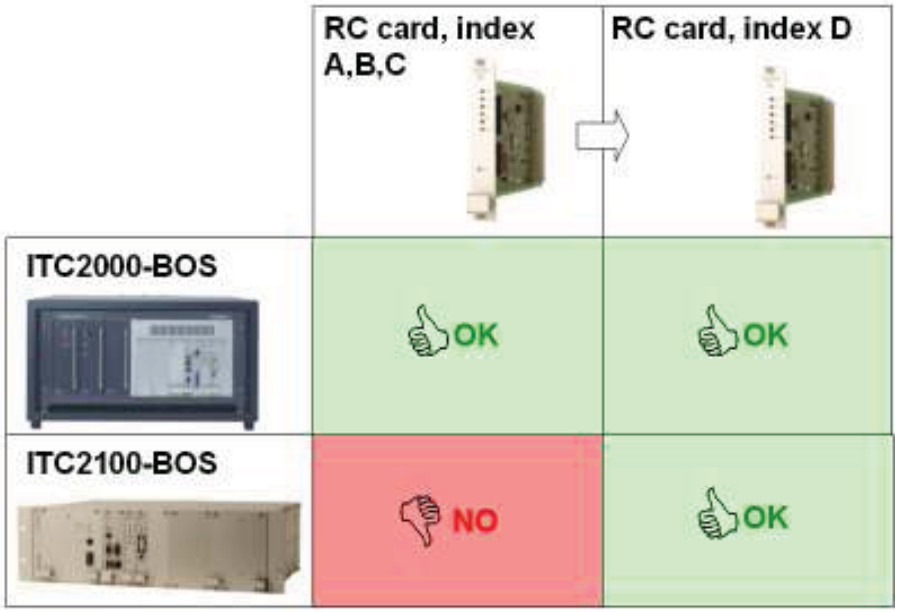
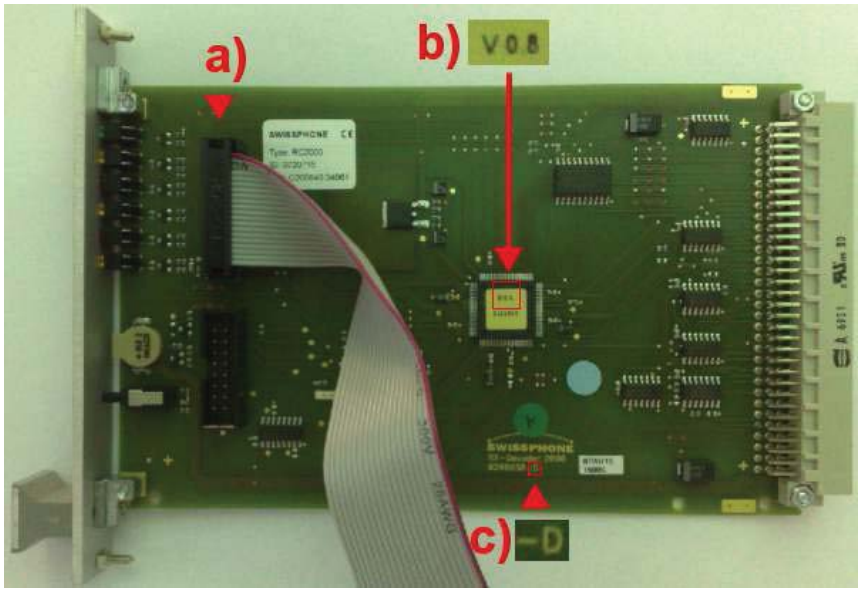


Fig. 9-7 Compatibility of the RC card

9.6.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Remove the "old" RC or RC09 card
   - Release the 2 screws on the front panel and pull the card out of its slot
   - Disconnect the cable from the RC or RC09 card
5) Insert the new RC or RC09 card
   - Connect the cable to the correct connector on the RC or RC09 card (see figure below).



a) Cable to transceiver module TRx 25W
b) Version of the Rx-FPGA (V 0.8)
c) Version of the hardware (index D)

Fig. 9-8: Cabling of the RC or RC09 card

- Insert the new RC or RC09 card into its slot and tighten the 2 screws on the front panel

6) Connect the mains cable

7) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot

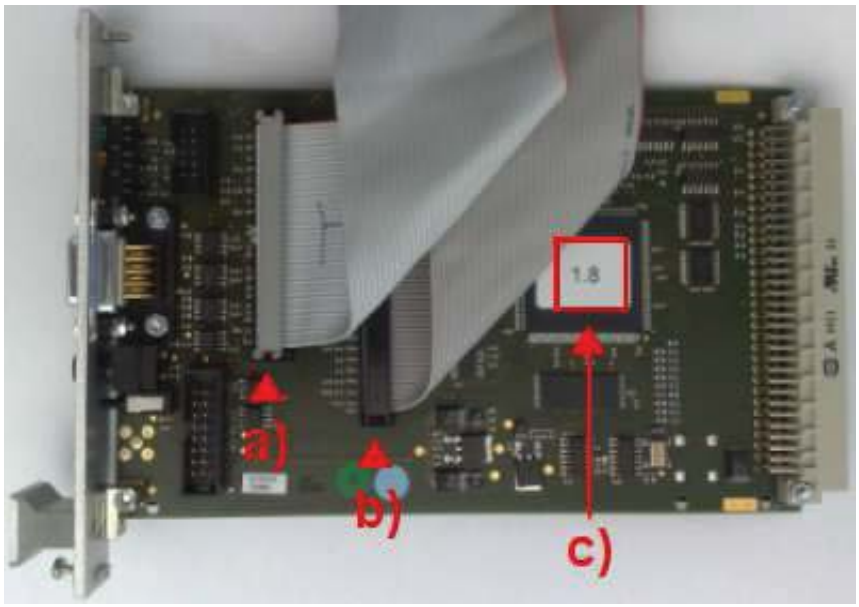
8) Function control:
   - Green LED of the RC or RC09 card is on
   - In the status page in link "Receiver (RX)" the first three fields "Frequency Prog. (I2C-Bus):", "Frequency Prog. (PLL):" and "PLL Frequency:" show OK.
   - Only for RC card: In the system page in link "Information about...Applications" the field "Rx-FPGA:" shows the value of min. 0.8.

9.7 Replacing the SC card

Important: The FPGA version of the sync card must be at least V1.8 (see figure below).

9.7.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Remove the "old" SC card
   - Release the 2 screws on the front panel and pull the card out of its slot
   - Disconnect the cables from the SC card
5) Insert the new SC card
   - Connect the cable to the correct location on the sync card (see figure below)



a) Cable to the optional I/O card
b) Cable to the transceiver module TRx 25W
c) Version of the Tx-FPGA (V1.8)

Fig. 9-9: Cabling of the SC card

   - Insert the new SC card into its slot and tighten the 2 screws on the front panel
9) Connect the mains cable
10) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot
11) Function control:
   - Green LED of the SC card is on
   - In the status page of the web-interface in link "Transmitter (TX)" the field "Synchronisation:" shows OK.
   - In the system page in link "Information about...Applications" the field "Tx-FPGA:" shows the value of min. 1.8.

9.8 Replacing the I/O Card

9.8.1 Procedure

1) Shut down the ITC2100
2) Switch off the power supply (mains switch to position "0")
3) Disconnect the mains cable
4) Remove the "old" I/O card
   - Release the 2 screws on the front panel and pull the card out of its slot
   - Disconnect the cable from the I/O card
5) Insert I/O card (see chapter 5.14)
   - Connect the cable
   - Insert the new I/O card into its slot and tighten the 2 screws on the front panel
6) Connect the mains cable
7) Switch on the ITC2100 (mains switch to position "1"), the ITC2100 will boot
8) Function control:
   - Green LED of the I/O card is on
   - In the status page of the web-interface the field "Hardware components:" is green.

10 List of Replacement Parts and Spare Parts

The following components are replaced on a module basis and can be ordered by quoting the following item number.

Item number	Designation
0721'699	TRx 25W: Transceiver module 144-174MHz 25W
0721'702	PS 150W-B: Power supply module
0721‘703	BSC: Controller module (without flash card)
0721'696	Flash card for the controller module with newest ITC2100-BOS software v3.xx
0722'199	Flash card for the controller module with newest ITC2100-BOS software v4.xx
0721‘704	SC: Sync card
0721‘705	RC: POCSAG decoder card
0722'196	RC09: POCSAG decoder card (multi-baud)
0721'688	GPS transformation set to multi-master (GPS antenna and interface card S-Com)
0721'718	GPS: GPS receiver card
0721'706	I/O: I/O card
0330‘095	Rechargeable battery Pb 12 V / 12 Ah

Switch off the ITC2100 (power switch to position "0") and disconnect the station from the mains before exchanging any components.

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