BLACK BOX Catalogue Ltd.
The Source for Connectivity

TSU9020

ISDN and LAN PRO TESTER

Introduction

You are now the owner of the ISDN & LAN Pro Tester. A unique instrument, which offers you a wide range of functions. The tester you bought is the only one of its kind able to analyse an active and/or passive ISDN-network and to measure the complete cabling of a LAN.

The tester consists of two units. The main unit consists of an enclosure with keyboard, display and various connectors. The second unit, the so-called satellite, is used to perform various functions of the main unit. The Pro Tester can perform each test separately, but can also run a series of programmed tests.

The Pro Tester uses time domain reflectometry and resistance measuring to determine for cable lengths or termination resistors. The tester is protected against overloads from an active S0 bus on the passive (cable check) side. The memory of the Pro Tester can store more than 400 measurements.

Fig. 1-1

ISDN and LAN TESTER

SALES: 0118 965 5100

1 Description

1.1 Keyboard

The figure below shows the layout of the keyboard.
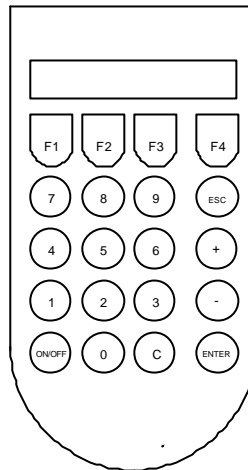
Fig. 1-2

- **<ON/OFF> key**
  Switches the unit off and on. The unit will switch off automatically if it is not used for a previously determined period (default: 10 minutes).

- **<0 t/m 9> (Numerical) keys**
  The numerical keys have several functions:
  - enter various system configurations;
  - enter project information;
  - enter line numbers.

- **<C> (Cancel) key**
  The cancel key is used to correct any mistakes made during the data entry. If you are in an option in which you do not need to enter any data, this key can be used to go back to the main menu level.

- **<Fx> (Function) keys**
  Executes programmed tests.

- **<ESC> (Escape) key**
  Takes you back one-step in the menu.

- **<+> key**
  Scroll forward in a menu level. Also used for entering a full stop in a line number.

- **<-> key**
  Scroll back in a menu level. Also used to go back one digit while entering a line number.
- **<ENTER> key**
  Confirms an entry, chooses a menu or executes/starts a menu function.

1.2 Display

All data is shown on the display (Fig. 1-3) with a maximum of 16 digits on one line. Where the cursor is blinking, the tester expects an input through the numerical keys. The contrast of the display can be adapted to the wishes of the user with the potentiometer on the interface side (Fig. 1-4). The potentiometer can be turned with a small screwdriver.
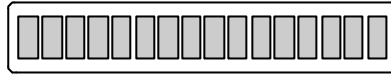
Fig. 1-3

1.3 Power supply

The tester operates on a rechargeable battery type PP3, 9 Volts 150 mAh. The battery can be recharged in two different ways:

1.   through the SO Bus;
2.   through the external power adapter.

The specifications for the external power supply are: DC 40V/50mA. Charging time through the external power supply is approx. 14 hours. Charging through the S0 bus takes approx. 24 hours. In both cases the tester needs to be switched off.

NOTE 1 : If the tester is recharged through the S0 Bus it is not allowed to have a cable
**   connected to the passive connector (nr. 2 fig. 1-4). Recharging will only take**
**   place if the NT is in normal mode.**
**   In the UK recharging via the S0 Bus is not possible.**

NOTE 2 : When recharging with the external power supply it is advised to only use the
**   power adapter that is included!**

When there is a power shortage, the Pro Tester will give a warning signal on the display. The signal is

Low Batt: 06.8V

A fully charged battery can supply power for 10 hours.

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1.4 Interface
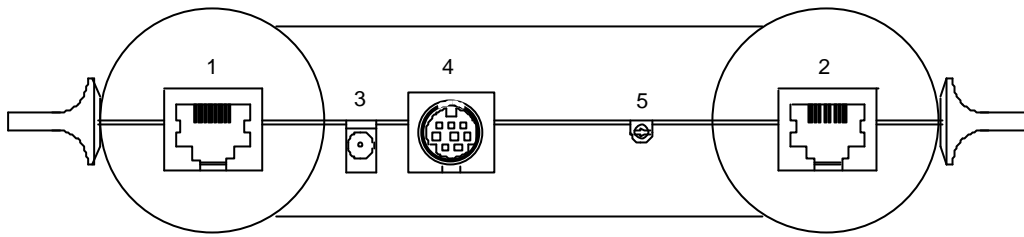
Fig. 1-4

Connection points:
1.   connection (RJ-45 shielded) for measuring an active ISDN network;
2.   connection (RJ-45 shielded) for measuring a passive LAN network;
3.   connection for external power supply (3.5mm DC-socket) to recharge the internal battery;
4.   download connection (Mini-DIN 8 poles) for downloading and/or printing the stored test results. The test results can also be downloaded into a PC with the optional Test Data Management Software. The TDMS™ then generates a report at your choice.
5.   Potentiometer to adapt the contrast of the display.

1.5 Satellite

The satellite is used in various tests. Please refer to chart 1-1 in chapter 2 for the functions.

Extendable plug

Turnable disc for extension of plug
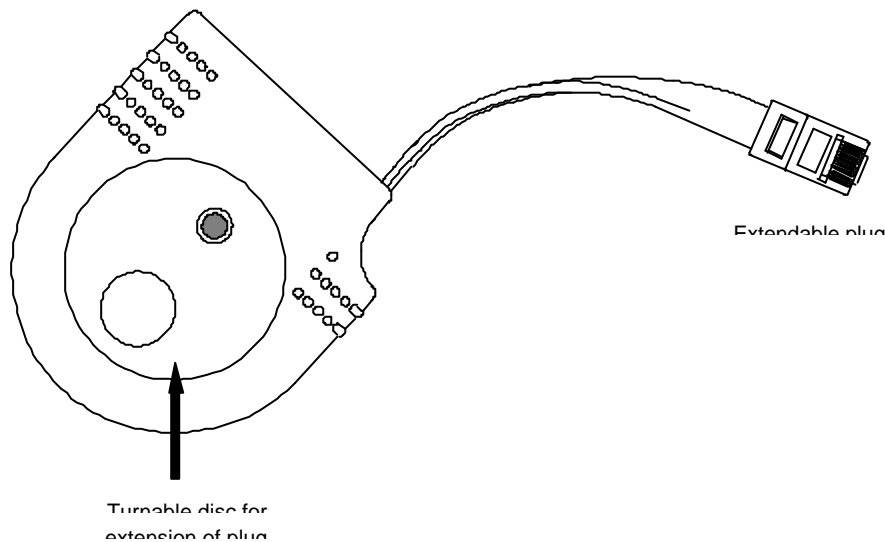
Fig. 1-5

The satellite is connected to a network with a plug (RJ45 connector) The plug is extendable with the turning disc. The length of the lead is 10 centimetres. At the END-ADAPTER test (section 3.5.2.2.5) the LED will light up shortly.

2 Using the ISDN & LAN Pro Tester

2.1 Switching on

Press the <ON/OFF> key. The text <ISDN Tester Vx> will   appear in the display. Press <ENTER> to activate the menu.

x = software version

2.2 Using the menus

Operation of the Pro Tester is simple using the menus. The main menu consists of 4 levels. The tester is operated with the following keys:

- <+> key   :   scroll forward in a menu level;
- <-> key   :   scroll back in a menu level;
- <ENTER> key   :   one menu further or activate a menu function;
- <ESC> key   :   back to the previous menu;
- <C>   :   back to main menu (if not in menu level where data is to be entered).

2.3 Using the shortdial keys

All menu levels and functions have been indexed. You can directly choose a menu function from the first screen <ISDN tester Vx> by using the numerical keys (0 till 9).

Example: press **5 2 2 5** for the function <End Adapter>.

2.4 Menu levels and functions chart

Previous level	⬅	\<ESC> key	Next level	➡	\<ENTER> key

	Menu level 1	Menu Level 2	Menu level 3	Menu level 4	Short key	Sat
Scroll back	1. Active line test	1. Line power	1. Power 1		111	No
			2. Power 1 + load		112	No
			3. Power 2		113	No
			4. Power 2 + load		114	No
		2. Line activity	1. Tx activity		121	No
⬆			2. Rx activity		122	No
			3. ISDN data=		123	No
	2. Cable measuring	1. Length	1. Length open		211	No
			2. Length shorted		212	Yes
		2. Resistance	1. Wire		221	Yes
			2. Terminator Rx		222	All
			3. Terminator Tx		223	All
		3. Cable testing	1. Open wires		231	Yes
			2. Short circuits		232	All
			3. Crossings		233	Yes
			4. Split pairs		234	Yes
\<-> key	3. Data management	1. Store data			31	na
		2. Load data			32	na
		3. Display data			33	na
		4. Check line no's			34	na
		5. Display line no's			35	na
		6. Delete all			36	na
		7. Delete line			37	na
		8. Print all			38	na
		9. Export CSV			39	na
		0. Clear data			30	na
scroll forward	4. Project	1. Project id			41	na
		2. Project config	1. Signal velocity		421	na
			2. Char. impedance		422	na
			3. Used pins		423	na
			4. Pairs		424	na
			5. DC Resistance		425	na
			6. Cable type		426	na
		3. Fixed settings			43	na
⬇	5. Configuration	1. User	1. Language		511	na
			2. Baudrate		512	na
			3. Auto off		513	na
			4. Battery test		514	na
\<+> key		2. Factory	1. Calibration		521	na
			2. Test	1. EEprom	5221	na
				2. Keyboard	5222	na
				3. Display	5223	na
				4. Relays	5224	na
				5. End Adapter	5225	Yes
			3. Initialise		523	na
			4. Memory size		524	na
	6. Function keys	1. Function key F1			61	na
		2. Function key F2			62	na
		3. Function key F3			63	na
		4. Function key F4			64	na

Sat. = Satellite	All. = Allowed	na = not applicable

Chart 1.1

3 Use and description of functions

We will describe the functions of the Pro Tester on the basis of the arrangement of the menu. All entries are activated with the <ENTER> key and aborted with the <ESC> key.

All measurements in the menu "active line test" are performed using the connector indicated with ACTIVE.

All measurements in menu "cable measuring" are performed using the connector indicated with PASSIVE.

3.1 Active line test   [shortdial 1]

Analysing the voltage and activity on an ISDN network. It is also possible to identify a signal as an ISDN signal.

3.1.1 Line power   [shortdial 11]

The voltage on an ISDN bus can vary between 32 and 50 Volts. The voltage can change drastically under load. This can be measured with the following functions.

3.1.1.1 Power 1   [shortdial 111]

Press <ENTER>. The display will show the voltage on lines 3/6 and 4/5 of the S0-Bus..

Example:

```
Power
1=+38V
```

NOTE :   **+ and - give an indication on polarity of the signal. + could mean S0-bus in normal condition. - could mean NT of the S0-bus is in restricted mode or there is a miswire. If there is a miswire and the NT is in restricted mode, then the polarity will indicate +.**

3.1.1.2 Power 1 + load   [shortdial 112]

Press <ENTER>. The tester will run the test by putting a load of 2kΩ on the bus. The display will show the voltage under load on lines 3/6 and 4/5 of the bus.

Example:

```
Power 1
L=+37V
```

3.1.1.3 Power 2   [shortdial 113]

Press <ENTER>. The display will show the voltage on lines 7/8 of the bus.

Example:

```
Power
2=+38V
```
.

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3.1.1.4 Power 2 + load   [shortdail 114]

Press <ENTER>. The tester will run the test by putting a load of 2kΩ on the bus. The display will show the voltage under load on lines 7/8 of the bus.

Example:

```
Power 2L=+37V
```

3.1.2 Line activity   [shortdial 12]

Registrates any data transmitting through the ISDN network, analyses if any signal present actually is an ISDN signal and displays the status of the data transmitted.

3.1.2.1 Tx activity   [shortdial 121]

Press <ENTER>. The display will show if there is any activity on lines 4 - 5 of the bus.

Example:

```
Act Tx=no
```

3.1.2.2 Rx activity   [shortdial 122]

Press <ENTER>. The display will show if there is any activity on lines 3 - 6 of the bus.

Example:

```
Act Rx=yes
```

3.1.2.3 ISDN data=   [shortdial 123]

The Pro Tester analyses whether any activities on the network are ISDN activities. The tester distinguishes different networks and finds any transmitting activities on an ISDN-network level. The measurement will only be done on the Tx line. The read out of this measurement is a qualification, not a quantification

Possible read outs :
none	: no ISDN transmitting activity;
low	: low level of ISDN transmitting activity, for example after ending communications;
normal	: normal level of ISDN transmitting activity, for example during communications;
high	: exceptionally high level of ISDN transmitting activity, for example during communications.

Example:

```
ISDN
data=high
```

Note 1   :   The satellite is not used for active line tests.
Note 2   :   Pulses higher than 1Mb are not discerned (higher than 1Mb is Ethernet or Tokenring).

3.2 Cable measuring   *[shortdial 2]*

All tests are performed on a passive LAN network. The tests are directed at the physical characteristics of the network.

NOTE ! :   **It is crucial to set the project data before running the test according to the following methods. If this is not done, the results will be meaningless.**

         The NT needs to be connected from the S0-Bus when performing tests

3.2.1 Length   [shortdial 21]
Determines the length of the network branch or the distance to a short circuit or rupture.

3.2.1.1 Length open   [shortdail 211]

Press <ENTER>. The display will show the following:

> **Open (45) =**

Enter the conductor number of which the length is to be determined. You always have to enter two conductor numbers, preferably a pair. Default conductors are 4 and 5.
Enter the numbers and press <ENTER> to activate the test.

Example:

> **Open (36)=80m**

Note: The tester will display the shorter of the two conductors.

3.2.1.2 Length shorted   [shortdial 212]

Press <ENTER>. The display will show the following:

> **Short (45) =**

Enter the conductor number of which the distance to the short circuit must be determined. You always have to enter two conductor numbers. (Short circuit testing with "Cable Testing" under shortdial 232). Default is conductors 4 and 5. Enter the numbers. Press <ENTER> to run the test.

Example:

> **Short (13)=54m**

3.2.2 Resistance   [shortdial 22]

Determines the DC resistance of the cable (for example a branch of the network). You can also determine the termination resistance.

3.2.2.1 Wire   [shortdial 221]

Press <ENTER>. The display will show the following:

> **Resis (4) =**

Enter the conductor number of which the resistance must be determined. Enter a new value at the cursor with the numerical keys. It is also possible to change the value with the <+> and <-> keys. Press <ENTER> to activate the test.

Example:

> **Resis (7)=3.4W**

Note 1   : below 40m. the test is not accurate
Note 2   : at resistance measuring of the conductors, the outer conductors can not be measured. The tester sees the outer conductors according the sequence of the satellite which is 12 36 45 78
**   Re   : on connection of 8 conductors, you can only measure conductors 2 to 7.**
**   : on connection of 4 conductors, you can only measure conductors 6 and 4.**

3.2.2.2 Terminator Rx   [shortdial 222]

Tests the termination resistance on lines 4 and 5.
Press <ENTER>. The display can show the following:

> **Term Rx=118W**

Note : The cable resistance is added to the termination resistance.

3.2.2.3 Terminator Tx   [shortdial 223]

Determines the termination resistance on lines 3 and 6.
Press <ENTER>. The display can show the following.

> **Term Tx= 8**

Note : the cable resistance is added to the termination resistance

NOTE: 1   : When performing terminator measurement, do not use the satellite.

NOTE: 2   : There are various read outs at terminator measurements, such as:

Term Rx = 116Ω : there are termination resistors: the value is above 100
                        (cable resistance added to termination resistance)
Term Rx = 8   : there is no termination resistor.
Term Rx = 58Ω : there are two terminators. This can apply to read outs of 75Ω or lower.
Term Rx = 232Ω : there is a satellite on the line through which measurements are made. There is no termination resistance or the wrong one has been installed. This can apply to read outs over 220Ω.
Term Rx = 93Ω : there is a satellite on the line parallel to the termination resistance. This can apply to read outs between 70Ω and 98Ω.

Note that the above mentioned values only apply to a UTP/STP network of which the cable has a resistance of 9.2Ω/100m and a maximum length of 250m.

The above-mentioned read outs are mere examples and are not complete. The interpretation of the measurements depends on the knowledge of the user.

3.2.3 Cable testing [shortdial 23]

Finds errors in the cables that can cause problems for the functioning of the LAN.

3.2.3.1 Open Wires [shortdial 231]

Checks all lines (and shield) on continuity. Press <ENTER> to activate the test.

Example:

```
Open= --3----8S
```

This means that lines 3, 8 and the shield are disconnected. Connected lines are indicated with "-".

Note : **If the tester is set the measuring of STP cables and the network uses UTP, the indication of an open shield will appear constantly. This also applies to settings of 8 conductors when there are only 4 conductors present in the network.**

3.2.3.2 Short circuits [shortdial 232]

Checks the lines (and shield) on short circuits. Press <ENTER> to activate the test.

Example:

```
Short = 3S, 45
```

This indicates a short circuit between line 3 and the shield and lines 4 and 5. When there is no short circuit, the display indicates "none".

3.2.3.3 Crossed Pinning [shortdial 233]

Checks the way lines (and shield) are connected. Press <ENTER> to activate the test.

Example:

```
Order=12364578
```

The displayed order gives the connection of pairs in a UTP/STP cable. This read out indicates that the connection is correct.
An error indication would be "Order=12345678".

Note 1: **If you measure cables with straight conductors, the read out order for a 1:1 cabling would still be "12364578".**

Note 2: **If the tester can not determine with a reasonable certainty that the wiring sequence could be swapped, a ★ will appear on the first position**

3.2.3.4 Split pairs [shortdial 234]

Checks on the basis of impedance if pairs have been interchanged. Press <ENTER> to activate the test.

Example:

```
Split pairs=x-x-
```

"x" means that pairs have been interchanged
"-" means that everything is correct.

This test uses the entered cable definition data.

Note: This test is reliable when the split pair length is above 40 metres.

3.3 Data management [shortdial 3]

The memory of the ISDN tester consists of two parts.
The working memory   : contains the previously performed tests.
Data memory   : can be used to store the data from the working memory after which the working memory can be cleared.

3.3.1 Store data [shortdial 31]

Stores data from the working memory into the data memory. Press <ENTER>. The display will show the following:

```
Give lno:------
```

Enter the line number of the measurement (for example the number of the wall outlet that has been measured).
Press <+> to place a full stop.
Press <-> to scroll back (backspace)

Press <ENTER> to store the data. If the line number already exists, the display will show the following:

```
In use!
Rewrite?
```

Press <ENTER> to rewrite the line.
Press <ESC> to abort storing.

3.3.2 Load data   [shortdial 32]

Puts the stored data of a line number from the data memory back into the working memory. The data can be adapted or completed after which it can be stored again under the same or a different line number.

For example: repairing a cabling error, testing again and than storing the data for the report.

Press <ENTER>. The display shows the following:

| Give Ino: ------ | Enter the line number of which the data must be stored in the working

memory. If there is no such number, the display will show "Ino not found". If the line number does exist, the display will show "Done" to implicate that the data is stored in the working memory.

3.3.3 Display data   [shortdial 33]

Shows the data in the working memory. Press "+" and "-" to scroll through the data. If the data is not known (not measured) the display shows "?" . Press <ESC> to leave this function.

3.3.4 Check line no's   [shortdial 34]

Checks if a line number is present. Enter the line number. The display will show either "present" or "not found".

3.3.5 Display line no's   [shortdial 35]

Shows all line numbers of the data memory. The display also shows the project number and the storage place.

Example: 0001:15-2343

0001   : Storage place
15   : Project number
2343   : Line number

Use <+> and <-> to scroll through the numbers.

3.3.6 Delete all   [shortdial 36]

Deletes all data of the active project from the data memory. Press <ENTER>. The display will show the following:

| Sure<Enter,ESC> |

<ENTER>   : activates the option
<ESC>   : go back to previous screen

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3.3.7 Delete line   **[shortdial 37]**

Deletes one measurement from the memory. Press <ENTER>. The display will show the following:

> **Give lno :------**

If the line number is not present, the display will show " Lno not found". When the data is deleted from the data memory, the display will show "Done".

3.3.8 Print all [shortdial 38]

The ISDN - LAN tester can be connected to a *serial* printer with a special cable (optional with Test Data Management Software). The data can be printed in a standard format directly from the tester on this printer. Press <ENTER> to activate printing.

3.3.9 Export CSV [shortdial 39]

Exports data to a PC. The downloading is in CSV (Comma Separated Value) format.
Press <ENTER> to start downloading. The dis play will show "Done" when the downloading is finished. If you have TDMS™ the data export can be activated automatically by the PC connected.

3.3.10 Clear data [shortdial 30]

Deletes the working memory. Press <ENTER> to activate this function. It is recommended to always program this option in the function keys. This to assure so that you always tests with a clean memory.

3.4 Project [shortdial 4]

Enter all the relevant data concerning the project (project number, cable specifications or fixed settings). This is a very important function. Always enter all project data before testing. The data must remain the same during the whole project, if not, the results are meaningless.

3.4.1 Project id [shortdial 41]

The Pro Tester can store a number of project-dependant parameters. This function enables you to choose for which project the settings are changed and for which project the tests are run.

Press <ENTER>. The display will show the following:

> Project id:-----

Enter the number of the project for which you want to enter the settings or for which you want to run the tests. Range is from 0...99.

Note : If a project is re-activated, the settings (project config) are not automatically activated. You do this by using "Load data" to load a line number of the activated project.

3.4.2 Project settings [shortdial 42]

Enter the settings that apply to the cable and the connection of the network.

3.4.2.1 Signal velocity   [shortdial 421]

Depending on the kind of cable, there are various signal velocities possible. These can be entered, in percentages of light speed, between 60 and 92%. Default is 66%. Press <ENTER>. The display will show the following:

Velocity : 66%

Enter another percentage at the cursor. It is also possible to change the percentage using the <+> or <-> keys. Press <ENTER> to activate the percentage.

3.4.2.2 Characteristic impedance   [shortdial 422]

If there are no standard ISDN wires (UTP/STP) used, the characteristic impedance can be adjusted. The values available are:
- 80Ω
- 100Ω
- 120Ω
- 150Ω

Default is 100 Ω.

Press <ENTER>. The display will show the following:

Char imp : 100**W**

Press <+> or <-> to scroll through the standard values. Press <ENTER> to activate this impedance.

3.4.2.3 Pins used   [shortdial 423]

Enter the data of the contacts used of the network. Press <ENTER>. The display will show the following:

Pins = 12345678S

Press the numerical keys to activate or de-activate a line. The "S" stands for cable shield. You can activate or de-activate the shield by pressing 9. When you de-activate a line, a "-" will appear in its position.

Example:

Pins = 123--6--S

3.4.2.4 Pairs   [shortdial 424]

For some tests, the tester needs to know which positions in the wiring of the network are paired. This can be set with this function. Press <ENTER>. The display will show the following:

Pairs:12,36,45,78

Press <+> or <-> to scroll through the standard settings. Press <ENTER> to activate a setting.

The standard settings are:
- 12 & 36
- 34 & 56
- 36, 45
- 12, 34, 56 & 78
- 12, 36, 45 & 78
- -   (none)

3.4.2.5 DC resistance   [shortdial 425]

If a project does not use standard ISDN cabling (UTP/STP), the specific conductor resistance can be adapted. The value is given in Ohm per hundred metres cable (Ω/100m). Default is 9,2 Ω/100m. Press <ENTER> to activate this function. The display will show the following:

Resistance =
092

This means that the value is set at 9.2Ω . The display does not use the decimal. A new value can be entered at the cursor. It is also possible to adapt the value by pressing <+> or <->.

Note : the range that can be entered lies between 0.1 and 25.5 Ohm.

3.4.2.6 Cable type   [shortdial 426]

Default is a Twisted Pair cable. It is, however, also possible to choose another cable. Press <ENTER>. The display will show the following:

Type = tp

Press <+> or <-> to scroll through the standard settings. Press <ENTER> to activate a setting.

De default possibilities are:

- flat   : cable with straight conductors.
- tp   : cable with conductors twisted together in pairs.
- quad   : cable with four conductors twisted together, of which the opposite conductors
                    are used as a pair

3.4.3 Fixed settings　　　　　　[shortdial 43]

The ISDN - LAN tester enables you to choose a standard cable setting. If you choose one of the default settings, the various values are adapted automatically. Press <ENTER>. The display will show the following:

```
Cat5utp
```

Press <+> or <-> to scroll through the default settings. Press <ENTER> to activate the setting. The display shows "Done" .

The cables available are:

Cable	Velocity	Impedance	Pairs	Pins	Resistance	Type
Cat5utp	66%	100 Ohm	12 36 45 78	1-8	9.2 Ohm tp	
Cat5stp	66%	100 Ohm	12 36 45 78	1-9	9,2 Ohm tp	
ics	78%	150 Ohm	36 45	3-6,9	5 Ohm	tp
PTT N88	65%	150 Ohm	36 45	3-6	9 Ohm	quad
Flatcable	66%	100 Ohm	-	1-8	9 Ohm	flat

3.5 Configuration　　　　[shortdial 5]

The configuration option under '"System" is used by the user to enter settings. The producer mainly uses the other options under "Factory". It is, however, possible to browse through.

3.5.1 User　　　　　　　　[shortdial 5.1]

Enables the user to make settings for data export velocity and the battery.

3.5.1.1 Language　　　　　[shortdial 5.1.1]

Implicates that you can choose between different languages. This is however not yet possible. This option is built-in for future versions.

3.5.1.2 Baudrate　　　　　[shortdial 5.1.2]

The ISDN - LAN tester enables you to export data to a PC or to print directly on a serial printer. A different Baudrate may be needed. Press <ENTER>. The display will show the following:

```
Baudrate=
```

Press <+> or <-> to scroll through the default settings. Press <ENTER>.

The Baudrates available:

- 1200
- 2400
- 4800
- 9600
- 19200

3.5.1.3 Auto off   [shortdial 5.1.3]

The tester shuts down automatically after a pre-determined period if there is no activity. Press <ENTER>. The display will show the following:

> Auto off = I5

The default time is 10 minutes. You can alter this with the numerical keys. It is also possible to adapt the value by pressing <+> or <->.

The auto-off time can lie between 1 and 99 minutes. If you enter 0 the tester will not shut down automatically.

3.5.1.4 Battery test   [shortdial 5.1.4]

Tests the voltage the battery is giving. Press <ENTER>. The display will show the following:

> Battery = 08.5 V

This indicates that the battery can deliver 8,5 Volt.

Note :   When the battery is almost empty a warning will appear on the display. The warning is "Low Batt: 06.8V".

3.5.2 Factory   [shortdial 5.2]

These options are for your supplier and are seldom used by yourself. There is one option that could be useful for you. This option will be explained later.

3.5.2.1 Calibration   [shortdial 5.2.1]

This option is added for the calibration at production or at possible maintenance or repairs. During the calibration the voltage is corrected on the basis of a default voltage. The internal resistance values and the distance measurement (open and short circuited) are checked and possibly adapted using default lengths of cable (short and long) as reference and a loopback.

More information can be found in the calibration procedure (not in this user's manual)

3.5.2.2 Test   [shortdial 5.2.2]

Tests different parts of the hardware. The parts that can be tested are described in the following sections.

3.5.2.2.1 EEprom   [shortdial 5.2.2.1]

Tests the two EEproms that are in the tester (standard 2x8K). Press <ENTER>. The display will show the following:

> EEprom test:12XX

When the display shows "EEprom test:12XX" , all two EEproms are functional. If an "X" replaces one of the two first digits, this can mean two things.
1) The EEprom is defective.
2) The memory bank is empty.

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3.5.2.2.2 Keyboard   [shortdial 5.2.2.2]

Tests each key. Press <ENTER>. The display will show the following:

```
Key   >   <
```

Press the various keys. The numerical value will be indicated between the > < symbols. This test can be aborted by pressing the ON/OFF key.

3.5.2.2.3 Display   [shortdial 5.2.2.3]

Displays all the available symbols on the display. Press <ENTER>. The display will show the following:

```
• !"#$%&'()*+,-
./
```
Use "+" or "-" to scroll through the various screens.

3.5.2.2.4 Relays   [shortdial 5.2.2.4]

Tests various relays (2). Press <ENTER>. The display will show the following:

```
Relays         0
```

values that can be entered are 0, 1, 2, and 3
0   : All relays off.
1   : Relay 1 on.
2   : Relay 2 on.
3   : Both relay 1 and 2 on.

If no error is reported, the relays are all functional.

3.5.2.2.5 End-adapter   [shortdial 5.2.2.5]

Tests the satellite. The satellite must be connected to the passive side of the tester. Press <ENTER> to activate the test. The display may show the following:

Adapter ok   : the satellite is functioning
Adapter faulty   : the satellite is malfunctioning
Adapter reverse   : the cable of the satellite has been connected reversibly.

3.5.2.3 Initialise   [shortdial 5.2.3]

Sets all values to default. The data-memory is deleted and all function keys lose their programming. The default values are:

•   Baudrate = 9600
•   Project id = 0
•   Auto off = 10 minutes
•   Cable type = Cat5utp

3.5.2.4 Memory size   [shortdial 5.2.4]

Checks the memory storage capacity. Press <ENTER>. The display will show the following:

> **Memory size=16K**

Values possible : 8, 16, 24 en 32.

Standard is 16K.

3.6 Function keys   [shortdial 6]

The ISDN - LAN enables you to run test-cycles automatically. These cycles can be programmed freely. They can be stored under the function keys.

The programming of the function keys will be explained in the following sections. For this description the keys are not yet programmed.

3.6.1 Function key F1   [shortdial 6.1]

Press <ENTER>. The display will show the following:

```
F1 01:00
```

F1   : Function key 1
01   : Line number
00   : Measuring code

Press <ENTER> to put the cursor at the "measuring code" position. You can now enter the code with the numerical keys. It is also possible to adapt the code by pressing <+> or <->. See Chart 1.2 for the codes available.

Press <ENTER> again to program the first line.

Press <+> to go to the next line. Repeat the above-mentioned procedure to program another line.

For running the programmed test procedures you have to be in the main menu <ISDN tester Vx>. Pressing the various function keys can activate the programmed test procedures.

Measuring code	Measuring	Measuring description	Satellite necessary
01	Power 1	Power voltage on Rx (Pin 4 - 5)	No
02	Power 1 + load	Power voltage on Rx under load	No
03	Power 2	Power voltage on Tx (Pin 3 - 6)	No
04	Power 2 + load	Power voltage onTx under load	No
05	Tx Activity	Data activity on Tx lines	No
06	Rx Activity	Data activity on Rx lines	No
07	ISDN Detect	Checks if there is ISDN	No
08	Length open	Length of network/ distance to cable rupture	No
09	Length short	Distance to short circuit	Yes
10	Wire resistance	Dc resistance of the wire	Yes
11	Terminator Rx	Determining resistance of terminator on Rx	Allowed
12	Terminator Tx	Determining resistance of terminator on Tx	Allowed
13	Open wires	Detection of open (ruptured)conductors	Yes
14	Short circuit	Detection of short circuiting wires	Allowed
15	Crossings	Detection of wire	Yes
16	Split pairs	Detection of split pairs (wrongly paired conductors)	Yes
17	Store data	Storing the measured data	na
18	Clear data	Deleting the working memory	na

Chart 1.2

For notes see next page.

NOTE   :   **Execute assignment 18 first in a pre-programmed measuring cycle.
That way the working memory is emptied and the old and new data will not be
mixed up.**

BEWARE :   **That conflicting tests using f.i. the satellite when it is not supposed to be used, will be run,
but the results will be meaningless. Please take this into account when programming the
function keys.**

3.6.2 Function key F2   [shortdial 6.2]

See Function key F1.

3.6.3 Function key F3   [shortdial 6.3]

See Function key F1.

3.6.4 Function key F4   [shortdial 6.4]

See Function key F1.

4 Requirements for measuring

The number of devices connected to the bus influences the accuracy of the test. It is therefore necessary to disconnect every device during the terminator test. Please check before testing (warn the operator). Tests run on cable lengths under 40 metres and above 250 metres are not accurate.

5 Accessories and options

Test Data Management Software

You can export data from the Pro Tester to a PC. In order to do this you need a special cable between the Pro Tester and the PC, with special software. This enables communication such as the exportation of a CSV file (for instance Excel).

The software is written for Windows 3.1 and higher. The program starts the data uploading with a browser for the filename to be used. After all the data from the Pro Tester has been downloaded, general information is asked (customer data, project data etc.) The user can click the data in checkboxes. A report is then generated (In Excel 5.0) which can be printed immediately. The data can also be exported to a CSV file (for instance Lotus 123). Contact Black Box technical support for details.

Minimum system requirements : 386 or higher, VGA-colour monitor, Windows 3.1
Recommended: Pentium, SVGA-colour monitor, Excel 5.0 or higher.

6 Compatibility

Electromagnetic   :   according domestic appliances and light industrial equipment EN 50081-1
and EN 50082-1.
Electronic :   EN 60950 safety of apparatus for information technology including electrical
office supplies.

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