# ARGUS
# PRI Manual

Version: valid from 1.10 respectively 2.30 / **EN**

**Important Notice:**
The basic ARGUS package includes support for at least one DSL interface (ADSL, VDSL or SHDSL) or the PRI interface with a variety of functions and tests for the interface(s). Support for other interfaces and functions is optional (see the options in the data sheet). Consequently, depending on the scope of the functions delivered, certain menu items may be hidden.

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**D-58507 Lüdenscheid, Germany, 2013**

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# 1 Introduction

When fully equipped, the ARGUS supports a comprehensive range of test functions for not only BRI accesses and POTS, but also for U-interface, E1/PRI, ADSL, VDSL, SHDSL and Ethernet accesses. This manual covers the optional E1/PRI interface.

In addition to TE/NT simulation on a PRI interface, the ARGUS also supports D-channel monitoring on PRI accesses.

Furthermore, it supports tests of digital leased lines including bit error rate tests (BERT) in the D-channel. The MegaBERT expands the bandwidth to 2 Mbit/s - to either 2048 kbit/s (framed) or 1984 kbit/s in time slots 1-31 (2 Mbit unframed). Last but not least, the ARGUS can run a BERT to a remote loopbox or perform an end-to-end measurement to another ARGUS.

An overview of some important ARGUS functions:

**PRI Functions**

- **Bit Error Rate Test (BERT) for E1/PRI in accordance with ITU-T G.821**

  Performs a BERT in an extended call to itself, via a loopbox or in end-to-end operation. The ARGUS will, if needed, handle the loopbox function itself.
  The optional MegaBERT extends the bit error test on E1/PRI accesses to a full 2 Mbit/s bandwidth.

- **Leased Line Tests – tests permanent circuits with BERT and speech**

- **NT Simulation of a Primary Rate Interface**

- **D-channel monitoring on the Primary Rate Interface**

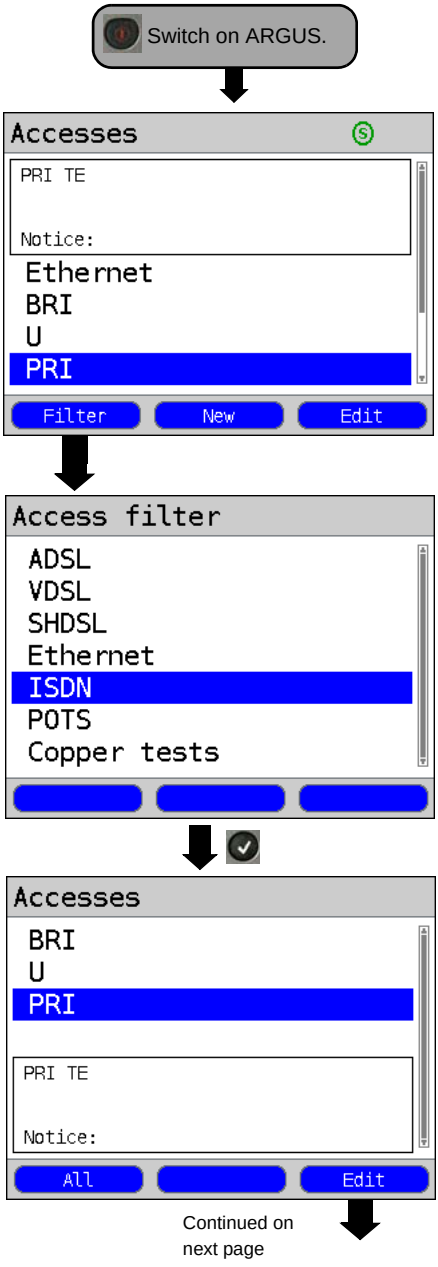
  All of the D-channel signals are captured and passed to the USB interface. When passively monitoring, the ARGUS does not affect Layer 1.

- **Test of Layer 1**

Should you have any further questions, please contact us:

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## 2 Configuring accesses




After powering up, ARGUS displays all configured accesses (up to 100). A default connection is configured for each access type.

The most recently used access is indicated on the display with ● .

ARGUS additionally displays a preview of the selected access settings, see also page 10. The preview window opens after 2 seconds.

| | |
|---|---|
| **<New>** | Creates an access, see page 8, Fig. 2. |
| **<Edit>** | Edits an access, see page 8, Fig. 1. |
| | Switches softkey assignment, see page 11. |
| | Switches to main menu. |

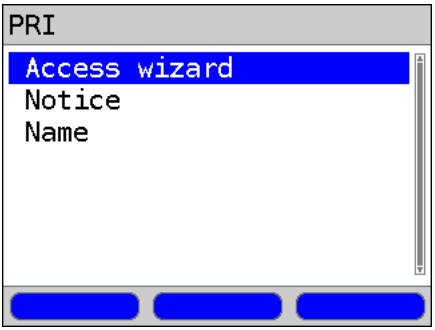
With the **<Filter>**softkey, ARGUS lets you filter all pre-configured accesses according to access type and displays this group.

In this example, ISDN is selected.

All relevant accesses are displayed in which ISDN is specified in the configuration.

| | |
|---|---|
| **<All>** | Display of all possible accesses, see Fig. 1. |
| **<Edit>** | Edits the selected access profile. |

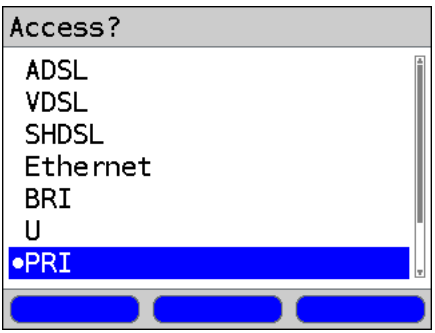
## 2.1 Access wizard



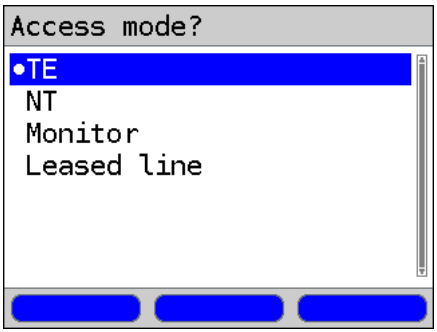

ARGUS switches to the "Accesses" main menu.

You can now configure the selected access, here PRI, using the access wizard.

The query parameters of the access wizard depend on the selected access, see page 10.



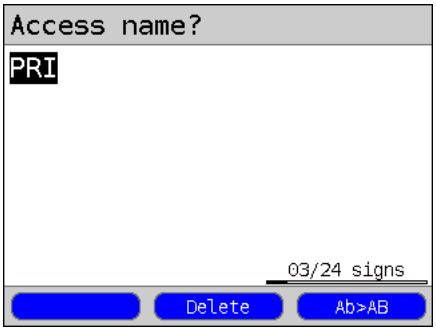

Selection of physical interface (here PRI).
- for PRI, see page 15.




ARGUS switches directly to the access mode settings.

Selection of access mode (here PRI TE).

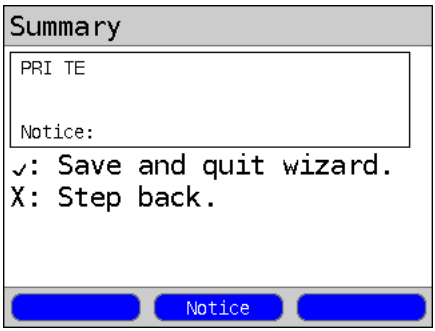
Continued on next page




ARGUS displays an access name, depending on the settings you made previously (here PRI).

| | |
|---|---|
| **<Delete>** | Deletes access name. |
| **<Ab>AB>** | Entry starts with upper-case letters und will be continued with lower-case letters. |
| **<AB>12>** | Entry of upper-case letters. |
| **<12>ab>** | Entry of numerals 0 through 9 and *, #. |
| **<12>ab>** | Entry of numbers. |
| **<ab>Ab>** | Entry of lower-case letters. |
| | Entry of special characters, e. g. @, /, -, ., *, ?, %, =, &, ! etc. |
| | Entry of special characters, e. g. _, :, +, # etc. |

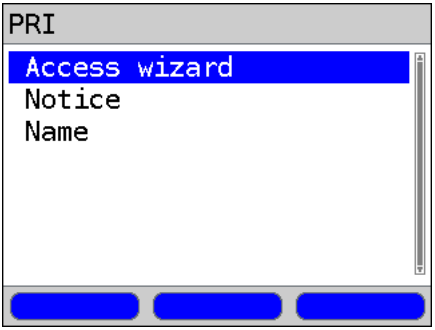





ARGUS displays a summary and a pre-view of the configuration.

| | |
|---|---|
| **<Notice>** | Allows you to make a note, see page 12. |
| | Save and quit wizard. |
| | Step back. |



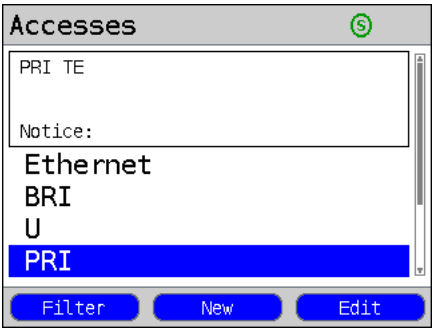



ARGUS returns to the editing overview of the selected access (here PRI).

You need to quit the access wizard before ARGUS can use the configured access.

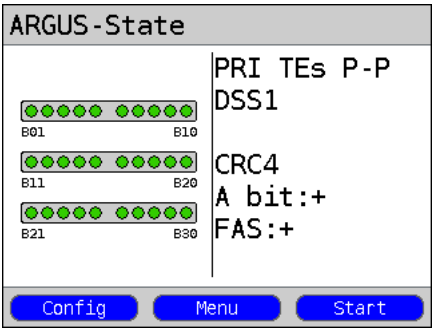
Continued on next page


2x




Select PRI.

Press „OK“ to confirm the selected access, here PRI.




ARGUS switches to the ARGUS status display.

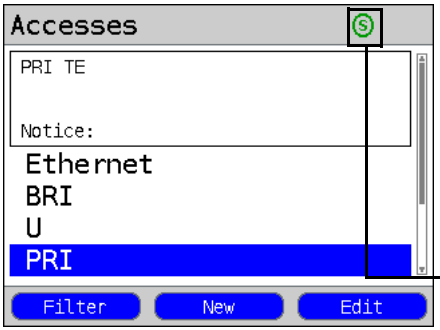
| | |
|---|---|
| **<Conig>** | Opens the Menu „PRI settings“, see page 15. |
| **<Menu>** | Switches to main menu. |
| **<Start>** | Starts B channel test. |

**ARGUS access wizard**

The access wizard conducts and individual query depending on the connection. Each parameter queried depends on the respective previous parameters (from left to right).

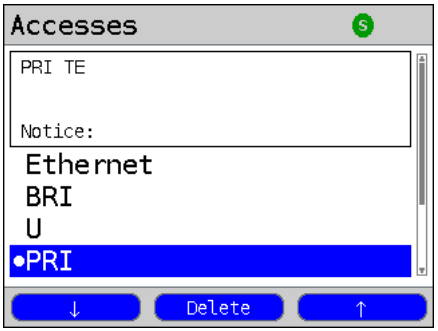
| Access | Mode |
|---|---|
| **PRI** | TE, NT, Leased line, Monitor |

**Sorting the access in the access overview**



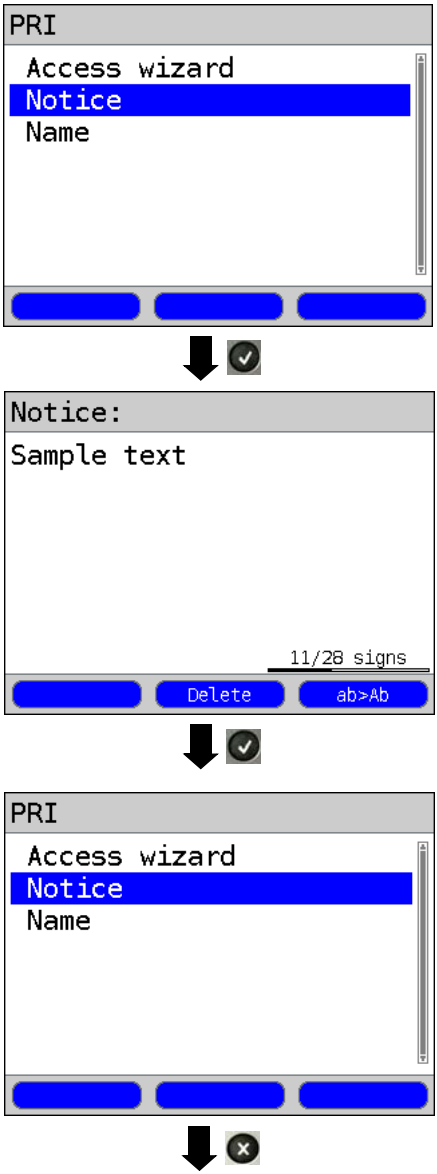

In order to keep frequently used accesses readily available, ARGUS allows you to put the configured accesses in any individual order.

Switches to softkey assignment.




| | |
|---|---|
| **<↓>** | The selected access is moved down one place in the list. |
| **<↑>** | The selected access is moved up one place in the list. |
| **<Delete>** | Deletes marked access. |

## 2.2 Notice

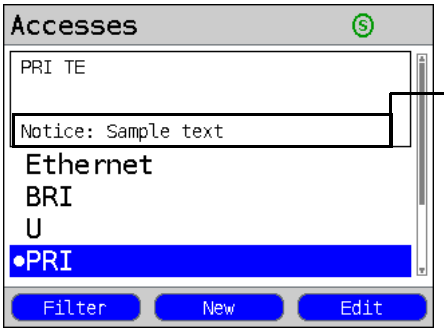



In the preview next to the selected access, ARGUS also displays a freely editable note.
This note can be up to 28 characters long.

In this example, the note "Sample text" is displayed.

| | |
|---|---|
| **<Delete>** | Delete access name. |
| **<Ab>AB>** | Entry starts with upper-case letters und will be continued with lower-case letters. |
| **<AB>12>** | Entry of upper-case letters. |
| **<12>ab>** | Entry of numerals 0 through 9 and *, #. |
| **<12>ab>** | Entry of numbers. |
| **<ab>Ab>** | Entry of lower-case letters. |
| | Entry of special characters, e. g. @, /, -, ., *, ?, %, =, &, ! etc. |
| | Entry of special characters, e. g. _, :, +, # etc. |

Press „OK“ to accept the entered note.




The accepted note is linked with the access profile and is displayed in the preview.
The preview appears approx. 2 seconds after the access is selected.

| | |
|---|---|
| **<Filter>** | ARGUS switches to the Filter menu, see page 7. |
| **<New>** | Creates a new access. |
| **<Edit>** | Edits an access. |

The access name can be edited as for notices, see page 12.

## 3 Connection for a PRI network

Since there is no commonly accepted standard for the connections in the 2 Mbit sector, you will be confronted with different forms of connectors depending on the type of terminal and the network termination used.

The ARGUS changes the connector pin assignments automatically in accordance with the mode, TE or NT. Additionally, it is also possible to change the pin assignments manually in the L1-Status menu.

### 3.1 Pin Assignment on the ARGUS (BRI/PRI/E1)

In TE mode, the ARGUS sends on lines 4 and 5, in NT-Mode on 1 and 2 (see illustration). An adapter cable, which is suitable for the PRI network/system to be tested, can be connected using the RJ45-RJ45 adapter.




ARGUS RJ45 connector (WE8/4) RJ45 connector (WE8/4)

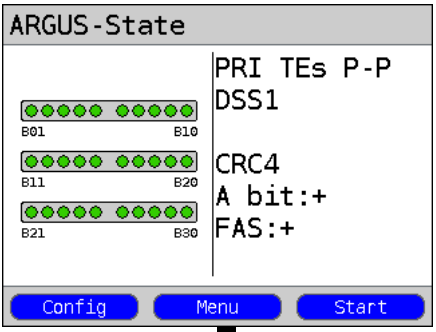
| PIN | PIN | Function | |
|---|---|---|---|
| | | NT | TE |
| 1 | 1 | Tx | Rx |
| 8 | 2 | Tx | Rx |
| 2 | 4 | Rx | Tx |
| 7 | 5 | Rx | Tx |

# 4 Operation on a PRI Access

## 4.1 Configuring the PRI Interface and Access Mode Settings

Use the included connection cable to connect the ARGUS "BRI/PRI/EI" jack to the access to be tested and then switch the ARGUS on. The PRI settings are made in chapter 2 Configuring accesses page 7. In this example the PRI TE mode was selected.

**ARGUS State display**



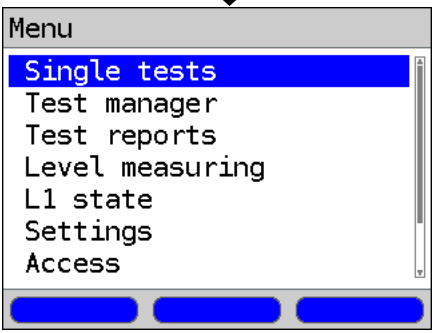

**<Start>** Start the B-channel test

**<Config>** Open the "PRI Setting" menu.

Open L1 state

**<X>** Switch the pin assignment (will not be displayed until the Level key is pressed)

**Main menu**




The menus, which are available for the type of access under test, are listed in the main menu.

The ARGUS will open the marked menu (in this example, Single tests).

Select a menu. The selected menu will be marked blue in the display.

To return to the previous menu (in the example, the State display).

### 4.1.1 TE Simulation of a Primary Rate Interface

In the Access mode menu (see page 16), select the desired simulation mode:

- **TE P-P (point-to-point)**

  Afterwards, the access and the protocol stack will be initialized in accordance with the selected setting.

### 4.1.2 NT Simulation of a Primary Rate Interface

In the Access mode menu (see page 16), select the desired simulation mode:

- **NT P-P (point-to-point)**

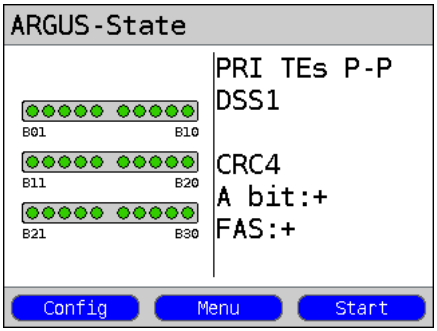
  Afterwards, the access and the protocol stack will be initialized in accordance with the selected setting.

## 4.2 Initialization Phase including B-Channel Test

**Initialization on a PRI network**

As soon as Layer 1 is setup, the "L1 Sync" LED will light continuously. The ARGUS will automatically determine and display, whether or not the PRI access uses CRC4-monitoring. CRC4 monitoring can be switched on or off manually.

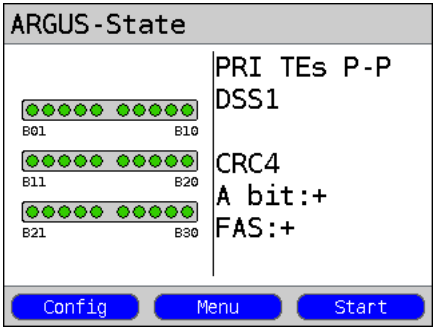
The ARGUS will begin to automatically determine the access configuration. After Layer 2 is setup, the “L2” LED will also light.
The ARGUS will, regardless of the mode of operation (TE or NT mode), determine the D-channel protocol and attempt to setup Layer 3.




During this phase, the ARGUS displays the A bit of the remote side and the FAS. The protocol can only be determined when the A bit is not set (+).
The FAS (Frame Alignment Signal) indicates whether the ARGUS could correctly synchronize with the incoming 2 Mbit data stream’s alternating frame identification word or message word and the, perhaps present, CRC4-superframe structure.

Press the **<Start>** softkey to have the ARGUS begin to test the availability of all 30 B-channels one after the other by occupie the B-channels.. If the ARGUS can place a call on a B-channel, it will be assumed that the B-channel is available in both directions; the B-channel test cannot distinguish between alternating and exclusively "outgoing" B-channels. If the connection is rejected, the B-channel will be identified as unavailable. In the case of a cause, which indicates that the B-channel is occupied, the connection will be tried up to two times and, if a connection can still not be setup, it will then be marked as unavailable.

**Example:**
**The status display on a PRI access**

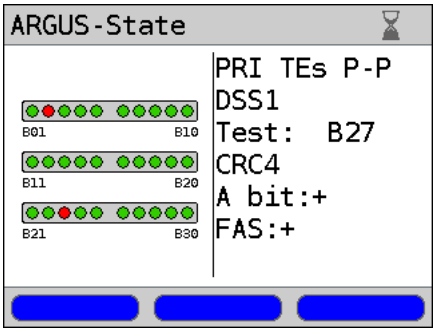



The ARGUS will display the following:
- Type of access
- Access Mode
- Bus configuration
- D-channel protocol

- The availability of the B-channels
  Available B-channels: green circle
  is indicated by three rows
  of red or green circles.

B-channel 1 is at the upper left
B-channel 30 is at the lower right
In the example, all 30 B-channels are available and can be used for outgoing or alternating connections.
- CRC4-monitoring, A-Bit, FAS

**B-channel test – example:**

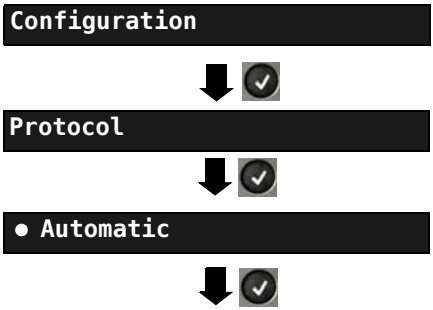



The ARGUS is in TE-Simulation Slave mode.
B-channel 2 and 23 are not available or are busy. This state is indicated in the display by the red circles. Green circles are used to indicate the available B-channels.

If the ARGUS is not properly connected (e.g. incorrect cabling) or the network is not in order, the ARGUS will display “No Net”.

### 4.3 Configuring the PRI Parameters

The following PRI parameters can be configured as needed. The procedure for configuring a parameter will be illustrated with a single example: It is possible to restore the default settings for the parameters (see the ARGUS main Manual).




The ARGUS - Main menu

Use the cursor keys to select, e.g. Protocol.



Mark the desired protocol. The selected protocol will be marked in blue (in this example, Automatic). The default protocol will be marked in the display by a ●. The ARGUS will use the default protocol for the PRI connection.



Open the next higher menu without making any changes. The ARGUS will continue to use the default setting.

The ARGUS will use the marked setting as the default and return to the next higher menu.

| Setting | Explanation |
|---|---|
| **Protocol** | Instead of allowing the ARGUS to automatically determine the protocol (setting: Automatic), it is also possible to manually set the Layer-3 D-channel protocol. The ARGUS will save the protocol setting permanently, i.e. it will use this protocol the next time that it is switched on.<br>Default setting: ***Automatic*** |
| **Alerting mode** | You can specify whether, for an incoming call on a PRI point-to-point access, the ARGUS should display only the access number without extension or the complete number with extension.<br>If it is set to “Manual”, the ARGUS will display the extension (an incoming call will be signaled. The ARGUS will send the Layer 3 message “Alert” when it accepts the call. The digits of the extension that have been sent by this point will be displayed.).<br> With the Manual setting, an incoming call must be answered within 20 seconds or it will be lost. Furthermore, you should note that the remote subscriber will not hear a ringing tone.<br>If it is set to “Automatically”, the ARGUS will only display the access number without extension or, depending on the configuration of the access in the exchange, it may not display the number called at all.<br>Default setting: ***Automatic*** |
| **Clock mode** | This parameter sets where the clock will be generated in the case of a BRI or PRI access. You can either specify that the ARGUS generates the clock (is Master) or that it is the slave of a clock generated at the other end (Slave).<br>Default setting:<br>NT mode ***Master***<br>TE mode ***Slave***<br>Leased line ***Slave***<br>This setting will not be saved permanently, rather only applies for the current measurement. |

<table>
<tr><td>PRI termination</td><td>Depending on the transmission technique (75 Ohm coaxial-cable or twisted-pair cable with an impedance of 120 Ohms) used, the PRI termination resistor must be selected accordingly.<br><br>The default setting is country-specific and corresponds to the system most common in the respective country:<br>Germany, Austria, England, the Netherlands, France: 120 Ohm<br><br>Spain, Italy, Greece: 75 Ohm</td></tr>
<tr><td>PRI haul mode</td><td>The ARGUS can set the sensitivity on a PRI access.<br><br>By default, “short haul” will be suggested.<br><br>short haul: Normal sensitivity, i.e. signal reception with cable attenuation of up to ca. -10 dB.<br><br>long haul: Increased sensitivity, i.e. signal reception with cable attenuation of up to ca. -35 dB. This corresponds to a distance of 1600 m with 22 AWG twisted pair cable.<br><br>When using greater sensitivity (“long haul” mode) on longer lines, feedback on the line can cause faulty synchronisation.</td></tr>
<tr><td>Sa5 bits</td><td>The ARGUS can set the Sa5 bits on a PRI access. By default, the Sa5 bits are set to 0000.<br><br> The Sa5 bits have no significance between an NTPM and a PBX system.<br><br>This setting will not be saved permanently, rather only applies for the current measurement.<br><br>Sa5 coding | Meaning | Meaning<br>0000 | Network -> Terminal | Terminal -> Network<br>1111 | Direction code | Ack. for loop command<br>---------- | Direction code</td></tr>
</table>

<table>
<tr><td>Sa6 bits</td><td>The ARGUS can set the Sa6 bits on a PRI access.<br>By default, they are set to 0000.<br>This setting will not be saved permanently<br><br>
<table>
<tr><th>Sa6 coding</th><th>Meaning</th><th>Meaning</th></tr>
<tr><td>0000</td><td>Network -> Terminal<br>Setting for normal operation (default)</td><td>Terminal -> Network<br>Setting for normal operation, idle (default)</td></tr>
<tr><td>1010</td><td>Switches a loop in the NTPM.<br>In the permanent circuit mode, a BERT can then be performed using the loop setup there.<br>Important: The ARGUS must be set to “Leased line” even if it is a dialup access!</td><td>----------</td></tr>
<tr><td>1111</td><td>Switches a loop in the LEPM.<br>In the permanent circuit mode, a BERT can then be performed using the loop setup there. Important: The ARGUS must be set to “Leased line” even if it is a dialup access.</td><td>AIS on $U_2$ (incoming side) of the NTPM</td></tr>
</table>
</td></tr>
<tr><td>A bit</td><td>Using the ARGUS, you can set the A bit on a PRI access.<br>By default, it is preset to A=0 (automatic).<br>This setting will not be saved permanently</td></tr>
<tr><td>CRC4 mode</td><td>CRC4 monitoring can be switched on or off manually.<br>By default, it is preset to CRC4.<br>This setting will not be saved permanently</td></tr>
</table>

| | |
|---|---|
| **Call parameters** | Two different parameters can be set for calls generated (on a PRI access) on both the network-side (ARGUS in NT mode) and on the user-side (ARGUS in TE mode):<br>1. Type of number (TON) for the CGN (=CGPN) or CDN (=CDPN) element of a SETUP signal<br>Network-side: Net CGN TON / Net CDN TON<br>Default setting: ***Automatic***<br>2. Numbering Plan (NP) for the CGN (=CGPN) or CDN (=CDPN) element of a SETUP signal<br>Network-side: Net-CGN-NP/ Net-CDN-NP<br>User-side: User CGN NP / User CDN NP<br>3. CGN/CDN Subaddress<br>CGN/CDN Subaddress type: User specific and NSAP<br>Default setting: ***User specific***<br>4. UUI (User User Info) |
| **Services** | Up to three user-specific services (user spec.1 to user spec.3) can be entered and saved. The three Info elements, BC, HLC and LLC (switch using the left softkey) must be entered for each user specific service in hexadecimal using the keypad and softkeys **<A ... F>** (e.g. to enter a C press the softkey three times, to enter an F press it six times). |
| **Call acceptance** | If the ARGUS is set to “own MSN/DDI“ and is in TE mode on a P-P access, it will only signal those calls which are placed to the DDI of the access under test.<br>If set to “all MSN/DDI”, the ARGUS signals all calls.<br>The prerequisite for this is (This setting will be saved permanently): The own call number must be entered in speed-dialing memory under "own number" (see the ARGUS main Manual)<br>Default setting: ***all MSN/DDI***. |
| **Voice coding** | Two codes are available for coding voice data in a B-channel (this setting will be reset to the default when the ARGUS is switched off): µ-law and ***a-law*** (default setting) |

### 4.4 Bit error rate Test

The bit error rate test (BERT = Bit Error Rate Test) is used to check the transmission quality of the access circuit.

As a rule, the network operator will guarantee an average error rate of $1 \times 10^{-7}$, in other words in long-term operation 1 bit error in 10 million transmitted bits. A higher bit error rate will be especially noticeable in transmitting data.

The application program detects the errors in the data blocks transmitted and requests that the remote partner send them again, which reduces the effective throughput of the PRI connection.

In the bit error rate test, the tester establishes a PRI connection to a remote tester (end-to-end) or calls itself (self call), sends a standardized (quasi-) random number string and compares the received data with that which was sent. The individual bit errors are summed and depending on the test procedure and equipment evaluated in accordance with the ITU Guideline G.821.

During the test, the ARGUS counts the bit errors and after the test is done it calculates the bit error rate and other parameters in accordance with the ITU-T G.821 standard.

As a rule, the quality of the network operator’s access circuits is quite good. Therefore, no bit errors should occur in a one-minute test. However, if an error occurs, the test should be repeated with a measurement time of 15 minutes to achieve higher statistical precision. The access circuit is heavily distorted, if more than 10 bit errors occur within a test period of 15 minutes.

Contact the network operator or the supplier of the PBX equipment and ask them to test your access circuit.



In the case of an NGN (Next Generation Network), where a packet-switched network segment may follow a circuit switched one, please explicitly select "UDI 64k" as the service for the BERT. Then the ARGUS will, in accord with RFC 4040, switch to clear mode, deactivate the echo canceler and not use a codec.

The BERT can be performed in three different ways:

1. **BERT in an extended self call**

   A remote number is not needed, since the ARGUS sets up the PRI connection to itself. In this case, the ARGUS requires two B-channels for the test.

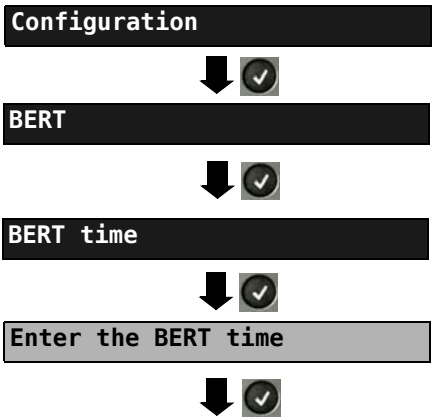
2. **BERT with a loopbox**

   A loopbox (e.g. another member of the ARGUS family of testers at the remote end) is required. The test uses one B-channel.

3. **BERT end-to-end**

   This test requires a waiting remote tester (e.g. a second ARGUS in the "BERT wait" mode*).* (see page 32 BERT wait) A bit pattern is sent to this remote tester. Independent of the received bit pattern, the remote tester uses the same algorithm to generate the bit-pattern that it sends back. Therefore, both directions are tested independently.

### 4.4.1 Setting the BERT Parameters



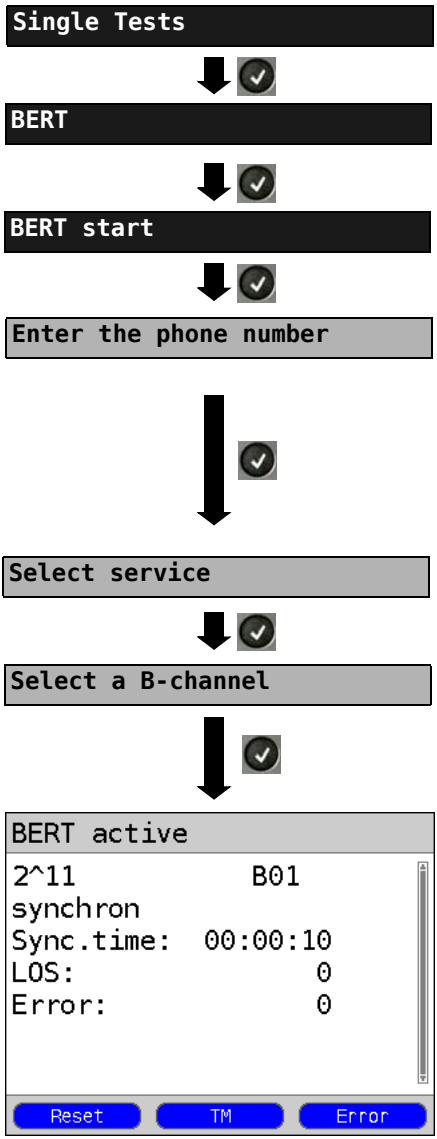

The ARGUS - Main menu

The procedure for configuring a parameter will be illustrated with a single example: The default settings for the parameters can be restored at any time (see the ARGUS main Manual).

The ARGUS sets the value entered as the default BERT time and returns to the next higher menu.

| Setting | Explanation |
|---|---|
| **BERT time** | You can use the keypad to enter measurement times ranging from 1 minute to 99 hours and 59 minutes (= 99:59).<br><br>If the time is set to 00:00 (=BERT with unlimited measurement time), the BERT will not stop automatically. In this case, the BERT must be terminated manually by pressing the .<br>Default setting: ***1 minute*** |
| **Bit pattern PRI** | This function is used to select the bit pattern to be sent cyclically by the ARGUS to perform a BERT on a PRI access (see “Bit patt. BRI/U”).<br>($2^{15}$-1= ***default setting***). |
| **Error level** | This is the level used to evaluate whether the BERT had an "acceptable" bit error rate.<br>If the BERT has a bit error rate, which exceeds this error level, the ARGUS will display a "NO" as the test result.<br>Using the keypad, this parameter can be set to any value from 01 (= $10^{-01}$) to 99 (= $10^{-99}$).<br>The default threshold (error level) is ***10***$^{-06}$ (1E-06). That means that, in the event that the bit error rate is less than $10^{-06}$ (one error in $10^6$ = 1,000,000 sent bits), the bit error rate test will be evaluated as OK. |
| **HRX value** | Setting the HRX value<br>(Hypothetical Reference Connections, see the ITU-T G.821)<br>Using the keypad, you can enter a value ranging from 0 to 100%.<br>Default setting: ***15 %*** |

### 4.4.2 BERT start




The ARGUS - Main menu

The ARGUS opens the speed-dialing memory (see the ARGUS main Manual). Enter/dial your own number to perform the BERT in an extended call to oneself (two B-channels). Enter/dial a remote number for a BERT to a loopbox (one B-channel) or end-to-end.

<↓> Scroll through the speed-dialing
<↑> memory.

Using the cursor keys, select the service which should be used for the BERT.

Enter the B-channel on the keypad (first press **<Delete>**). If you enter an *, the ARGUS will choose any B-channel that is free.

BERT start

After the connection has been setup and synchronized in both the send and receive directions, the ARGUS will display:

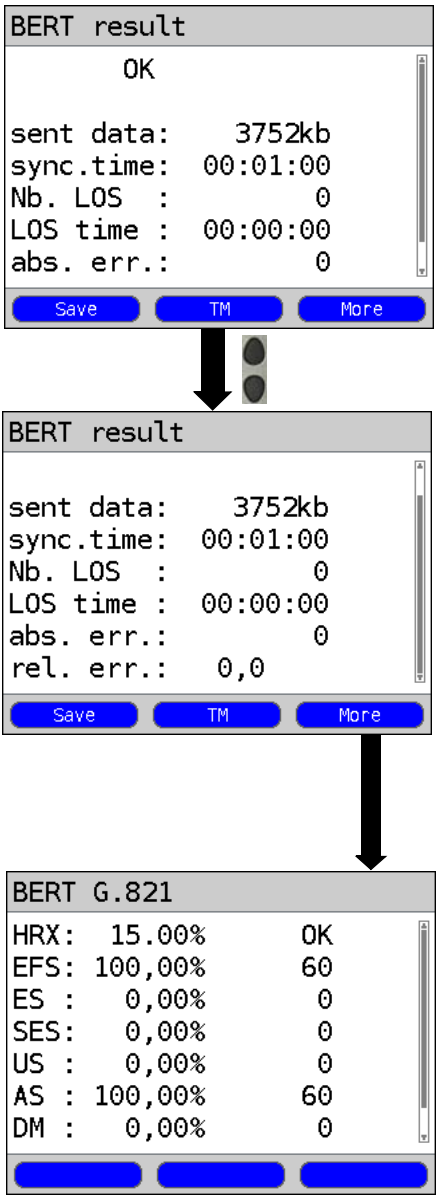
- the bit pattern and B-channel / bit rate used
- Synchronicity of the bit pattern (in the example, synchron)
- Sync.time in h:min:sec (The time in which the ARGUS can sync to the bit pattern)
- LOS-counter: shows the absolute number of synchronisation losses. synchronisation is lost at an error rate greater than or equal to 20 % within a period of a second.
- The number of bit errors that have occurred

| | |
|---|---|
| **<Error>** | The ARGUS will generate an artificial bit error, which can be used to test the reliability of the measurement (in particular for end-to-end tests). |
| **<TM>** | Opens the Test Manager, see page 66 |
| **0-Key** or **<Reset>** | Restarts the BERT. The test time and number of bit errors will be reset. |
|  | Stop the BERT |

When a bit error is detected the ARGUS will sound a brief alarm. When synchronisation has been lost, the ARGUS will sound a constant alarm (see the ARGUS main Manual), if one has been configured earlier.

After the BERT is over, the ARGUS will display the cause and the location which initiated the disconnect. If the test ran normally, the ARGUS will display “Active clearing” on this line.

**BERT results:**




To scroll through the results

- The evaluation of the results depends on the error threshold that you set (in the example, OK).
- sent data (data transferred) (K = 1024 bits, k = 1000 bits)
- sync.time in h:min:sec (The time in which the ARGUS can sync to the bit pattern)
- Nb. LOS (counter) synchronisation is lost at an error rate greater than or equal to 20 % within a period of a second. The absolute number (Nb.) of synchronisation losses will be shown.
- LOS time: Duration of the BERT minus the sync. time (The time in which the ARGUS could not sync to the bit pattern after it had been in sync at least once)
- abs. err.: The number of bit errors
- rel. err: Bit error rate (e.g. 9.7E-07 = $9.7 \cdot 10^{-7}$ = 0.00000097)

Display of other characteristic values (in accordance with ITU-T G.821)

All values are given in percentages and absolute values.
The ARGUS evaluates whether the test results satisfy the limits specified in the G.821 under consideration of the reference connection (HRX).
(The display will show either OK or NO).

To scroll through the results

Return to the previous display

**Characteristic values (in accordance with ITU-T G.821)**

**HRX** Defines the hypothetical reference connection

**EFS** Error Free Seconds:
The number of seconds in which no error occurred.

**ES** Errored Seconds:
The number of seconds in which one or more errors occurred.

**SES** Severely Errored Seconds:
The number of seconds in which the bit error rate is greater than $10^{-3}$.
In one second, 64,000 bits are transferred, thus BitErrorRate (BER) = $10^{-3}$ equates to 64 bit errors.

**US** Unavailable Seconds:
The number of all sequentially adjacent seconds (at least 10 sec) in which BER > $10^{-3}$.

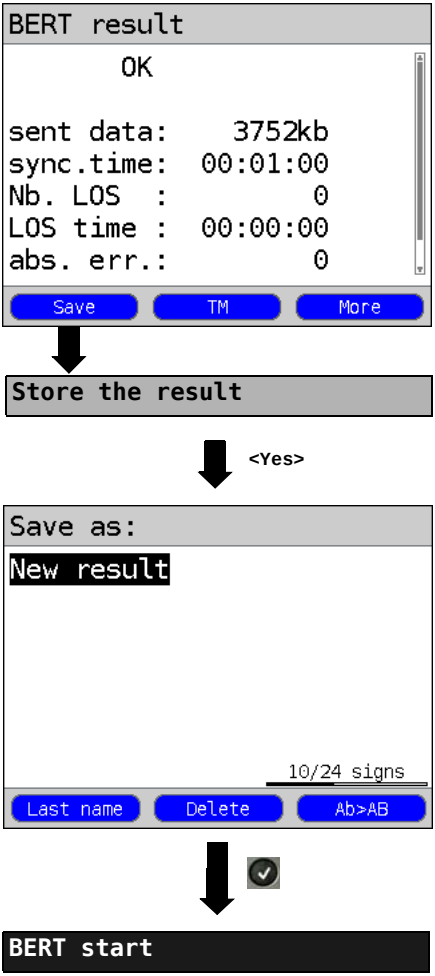
**AS** Available Seconds:
The number of all sequentially adjacent seconds (at least 10 sec) in which BER < $10^{-3}$.

**DM** Degraded Minutes:
The number of minutes in which the bit error rate is greater than or equal to $10^{-6}$.
In one minute, 3,840,000 bits are transferred, thus a BER = $10^{-6}$ corresponds to 3.84 bit errors (3 errors = NO (no degraded minutes), 4 errors = OK (Degraded Minutes).

**LOS** Loss of Synchronize:
synchronisation is lost at an error rate greater than or equal to 20 % within a period of a second.
The absolute number of synchronisation losses will be shown.

### 4.4.3 BERT saving

The ARGUS can store the results of several BERTs. The ARGUS saves the results together with the date, time and call number of the access under test (if this number has been entered as the "own" number in the speed-dialing memory, see the ARGUS main Manual) in the next free memory location. If all of the memory locations are used, the ARGUS will select the oldest test results to be overwritten.

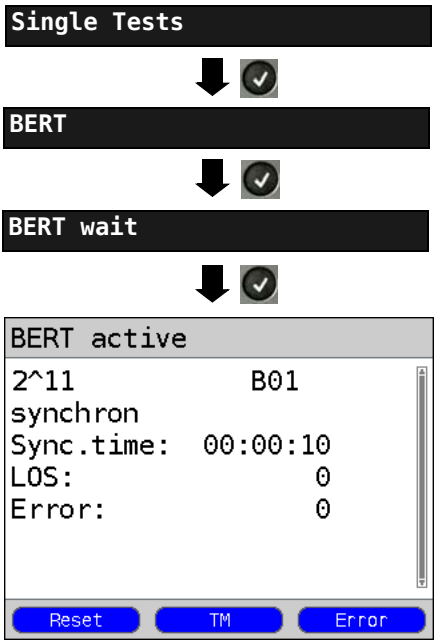



Using the numeric keys, enter the name under which the ARGUS should save the results (see the ARGUS main Manual). By default, the ARGUS will use the call number last used as the record name.

Save BERT results

### 4.4.4 BERT wait

In “BERT wait” mode, the ARGUS will wait for the BERT at the remote end which is necessary for an end-to-end test:




The ARGUS - Main menu

Activate "BERT wait“

The ARGUS first waits for a call and then sets up the connection. During the connection, the received bit pattern will be evaluated and an additional independent bit pattern will be sent.

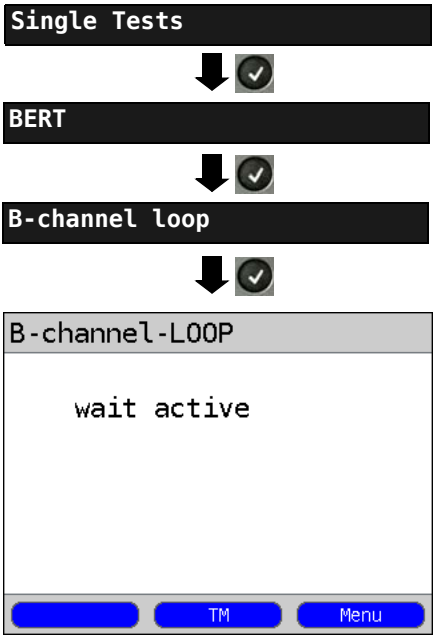
**<TM>** Opens the Test Manager (page 66)

For information on the displays shown, see "BERT start“ on page 27.

Display BERT results

### 4.4.5 B-channel loop

“B-channel loop” mode is required in order to run a bit error rate test using a loopbox (an ARGUS is the loopbox) at the remote end.



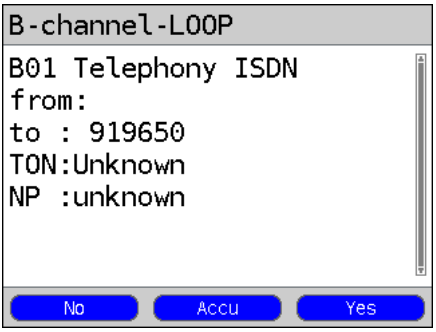

The ARGUS - Main menu

Activate a “B-channel loop”
The ARGUS will wait for a call. Any incoming call (regardless of the service) will be taken immediately. The ARGUS will switch a loop back in the B-channel that is specified by the exchange and then send (loop) the received bit pattern back to the caller/sender.

**<Menu>** Open the Main menu:
the “B-channel loop” remains active.
A second B-channel loop connection can be started from
this menu or from the **<TM>**.
From the **<TM>** (see page 66)
the ARGUS will return to the
"B-channel loop wait active" display.

**<TM>** Opens the Test Manager (page 66)

Exit “B-channel loop” mode




Display shown after taking a call:

- B-channel used and service
- The caller's number (from:)
- The number dialed (to:)
- If available: TON, NP, UUI etc.

**<TM>** Opens the Test Manager (page 66)

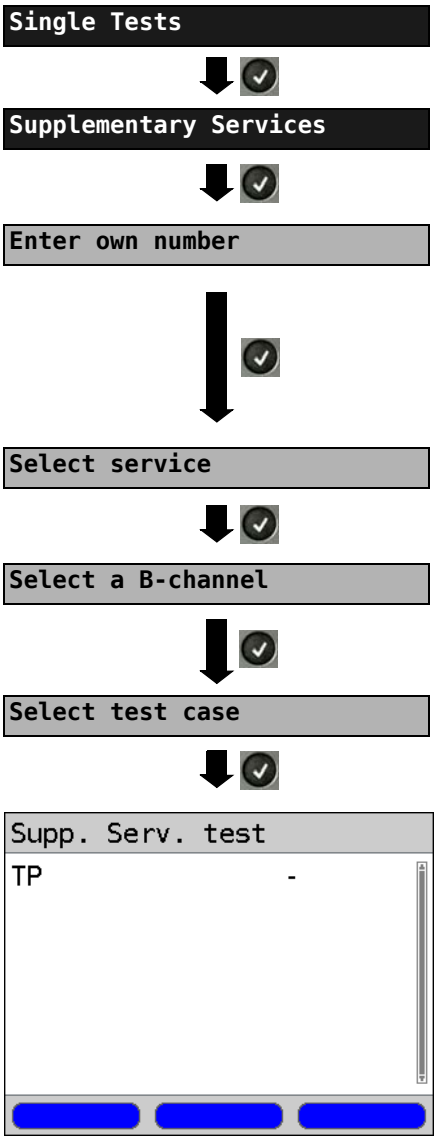
**<Menu>** Open the Main menu.

Clear down the B-channel loop connection, the B-channel loop, however, remains active!

## 4.5 Supplementary Services Test

The ARGUS checks whether the access under test supports supplementary services.

### 4.5.1 Supplementary Services on DSS1




The ARGUS - Main menu

The speed-dialing memory will open (see the ARGUS main Manual).

< ↓ > Scroll through to your own call number (the number of the access under test) or enter it using the keypad.
< ↑ > The ARGUS will test the availability of the supplementary service (in part by placing a call to itself).

Using the cursor keys, select the service which should be used for the supplementary services test.

Enter the B-channel on the keypad. The ARGUS selects the B-channel used last. If you enter an "*", the ARGUS will choose any B-channel that is free.

Select the supplementary service, which the ARGUS should determine whether it is supported by this access.

Start test

Display the test results:

| | | |
|---|---|---|
| + | = | suppl. service supported |
| - | = | suppl. service not supported |

To scroll through the results

Close the results display.
Open the next higher menu.

### 4.5.2 Error Messages

If an error occurs during the Supplementary Services Tests or if it is not possible to setup a call, the ARGUS will display the corresponding error code (e.g. 28).
Example: The error code 28 equates to "wrong or invalid number" (see the ARGUS main Manual).

## 4.6 Service Tests

The ARGUS checks, which of the following services are supported by the access under test:

| Service | Name displayed on the ARGUS |
|---|---|
| Language | **Language** |
| Unrestricted Digital Information (data telecommunications) | **UDI 64kbit** |
| Audio 3.1 kHz | **3.1kHz audio** |
| Audio 7 kHz | **7 kHz audio** |
| Unrestricted Digital Information with Tones & Announcements | **UDI-TA** |
| Telephony | **Telephony PRI** |
| Telefax Groups 2/3 | **Fax G3** |
| Fax Group 4 | **Fax G4** |
| Combined text and facsimile communication | **Mixed Mode** |
| Teletex Service basis mode | **Teletex** |
| International interworking for Videotex | **Videotex** |
| Telex | **Telex** |
| OSI application according to X.200 | **OSI** |
| 7 kHz Telephony | **Telephony 7kHz** |
| Video telephony, first connection | **Video telephony 1** |
| Video telephony, second connection | **Video telephony 2** |
| Three user-specific services | **User-specified 1 to 3** |

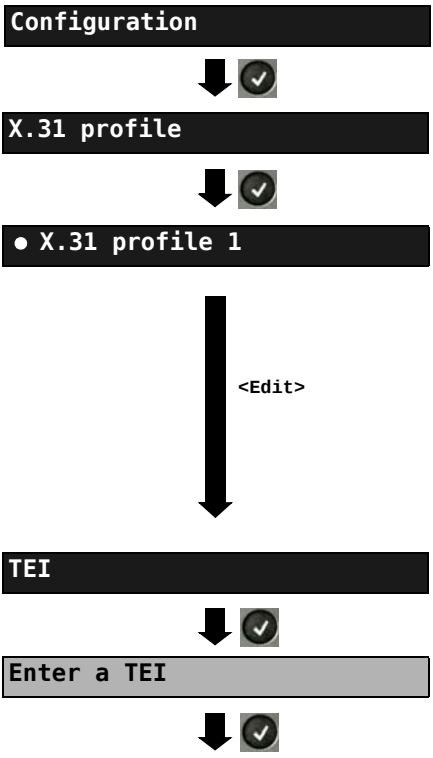
(see the ARGUS main Manual)

## 4.7 X.31 Test

The ARGUS will perform a “Manual X.31 Test” or, if desired, an “Automatic X.31 Test”:
In the case of an automatic test, the ARGUS will first setup the D-channel connection and then an X.31 connection. The ARGUS will then automatically clear the connection and display the results.

In the case of a manual test, the ARGUS will setup a D-channel connection and an X.31 connection. The duration of this connection is determined by the user (or the remote end). For the duration of the connection, the ARGUS will repeatedly send a predefined data packet. The ARGUS will count all of the data packets sent and received and will display (where possible) the contents of the data packets received.

### 4.7.1 Setting the X.31 Parameters




The ARGUS saves the TEI entered and returns to the next higher menu.

The ARGUS - Main menu

The ARGUS stores the parameters for the X.31 in the three X.31 profiles.

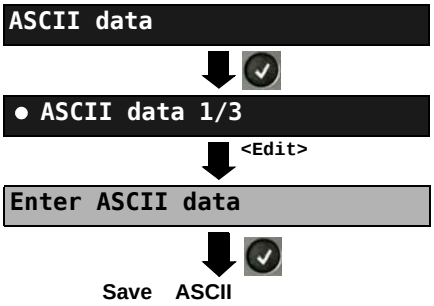
Mark a profile for editing. The selected profile will be marked blue in the display. The default profile will be marked in the display with a ●. The ARGUS will use the parameters in the current profile for the X.31 test.

The ARGUS takes over the marked profile as the default and returns to the Settings menu.

It is possible to restore the default settings for the parameters (see the ARGUS main Manual).

| Setting | Explanation |
|---|---|
| **X.31 profile:** | |
| **Packet number** | Number of packets sent<br>Default setting: ***10*** |
| **TEI** | Entry (from the keypad) of the TEIs (Terminal Endpoint Identifier) to be used in the X.31 test. If you enter **, the ARGUS will automatically select a TEI. Minimum 0 to a maximum of 63 |
| **LCN** | Use the keypad to enter the LCN (Logical Channel Number) to use in the X.31 test.<br>Default setting: ***1*** |
| **Packet size** | The size of the data packets<br>Default setting: ***128 Bytes*** |
| **Agree Packet size** | Negotiate with the network side (DCE) regarding the data packet size. If the desired data packet size is larger than the default, this parameter should be set to “yes”.<br>Default setting: ***No*** |
| **Window size** | Window size of Layer 3<br>Default setting: ***2 Packets*** |
| **Negotiate window size** | Negotiate between the terminal (DTE) and the network (DCE) an agreement regarding the window size.<br>Default setting: ***No*** |
| **Throughput** | Data throughput in bits/sec<br>Default setting: ***1200 bit/s*** |
| **Agree Throughput** | Throughput agreed<br>Default setting: ***No*** |

**User data** Content of the user data: Format setting of the user data:

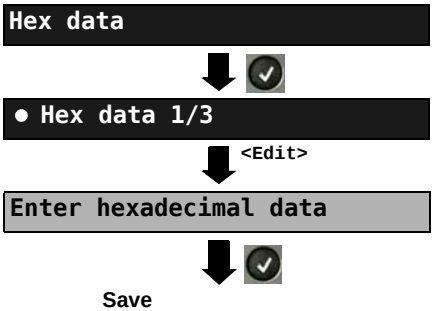



- Entry of the ASCII data

Use the cursor keys to select one of the three available memory locations for the ASCII data (in this example, the first location 1/3)

Use the numeric keypad to enter the ASCII data. When the right softkey is pressed it assumes a different meaning and thus influences the entries made from the keypad:

| | |
|---|---|
| **<12>ab>** | Entry of the digits 0 to 9 plus * and # |
| **<ab>AB>** | Entry of the lowercase characters and @, /, -, and . (e.g. to enter a “c” press the “2” on the keypad three times) |
| **<AB>12>** | Entry of the uppercase characters and @, /, - and . |
| | Move the cursor |
| **<Delete>** | Delete the character before the cursor |
| | Do not save ASCII data. |




Entry of the hexadecimal data:

Select one of the three available memory locations for the hexadecimal data (in this example, the first location 1/3)

Use the keypad to enter the hex value. To enter the values A...F, use the softkey **<A...F>** (e.g. to enter a C, press the softkey **<A..F >** three times). To confirm the entry, press **<OK>** (the softkey in the middle changes from **<Delete>** to **<OK>**).

| | |
|---|---|
| **<Delete>** | Delete the character before the cursor |
| | Do not save the hexadecimal values. |

| | |
|---|---|
| **D bit** | Local: DCE acknowledges data packets, i.e. flow control on local DTE-DCE path<br>End-to-end: DTE-DTE flow control<br>Default setting: ***Local*** |

| | |
|---|---|
| **Facilities** | Coding for various supplementary services<br>A maximum of 3 facilities can be stored. |
| **Profile name** | Use the keypad to enter the profile name for the X.31 profile. The ARGUS will later display this name for the profile. |

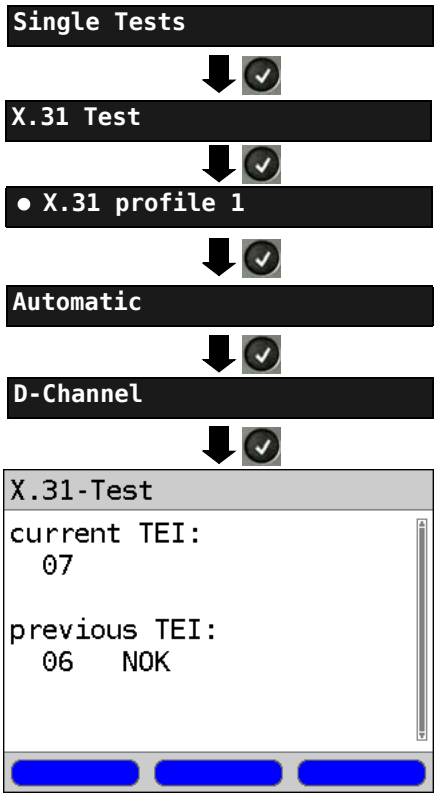
#### 4.7.2 Automatic X.31 Test

### D-Channel

The “X.31 Automatic, D-channel” test consists of two steps:

**1. Step:** The ARGUS tests whether it is possible to access the X.25 service via the D-channel on the ISDN access under test. The ARGUS checks all of the TEIs from 0 to 63 one after the other. All the TEIs, which support X.31service on Layer 2, will be displayed.

**2. Step:** For each TEI with which X.31 is possible on Layer 2, a CALL_REQ packet will be sent and then the ARGUS will wait for an answer. Beforehand, the ARGUS will request the entry of the X.25 access number, which will be saved in speed-dialing memory under X.31 test number. With the entry of the X.25 access number, you can – if you wish – select a logical channel (LCN) other than the default.




The ARGUS - Main menu

Select the profile

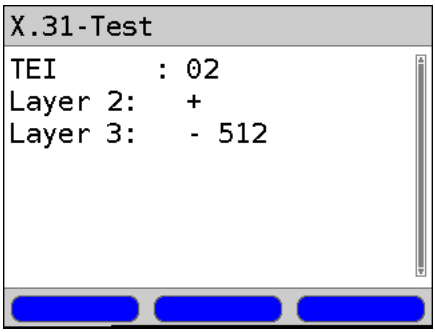
**<Edit>** Change to the profile parameters
The parameters can be edited.

Start test

The start up procedure can take up to 4 minute. The ARGUS will display the currently tested TEI, the previously tested TEI and the results:

**OK** = X.31 is available for this TEI
**NOK** = X.31 is not available for this TEI

**Test results**




The ARGUS will check whether the X.31 service is available for Layer 3 for the TEIs found in Step 1.
Example: Test results

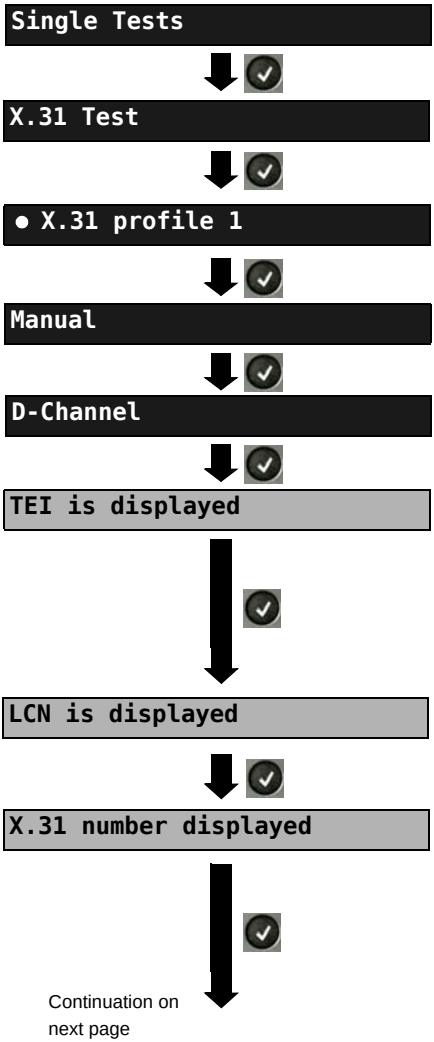
| | | |
|---|---|---|
| **TEI 02** | | The first valid TEI is 02. |
| **Layer 2** | **+** | 1. Test step was successful |
| | **-** | 1. Test step was not successful |
| **Layer 3** | **+** | 2. Test step was successful |
| | **-** | 2. Test step was not successful<br>In this case, the ARGUS will display the relevant X.31 cause for the failure (in the example above: 512) and the associated diagnostic code if there is one. |

If the X.31 service is not supported, the ARGUS will report “X.31 (D) n. impl.”.

#### 4.7.3 Manual X.31 Test

### D-Channel

The ARGUS first requests a TEI, an LCN and an X.31 number (The ARGUS uses the values stored in the X.31 profile.). If an "**" is entered for the TEI, the ARGUS will automatically determine a TEI. Using the first TEI with which X.31 is possible, the ARGUS will setup a connection.




The ARGUS – Main menu

Select a profile.

**<Edit>** Change to the profile parameters
The parameters can be edited.

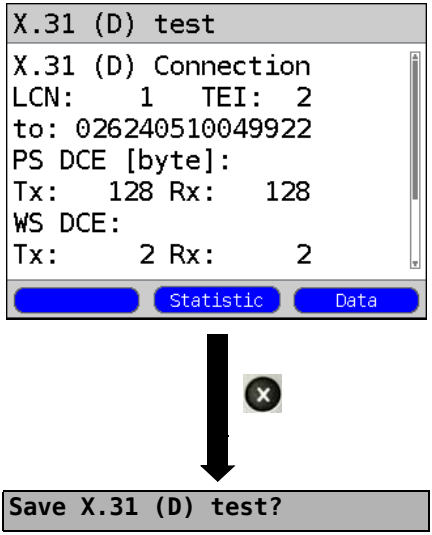
The ARGUS displays the TEI stored in the X.31 profile. It can be edited from the keypad. If you enter „**“, the ARGUS will automatically select a TEI.

**<Delete>** Delete the TEI

The ARGUS displays the stored LCN. It is possible to edit the LCN from the keypad.

The ARGUS displays the X.31 number saved in the speed-dialing memory. It can be edited from the keypad.

Setup a X.31 connection.




The ARGUS will display the LCN, the TEI, the X.31 number and the negotiated connection parameters.

| | |
|---|---|
| **<Data>** | Sends a predefined data packet |
| **<Stat.>** | Press STAT. to display the L1/L2/ L3 statistics. |
| **<L2>** | To scroll to the L2 statistics |
| **<L3>** | To scroll to the L3 statistics |

The X.31 connection will be maintained until the user or the remote end clears it. When the X.31 connection is cleared, the ARGUS will automatically clear the D-channel connection.




| | |
|---|---|
| **<Yes>** | The ARGUS saves the results. |

## 4.8 Connection display

The ARGUS can setup a connection for the following services:

| Service | Display |
|---|---|
| Language | **Language** |
| Unrestricted Digital Information (data telecommunications) | **UDI 64kBit** |
| Audio 3.1 kHz | **3.1 kHz audio** |
| Audio 7 kHz | **7 kHz audio** |
| Unrestricted Digital Information with Tones & Announcements | **UDI-TA** |
| Telephony | **Telephony PRI** |
| Telefax Groups 2/3 | **Fax G3** |
| Fax Group 4 | **Fax G4** |
| Combined text and facsimile communication | **Mixed Mode** |
| Teletex Service basis mode | **Teletex** |
| International interworking for Videotex | **Videotex** |
| Telex | **Telex** |
| OSI application according to X.200 | **OSI** |
| 7 kHz Telephony | **Tele. 7 kHz** |
| Video telephony, first connection | **Video telephony 1** |
| Video telephony, second connection | **Video telephony 2** |
| Three user-specific services | **User-specified 1 to 3** |

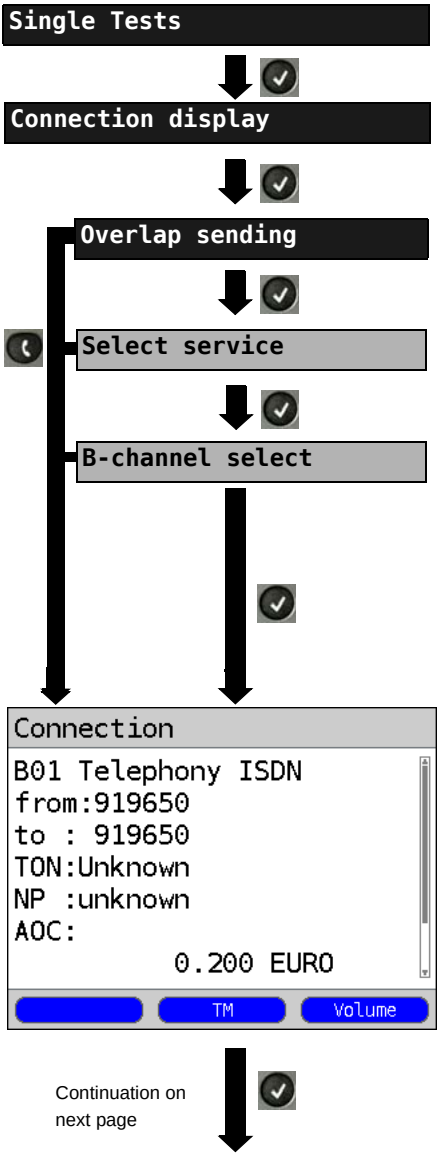
(see the ARGUS main Manual)

A headset or the integrated handset can be used as a phone during a telephone connection.

When a connection is set up, pressing the number keys (0-9) or the * or # will generate and send the corresponding DTMF tones.

### Overlap sending (outgoing call)

In overlap sending, the digits entered for the call number are sent individually.




The ARGUS - Main menu

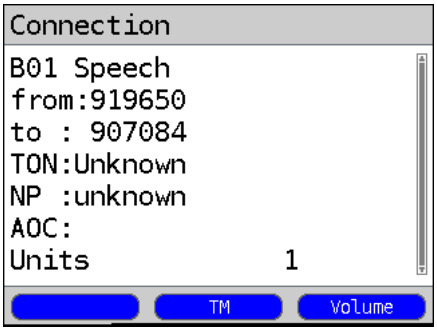
The ARGUS will open the Connection display
Where Overlap sending (such as links) as well as
- En-block sending (see below)
- Redialing (see below)
- Keypad dialing

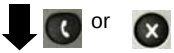
are available.

Select the service to be used for the connection.
Enter the B-channel on the keypad. The ARGUS selects the B-channel used last. To enter a new B-channel, first press **<Delete>**. If you enter an *, the ARGUS will choose any B-channel that is free. The ARGUS will show whether the B-channel is available.
Setup the connection
Enter the number on the keypad.
Display:

- B-channel and service
- The number that is stored in the speed-dialing memory under "Own number", see the ARGUS main Manual (from:)
- The number dialed (to:)
- Other information depending on the access, e.g. TON and NP

| | |
|---|---|
| **<TM>** | Starts the Test Manager (page 66) |
| **<Volume>** | Setting the volume |
| or | Cancel setup |




Disconnect

The connection is setup using B-channel 1.



Depending on the type of access other information will be displayed.
- Subaddress of the caller (SUB)
- Destination number
- User-User Information (UUI)
- Display Information
- Type of number (TON)
- Numbering Plan (NP)
- Units for charges

| | |
|---|---|
| **<Volume>** | Setting the volume |
| **<TM>** | Starts the Test Manager (see page 66) |

**Displaying Advice of Charges (AOC)**

If the charges are not given in units, rather directly as currency, the ARGUS will display the current charges in currency. If, in DSS1, the call charges are not provided in accordance with the DIN ETS 300182 standard, rather in the form of the information element DISPLAY (DSP), the ARGUS will display the DISPLAY message's character string.



**Note regarding the entry of the own call number**

Separate the extension from the access number with a # (e.g. 02351 / 9070-40 is entered on the ARGUS as: 023519070 #40). For an outgoing call, the ARGUS uses the entire call number (without #) as the number called (CDPN or DAD) and, for the calling number, only the extension (DSS1-CGPN or 1TR6-OAD).
A '#' at the beginning of a call number is treated as a valid character. A '#' at the end of the own call number instructs the ARGUS to not send the caller's number for outgoing calls (CGPN or OAD).

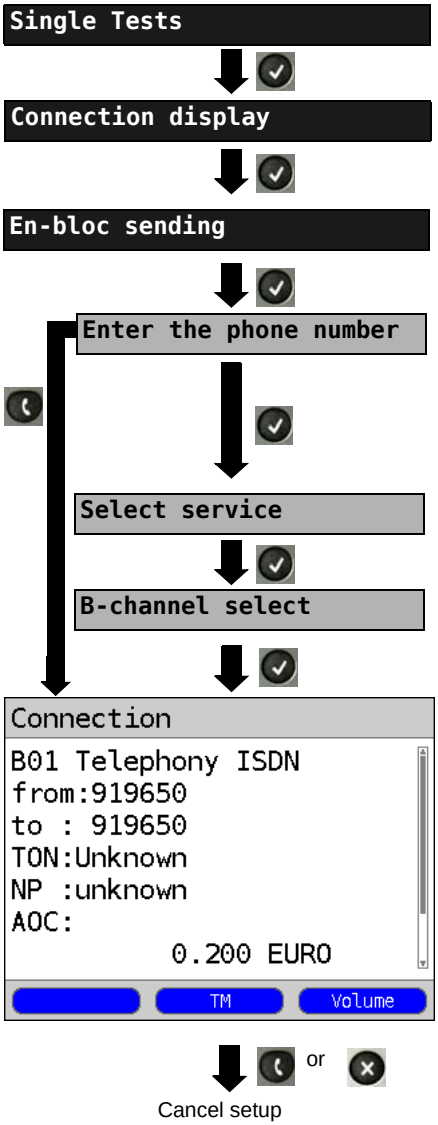


**Simplified overlap signaling using the telephone key**

| | |
|---|---|
| depressed: | The ARGUS will open the Connection/Overlap window directly regardless of the currently open menu. |
| depressed again: | A dial tone will be heard and once the call number is entered, the call will be setup. |

### En-bloc sending (outgoing call)

In en-bloc sending, the ARGUS sends the entire dialing information in one block.




The ARGUS - Main menu

The ARGUS opens the speed-dialing memory (see the ARGUS main Manual). Use the cursor keys to scroll to desired the number or reenter the number on the keypad.

The ARGUS will open the Connection display.
For more information see overlap sending which is similar.

Enter the B-channel on the keypad (for details on entry, see “Overlap sending”).

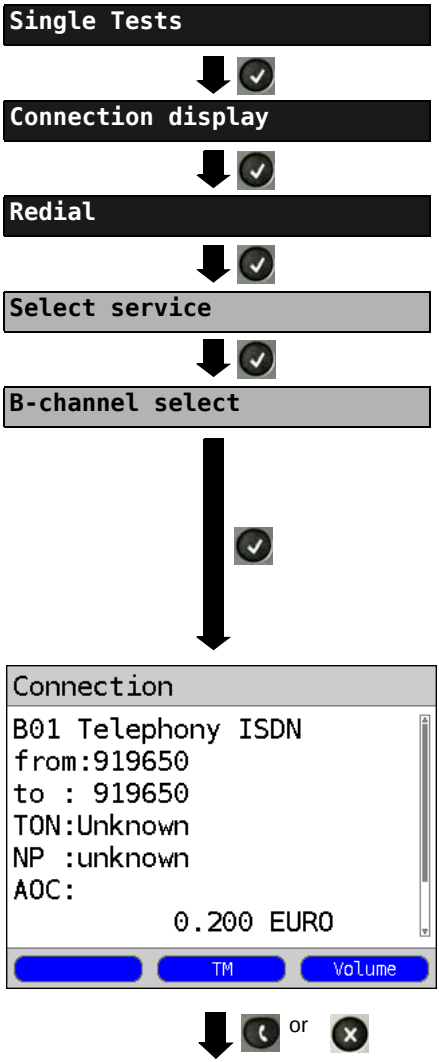
Start the dialing procedure

For more information on the displays and operation, see overlap sending.

| | |
|---|---|
| **<Volume>** | Setting the volume |
| **<TM>** | Starts the Test Manager (page 66) |

### Redial (outgoing call)

The ARGUS will set up a call using the last number dialed.




Cancel setup

The ARGUS – Main menu

Enter the B-channel on the keypad. The ARGUS suggests the B-channel used last. To enter a new B-channel, first press **<Delete>**. If you enter an *, the ARGUS will choose any B-channel that is free. The ARGUS will show whether the B-channel is available.

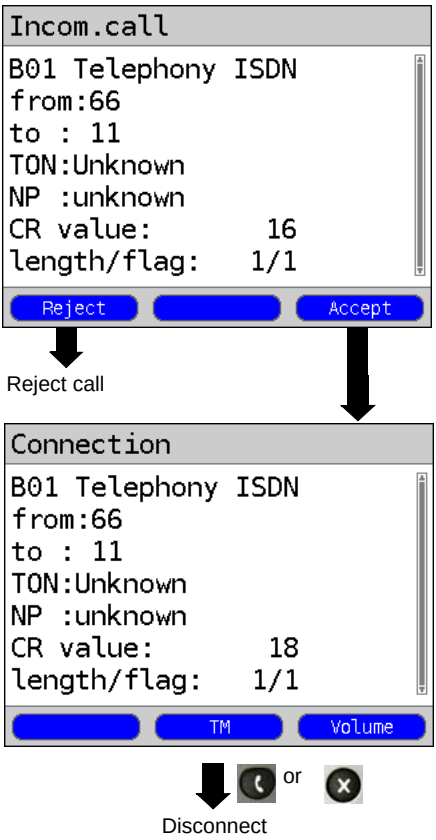
The dialing procedure will begin using the number which was dialed last.

For more information on the displays and operation, see overlap sending.

| | |
|---|---|
| **<Volume>** | Setting the volume |
| **<TM>** | Starts the Test Manager (see page 66) |

### Incoming Call

An incoming call can be taken at any time even when a test (e.g. a BERT) is in process (see page 67). The ARGUS will signal an incoming call with an audible tone and a message on the display. The function Accept call (see the ARGUS main Manual) can be configured so that, on a P-P access, the ARGUS will only signal incoming calls that are placed to its own call number. This function can only be used when the own call number has been entered into the speed-dialing memory (see the ARGUS main Manual) and the incoming call has a call number.




Display:

- B-channel used and service
- The caller's number (from:)
- Destination number (to:)
- Other information depending on the access, e.g. TON and NP

The ARGUS will display the complete destination number (DDI), if the Alerting mode is set to manual (see the ARGUS main Manual).

To take the call.

Depending on the access, additional information will be displayed (in this example, TON and NP).

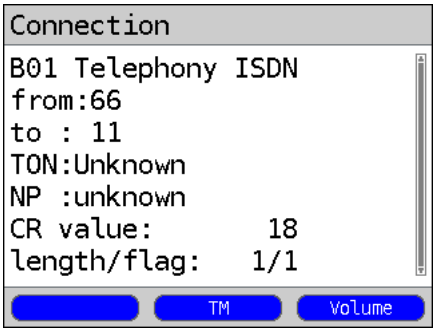
| | |
|---|---|
| **<Volume>** | Setting the volume |
| **<TM>** | Starts the Test Manager (see page 66) |

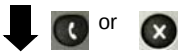
The ARGUS displays the cause of the disconnect (see page 50).

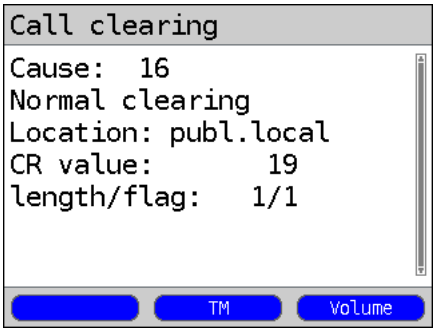
**Charge information in NT mode:**

In NT mode, the ARGUS will – for incoming calls – send advice of charges in accordance with DSS1 as units and as currency (in euros).

### 4.9 Clear down (disconnect) the connection




| | |
|---|---|
| **<Volume>** | Setting the volume |
| **<TM>** | Starts the Test Manager (see page 66) |

The ARGUS will display the cause (see the table below) of the disconnect (e.g. Normal clearing) and the location where the cause occurred (e.g. subscriber).
Depending on the access, additional information will be displayed (in this example, Units).

The following causes are shown in clear text:

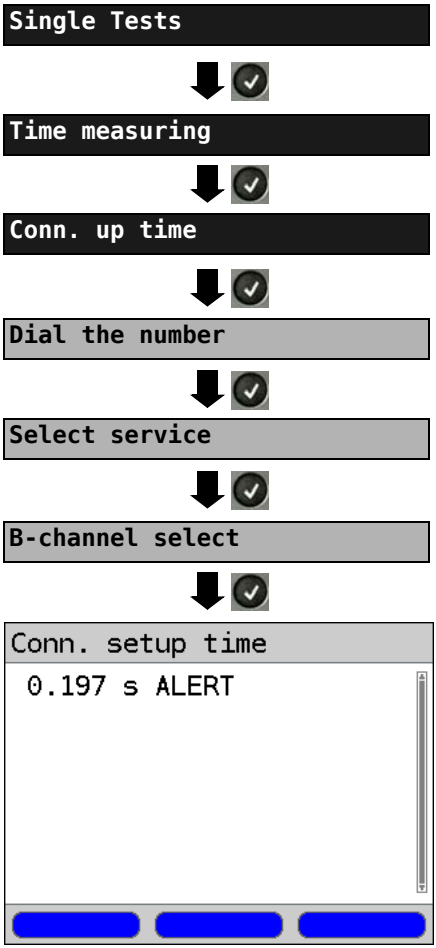
| Reason | Display | Explanation |
|---|---|---|
| **255** | Active clearing | Clearing User actively initiated the disconnection |
| **Length 0** | Normal disconnect | Cause element with length 0 |
| **01** | unalloc. number | No access under this call number |
| **16** | Normal disconnect | Normal disconnect |
| **17** | User busy | The number called is busy |
| **18** | No user respond | No answer from the number called |
| **19** | Call time too long | Call time too long |
| **21** | Call reject | The call is actively rejected |

| | | |
|---|---|---|
| **28** | Wrong number | Wrong call number format or call number is incomplete |
| **31** | Normal disconnect | Unspecified “normal class” (Dummy) |
| **34** | No B-chan.avail. | No circuit / B-channel available |
| **44** | Req.chan.unavail | Requested B-channel not available |
| **50** | Req.fac.not subs | Requested supplementary service (facility) not subscribed |
| **57** | BC not authoriz. | Requested bearer capability is not enabled |
| **63** | Srv./opt.n.avail | Unspecified for “Service not available” or “Option not available” |
| **69** | Req.fac.not impl. | Requested facility is not supported |
| **88** | Incompat. Destination | Incompatible destination |
| **102** | Timer expired | Error handling routine started due to time-out |
| **111** | Protocol error | Unspecified for “protocol error class” |
| **127** | Interworking err | Unspecified for “interworking class” |

Other causes will not be displayed in plain text but will instead be shown as decimal numbers (see "CAUSE Messages - DSS1 Protocol” on page 16).

### 4.10 Connection setup time

The ARGUS places an outgoing call and measures the time between sending the SETUP and receiving the ALERT or CONN. The ARGUS disconnects automatically as soon as the measurement is completed.




The ARGUS – Main menu

The ARGUS opens the speed-dialing memory (see the ARGUS main Manual). Use the cursor keys to scroll to desired the number or reenter the number on the keypad.

Enter the B-channel on the keypad.

Perform measurement

Display:

- Connection setup time in seconds
- L3 message received when the connection has been fully setup

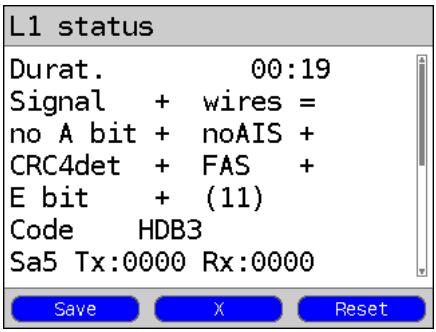
If the ARGUS cannot perform the measurement - e.g. because the call number entered was wrong or no B-channel is free - the cause (see the ARGUS main Manual) will be displayed.

### 4.11 The L1 Status of a PRI Access

The ARGUS displays the Layer 1 alarms and messages, which provide detailed information regarding the state of the PRI access and the transmission line (For further information, see the CCITT/ITU guidelines G.703 and G.704).




The ARGUS - Main menu




The ARGUS displays the time that has elapsed since the ARGUS was initially started or it was last reset in minutes and seconds (00:19).
The measurement time and all Layer 1 alarms and messages are updated continuously.

Use the cursor keys to scroll

**<X>** The PRI relay for the Rx/Tx pin assignment will be toggled to its other position, regardless of the state that it was in before.
This function is only available in the L1 status menu if there is currently no signal. The state of the relay will remain unchanged when you close the L1 status menu.
wires = means that Rx/Tx are normal
wires X means that Rx/Tx are inverted

**<RESET>** Reset the History function and all counters.

**<SAVE>** Save results (see the ARGUS main Manual)

OK symbol: +

Error symbol: -

History symbol: ! This indicates that, regardless of the current state of the access (+ or -), an error occurred during the test period.

**The meaning of the individual displays:**

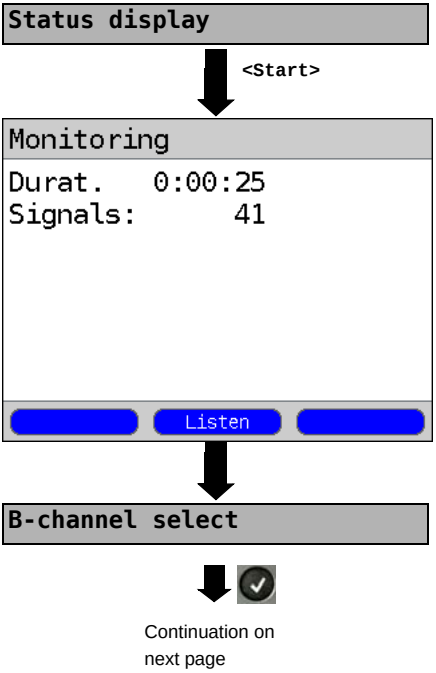
| | |
|---|---|
| **Signal** | The ARGUS has received the correct send signal from the remote end (access or terminal depending on whether operating in TE-Simulation or NT-Simulation mode) and indicates this by displaying a +. If the Rx and Tx are on the usual wires, a "**=**" will be shown after wires; if they are swapped, an "**X**" will be shown instead. |
| **FAS** | Frame Alignment Signal<br>Indicates whether the ARGUS could correctly synchronize with the incoming 2 Mbit data stream's alternating frame identification word or message word and the, perhaps present, CRC4-superframe structure. |
| **CRC4 det** | If CRC4-monitoring is active for the access or the terminal and the ARGUS is able to synchronize itself to the CRC4 superframe, it will indicate this by displaying "CRC det +". If "CRC det –" is displayed together with "Signal +" and "FAS +", this indicates that no CRC4 is active. To prevent power up effects (transients), we recommend that you set the display and counter to a defined initial state with a **<Reset>**. |
| **Code HDB3** | Display the transmission code used (currently set to HDB3) |
| **noA-Bit** | The remote end uses the A-Bit to signal whether the circuit is available on their receive side.<br>noA-Bit + means A = 0: Idle state<br>noA-Bit - means A = 1: Return direction is not available |
| **noAIS** | **A**larm **I**ndication **S**ignal)<br>AIS will be set if a component on the transmission line determines that the signal they have received is faulty (e.g., in the event, that they lose frame synchronisation) and has sent a Time -1 (= AIS) to indicate this.<br>"noAIS = +:" no AIS occurred. |
| **Sa5-Bit (Rx,Tx)** | The "Sa5-Bit (Rx)" sent by the ARGUS can be configured in the Configuration menu (See "Sa5 bits" on page 21 ) |
| **Sa6-Bit (Rx,Tx)** | The "Sa6-Bit (Rx)" sent by the ARGUS can be configured in the Configuration menu (See "Sa6 bits" on page 22 ) |
| **E-Bit** | With the two E-Bits, E1 and E2, the remote end will report any CRC4-errors that it finds on its receive side in the first or second.submultiframe (the E-Bit will be set to 0).<br>"E-Bit11+:" if both E-Bits are set to 1, no error occurred<br>"E-Bit11+!:" A CRC4-error was found (indicated by the "!"), however the circuit is in largest part OK (see the E-Bit counter Ecnt or the CRC4 error counter CRCErr) |

| | |
|---|---|
| **Ecnt** | The E-Bit counter counts the individual E-Bit error messages; i.e. all cases where a faulty CRC4 submultiframe was received (counts at a maximum of 1 kHz) |
| **CRC Err** | The CRC4 error counter totals the number of CRC4 submultiframes in which errors were detected. |
| **CRC rel** | Shows the CRC4 error rate, in other words, the number of faulty CRC4 frames relative to the total number of CRC4 frames received. |
| **Code Err** | Counter for the detected HDB3 transmission code errors |
| **Code rel** | Transmission code error rate |
| **Frm. Err** | Counter for faulty 2Mbit frames. |

When running a MegaBERT unframed in leased line mode, if the menu L1 status is opened (via the  -Key or the Test Manager), the display will only show the parameters Signal and noAIS.

### 4.12 Monitor

The ARGUS accepts all of the D-channel signals from the S-Bus access and sends these D-channel signals over the USB interface to a PC which must be running ARGUS WINplus or WINanalyse. The bus and Layer 1 are not influenced by the monitoring.




Continuation on next page

Monitoring is not yet active!

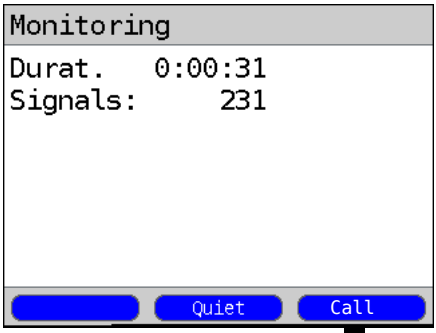
Start monitoring

The ARGUS displays the recording time (duration) in h:min:sec and the number of recorded signals.

Stop monitoring.

Listening-in on voice data

Enter the B-channel from the keypad (first press **<Delete>**) or use the cursor keys to set the B-channel. The ARGUS will switch the handset to this B-channel.




**Display call parameters**

Can listen-in on voice data (direction: Network -----> User).

| | |
|---|---|
| **<Quiet>** | To stop listening |
| **<Talk>** | Parallel call display while monitoring<br>The ARGUS searches all of the D-channel signals sent for a SETUP. If a SETUP is detected, the **<Talk>** softkey will be displayed. |

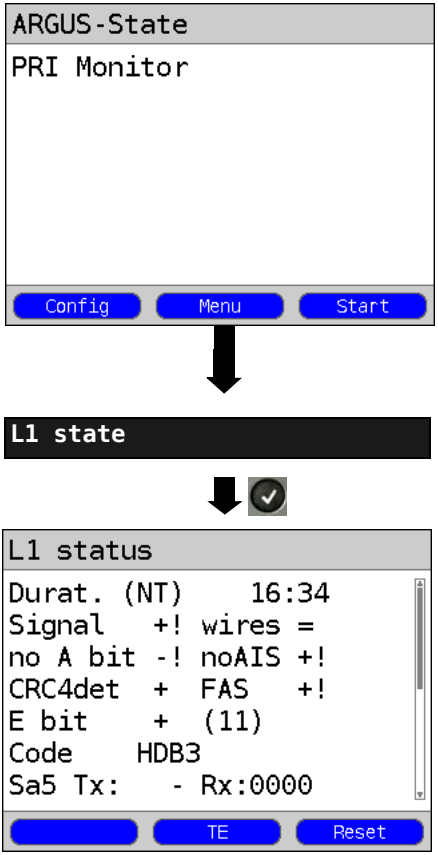
The ARGUS displays the call parameters of the last SETUP received.

As soon as a change occurs, the ARGUS will send a time-stamped report of the following alarms/states to the PC, which will evaluate them:
- Signal
- FAS
- CRC4det
- A bit
- AIS

The ARGUS will check the following values and counters every second and, in the event of a change, will pass them on the PC:
- Sa5-Bit (Rx)
- Sa6-Bit (Rx)
- E-Bit
- Ecnt
- CRC Err.
- Cod.Err.
- Fram.Err.

**Display of the L1 Status in PRI Monitor mode**

The L1 status function is only available in PRI Monitor mode. The Layer 1 alarms and messages are presented in several windows and allow detailed assessments of the state of the PRI access and the transmission line (For further information, see the CCITT/ITU guidelines G.703 and G.704).




The ARGUS in the PRI Monitor Mode Monitoring is not active.

Display of the "NT-side parameters"
Use the cursor keys to scroll through the display

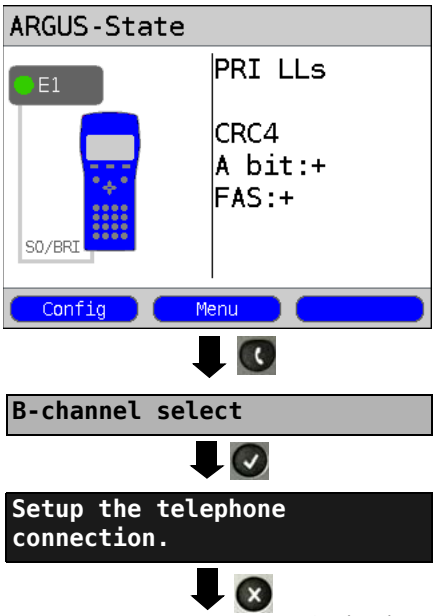
| | |
|---|---|
| **<TE>** | Switch to “L1 status TE”; the “TE-side parameters” will be displayed |
| **<Reset>** | Reset the History function |
| | Quit.<br>The ARGUS will open the Main menu. |

## 4.13 Leased line on a PRI access

Besides dial-up connections to any subscriber, PRI also supports the use of permanent circuits switched to a specific remote location (leased lines). These leased lines (permanent circuits) are available after setting up Layer 1, in other words after synchronizing both terminals by exchanging HDLC-frames. The location where the clock is generated can be selected . A quick test of a leased line can be made by placing or taking a call on a selected B-channel. However, for a more precise test, a bit error rate test should be run.

Both ends of the permanent circuit (leased line) must use the same channel.

### 4.13.1 Telephony




**<Config>** Configuring the PRI parameters

Enter the B-channel from the keypad (first press **<Delete>**) or use the cursor keys to set the B-channel.

The ARGUS will display the B-channel used and the duration of the leased line (in h:min:sec).

**<Volume>** Set the volume

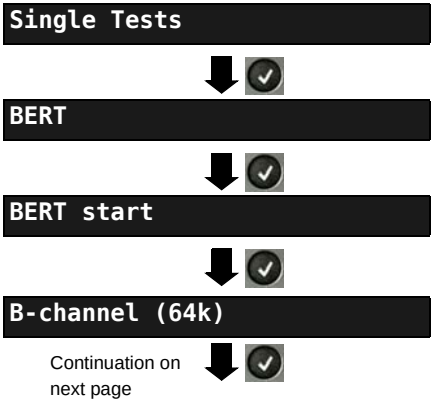
**<TM>** Start the Test Manager (see page 67).
Another connection can be setup.

Alternatively, the connection can be setup via Connection in the Single tests menu.

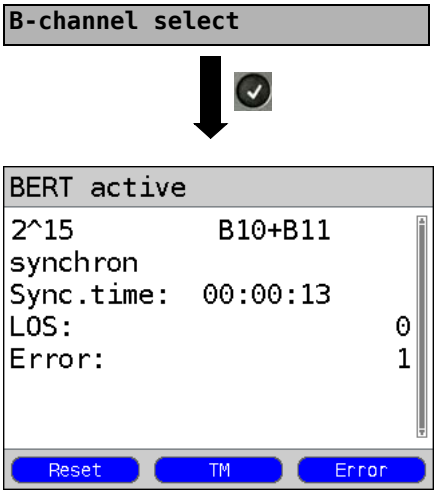
### 4.13.2 Bit error rate Test

There are a number of variants of the bit error rate test: In the simplest case, a B-channel loop will be set up at the remote end. Parameter settings (see page 25).
After selection of the channel to be tested (B-channel or D-channel), the ARGUS will send the test pattern, receive it back and evaluate it accordingly.

The displays and operation are, in largest part, similar to those of a BERT on a dial-up connection, you simply need not enter call numbers or select a service.




In the case of a PRI access in end-to-end mode (see page 59), a BERT can be run:
- in the D-channel
- in a B-channel
  (Select channel: B-channel (64k))
- in two B-channels
  (Select channel: B-channel (128k))
- MegaBERT framed
  (optional: in all B-channels and in the D-channel)
- MegaBERT unframed
  (optional: all B-channels, the D-channel and time slot 0).




Enter the B-channel from the keypad (first press **<Delete>**) or use the cursor keys to set the B-channel.

Start BERT (128k-BERT)

During the BERT, the display shows:

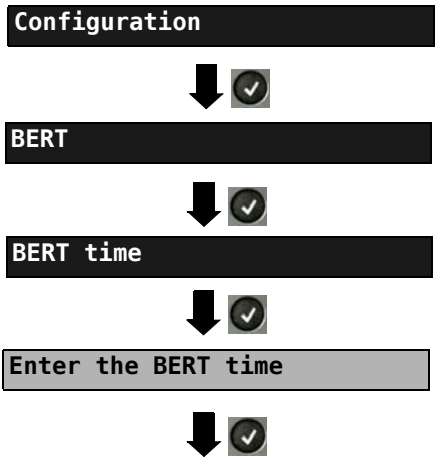
- The bit pattern and channel / bit rate used
- Synchronicity of the bit pattern (in the example, synchron)
- Sync.time in h:min:sec
  The time in which the ARGUS can sync to the bit pattern
- LOS
  synchronisation is lost at an error rate greater than or equal to 20 % within a period of a second. The absolute number of synchronisation losses will be shown.
- Error: The bit errors that have occurred.

| | |
|---|---|
| **<Error>** | Insert artificial bit errors to test the reliability of the BERT. |
| **<Reset>** | The test time and number of bit errors will be reset. |
| **<TM>** | Open the Test Manager (see the ARGUS main Manual) |
| | Stop the BERT<br>Display the test results (see the ARGUS main Manual). |

Saving Test Reports
(see the ARGUS main Manual)

### 4.13.3 Configuration: BERT

The operation is the same for all configurations and will be illustrated with a single example:




The ARGUS - Main menu

Use the keypad to enter the duration of the BERT.

The ARGUS will return to the "BERT config." menu without making any changes.

The ARGUS saves the settings and returns to the next higher menu.

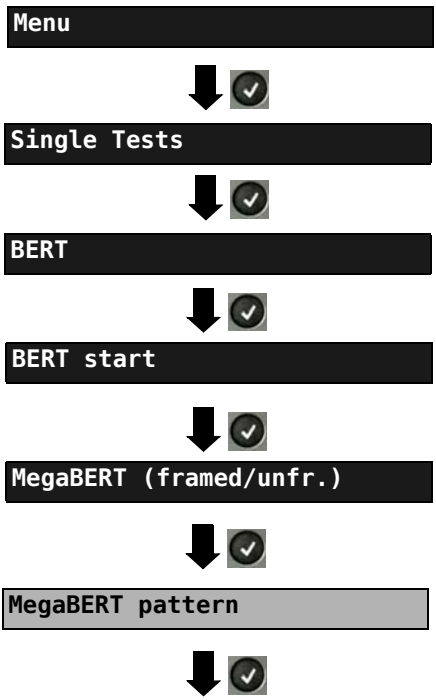
**Settings for the BERT:**

| Display Name on the ARGUS | Remark |
|---|---|
| **BERT time** | You can enter measurement times ranging from 1 minute (default setting) to 99 hours and 59 minutes (= 99:59).<br><br>If the time is set to 00:00 (=BERT with unlimited measurement time), the BERTwill not stop automatically. In this case, the user must terminate the BERT (by pressing the ). |
| **Bit pattern PRI** | This function is used to select the bit pattern to be sent cyclically by the ARGUS to perform a BERT on a PRI access (see "Bit patt. BRI/U"). ($2^{15}$-1= default setting). |

| | |
|---|---|
| **Error level** | This is the level used to evaluate whether the BERT had an "acceptable" bit error rate.<br>If the BERT has a bit error rate, which exceeds this error level, the ARGUS will display a "NO" as the test result.<br>Using the keypad, you can enter a value ranging from 01 (= $10^{-01}$) to 99 (= $10^{-99}$). The default threshold (error level) is $10^{-06}$ (1E-06). That means that, in the event that the bit error rate is less than $10^{-06}$ (one error in $10^{6}$ = 1,000,000 sent bits), the bit error rate test will be evaluated as OK. |
| **HRX value** | Setting the HRX value<br>(Hypothetical Reference Connections, see the ITU-T G.821)<br>Using the keypad, you can enter a value ranging from 0 to 100 %. |

**Setting the MegaBERT bit pattern**

The various MegaBERT bit patterns that are available can be called up in "Leased line" mode as follows:




A distinction is made between two types of MegaBERT in the channel selection:
- MegaBERT framed (31 B-channels)
- MegaBERT unframed (32 B-channels)

The ARGUS will save the setting and start the single test.

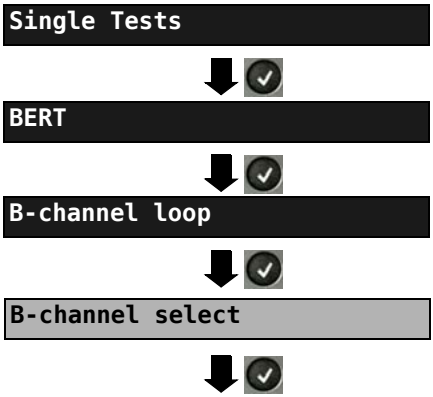
**Menu for selecting the bit pattern to be used for a MegaBERT:**
In a BERT, the ARGUS will repeatedly send the following bit pattern.

| Display on the ARGUS | Remark |
|---|---|
| **2^15-1** | 32767-bit pseudo-random test sequence in accordance with ITU-T O.150 5.3 (longest sequence of zeros = 15) |
| **2^15-1 inverted** | The ARGUS will send the bit pattern described above inverted. |
| **2^20-1/QRSS** | 1048575-bit pseudo-random test sequence in accordance with ITU-T O.150 5.5 (longest sequence of zeros = 14) |
| **2^20-1/QRSS inverted** | The ARGUS will send the bit pattern described above inverted. |
| **Constant NULL** | The ARGUS will only send nulls (zeros). |
| **Constant ONE** | The ARGUS will only send ones. |

### 4.13.4 Loopbox

The ARGUS can be used as a loopbox on a permanent circuit (leased line).

The ARGUS - Main menu




Select channel:
The ARGUS will loop on either one B-channel (channel selection: B-channel) or all B-channels and the D-channel (channel selection: All framed).
In addition, the channel selection "All unframed" can be select:
in which case the ARGUS will loop all B-channels, the D-channel and time slot 0.

The ARGUS will display the B-channel used and how long the loopbox has been activated (in h:min:sec).

Deactivate the loopbox.

### 4.14 Managing Multiple Tests on a PRI Access

The ARGUS can simultaneously start several tests or “connections” independently of each other. As an example, a BERT can be run at the same time that you make a phone call. The individual tests or “connections” use resources.

All of the tests that have been started will be administered by the Test Manager. Using the Test Manager, you can start new tests, switch between tests running in parallel or terminate all of the tests that are currently running.




The ARGUS – Main menu

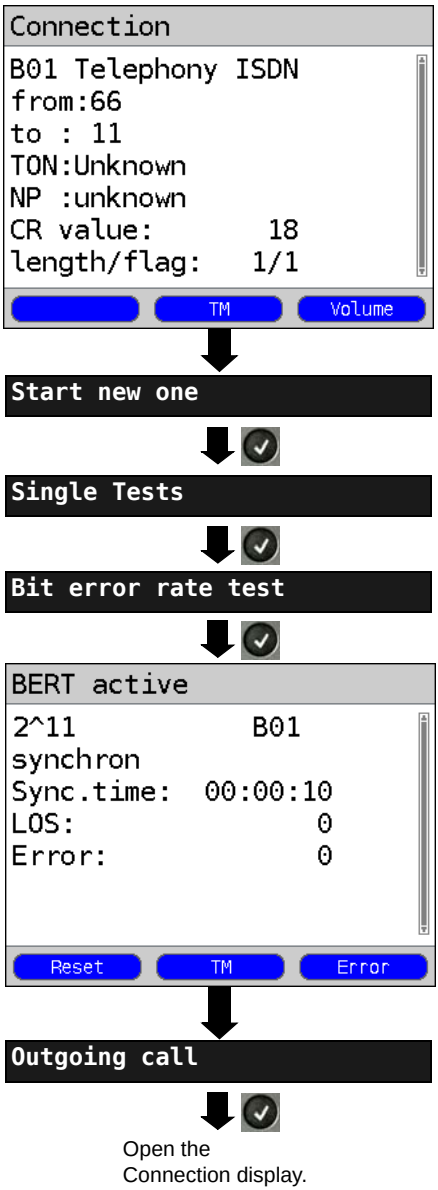
Open the Test Manager

**<TM>**
or


Opens the Test Manager directly in the Single tests menu if a connection has already been setup or if the ARGUS is running a test.

### 4.14.1 Starting Several Tests to Run Simultaneously

**Starting a new test or connection during an existing connection**




Example:
There is a connection on B-channel 1.

Open the Test Manager (can also be opened by pressing the "6" on the keypad).

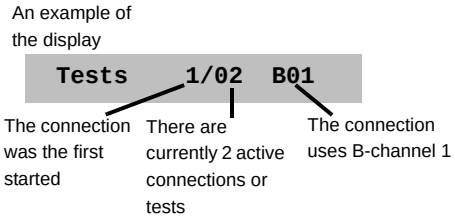
Select desired test
(e.g. bit error rate test, BERT)

Start BERT, the connection is not yet setup.

For information on running a BERT, see page 27

Open the Test Manager.
Mark “Outgoing connection”

Open the
Connection display.




If a test (or connection) is canceled or cleared, the ARGUS will return to the Test Manager if there is another test (or connection) running in the background.

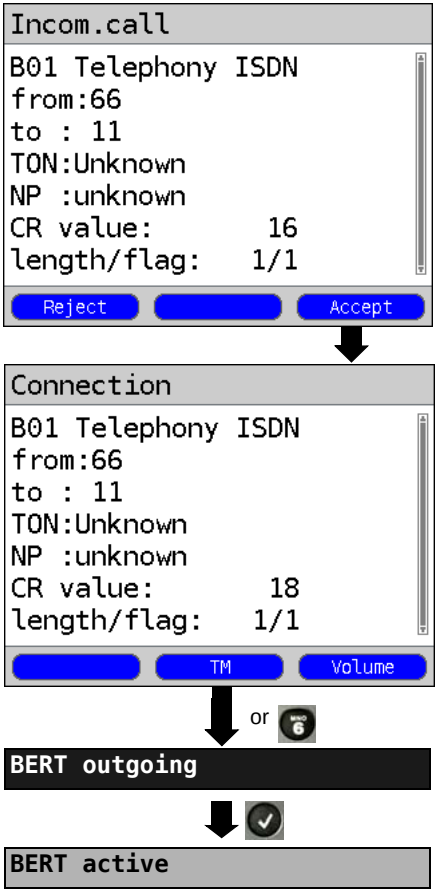
Some tests use so many resources that they cannot be run in every combination with other tests. In this case, the ARGUS will display the message “Test not possible at this time”.

| **Test/ Connection display.** | **Number of times that a test or connection can be started at the same time** | **Switching to another test is possible** |
|---|---|---|
| Incoming call | 30 | Yes |
| Outgoing call | 30 | Yes |
| BERT | 2 | Yes |
| Loop | 2 | Yes |
| Service tests | 1 | No |
| Suppl.serv.test | 1 | No |
| Time measurement | 1 | No |
| CF Interrogation / Active / Clear | 1 | No |

### 4.14.2 Switching between Parallel Tests or Connections

This operation will be illustrated using the example of "Accepting an incoming call during a BERT".

The ARGUS signals an incoming call both audibly and on the display (see page 44). The incoming call can be accepted without influencing the currently running BERT. If either the "B-channel loop" or the "BERT wait" function is active, the call will be accepted automatically.




BERT is running.

While running a BERT, the ARGUS displays information about an incoming call.

**<Reject>** Reject the incoming call. The ARGUS will open the BERT display.

Accept the call.
The BERT will continue in the background.

Mark "BERT outgoing".

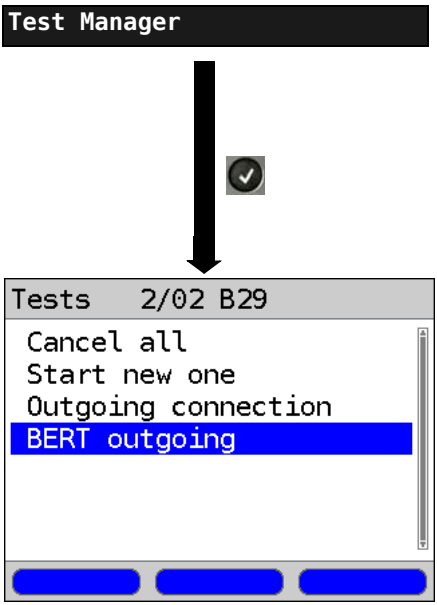
Switch to BERT.

The connection remains active in the background, the handset is assigned to the connection.

The handset will be assigned to the currently active connection. The assignment of the handset to a given connection is also retained in the background.

### 4.14.3 End All Currently Running Tests or Connections

The ARGUS - Main menu




Open the Test Manager

**<TM>**
or


Opens the Test Manager directly in the Single tests menu if a connection has already been setup or if the ARGUS is running a test.



All tests will be terminated and all connections cleared down.

# 5 Appendix

## A) Acronyms

| | |
|---|---|
| | **A** |
| **A3k1H** | Audio 3.1 kHz |
| **A7kHz** | Audio 7 kHz |
| **A-Bit** | Alarm Bit |
| **AIS** | Alarm Indication Signal |
| **AMP** | Argus measurement report |
| **AS** | Available Second |
| **ASCII** | American Standard Code for Information Interchange. |
| **Avg** | Average |
| | **B** |
| **BC** | Bearer Capability |
| **BERT** | Bit Error Rate Test |
| **BRI** | Basic Rate Interface (in Germany the $S_0$ interface) |
| | **C** |
| **CDN** | see also CDPN |
| **CDPN** | CalleD Party Number |
| **CF** | Call Forwarding |
| **CFB** | Call Forwarding Busy |
| **CFNR** | Call Forwarding No Reply |
| **CFU** | Call Forwarding Unconditional |
| **CONN** | CONNect Message |
| **CRC** | Cyclic Redundancy Check |
| **CUG** | Closed User Group |
| | **D** |
| **D-Bit** | Data Bit |
| **dB** | Decibel |
| **DCE** | Data Communication Equipment |
| **DDI** | Direct Dialling In (dialling in to an extension directly) |
| **DE** | German |
| **UDI** | Unrestricted Digital Information (data telecommunications) |
| **UDI-TA** | Unrestricted Digital Information with Tones & Announcements |
| **DIN** | Deutsches Institut für Normung e. V. |
| **DM** | Supplementary services (Dienstmerkmal) |
| **DSS1** | Digital Subscriber Signalling System No. 1 |
| **DTE** | Data Terminal Equipment |
| **DTMF** | Dual Tone Multi Frequency |

| | |
|---|---|
| | **E** |
| **E1** | Primary Rate Interface (PRI) |
| **E-Bit** | Error-Bit |
| **Ecnt** | E-Bit Counter |
| **EFS** | Error Free Seconds |
| **ES** | Errored Seconds |
| | **F** |
| **FAS** | Frame Alignment Signal |
| **Fax G3** | Fax Group 3 |
| **Fax G4** | Fax Group 4 |
| | **G** |
| **GmbH** | German Limited Liability Company |
| | **H** |
| **HDB3** | High Density Bipolar of order 3 |
| **HDLC** | High-Level Data Link Control |
| **HEX** | Hexadecimal value |
| **HLC** | High Layer Compatibility |
| **HRX value** | Hypothetical reference connection |
| **HTTP** | Hyper-Text Transfer Protocol |
| **HVT** | Main distribution frame (MDF) |
| | **I** |
| **ITU** | International Telecommunication Union |
| | **K** |
| **kHz** | Kilohertz |
| | **L** |
| **L1** | Layer 1 in the OSI reference model |
| **L2** | Layer 2 in the OSI reference model |
| **L3** | Layer 3 in the OSI reference model |
| **LCN** | Logical Channel Number |
| **LED** | Light-Emitting Diode |
| **LEPM** | Line End for Primary Multiplex (Rate Interface) |
| **LLC** | Low Layer Compatibility |
| **LOS** | Loss of synchronisation |
| | **M** |
| **m** | Meter |
| **MegaBERT** | Mega Bit Error Rate Test |
| **MSN** | Multiple Subscriber Number |
| | **N** |
| **NGN** | Next Generation Network |
| **NP** | Numbering Plan |
| **NSAP** | Network Service Access Point |

| | |
|---|---|
| **NT** | Network Termination |
| **NTPM** | Network Termination Primary Multiplex |
| | **O** |
| **OSI** | Open Systems Interconnection |
| | **P** |
| **PC** | Personal Computer |
| **P-P** | Point-to-point |
| **PRI** | Primary Rate Interface (German $S_{2M}$ interface) |
| **PSI** | Program Specific Information |
| **PWR** | Power |
| | **Q** |
| **QRSS** | Quasi Random Signal Sequence |
| | **R** |
| **Rx** | Receive |
| | **S** |
| **BRI S/T** | Basic Rate Interface (access on a S/T bus) |
| **PRI** | Primary Rate Interface (PRI access) |
| **Sa** | Vertical transmission channels |
| **SES** | Severely Errored Second |
| **Spch** | Speech |
| | **T** |
| **TE** | Terminal Equipment |
| **TEI** | Terminal Endpoint Identifier |
| **Tel31** | Telephony 3.1 kHz |
| **Tel7k** | Telephony 7 kHz |
| **TM** | Test Manager |
| **TON** | Type of Number |
| **TTX** | Teletext |
| **Tx** | Transmit |
| | **U** |
| **$U_{2an}$** | $U_2$ Interface |
| **U-interface** | Basic Rate Interface (U-Interface access) |
| **US** | Unavailable Second |
| **UUI** | User-User-Info (UUI) |
| | **V** |
| **ViSyB** | Video Syntax Based |
| **ViTel** | Video-Telephony |
| | **X** |
| **X.25** | ITU-T X.25 Protocol Standard |
| **X.31** | ITU-T X.31 Protocol Standard |

**B) Index**

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