WISE Indústria de Telecomunicações

Operation Manual

ISDN

Annex to TSW200E1's Operation Manual

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Summary

1 -   The ISDN Module

The ISDN (Integrated Services Digital Network) Module allows the equipment to be connected to an ISDN network to receive, interpret and reply to the received frames. In this way, the TSW200E1 becomes a powerful tool to locate any faults afflicting the ISDN protocol. This module has two modes: CALL TEST and MONITOR.

The CALL TEST mode allows emulation of terminals connected to the network. The user can emulate a terminal as well as the network, so as to locate the origin of the fault. Another interesting characteristic of this mode is to allow making and receiving calls (that can be made in various channels and simultaneously). The figure below exemplifies how tests can be performed using the CALL TEST mode.

TSW200E1 emulating an ISDN network

TSW200E1 emulating an ISDN terminal
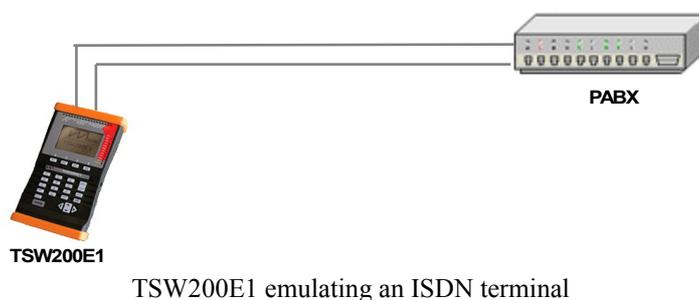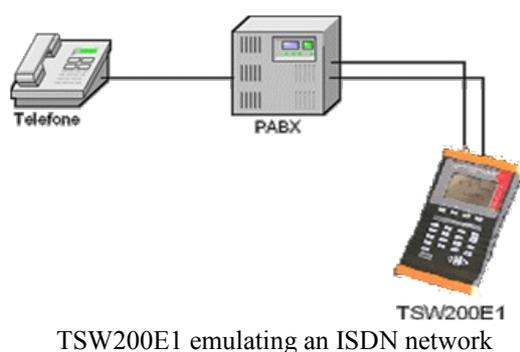
In the MONITOR mode, the TSW200E1 monitors the dialog between two terminals, receiving and interpreting the frames that it receives from both sides of the communication. In this way, the two receiving ends of the equipment are used. The figure below depicts an example of how to run a test using the MONITOR mode.
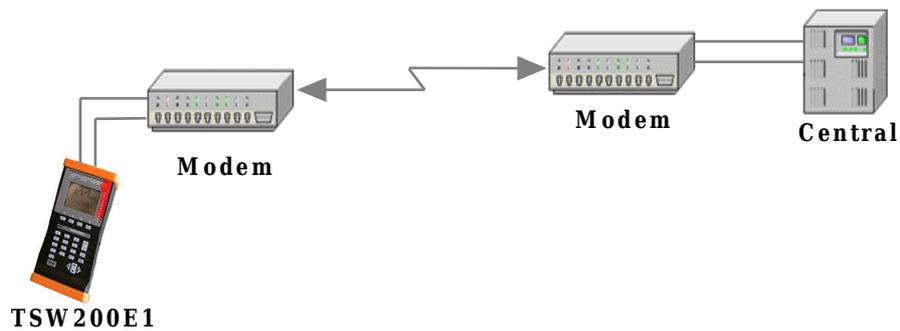
TSW200E1 connected as MONITOR

When the ISDN option is chosen at the TSW200E1 module screen, the following screen will be shown. In this screen, it is possible to select which of the two types of test will be run. To do this, move the cursor so that it points to the desired mode and press <F3> (ENTER). To go back to the module screen, press <F2> (MODULE).

From this screen, it is still possible to access the memory module. The last test performed is stored in this memory. Navigating at the memory screen is done similarly as navigating in the screens used to run the test. They will be described in the following sections.
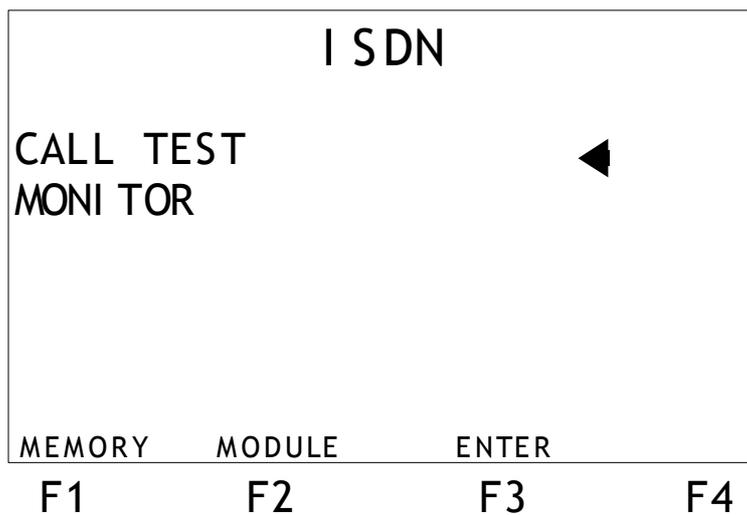
2 - ISDN Module Operation

2.1 - *Call Test Configuration*

When selecting the Call Test mode, the following screen will be shown. This mode has three configuration screens. To toggle between them, use the <F1> (BACK) or <F4> (NEXT) keys. To go back to the ISDN module, press the <F2> (MENU) key.

```
            CALL  TEST
Emulation:      NETWORK       ◄
Interface:      G.703 2M
Termination:    75Ω UNBAL
Line Code:      HDB3
PCM:            PCM31C
Tx Clk Source: INTERNAL


          MENU                NEXT
    F1          F2          F3          F4
```

In this screen, the user can configure the following parameters:
- **Emulation**: Allows setting the equipment to operate as terminal or network.
- **Interface**: The one used by this module is the G.703-2M interface.
- **Termination**: Allows the user to choose the cable termination as 75 Ohms Unbal, 120 Ohms Bal, High-Z Unbal or High-Z Bal.
- **Line Code**: Allows the user to choose the line code as HDB3 or AMI.
- **PCM**: This module uses only PCM31 or PCM31C frames. The user can choose one of these options.
- **Tx Clk Source** : Allows the user to choose the transmission clock source. There are two options:
  ◆ **Internal**: the Test Set itself provides the transmission clock. In this case, the external circuit must be prepared to receive external clock.
  ◆ **From Rx**: the clock is recovered at the receive end.

The second configuration screen of the Call Test mode is presented at the next figure:

```
            CALL  TEST
Calling(A): 33445566        ◄
Called (B): 33447788
Service:    DATA/TONE
B Channel:     01
D Channel:     16
TEI:          000


BACK         MENU              NEXT
   F1          F2        F3         F4
```

At this point, it is possible to alter the following parameters:
● **Calling**: caller number, assumed by the TSW200E1
● **Called**: sender number, that is, the number to be called
● **Service**: Specifies the type of service: SPEECH, UNR. DATA (unrestricted digital information), RES. DATA(restricted digital information), 3.1kHz (audio), DATA/TONE (Unrestricted digital information with tones/announcements), VIDEO;
● **B Channel**: Specifies which voice channel will be used when the equipment originates a call.
● **D Channel**: Specifies the data channel to be used to communicate with the network, that is, the signaling channel (the default channel is, usually, 16).
● **TEI**: Terminal identification number (in case of doubt, leave it 000).

```
            CALL  TEST
Calling Subs: UNKNOWN
Called  Subs: UNKNOWN
Calling Plan: TELEPHONY
Called  Plan: TELEPHONY




BACK         MENU
   F1          F2        F3         F4
```

● **Calling Subs.:** Local's subscriber: UNKNOWN, INTERNAT., NATIONAL, NET SPEC., SUBS NU, ABBREVIA.;
● **Called Subs.:** Destiny's subscriber: UNKNOWN, INTERNAT., NATIONAL, NET SPEC., SUBS NU, ABBREVIA.;
● **Calling Plan:** Local's plan: TELEPHONY, DATA, TELEX, NATIONAL, PRIVATE,

RESERVED, UNKNOWN;
- **Called Plan:** Destiny's plan: TELEPHONY, DATA, TELEX, NATIONAL, PRIVATE, RESERVED, UNKNOWN.

2.2 - *Monitor Mode Configuration*

To use the TSW200E1 as monitor, just a few parameters need to be configured at a single configuration screen. This screen appears when the Monitor mode is selected at the menu screen. The configuration screen is shown in the figure below.

```
              MONITOR
Interface:       G.703 2M
Termination:     75Ω UNBAL
Line Code:       HDB3
PCM:             PCM31C
Rx1 D Channel: 16
Rx2 D Channel: 16

              MENU
   F1        F2        F3        F4
```
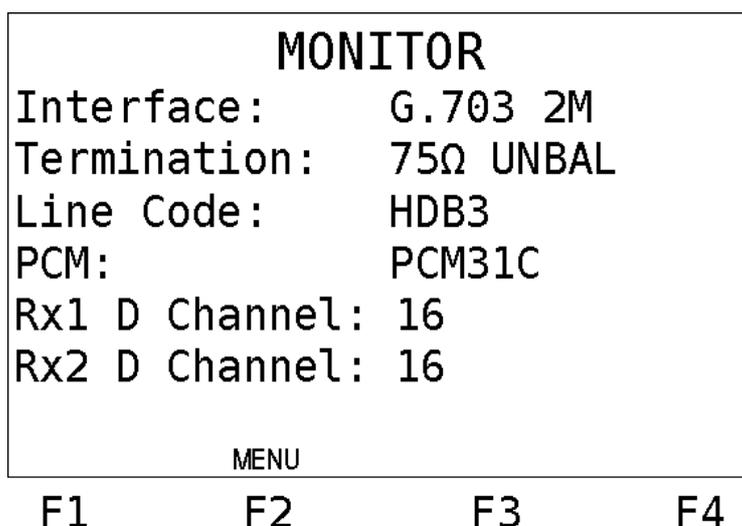
To use the Monitor mode, the user must connect the two transmission signals to the two receive terminals (RX1 and RX2), which are available at the TSW200E1. It is recommended to select the High-Z impedance mode.

The parameters of this screen were described in the previous section. The only difference is that the channels that carry the signaling must be specified for both receptions (Rx1 and Rx2 D Channel).

2.3 - *Running the ISDN Module Tests*

2.2.1 Call Test Mode

When done configuring and the equipment is properly connected, the test can be run by pressing the START/STOP key. The following screen will be displayed:

```
21/08/2006                  DESCRIPTION
11:03:17.755    N→T         SABME
11:03:17.756    N←T    ▶ UA
11:03:27.755    N→T         RR
11:03:27.774    N←T         RR
11:03:37.759    N→T         RR
11:03:37.759    N←T         RR
11:03:40.528    N←T         SETUP
11:03:40.528    N→T         RR
11:03:40.604    N←T         RELEASE COMP.
11:03:40.643    N→T         RR

                     HDLC UP
 DETAIL                     CALL    UPDATE
```

F1	F2	F3	F4

This is the Log screen, where the sent and received frames are displayed in chronological order. The frame types are identified and the direction to which the frames were sent, that is:

- CALL TEST: if they were sent from the terminal to the network (N←T) or from the network to the terminal (N→T);
- MONITOR: if they were sent through RX1 or RX2.

The log can handle 8122 lines. When it reaches 8122 lines, if there were no alarms, the buffer is restarted, writing new lines. Otherwise, if an alarm occurs, only the last line of the screen changes, showing the received frames.

To stop the update process and navigate through the lines, press F4 (FREEZE) and ↑ or ↓ to move a line, or ← or → to move a page (PAGE UP / PAGE DOWN). It is also possible to view the state of the channels, by pressing F1 (DETAIL) in the log screen, followed by F1 (CHANNEL) in the details page (that will be explained later). To update again, return to the log page and press F4 (UPDATE).

```
                  DETAIL
Time        : 11:31:11
Call Ref.   : 01002
Subscriber  : UNKNOWN/UNKNOWN
B Channel   : 19
Calling (A): 987654
Called (B) : 123456
Service     : SPEECH
Numbering   : UNKNOWN/UNKNOWN

Status      : OPENED
                  ACTIVE CALL
 CHANNEL        LOG        HANG UP    FREEZE
```

F1	F2	F3	F4

```
                        CHANNELS

CH   STATE        CH   STATE        CH   STATE
01   XXXX         11   XXXX         22   XXXX
02   XXXX         12   XXXX         23   XXXX
03   XXXX         13   XXXX         24   XXXX
04   XXXX         14   XXXX         25   XXXX
05   XXXX         15   XXXX         26   XXXX
06   XXXX         16   XXXX         27   XXXX
07   XXXX         17   XXXX         28   XXXX
08   XXXX         18   XXXX         29   XXXX
09   XXXX         19   XXXX         30   XXXX
10   XXXX         20   XXXX         31   XXXX
                     ACTIVE CALL


             LOG           HANG UP         FREEZE
   F1         F2              F3             F4
```

If the chosen operating mode is Call Test, the text CHANNEL XX UP (XX is the channel selected to make the call) appears when the link is ready. If the link is not ready, the message IDLE is shown.

When the communication is established, the F3 soft key will display the CALL option. When it is pressed, a call is initiated to the number defined in the CALLED parameter. If the equipment receives a call request, the F2 key displays the label REJECT, allowing the user to reject the call and the <F3> key assumes the label ANSWER, so as to accept the call. After answered, the <F3> key is used to end the call, designated by HANG UP.

It is possible to access the register of all the calls made during the test. Press F4 (FREEZE), followed by ← and → to move to the first or last register and ↑ and ↓ to move up and down in the current page. The DETAIL screen will restart updating after the F4 key (UPDATE) is pressed. After the call is ended, the duration of the call is shown, and the status line displays a number that indicates the cause of the end of the call, according to the Q.850 ITU-T document. Please refer to Table 1 in Appendix A, in order to view such causes and the numbers they are referred to. When the connection is still on course, the status line shows the message OPENED. The test set is capable of recording up to 680 calls.

Still in the DETAIL screen, when pressing the F1 key (CHANNEL), the CHANNEL (displayed below) screen opens, showing the state of all the channels. In case the state is IDLE, the channel is unavailable for calls, if it is UP, the channel can make and receive calls. When the state of the channel is TALK, on the other hand, it has a call running. The message below the state table shows the current state of the channel indicated by the arrow.

```
                          CHANNELS

        CH   STATE      CH   STATE      CH   STATE
        01   UP         11   UP         22   UP
        02   UP         12   UP         23   UP
        03   UP         13   UP         24   UP
        04   UP       ► 14   TALK       25   UP
        05   UP         15   UP         26   UP
        06   UP         16   UP         27   UP
        07   UP         17   UP         28   UP
        08   UP         18   UP         29   UP
        09   UP         19   UP         30   UP
        10   UP         20   UP         31   UP


                     CHANNEL 14 TALK

               DETAIL      HANG UP      OFF
```

F1	F2	F3	F4

It is also possible to make simultaneous calls. For that, indicate a channel that is UP when there is (are) other channel(s) making calls. The F3 key will display the CALL function. The test set that receives the call should indicate the channel whose state is RING, and F3 will assume the ANSWER function, while F2 will be responsible for rejecting the call. In order to finish the test, press START/STOP.

2.3 Monitor Mode

After finishing the configuration of the equipment and the connection of the same for the Monitor Test, it begins after the START/STOP key is pressed. The log screen will be displayed, as seen below.

```
 21/08/2006                 DESCRIPTION
 11:03:17.755    Rx1        SABME
 11:03:17.756    Rx2        UA
 11:03:27.755    Rx1        CONNECT ACK
 11:03:27.774    Rx1        RR
 11:03:37.759    Rx2        CALL PROC.
 11:03:37.759    Rx2        RR
 11:03:40.528    Rx2        SETUP
 11:03:40.528    Rx1        RR
 11:03:40.604    Rx2        RELEASE COMP.
 11:03:40.643    Rx1        RR



 DETAIL                     ALARMS      FREEZE
```

F1	F2	F3	F4

It shows the type of frame and which connector has received them (either Rx1 or Rx2). The log can handle 8122 lines. When it reaches 8122 lines, if there were no alarms, the buffer is restarted, writing new lines. Otherwise, if an alarm occurs, only the last line of the screen changes, showing the received frames.

To stop the update process and navigate through the lines, press F4 (FREEZE) and ↑ or ↓ to move a line, or ← or → to move a page (PAGE UP / PAGE DOWN). To update again, return to the log page and press F4 (UPDATE).

When the equipment is a MONITOR, the <F3> key (ALARMS) gives the user the screens below, where the amount of seconds that each alarm is present in each reception during the test is counted. The first screen shows alarms of E1 frame and the second of ISDN packages.

```
            ALARMS

                    RX1         RX2
SIGNAL LOSS        00000       00000
AIS                00000       00000
FASLOSS            00000       00000
REMOTE ALARM       00000       00000
CRC ERROR          00000       00000


            LOG                 NEXT
   F1        F2         F3        F4
```

```
            ALARMS

                    RX1         RX2
FCS ERROR          00000       00000
PACKET ERR         00000       00000




BACK        LOG
   F1        F2         F3        F4
```

Pressing CLEAR, the leds signalizing alarms are cleaned and the alarms are reset.

To analyze the data relative to the last call, press <F1> (DETAIL) from the log screen. The DETAIL screen will be shown, as depicted in the figure below, which presents part of the information.

```
                          DETAIL

Time      :  02:44:01
Call Ref. :  00002
Subscriber:  UNKNOWN    /UNKNOWN
B Channel :  01
Calling(A):  34689100
Called (B):  34689109
Service   :  SPEECH
Numbering :  TELEPHONY/TELEPHONY

Status    :  OPENED

                      ACTIVE CALL


                LOG        HANG UP      FREEZE

      F1        F2           F3           F4
```

This screen gives the user details about the last call or the current one, such as status, elapsed time, type of service, local number and called number. It is possible to access all calls registry during the test. Pressing <F4> (FREEZE) and ← or → to see the first and the last call and ↑ or ↓ to change from call to call. The screen will be updated again when the <F4> key (UPDATE) is pressed. The STATUS line, after the call has ended, shows a number, depending on the cause of the end of the call, that refers to ITU-T recommendation Q.850. In some cases, a short message explains the cause of the end. When the call is still happening, the STATUS shows OPENED. The TSW200E1 can record 681 calls. To end the test, press the START/STOP key from any of the screens.

From the DETAIL screen, it is possible to move to the CHANNEL screen, that shows all the channels, as well as their states. Such screen has been described in Section 2.3.1 (CALL TEST Mode).

3 - Memory and Printout

From the module's initial page, it is possible to access the last result by pressing <F1> (MEMORY). The results view is similar to the one made when the test was running. It is also possible to print this result by pressing <PRINT> after accessing the memory. Further information about printout configuration and procedures can be found in section *"6.3 – Memory and Printout"* at *"OSP200T1 Operation Manual"*.

Appendix A

Table 1/Q.850 – Cause information element/ number and definition

1	Unallocated (unassigned) number	26	Non-selected user clearing	53	Outgoing calls barred within CUG	88	Incompatible destination
2	No route to specified transit network	27	Destination out of order	55	Incoming calls barred within CUG	90	Non-existent CUG
3	No route to destination	28	Invalid number format (address incomplete)	57	Bearer capability not authorized	91	Invalid transit network selection
4	Send special information tone	29	Facility rejected	58	Bearer capability not presently available	95	Invalid message, unspecified
5	Misdialled trunk prefix	30	Response to STATUS ENQUIRY	62	Inconsistency in designated outgoing access information and subscriber class	96	Mandatory information element is missing
6	Channel unacceptable	31	Normal, unspecified	63	Service or option not available, unspecified	97	Message type non-existent or not implemented
7	Call awarded and being delivered in an established channel	34	No circuit/channel available	65	Bearer capability not implemented	98	Message not compatible with call state or message type non-existent or not implemented
8	Preemption	38	Network out of order	66	Channel type not implemented	99	Information element /parameter nonexistent or not implemented
9	Preemption – circuit reserved for reuse	39	Permanent frame mode connection out of service	69	Requested facility not implemented	100	Invalid information element contents
16	Normal call clearing	40	Permanent frame mode connection operational	70	Only restricted digital information bearer capability is available	101	Message not compatible with call state
17	User busy	41	Temporary failure	79	Service or option not implemented, unspecified	102	Recovery on timer expiry
18	No user responding	42	Switching equipment congestion	81	Invalid call reference value	103	Parameter non-existent or not implemented, passed on
19	No answer from user (user alerted)	43	Access information discarded	82	Identified channel does not exist	110	Message with unrecognized parameter, discarded
20	Subscriber absent	44	Requested circuit/channel not available	83	A suspended call exists, but this call identity does not	111	Protocol error, unspecified
21	Call rejected	46	Precedence call blocked	84	Call identity in use	127	Interworking, unspecified
22	Number changed	47	Resource unavailable, unspecified	85	No call suspended		
23	Redirection to new destination	49	Quality of service not available	86	Call having the requested call identity has been cleared		
25	Exchange routing error	50	Requested facility not subscribed	87	User not member of CUG		