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NeTIS MAINTENANCE ASSISTANCE GUIDE

Version	Date	Modifications	Sign.
1.0	20/05/11	CREATION	LM/PM
1.1	25/04/13	Add 2.6.7	PM/LM

1. PRESENTATION OF A STANDARD TETRA NETWORK

System composition

A system is composed of:

- One or more NeTIS-Ns and one or more sites, each one composed of one or more base BS stations (NeTIS-B).
- Of a main NeTIS-M service network management terminal and eventually one or more secondary NeTIS-M service network management terminal
- Standard operator stations supplied by ETELM or supplied by other enterprises which form Dispatching
- Portable and mobile terminals
- SO, T2 links
- Specific applications: for example data transmission.

2. NETIS -B

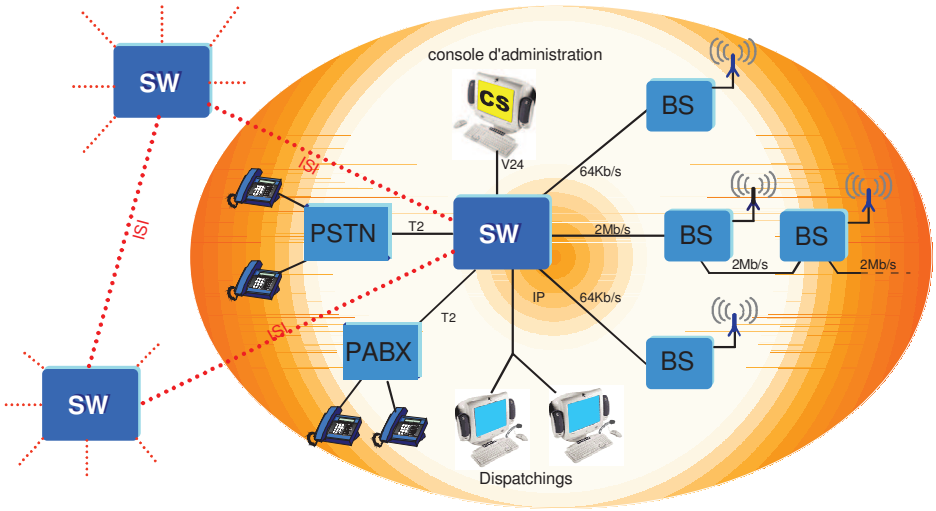
2.1 Presentation of the base station

NeTIS-B is a duplex TETRA transmitter receiver connected to the switch using an IP or G703 or V11 link or it can operate autonomously (TETRAG).
It manages a TETRA carrier which includes a signal channel and three phone channels.

The base station is composed of the following sub-sets:

- A ventilation unit
- An electronic unit with a backplane that can receive the following plug-in modules:
  - Power supply (ALIM)
  - CPU (CPUBDT)
  - Demodulator/ Down converter (DCTR) 2 slots for the use of 1 or 2 channel diversities.
  - Modulator/Up converter (UCM2)
  - Power amplifier (PA)

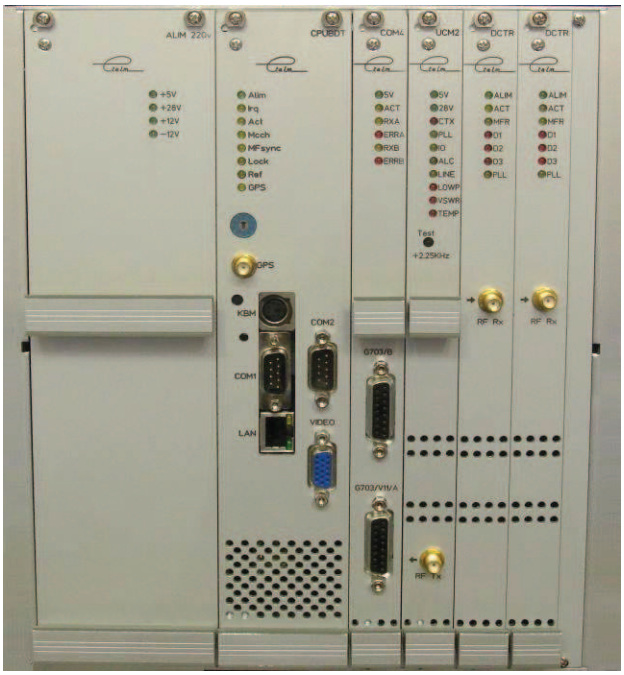
The synthetic view below is an example of 4 site architecture.


SW
ISI
ISI
ISI
SW
console d'administration
CS
V24
PSTN
T2
SW
64Kb/s
BS
2Mb/s
BS
BS
2Mb/s
2Mb/s
IP
64Kb/s
T2
PABX
BS
Dispatchings

2.2 Different versions

2.2.1 NeTIS Box version

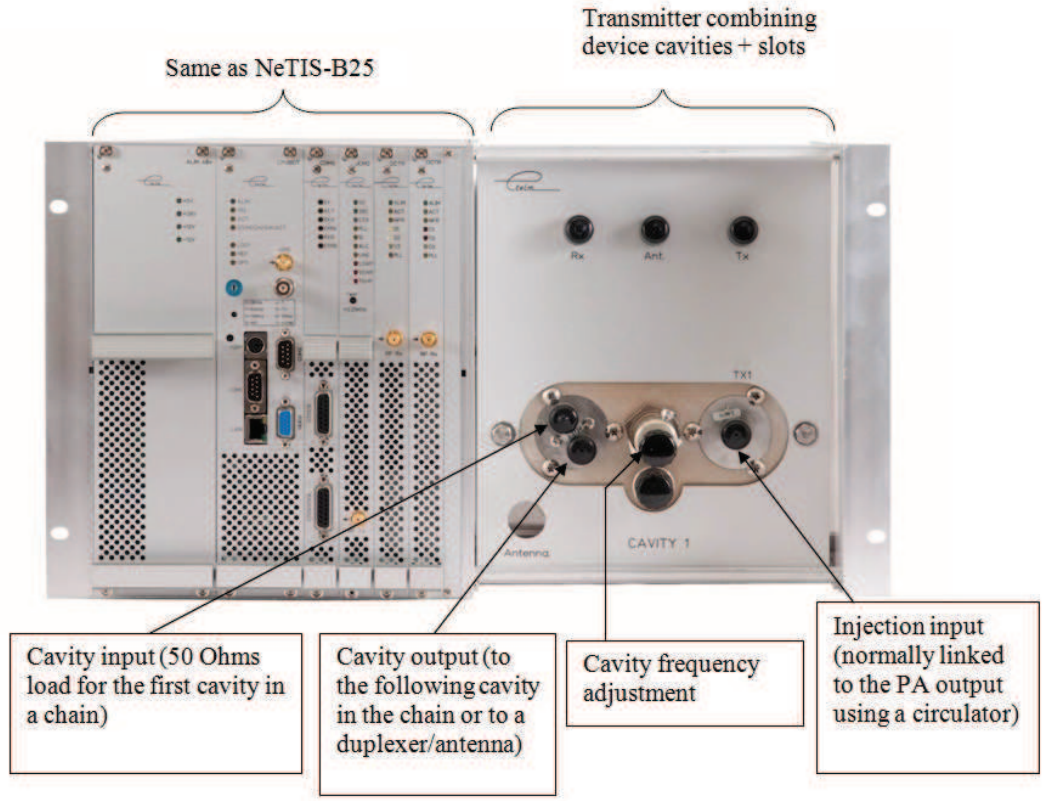
2.2.1.1 NeTIS-Box front view



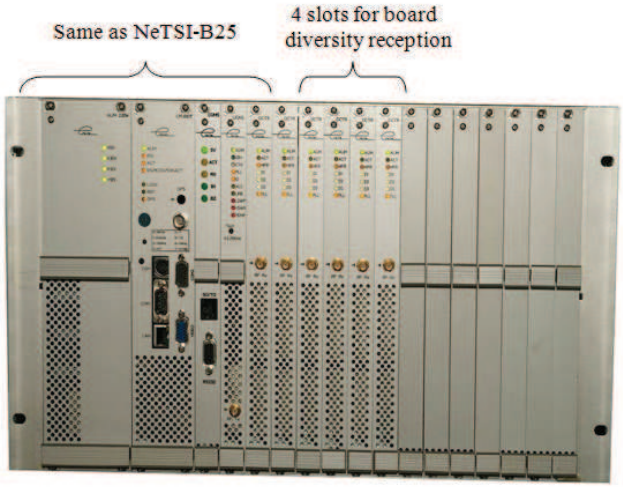
2.2.2 *RACKABLE VERSIONS*

2.2.2.1 NeTIS B-25

2.2.2.2 NeTIS B25-C



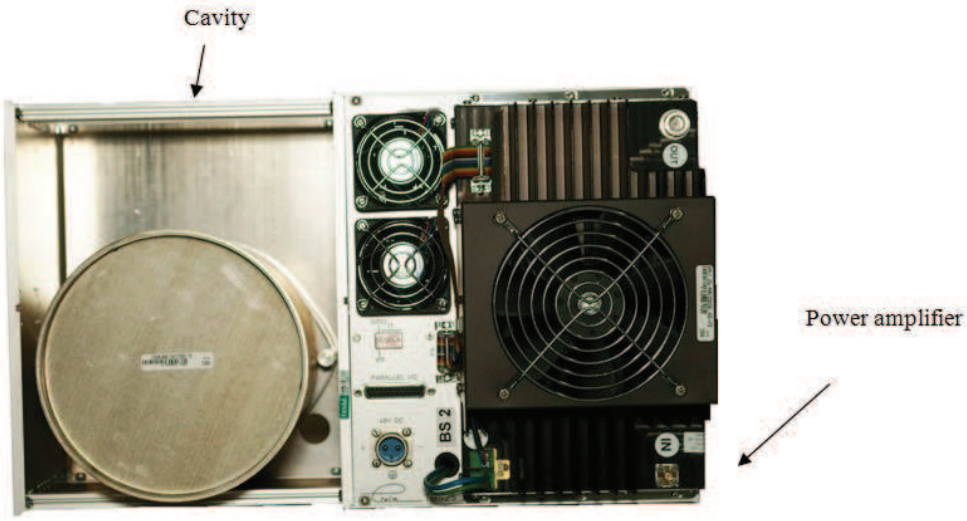
2.2.2.3 NeTIS-B25-D



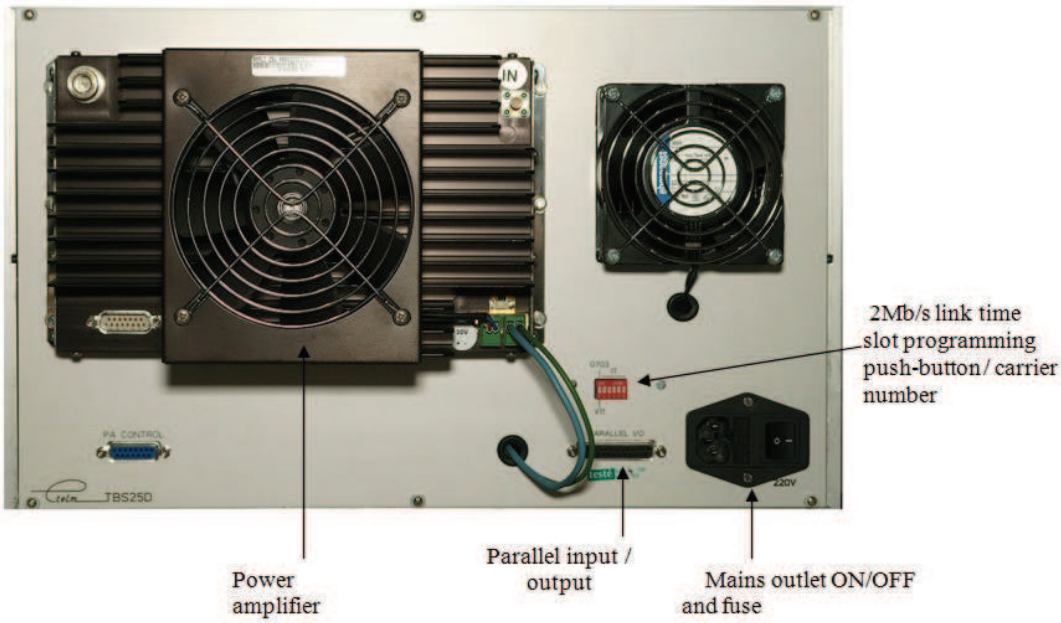
2.3 Rear face

2.3.1 NETIS-B25

2.3.2 NETIS –B25C



2.3.3 NETIS-B25D



2.4 Normal NeTIS-B operation

When powered on, the NeTIS normal behaviour is the following: Two phases should be observed.

1st phase:

- All the power indicators light (all the power supply module indicators and the different power supply indicators on each other module)
- The CPUBDT board operates immediately and supplies all the clock signals the system needs; the 8 test signals (8Khz; 64 KHz; HT; ...) that are selectable using the (blue) switch are available on the BNC connector of the BDT module.
- The INT indicator for the module flashes
- The module loads its software and then runs it in several phases

- If the CPUBDT is fitted with the GPS synchro module, the operation of this board is as follows:
  - The indicator flashes very slowly when the GPS module is present but reception is bad
  - The flashing is per second when the GPS module is present and reception is correct.

- The transmission command, lower power and TOS indicators for the UCM board are off. Only the ALC indicator flashes
- Verification of the state of the different modules and files - if a problem is detected the remaining operations may be halted.

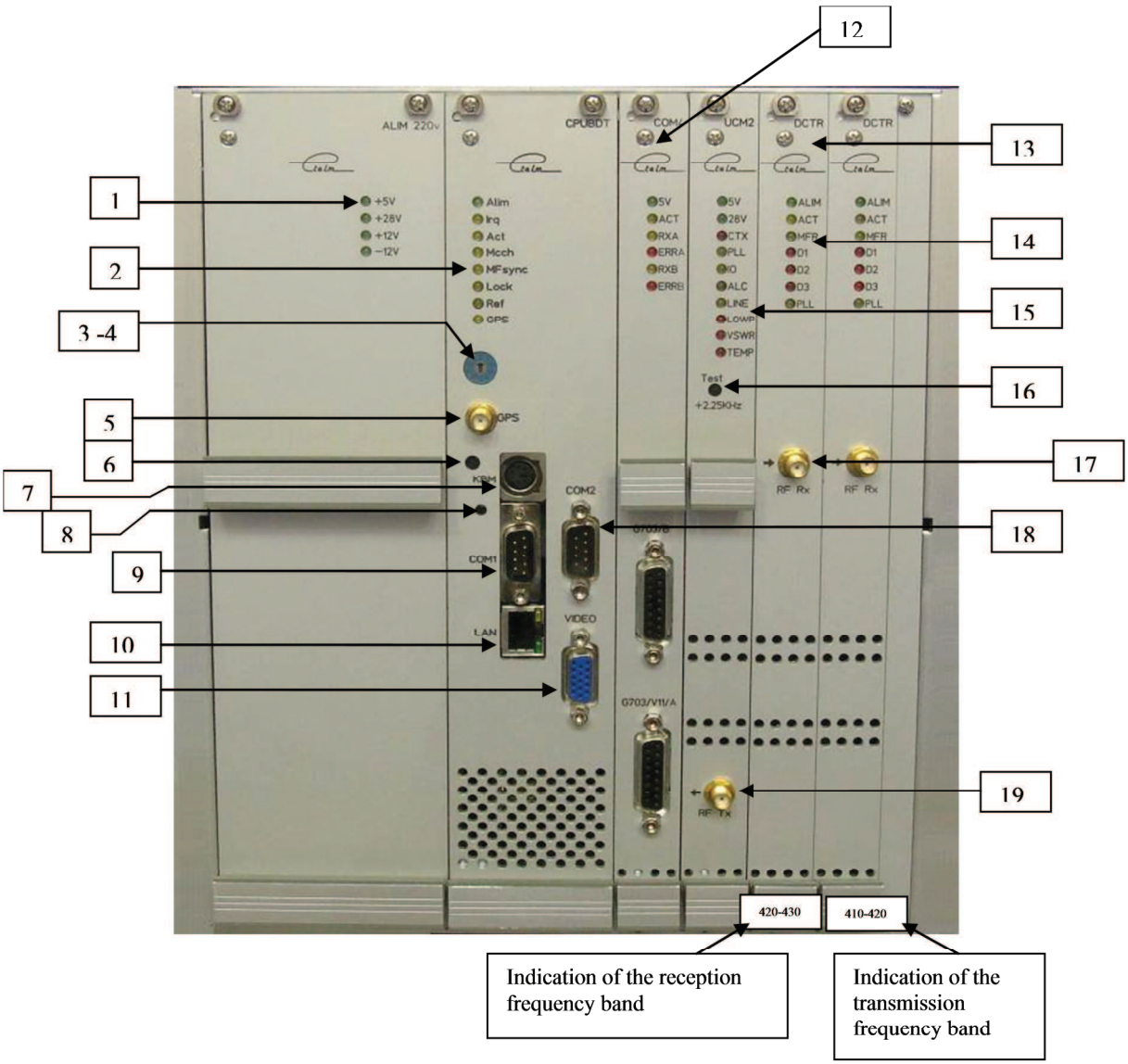
2nd phase:

- The CPUBDT board operates immediately and supplies all the clock signals the system needs; the 8 test signals (8 KHz; 64 KHz; HT; ...) that are selectable using the (blue) switch are available on the BNC connector of the BDT module.
- The INT indicator for the module flashes
- The ACT indicator on the CPUBDT board starts flashing which means that the programme is running
- The EF/ indicator on the UCM board lights (the CPUBDT loads data into the module) and then the ALC and COR indicators light alternately
- The MCCH indicator on the CPUBDT board lights if the BS manages the MCCH channel
- The PLL and CTX indicators light and the ALC and COR indicators turn off => the BS is transmitting
- The programme itself runs

The base station can be in one of the three following situations:

- The base station has a correct link with the switch: the switch then uploads the base station configuration and the base station transmits.
- The link with the switch is not established (or the switch is stopped) and the base station is not programmed to switch to degraded mode: in this case the base station remains on standby
- The link with the switch is not established but the base station is programmed to switch to degraded mode: in this case the base station behaves as an automatic TRA-2M relay and transmits.

It is important to note that TETRA mobiles synchronise on the signal received from the relay transmitter or the base station and that they immediately cease all transmissions if the signal is not correct – it is therefore essential, when faced with a 'dumb' mobile, to start by checking the station transmission before checking anything on the mobile itself.



1 Power indicators - normally all on

2 CPUBdT board indicators

- 2a power supply normally on
- 2b 'IRQ' normally fast flashing
- 2c 'ACT' (Activity):
  - Static (on or off): the software is not operating correctly
  - Fast flashing: no reception board (DCTR) detected
  - Slow flashing (1 second): the base station has received a configuration from a switch
  - Very slow flashing (2 seconds): the base station has received a configuration from a switch but has switched to degraded mode (link with the switch has been cut)
  - Very fast flashing: software fault (Authentication or other problem)
- 2d 'MCCH' indicates that the base station is carrying the site MCCH
- 2f 'LOC' on if the internal time base is in slave mode – to the GPS or the G703 link or V11 link

- 2g 'REF' Presence of a synchronisation by link (communications board)
- 2f 'GPS' This indicator has different flashing frequencies,
  - State 1: On 100ms / Off 100 ms No GPS module or defective GPS module
  - State 2: On 100ms / Off 900 ms GPS module OK / Satellite acquisition in progress
  - State 3: On 100ms / Off 5 s Module GPS OK / Antenna fault
  - State 4: On 1 s / Off 1 s GPS module OK / Satellites OK
  - State 5: On 2s / Off 2s GPS module OK / Satellites lost, synchronisation maintained for 8 min 30 s before switching to the internal reference

The board's synchronisation source can be determined from the indicator states,
'LOC' off whatever the state of the other indicators means synchronisation on the internal reference
'LOC' and 'REF' on mean synchronisation on the link
'LOC' on and 'REF' off and 'GPS' state4 or state5 means synchronisation on the GPS

3 The clock test connector is controlled by selector 4
Position 0: 8 KHz (used on G703)
Position 1: 64 KHz (used on G703)
Position 2: 10 MHz (internal reference clock)
Position 3: TETRA multiframe
Position 4: TETRA frame
Position 5: TETRA time slot
Position 6: 2,048 MHz (G703)
Position 7: TETRA symbols

4 Clock signal selector on test connector 3

5 GPS antenna connector

6 Opening for access to the clock frequency internal reference fine tuning potentiometer for the base station

7 Keyboard and mouse connector (diagnosis mode only)

8 Reset push button - this push button is accessible using a pointed object. Launching this command triggers a restart of the software which is indicated by a tone on the restart

9 COM1 serial connector

10 RJ45 connector for LAN network

11 Video connector for local screen connection (diagnosis mode only)

(12) Location for board communications (option) or a COM4 board for network mode connection to a switch using a V11 or G703 link, or a COM S board for connection to a PABX in autonomous mode.

(13) Location for an optional DCTR board for a second diversity reception channel.

(14) DCTR operation indicators

- 14a ALIM Normally on
- 14b ACT Flashes once per second as soon as the software is running correctly
- 14c MFR Flashes at high speed (perceivable by the lessening of the brightness of the indicator) if the board is operating correctly
- 14d D1 On when a high level radio signal is received
- 14e D2 On when a block of high power radio data is received (threshold around -70dBm)
- 14f D3 Indication of the correct decoding of the TETRA block received as input
- 14g PL Local oscillator slave mode indicator (normally on) When reception frequency of the board is changing the indicator flashes briefly.

(15) UCM board operation indicators

- 15a ALIM Normally on permanently
- 15b 28V PA power supply: Normally on permanently
- 15c CTX Radio transmission indicator
- 15d PLL Transmission oscillator slave mode indicator: Normally on permanently
- 15e IO Reception of messages from the BS software indicator.
- 15f ALC Power slave mode operation indicator: normally permanently on
- 15g LINE PA linearization indicator
- 15h LOWPW Low power alarm: normally off
- 15i VSWR Too high reflected power alarm: normally off
- 15j TEMP PA temperature alarm: normally off

(16) '11111' transmission command - this push button can be accessed using a sharp object. When it is activated, the TETRA modulation signal is replaced by a series of 1 symbol which correspond to a pure radio carrier offset from the nominal frequency by +2.25 KHz - this function is used to check the frequency of a base station using an analogue radio bench.

(17) Radio input - level between - 20 dBm and - 130 dBm

(18) COM2 serial connector used to connect a local network management terminal

(19) Radio output to the PA, nominal level - 5 dBm

2.5 Handling

2.5.1 PLUG-IN MODULES

The different modules must be plugged in or removed when power is off.
Before removing a module, disconnect the eventual coaxial connections from its front face
To remove a module, first remove the screws from the four corners of the front face of the module before gently extracting it by pulling it forward using the extraction handles.

The power supply module has an auxiliary connector (mains input) which must be disconnected before completely extracting the block.

Plugging a block back in must be done gently but firmly; once the block is correctly engaged on its connector, push hard on the set to place it correctly.

2.5.2 REAR FACE

Before any interventions inside the chassis, the mains or 48V input at the rear of the chassis must be disconnected.
The rear face is removed by unscrewing the 4 screws at each corner of the rear face; the connection cables are long enough to be able to lay the face on a flat, cleared surface.

2.5.2.1 Ventilators

Access to the ventilators differs depending on whether the NeTIS is the rack version or the box version:

Rack version:
The mains power input located to the rear must be disconnected and then the rack mounting screws must be removed in order to extract the entire block from the front.

Box version:
Access to the ventilators is from the bottom: remove the screws on the sides and then lift the entire appliance; the lower part comes away.

2.6 Diagnosis / Maintenance

WARNING: placing a base station in test on a site can cause major radio disruptions both on the network on which the station is working and on the other networks in the region

(frequency change) - it is therefore strongly recommended to disconnect the base station from the antenna and to reconnect it to a load before any tests.

2.6.1 GENERAL POWER FAULTS

- No indicators on
  - Check the general fuse located to the rear on the main power input block
  - Check that there is 220V
  - Check the position of the switch located on the rear face

- If everything is correct:
  - Unplug the power supply module
  - Disconnect the auxiliary mains supply cable from the module
  - Check for 220V on this disconnected connector
  - If everything is correct: the power supply module is out of order
  - Otherwise the internal mains wiring or the switch or the mains filter are defective

- Only the 220v indicator is on, on the power supply module:
  - Unplug the power supply module
  - Power off and on again

If the indicators turn on again there is either a short circuit on a power supply, or all the circuits were put on stand-by following a general power surge

- One or mode indicators on the power supply module are off:
  - Turn off the TBS11
  - Wait for a few seconds
  - Turn the appliance back on

If the indicators are back on:

- It indicates a power overload which caused the corresponding power supply circuit to go into safety mode
- Check consumption

If the fault persists,

- Turn the appliance off and unplug all the modules using the defective voltage;
- Turn the appliance back on

If the fault persists,

- The power supply module is defective

If the fault disappears,

- Plug the removed modules back in, one by one (turning power off each time) to isolate the defective module

2.6.2 POWER FAULT ON A MODULE

The power supply indicator on the module stays off even though the 5 volt indicator is on the power supply module:

Each module has a fuse soldered to the 5 volt input, close to the 96 point Europe connector. If this fuse is broken, it is possible to replace it and closely watch when powering back on; if the fuse breaks again, the module must be returned for repair.

Some modules also have fuses on other voltages; when these fuses break it is not shown by the power supply indicator (which only indicates the presence of a +5 volt power supply).

2.6.3 SWITCH INTERFACE FAULT

The defect can come from the CPUBDT board, or from the IP link itself.

WARNING: the fault diagnosis must be carried out taking into account the settings of the degraded mode with the following cases:

- A base station not programmed for degraded mode with an interface fault ceases all radio transmission
- A base station programmed for degraded mode continues to transmit (as a TRA-2M) if there is an interface fault - the MCCH indicator is necessarily on (but the fact that it is on does not necessarily indicate a fault)

The link between the switch and the BS is managed by the CPU board; this board should always show:

- The 5 volts indicator on
- The yellow "ACT" indicator flashing slowly
- The red "INT" indicator flashing quickly
- The yellow "MCCH" indicator on if the BS is carrying the MCCH

Refer to the authentication chapter in the event of an intervention of the CPUBDT in the following cases:

- Compact flash replacement
- CPUBDT replacement
- LEVEL2 software upgrade

When the link is correctly established the base station must synchronise on the link - i.e. the 'synchro signal present' and 'lock' indicators on the module should be on.

2.6.4 CLOCK FAULT

A high number of defects can have their origin in a clock fault; they should therefore be checked systematically before any research on the other signals.

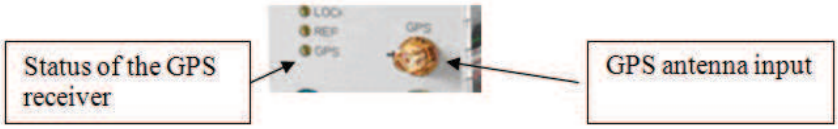
*Check according to your measurement bench:

- With a digital TETRA bench measure the frequency error at the UCM or PA output; it should be less than +-100Hz. If this is not the case, check the clocks.

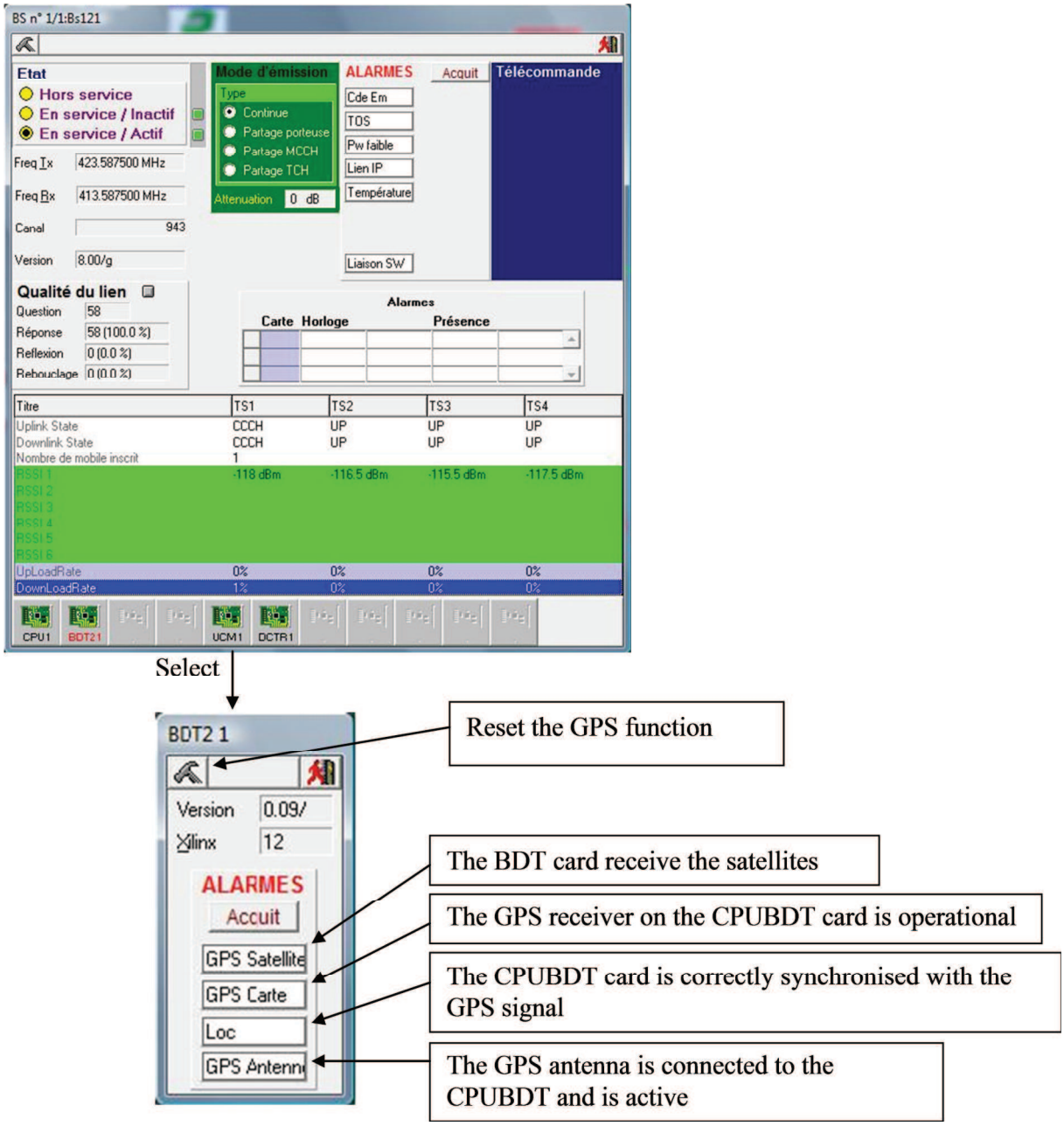
- With an analogue bench, check the frequency error at the UCM or PA output; it should be less than +-100Hz. To do this keep the 2.25 KHz test button on the face of the UCM pressed down in order to observe a pure offset carrier compared to the TX BS frequency of 2.25 KHz.

If this is not the case, check the clocks:

- If the BS is synchronised on the GPS signal, then check the rhythm of the GPS indicator on the CPUBDT board



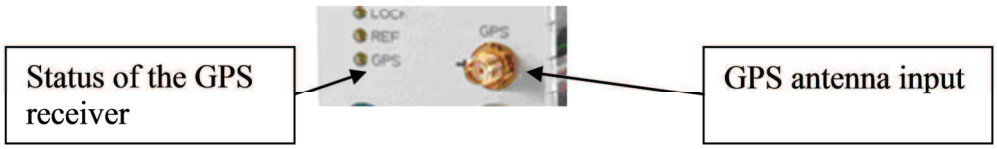
- Or consult the GPS alarms on the network management terminal by zooming on the NeTIS and then viewing the BDT status by clicking on the resource (See below)



- If the BS is synchronised on its own LO (local oscillator), then adjust the CPUBDT LO using the potentiometer on the face (small hole)

- If the BS is synchronised with a G703 link, then:
  - Adjust the remote SWITCH reference if the CPUBDT is not synchronised with an external clock source

- If the SWITCH is synchronised with the GPS, the CPUBDT receives the GPS signal; check the rhythm of the GPS indicator on the CPUBDT



The general check of the clock signals is carried out from the front face of the CPU_BDT module using the selector located on the top.

All the clock signals must be perfectly recurrent, stable and exempt from jitter.
Check in the following order:

- position 7: TETRA clock symbol 18 KHz
- position 5: clock time slot 70 Hz
- position 4: clock frame 70 / 4 Hz = 17.5
- position 3: multiframe 1.02 second (18 frames)

2.6.5 TRANSMISSION FAULT

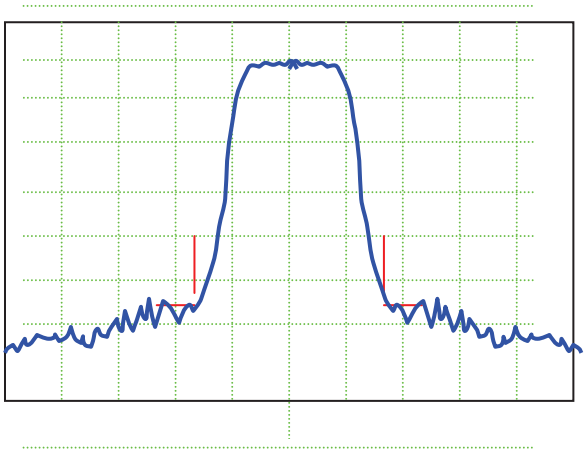
2.6.5.1 The transmission command indicator, CTX on the UCM stays off

Check that the UCM is receiving data from the central processing unit - this traffic is viewed via the IO indicator on the UCM front face which should light.
If data is being received, the UCM board is defective.
Otherwise check the central processing unit and the settings.

The transmission command indicator, CTX on the UCM is on

Measure the RF signal output from the UCM board
On a spectrum analyser the signal should have the following form:

- Central frequency Fo MHz / 10 KHz / division Fo: programmed radio frequency
- 1 KHz bandwidth
- 10dB/division



If the spectrum only shows rays or if the spectrum overshoots the 25 KHz width, the UCM board is defective
When a TETRA radio bench is available, the RF MHz signal will be analysed by the bench programmed on the RF frequency of your BS. The bench is configured as follows:

- Base station test
- Duplex test, Tx test
- RF MHz carrier
- Synchronisation acquisition on 'normal and synchro burst'
- Constellation measurement

If the bench does not synchronise, check the spectrum as indicated previously.
If the bench synchronises, it indicates the signal power and its frequency error; it should be less than +-100Hz. If this is not the case, check the clocks. (See §2.6.4)

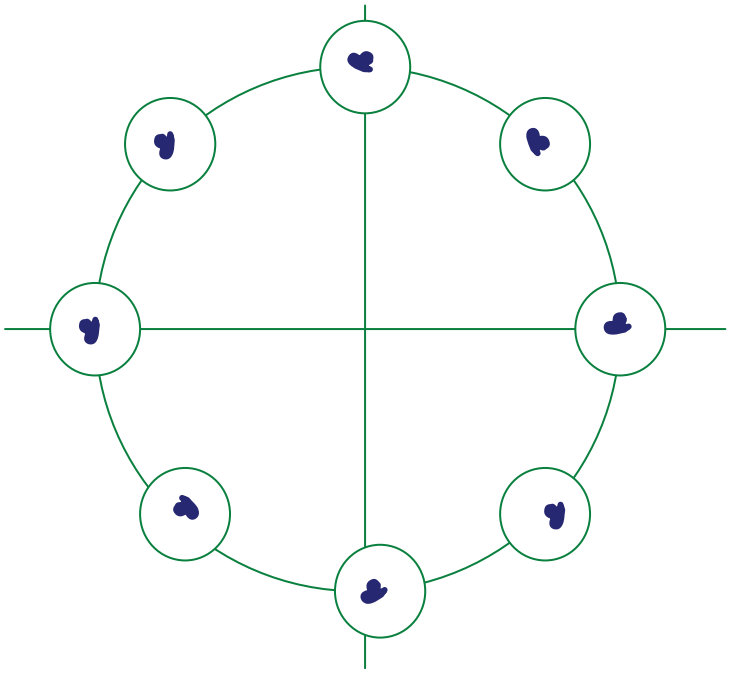
The output level of the UCM board: around - 5 dBm.
Pay attention to the power regulation from a set point supplied by the PA (Power Amplifier) which can vary this level. A check of the power of the PA output must also be carried out.

- If no significant signal is present at this level, check that the UCM frequency band is compatible with the desired value - if so the UCM module is defective.

- If the signal is correct but has a carrier on another channel, check the transmission channel programming and check the clocks; if these tests are correct, the UCM module is defective.

- If the signal is correct but on a carrier that is offset compared to the nominal value, check the clocks or the synchronisation sources.

The complete constellation must comply with the diagram below:



- If the constellation presents points that spread radially, check the level.
- If the constellation presents points that spread at a tangent, check the clocks.

2.6.5.2 Possible alarms on the transmission chain

If the TOS indicator on the UCM board is on, disconnect the antenna and replace it with a 50 Ohms load.

- If the TOS indicator switches off, check the antenna connections.

If the 'low power' indicator is on, disconnect the antenna and replace it with a 50 Ohms load.

- If the indicator stays on the PA is defective (check its power supply)
- If the indicator switches off there is probably an antenna connection problem which caused a fault on the PA

If the 'low power' indicator is off, check the signal power output from the PA.

Also check the signal spectrum output from the PA; if the 'shoulders' lift, check the level at the PA input; if this level is correct and the spectrum at this access has no lifting, the PA is defective.

2.6.6 CORRECT TRANSMISSION

2.6.6.1 The mobiles do not attempt to register

Check the network and mobile settings, especially:

- The compliance of the channel declared on both sides
- The mandatory nature or not of the registration
- The type of services provided by the BS or the system (phone, data)
- The MCC and MNC network numbers
- The mobile's authorisation on the system

2.6.6.2 The mobiles attempt to register

Place a reference mobile close to the BS receiver antenna on the site concerned in order that the receiver (or receivers for the diversity option) receive a very strong field.
If the packet detection LED on the DCTR board briefly lights (each time a packet transmitted by the mobile is received), the receiving chain is apparently correct and the fault is more likely to be found before the BS or the site concerned; otherwise the receiver chain must be checked.

Checking a receiver chain

Place a reference mobile close to the BS receiver antenna on the site concerned in order that the receiver (or receivers for the diversity option) receive a very strong field.
If the packet detection LED on the DCTR board briefly lights (each time a packet transmitted by the mobile is received), the receiving chain is apparently correct and the fault is more likely to be found before the BS or the site concerned; otherwise the receiver chain must be checked.

Preliminary checks

Connect the network management terminal in order to monitor the RSSI level (direct access to this data can also be obtained using a screen and keyboard connected to the central processing unit by launching the level measurement test (RSSI) by pressing the I key - this function is terminated by pressing the key again - the field measurements scroll permanently for each installed receiver channel). Make sure that this monitoring is correctly deactivated in order to avoid disrupting the BS.

Disconnect the input to the antenna DCTR module (or to the duplexer). The indicated RSSI level corresponds to the sound level at the input of the DCTR module; this level is normally between -120 and -126 dBm

- If the sound level increases too much when the RF input of the DCTR is reconnected, the BS is probably correct and the pollution should be looked for upstream; it can

come from a disturbance or an incorrect adjustment of a duplexer or an incorrect separation of the transmission and receiver antennas; to refine the diagnosis stop the BS transmission by disconnecting the CPU from the PA.

Checking a DCTR circuit

Connect an RF generator to the DCTR input to be tested, adjusted to the programmed nominal receiver frequency on the BS; the RSSI level indications should correspond within 3 dB to the test generator level within the range of - 20 to - 90 dBm. Further, the D1 LED of the DCTR module lights progressively as the generator level exceeds - 70 dBm. Several faults can be detected at this level:

- The viewed RSSI level is weak and almost constant whatever the generator level; check the programmed receiver channel, check that the DCTR module is compatible with the frequency band, find out if it is responding on a neighbouring carrier; check the DCTR module
- The viewed RSSI level varies correctly either at a weak level (- 90 to - 50 dBm), or at a strong level (- 50 to - 20 dBm) but not over the entire range: the DCTR module is defective
- The viewed RSSI level varies correctly at a weak level but varies at levels greater than - 40 dBm and the D1 LED does not light, the DCTR module is defective
- The viewed RSSI level varies correctly at a strong level but not at a weak level although the noise levels are correct: the DCTR module is probably defective, it should be checked

2.6.7 CONFLICTS BETWEEN NMT ALARMS AND LED OF BS

If there are different alarms on NMT for the same base station concerning VSWR, PA or Tx and the LEDs on the base station do not correspond to this, that's means that there is an issue with the power alimentation of each board. In this case, the LED (+30v) on the supply board is very weak or off.

1 – switch off the base station
2 – disconnect on the PA board (rear of the rack), supply cable (2 pins, green connector)
3 – disconnect the alarm connector (SubD 15pins)
4 – start the base station

If the LED +30v is ok, exchange the PA module
If the LED is still not working, exchange the main supply board
If both are not ok, check the different wire of supply

3. NeTIS-N

3.1 Presentation of the switch

Each switch has the following modules:

- Power supply (ALIM)
- CPU (CPUBDT)
- IP phone sequencing board (SUPIP)
- one or more communications boards (COM3 or 4) for the connection of the switch to remote sites
- one or more communications boards (COM3 or 4) for the connection of the switch to the PABXs
- one or more CCT boards (CODEC)
- one or more COMS boards for S0 link management

3.1.1 NUMBER OF COM 3 OR 4 BOARDS

COM boards used for PABXs

- One Com board for the same T2 access should support 30 simultaneous communications

COM boards used for radio sites: the number depends on the style of network:

- Ring network
- Star network
- IP network => no need for boards

3.1.2 NUMBER OF CODEC BOARD (CCT)

There should be as many CODECs as there are simultaneous phone communications exiting the TETRA world.

One CCT board supports up to 16 CODECs.

The phone communications exiting the TETRA world are:

- Mobile to telephone and telephone to mobile communications
- Mobile group to telephone and telephone to mobile group communications
- Dispatching to mobile and mobile to dispatching communications
- Mobile group to dispatching and dispatching to mobile group communications
- Mobile(s)/Mobile(s) communications listened to by dispatching

On the other hand, communications routed to another switch are not considered as exiting the TETRA world (however they need a CODEC channel if they are to be listened to by a local dispatching or if the telephone is a third party).

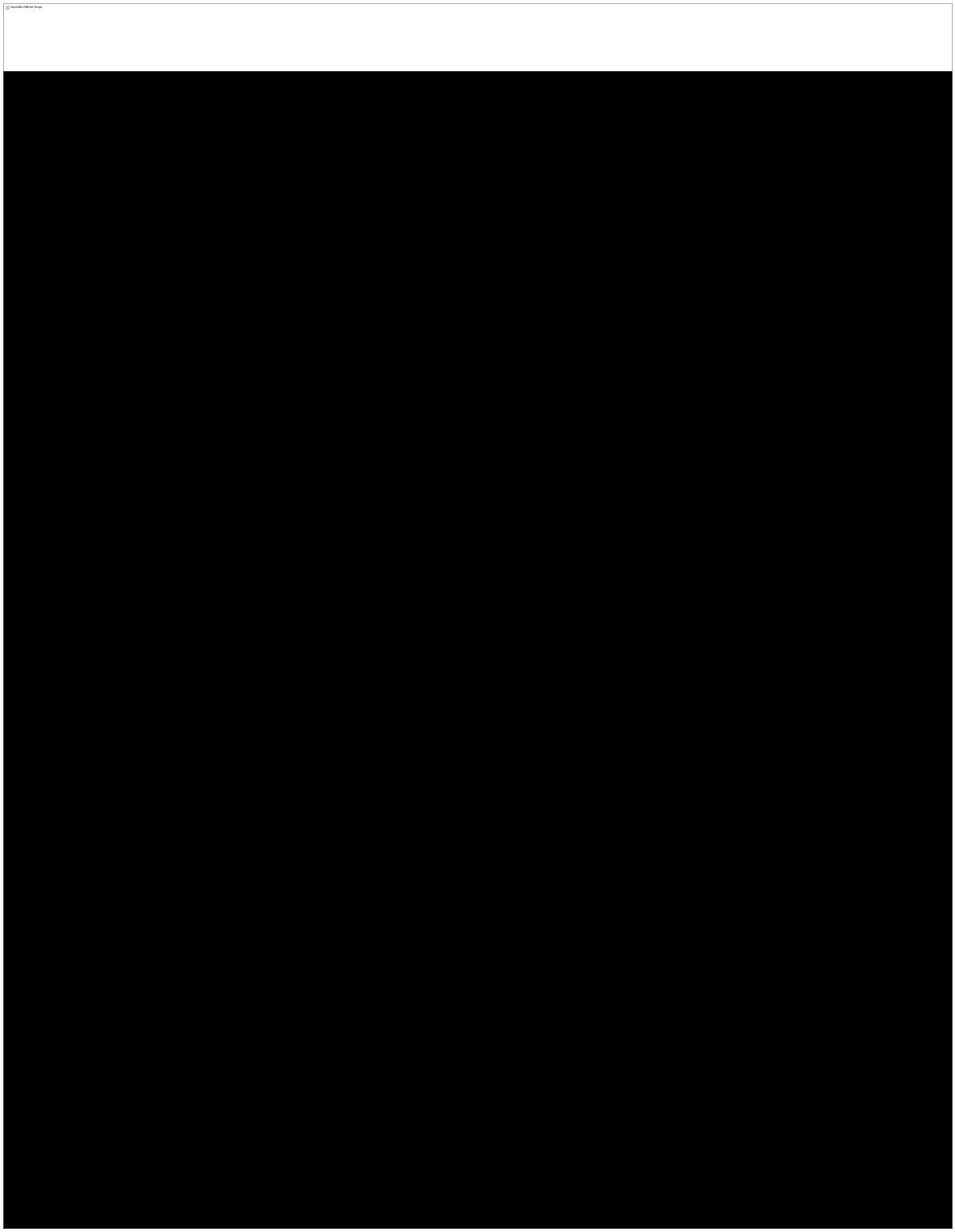
The photo on the following page gives the position of the different boards in the chassis and the meaning of the indicators and their statuses during normal operation.

3.1.3 NUMBER OF COMS BOARDS

The COMS board gives the possibility of having a S0 or T0 type phone connection.
This type of link carries 1 signal channel (D) and 2 phone channels 'B).

This board is therefore adapted to a small network wishing to limit resources dedicated to phone communications (max. 2) and the cost of the access to the phone network.

The T0 or S0 access is processed in compliance with the VN4 and VN5 specifications of the EURO-RNIS network



3.2 Launching

When powering on, the power supply indicators light and the time base board operates immediately with the lighting of the following indicators:

- TFB "synchronisation signal presence" if a synchronisation signal is configured and present,
- LOC indicating the internal reference oscillator is correctly locked.

The CPU board initialises and loads its resident flash disk software; this software is then launched with:

1. The survey of available resources (COM and CCT boards).
2. The loading of the configuration for all the switch boards.

At this time the link with the network management terminal is established and the standby screen for the network management terminal displays the representation of the link with the switch in green.

The switch detects the presence of the base stations and uploads their configuration; each base station successfully uploaded is declared available in the resources and the representation of the link with them on the standby screen of the network management terminal changes to green.
The traffic with the base station is established and it starts radio transmission.
If it is selected to carry the site MCCH, the 'broadcast' data is transmitted and mobiles can register.

As soon as the SUPIP board is initialised it transmits synchronisation packets on the IP network (rhythm of about 30 milliseconds).

When a COM board is programmed as a T2 interface with a switchboard, it transmits connection data and, as soon as it receives data, the switch declares the resource as available - the link representing this connection changes to green on the standby screen of the network management terminal .

3.3 Normal operations

During normal operation the state of the indicators is as shown in the table below:

Board	Indicators	state
ALIM	220v	On
	28v	On
	12v	On
	5v	On
	-12V	On
CPUBDT	+ 5v	On
	TLY	Slow flashing
	LOC	Off
	TFR	Off
	+ 5v	On
	INT	Fast flashing
	ACT	Slow flashing
	MCCH	On for the active switch
SUPIP	+ 5v	On
	INT	Fast flashing
	ACT	Flashing if phone traffic (reception of phone blocks)
CCT2	+ 5 v	On
	MFR	Slow flashing
	D1	Off / flashes during communications (reception of phone blocks) - odd channels
	D2	Off / flashes during communications (reception of phone blocks) - even channels
COM3 or COM4 Site communication mode COM3 Site communication mode	+ 5v	On
	ACT	Slow flashing
	RX A	On = Frame locked in G703 or clock presence in V11 flashes if star network fixed if ring network
	ERR A	Off – bit error in G703
	RX B	
	ERR B	On if no link
COM3 or COM 4 T2 mode	+ 5v	On
	ACT	Slow flashing
	RX A	On = Frame locked in G703
	ERR A	On
	RX B	Off
	ERR B	Off
COM S0	+ 5v	On
	ACT	Slow flashing
	RX	On = synchronisation with remote equipment
	B1	On during communication
	B2	On during communication

3.4 Removing subsets

3.4.1 PLUG-IN MODULES

The different modules must be plugged in or removed when power is off.
Before removing a module, disconnect the eventual coaxial connections from its front face.
To remove a module, first remove the screws from the four corners of the front face of the module before gently extracting it by pulling it forward using the extraction handles.
Before any interventions inside the chassis, the mains or 48V input at the rear of the chassis must be disconnected.

The power supply module has an auxiliary connector (mains input) which must be disconnected before completely extracting the block.

Plugging a block back in must be done gently but firmly; once the block is correctly engaged on its connector, push hard on the set to place it correctly.

3.4.2 REAR FACE

The rear face is removed by unscrewing the 4 screws at each corner of the rear face; the connection cables are long enough to be able to lay the face on a flat, cleared surface.

3.4.3 VENTILATORS

Access to the ventilators differs depending on the rack or box versions: for the rack version, the mains power input located to the rear must be disconnected and then the rack mounting screws must be removed in order to extract the entire block from the front.
In the box version, access to the ventilators is from the bottom: remove the screws on the sides and then lift the entire appliance; the lower part comes away.

3.5 Diagnosis and maintenance

WARNING: putting a switch in test mode can cause major radio disturbances both on the network on which the station is working and on other networks in the region (frequency changes) - it is therefore strongly recommended to disconnect the base stations before any tests

3.5.1 GENERAL POWER FAULT

No indicators on:

- Check the general fuse located to the rear on the main power input block
- Check that there is 220V
- Check the position of the switch located on the rear face

If everything is correct:

- Unplug the power supply module
- Disconnect the auxiliary mains supply cable from the module
- Check for 220V on this disconnected connector
- If everything is correct: the power supply module is out of order
- Otherwise the internal mains wiring or the switch or the mains filter are defective

Only the 220v indicator is on the power supply module:

- Unplug the power supply module
- Power off and on again

If the indicators turn on again there is either a short circuit on a power supply, or all the circuits were put on stand-by following a general power surge.

One or mode indicators on the power supply module are off:

- Turn off the switch
- Wait for a few seconds
- Turn the appliance back on

If the indicators are back on: it was a power overload that caused the corresponding power circuit to switch to safety mode, check consumption

If the fault persists, turn the appliance off and unplug all the modules using the defective voltage;

- Turn the appliance back on

If the fault persists, the power supply module is defective.
If the fault disappears, plug in the removed modules one by one (powering off between each one) in order to isolate the defective module

3.5.2 POWER FAULT ON MODULE

The power supply indicator on the module stays off even though the 5 volt indicator is on the power supply module:

Each module has a fuse soldered to the 5 volt input, close to the 96 point Europe connector. If this fuse is broken, it is possible to replace it and closely watch when powering back on; if the fuse breaks again, the module must be returned for repair.

Some modules also have fuses on other voltages; when these fuses break it is not shown by the power supply indicator (which only indicates the presence of a +5 volt power supply).

3.5.3 CLOCK FAULT

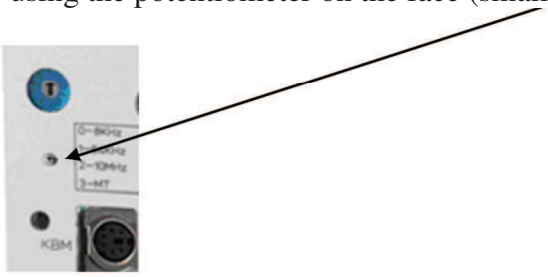
A high number of defects can have their origin in a clock fault; they should therefore be checked systematically before any research on the other signals.
*Check on one BS in the network depending on your measuring bench:

- With a digital TETRA bench measure the frequency error at the UCM or PA output; it should be less than +-100Hz. If this is not the case, check the clocks.
- With an analogue bench, check the frequency error at the UCM or PA output; it should be less than +-100Hz. To do this keep the 2.25 KHz test button on the face of the UCM pressed down in order to observe a pure offset carrier compared to the TX BS frequency of 2.25 KHz.

If this is not the case, check the clocks:

-If the SWITCH is synchronised on the GPS signal, then check the rhythm of the GPS indicator on the CPUBDT board of the SWITCH

-If the SWITCH is synchronised on its own LO (local oscillator), then adjust the CPUBDT LO using the potentiometer on the face (small hole)



The general check of the clock signals is carried out from the front face of the CPU_BDT module using the selector located on the top.

All the clock signals must be perfectly recurrent, stable and exempt from jitter.
Check in the following order:

- Position 7: TETRA clock symbol 18 KHz
- Position 5: clock time slot 70 Hz
- Position 4: clock frame 70 / 4 Hz = 17.5
- Position 3: multiframe 1.02 second (18 frames)

4. NETWORK FAILURE SCENARIOS

4.1 None of the network equipment is operational

The standby screen on the network management terminal indicates that the switch is no longer connected.
The base stations are not transmitting or are in degraded mode.
The dispatching stations are no longer operational.
Telephone access is no longer operational.

First check the position of the switching unit if the installation has one. If everything is normal the fault probably originates from the CPU board. Reset it by pushing a pointed object into the hole on the front face of the CPU board.

If, after the reset, everything seems to operate correctly, check that the link with the service network management terminal is correct (view the network management terminal's standby screen). If the installation has a switch unit, check its correct operation because the switch may have occurred - this test is carried out by cutting the junction on the COM2 port of the active switch with the switch unit (the other switch must, of course, be operational for the test).

If the installation does not seem to start up, connect a VGA screen to the front face of the CPU board and check its indications after resetting. The software loading and programme launch steps are indicated. After the software is loaded, indications are given of the resources detected by the CPU board - check that the displayed resources correspond to the various boards located in the chassis. If the run fails, carry out software reload.

If the problem comes from the non-loading of the OS, change the flash board and reconfigure the network

If, after re launch, the service console indicates that the switch connection is correct, refer to the following case where only the network management terminal is operational on the network. Otherwise, after checking the correct operation of the network management terminal and the link, change the CPU board.

4.2 The network management terminal (NeTIS-M) is the only operational equipment on the network

The network management terminal's *standby screen shows that the switch is connected and that no other equipment is connected (base station, telephone) or these indications are random.*
The base stations are not transmitting or are in degraded mode.
The dispatching stations are no longer operational.
Telephone access is no longer operational.

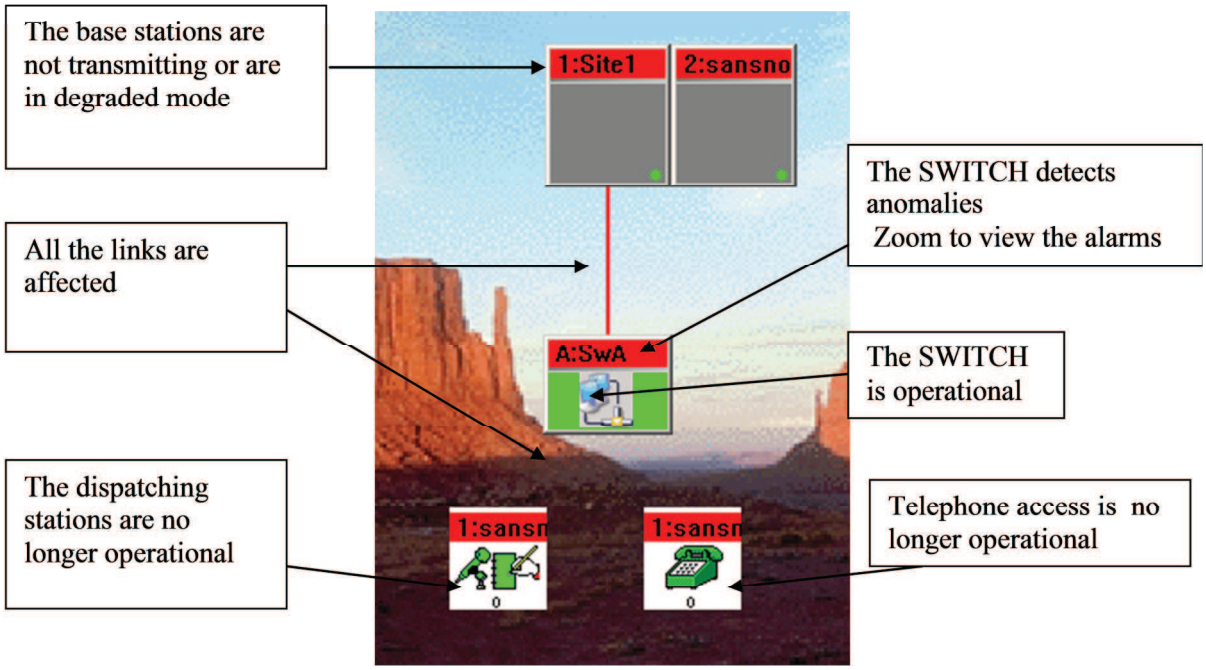
This is probably a fault in the CPU board, or a problem with the switch internal bus; in order to find out, disconnect the switch extension unit if it has one and reset the CPU board:

- If all the resources connected to the main switch unit are operational again, the fault comes from the extension (or the cable connecting it)
- Otherwise remove all the communications boards, the codec boards and the SUPIP board from the chassis. Reset the CPU board and check that it detects no resources (except for the time base board); reconnect a communications board and check that it is detected; if it is not detected, the CPU board is defective.
- If the resource is detected, continue reconnecting the boards one by one and check each time that they are detected correctly. If a board is not detected or is detected with a wrong location number, that board is defective and may have caused a major disturbance to the entire equipment.

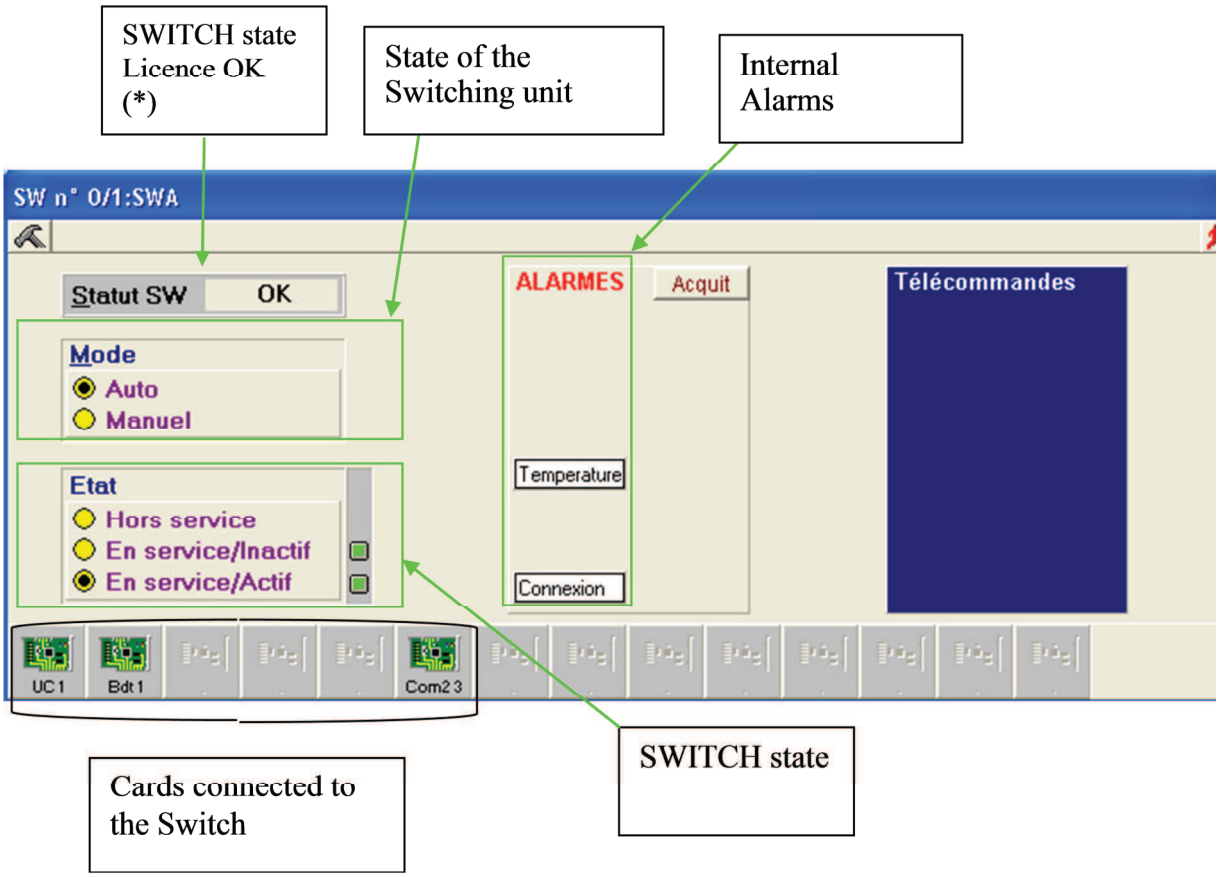
4.3 No equipment on the network is operational except for the network management terminal (NeTIS-M) which

indicates that switch is operational and all the BSs out of order

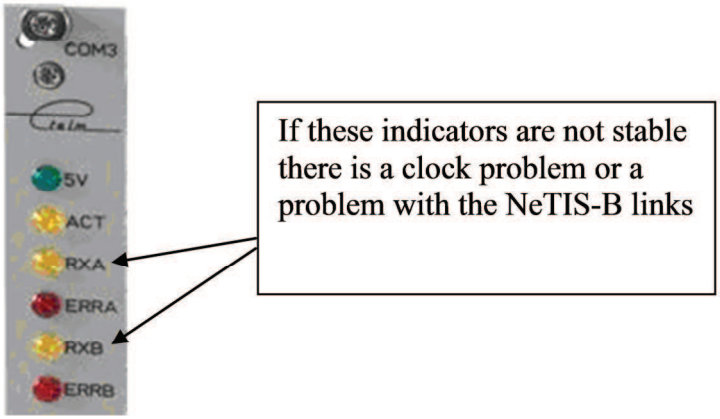
The network management terminal's standby screen shows that the switch is connected and that no other equipment is connected (base station, telephone ...) or these indications are random.



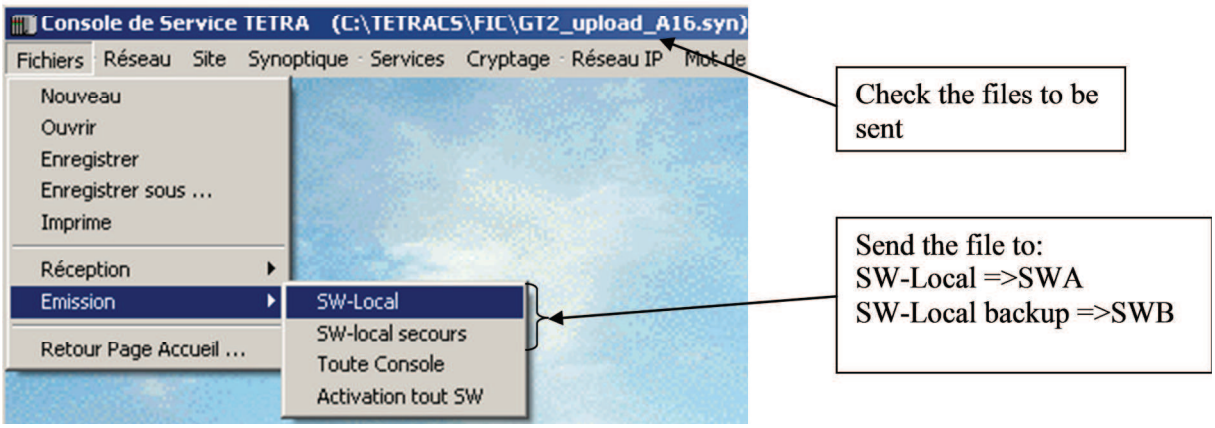
The resources are correctly detected by the CPU



Check the state of the 'Rx' and 'ERR' indicators on the communications boards (COM)



If all the indicators are in a normal state, the problem comes from a resource assignment error
Reload the equipment configuration file from the network management terminal (download).



4.4 BSs answer correctly on the NMT, but mobiles do not register onto the network.

The base stations reply normally to a 'zoom' request from the service network management terminal.
Mobiles do not register into the network.
In the event file there are no mobile registrations; the messages below cannot be found in the log.

23-02-11	15:04:27	A	Inscr MS:00175051 BS:sansnom/02 accepté (démarrage)
23-02-11	15:04:28	A	AssGr MS:00175051

In this specific case there is necessarily a problem on the site due to the absence of registration.