FBTEST Reference Manual

Contents

1 Introduction

FBTEST is a test program for the Base Radio Unit 1 (BRU1) and Base Radio Unit 3 (BRU3). Two types of user interfaces are available through a serial communication port. One by a menu-oriented structure where test alternatives and parameters are selected by stepping through the menus. The other interface is by command frame input, suitable for automatic testing with computer supervision over a communication line. In this case, the command frame syntax is the user interface. This is not described in this document. The test program is operated using a console terminal, connected to the node, on which the result is displayed.

A negative test result indicates a hardware fault, but a positive test result does not guarantee that the hardware is OK. It is not possible to test everything with this test program.

1.1 Field of Application

There are four main applications for the FBTEST:

- Acceptance control of the node hardware
- Validating a new node
- Trouble-shooting an existing node
- Set up of node specific Loader parameters.

The *FBTEST Reference Manual* covers both the procedures required when calibrating the node's components at the factory, and the on-site installation and commissioning procedures for the BRU1 and BRU3, respectively.

Note: The examples given in this document shows both BRU1 and BRU3, when they differ.

The information applicable when commissioning shall take place is described in the following sections:

- Set System Clock Menu
- Radio Control and Calibration Menu, alternatives 1-3
- Status Overview Menu
- Modem Operation Menu
- Edit Loader Parameters Menu

1.2 Date and Time Window

The date and time window in the upper right-hand corner shows the system clock, marked with *SYS:*.

1.3 FBTEST Menu Overview

2 Installation Procedures

Load FBTEST by using ZMODEM during the procedure of installing the node software. For details, see *NTE Client Library/Node Software/Software Commissioning Procedure*.

3 Hardware, Equipment and Preparation

The preparation work necessary for testing a node is kept at a minimum. A console terminal has to be attached to the Console Connector on the node, and if a test that requires external hardware is to be executed, special test cables are to be connected.

3.1 Configuration

All terminal inputs and outputs are directed to the console. The console should be a VT100 terminal or the equivalent.

The communication parameters should be as follows:

- Baud rate 9600.
- 8 data bits.
- no parity.

Most VT100-compatible terminals feature dumping the screen information to a hardcopy device, which may be very useful when logging the results from the tests. See the documentation of the actual terminal for more information.

3.2 External Tests requiring External Hardware

Some of the external tests require external hardware. The external tests in question are:

- Loopback Test of FNB Board
- Loopback Test of Ethernet in FIB Board (BRU1 only)
- RFTL Test of FRB Board
- Modem Tests (BRU3 only)

A Loopback test is carried out of the FNB Board by using a 25 pin D-Sub plug. One of the physical ports is selected according to strapping alternative RS232 or RS422.
For the BRU1, the corresponding serial interfaces are tested when testing the FIB board.

Also for BRU1, a loopback test of Ethernet in FIB Board is carried out, using the external ethernet plug.

An RFTL test is carried out of the FRB Board by using an external radio instrument. A predefined bit stream (Tx-signal) is transmitted from the node to the RFTL-adapted instrument, where the signal is measured and retransmitted as an RX-signal back to the node. A bit error count is carried out by comparing the signals.

One modem test is carried out requiring a test modem and a connection cable to the node's line port. Applicable to BRU3 only.

3.3 Start of FBTEST

At the BOOT command prompt "CMD>", type TE and then press <RETURN>. The FBTEST program will be loaded and the Main Menu will be displayed ready to accept commands from the user.

To execute the command frame mode of FBTEST, set the SW2 dip switch on the FCB-board in the following position: SW2:4 (OEM-Strap) to Open. For more information, see *Node Hardware Library/BRU3/BRU3 Mechanical Design/FB Computer Board - FCB* and *BRU3/BRU3 Logic and Radio System/ Modem Equipment.* For BRU1 information, see corresponding documents in

Node Hardware Library/BRU1.

When the OEM-Strap is set to Open, BOOT will automatically start FBTEST, and FBTEST will automatically start its command frame mode. This procedure is not described in this document.

4 FBTEST User Modes

FBTEST can be executed in two different user modes. One mode is implemented with menus while the other mode involves the use of a command frame protocol.

The menu mode is interactive and the selected test is executed after set up of its parameters.

The command frame mode is designed to allow control of execution from an external computer.

5 User Interface Description

This section describes all the menus that are used in the FBTEST. When the FBTEST program is loaded and started, the Main Menu is displayed on the console terminal. The program is then ready to accept commands.

5.1 Working with Menus

The user interface is quite straight-forward but the following must be noted:

- To choose a menu alternative:
  Write the corresponding number and press <RETURN>.
- To change any number:
  Write the number and press <RETURN>. If the number has to be entered in hexadecimal form, write 16#nnnnnnnn#, where nnnnnnnn is the hexadecimal value, e.g. 8A hex is entered as 16#8A#.
- When a batch test is running:
  You can stop the test by pressing the “Q” key (<RETURN>). The test will stop when the current test cycle is completed, which may take up to several minutes.
- To temporary stop the printing on the screen:
  “<CTRL>S” prevents scrolling
  “<CTRL>Q” resumes printing.

5.1.1 Toggling Function

Many menu alternatives are prefixed with a “+” or a “-”.

“+” Active - the test will be executed or this board will be tested.

“-” Inactive - the test will not be executed or this board will not be tested.

By selecting the number of such a menu alternative, the prefix will toggle.

5.1.2 Menu Displays

For the various menu examples shown in this document the respective “paths”, i.e., the hierarchic structure is indicated, to facilitate the selection of the desired menus. See the example below:

[Main menu, Radio Operations, Calibration]

6 Main Menu

When the FBTEST program is started, the Main Menu is displayed on the screen, see *Figure 1 "Main menu (BRU3)."* and *Figure 2 "Main menu (BRU1)."*. Depending on selected alternative, different submenus will be displayed, as described below the figure.

[Main menu]

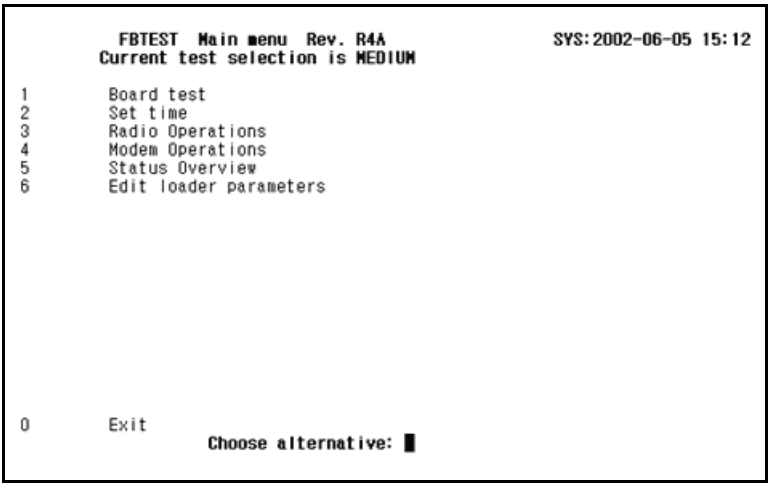

Figure 1 Main menu (BRU3).

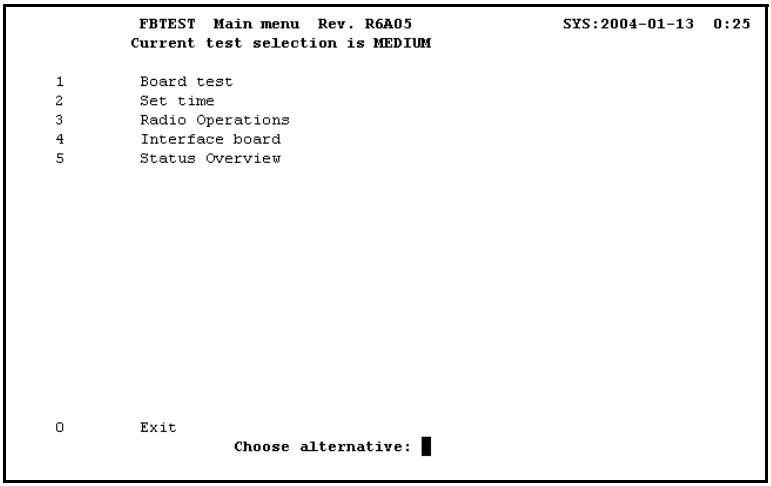

Figure 2 Main menu (BRU1).

The selected alternative will display other menus as follows:

Alt. 1 BOARD TEST
Displays the Board Test menu, *Figure 3* for BRU3 and *Figure 4* for BRU1.

Alt. 2 SET TIME
Displays the Set System Clock menu, *Figure 17*.

Alt. 3 RADIO OPERATIONS
Displays the Radio Control and Calibration menu, *Figure 18*.

Alt. 4 MODEM OPERATIONS
(BRU3) Displays the Modem Operation menu, *Figure 47*.

Alt. 4 INTERFACE BOARD
(BRU1) Displays the Interface Board (for BRU1 only), *Figure 48*.

Alt. 5 STATUS OVERVIEW
Displays the Status Overview menu, *Figure 50*for BRU3 and *Figure 51* for BRU1.

Alt. 6 EDIT LOADER PARAMETERS
(BRU3) Displays the Edit Loader Parameters, *Figure 52*.

Using the **Exit** alternative exists the FBTEST program and the node will be restarted.

The second line from the top of the screen tells the user which test selection has been chosen. The test alternatives are Medium, Extended, No-tests or User-defined. Medium is default.

6.1 Board Test Menu

This menu is shown if alternative 1, “Board Test”, is selected in the Main Menu. From this menu, all tests can be configured and executed. The batch test sequence for each board type is chosen from the different board type menus, and so are all the interactive tests. *Figure 3 “Board Test menu (BRU3).”* and *Figure 4 “Board Test menu (BRU1).”* shows the Board Test Menu.

[Main menu, Board test]

```
     Board Test menu                SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


   1       Do the test
   2       Number of test cycles (0=Forever)
   3       Select/unselect boards
   4       Select extended test (External HW needed)
   5       Select medium test
   6       Unselect all tests
   7       Set test parameters for FCB
   8       Set test parameters for FRB
   9       Set test parameters for FNB
   10      Set test parameters for FMB
   11      Set test parameters for FPB
   12      Look at test results




   0.      Main menu

                    Choose alternative:
```

Figure 3 Board Test menu (BRU3).

```
     Board Test menu              SYS:2004-01-13 0:27
Current test selection is MEDIUM


   1       Do the test
   2  1    Number of test cycles (0=Forever)
   3       Select/unselect boards
   4       Select extended test (External HW needed)
   5       Select medium test
   6       Unselect all tests
   7       Set test parameters for FCB
   8       Set test parameters for FRB

   10      Set test parameters for FIB

   12      Look at test results




   0       Main menu

                   Choose alternative:
```

Figure 4 Board Test menu (BRU1).

6.1.1 Alt. 1: Do the Test

This alternative starts the batch test which will execute all selected tests on all selected boards. The tests is defined by:

- number of cycles
- type of board test mode (extended, medium userdefined)
- selected boards
- selected tests for each board

6.1.2 Alt. 2: Number of Test Cycles

This alternative will display the question

“Number of cycles”: (1).

Accordingly, the default value is 1. The alternative specifies how many cycles a batch test will execute. Legal values are 1-999 or 0. The value 0 means an indefinite test loop, which can be manually stopped by entering “Q”.

6.1.3 Alt. 3: Select/Unselect Boards

Displays a submenu, where all boards can be selected or unselected, and included in or excluded from the test by using the toggle function.

Figure 5 "Example of select/unselect menu (BRU3)." and *Figure 6 "Example of select/unselect menu (BRU1)."* gives an example of this menu.

[Main menu, Board Test, Select/Unselect Boards]

```
     Select/unselect boards        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


          Board type           Comment
1    +    FCB
2    +    FRB
3    +    FNB
4    +    FMB
5    +    FPB




0.  Board Test menu

                Choose alternative:
```

Figure 5 Example of select/unselect menu (BRU3).

Alt. 1 - 5 A toggle function between "+" (select) and "-" (unselect) is used to include boards in or exclude boards from the test.

Note:

" + " = select
" - " = unselect

```
     Select/unselect boards        SYS:2004-01-13 0:28
  Current test selection is MEDIUM


           Board type           Comment
1    +     FCB
2    +     FRB
3    +     FIB




0. Board Test menu

                 Choose alternative:
```

Figure 6 Example of select/unselect menu (BRU1).

Note:

" + " = select
" - " = unselect

6.1.4 Alt. 4: Select Extended Test

The extended test is a quick-choice alternative to turn on all possible, not interactive tests, for those boards that are selected.

External hardware is needed for certain tests.

6.1.5 Alt. 5: Select Medium Test

The medium test is a quick-choice alternative to activate tests for selected boards, which do not require interactive operator involvement or external hardware.

6.1.6 Alt. 6: Unselect all Tests

All test selections are deleted, except board selection.
If this alternative is used, the user has to specify what is to be tested.

6.1.7 Alt. 7-11: Sets the Test Parameters for Each Board

Each board has its own menu, where its functions can be selected or not selected for test. Some tests may require test parameters. See the following menu displays. Note that alt. 10 for a BRU1 differs from that of a BRU3.

6.1.8 Alt.7: Set Parameters for FCB – FE Computer Board

[Main menu, Board Test, Set test parameters for FCB]

```
      Test for FCB                  SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

1     +     DRAM test
2     -     Exhaustive DRAM test
3     +     DPRAM test
4     +     Signal Processor test
5     +     Communication IC Internal test
6     -     FLASH Boot Memory test
7     -     FLASH System Memory test
8     -     Alarm test
9     -     Ethernet Module test




 0.  Test menu

                  Choose alternative:
```

Figure 7 Test for FCB – FE Computer Board (BRU3).

Alt. 1 - 9 A toggle function between “+” (select) and ”-” (unselect), is used to include or exclude boards from the test.

Note:

“ + ” = select
“ - “ = unselect

```
      Test for FCB                  SYS:2004-01-13 0:29
Current test selection is MEDIUM

1     +     DRAM test
2     -     Exhaustive DRAM test
3     +     DPRAM test
4     +     Signal Processor test
5     +     Communication IC Internal test
6     -     FLASH Boot Memory test
7     -     FLASH System Memory test




 0.  Test menu

                  Choose alternative:
```

Figure 8 Test for FCB – FE Computer Board (BRU1).

Alt. 1 - 8 A toggle function between “+” (select) and ”-” (unselect), is used to include or exclude boards from the test.

Note:

“ + ” = select “ - “ = unselect

6.1.9 Alt. 8: Set Parameters for FRB – FE Radio Board

[Main menu, Board Test, Set test parameters for FRB]

```
      Test for FRB                SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


1     +     Alarm test
2     +     EEprom test
3     -     Radio Loopback test









 0.  Test menu

                Choose alternative:
```

Figure 9 Test for FRB – FE Radio Board.

Alt. 1 - 3 A toggle function between “+” (select) and ”-” (unselect), is used to select the type of tests that should be performed.

Note:

“ + ” = select
“ - “ = unselect

6.1.10 Alt. 9: Set Parameters for FNB – FE Connection Board (BRU3 only)

[Main menu, Board Test, Set test parameters for FNB]

```
          Test for FNB            SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


1     -     Serial Loopback - RS232 or RS422
2     -     Alarm Interface test









0.  Test menu

                Choose alternative:
```

Figure 10 Test for FNB – FE Connection Board.

Alt. 1 - 2 A toggle function between “+” (select) and ”-” (unselect), used to include or exclude boards from the test.

Note:

“ + ” = select
“ - “ = unselect

6.1.11 Alt. 10 (BRU3): Set Parameters for FMB – FE Modem Board

[Main menu, Board Test, Set test parameters for FMB]

```
          Test for FMB              SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


1     -     Internal Modem test
2     -     Local Loopback test
3     -     Remote Loopback test









 0.  Test menu

                Choose alternative:
```

Figure 11 Test for FMBF – FE Modem Board.

Alt. 1 - 3 A toggle function between “+” (select) and ”-” (unselect), is used to include or exclude boards from the test.

Note:

“ + ” = select
“ - “ = unselect

6.1.12 Alt. 10 (BRU1): Set Parameters for FIB - FE Interface Board

[Main menu, Board Test, Set test parameters for FIB]

```
          Tests for FIB           SYS:2004-01-13 0:29
Current test selection is USER_DEFINED


1     -     Ethernet Loopback test
2     +     Alarm test
3     +     Power Alarm test
4     +     Temperature Alarm test
5     -     Serial Loopback - RS232 or RS422




 0.  Test menu

                Choose alternative:
```

Figure 12 Test for FIB (BRU1).

Alt. 1 - 5 A toggle function between “+” (select) and ”-” (unselect), is used to include or exclude boards from the test.

Note:

“ + ” = select “ - “ = unselect

6.1.13 Alt. 11: Set Params for FPB – FE Power Supply Board (BRU3 only)

[Main menu, Board Test, Set test parameters for FPB]

```
        Test for FPB              SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

1     -     Alarm test









0.  Test menu

                Choose alternative:
```

Figure 13 Test for FPB – FE Power Supply Board.

Alt. 1 A toggle function between “+” (select) and ”-”(unselect).

Note:

“ + ” = select
“ - “ = unselect

6.1.14 Alt.12: Look at Test Results

When the batch tests are started, the Test Status is shown. It tells you how many faults have been detected for each board, and how many test cycles have been completed. If a 'Q' is pressed before the test is finished, the test is interrupted after the current cycle, and the user has the option to select the alternative “Continue the test” or stop the test by selecting the “0” alternative.

When the test is completed, either by itself or when the user has pressed 'Q', it is possible to jump to the “Examine Board” screen for each board, by selecting the appropriate alternative in the menu. *Figure 16 “Example of “Examine Board” screen.”* shows an example of the Test Status menu when the test is finished.

When selecting the “Look at test result” alternative (Alt. 12) in the Board test menu, the selection between NEW, OLD and OLDEST test has to be made. The three latest test results are stored and can be displayed.

SELECT RESULT BUFFER: (1) NEW (2) OLD
(3) OLDEST

[Main menu, Board Test, Look at test result]

```
     Test Status :  SECOND                SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

     Board               Comment              Errors
 1.  FCB                                        0
 2.  FRB                NO_TEST
 3.  FNB                                        1
 4.  FMB                NO_TEST
 5.  FPB                NO_TEST




 0.  Board Test Menu

                    Choose Alternative:
```

Figure 14 Test Status menu (BRU3).

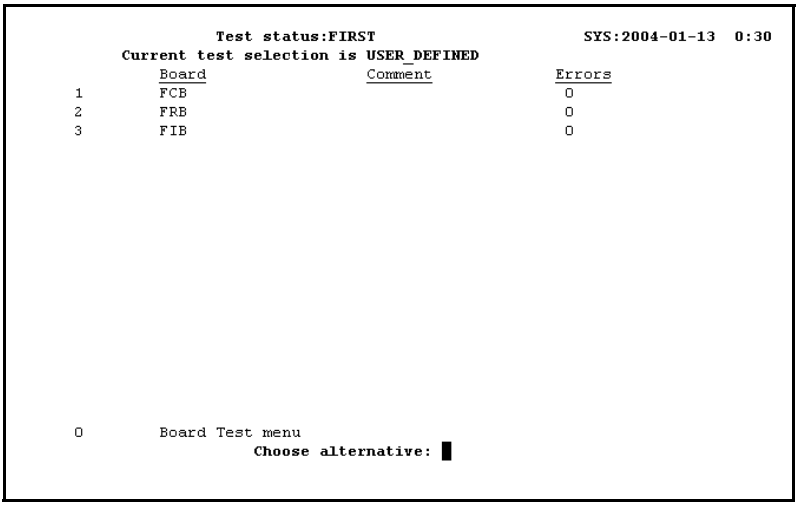

Figure 15 Test Status menu (BRU1).

The “Examine Board” Screen

Select any menu alternative except “17” or “0” in the “Test Status” menu to get the “Examine Board” screen for the corresponding board. There is one “Examine Board” screen for each board which has been tested. This screen contains information about what kind of errors have been detected, and at which time. If there is a printer connected to the terminal, it is possible to get a hardcopy for each tested board. *Figure 16 “Example of “Examine Board” screen.”* shows an example of this screen.

[Main menu, Board Test, Look at Test Results]

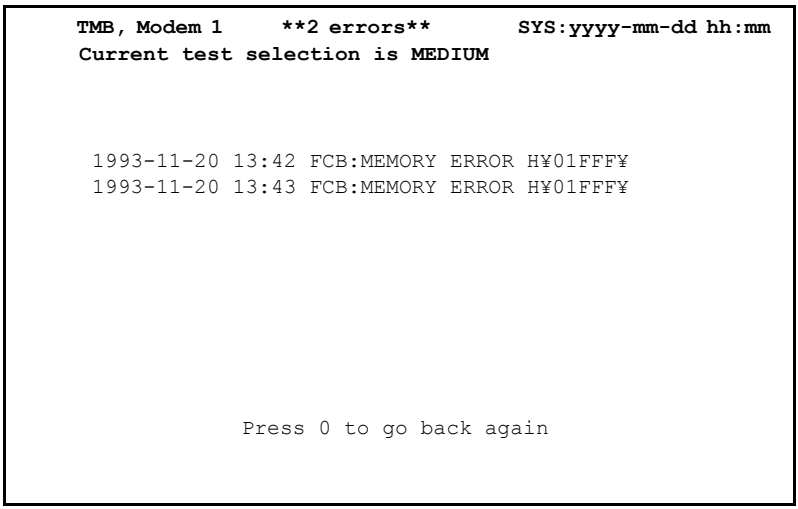

Figure 16 Example of “Examine Board” screen.

6.2 Set Time

[Main menu, Set Time]

```
     Set the System Clock          SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

  1. Change year (1901 - 2099).
  2. Change month (1 - 12).
  3. Change day (1 - 31).
  4. Change hour (0 - 23).
  5. Change minute (0 - 59).









  0.  Main menu

                Choose alternative:
```

Figure 17 Set System Clock menu.

Alt. 1 modifies the year (entering 4-digit value)

Alt. 2 modifies the month (entering value 1 - 12)

Alt. 3 modifies the day (entering value 1 - 31)

Alt. 4 modifies the hour (entering value 0 - 23)

Alt. 5 modifies the minute (entering value 0 - 59)

The default values are displayed within brackets. Enter the current value for the respective alternatives.

6.3 Radio Operations

6.3.1 Radio Control and Calibration Menu

[Main menu, Radio Operations]

```
Radio Control and Calibration Menu      SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

  1    TRANSCEIVER SETUP MENU
  2    MEASUREMENT SETUP MENU
  3    TRANSCEIVER CONTROL AND PRESENTATION MENU
  4    CALIBRATION
  5    RADIO REGISTER EDITOR
  6    ADJUSTMENT
  7    SETUP




  0.   Main menu

                   Choose alternative:
```

Figure 18 Radio Control and Calibration Menu.

Alt. 1 TRANSCEIVER SETUP MENU
Displays the Transceiver Setup menu, *Figure 19*.

Alt. 2 MEASUREMENT SETUP MENU
Displays the Transceiver Measurement/Test Setup menu, *Figure 21*.

Alt. 3 TRANSCEIVER CONTROL AND PRESENTATION MENU
Displays the Transceiver Control and Presentation menu, *Figure 22*.

Alt. 4 CALIBRATION
Displays the Radio Calibration menu, *Figure 23*.

Alt. 5 RADIO REGISTER EDITOR
Displays the Radio Register Editor menu, *Figure 43*.

Alt. 6 ADJUSTMENT
Displays the Radio Adjustment menu, *Figure 44*.

Alt. 7 SETUP
Displays the Radio Setup menu, *Figure 46*.

6.3.2 Transceiver Setup Menu

[Main menu, Radio Operations, Transceiver Setup]

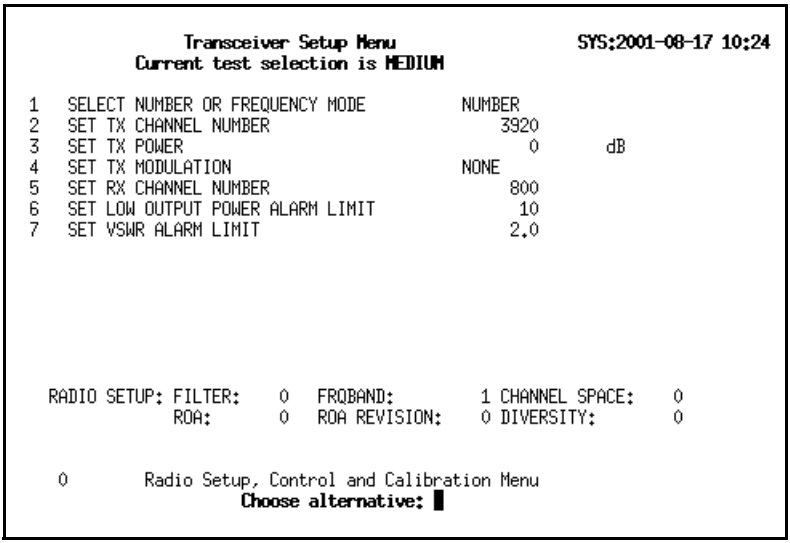

Figure 19 Transceiver Setup Menu (NUMBER MODE).

Alt. 1 SELECT NUMBER OR FREQUENCY MODE
Displays the Transceiver Setup menu, (Number Mode in *Figure 19* or Frequency Mode in *Figure 20*).
This alternative is a toggle function between channel number mode and channel frequency mode. Conversion between these modes is done automatically. The menu text is changed at appropriate places between number and frequency.

RADIO SETUP

The radio type parameters are read from radio registers, showing

- FILTER, showing the transmitter power
- FREQBAND, high or low frequency band

- DIVERSITY, radio build with diversity function, YES (= 1) or NO (= 0).

NUMBER MODE

Alt. 2 SET TX CHANNEL NUMBER

Displays **TX_CHANNEL NUMBER, TXCH = (3840)**

This alternative sets the transmitter channel number. A check is made to eliminate incorrect channel values.

Alt. 3 SET TX POWER

Displays **SELECT TX_POWER = - 21.0 PRESS Y TO SELECT N TO NEXT**
[-21.0 (def), -18.0, -15.0, -12.0, -9.0, -6.0, -3.0, 0.0]

The transmitter power is set in the following steps: 0.0, -3.0, -6.0, -9.0, -12.0, -15.0, -18.0, -21.0 dB.

When this alternative is selected an operator procedure is activated where only these predefined values can be chosen by answering yes or no.

Alt. 4 SET TX MODULATION

Displays **SELECT MODULATION = NONE PRESS Y TO SELECT N TO NEXT**
[NONE (default), AC, LOW, HIGH, PRBS, PERIOD, SINE]

This alternative has the following choices, NONE, LOW, HIGH, AC, PRBS, PERIOD and SINE. The PERIOD alternative activates a question of how many HIGH and LOW values should be in the symmetrical sequence.

Alt. 5 SET RX CHANNEL NUMBER

Displays **RX_CHANNEL NUMBER, RXCH = (3040)**

This alternative sets the receiver channel number. A check is made to eliminate incorrect channel values.

Alt. 6 SET LOW OUTPUT POWER ALARM LIMIT

Displays **OUTPUT ALARM LIMIT = (10)**

This alternative sets the low output power limit. This value is transferred to the signal processor part, where it is checked against the calculated radio value. The alarm is activated if the LOW OUTPUT POWER ALARM value is 10 dB less than the set TX POWER value.

Alt.7 SET VSWR ALARM LIMIT

Displays **VSWR = (1.5)**

This alternative sets the VSWR alarm limit. This value is transferred to the signal processor part, where it is checked against the calculated radio value.

FREQUENCY MODE

[Main menu, Radio Operations, Transceiver Setup]

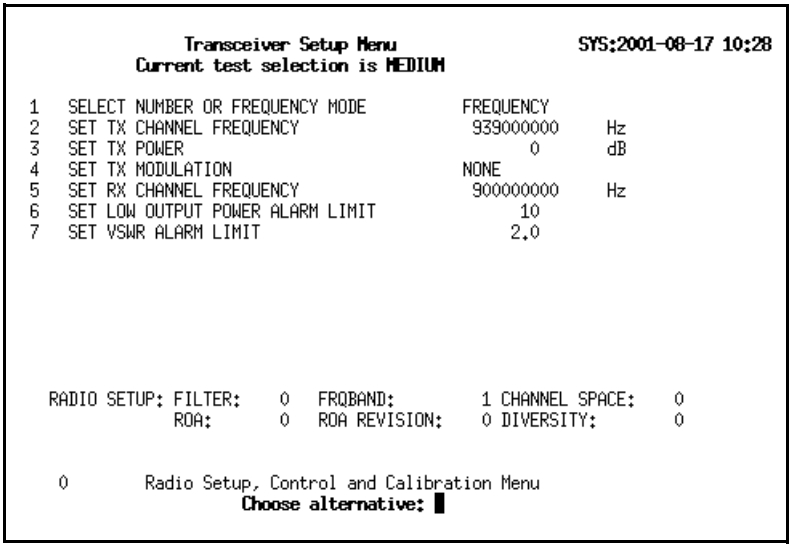

Figure 20 Transceiver Setup Menu (FREQUENCY MODE).

Alt. 2 SET TX CHANNEL FREQUENCY

Displays **TX IN Hz, > = 890 000 000: TXFRQ = (939 000 000)**

This alternative sets the transmitter channel frequency. A check is made to eliminate incorrect channel values. Input frequency values are given in Hz as the channel separation is 12.5 kHz.

Alt.3 SET TX POWER

Please refer to NUMBER MODE

Alt. 4 SET TX MODULATION

Please refer to NUMBER MODE

Alt. 5 SET RX CHANNEL FREQUENCY

Displays **RX IN Hz, > = 890 000 000: RXFRQ =(900 000 000)**

This alternative sets receiver channel frequency. A check is made to eliminate incorrect channel values.

Alt. 6 SET LOW OUTPUT POWER ALARM LIMIT

Please refer to NUMBER MODE

Alt. 7 SET VSWR ALARM LIMIT

Please refer to NUMBER MODE

6.4 Measurement Setup Menu

[Main menu, Radio Operations, Measurement Setup]

```
Transceiver Measurement/Test Setup Menu    SYS:yyyy-mm-dd hh:mm
  Current test selection is MEDIUM


    1   -SELECT PF MEASUREMENT
    2   -SELECT PR MEASUREMENT
    3   -SELECT RSSI MEASUREMENT
    4   -SELECT TEMPERATURE MEASUREMENT
    5   -SELECT BIT ERROR RATE TEST
    6   -SELECT LOOPBACK TEST
    7   -SELECT ALARM STATUS
    8   -SELECT DEVIATION MEASUREMENT

    9   -SELECT TRANSMITTER ON/OFF
    10  -SAVE TEST DATA AT STOP
    11        SET TEST TIME:  0 IS FOREVERTEST  CYCLES =   0



    0.  Radio Setup, Control and Calibration Menu

                  Choose alternative:  _
```

Figure 21 Transceiver Measurement/Test Setup Menu.

Alt. 1 - 8. A toggle function between “+” (select) and “-” (), is used to select the type of measurements that should be performed. The results of these measurements are shown in the presentation menu.

Alt. 9 SELECT TRANSMITTER ON/OFF

A toggle function between “+” (ON) and “-” (OFF).

Alt. 10: SAVE TEST DATA AT STOP

A toggle function between “+” (active) and “-” (inactive).

This alternative, when active, stores test data when the test period is finished. This allows the operator to compare test data, while making test observations without saving, between the save instances.

Alt. 11: SET TEST TIME

Displays ENTER TEST_CYCLES (0)

The number of test cycles is set, which is translated in to the time domain, if needed.

6.4.1 Transceiver Control and Presentation Menu

[Main menu, Radio Operations, Transceiver Control and Presentation]

```
Transceiver Control and Presentation Menu    SYS:yyyy-mm-dd hh:mm
        Current test selection is MEDIUM

TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

       1-   SELECT TRANSMITTER ON/OFF
       2-   SELECT MODULATION ON/OFF
       3-   SAVE TEST DATA AT STOP
       4    SET TEST TIME:0 IS INDEFINITE   TEST CYCLES =    0
       5   START
       6    LOOK AT PREVIOUS TEST DATA


      0. Radio Setup, Control and Calibration Menu

                Choose alternative:
```

Figure 22 Transceiver Control and Presentation Menu (NUMBER MODE).

Alt. 1 SELECT TRANSMITTER ON/OFF

A toggle function between " - " (ON) and " + " (OFF).

Alt. 2 SELECT MODULATION ON/OFF

A toggle function between " + " (ON) and " - " (OFF).

The set value for modulation is active when modulation is ON. OFF is equal to NONE.

Alt. 3 SAVE TEST DATA AT STOP

A toggle function between " + " (YES) and " - " (NO).

Measurement data is saved when the test period is finished.

Alt. 4 SET TEST TIME

Displays **ENTER TEST_CYCLES (10)**

The test period is set in cycles, which also correspond to time. A sampling rate of about 1 second is selected, but can be changed to a practical value if necessary.

Alt. 5 START The start command starts the measurement.

Alt. 6 LOOK AT PREVIOUS TEST DATA

Displays **SELECT BUFFER 1 = LAST, 2 = PREV. or 3 = OLD (1)**

Measurement data are stored in two buffers, i.e., the last and previous results can be analysed. When this command is used, a question is put to the operator as to which buffer to look at. These buffers are updated if the save condition is activated.

Operating conditions: TX: OFF TXCH: 3840 PF: 0 TXSEND: OFF RXCH: 3040

The status line, below the header, indicating the present operating conditions for the transceiver with the following meaning:

- TX is the status of the transmitter, either OFF or ON.
- TXCH or TXFRQ is the transmitter channel frequency or number.
- PF is the transmitter power from 0 to -21 dB in 3 dB steps.
- TXSEND is the transmitter modulation, shown as OFF, NONE, LOW, HIGH, AC, PRBS or PERIOD. The OFF condition is shown when modulation is switched off.
- RXCH or RXFRQ is the receiver channel frequency or number.

Measurement data

These measurements that are selected as active, are presented on the following lines before operator alternatives for control.

- PF VALUE is the measured output power in dB.
- PR VALUE is the measured reflected power in dB.
- RSSI VALUE is the measured receive signal level in dBuVemf.
- TEMPERATURE VALUE is the measured temperature on the radio board in °C.
- BER RX BITS is the number of received bits, RX ERR is the number of error bits and finally on this line, two bit error rates are shown as a percentage. The first value is the quotient (times 100) between the accumulated number of error bits and the number of received bits. i.e. 100*RX ERR/RX BITS. The second value (within brackets) is the same quotient, but for the received bits during the latest 1 s. (appr.).

  Example:

+BER Rx BITS: 588765 Rx ERR: 5687 0.966 (0.176)%

- ALARM status is shown, with PF_LOW, VSWR and TEMP as YES or NO, i.e., whether the set limit is exceeded or not.
- RX DEVIATION VALUE is the receive frequency measurement deviation.

6.4.2 Radio Calibration Menu

[Main menu, Radio Operations, Calibration]

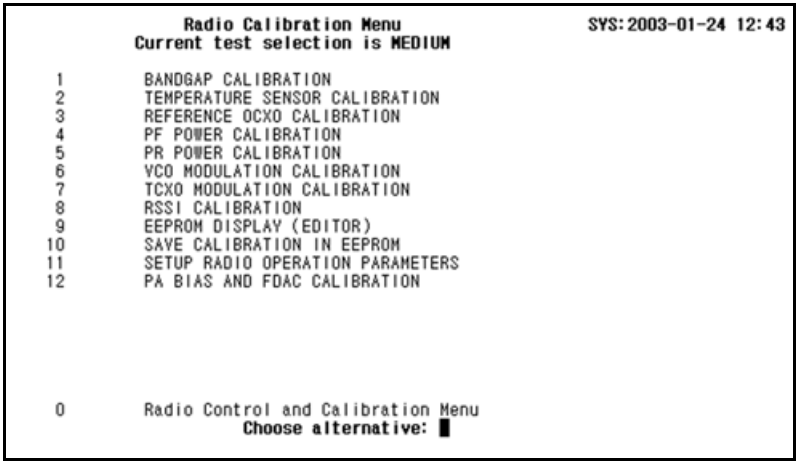

Figure 23 Radio Calibration Menu.

Alt. 1 BANDGAP CALIBRATION

Gives the Bandgap Calibration Menu, *Figure 24*.

Alt. 2 TEMPERATURE SENSOR CALIBRATION

Gives the Temperature Calibration Menu, *Figure 25*.

Alt. 3 REFERENCE OCXO CALIBRATION

Gives Reference Oscillator OCXO Calibration menu 1, *Figure 27*.

Alt. 4 PF POWER CALIBRATION

Gives PF Power Calibration menu 1, *Figure 29*.

Alt. 5 PR POWER CALIBRATION

Gives PR Power Calibration menu 1, *Figure 31*.

Alt. 6 VCO MODULATION CALIBRATION

Gives VCO Calibration menu 1, *Figure 33*.

Alt. 7 TCXO MODULATION CALIBRATION

Gives TCXO Calibration menu 1, *Figure 35*.

Alt. 8 RSSI CALIBRATION

Gives RSSI Calibration menu 1, *Figure 37*.

Alt. 9 EEPROM DISPLAY (EDITOR)

This alternative selects a function that will display all calibration object values. This is an overview display with the purpose of showing how calibration objects depend on temperature. Please refer to *Figure 38*.

Alt. 10 SAVE CALIBRATION IN EEPROM

This alternative saves the calibration parameters in EEPROM if something is changed. This function is called when the exit command is used, to protect from accidental exit without saving calibration data.

Alt. 11 SETUP RADIO OPERATION PARAMETERS

Each calibration procedure requires the radio to operate with some specific frequency, modulation or power level. This alternative is a call to the same procedure as in the transceiver setup menu. Please refer to *Figure 19*.

Alt. 12 PA BIAS AND FDAC CALIBRATION

Gives the PA Bias and FDAC Calibration Menu, *Figure 42*.

6.4.3 Bandgap Calibration

[Main menu, Radio Operations, Calibration, Bandgap Calibration]

```
    Bandgap Calibration                    SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

CONNECT VOLTMETER TO BANDGAP VOLTAGE SIGNAL

BANDGAP REFERENCE SET VALUE IS 128 NUM

IS MEASURED VALUE EQUAL TO 2.5 V ?



       1   INCREMENT
       2    DECREMENT
       3    SET VALUE
       4    MARK FOR STORAGE IN EEPROM


       0.   Calibration Menu

                  Choose alternative:
```

Figure 24 Bandgap Calibration menu.

The BANDGAP REFERENCE SET VALUE is a digital variable to a DA converter, which should be set to give a BANDGAP_VOLTAGE of 2.5 V. The bandgap voltage is not temperature-dependent.

Alt. 1 INCREMENT

Increases the bandgap by 1 step to 129.

Alt. 2 DECREMENT

Decreases the bandgap by 1 step to 127.

Alt. 3 SET VALUE

Displays VALUE (128)

The value can be changed by increment, decrement or by set functions.

Alt. 4 MARK FOR STORAGE IN EEPROM

This alternative indicates that, this calibration object will be saved in EEPROM when the calibration procedure is finished.

6.4.4 Temperature Sensor Calibration

[Main menu, Radio Operations, Calibration, Temp. Sensor Calibration]

```
  Temperature Calibration       SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


  1      SET OFFSET CALIBRATION MODE
  2      SET ABSOLUTE CALIBRATION MODE









  0.     Calibration Menu


             Choose alternative: _
```

Figure 25 Temperature Sensor Calibration menu.

Alt. 1-2 Will display the Temperature Calibration menu, *Figure 26*.

Alt. 1 Offset mode
Alt. 2 Absolute mode

[Main menu, Radio Operations, Calibration, Temp. Sensor Calibration. 2]

```
 Temperature Calibration              SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

 TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

TEMPERATURE A/D VALUE: 141
TEMPERATURE INDEX: 2
             T1          T2          T3          T4          T5
TDEG:      -8.0         6.0        20.0        34.0        48.0
TNUM:        78         107         134         163         195


 1       ENTER TEMPERATURE INDEX T1 - T5 FOR OFFSET/ABSOLUTE
           MODE
 2       ENTER CALIBRATION VALUE FOR OFFSET/ABSOLUTE MODE
 3       MARK FOR STORAGE IN EEPROM



 0.      Calibration Menu
```

Figure 26 Temperature Sensor Calibration menu, offset and absolute mode.

Alt 1. ENTER TEMPERATURE INDEX T1 - T5 FOR OFFSET/ ABSOLUTE MODE

Enter **TEMPERATURE INDEX (2):**

Alt 2. ENTER CALIBRATION VALUE FOR OFFSET/ABSOLUTE MODE

Displays whether the temperature is OK or NOT.

Alt. 3 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

6.4.5 Reference Oscillator OCXO Calibration

[Main menu, Radio Operations, Calibration, Reference OCXO Calibration]

```
Reference Oscillator OCXO Calibration SYS:yyyy-mm-dd hh:mm
    Current test selection is MEDIUM


      1  SELECT OFFSET CALIBRATION MODE
      2  SELECT ABSOLUTE CALIBRATION MODE




      0.  Calibration Menu

                Choose alternative: _
```

Figure 27 Reference Oscillator OCXO Calibration - 1 menu.

Alt. 1-2 Will display the Reference Oscillator OCXO Calibration menus in *Figure 28*.

Alt. 1 Offset mode
Alt. 2 Absolute mode

[Main menu, Radio Operations, Calibration, Reference OCXO Calibration]

```
Reference Oscillator OCXO Calibration        SYS:yyyy-mm-dd hh:mm
 Current test selection is MEDIUM


   TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

   PF. INDEX: 2                 TEMP INDEX: 2
            T1          T2           T3           T4        T5
   TDEG:  -8.0         6.0         20.0         34.0      48.0
   OCXO:    80          80           81           81        81

   IS OCXO FREQUENCY OK ON EXTERNAL INSTRUMENT ?

   1    ENTER TEMPERATURE INDEX FOR OCXO IN OFFSET/ABSOLUTE
          MODE
   2    INCREMENT3      DECREMENT4    SET VALUE
   5    MARK FOR STORAGE IN EEPROM
   6 -  SELECT TRANSMITTER ON/OFF



   0.     Calibration Menu
```

Figure 28 Reference Oscillator OCXO Calibration - 2 menu.

Alt. 1 ENTER TEMPERATURE INDEX FOR OCXO IN OFFSET/ ABSOLUTE MODE

Enter **TEMPERATURE INDEX (2)**.

Alt. 2 INCREMENT

Increases the OCXO value in steps.

Alt. 3 DECREMENT

Decreases the OCXO value in steps.

Alt. 4 SET VALUE

Sets **VALUE (xx)**

The value can be changed by increment, decrement or by the set function.

Alt. 5 MARK FOR STORAGE IN EEPROM

After some changes of the old value, the new value can be marked for storage in EEPROM, when the calibration procedure is finished.

Alt. 6 SELECT TRANSMITTER ON/OFF

A toggle function between " + " (ON) and " - " (OFF).

6.4.6 PF Output Power Calibration

[Main menu, Radio Operations, Calibration, PF Power Calibration]

```
PF Power Calibration                SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


    1     SELECT OFFSET CALIBRATION MODE
    2     SELECT ABSOLUTE CALIBRATION MODE




    0.    Calibration Menu

                  Choose alternative:
```

Figure 29 PF Power Calibration menu.

Alt. 1-2 Will display the PF Power Calibration menu in the next figure, *Figure 30*.

Alt. 1 Offset mode
Alt. 2 Absolute mode

Warning! The PF Power Calibration parameters may only be set by authorized personnel. If the value for the output power is set too high, the BRU1 will be damaged.

[Main menu, Radio Operations, Calibration, PF Power Calibration]

```
          PF Power Calibration                  SYS:yyyy-mm-dd hh:mm
     Current test selection is MEDIUM

TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

PF. INDEX: 2               TEMP INDEX: 2

           T1      T2      T3      T4      T5
 TDEG    -8.0     6.0    20.0    34.0    48.0
 PFNUM:   108     107     107     107     106
  PFM:    128     126     124     121     117

            1       2       3       4       5       6       7       8
PFSET: -21.0   -18.0   -15.0   -12.0    -9.0    -6.0   -3.0     0.0
PFNUM:   101     107     117     128     141     157    177     201
 PFM     118     126     137     150     167     186    211     237

  1      ENTER TX POWER OR PF INDEX P1-P8 FOR OFFSET/ABSOLUTE MODE
  2      ENTER TEMPERATURE INDEX FOR PF IN OFFSET/ABSOLUTE MODE
  3      INCREMENT 4   DECREMENT   5  SET VALUE  6  MARK FOR EEPROM
  7   -  SELECT TRANSMITTER ON/OFF




  0.     Calibration Menu

                        Choose alternative:
```

Figure 30 PF Power Calibration menu.

Alt. 1 ENTER TX POWER OR PF INDEX P1-P8 FOR OFFSET/ ABSOLUTE MODE

Displays **SELECT TX_POWER = -21.0 PRESS Y TO SELECT N TO NEXT**

[-21.0 (def), -18.0, -15.0, -12.0, -9.0, -6.0, -3.0, 0.0]

Alt. 2 ENTER TEMPERATURE INDEX FOR PF IN OFFSET/ ABSOLUTE MODE

Displays **TEMPERATURE INDEX (2)**

Alt. 3 INCREMENT

Increases the value in steps.

Alt. 4 DECREMENT

Decreases the value in steps.

Alt. 5 SET VALUE

Displays **VALUE (x)**

The alternatives, if the temperature check was OK, modify the output reference value. The measured output power on the external instrument is calibrated to the defined nominal value for the selected PF index. In offset calibration all reference values for the selected PF index are changed.

Alt. 6 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

Alt. 7 SELECT TRANSMITTER ON/OFF

A toggle function between " + " (ON) and " - " (OFF).

Operational conditions

The transmitter and receiver conditions are shown, as described in the transceiver control and presentation menu. The operation conditions are changed in Radio Calibration Menu.

6.4.7 PR Reflected Power Calibration

[Main menu, Radio Operations, Calibration, PR Power Calibration]

```
   PR Power Calibration            SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


  1     SELECT OFFSET CALIBRATION MODE
  2     SELECT ABSOLUTE CALIBRATION MODE









  0.    Calibration Menu

                Choose alternative:
```

Figure 31 PR Power Calibration - 1 menu.

Alt. 1-2 Will display PR Power Calibration menu 2, *Figure 32*.

Alt. 1 Offset mode
Alt. 2 Absolute mode

[Main menu, Radio Operations, Calibration, PR Power Calibration]

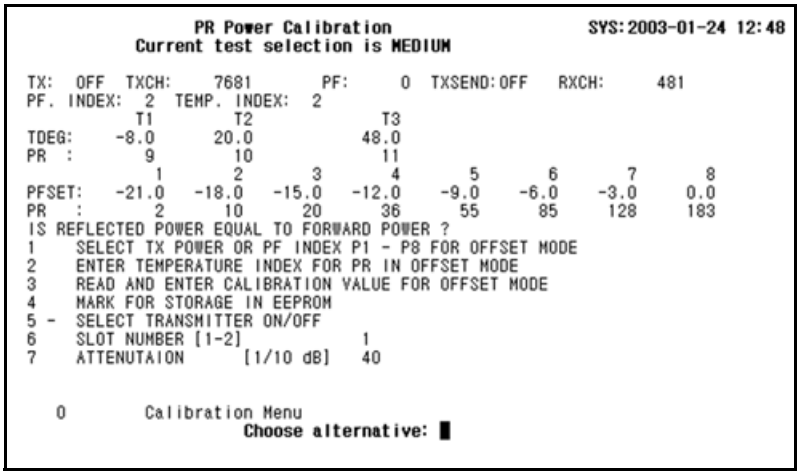

Figure 32 PR Power Calibration - 2 menu.

Alt. 1 SELECT TX POWER INDEX P1-P8 FOR OFFSET/ABSOLUTE MODE

Displays **SELECT TX_POWER = -21.0 PRESS Y TO SELECT N TO NEXT**

[-21.0 (def), -18.0, -15.0, -12.0, -9.0, -6.0, -3.0, 0.0]

Alt. 2 ENTER TEMPERATURE INDEX T1-T5 FOR OFFSET/ ABSOLUTE MODE

Displays **TEMPERATURE INDEX (2)**

The temperature index is selected and the temperature check as described for temperature calibration is initiated.

Alt. 3 READ AND ENTER CALIBRATION VALUE FOR OFFSET MODE

Alt. 4 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

Alt. 5 SELECT TRANSMITTER ON/OFF

A toggle function between " + " (ON) and " - " (OFF).

Alt. 6 SLOT NUMBER [1-2]

Displays the selected slot number. Enter the desired slot number

Alt. 7 ATTENUATION [1/10 dB]

Displays the attenuation for the selected slot (1/10 dB) Enter the desired cable loss in dB for slot 1 and 2 respectively. The slot number is selected in alternative 6.

If the temperature check was OK these alternatives modify the output reference value. The measured output power is calibrated to the defined nominal value for the selected PF index. In offset calibration, all reference values for the selected PF index are changed.

6.4.8 VCO Modulation Calibration

[Main menu, Radio Operations, Calibration, VCO Calibration]

```
   VCO Calibration                          SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


    1       SELECT OFFSET CALIBRATION MODE
    2       SELECT ABSOLUTE CALIBRATION MODE









    0.      Calibration Menu

                    Choose alternative: _
```

Figure 33 VCO Calibration - 1 menu.

Alt. 1-2 Will display the VCO Calibration menu 2, *Figure 34*.

[Main menu, Radio Operations, Calibration, VCO Calibration]

```
   VCO Calibration                          SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

TEMP INDEX: 2        SLOT:    1       CHANNEL:   3800
          T1          T2            T3             T4     T5
TDEG:  -8.0          6.0           20.0           34.0   48.0
VCO:    212          201           189            182    179


1      ENTER TEMPERATURE INDEX FOR VCO IN OFFSET/ABSOLUTE MODE
2      INCREMENT3    DECREMENT4    SET VALUE
5      MARK FOR STORAGE IN EEPROM
6   -  SELECT TRANSMITTER ON/OFF
7      SELECT MODULATION
8   -  SELECT MODULATION ON/OFF
9      SELECT SLOT
10     SELECT SLOT CHANNEL



0.     Calibration Menu
```

Choose alternative:

Figure 34 VCO Calibration - 2 menu.

Alt. 1 ENTER TEMPERATURE INDEX T1-T5 FOR OFFSET/ ABSOLUTE MODE

Displays **TEMPERATUR INDEX (2)**

The temperature index is selected and the temperature check, as described for temperature calibration, is initiated.

Alt. 2 INCREMENT

Increases the value in steps.

Alt. 3 DECREMENT

Decreases the value in steps.

Alt. 4 SET VALUE Displays **SET VCO (201)**

The value can be changed by increment, decrement or by set functions.

Alt. 5 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

Alt. 6 SELECT TRANSMITTER ON/OFF

This alternative is a toggle function between “+” (ON) and “-” (OFF).

Alt. 7 SELECT MODULATION

Displays **SELECT MODULATION = NONE PRESS Y TO SELECT N FOR NEXT**

[NONE (default), AC, LOW, HIGH, PRBS, PERIOD, SINE]

Alt. 8 SELECT MODULATION ON/OFF

This alternative is a toggle function between “+” (ON) and “-” (OFF).

Alt. 9 SELECT SLOT

Displays **SLOT NUMBER [1-3] (1)**

34xx:
For each slot the calibration has to be done at three different frequencies. The frequency band, selected in the "Radio Operation Parameters in menu" in *Figure 23*, shall be divided into the current number of slots. The number of slots is determined by the total frequency band covered by the BRU3 variant.

38xx and 39xx:
The calibration is done at one frequency.
Enter SLOT NUMBER = 1.

Alt. 10 SELECT SLOT CHANNEL

Displays **SLOT CHANNEL (3800)**

The SLOT CHANNEL is the upper limit of the channel number for current slot (slot 1, slot 2 or slot 3)

34xx:
The upper limit for slot 3 shall be set to -1 (=).

38xx and 39xx:
The upper limit for slot 1 shall be set to -1 (=).

Reference values

The VCO modulation gain parameters are shown for all temperature index values.

6.4.9 TCXO Modulation Calibration

[Main menu, Radio Operations, Calibration, TCXO Calibration]

```
        TCXO Calibration                SYS:yyyy-mm-dd hh:mm
  Current test selection is MEDIUM


     1         SELECT OFFSET CALIBRATION MODE
     2         SELECT ABSOLUTE CALIBRATION MODE









     0.        Calibration Menu

                     Choose alternative:
```

Figure 35 TCXO Calibration - 1 menu.

Alt. 1-2 Displays TCXO Calibration menu 2, *Figure 36*.

[Main menu, Radio Operations, Calibrations, TCXO Calibration]

```
     TCXO Calibration                SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM

TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

   TEMP INDEX: 2

           T1         T2          T3          T4         T5
   TDEG:  -8.0        6.0        20.0        34.0       48.0
   TCXO:   234        234         234         234        234


   1      ENTER TEMPERATURE INDEX FOR TCXO IN OFFSET/ABSOLUTE
          MODE
   2      INCREMENT3    DECREMENT4      SET VALUE
   5      MARK FOR STORAGE IN EEPROM
   6 -    SELECT TRANSMITTER ON/OFF
   7      SELECT MODULATION
   8 -    SELECT MODULATION ON/OFF
   9 -    VCO MODULATION ON/OFF



   0.     Calibration Menu

                    Choose alternative:
```

Figure 36 TCXO Calibration - 2 menu.

Operational conditions

The transmitter and receiver conditions are shown, as described in the transceiver control and presentation menu. The operation conditions are changed in Radio Calibration Menu.

Reference values

The TCXO modulation gain parameter is shown for all temperature index values.

Alt. 1 ENTER TEMPERATURE INDEX T1-T5 FOR OFFSET/ ABSOLUTE MODE

Displays **TEMPERATURE INDEX (2)**

The temperature index is selected and the temperature check, as described for temperature calibration, is initiated.

Alt. 2 INCREMENT

Increases the value in steps.

Alt. 3 DECREMENT

Decreases the value in steps.

Alt. 4 SET VALUE

Display **SET TCXO (215)**

If the temperature check was OK these alternatives modify the output gain value. The measured frequency deviation on the external instrument should be within specified limits. In offset calibration, all reference values are changed.

Alt. 5 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

Alt. 6 SELECT TRANSMITTER ON/OFF

This alternative is a toggle function between “+” (ON) and “-” (OFF).

Alt. 7 SELECT MODULATION

Selects the modulation

Displays **SELECT MODULATION = NONE PRESS Y TO SELECT NO FOR NEXT**

[NONE (default), AC, LOW, HIGH, PRBS, PERIOD, SINE]

Alt. 8 SELECT MODULATION ON/OFF

This function is a toggle function between “+” (ON) and “-” (OFF).

Alt. 9 VCO MODULATION ON/OFF

This function is a toggle function between “+” (ON) and “-” (OFF).

6.4.10 RSSI Calibration

[Main menu, Radio Operations, Calibration, RSSI Calibration]

```
          RSSI Calibration                    SYS:yyyy-mm-dd hh:mm
    Current test selection is MEDIUM

      TX:  OFF  TXCH:    3840    PF:    0  TXSEND:OFF    RXCH:    3040

RSSI INDEX: 2
          T1   T2     T3    T4     T5    T6     T7    T8     T9   T10
TDEG:  -7.0  3.0  13.0  23.0  33.0  43.0  53.0  63.0  73.0  83.0
RSSI:    85  108   126   143   164   169   169   167   117    74


SET SIGNAL STRENGTH TO REFERENCE VALUE


1       SELECT RSSI INDEX S1 - S10
2       READ AND ENTER CALIBRATION VALUE
3       MARK FOR STORAGE IN EEPROM









0.     Calibration Menu

                      Choose alternative: _
```

Figure 37 RSSI Calibration menu.

Status Line:

Operational conditions

The transmitter and receiver conditions are shown, as described in the transceiver control and presentation menu. The operation conditions are changed in Radio Calibration Menu.

Reference values

The measured input signal RSSI, is shown for reference points R1 - R10.

Alt. 1 SELECT RSSI INDEX S1-S10 FOR OFFSET/ABSOLUTE MODE

Displays **RSSI SIGNAL INDEX (2**)

The RSSI index is selected. The measured RSSI value is entered at reference index point, when the signal strength is set to the defined value at the external instrument.

Alt. 2 READ AND ENTER CALIBRATION VALUE

Alt 3 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

6.4.11 EEPROM Display Editor Menu

[Main menu, Radio Operations, Calibration, EEPROM Display Editor-1]

```
            EEPROM-display, screen 1                    SYS:2001-08-17 10:43
          Current test selection is MEDIUM

Bandgap(1)      80
Temp(1-5)       90   106   135   168   194
OCXO(1-5)       77    77    78    78    79
PF(1,1-8)      103   111   120   130   142   156   175   201
PF(2,1-8)      102   110   119   130   141   156   176   201
PF(3,1-8)      102   110   119   129   141   156   175   200
PF(4,1-8)      102   110   119   130   142   157   177   202
PF(5,1-8)      101   110   119   131   143   158   177   203
PFM(1,1-8)     123   135   146   160   176   194   221   255
PFM(2,1-8)     121   132   143   157   171   192   217   252
PFM(3,1-8)     117   127   139   152   168   185   211   242
PFM(4,1-8)     114   123   135   148   163   182   207   237
PFM(5,1-8)     110   120   131   144   158   176   200   229

    SELECT SCREEN 1-4



   0        Calibration Menu
                    Choose alternative: _
```

Figure 38 EEPROM Display menu - screen 1.

Alt.1 SELECT SCREEN 1

This menu

Alt. 2 SELECT SCREEN 2

[Main menu, Radio Operations, Calibration, EEPROM Display Editor-2]

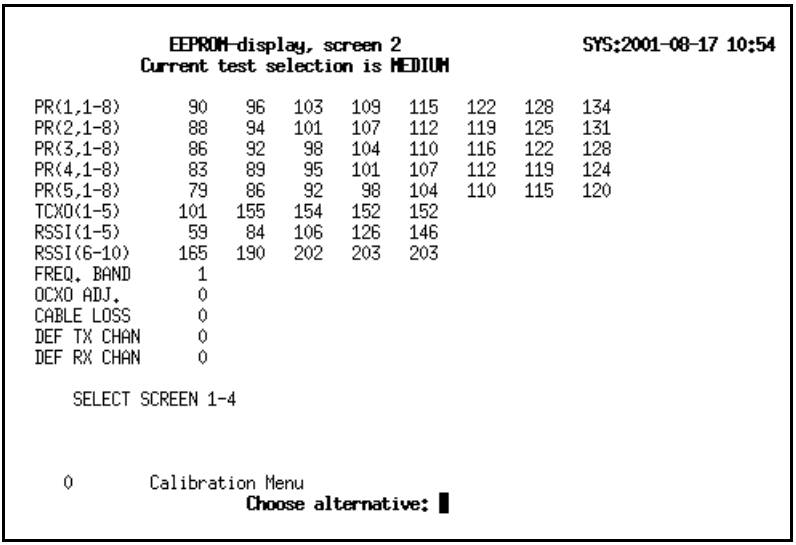

Figure 39 EEPROM Display menu - screen 2.

Alt. 3 SELECT SCREEN 3

[Main menu, Radio Operations, Calibration, EEPROM Display Editor-3]

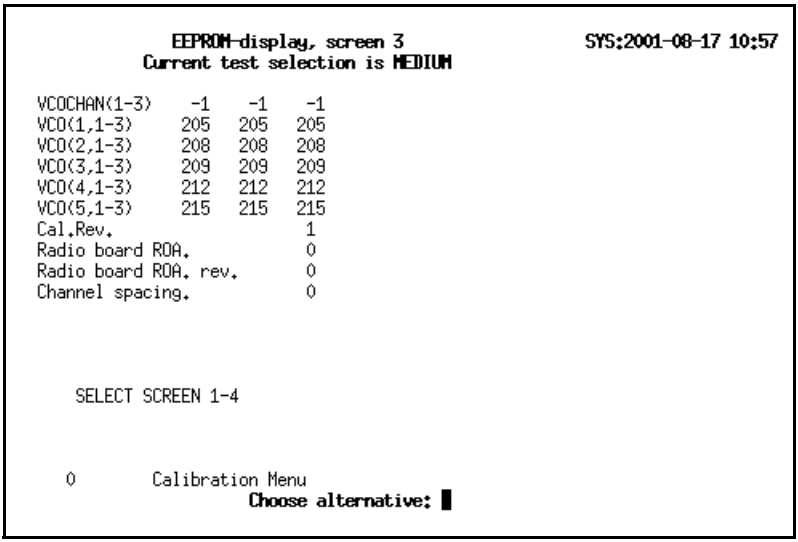

Figure 40 EEPROM Display menu - screen 3.

Alt. 4 SELECT SCREEN 4

[Main menu, Radio Operations, Calibration, EEPROM Display Editor-4]

```
            EEPROM-display, screen 4                    SYS:2003-01-24 12:53
          Current test selection is MEDIUM

XPRA(1-2)       40   140
XPRM(1,1,1-8)        2     9    19    35    54    84   126   179
XPRM(1,2,1-8)        1     2     3     5     6    11    20    33
XPRM(2,1,1-8)        2    10    20    36    55    85   128   183
XPRM(2,2,1-8)        1     3     5     6     9    16    28    44
XPRM(3,1,1-8)        2    11    22    37    57    87   131   187
XPRM(3,2,1-8)        1     5     6     7    11    22    36    54
PA Bias Driver.     908
PA Bias Final.      232
RX FDAC.             75
TX FDAC.             75


    SELECT SCREEN 1-4


  0        Calibration Menu
                    Choose alternative:
```

Figure 41 EEPROM Display menu - screen 4.

6.4.12 PA Bias and FDAC Calibration Menu

[Main menu, Radio Operations, Calibration, PA Bias and FDAC Calibration]

```
          PA Bias and FDAC Calibration Menu                SYS:2004-02-18  0:01
           Current test selection is MEDIUM


        1    SET PA BIAS DRIVER:       1000
        2    SET PA BIAS FINAL:         180
        3    SET FDAC RX:                75
        4    SET FDAC TX:                75
        5    SETUP RADIO OPERATION PARAMETERS
        6  - SELECT TRANSMITTER ON/OFF
        7    SAVE PA BIAS AT LOW POWER SLOT:  DRIVER=    0  FINAL=    0
        8    SAVE PA BIAS AT HIGH POWER SLOT: DRIVER=    0  FINAL=    0









    0       Radio Calibration Menu
                    Choose alternative:
```

Figure 42 PA Bias and FDAC Calibration Menu.

Alt. 1 SET PA BIAS DRIVER

Shows the current setting of the driver bias (a).

Alt. 2 SET PA BIAS FINAL

Shows the current setting of the final bias (a).

Alt. 3 SET FDAC RX

Shows the current setting of the Rx syntheziser (a).

Alt. 4 SET FDAC TX

Shows the current setting of the Tx syntheziser (a).

Alt. 5 SETUP RADIO OPERATION PARAMETERS

Shows the current setting of the radio operation parameters (a).

Alt. 6 SELECT TRANSMITTER ON/OFF

Shows the current setting of the transmitter (a).

Alt. 7 SAVE PA BIAS AT LOW POWER SLOT
Saves the current setting of PA BIAS at low power slot.

Alt. 8 SAVE PA BIAS AT HIGH POWER SLOT
Saves the current setting of PA BIAS at high power slot.

(a) When a new value is entered it takes effect on the radio board immediately. The new value will be stored in the EEPROM after confirmation. The setting can be changed by entering a new value.

6.4.13 Radio Register Editor Menu

[Main menu, Radio Operations, Radio Register Editor]

```
     Radio Register Editor Menu    SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


1   READ RADIO REGISTER
2   WRITE RADIO REGISTER


0.  Previous Menu


                Choose alternative: _
```

Figure 43 Radio Register Editor Menu.

Alt. 1 READ RADIO REGISTER

Displays "**ADDRESS** = (1)".

enabling reading of the address number.

Alt. 2 WRITE RADIO REGISTER

Displays "**ADDRESS** = (1)".

enabling writing of the register value.

6.4.14 Adjustment

[Main menu, Radio Operations, Adjustment]

```
     Radio Adjustment Menu            SYS:yyyy-mm-dd hh:mm
  Current test selection is MEDIUM


 1   OCXO AGE ADJUSTMENT
 2   SAVE ADJUSTMENT IN EEPROM




 0.  Radio Control and Calibration Menu

                  Choose alternative: _
```

Figure 44 Radio Adjustment Menu.

Alt. 1 OCXO AGE ADJUSTMENT

Displays the menu in *Figure 45*.

Alt. 2 SAVE ADJUSTMENT IN EEPROM

Saves the adjustment in EEPROM.

[Main menu, Radio Operations, Adjustment, OCXO Age Adjustment]

```
   OCXO Age Adjustment Menu       SYS:yyyy-mm-dd hh:mm
 Current test selection is MEDIUM


CURRENT ADJUSTMENT VALUE IS 0

1   INCREMENT
2   DECREMENT
3   SET VALUE
4   MARK FOR STORAGE IN EEPROM



0.  Adjustment menu

                Choose alternative: _
```

Figure 45 OCXO Age Adjustment Menu.

Alt. 1 INCREMENT

Increases the CURRENT ADJUSTMENT VALUE in steps.

Alt. 2 DECREMENT

Decreases the CURRENT ADJUSTMENT VALUE in steps.

Alt. 3 SET VALUE

Displays **VALUE (0)**

The CURRENT ADJUSTMENT VALUE can be set.

Alt. 4 MARK FOR STORAGE IN EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

6.4.15 Setup

[Main menu, Radio Operations, Setup]

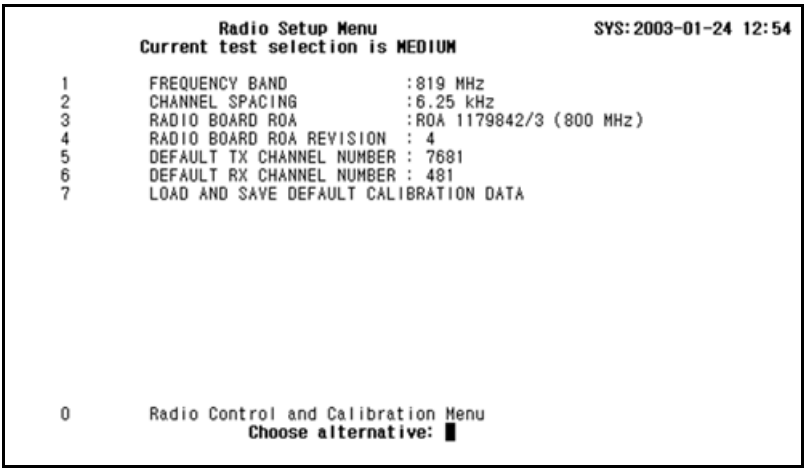

Figure 46 Radio Setup Menu.

Alt. 1 FREQUENCY BAND

A toggle function between 400-1, 400-2, 800, 819 and 900 MHz.

This alternative is used to choose between the 400-1 and 400-2 MHz, 800 and 819 MHz and 900 MHz bands.

400-2 equals the UK National frequency band.
400-1 equals all other 400 MHz frequency bands including the UK City frequency band.

800 and 819 MHz covers the 800 MHz band using different base frequencies for channel number 0.

Alt. 2 CHANNEL SPACING

Toggles channel spacing between 6.25 and 12.5 kHz.

Alt. 3 RADIO BOARD ROA

Toggles radio board between:

- Unknown (old)
- ROA 1179842/1 (900 MHz)
- ROA 1179842/3 (800 MHz)
- ROA 117 8897 (400 MHz)

Alt. 4 RADIO BOARD ROA REVISION

Sets radio board revision number

Alt. 5 DEFAULT TX CHANNEL NUMBER

Displays **DISPL. TX CHAN. (3840)**

Sets the transmitter channel number.

Alt. 6 DEFAULT RX CHANNEL NUMBER

Displays **DISPL. RX CHAN. (3040)**

Sets the receiver channel number.

Alt. 7 LOAD AND SAVE DEFAULT CALIBRATION DATA

Sets the default data for the current radio board and frequency board.

Alt. 0 SAVE PARAMETER IN PHYSICAL EEPROM

This alternative indicates that this calibration object will be saved in EEPROM when the calibration procedure is finished.

6.5 Modem Operation Menu (BRU3 only)

[Main menu, Modem Operations]

```
      Modem Operation          SYS:yyyy-mm-dd hh:mm
  Current test selection is MEDIUM


1.  Line Speed on Modem port              9600
2.  DTR status                            OFF
3.  RTS status                            OFF
4.  Transparent Mode access




0.  Main menu

                Choose alternative:
```

Figure 47 Modem Operation menu.

Alt. 1 LINE SPEED ON MODEM PORT

This toggle function provides a step-by-step increase of the transmission rate starting with 1200 and further 2400, 4800, 7200, 9600, 14400, 19200 up to 38400 bps from where the cycle will repeat itself.

Alt. 2 DTR STATUS

A toggle function between ON and OFF.

Alt. 3 RTS STATUS

A toggle function between ON and OFF.

Alt. 4 TRANSPARENT MODE ACCESS

Transparent access to modem. Return from this mode is achieved by pressing CTRL + C **three times**.

6.6 Interface Board Parameters Menu (BRU1 only)

[Main menu, Interface Board Parameters]

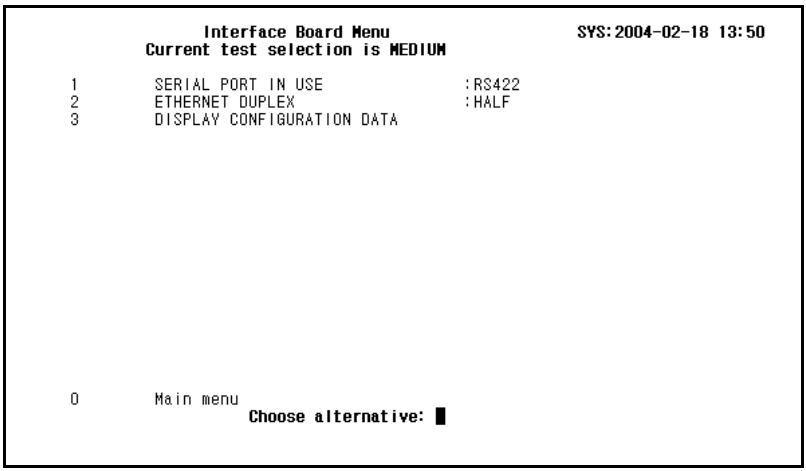

Figure 48 Interface Board Parameters menu (BRU1 only).

Alt. 1 SERIAL PORT IN USE
In BRU1 the serial port in use is set here, instead of the strap used in BRU3.

Alt. 2 ETHERNET DUPLEX
Sets Ethernet duplex.

Alt. 3 DISPLAY CONFIGURATION DATA
Displays the “Configuration Data Display” in *Figure 49*.

6.6.1 Configuration Data Display

[Main menu, Interface Board Parameters, Display Configuration Data]

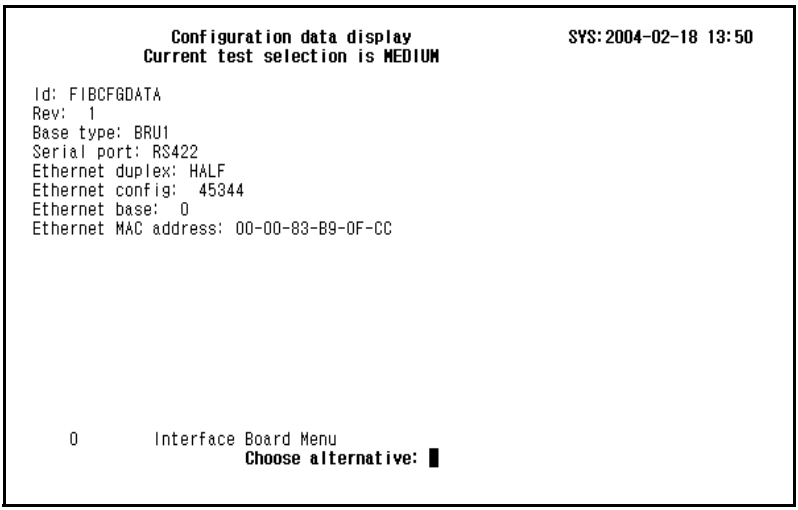

Figure 49 Configuration Data Display menu. (BRU1 only)

6.7 Status Overview Menu

[Main menu, Status Overview]

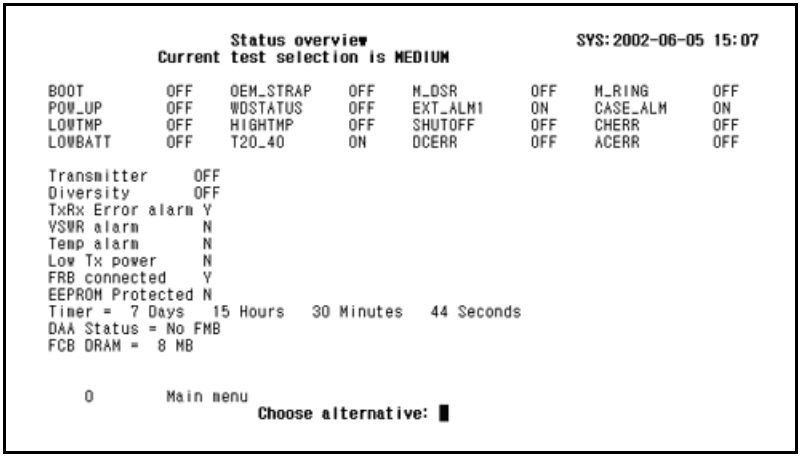

Figure 50 Status Overview menu (BRU3).

Figure 50 "Status Overview menu (BRU3)." and *Figure 51 "Status Overview menu (BRU1)."* shows an example of the Status Overview menu.

Status Line **"DAA Status"** will display the current country code.

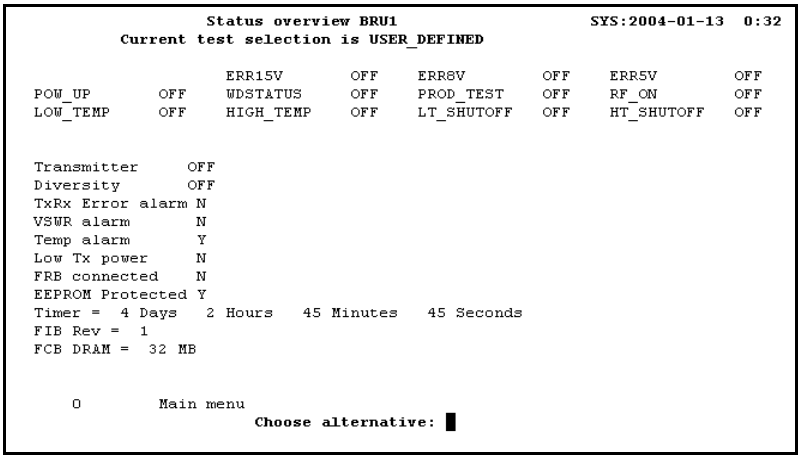

Figure 51 Status Overview menu (BRU1).

6.8 Edit Loader Parameters Menu (BRU3 and System Release R14 only)

[Main menu, Edit Loader Parameters]

```
    Edit Loader Parameters          SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


     1.  Node 0
     2.  Ports
     3.  Channels
     4.  Connections
     5.  Read parameters from Flash
     6.  Store parameters to Flash



     0.  Main menu

                 Choose alternative:
```

Figure 52 Edit Loader Parameters menu.

Note: Normally, an edit session starts with the selection of alt 5., to read in the present values from Flash. Otherwise a default set of parameters is used.

Alt. 1 NODE 0.

For example if node number alternative “1” is selected the program will ask for a node number between 0 - 99999.

Displays **Own node number [0 - 99999]: (0)**

The required Own node number should be entered.

Alt. 2 PORTS

Displays the “Define Ports menu” in *Figure 53*.

Alt. 3 CHANNELS

Displays the “Define Channels menu” in *Figure 59*.

Alt. 4 CONNECTIONS

Displays the “Define Connections menu” in *Figure 62*.

Alt. 5 READ PARAMETERS FROM FLASH

Reads the parameters stored in flash.

Alt. 6 STORE PARAMETERS TO FLASH

Saves the parameters in FLASH.

6.8.1 Ports

[Main menu, Edit Loader Parameters, Ports]

```
     Define ports                        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


    1.  Port            :   1
    2.  Not in use









    0.  Previous menu

                  Choose alternative:
```

Figure 53 Define Ports - "Not in use" menu.

Alt. 1 PORT

Displays **Port number [1-1]:(1)**

The desired physical port can only be set to "1" as only one port is available on the BRU3.

Alt. 2 NOT IN USE

Selects between "Not in use" or "In use" by toggling. The select "In use" displays the menu in *Figure 54*.

[Main menu, Edit Loader Parameters, Ports]

```
     Define ports            SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


1   Port                  : 1
2   In use
3   Unit number           : 0
4   Local port number     : 1
5   Modem parameters
6   X25 parameters



0.  Previous menu

              Choose alternative: _
```

Figure 54 Define Ports - "In use" menu.

Alt. 1 PORT

Choose alternative: Port number [1 - 1]: (1)

Alt. 2 IN USE

Selects between "Not in use" or "In use" by toggling. The select "In use" displays the menu in *Figure 54*.

Alt. 3 UNIT NUMBER

Choose alternative: Unit number [0 - 0]: (0)

As only one unit is available on the node, the set value should be "0".

Alt. 4 LOCAL PORT NUMBER

Choose alternative: Local port number [1 - 1] (1)

As only one local port is available on the node, the set value should be “1”.

Alt. 5 MODEM PARAMETERS

Displays the Port - Modem Parameter menu in *Figure 55*.

Alt. 6 X.25 PARAMETERS

Displays the Port - X.25 Parameter menu in *Figure 58*.

[Main menu, Edit Loader Parameters, Ports, Modem Parameters]

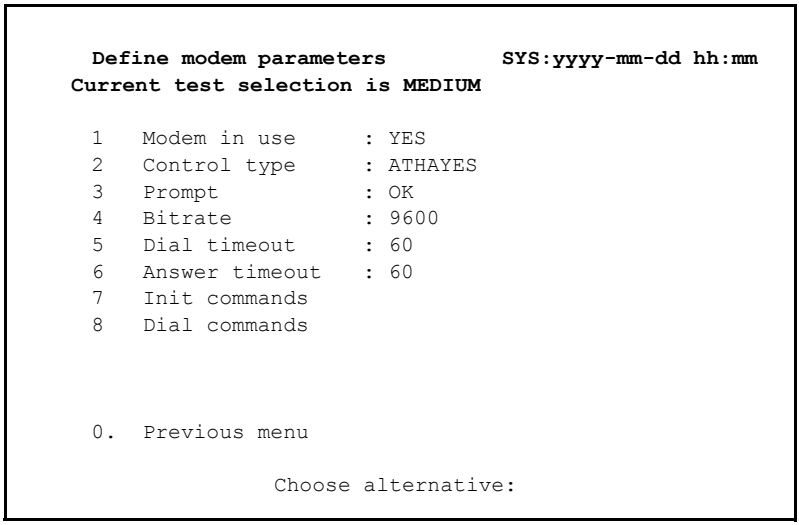

Figure 55 Edit Modem Parameters menu.

Alt. 1 MODEM IN USE

A toggle function between YES or NO.

Alt. 2 CONTROL TYPE

A toggle function, selection between ATHAYES, ATHAYES_LL, V25BIS and NO_CONTROL can be made.The alternative ATHAYES_LL gives Alt. 6 Retry timeout.

Alt. 3 PROMPT

The **PROMPT**: question should be set to OK.

Alt. 4 BIT RATE

A toggle function between bit rates 1200, 2400, 4800, 9600 and 14400, where the bit rate normally should be set to 9600, but it is possible to select other rates by toggling.

Note: This bit rate setting is related to asynchronous communication (sending initiation commands to the modem).

Alt. 5 DIAL TIMEOUT

The Dial Timeout in seconds should be entered.

Dial timeout [sec][0 - 500]: (0)

The value should normally be 60 sec.

Alt. 6 ANSWER TIMEOUT

The Answer Timeout in seconds should be entered.

Answer timeout [sec][0 - 500]: (0)

The value should normally be 60 sec.

RETRY TIMEOUT

The (Answer) Retry Timeout in (milliseconds) seconds should be entered.

Answer timeout [sec][0 - 600000]: (0)

The value should normally be 600000.

RETRY TIMEOUT is used when control type ATHAYES_LL has been selected. The value controls how often the modem tries to connect to the leased line. The established dial-up connection is disconnected during theses attempts.

Alt. 7 INIT COMMANDS

Displays the Prompt - Modem Parameter - Init Command menu in *Figure 56*.

Alt. 8 DIAL COMMANDS

Displays the 10 Dial Command sequences, please refer to the menu in *Figure 57*.

[Main menu, Edit Loader Parameters, Ports, Modem Parameters, Init Commands]

```
Modem Initial Command for Port 1      SYS:yyyy-mm-dd hh:mm
 Current test selection is MEDIUM


    1   Command 1 :  ATE0
    2   Command 2 :  AT&D2
    3   Command 3 :  AT&M1
    4   Command 4 :
    5   Command 5 :


    0.  Previous menu


                Choose alternative: _
```

Figure 56 Edit Modem Parameters menu, Init Commands.

Note: Commands 1 – 5 above are used differently depending on the selected control type. If ATHAYES is selected, commands 1 – 5 are sent to the modem for initialization, followed by the telephone numbers specified in *Figure 57 "Edit Modem Parameters menu, Dial Commands."*. If ATHAYES_LL is selected, commands 1 – 3 are sent to the modem to initialize it for leased-line mode. If this does not work and the modem attempts to established a dial-up connection, commands 4 – 5 are sent to the modem for initialization, followed by the telephone numbers specified in *Figure 57*.

Prior to an attempt to establish a connection, the loader program will send the above defined init commands to the modem. It is possible to define additional init commands in 4 and 5. For more information about modem settings, see *Node Hardware/BRU3/Telephone Modem Settings.*

[Main menu, Edit Loader Parameters, Ports, Modem Parameters, Dial Commands]

```
  Modem Dial Command for Port 1        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


   1   Command 1  : ATD543301
   2   Command 2  : ATD543302
   3   Command 3  :
   4   Command 4  :
   5   Command 5  :
   6   Command 6  :
   7   Command 7  :
   8   Command 8  :
   9   Command 9  :
   10  Command 10 :



   0.  Previous menu


                Choose alternative: _
```

Figure 57 Edit Modem Parameters menu, Dial Commands.

[Main menu, Edit Loader Parameters, Ports, X.25 Parameters]

```
   X25 parameters for port 1        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


  1   Local address          : 1
  2   Packet size            : 512
  3   Window size            : 2
  4   Bitrate                : 9600 bps
  5   Ltc channel            : 1
  6   Htc channel            : 8
  7   Network                : X25 Network
  8   Network ID             : 255


  0.  Previous menu

                Choose alternative:
```

Figure 58 Edit X.25 Parameters menu.

Alt 1. Enter the **LOCAL ADDRESS:**

Enter your own X.25 address.

Alt 2. Enter the **PACKET SIZE [-1 - 512]:(512)**

Alt 3. Enter the **WINDOW SIZE [-1 - 7]:(2)**

Alt 4. Enter the bit rate, a toggle function between 1200 bps, 2400, 4800, 9600, 14400, 19200, 48000, 56000, 64000 bps, External 115 and External 114. Default External 115.

Alt 5. Enter the **Ltc channel [0 - 255]:(1)**, 2 if PVC

Alt 6. Enter the **Htc channel [0 - 255]:(8)**, Normally 8

Alt 7. A toggle function between X.25 Network or No Network.

Alt 8. Enter the **Network ID [0 - 9999]:(255)** the X.25 ID if X.25 Network.

6.8.2 Channels

Alt. 3 “Channels” in the Edit Loader Parameters Menu displays the following menu:

[Main menu, Edit Loader Parameters, Channels]

```
      Define channels           SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1.  Channel          : 1
 2.  Not in use









 0.  Previous menu


               Choose alternative: _
```

Figure 59 Define Channels menu.

If alternative 1 is selected, the “Choose alternative” will change to:

Channel number [1 - 5]: (1).

[Main menu, Edit Loader Parameters, Channels]

```
     Define channels           SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1.  Channel                :  1
 2.  In use
 3.  Port                   :  1
 4.  Local channel number   :  1
 5.  X.25 Parameters




 0.  Previous menu

              Choose alternative: _
```

Figure 60 Define Channels menu.

Alt 1. Enter the **Channel number [1 - 5]:(1),** select the channel number to be edited.

Alt 3. Enter the **Port number [1 - 1]:(1)**

Alt 4. Enter the **Local channel number [0 - 255]:(1)**

Alt 5. Displays the menu “X.25 parameters for channel 1” in *Figure 61*.

[Main menu, Edit Loader Parameters, Channels, X.25 Parameters]

```
X.25 parameters for channel 1        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1.  Remote address         :  00000
 2.  Packet size            :  128
 3.  Window size            :  2
 4.  Connection type        :  VC
 5.  Logical channel        :  -1
 6.  Request rev chg        :  No
 7.  Accept rev chg         :  Yes
 8.  Accept empty addr      :  No


 0.  Previous menu

                Choose alternative: _
```

Figure 61 X.25 Parameters for Channel 1 menu.

Alt 1. Enter the **Remote address:** The Address for the MOX.

Alt 2. Enter **Packet size [-1 - 512]:(128)**

Alt 3. Enter **Window size [-1 - 7]:(2)**

Alt 4. Enter the **Connection type:**
A toggle function between VC and PVC type.

Alt 5. VC - mode:
Not alterable in VC-mode. Press any key to continue:

PVC - mode:
LOGCHAN [1 - 4095]:(1)

Alt 6-8 A toggle function between YES and NO.

6.8.3 Connections

Alt. 4 “Connections” in the Edit Loader Parameters Menu displays the following menu:

[Main menu, Edit Loader Parameters, Connections]

```
     Define connections           SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1.  Connection             :  1
 2.  Not in use









 0.  Previous menu

               Choose alternative:
```

Figure 62 Define Connection menu.

Alt 1. Enter the **Connection number [1 - 5]:(1)**

Alt 2. A choice between NOT IN USE and IN USE. The in use alternative gives the menu in *Figure 63*.

[Main menu, Edit Loader Parameters, Connections]

```
    Define connections              SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1.  Connection              :  1
 2.  In use
 3.  Remote node             :  0
 4.  Priority                :  0
 5.  Channel                 :  1



 0.  Previous menu

              Choose alternative:  _
```

Figure 63 Edit Loader Parameters menu - selection of connection.

Alt 1. Enter **the Connection number [1 - 5]:(0)**

Alt 2. Enter the **Remote node number [0 - 99999]:(0)**

Alt 3. Enter the **Priority [0 - 255]:(0)**

Alt 4. Enter **Channel [1 - 5]:(1)**

6.8.4 Read Parameters from FLASH

[Main menu, Edit Loader Parameters, Read Parameters from FLASH]

```
     Edit loader parameters          SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


   1   Node XXXXX
   2   Ports
   3   Channels
   4   Connections
   5   Read parameters from Flash
   6   Store parameters to Flash




   0.  Main menu

                Choose alternative:
```

Figure 64 Edit Loader Parameters menu - selection of parameters.

Alt 1. Enter **your own node number [0 - 9999]: (xxxxx)**

Alt 2. Gives the menu in *Figure 54*.

Alt 3. Gives the menu in *Figure 60*.

Alt 4. Gives the menu in *Figure 65*.

Alt 5. Reads the parameters from Flash.

Alt 6. Stores the parameters in Flash.

Note: Alternative 6 should now be selected! If alternative 5 is selected, the result will be that the newly entered or modified parameter values will be overwritten by the values stored in the Flash PROM.

6.8.5 Store Parameters in FLASH

The messages “Storing data in Flash”, followed by “Data stored successfully in Flash” will be briefly displayed. The menu will then return to normal display:

[Main menu, Edit Loader Parameters, Store Parameters in FLASH]

```
     Edit loader parameters        SYS:yyyy-mm-dd hh:mm
Current test selection is MEDIUM


 1   Node XXXXX
 2   Ports
 3   Channels
 4   Connections
 5   Read parameters from Flash
 6   Store parameters to Flash


 0.  Main menu



                Choose alternative:
```

Figure 65 Edit Loader Parameters menu - selection of parameters.

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