Trend aurora[Profi]

S-Bus Tester

User Guide

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Introducing aurora[Profi]

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aurora[Profi] allows you to test S-Bus wiring and measure the S-Bus supply voltage and termination resistance on Basic Rate ISDN installations. You can use it to test newly connected sockets before closing them, and also to test ISDN telephone lines.

About the tests

Begin testing at the NT or the nearest socket. Connect to each socket in turn and run aurora[Profi]'s test sequence—four tests which follow each other automatically.

- **Self Test**
  Tests the operation of aurora[Profi]'s LED indicators and the condition of its battery.
- **Step 1: S-Bus Supply Voltage Check**
  Measures and displays the S-bus feed voltage and detects any short-circuits and line breaks.
- **Step 2: Termination Resistance/Short Circuit Check**
  Displays the termination resistor values, determines whether the values are correct, identifies any resistors which are incorrectly installed and detects any short circuits.
- **Step 3: Wiring Check**
  Detects all possible crossed wire combinations, any interchanged wires in a line pair and up to two line breaks.

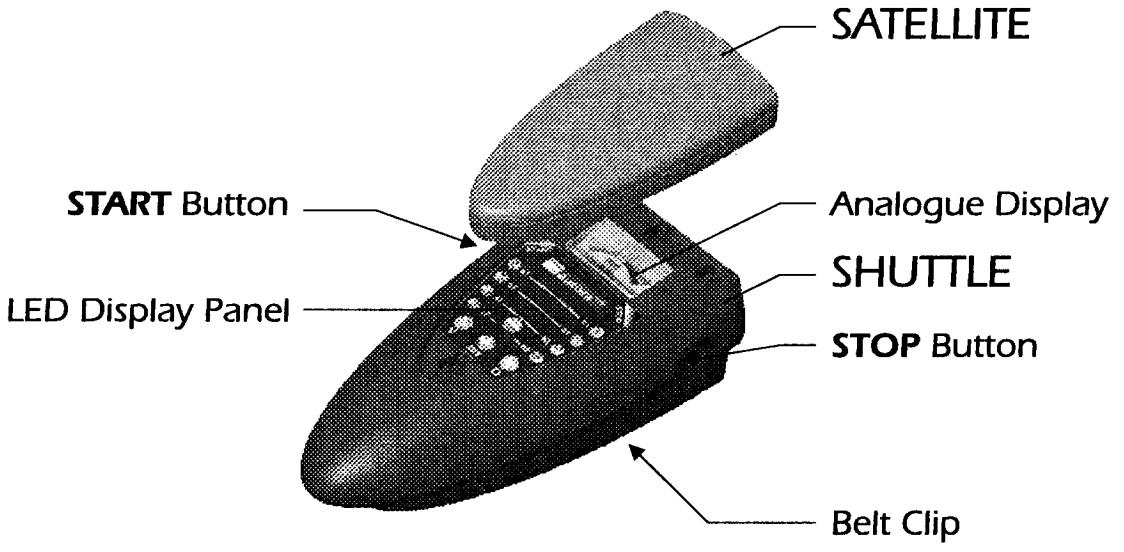
If aurora[Profi] detects a fault during the Termination Resistance/Short Circuit or Wiring check, the sequence stops, allowing you to correct the fault and start again. When the whole test sequence runs successfully, you can move on to the next socket.

Note

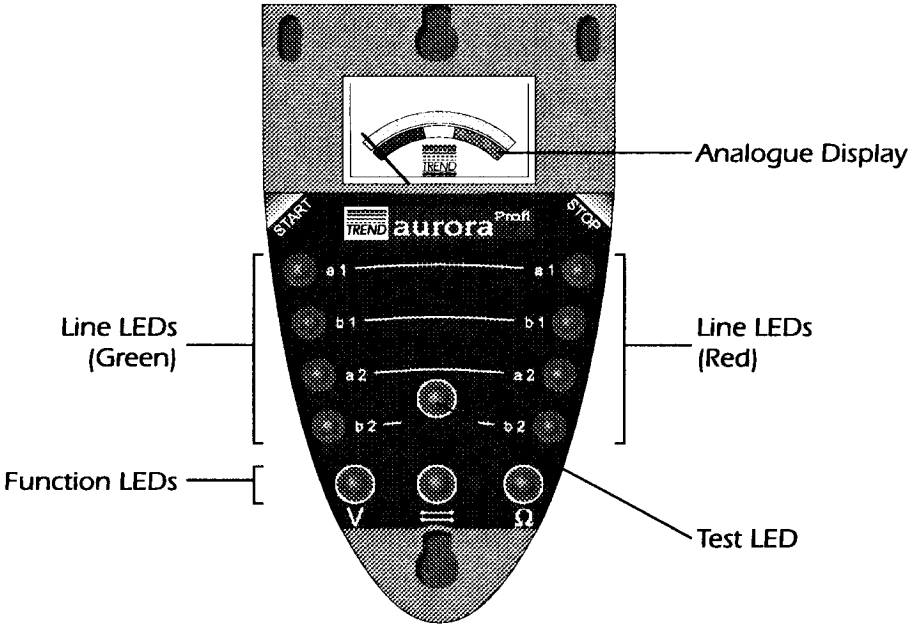
You can perform the tests with or without an associated NT, but you can only measure termination resistance when the supply voltage has been removed—i.e. without the NT.

A look at aurora^{Profi}

aurora^{Profi} consists of a 'shuttle' unit and a 'satellite' unit. It comes with two RJ45 ISDN interface cables to connect the shuttle and satellite to the ISDN sockets.



How aurora^{Profi} shows information



TEST LED

The **TEST** LED indicates that aurora^{Profi} is running a self test—see the section titled *Self test* in Chapter 2.

Function LEDs

After the self test, each subsequent test step has an associated Function LED which flashes red while that step is in progress.

- **V** S bus supply voltage
- **Ω** Termination resistance
- ⁝⁝ Crossed or broken wires

When each test has completed successfully, its Function LED shows steady green while the results are displayed. When a fault is detected the LED shows steady red and aurora^{Profi} automatically stops testing.

Line LEDs

The Line LEDs show which circuit is currently being tested and indicate the location of any faults. There are four sets—***a1***, ***a2***, ***b1*** and ***b2***, corresponding to the four wires. Each has a red and a green LED.

The following table defines the naming, function and RJ-45 pin number of each of the four circuits:

Name	Function	RJ-45 Pin Number
a1	Rx-	4
b1	Rx+	5
a2	Tx-	3
b2	Tx+	6

The colours, combinations and sequence in which the line LEDs light up tell you which circuit is being tested, whether any faults are present and the type of fault that exists.

Analogue display

Displays the supply voltage for the S-bus, also termination resistance, short circuits and battery self-check.

START button

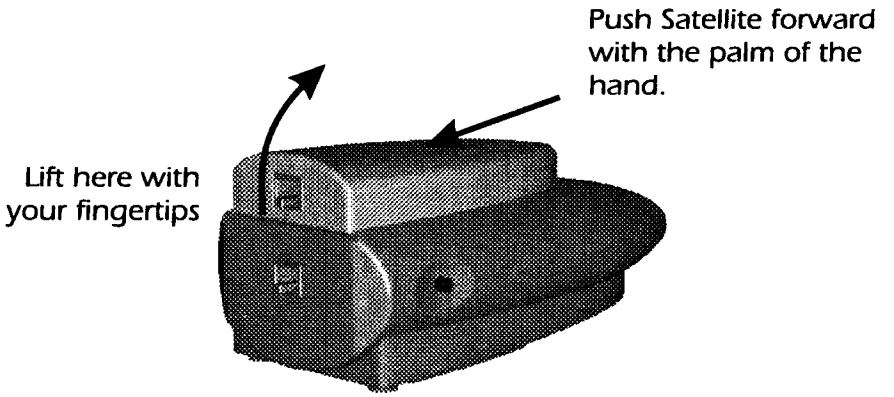
The *START* button is held depressed all the time during the tests.

STOP button

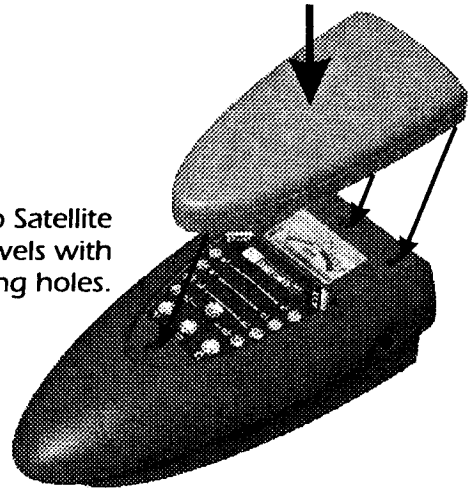
The *STOP* button is pressed to pause the test sequence when resistance or wiring check results are being displayed.

Removing and replacing the satellite

To remove the satellite from the shuttle, first place the unit on a firm surface.



To re-attach the satellite:



Changing the battery

aurora[Profi] is powered by a 1.5V (Type AA) battery.

The battery compartment is on the base of the shuttle. To open it, push each latch in turn in the direction of the arrow and lift the compartment cover.

Note

Always observe the battery polarity indicated on the unit.

To close the battery compartment, press the cover down until the latches click into place.

Supplied with aurora[Profi]

- Two RJ45—RJ45 cables
- User Guide
- 1.5V (Type AA) battery
- Carrying case (optional)

Technical information

Voltage/current levels

Maximum permitted voltage measurement: 100V

Maximum current rating: approx. 210mA

Power

Shuttle power requirement: 1.5V battery (Type AA)

Approx. 12 hrs maximum (continuous use)

Environment

Operating temperature: 0 to+50°C

Storage temperature: -25°C to +75°C

Dimensions (mm)

Shuttle: 90 (w) x 180 (l) x 55 (d)

Satellite: 62 (w) x 118 (l) x 28 (d)

Weight

Shuttle: 267g incl. battery

Satellite: 72g

Testing with aurora^{Profi}

Before you start, disconnect all terminal equipment from the ISDN sockets. Connected equipment may cause aurora^{Profi} to wrongly detect a short circuit.

Self test

When you first switch on aurora^{Profi} by pressing the **START** button, it carries out a self test. During this test, the **TEST** LED shows red. All the Line LEDs light up to show that they are working properly.

Note

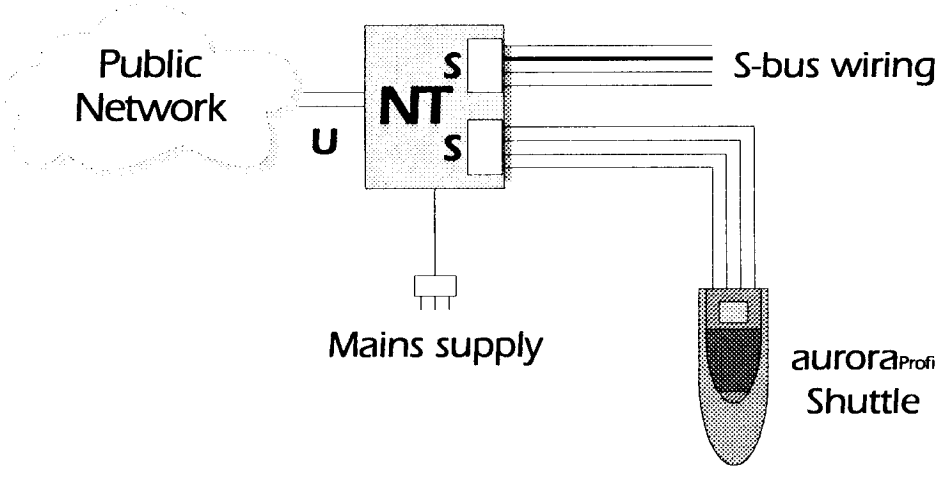
Check the battery indicator on the analogue display. If it lies outside the green area during the self test, you need to replace the battery.

Preliminary tests (direct at the NT)

Before you start connecting to sockets and running the test sequence, connect directly to the NT and check the S-bus supply voltage and whether the NT is operating under normal or restricted power. You can then compare these results with the results obtained when you connect to the sockets.

-1- Connect the shuttle directly to the NT (you do not use the satellite at this stage).

Most NTs are equipped with two 'S' sockets. One of these can be left connected to the S-bus wiring during this test. Connect the shuttle to the other. If there is only one socket, the S-bus wiring needs to be unplugged and the socket used for the shuttle for this test.



-2- Press and hold the ***START*** button.

-3- During the voltage test, the *V* LED flashes red.

-4- When the test is complete the *V* LED lights steady *red* or *green*, while the results are displayed.

-5- The test sequence then continues, but the remaining tests are not relevant at this stage.

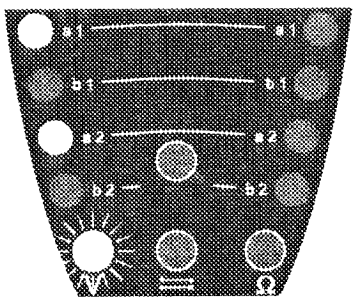
Results of the direct test

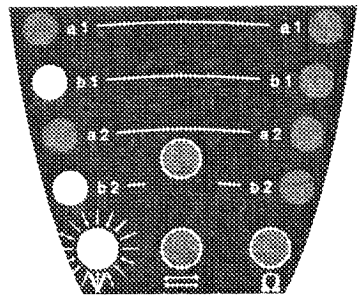
aurora[Profi] measures and displays the voltage on the S bus between wires a1 and a2 and between wires b1 and b2. It also indicates whether the NT is operating with normal or restricted power, by lighting up the Line LEDs.

When the test has completed successfully, the analogue display shows the S-bus supply voltage.

NT operating normally

The green ***a1*** and ***a2*** LEDs light up, then the green ***b1*** and ***b2*** LEDs, then the sequence repeats.

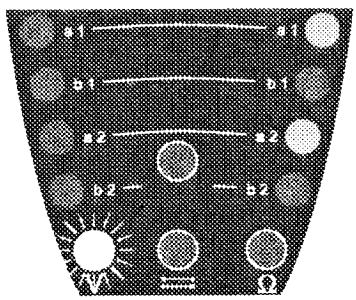


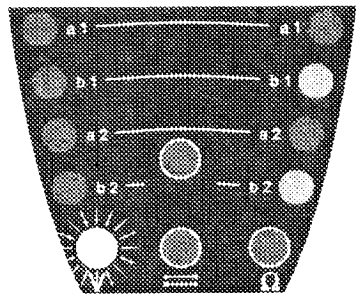


As each pair of LEDs lights up, the analogue display shows the S-bus voltage for that pair of wires. During normal operation, a voltage of 40V should be measured across ***a1—a2*** and ***b1—b2***.

NT operating with restricted power feed

The red ***a1*** and ***a2*** LEDs light up, then the green ***b1*** and ***b2*** LEDs, then the sequence repeats.





As each pair of LEDs lights up, the analogue display shows the S-bus voltage for that pair of wires.

Fault indicators

V *LED shows steady red*

The S-bus supply voltage may be being loaded—for example, because the termination resistors are wrongly connected, or short circuits are present.

-1- Disconnect the S-bus from the NT.

-2- Press and hold the ***START*** button to repeat the test without the S-bus wiring connected, to check if the fault is in the wiring or the NT.

The main test sequence

When you have measured the S-bus voltage and checked NT operation direct at the NT, you can connect to the first socket and begin the main test sequence.

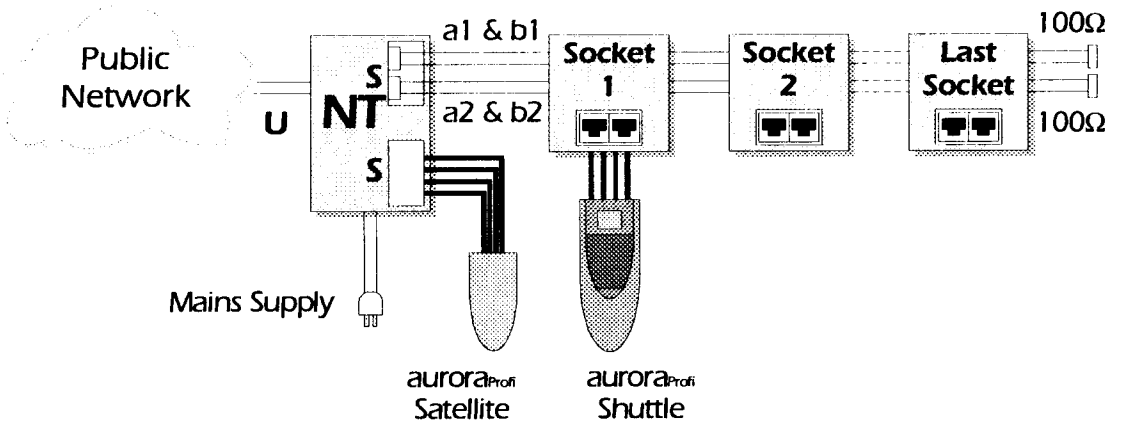
The test sequence consists of the following steps:

- S-bus supply voltage check
- Termination resistance/short circuit check
- Wiring check

To run the sequence:

-1- Use the supplied ISDN cables to connect the satellite to the NT and the shuttle to the first ISDN socket.

If the NT is eqipped with two 'S' sockets, the S-bus wiring can be left connected to one of these, and the sattellite is connected to the other. If there is only one socket, use an RJ-45 'T'-piece to provide two sockets.



-2- Press and hold the *START* button.

Keep the *START* button pressed down throughout the rest of the test sequence.

Step 1: S-bus supply voltage check

During this test, the **V** LED flashes red.

The results of this test are displayed in the same way as when you connected aurora^{Profi} directly to the NT. For details, see *Preliminary tests (direct at the NT)* earlier in this chapter.

If there are no errors, the displayed voltage should be the same as the voltage measured directly at the NT.

Fault indicators

V *LED shows steady red*

The S-bus supply voltage may be being loaded—for example, because the termination resistors are wrongly connected, or short circuits are present.

Check the wiring, correct any faults found, then repeat the test.

Step 2: Termination Resistance/Short circuit check

During this test, the **Ω** LED flashes red.

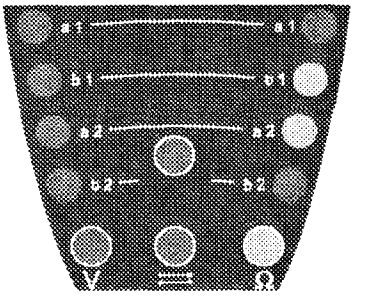
Note

Remember: if any terminal equipment is connected to the ISDN sockets, aurora^{Profi} may wrongly detect a short circuit.

Fault indicators

Ω *LED shows steady red: analogue display around 0Ω*

aurora^{Profi} has detected a short circuit and the test automatically stops. The Line LEDs indicate the wires between which there is a short circuit. In the example below, there is a short circuit between wires b1 and a2.



-1- Disconnect the shorted wires to the next socket (i.e. break the line).

-2- Restart the test by pressing and holding the **START** button.

Warning: Voltage on the S-bus
40V is present on the S-bus while the NT is connected.

If the short circuit persists

If the short circuit remains after you disconnect the wires to the next socket, it must exist in a previous line segment (between the shuttle and the satellite).

-1- Eliminate the short circuit (e.g. on the connectors), or replace the cable.

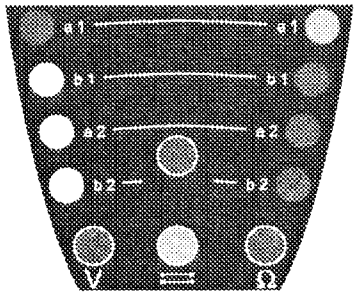
If the short circuit is now clear, it must exist in the disconnected cable. You can then reconnect the line to the succeeding sockets.

Step 3: Wiring check

During this test, the ⋮⋮ LED flashes red. When the test is complete, the ⋮⋮ LED lights steady red or green and the results are displayed.

Broken wires

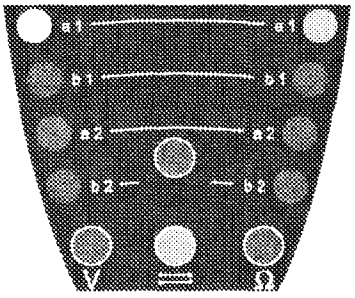
When aurora^{Profi} detects a broken line, the appropriate Line LEDs light up red. In the example below, line ***a1*** is broken.



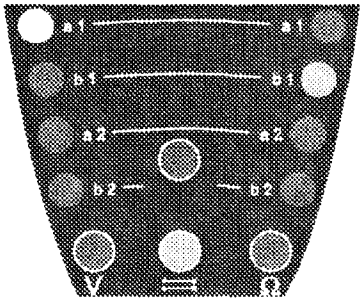
Crossed wires

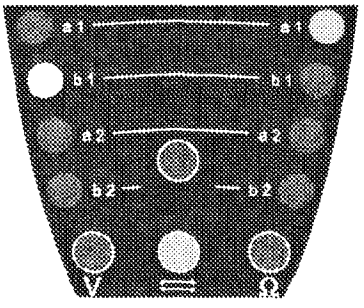
aurora^{Profi} indicates crossed wires between the shuttle and the satellite. Because you connect the shuttle at every socket, you can determine immediately which socket you need to open to fix the wire crossing.

When the lines are not crossed, the red and green Line LEDs light up for each line in turn, starting with ***a1***.



When aurora^{Profi} detects that lines are crossed, the Line LEDs for each of the crossed lines flash alternately red and green. In the example below, lines ***a1*** and ***b1*** are crossed.





The ***a1*** LED flashes green while ***b1*** flashes red, then ***a1*** flashes red while ***b1*** flashes green.

Tip

You can pause the current LED display by pressing and holding the ***STOP*** button while keeping ***START*** pressed down. To continue, release the ***STOP*** button.

When the test sequence is complete on a socket

When aurora^{Profi} has completed the test sequence on the first socket, release the START button.

-1- Connect the shuttle to the next socket (keep the satellite connected to the NT) and re-run the test sequence.

Note

On a Y-configuration (see Chapter 3), you need to test the two separate branches, starting from the NT.

-2- Continue testing until the last socket has been tested. Remember that on a 'Y-configuration' (see Chapter 3) there are two end sockets—left and right.

Measuring the termination resistance

When the last socket has been tested:

-1- Remove the power supply from the S-bus by breaking the connection between the NT and the S-bus wiring.

-2- Plug the shuttle into any ISDN socket.

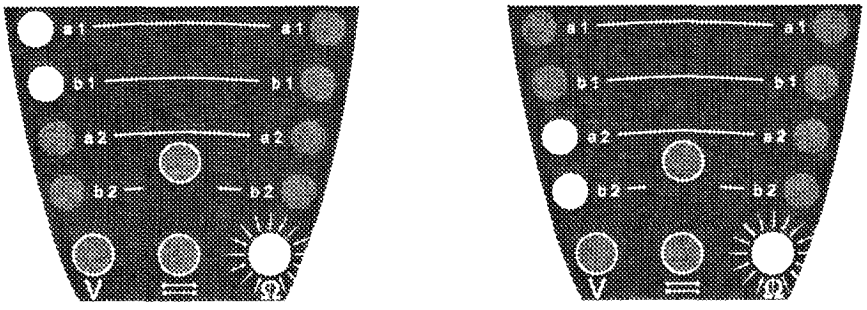
Note

This test only determines the lines between which the termination resistors are connected—it does not confirm that they are fitted to the correct socket. On an ISDN installation, they should be connected to the last socket or, in a Y-configuration, to both the left and right sides.

-3- Press and hold the **START** button to begin the test.

During the test, the **Ω** LED flashes red.

When the test has completed successfully, aurora^{Profi} indicates the lines between which the resistors are connected with green Line LEDs. When correctly installed, resistors are present between a1 and b1 and between a2 and b2.



The LED display alternates between the two connections: in the above example, first a1 and b1 flash green, then a2 and b2.

The analogue display shows the resistance value. For a standard point-to-multipoint configuration the value should be about 100Ω. On a Y-configuration (see Chapter 3) it should be about 50Ω.

If aurora^{Profi} detects only one resistor or no resistors, check the last socket to make sure the appropriate resistors are present and insert them if missing. Remember that on a Y-configuration there are two end sockets—left and right.

When you have finished testing

-1- Disconnect the satellite and shuttle.

-2- Reconnect the S-bus to the NT.

If you wish, you can now connect another tester—for example, a Trend aurora^{Plus}, to test service availability, check the setup of Layers 1 to 3, test bit error rates and so on.

-3- Reconnect all terminal units.

Connecting ISDN Units

3

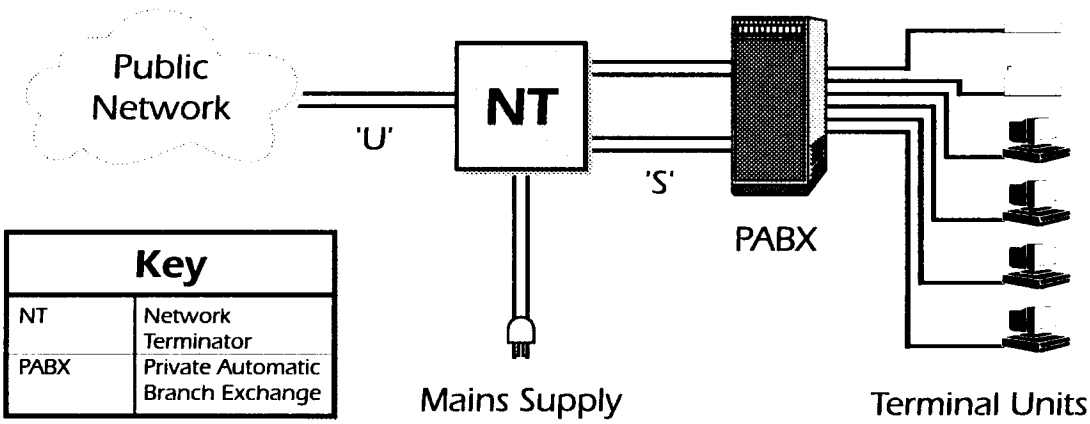
This chapter gives a short explanation of the various methods of connecting ISDN units, to help you understand the measurement results provided by aurora[Profi]. It covers the most commonly used types of ISDN connections.

As a rule, on a basic access, the public network provides a copper wire U interface leading on to the network access (NT).

Essentially there are two different types of access for ISDN terminal units:

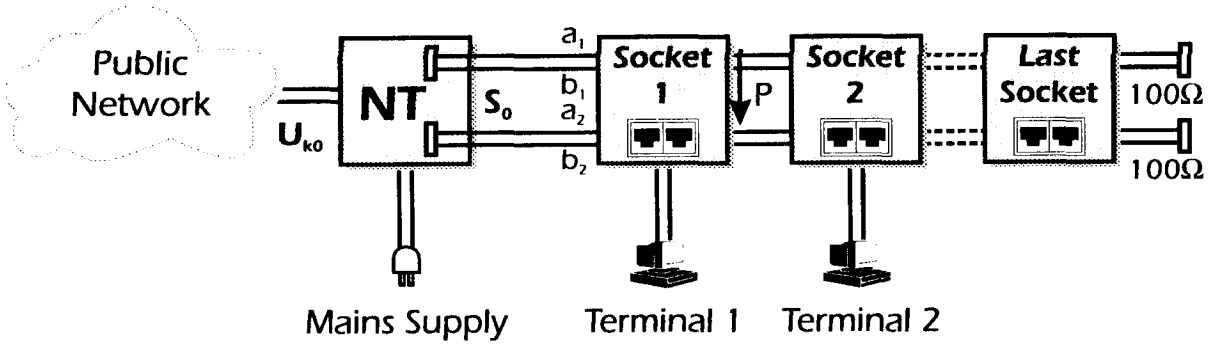
- point-to-point
- point-to-multipoint

Point-to-point access



Individual units (telephone, fax, modem, etc.) are connected to the PABX.

Point-to-multipoint access



Up to 12 ISDN sockets may be installed on a single S-bus, and up to 8 terminals may be connected.

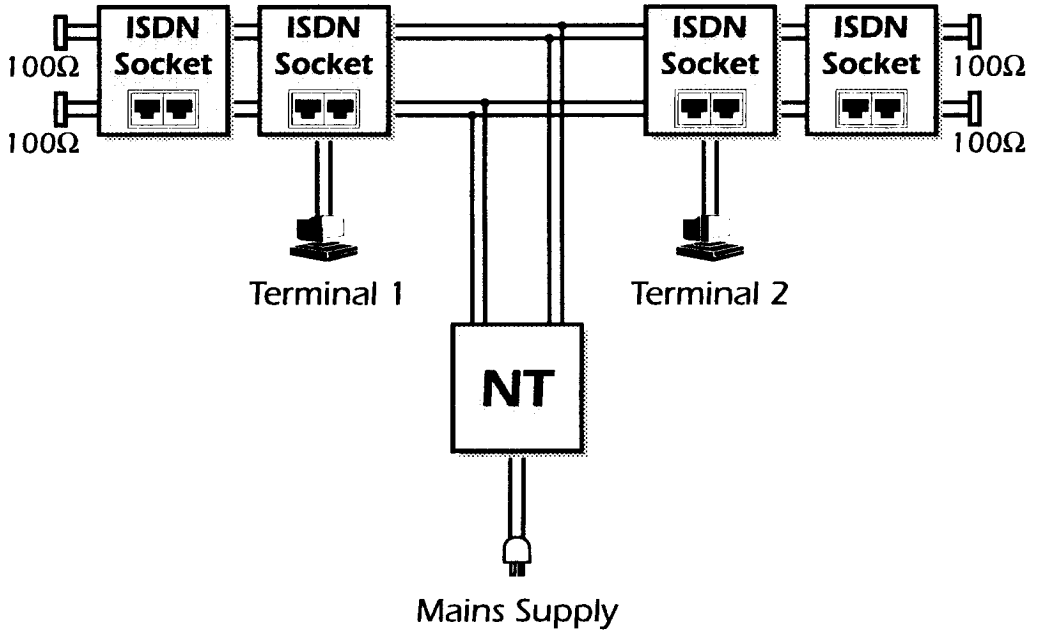
The NT must be configured as a point-to-multipoint access, and the resistors in the NT must be connected to the S-bus.

The NT power plug must be inserted. In this way, a "phantom supply" of around 40V (P on the diagram above) is generated across pins a1 and a2 as well as b1 and b2, serving as the operating supply for non self-powered ISDN terminals on the line. If no power plug is inserted, the S-bus derives its power from the U interface—this is known as emergency, or restricted, operation. The U-supply has a reverse polarity to the previous supply.

The termination resistors on the last socket must each be 100Ω, regardless of whether or not a terminal is connected.

Y-configuration

The Y-configuration is a special type of point-to-multipoint access.



The 100Ω resistors in the NT must not be connected. The total termination resistance measured from the NT should be around 50Ω (parallel connection).