

PAMS Technical Documentation

NME-3 Series Transceiver

Service Software Instructions

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Introduction

General

To run the After Sales SW, a parallel port software protection device (PKD-1) has to be connected. The user can use WinTesla functions in modules for testing NME-3 mobile stations (MS). The test functions send test messages from PC to MS and receive results and show them in the PC display. The messages can be sent via M2BUS.

Note: if this software is to be run on laptops, the power saving feature MUST be switched off.

Hardware requirements for Windows 3.1x

The recommended minimum hardware standard to run Service Software is any computer which is 386 33 MHz or greater with at least 4 MB of memory and VGA type display (640 x 480). This assumes that only the WinTesla with After Sales Support Modules is active, i.e. other Windows packages are not running in the background.

Hardware requirements for Windows 95

The recommended minimum hardware standard to run Service Software is any computer which has Pentium processor, memory 8 MB and meets HW requirements recommended by Microsoft.

Software Environment of the Support Modules

The Service Software user interface is intended for the following environments: Microsoft Windows 3.1x (enhanced mode) and Windows 95 environment running in enhanced mode. Support for Microsoft NT may be added, if required. Detailed information about Windows and application usage can be found from the Microsoft Windows Version 3.1 Users Guide chapter one (Windows Basics) and chapter two (Application Basics).

As an ordinary Windows application, the main idea in the user interface is that selections are made with menus, push buttons and shortcut keys. Selections can be done by using keyboard and/or mouse. There is always a status bar displayed at the bottom of the main window which contains information about current actions.

Required Servicing Equipment

- Computer: At least IBM 80386 or compatible with one unused serial port (COM1 or COM2)^{*)}, one parallel port (LPT1), hard disk recommended
- Operating System: DOS Version 3.2 or later
- If PCLStart in use: DOS 6.22 and IBM 80486 or compatible
- Display: Any 80-character text display
- Service software version for 3.5" disk (product code:)
- Software protection key PKD-1 (product code: 0750018)

Detailed equipment is shown on *Equipment Setup* pages

^{*)} Note: A number of PC's of an older generation use the Intel, National Semiconductor, or United Microelectronics IC 8250 as the serial port UART. This is a comparatively inefficient circuit for current purposes and does not necessarily support the M2BUS adapter at 9600 baud. The newer UART's NS16450 and NS16550AF of National Semiconductor offer solutions for these problems.

Installation

Mechanical Connections

Caution: Make sure that you have switched off the PC and the printer before making connections.

Caution: Do not connect the PKD-1 key to the serial port. You may damage your PKD-1 !

The software controls the phone via a separate adapter connected to the serial port of the PC, and to the telephone's M2BUS (DAU-9S).

Attach the dongle PKD-1 to the parallel port 1 (25-pin female D-connector) of the PC. When connecting PKD-1 to the parallel port, be sure that you insert the computer side of the PKD-1 to the PC (male side). If you use a printer on parallel port 1, install the PKD-1 between the PC and your printer cable.

The PKD-1 should not affect devices working with it. If some errors occur (errors in printing are possible) please try printing without the PKD-1. If printing is OK without the PKD-1 please contact your dealer. We will offer you a new PKD-1 in exchange for your old one.

Installing the Software on PC Hard Disk

The program is delivered on a diskette and is copy protected with a dongle PKD-1. It must be present in parallel port when using Service software.

The program can also be installed on the hard disk, which is recommendable to obtain a maximum data access rate.

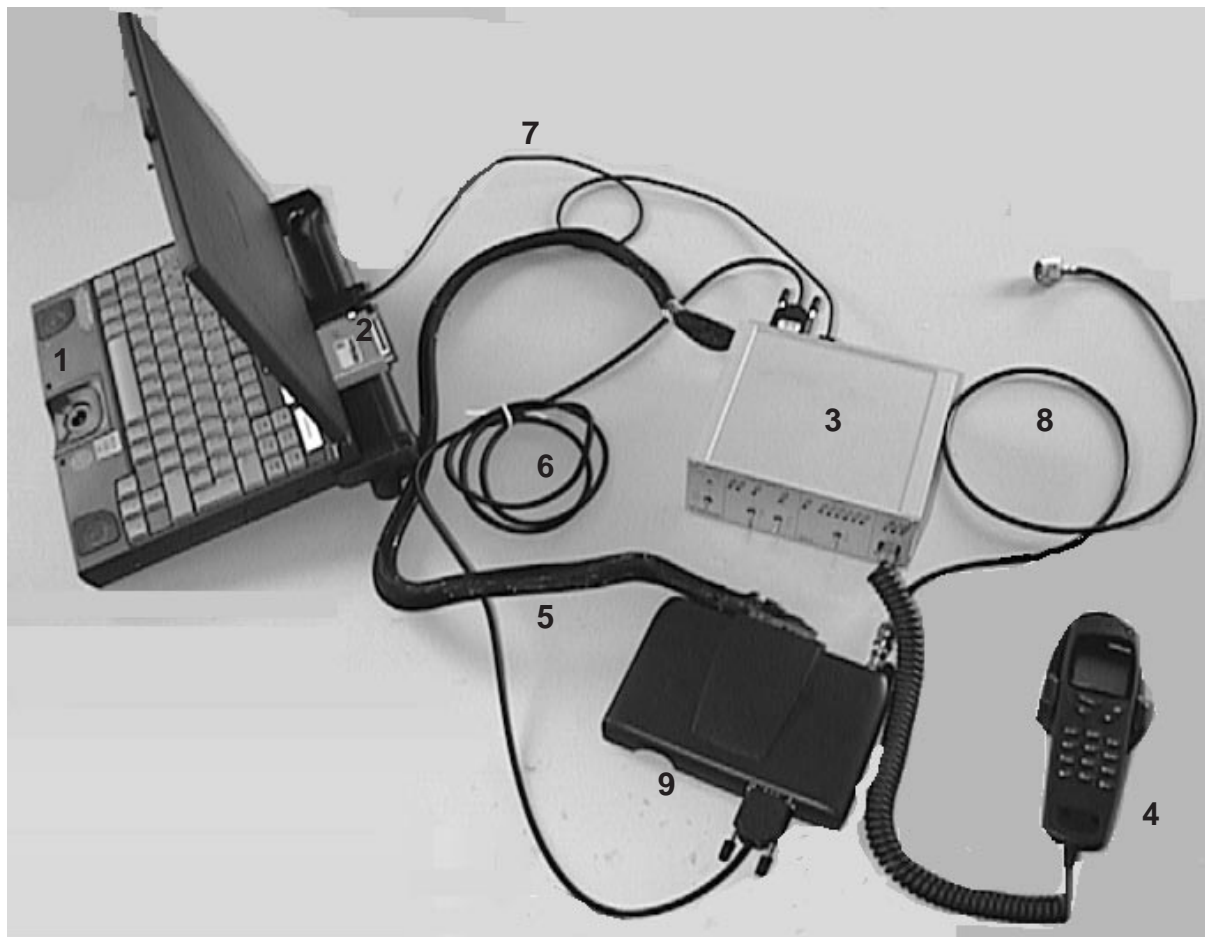
Keep the original diskette safe to enable upgrading of the program !

If you plan to use PCL Start service software, you must install it before installing Service software, see PCL Start installation instructions.

To install the new Service software program, follow the steps below:

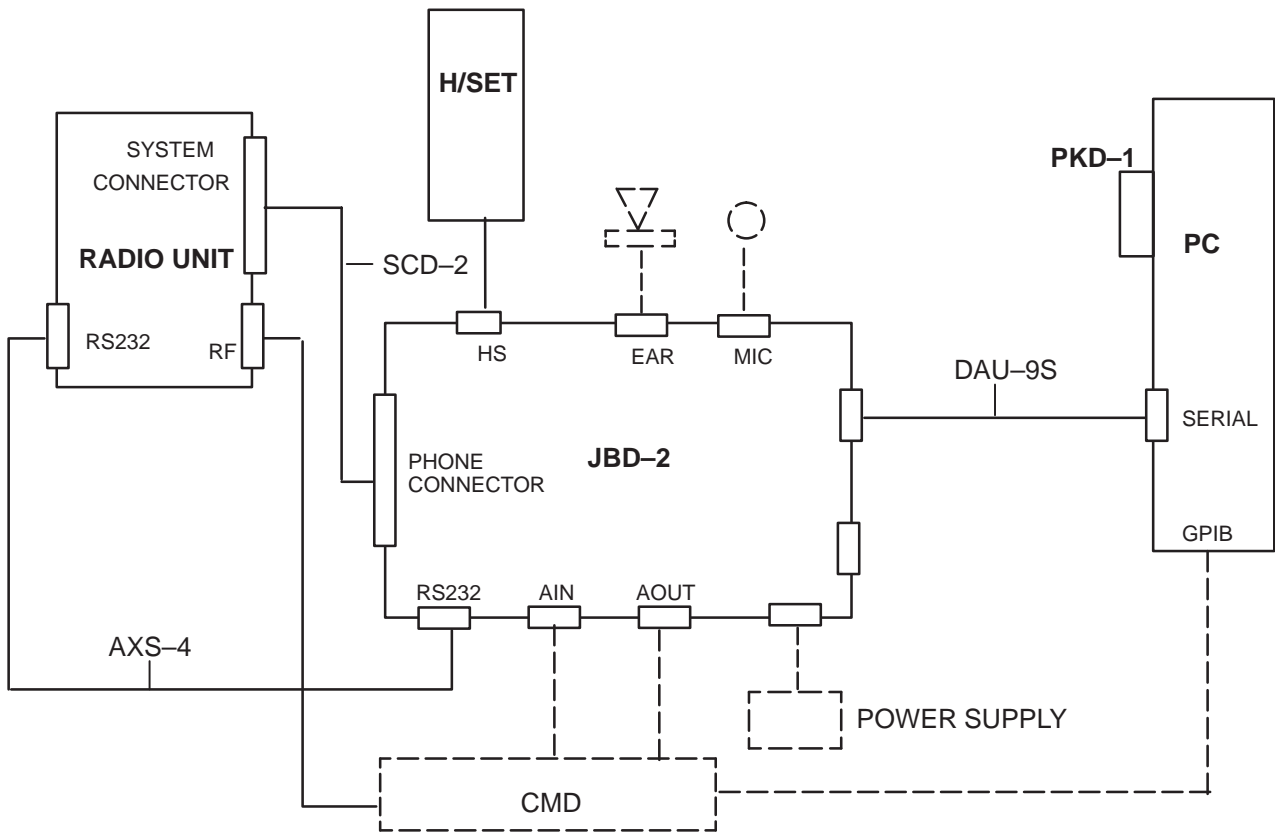
-
1. insert the new Service software diskette into drive A: of your computer
 2. start Windows, and open File Manager
log into drive a:
type A: and press <Enter>
 3. start SETUP.EXE and *type C: and press <Enter>*
install Service software to drive C:

Equipment & Setup for Test / Repair



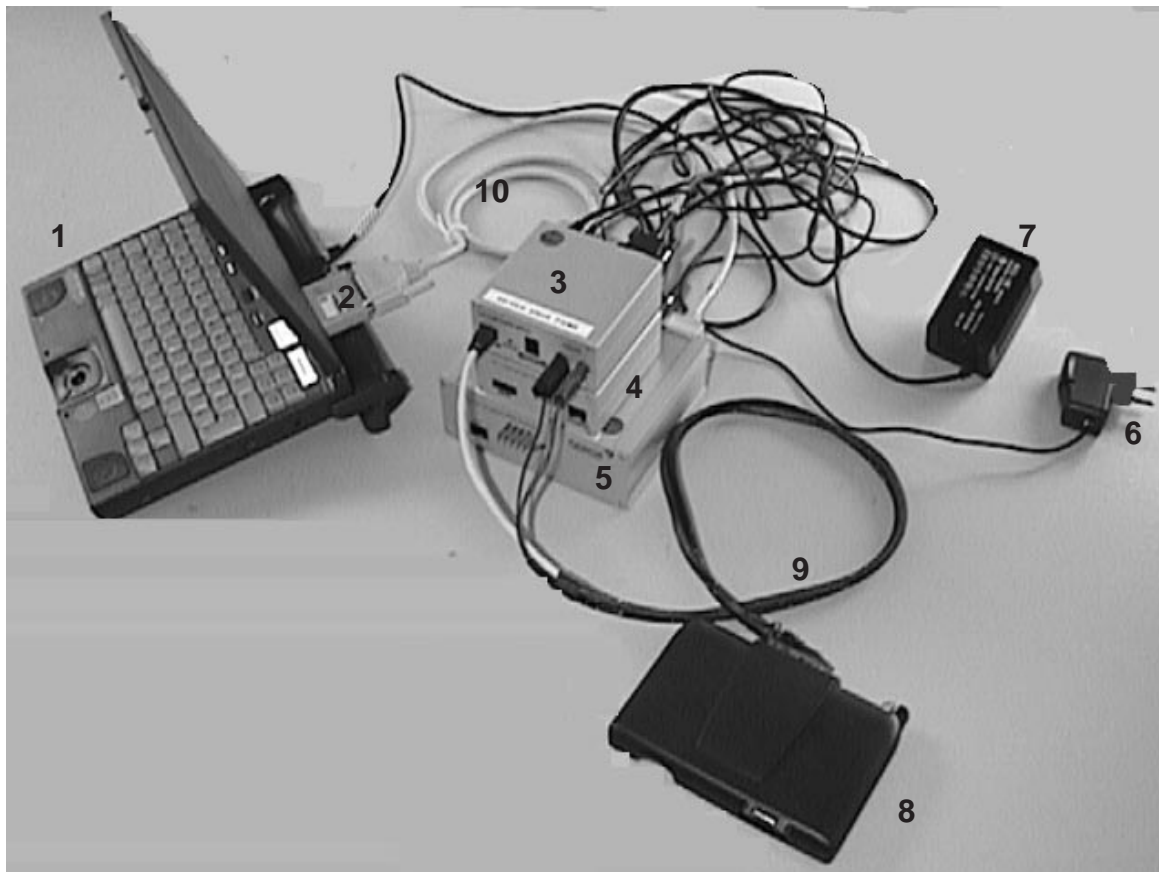
Item:	Description	Product code:
1	PC	-
2	PKD-1 Software protection key	0750018
3	JBD-2 Test / repair box	0770171
4	Handset	-
5	SCD-2A Repair Place Cable	0730171
6	AXS-4 D9 - D9 Cable	0730090
7	DAU 9S MBUS Cable	0730108
8	RF Cable	4626009
9	Radio Unit	-

Test Repair Setup –Block Diagram



NOTE: ITEMS IN BROKEN LINES NOT SHOWN IN PHOTO

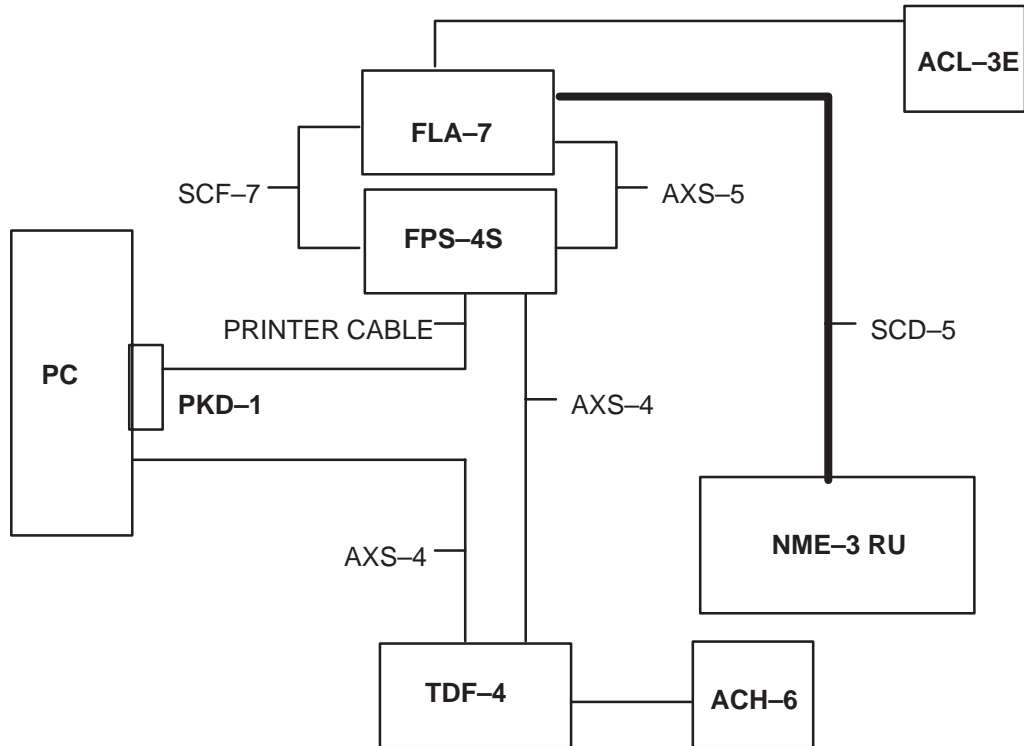
Equipment & Flash Update Setup



Item:	Description:	Product code:
1	PC	–
2	PKD-1 Software protection key	0750018
3	FLA_7 Flash Loading Adapter	0770119
4	TDF-4 Flash Security Box	0770106
5	FPS-4S Flash Prommer	0085095
6	ACH-6 Power Supply (Euro)	0270381
7	AC Charger ACL-3E	0680015
8	Radio Unit	–
9	SCD-5 Flash Update Cable	0730170
10	Printer Cable	0730029
*	AXS-4 D9 – D9 Cable	0730090
*	SCF-7 Power Cable (FLA-7 to FPS-4S)	0730141
*	AXS-5 D15 – D15 Cable	0730091

(* hidden items)

Flash Update Setup –Block Diagram



Tuning Steps

1. RX Calibration (AGC + AFC)

Procedure

Follow the steps described in chapter "Service Software Instructions" section "RX calibration... command".

Software reports the following:

AFC init value

AFC slope

PSW slope

AGC DAC values and the corresponding voltages for each gain step (0 - 57 dB)

Limits for the reported values

If everything went well the reported values should **approximately** be the following:

Parameter	Low limit	High limit
AFC init value	-80	80
AFC slope	135	230
PSW slope	250	350
AGC 0 dB	440	740
AGC 57 dB	60	360
Difference between the two neighbour AGC steps	10	20

Troubleshooting

If the calibration does not succeed the software normally reports "Unable to read data from phone" or "Failed to set high reference" or "Failed to set low reference".

In this case check first the basic functionality of the receiver chain: RF generator frequency set as in the calibration and level for example to the high reference value.

Then go to the RSSI reading menu (under RF controls). If the reading is very low there is something broken in the receiver and must be found by measuring voltages and signal levels at different places (information of these can be found elsewhere in this manual).

If the RSSI reading seems to be within 5 - 10 dB the same as the RF input level check that the VCTCXO (G650) frequency is close enough the wanted frequency. This is most easiest done by measuring the UHF VCO (G550) frequency because the absolute value of the deviation is biggest there. In the GSM mid channel the UHF-VCO frequency should be 1018 MHz. If the deviation is bigger than about +/-20 kHz it is probable that the VCTCXO is not operating correctly.

If both of these (RSSI reading and the frequency) seem to be correct and calibration still fails the most probable reason is that there is a little lack of gain somewhere or the AGC gain control slope in N600 is out of the limits.

This can be verified by changing the generator reference levels from the demanded ones in the calibration procedure in 1 dB steps up and down. If the calibration goes through with some reference levels the corrective action is most probably changing N500 or N600.

2. Alignment of Transmitter Power Levels

Equipment:

- Pulsed power meter or spectrum analyzer and 10 dB attenuator.
- MSJ-13 voltage source within 9-15VDCV.

The following **settings** for the spectrum analyzer are recommended when aligning the power levels: zero span, resolution and video bandwidths 1 MHz, input attenuation 40 dB, sweep time 1 ms, video triggering.

Procedure:

Follow the instructions given in chapter "Service Software Instructions" section "TX power... command".

For GSM the alignment channel is 60 (902 MHz)

Targets in dBm:

Power level	GSM
0	–
1	–
2 **	39
3	37
4	35
5	33
6	31
7 **	29
8	27
9	25
10 **	23
11 **	21
12	19
13	17
14	15
15	13
16 **	11
17	9
18	7
19 **	5.5
Base (2–10)	–12
Base (11–19)	–30

- **Align the six levels as denoted by the asterisks.
- Switch off base level calculation and re-calculate.
- Set baselevel values.
- Check that the power is within 0.5dB from target, adjust if not.
- Save the values to the phone.

3. I/Q Modulator Alignments

Procedure:

Connect the spectrum analyzer to the phone antenna connector. The recommended spectrum analyzer settings are: span 200 kHz, resolution BW 10 kHz, video BW 1 kHz, sweep 500 ms, input attenuation 30 dB.

- From *RF controls* menu make sure that TX data type is 1.
- Go to *TX I/Q tuning* menu. The alignment channel for GSM is 60 (902 MHz).
- Select the "TX I DC offset" option and adjust the level of the centre frequency (CHF) to minimum.
- Select the "TX Q DC offset" option and adjust the level of the CHF again to minimum.
- After finding both minima change "TX I DC offset" by step or two from the current value to both directions to see, whether better minimum can be found for CHF.
- Select the "Amplitude Difference" option and adjust the level of the unwanted sideband CHF + 67.71 kHz to minimum.
- Select the "Phase Difference" option and adjust the level of CHF + 67.71 kHz again to minimum.
- After all the minima have been found press "OK" button to store the values to phone EEPROM.

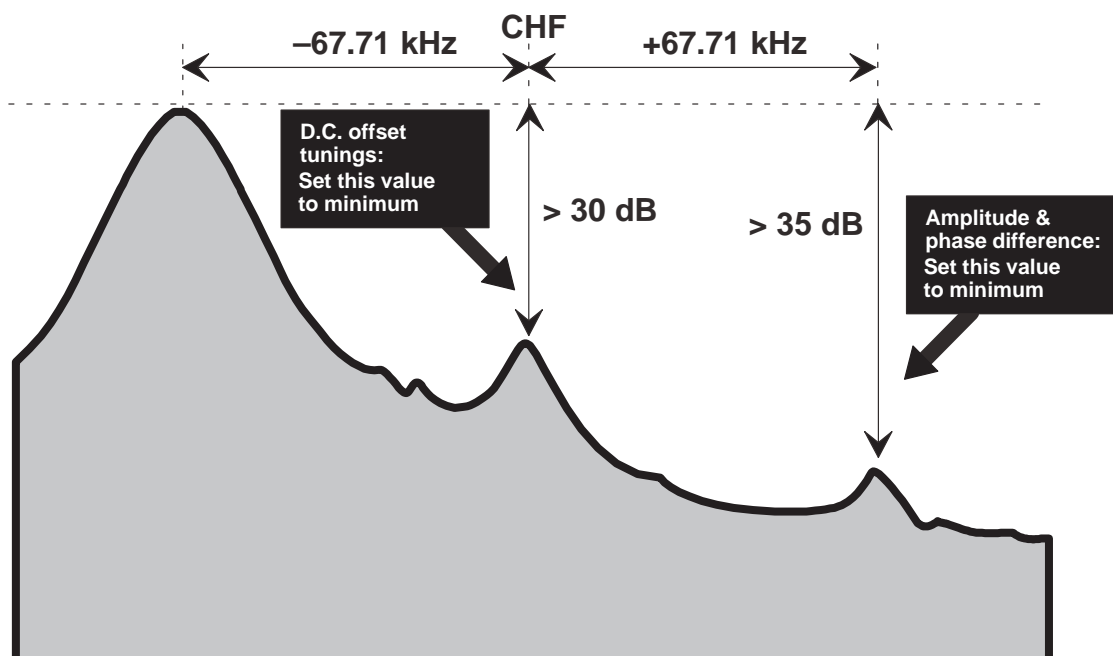
Targets:

The level of the centre frequency CHF should be at least **30 dB** down to the wanted sideband CHF - 67.71 kHz.

The level of the unwanted sideband CHF + 67.71 kHz should be at least **35 dB** down to the wanted sideband CHF - 67.71 kHz.

Alignment Verification

- Go to *Product* —> *Initialize* —> *Normal mode*. This is needed to give a SW reset for the phone. Which in turn is needed to get the aligned I/Q values in use.
- Go to *RF controls* menu and start transmission on channel 60, power level 10, TX data type 1.
- Check the levels of CHF and CHF + 67.71 kHz. **Both the levels should be at least 30 dB down** to the wanted sideband CHF - 67.71 kHz. If both or either of the specifications is not met adjust the required values (I and Q DC offsets for CHF and amplitude and phase for CHF + 67.71kHz) to meet the specifications.



4. A/D Calibration

Equipment

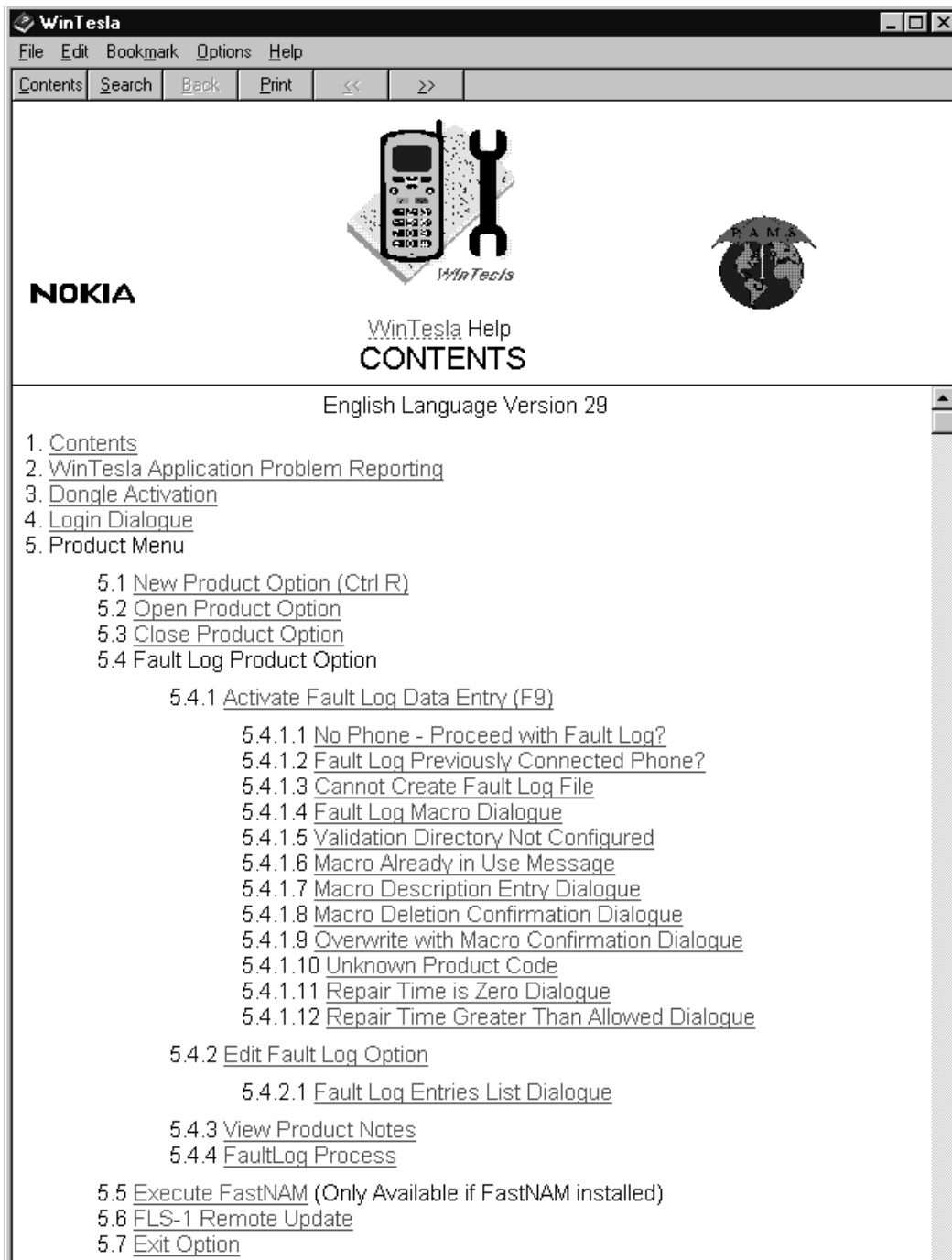
- Refer to repair place setup.

Procedure

- Connect phone to repair place.
- Start up WinTesla.
- Choose tuning menu and then A/D Calibration
- Press *Run*.
- Check that CCont Voltage result is OK.

Common User Interface

All WinTesla files share a common interface which are detailed in the WinTesla help files once the software is installed. A typical example is shown in the figure below.

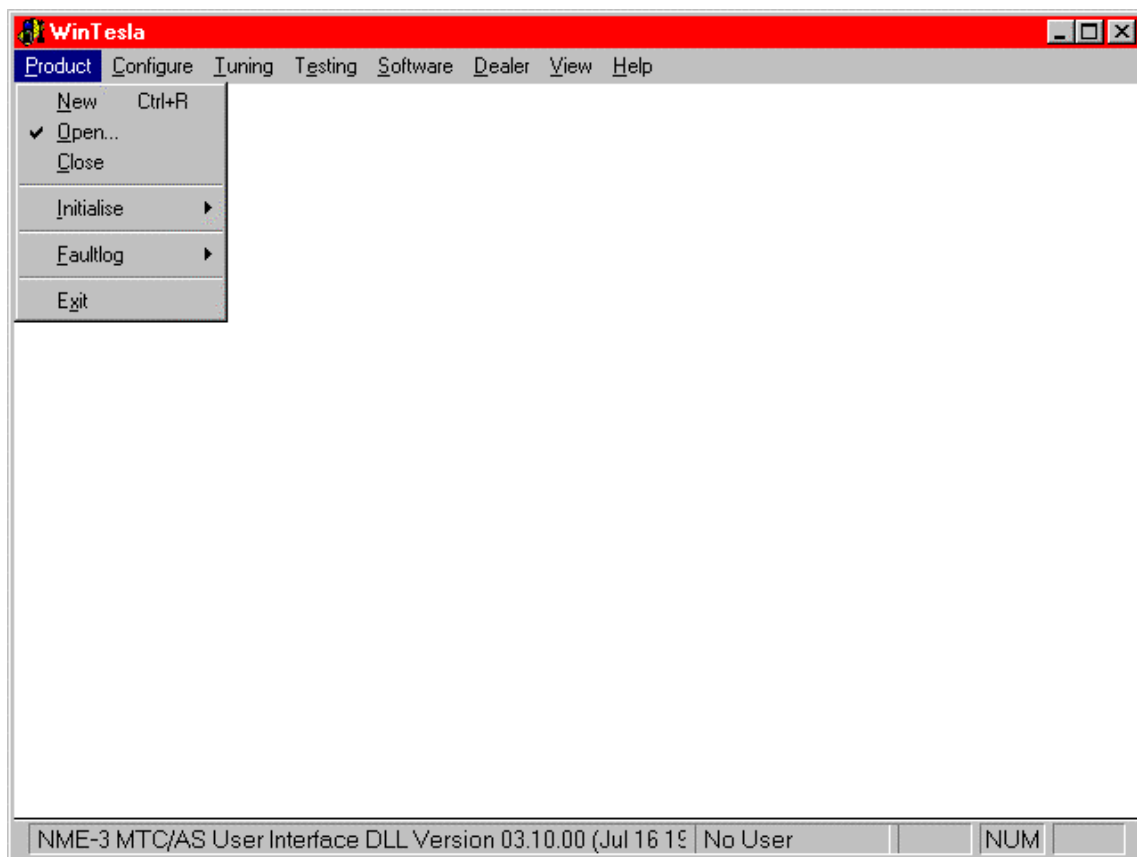


NME-3 Features (RU and HS)

Menu bar

After Sales SW's menus follow the menu structure specified in WinTesla User Interface Specification. This specification will describe functionality that differs from WinTesla specification.

Product



New command

Activation	Status Bar Text
------------	-----------------

Alt, P, N	Rescan a new phone
-----------	--------------------

Ctrl+R

If phone is changed (with same phone type only serial number is changed) phone will be initialised to local mode. If phone is changed to different phone type the current DLLs are unloaded and new ones are loaded for that phone.

If the Quick/RF Info view is open, window will be automatically updated.

If Phone Information view is open, it will be automatically updated.

NOTE: When different type of phone is changed user should select Product/New, so that application recognises phone type change and loads correct menu.

Open... command

Activation	Status Bar Text
Alt, P, O	Force load phone specific functionality
Phone is set to local mode.	

Initialise... command

Activation	Status Bar Text
Alt, P, I	
Opens a submenu	

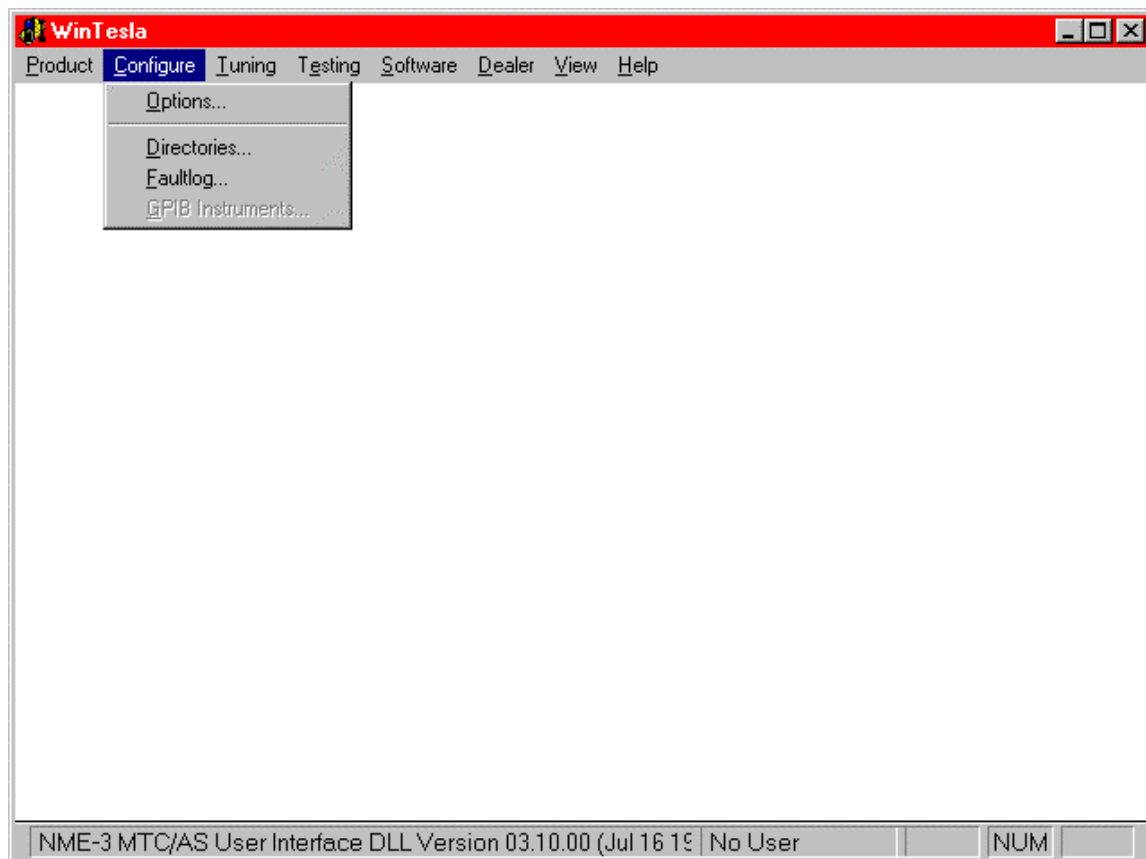
Normal Mode

Activation	Status Bar Text
Alt, P,I, N	Initialises phone to normal mode
F5	
When normal mode has been activated or program has been started, self-test results will be asked from MCU. If any fault was found in the tests, an error message is shown. If normal mode has been set successfully (no self test error has been found), and paging listening has been started, the used AFC value is requested from MS.	
Initialisation routine checks phone's cellular type and if unsupported phone is detected, application unloads the DLLs.	
The After Sales SW sets automatically the MS state to normal mode when needed.	
If phone identification view is open, window will be automatically updated. Also if RF Information Window is open it will be updated to quick info view.	
NOTE: When phone is changed to but phone type does not change, user may select Product/Initialise/Normal Mode instead of Product/New.	

Local Mode

Activation	Status Bar Text
Alt, P,I, L	Initialises phone to local mode
Shift+F5	
Selection will change the MS state to <i>local</i> . When user selects item from Testing or Tuning menus, the After Sales SW software will change automatically the MS state to local.	
The After Sales SW sets automatically the MS state to normal mode when needed.	
Also if quick info view is open it will be updated to RF Information view.	

Configure



Options

Activation Status Bar Text

Alt, C,O

Opens the "General Configuration" menu, where language, user ID, com port,..... can be selected.

Directories

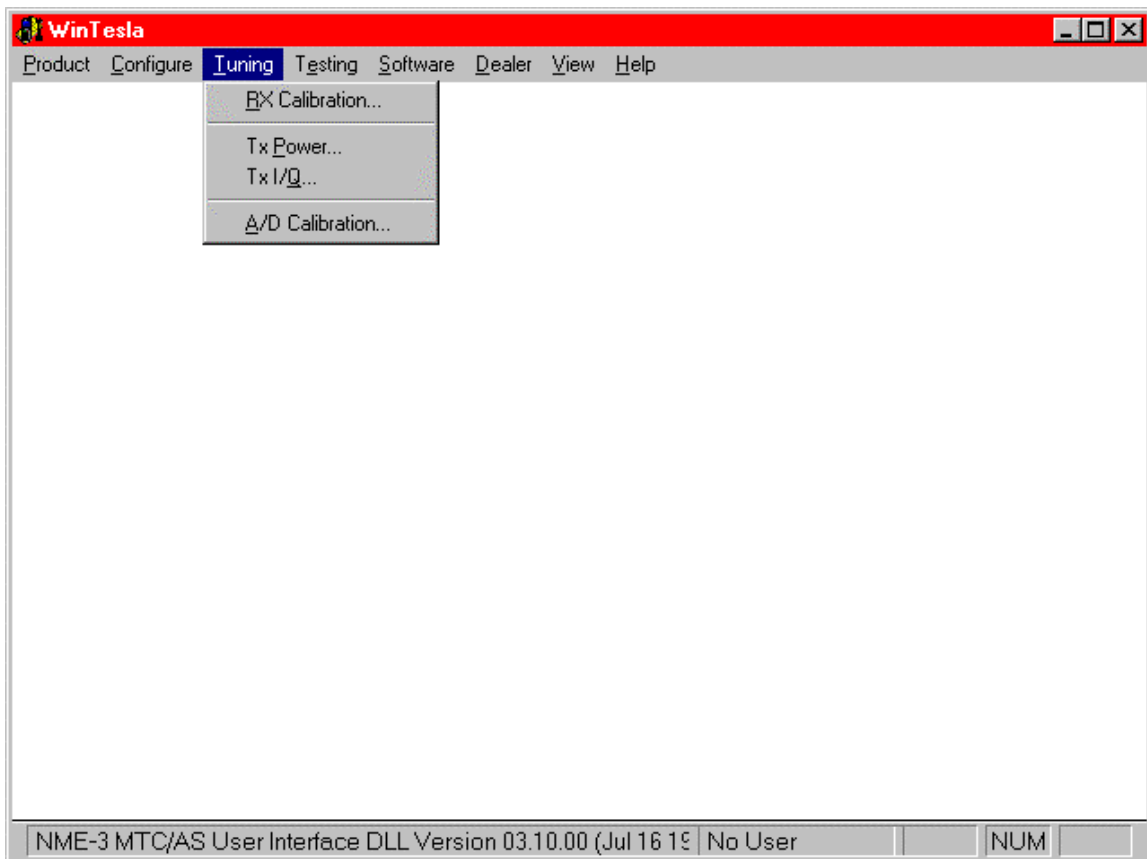
Activation Status Bar Text

Alt, C,D

Opens the "Directory Settings" menu, where the used directories can be modified.

Tuning

The tuning menu offers functions for ME adjustments.



RX Calibration... command

Activation	Status Bar Text
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Alt, T,R	Open RX Calibration dialog box
----------	--------------------------------

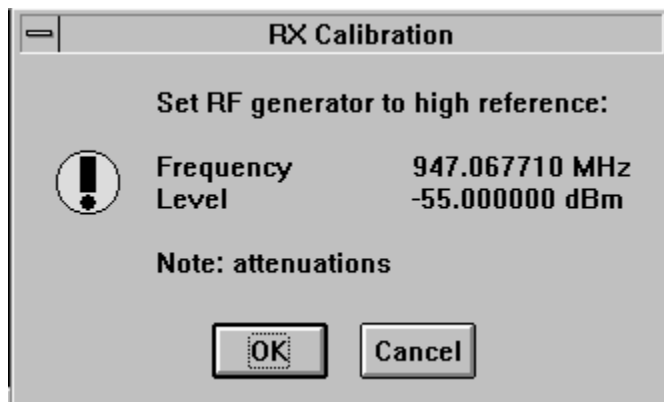
Starts RX calibration.

The next automatic selections are made when this tuning function is activated:

- Phone is set to local mode
- Update RF information window

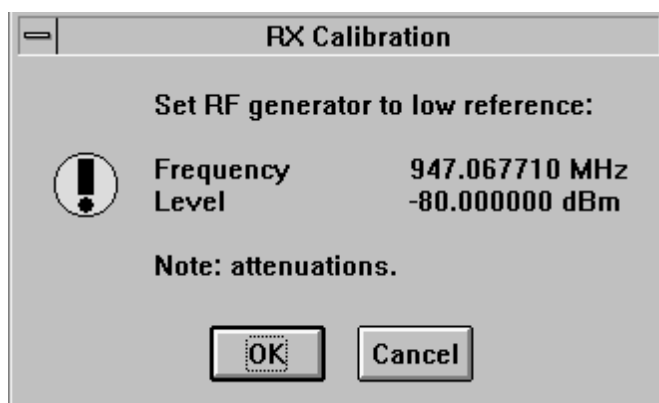
The measurement is started automatically when RX calibration is entered. The measurement is done in five steps:

1. User is requested to put signal generator to high input level (read from .INI file).



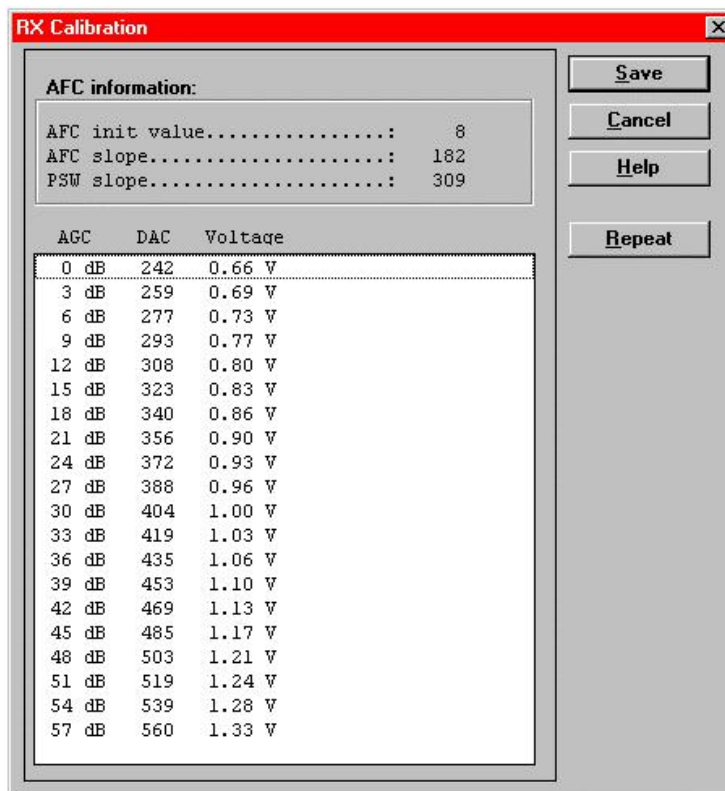
2. Measurement with high input level is executed

3. User is requested to put signal generator to low input level (read from .INI file).



4. Measurement with low input level is executed

5. The **RX Calibration** dialog will be updated when previous steps are done.



Dialog mode: **modal**

RX Calibration dialog has the following items:

AFC information box:

Shows AFC init value, AFC slope and PSW slope values.

AGC List box (ALT+A):

AGC, DAC, Voltage.

Repeat button (ALT+R):

The measurement can be started again by pressing this button.

Save button (ALT+S):

Dialog is closed and tuning *is saved* to phone.

Cancel button (ESC):

Dialog is closed and tuning *is not saved* to phone.

When calibration is ended, the DAC value checking is made and if it is not succeeded, error message is shown.

When exit is made, the next selections are set to the values which were selected before this adjustment.

Tx Power... command

Activation

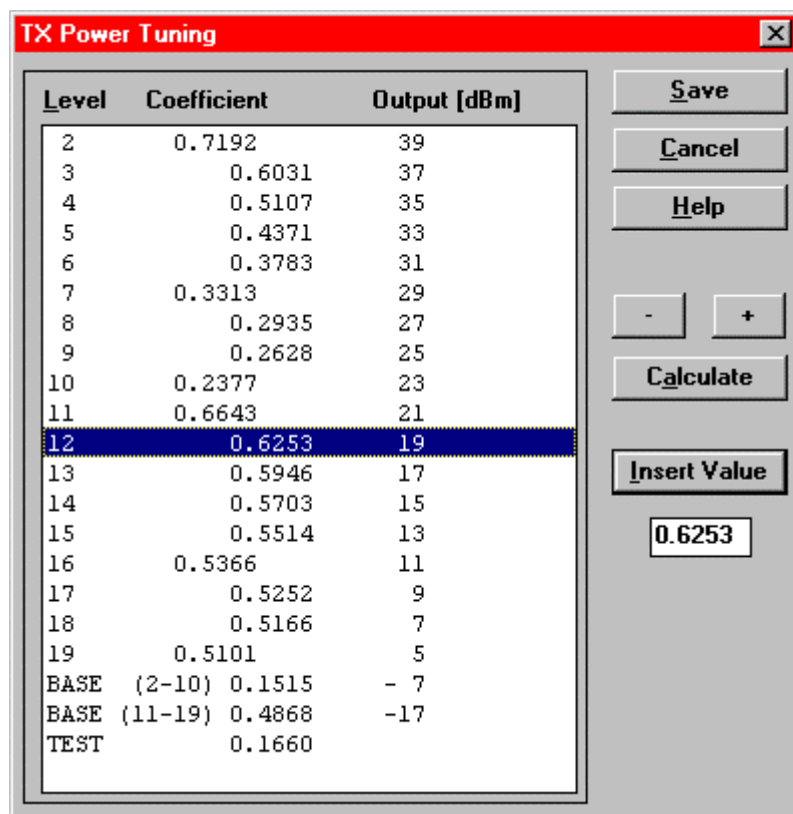
Status Bar Text

Alt, T,P

Open TX Power Tuning dialog box

Starts TX power tuning.

The **TX Power Tuning** dialog will be activated automatically after value selection.



Dialog mode: **modal**

TX Power Tuning dialog has following items:

Power Level & Coefficients list box (ALT+L):

The power is presented in GSM or values. The base power is selected automatically when the dialog is opened. The test value is not saved to the EEPROM. The test value can be changed during tuning as other power coefficients and the program remembers its value when tuning function is activated later again.

If there is more power levels in the phone that can fit into window the window is scrollable. When phone is initialised the program asks the number of power levels used in the phone.

Only six power coefficients are needed to tune (left justified Coefficients) and the rest of them are calculated.

The tuning position is highlighted and can be tuned with +/- keys or left/right cursor keys.

Calculate button (ALT+A):

The calculation is activated with this button. The power coefficients which are calculated from the tuned coefficients are displayed on the different columns than the others. All values can be tuned if needed.

Save button (ENTER):

Dialog is closed and tuned values are *saved* to phone.

Cancel button (ESC):

Dialog is closed and tuning *is not saved* to phone.

When selections are used, the power value checking is made and if it is not succeeded, error message is shown. The test checks that all power coefficients are in descending order (same order than power levels).

If the power tuning function is ended and EEPROM values are not received or EEPROM fault is noticed, an error message is shown.

When all power coefficients have such values that they don't cause any error messages, save can be made. The last used tuning power is in use after exit.

The next automatic selection is made when this tuning function is ended:

Operation Mode = RX pulsed

Tx I/Q... command

Activation

Status Bar Text

Alt, T,Q

Open TX I/Q Tuning dialog box

This function is used for tuning TX I and Q branch DC offset, amplitude difference and phase difference.

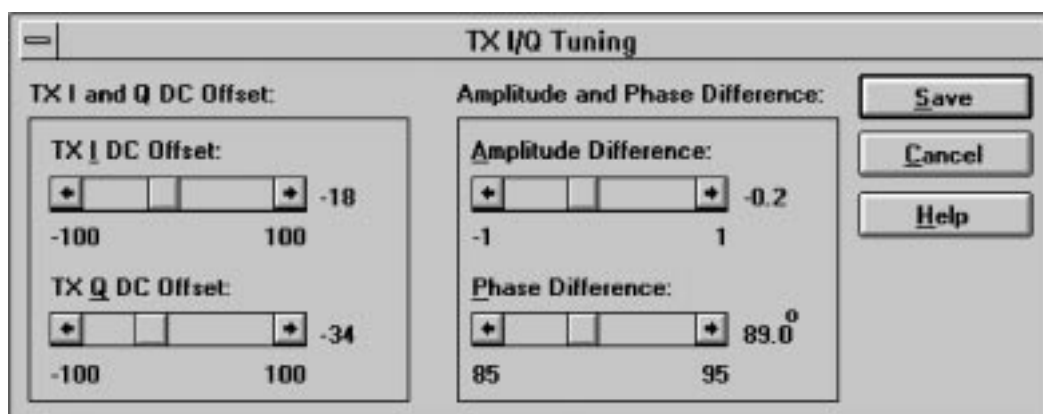
The function opens same **Start Tuning** dialog as with TX Power Tuning.

The next automatic selections are made when this function is activated:

Operation Mode = TX pulsed

Update RF Information window

The **TX I/Q Tuning** dialog is opened.



Dialog mode: **modal**

TX I/Q Tuning has following items:

Tune TX I DC Offset scroll bar (ALT+I):

The DC Offset is shown as percents (%) from the \pm maximum value. 0% means that there is no DC. The value range is -100%...100%. The value is rounded to the nearest integer value.

Tune TX Q DC Offset scroll bar (ALT+Q):

The operation of this function is the same as one above, except with this selection the Q branch DC Offset is tuned. The value range is $-100\% \dots 100\%$. The value is rounded to the nearest integer value.

Tune Amplitude Difference scroll bar (ALT+A):

When this selection is made user can increase or decrease the amplitude difference within 0.1 dB steps. The value range is $-1 \dots 1$.

Tune Phase Difference scroll bar (ALT+P):

When this selection is made user can increase or decrease the phase difference within 0.5° steps. The current phase difference is shown on the tuning window with numbers and bar figure. The value range is $85 \dots 95$.

Save button (ENTER):

Dialog is closed and tuning *is saved* to phone.

Cancel button (ESC):

Dialog is closed and tuning *is not saved* to phone.

After each value change the new value is sent to the phone.

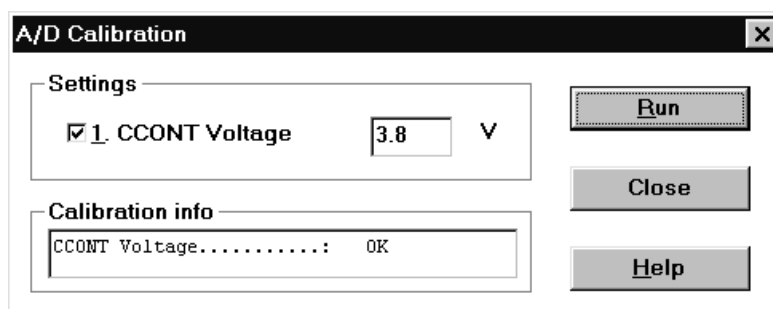
The next automatic selection is made when TX I / Q tuning function is ended:

Operation Mode = RX pulsed

Update RF Information window

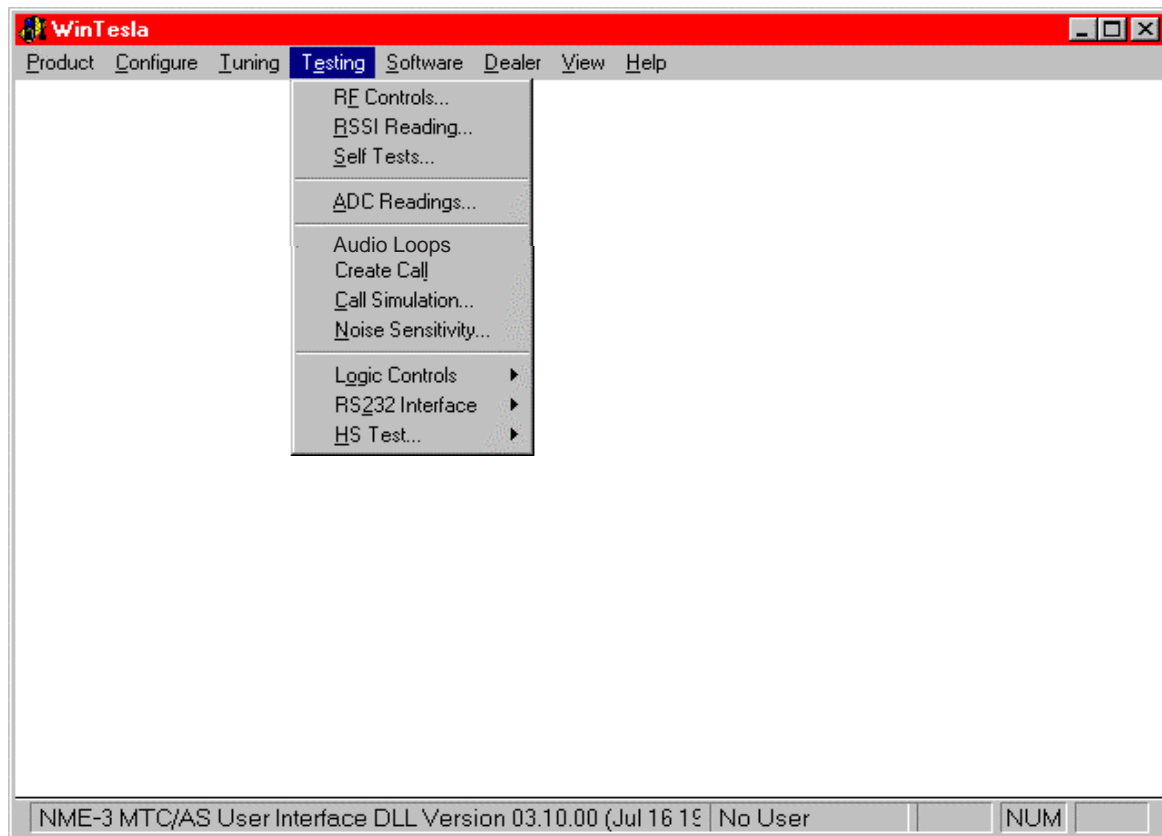
A/D Calibration

The A/D converter of CCONT Voltage is calibrated. First select the A/D converter for calibration, then edit the appropriate calibration voltage. By pressing the RUN button the calibration procedure is started and the result is shown in the text box.



Testing

The Testing sub menu offers functions for ME testing.



RF Controls... command

Activation _____ Status Bar Text _____

Alt, E,F _____ Open RF Controls dialog box

This function is used for RF testing.

Command opens **RF Controls** dialog, which contains data for testing and adjustments.



Dialog mode: **modal**

RF Controls dialog has following items:

Active Unit group:

RX radio button (ALT+R):

When *RX* is selected, the next functions are made:

Data transmission is deactivated

TX power is deactivated

If operation mode is continuous,

– AGC is controlled

– RX continuous mode channel is activated

RF Information window is updated

The RX value is always given as default.

Note! Function is activated immediately, Apply is not needed.

TX radio button (ALT+T):

When *TX* is selected, the next functions are made:

Data transmission is activated

If operation mode is continuous,

– Operation mode is set to burst

RF Information window is updated

Continuous mode radio button is disabled.

Note! Function is activated immediately, Apply is not needed.

Operation Mode group:

Continuous radio button (ALT+C):

When *continuous* selection is used,

synthesiser is set to constant frequency

synthesiser channel number is as given with Continuous Mode Channel selection

transmitter power is not connected

if Active Unit is RX, AGC is controlled

Note! Function is activated immediately, Apply is not needed.

Burst radio button (ALT+B):

When *burst* selection is used,

synthesiser is controlled by using receiving/transmission/measuring synthesiser control sequence

synthesiser channel numbers are as given with Channel/Monitoring Channel selections

if Active Unit is TX, data (selected with TX Data Type) is sent and the TX power is connected

Note! Function is activated immediately, Apply is not needed.

TX Data Type drop list (ALT+D):

TX Power Level edit box (ALT+X):

With this value is possible to change the transmission power. The user can give the needed power value or select the test value, which is tuned with TX power tuning function. The test value is found at the end of the list.

TX Power have value *OFF* and is disabled (*greyed*) when active unit is RX. When the TX power is tuned with test value (smallest value) the TX Power has value *TEST*.

Channel edit box (ALT+N):

User can enter here channel number that is used for both transmission and receiving. The frequency of the selected channel is shown after selection.

Monitoring Channel edit box (ALT+M):

This field selects neighbour monitoring channel. The frequency of the selected channel is shown after selection.

Continuous Mode Channel edit box (ALT+O):

To this edit box user can type continuous mode channel which may have all channel numbers.

The used frequency depends on the Active Unit. If Active Unit is RX, then RX frequency is used, else TX frequency. The frequency of the selected channel is shown after selection.

AGC Absolute edit box (ALT+A):

This selection allows user to edit AGC absolute value (value from A/D converter).

When AGC Absolute value is changed the AGC dB value will be calculated depending on the AGC Absolute value.

Front End On check box:

This selection allows user to change whether the Front End amplifier is On or Off.

AGC edit box (ALT+F):

This selection allows user to edit AGC absolute value (value from A/D converter).

AGC value is shown only when its value is controlled by PC. When Active Unit has value RX and Operation Mode is continuous, AGC is controlled by PC except when next adjustment functions are activated:

RSSI Calibration

AFC Diagram

Apply button (ALT+A):

Accepts entered values and validates them. After validation application sends corresponding messages to ME. Closes dialog and updates Info Window.

Note! Active Unit and Operation mode are not send with because they are activated immediately.

Set Defaults button (ALT+S):

Sets current values as default Rf Controls values.

Get Defaults button (ALT+E):

Gets default Rf Controls values as current values.

The next automatic selection is made when Quick testing function is ended:

Active Unit = RX

Update RF Information window

The next table shows the dialog's properties on different situations:

ACTIVE UNIT = TX:

TX Data Type: Updated

AGC values: Greyed

Monitoring Channel: Greyed

OPERATION MODE = BURST:

TX Power Level: Updated

Continuous Mode Channel: Greyed

Channel: Updated

ACTIVE UNIT = RX:

TX Data Type: Greyed

TX Power Level: OFF, Greyed

OPERATION MODE = BURST:

AGC values: Greyed

Continuous Mode Channel: Greyed

Channel: Updated

Monitoring Channel: Updated

OPERATION MODE = CONT:

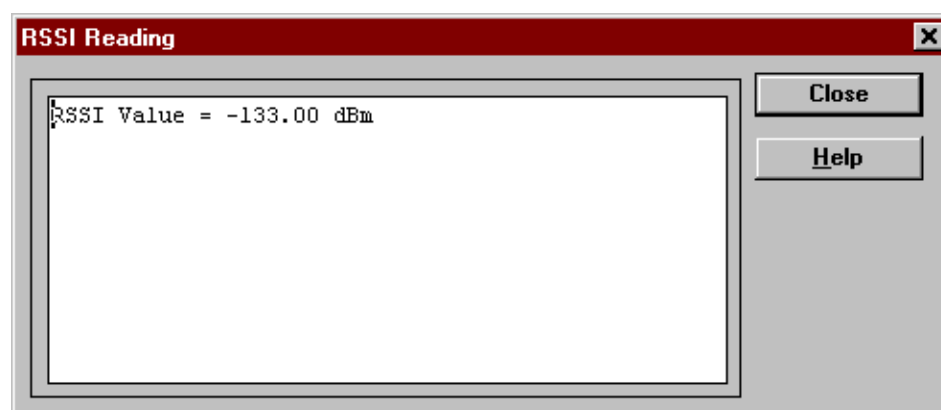
AGC values: Updated
Continuous Mode Channel: Updated
Channel: Greyed
Monitoring Channel: Greyed

RSSI Reading... command

Activation _____ Status Bar Text _____

Alt, E,R _____ read continuously RSSI value

Command opens RSSI Reading dialog:



Dialog mode: **modal**

RSSI value is read continuously until user presses ESC-key or Close button to cancel reading.

RSSI Reading dialog has following items:

Close (ENTER) button:

Closes the RSSI Reading dialog. Does not send anything to phone.

Help button:

Context sensitive help.

Self Tests... command

Activation

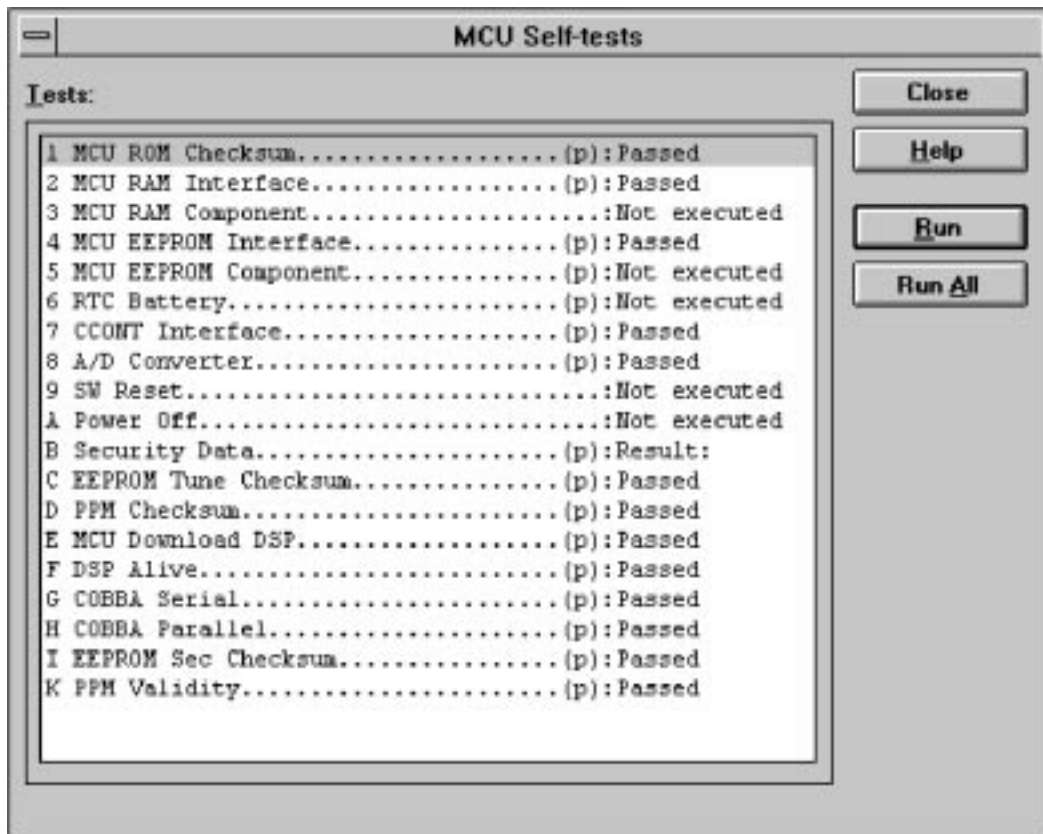
Status Bar Text

Alt, E,S

Open MCU Self-tests dialog box

Command is used for reading self test results and running self tests.

When the selection is made, the test result is read from ME. The test result will be shown to the user within **MCU Self-test** dialog.



Dialog mode: **modal**

MCU Self-test dialog has following items:

Tests list box (ALT+T):

The field "(p)" in the screen example means that the test is also run in power up. The field "/s)" means that this test is selectable one.

Test states are updated according to results received from the phone. Possible test states will be one of the next:

- Passed
- Failed
- No response
- Not executed
- Not valid
- RUNNING....

Note power-off test have no values, because if test has been passed, power has been turned off. If power-off test fails a special error message window is shown. If no response is received to power off test message in a few seconds, the user is informed by special info window, where user is asked to turn the power on and then press the return key.

Note also that power-off test (if passed) turns power off and power should be reconnected by using the phones keypad after the successful test. After the power has been connected to phone, the normal start-up routines are made and the self-test results are shown in the MCU self-tests menu (i.e. all other than power-up self-tests are in *Not executed* state after the power-up routines).

Run button (ALT+R):

User can select desired test from list and hit **Run** button. When user selects test to be run the text *RUNNING...* is shown in test state field and test is run. When results are received the test state field is updated according to the result.

If no response was received in the defined time, a *error message box* will be shown and the test state is changed to *No response*. Phone is set to local mode if it is not already there.

Run All button (ALT+A):

User can run all listed tests. The text *RUNNING...* is shown in test state field and test is run. When results are received the test state field is updated according to the result. When state field is updated application moves to next test and repeats previous cycle. Phone is set to local mode if it is not already there.

Supported Self Tests

- 1 MCU ROM Checksum.....
- 2 MCU RAM Interface.....
- 3 MCU RAM Component.....
- 4 MCU EEPROM Interface.....
- 5 MCU EEPROM Component.....
- 6 RTC Battery.....
- 7 CCONT Interface.....
- 8 A/D Converter.....
- 9 SW Reset.....
- A Power Off.....
- B Security Data.....
- C EEPROM Tune Checksum.....
- D PPM Checksum.....
- E MCU Download DSP.....
- F DSP Alive.....
- G COBBA Serial.....
- H COBBA Parallel.....
- I EEPROM Sec Checksum.....
- J PPM Validity.....
- K Warranty State.....

ADC Readings... command

Backlight Voltage and CCONT Voltage are scanned and the results are shown in the text box.

The event of this dialog is timer controlled.

Backlight Voltage is a VDA signal, which can be controlled by the JBD2 testbox.

Activation

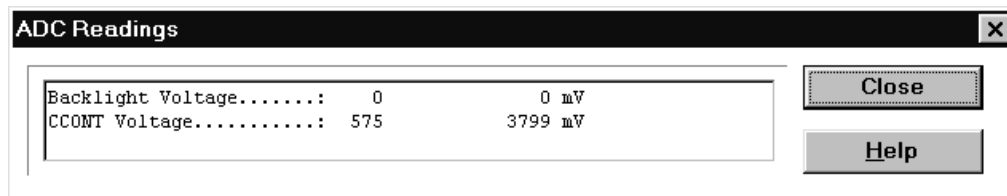
Status Bar Text

Alt, E,A

Open ADC Readings dialog box.

Command is used to read and show A/D values from phone.

Command opens **ADC Readings** dialog.



Dialog mode: **modal**

ADC Readings dialog has static text field where measurements are updated to window every one second.

ADC Readings dialog has following items:

Close (ENTER) button:

Closes the ADC Readings dialog. Does not send anything to phone.

Help button:

Context sensitive help.

Audio... command

Activation

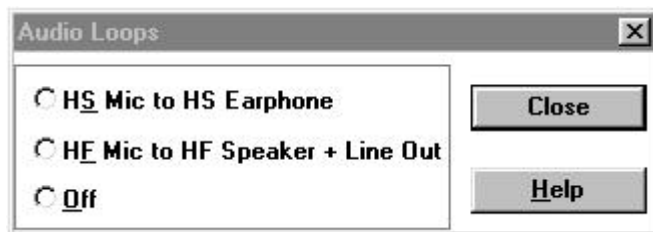
Status Bar Text

Alt, E,U

Opens a submenu which contains following options:

Internal Audio Loops

This dialog allows the activation of two audio loops: HS microphone to HS earphone and HF microphone to HF speaker in parallel to line out, and finally the deactivation of these loops.



Call Simulation... command

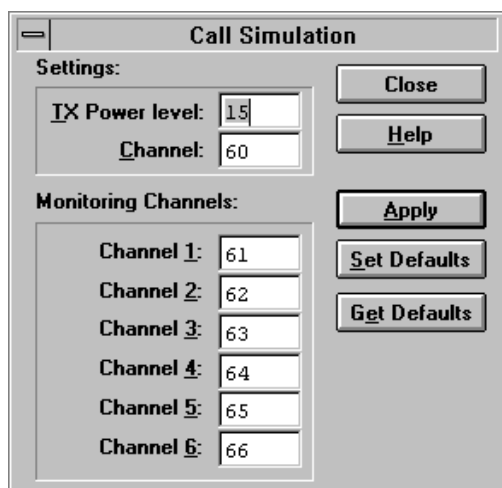
Activation

Status Bar Text

Alt, E,C

Open Call Simulation dialog box

Command is used for making call simulation. Function opens **Call Simulation** dialog.



Dialog mode: **modal**

Call Simulation dialog has following items:

TX Power Level edit box (ALT+T):

All power levels can be selected. This updates same parameter as **TX Power Level** in the **RF Controls** dialog. Note that TEST value cannot be selected. If TEST value was in use when Call simulation menu selected, power level is changed to smallest value.

Channel edit box (ALT+C):

This tells the normal operating RF channel number. Normal GSM channel numbers can be selected. Same channel is used both for transmission and receiving. This updates same parameter as **Channel** in the **RF-Controls** dialog.

Channel 1,2,3,4,5,6 edit box (ALT+1,2,...):

Channels for monitoring are specified with these six selections. All GSM channel numbers can be used. If more than one selection has same number, the monitoring channel list (neighbour list) will have less than 6 selected channels. The minimum number of monitoring channels is one (all channels have same value). The monitoring channel can also have same value as normal operating channel.

The first monitoring channel updates same parameter as **Monitoring Channel** in the **RF-Controls** dialog.

Apply button (ALT+A):

Validates and sends entered data to ME.

Set Defaults button (ALT+S):

Sets current values as default Call Simulation values.

Get Defaults button (ALT+G):

Gets default Call Simulation values as current values.

Noise Sensitivity... command

Activation Status Bar Text

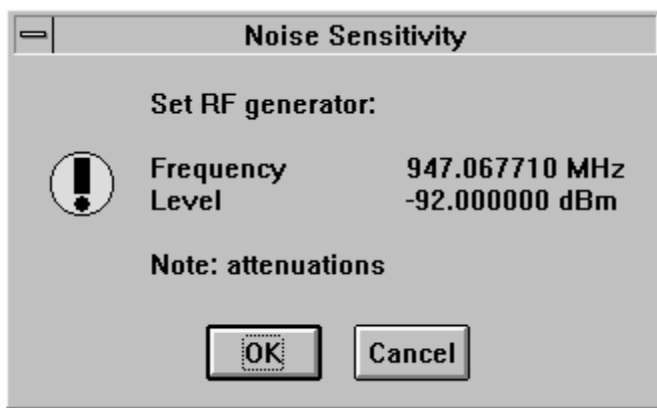
Alt, E,N Opens Noise sensitivity dialog box

Command is used for noise sensitivity measurement.

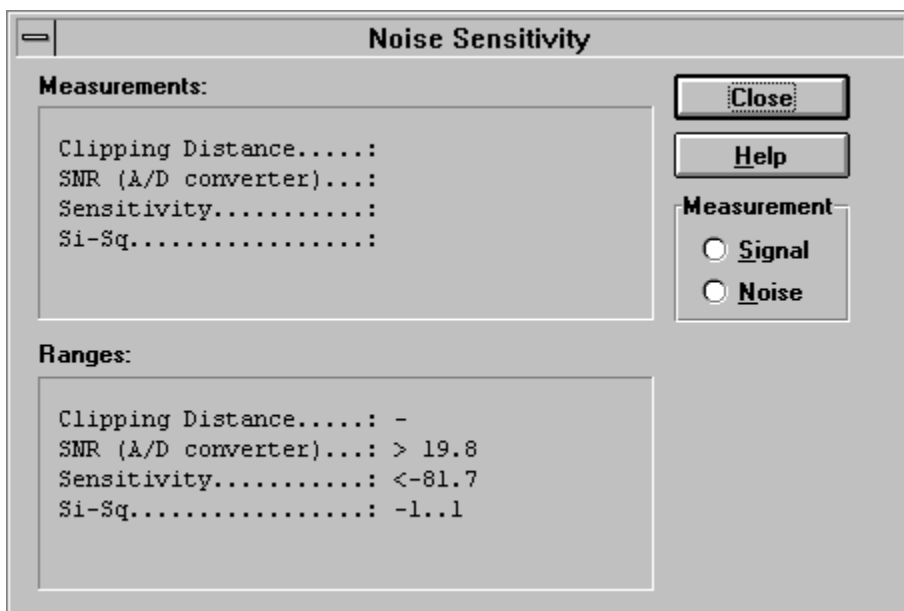
The next automatic selections are made when this tuning function is activated:

- Operation mode = RX cont
- AGC = 81 dB

Before function opens **Noise Sensitivity** dialog application prompts:



Then application opens **Noise Sensitivity** dialog:



Dialog mode: **modal**

Noise Sensitivity dialog has following items:

Measurements group:

Clipping distance is the difference to the signal clipping value. SNR is measured in AD converter.

The last value on the display is signal power difference between I and Q branch. The numbers are shown in 0.1dB accuracy. The error messages, "OUT OF RANGE", are shown only if the SNR and/or amplitude difference values are not acceptable.

Signal/Noise radiobutton (ALT+S/ALT+N):

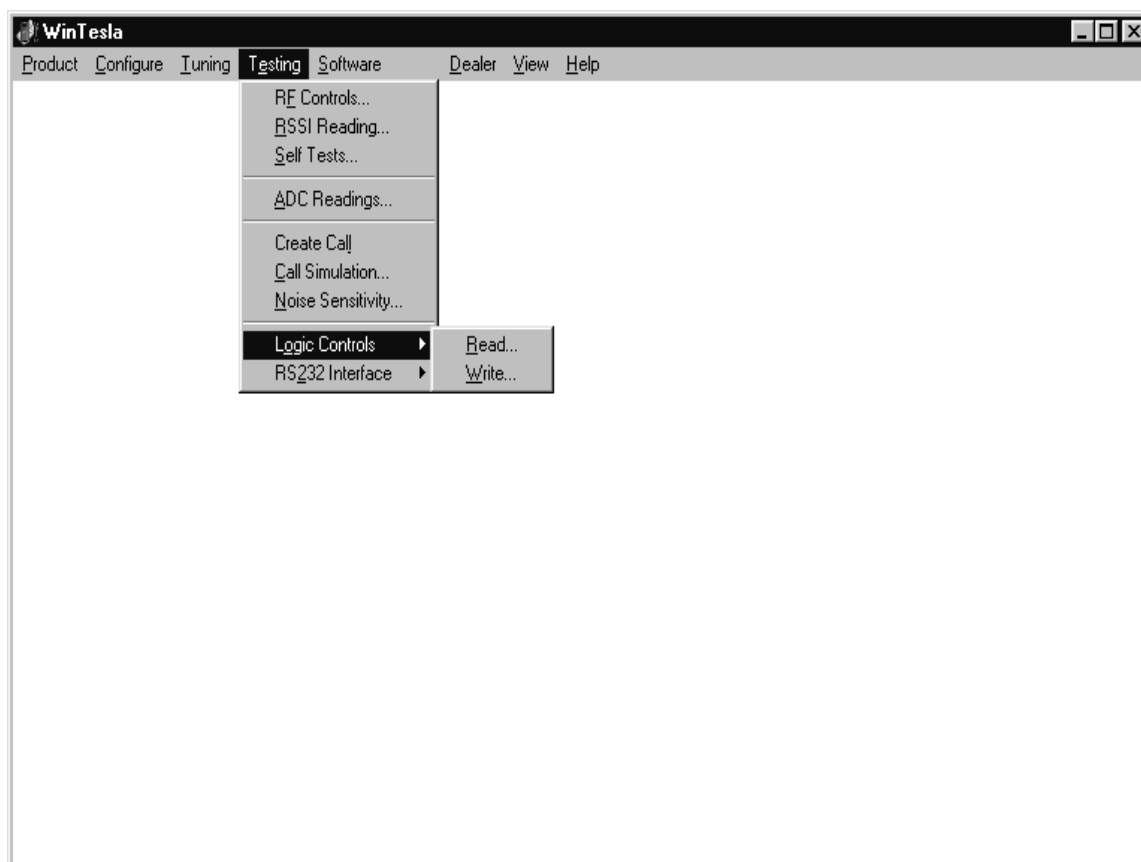
When buttons are pressed, the RX I and Q burst data is asked, text "SIGNAL MEASURING..." or "NOISE MEASURING..." will come to the measurement group window. The power level value should be -92 dBm during signal measurement.

When signal data is received, distance to clipping signal level is shown as dBs on the display. When either signal or noise measurement results are received "MEASURING" text is removed and measurements are updated to screen. When both measurements (signal and noise) are done at least once, the signal to noise relation and difference are also shown on the display.

When exit is made, the next selections are set to the values which were selected before this adjustment.

- Operation mode
- AGC value

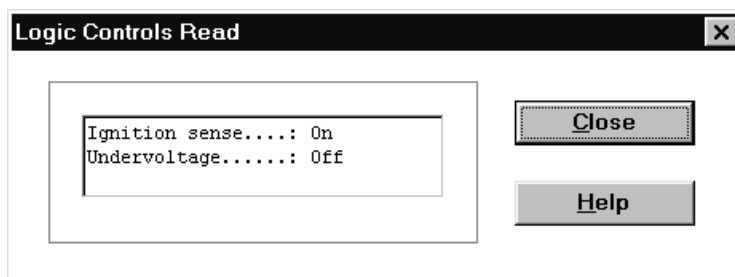
Logic Controls



Read

IGNITION SENSE and UNDERVOLTAGE are scanned and the results are shown in the text box.

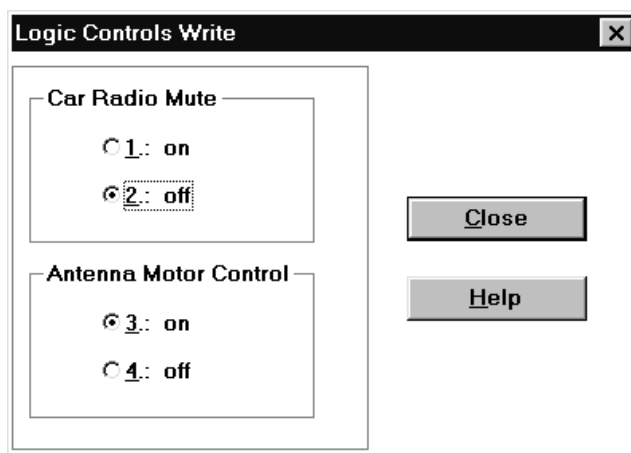
The event of this dialog is timer controlled.



Write

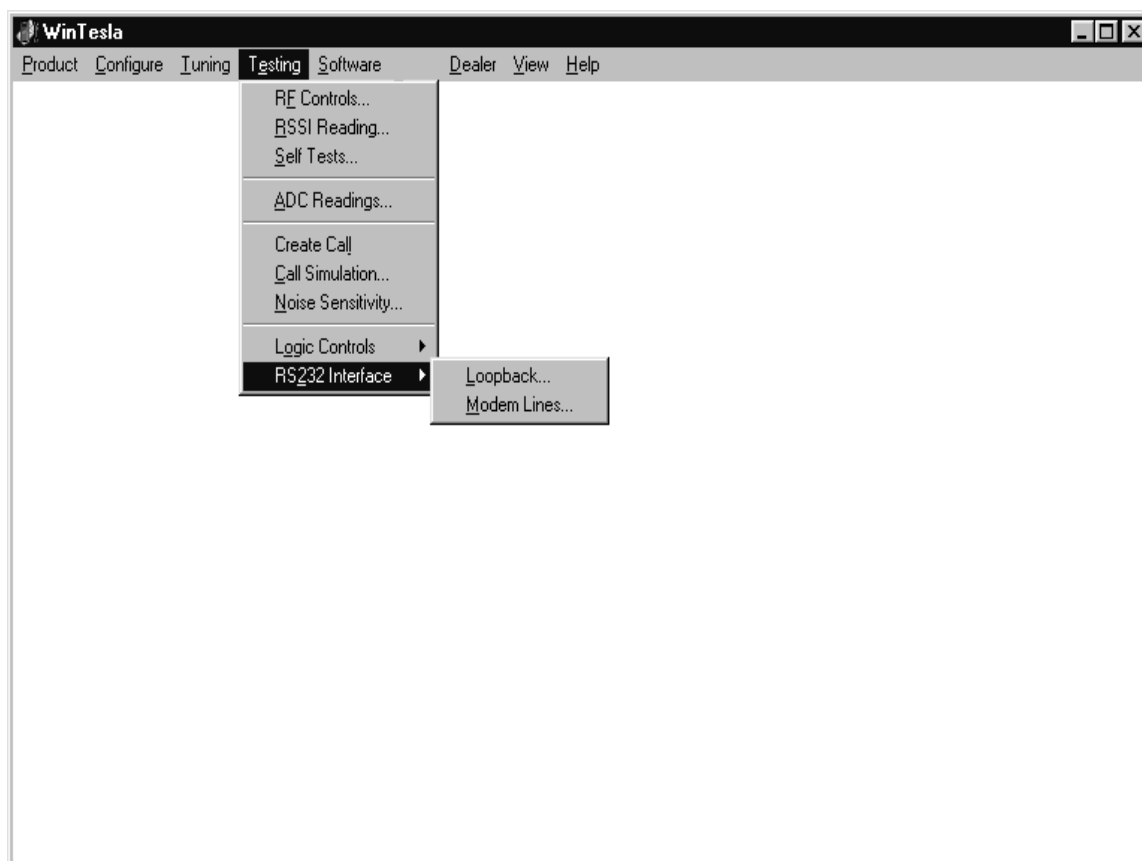
In this dialog box two signals can be switched on/off.

Car Radio Mute and Antenna Motor Control are VDA signals, which can be measured manually or by using the LEDs of the JBD2 testbox.



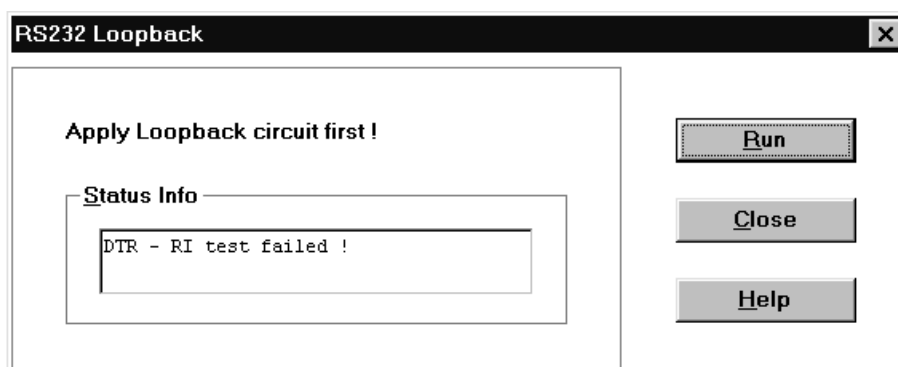
RS232 interface

Two Submenus are present.



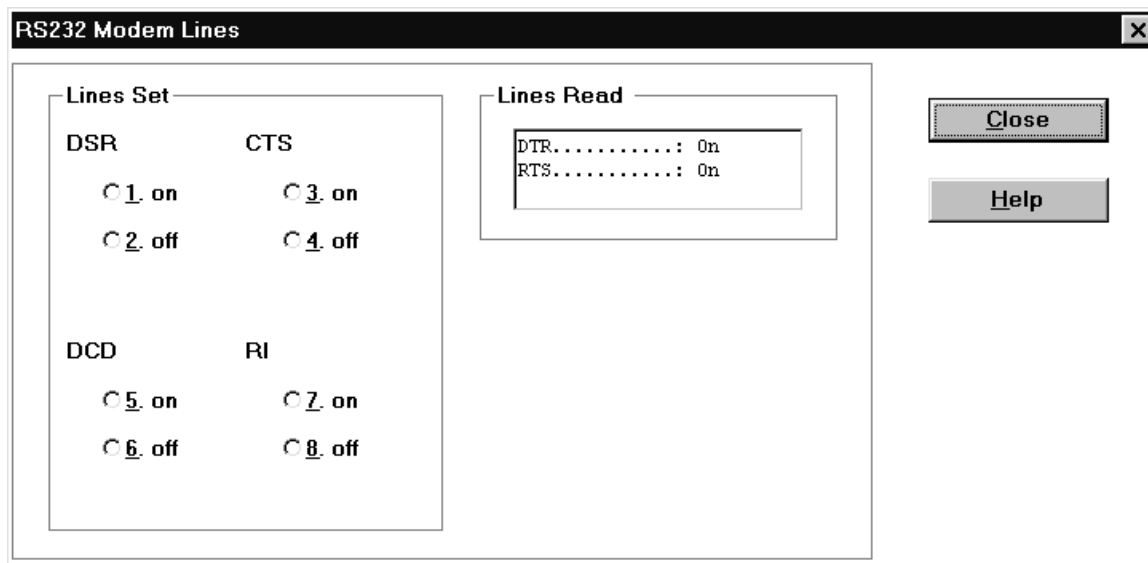
Loopback

For this test the operator has to use the JBD2 testbox to activate the relays for the Loopback circuit.
Use AXS-4 (D9-D9) cable to connect the phone to the testbox.

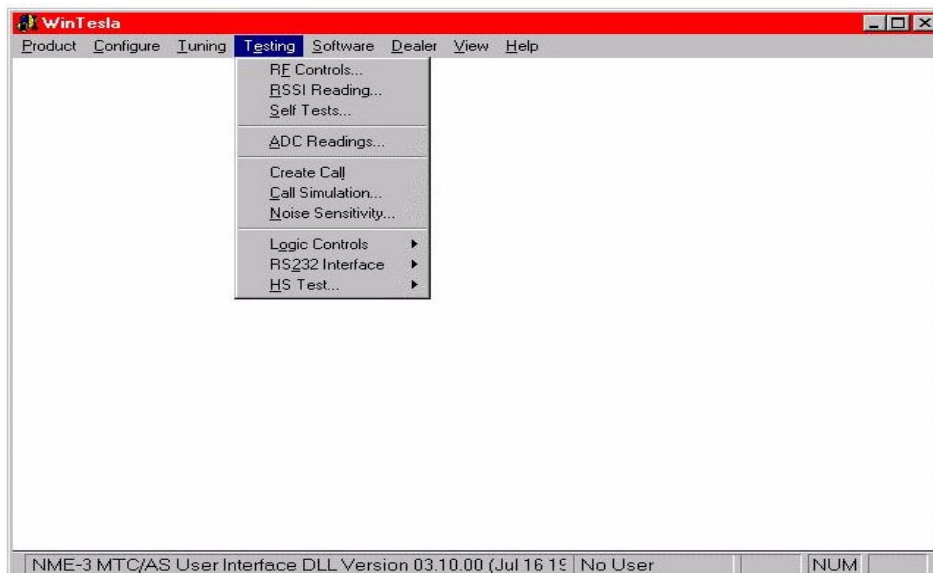


Modem Lines

The four output modem lines can be set from the UI radiobuttons. The operator, using measuring instruments must verify the result. The two modem-input lines are scanned and the results are shown in the text box. The event for this text box is timer controlled. The input lines can be connected with RS232 logic high/low signals.



HS Test

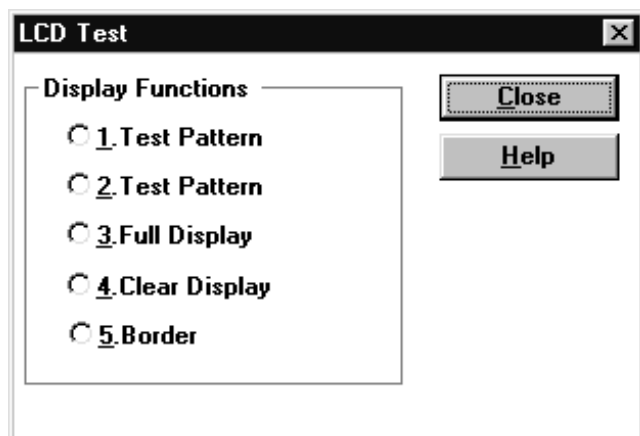


Self Tests..... Command

LCD Test..... Command

Activation	Status Bar Text	Menu
ALT+E, U	Open LCD Test dialog.	HS alone
ALT+E, H, U	"	RU & HS

Command is used for making display tests and opens LCD Test dialog.



Display Tests dialog has following items:

1. Test Pattern radio button (ALT+1):

In test display 1 all indicators are displayed and the display is filled with chessboard letters.

2. Test Pattern radio button (ALT+2):

In test display 2 none of the indicators are displayed and the display is filled with inverse chessboard letters.

3. Full Display radio button (ALT+3):

In test display 3 the whole display is filled.

4. Clear Display radio button (ALT+4):

In test display 4 the whole display is cleared.

5. Border radio button (ALT+5):

In test display 5 the whole display is cleared, only a one pitch border line around the display

is active.

Close button:

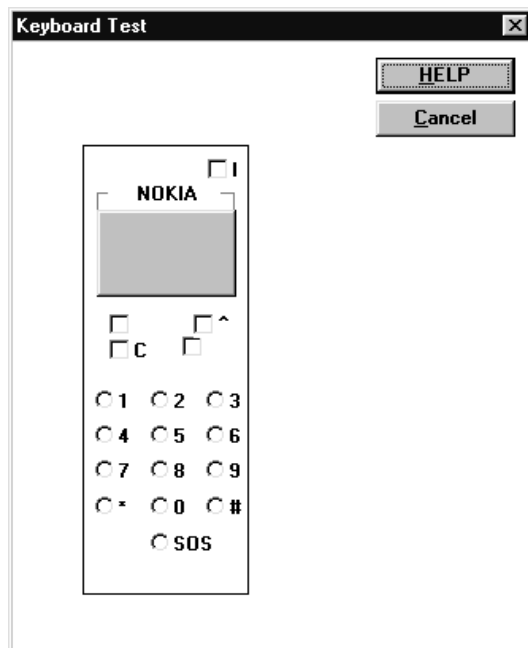
Closes the dialog and clears the handset LCD display

Keypad... command

Activation	Status Bar Text	Menu
ALT+E, K	Open Keypad Test dialog.	HS alone
ALT+E, H, K	"	RU & HS

This function is used to test the keypad.

After selection, the following dialog is opened:



After opening the dialog the keypad testmode is started automatically. This means that the keypad events are not longer routed to the UI. Instead they are collected in a buffer.

The test is performed in an auto scan mode.

The scan interval is 250milliseconds.

There is no fixed sequence for the key pressing order.

Keypad Test dialog has following items:

HS layout with key status

Every key of the Handset is present as a Check Button or a Radio Button.

At the test begin the buttons are not active. After pressing the keys of the HS the status of the display buttons can have 3 different states.

Possible status values are:

- not pressed → button is not active
- pressed → button is active
- not released , the key press is active for more than 2 seconds, → button is red.
- if the key is released afterwards, this key enters the status not pressed again, to force a new test of this key.

When all keys are pressed and the test is pass, the dialog box closes automatically afterwards.

Cancel button:

Closes the dialog and finishes the keypad test mode.

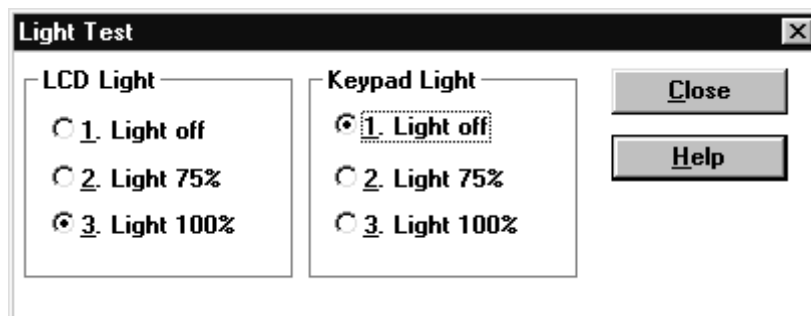
Pressing of the Power button can not be detected from HCI and WinTesla test program.

Light Test

Activation	Status Bar Text	Menu
ALT+E, I	Open Light Test dialog.	HS alone
ALT+E, H, I	“	RU & HS

This test is used to verify the LED Light of the HS.

The LCD and Keypad light can be switched and dimmed separately.



LCD Light – Box :

1. Light off

The LCD light is switched off, by activating this Radio button.

2. Light 75%

The LCD light is dimmed to 75%, by activating this Radio button.

3. Light 100%

The LCD light is dimmed to 100%, by activating this Radio button.

Keypad Light – Box :

1. Light off

The Keypad light is switched off, by activating this Radio button.

2. Light 75%

The Keypad light is dimmed to 75%, by activating this Radio button.

3. Light 100%

The Keypad light is dimmed to 100%, by activating this Radio button.

Close button:

Closes the dialog and clears the handset light.

During LCD Light test the intensity of the light can be checked easily by the service stuff.

Only the keypad light cannot check during daylight.

A possible method to verify the control of the keypad light is to measure the current consumption of the Handset. The increase of current is around 30mA from Light off to Light 100%.

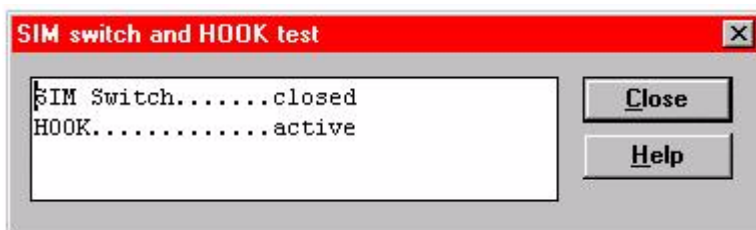
SIM Switch and HOOK Test

Activation	Status Bar Text	Menu
ALT+E, M	SIM switch and HOOK Test dialog.	HS alone
ALT+E, H, M	“	RU & HS

During this test a timer-controlled scan is running.

In this scan the status of the SIM switch and the status of the HOOK sensor is reported to

the WinTesla test program.



SIM status and HOOK status is reported in the EDIT BOX.

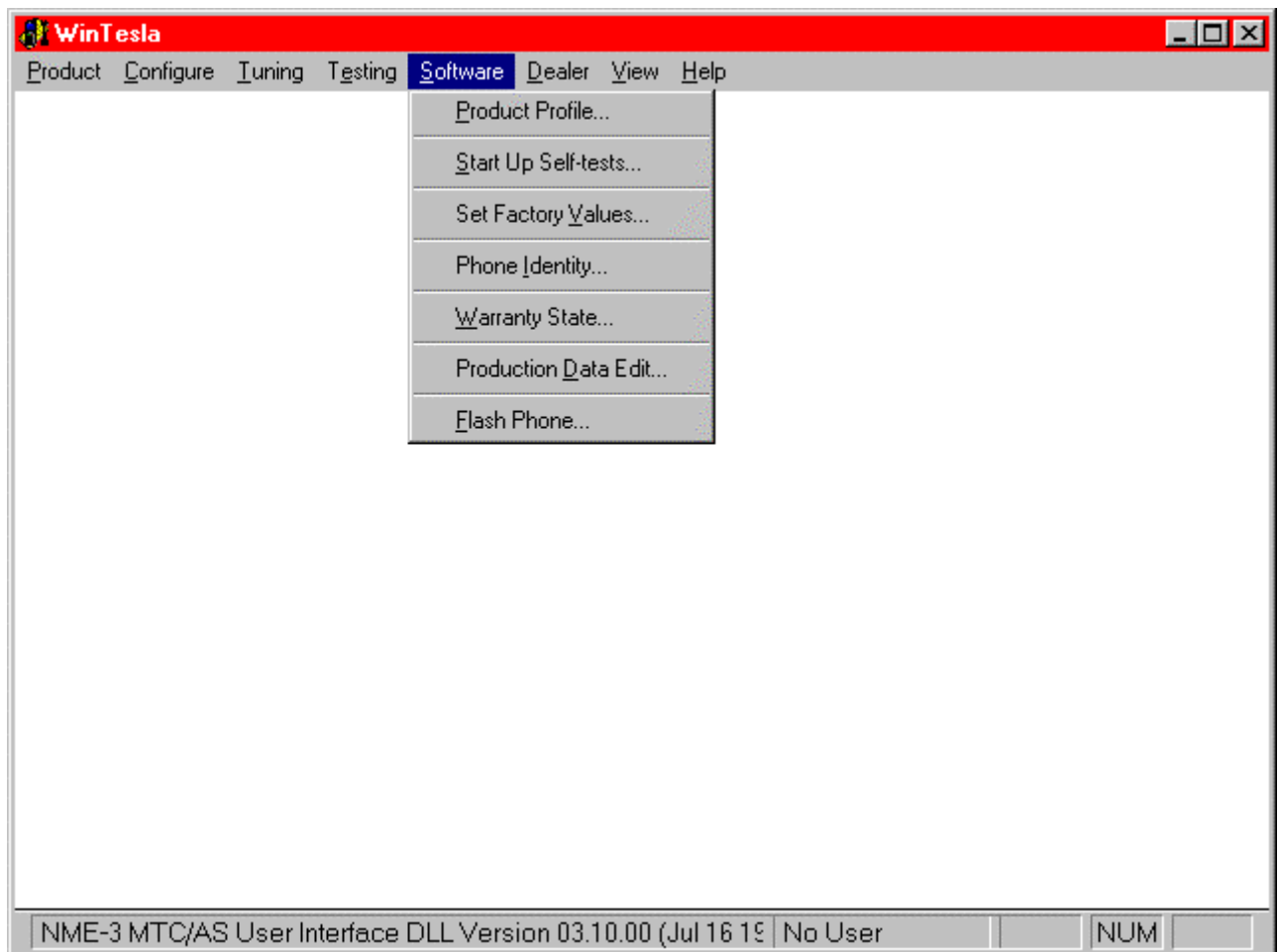
Possible for SIM : closed / open.

Possible for HOOK : active / not active.

Close button:

Closes the dialog and clears the handset light.

Software



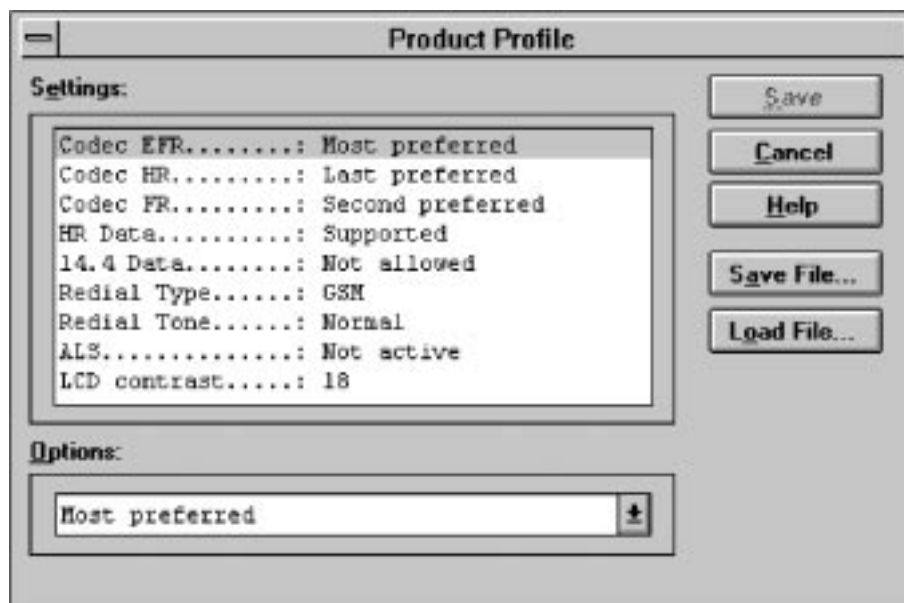
Product Profile... command

Activation Status Bar Text

Alt, S,P Open Product Profile settings dialog box.

Function is used for making product profile settings.

When command is activated the product profile information is read from EEPROM and **Product Profile** dialog is opened.



Dialog mode: **modal**

Product Profile dialog has following items:

Settings list box (ALT+E):

A list where user can select desired setting.

User can toggle setting with following **O**ptions drop list or by double clicking desired setting in list box.

Options drop list (ALT+O):

List allows user to set options to each settings which are listed in **S**ettings list box.

Save(OK) button (ENTER)

Selections are accepted and saved to EEPROM.

Cancel button (ESC)

Selections are ignored and control is returned back to main menu.

Start Up Self-tests... command

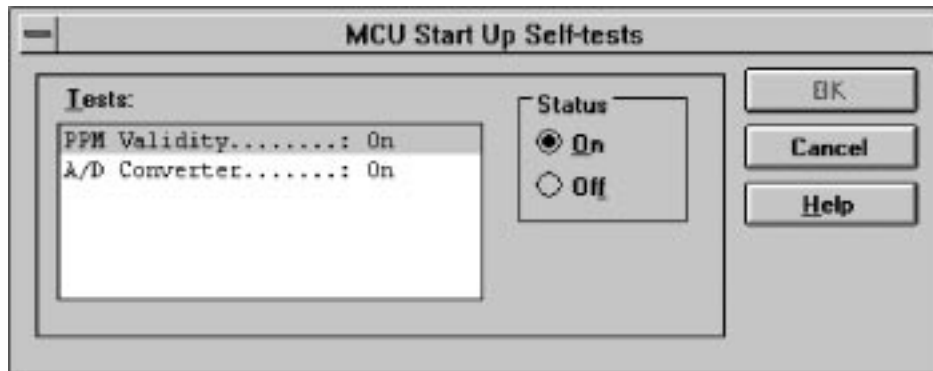
Activation

Status Bar Text

Alt, S,S

Open MCU start Up self-tests dialog box.

Function is used for changing the state of the EEPROM selectable tests in **MCU Start Up Self-tests** dialog.



Dialog mode: **modal**

MCU Start Up Self-tests dialog has following items:

Tests list box (ALT+T):

When dialog is opened, the previous values will be read from the MCU EEPROM and shown on the list box.

Status group:

When radio button **On** is selected, the test will be run every time when automatic start up self-tests are activated (e.g. in power up).

Save button (ENTER)

Selections are accepted and saved to EEPROM. A power up routine is made to phone.

Cancel button (ESC)

Selections are ignored and control is returned back to main menu.

Selectable Start-Up self tests:

1. PPM Validity
3. A/D Converter

Set Factory Values... command

Activation

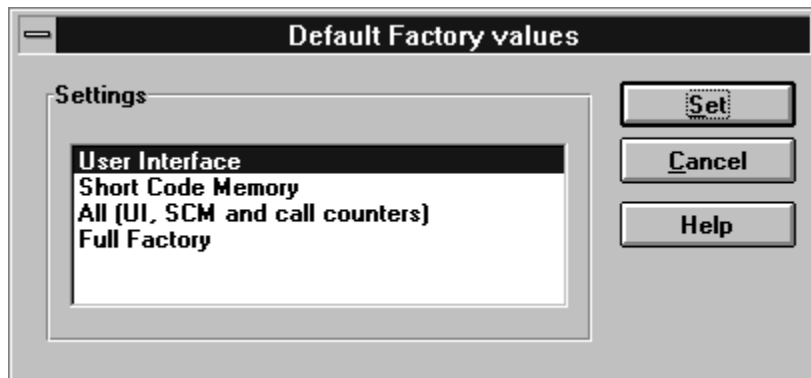
Status Bar Text

Alt, S,V

Set factory values

Application does not ask confirmation. Next kind of text will be shown to user:

“Setting UI and SCM Factory values...”



Dialog mode: **modal**

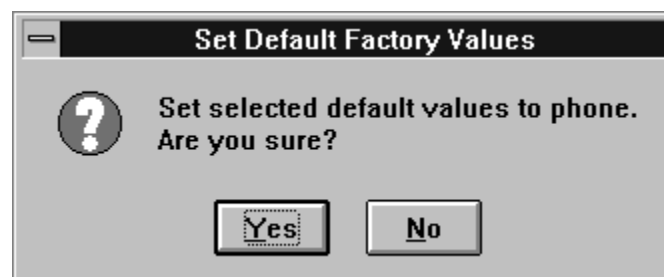
Default Factory Values dialog has following items:

Settings list box:

Contains the selectable factory values.

Set button:

Sets the selected factory value to phone. Before setting software asks confirmation:



Cancel button:

Closes the Default Factory Values dialog.

Phone Identity... command

Activation

Status Bar Text

Alt, S,I

Open Phone Identity dialog box for editing

Function is used to edit phone identity. With this dialog IMEI or SIM locks may be changed in following manner:

- current phone information is read from phone
- user edits User Name (and IMEI and Product Code, if they were not read correctly from phone)
- dialog information is saved to file, which is sent to secure place where actual programming information may be constructed
- programming information is got from secure place in an other file, which is loaded to dialog
- program checks input values and if they are correct programming information is written to phone

Function opens **Phone Identity** dialog.

Dialog mode: **modal**

Phone Identity dialog has following items:

User Name edit box (ALT+U):

Field where user can enter user identification.

IMEI edit box (ALT+I):

Field where user can enter IMEI value. Field can contain up to 40 digits. This field is automatically filled, if ME is connected to the PC when dialog is loaded.

Product Code edit box (ALT+P):

Field where user can enter Product Code value. This field is automatically filled, if ME is connected to the PC when dialog is loaded.

MS Id edit box (ALT+M):

Field where user can enter MS Id corresponding programming data. This field is automatically filled, if ME is connected to the PC when dialog is loaded.

Product Id edit box (ALT+R):

Field where user can enter Product Id. This field is automatically filled, if ME is connected to the PC when dialog is loaded.

Dongle Serial nr. edit box (ALT+N):

Field where user can enter Product Id. This field is automatically filled, if ME is connected to the PC when dialog is loaded.

Data edit box (ALT+A):

Field where user can enter Data entry. This field is automatically filled, when file is loaded or data is saved.

IMEI radio button:

File and ME operations contains only IMEI data.

SIM Lock radio button:

File and ME operations contains only SIM Lock data.

IMEI Programming Data edit box (ALT+I):

IMEI programming data is read from file or entered by user to this field.

SIM Lock Programming Data edit box (ALT+D):

SIM Lock programming data is read from file or entered by user to this field.

Close button (ESC):

Cancels all edits and does not save values to phone.

Help button

Opens a help text.

Write button (ALT+W):

Writes programming data to phone. Actions are selected with Action Selection radio button.

Read button (ALT+R):

Reads identification data from phone and shows it in dialog controls. Needed data is selected by Action Selection radio button.

Save File... button (ALT+S):

Writes a file containing data needed by security place application to create needed programming data. File is selected with File Save As dialog.

Load File... button (ALT+L):

Reads a file containing data needed to program selected data. File is selected with File Open dialog.

Warranty State... command

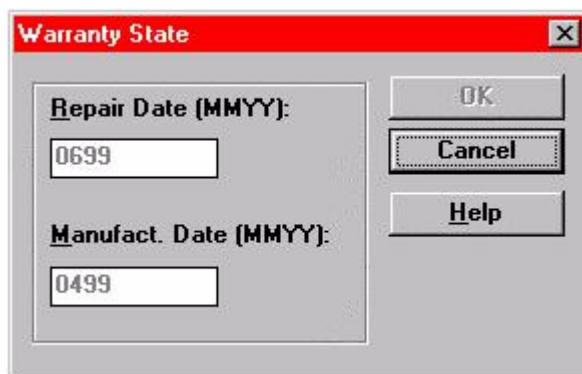
Activation

Status Bar Text

Alt, S,W

Open Warranty State dialog box

This command is used to set the warranty state of a phone. When selected application opens **Warranty State** dialog box.



Dialog mode: **modal**

Repair Date edit box:

When Warranty State is **USE** and PKD-1CS or PKD-1NS dongle is connected user can edit repair date. Otherwise field is read only. Format is MMY, where MM stands for month digits and YY stands for year digits.

Warranty Date edit box:

When state is **DEFECTIVE** and PKD-1CS or PKD-1NS dongle is connected user can edit warranty date. When warranty date is saved warranty state will be **EXCHANGE**. Format is MMY, where MM stands for month digits and Y stands for year digits.

OK button (ENTER):

Closes the dialog box and saves the edited date to the phone. This button is enabled only when phone is Repair Date or Warranty Date is changed.

Cancel button (ESC):

Closes the dialog box and *does not* save the warranty state to the phone.

Production Data Edit... command

Activation

Status Bar Text

Alt, S,D

Open Production Data Edit dialog box

This command is used for programming HW version to phone. Function opens the following **Production Data Edit** dialog box.

Dialog mode: **modal**

Production Data dialog has the following items:

Production Code edit box:

User can edit production code.

Order Number edit box (read only):

Displays order number. Order number "???????" is accepted, but not written to phone.

Production Ser. No edit box (read only):

Displays production serial number.

Manufacture Month edit box (read only):

Displays manufacturing month.

HW Version edit box:

User can edit HW version.

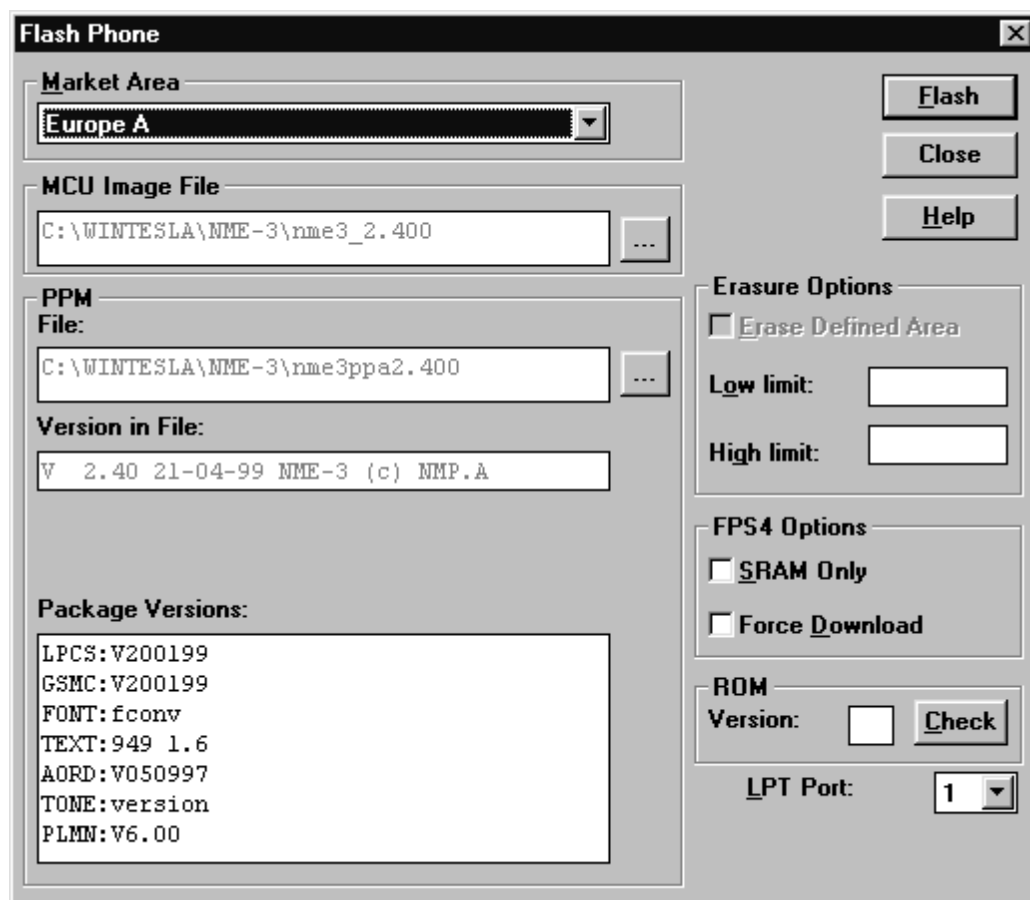
OK button (ENTER):

Closes the dialog box and writes HW version to ME.

Cancel button (ESC):

Closes the dialog box and *does not* write HW version to ME.

Flash Phone... command



Activation

Status Bar Text

Alt, S,F

Open Flash Phone dialog box.

This command is used for flashing new software into the phone. Function opens the following **Flash** dialog box. When flashing is started, waiting windows is showed which tells the user approximated flashing time. Flashing files are delivered in product and market area specific flash packages. These packages should be unpacked to product specific subdirectory of WinTesla directory e.g. *C:\WINTESLA\NME-3* for NME-3 flash packages and *C:\WINTESLA\NME-3* for NME-3 flash packages. This directory will then contain product specific INI-file e.g. *NME-3.INI* in which different market areas and files are described.

Note: *This is a screen sample, actual information may differ.*

Dialog mode: **modal**

Flash dialog box has following items:

Flash Image edit field (read only):

Displays path of image file to be flashed.

PPM Image edit field (read only):

Displays path of PPM package file to be flashed.

PPM Version edit field (read only):

MCU SW version string of the PPM package.

Market Area drop down list box (ALT+M):

User can select correct market area for phone. With this selection correct image and PPM files are loaded to edit fields. Usually this is the correct way to select files to be flashed.

PPM File Versions edit field (read only):

Lists the file versions of PPM package.

Flash button (ALT+L):

Starts flashing of selected file to phone. Before flashing asks, does user want to save all user settings to file (and load them after flashing). If reading user settings to ME or writing them to ME failed, Restore Default User Settings dialog is opened and user can restore default settings to phone. See Restore User Defaults... command.

Load Image button (ALT+I):

Opens Open File dialog, with which user can select an image file to be flashed to ME. If user selects OK button, the name of selected file is copied to Flash Image edit field. Usually you should use Market Area list box to select Image file.

Load Ppm button (ALT+P):

Opens Open File dialog, with which user can select a PPM package file to be flashed to ME. If user selects OK button, the name of selected file is copied to PPM Image edit field. Usually you should use Market Area list box to select PPM file.

LPT Port list box:

User can select parallel port to be used when flashed.

HW dep. files check box (disabled):

Close button (ESC):

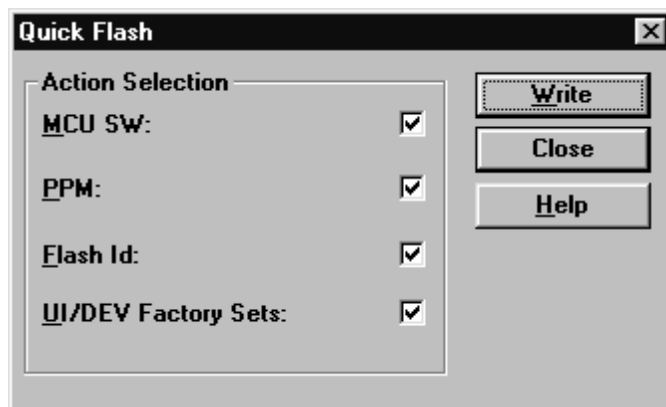
Closes the dialog box and *does not* start flashing.

During flashing status dialog is showed. After phone is flashed current time in PC is set to phone and user is asked to check that the time is correct.

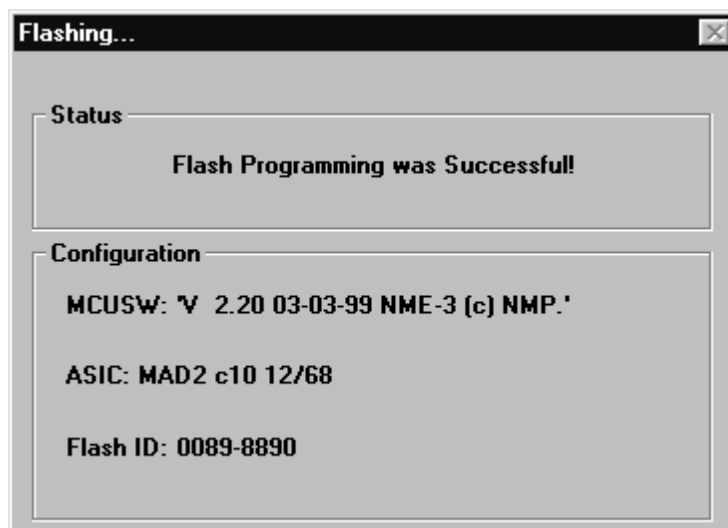
Quick Flash... command

This menu entry is used to flash the MCU and PPM image files, to write the FLASH AUTHORITY ID and UI/DEV factory default values.

This dialog allows a selection of items to be flashed. Image files are selected automatically from first available market area in \nme-3\nme-3.ini.

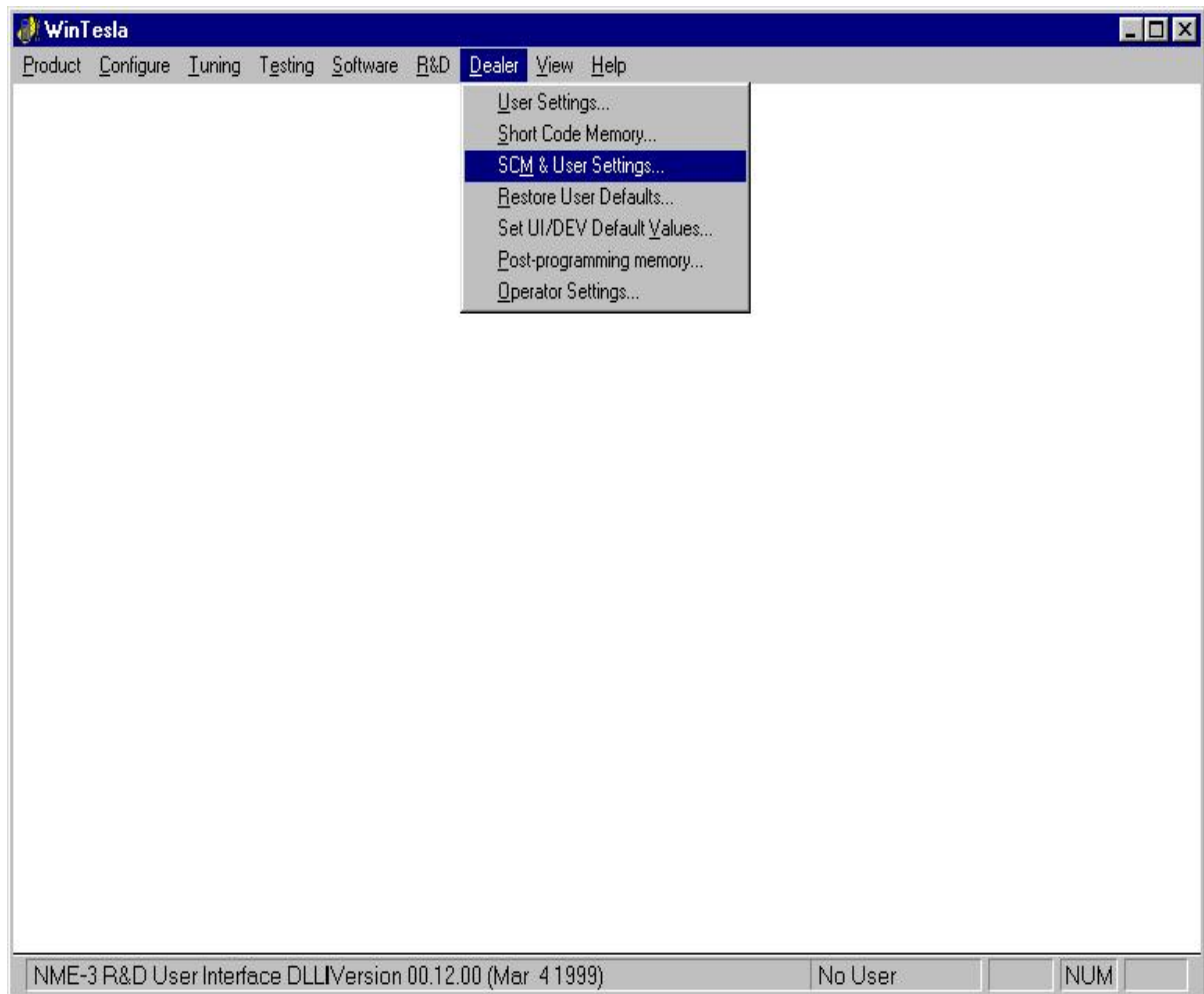


This dialog indicates the beginning of the flash procedure and displays the actual flash status. It appears on the screen until the end of quick flash procedure.



Dealer

The dealer sub menu offers functions for ME settings for dealers.

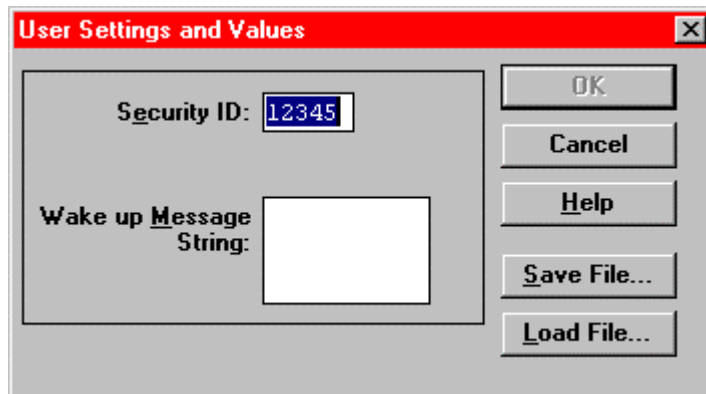


User Settings... command

Activation Status Bar Text

Alt, D,U Open User Setting dialog box

This command is used to edit some user settings. When this command is selected user is asked to read settings from the phone. After answering that dialog following **User Settings and Values** dialog is displayed.



Note: This is a screen example. All controls not visible for all phone types.

Dialog mode: **modal**

User Settings dialog box has following items:

Security ID edit box:

User can change security code in ME.

Save File....button (ALT+S)

User can save user settings to file.

Load File....button (ALT+L)

User can load user settings from file.

OK button (ENTER):

Writes user settings to phone.

Cancel button (ESC):

Closes the dialog box

Short Code Memory... command

Activation

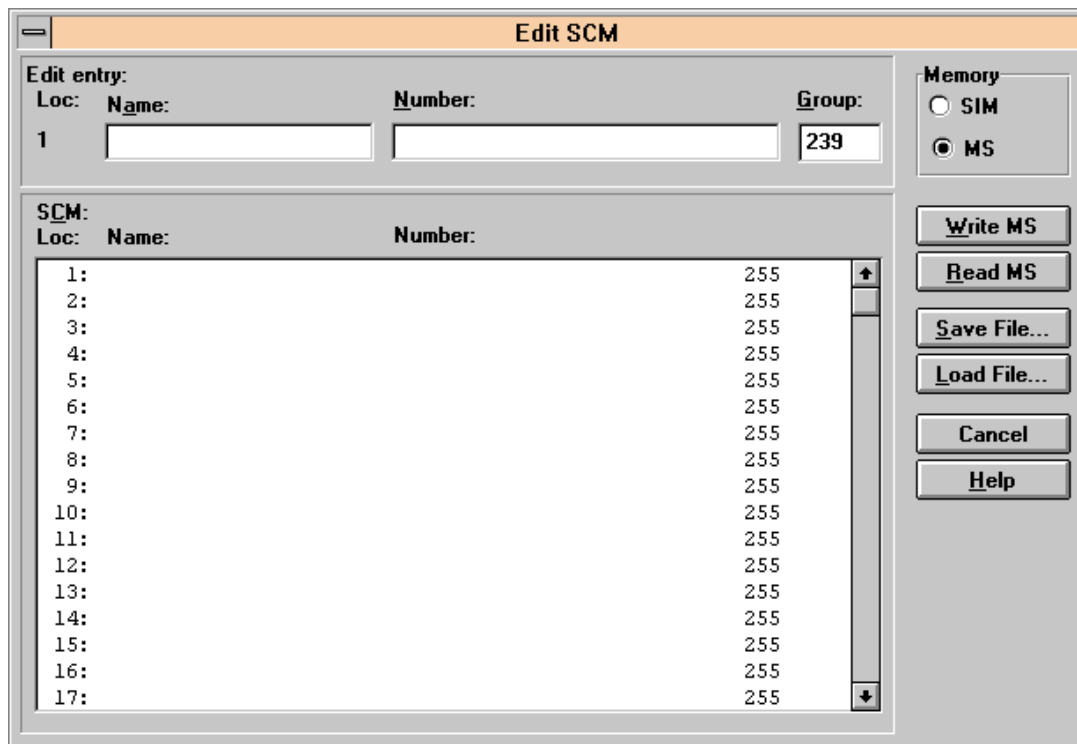
Status Bar Text

Alt, S,C

Open Edit SCM dialog box.

This command is used for reading, storing and modifying the SIM/ME SCM values. Before dialog is opened number of memory places is read from phone. If phone does not have SCM in ME Memory selection is disabled and SIM is used as default. If SIM is selected user may be asked to insert PIN and/or wait for SIM to wake up.

Function opens the following **Edit SCM** dialog:



Dialog mode: **modal**

Edit SCM dialog has the following items:

Loc static text:

Displays current location.

Name edit box (ALT+A):

Edit the Name.

Number edit box (ALT+N):

Edit the Number.

Group edit box:

Edit the Group number.

SCM list box (ALT+C):

List for available names and numbers.

Write MS / Write SIM button (ALT+W):

Write SCM values to phone or SIM and checks the validity of names and numbers.

Read MS / Read SIM button (ALT+R):

Read SCM values from phone or SIM.

Save File... button (ALT+S):

Opens a default Windows **File Save As** dialog and asks file-name where to save SCM values.

Load File... button (ALT+L):

Opens a default Windows **File Open** dialog and asks filename where from load SCM values. Checks the validity of names and numbers.

Memory group box:

When memory is selected **SCM** list box size is adjusted to correspond memory size. Adjusting is done either adding empty entries to the end or removing entries from the list box.

SIM radio button:

Selects dialog to edit SIM memory. Note PIN code must be set before editing SIM. During SIM selection user may be asked to insert PIN code and/or wait for SIM to wake up.

MS radio button:

Selects dialog to edit phone memory. This is default when dialog is opened.

When all values are sent and responses received, waiting window is removed and **Edit SCM** is back in control. The waiting state can be broken with **Cancel** (ESC) button. If writing to the ME is broken, only part of the SCM entries in the ME may be changed.

SCM & User Settings... command

Activation

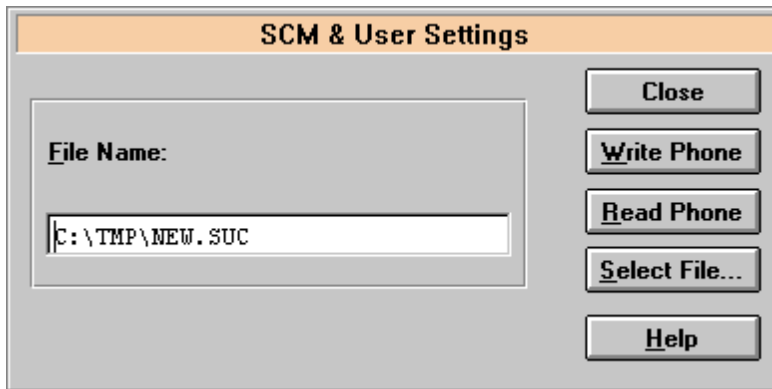
Status Bar Text

Alt, D,M

Open SCM & User settings dialog box.

This command is used to get SCM and user settings from phone to file and vice versa. Following information is loaded/saved with this dialog: all user settings, text wake up message, SCM, alarms, calendar items and CLI logos and groups. Only values of supported features are saved or loaded.

When data is written or read phone waiting dialog is showed to user.



Dialog mode: **modal**

SCM & User Settings dialog box has following items:

File Name edit field (ALT+F):

User can edit file name or select file with Open File dialog. When dialog is opened, it contains name of the previously saved or loaded file.

Write Phone button (ALT+W):

Loads settings from file and writes them to phone.

Read Phone button (ALT+R):

Reads settings from phone and writes them to file.

Select File button (ALT+S):

Opens Open File dialog, with which user can select the file, that contains the data to be loaded to ME or file to which data is saved from ME. If user selects OK button, the name of selected file is copied to File Name edit field.

Close button (ESC):

Closes the dialog box.

Restore User Defaults... command

Activation

Status Bar Text

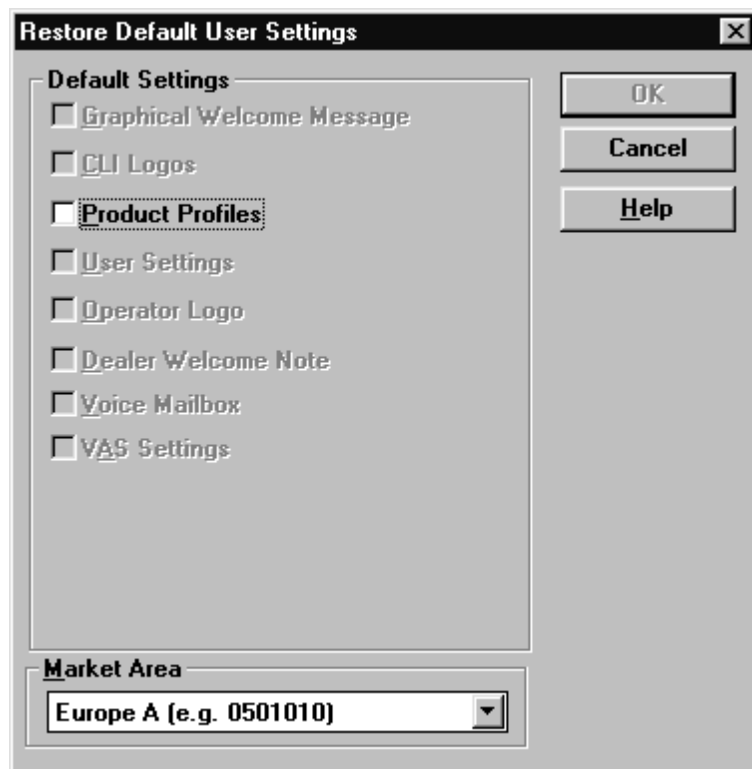
Alt, D,R

Open Restore Default User Settings.

This command is used to restore Default User Settings, if they have degenerated. Dialog may be opened from menu, or is opened automatically, when loading or saving user settings fails or is skipped during flashing (see Flash Phone... command). The dialog is also opened after full factory set.

Default settings are loaded from files in product specific subdirectory of WinTesla directory e.g. for NME-3 this directory could be *c:\wintesla\nme-3*. Into these directories user should unpack all flash packages. Market areas and corresponding files are described in INI-file in product specific subdirectory e.g. for NME-3 this file would be *c:\wintesla\nme-3\nme-3.ini*. INI-file is common to all flash packages, but market areas are added to Market Area list, when new flash packages are unpacked to product specific subdirectory.

Selecting Restore User Defaults opens following Restore Default User Settings dialog.



Note: This is a screen example. Actually enabled settings may differ.

Dialog mode: **modal**

Restore Default User Settings dialog box has following items:

Default Settings static text:

User can check one or more check boxes to restore corresponding defaults from file to ME. Check boxes are disabled/enabled according to settings available in selected Market Area.

Graphical Welcome Message check box (ALT+G):

When checked user selects to restore default graphical welcome message.

CLI Logos check box (ALT+C):

When checked user selects to restore default CLI logos.

Product Profiles check box (ALT+P):

When checked user selects to restore default product profiles.

User Settings check box (ALT+U):

When checked user selects to restore default user settings.

Operator Logo check box (ALT+O):

When checked user selects to restore default operator logo.

Dealer Welcome Note check box (ALT+D):

When checked user selects to restore default dealer welcome note.

Voice Mailbox check box (ALT+V):

When checked user selects to restore default voice mailbox number

Market Area drop list (ALT+M):

User selects market area of the phone.

Write Phone button (ALT+W):

Loads settings from files and writes them to phone.

Close button (ESC):

Closes the dialog box.

Set UI/DEV Default Values... command

Activation

Status Bar Text

Alt, D,V

Reset phone to UI and SCM factory settings

After selection application asks confirmation: "Are you sure you want to set UI/DEV to factory settings?". If Yes is answered, default settings are resetted to phone.

Post-programmable Memory... command

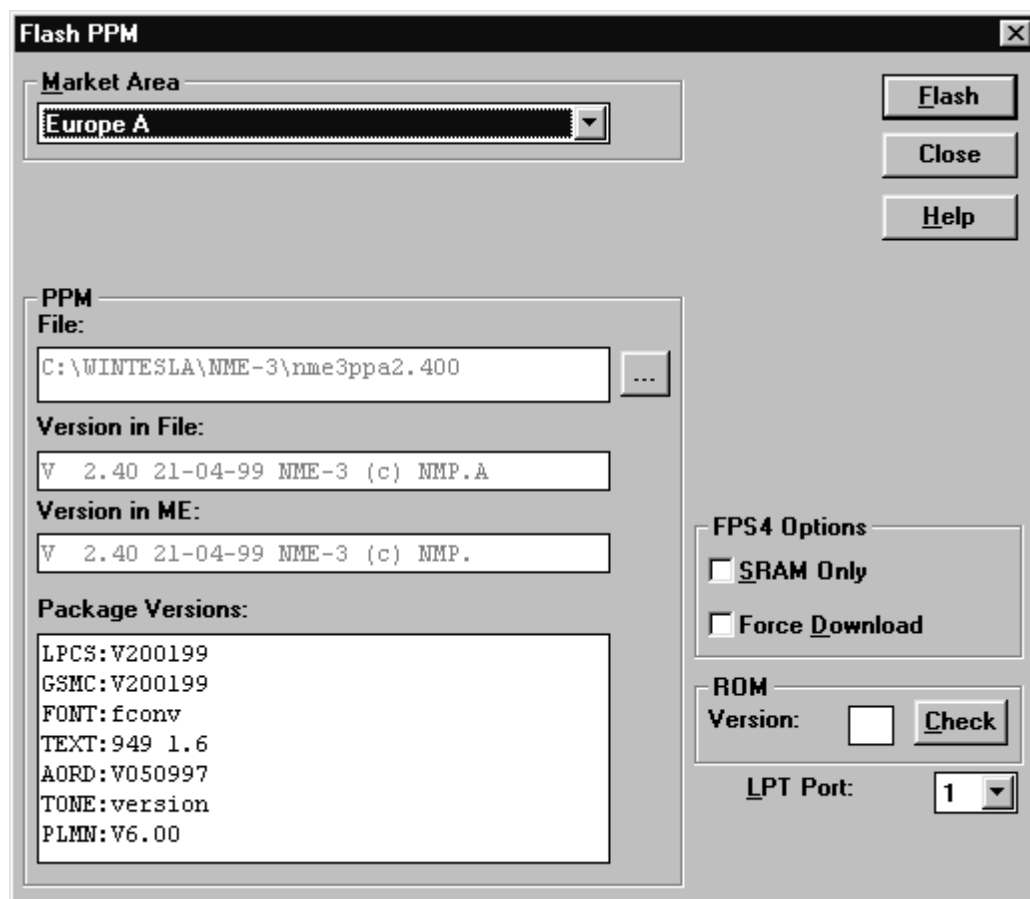
Activation

Status Bar Text

Alt, D,P

Open Post-programmable Memory dialog box.

This command is used to load PPM from file to phone. Application checks version numbers of PPM package and ME, when file is loaded.



NOTE: This is a screen sample, actual information may differ.

Dialog mode: **modal**

Post-programmable Memory dialog box has following items:

ME PPM Version edit field (read only):

MCU SW version string of the phone.

PPM Image edit field (read only):

Displays path of PPM package file to be flashed.

Market Area drop down list box (ALT+M):

User can select correct market area for phone. With this selection PPM file is loaded to edit field. Usually this is the correct way to select files to be flashed.

PPM Version edit field (read only):

MCU SW version string of the PPM package.

PPM File Versions edit field (read only):

Lists the file versions of PPM package.

Flash button (ALT+L):

Starts flashing of selected file to phone. Before flashing dialog asks, does user want to save SCM & User settings to file (and load them after flashing).

Load Ppm button (ALT+P):

Opens Open File dialog, with which user can select a PPM package file to be flashed to ME. If user selects OK button, the name of selected file is copied to PPM Image edit field. Usually user should use Market Area to select correct PPM package.

LPT Port list box:

User can select parallel port to be used when flashed.

HW dep. files check box (disabled):

Close button (ESC):

Closes the dialog box and *does not* start flashing.

Operators Settings... command

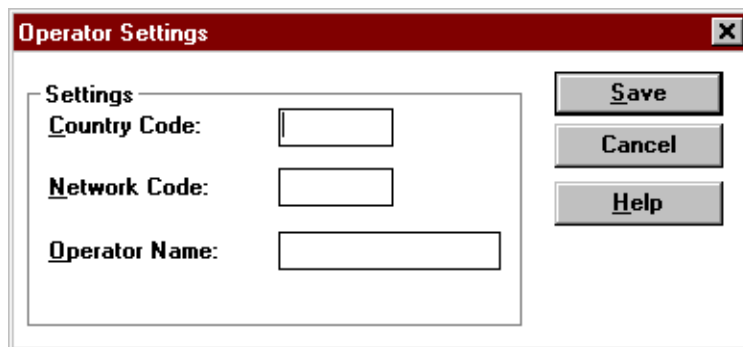
Activation

Status Bar Text

Alt, D,O

Open Operator Settings dialog.

This command is used to set operator settings This selection opens following **Operator Settings** dialog.



Dialog mode: **modal**

Operator Settings dialog box has following items:

Settings group:

Country Code edit box (ALT+C):

User can edit country code.

Network Code edit box (ALT+N):

User can edit network code.

Operator Name edit box (ALT+O):

User can edit operator name.

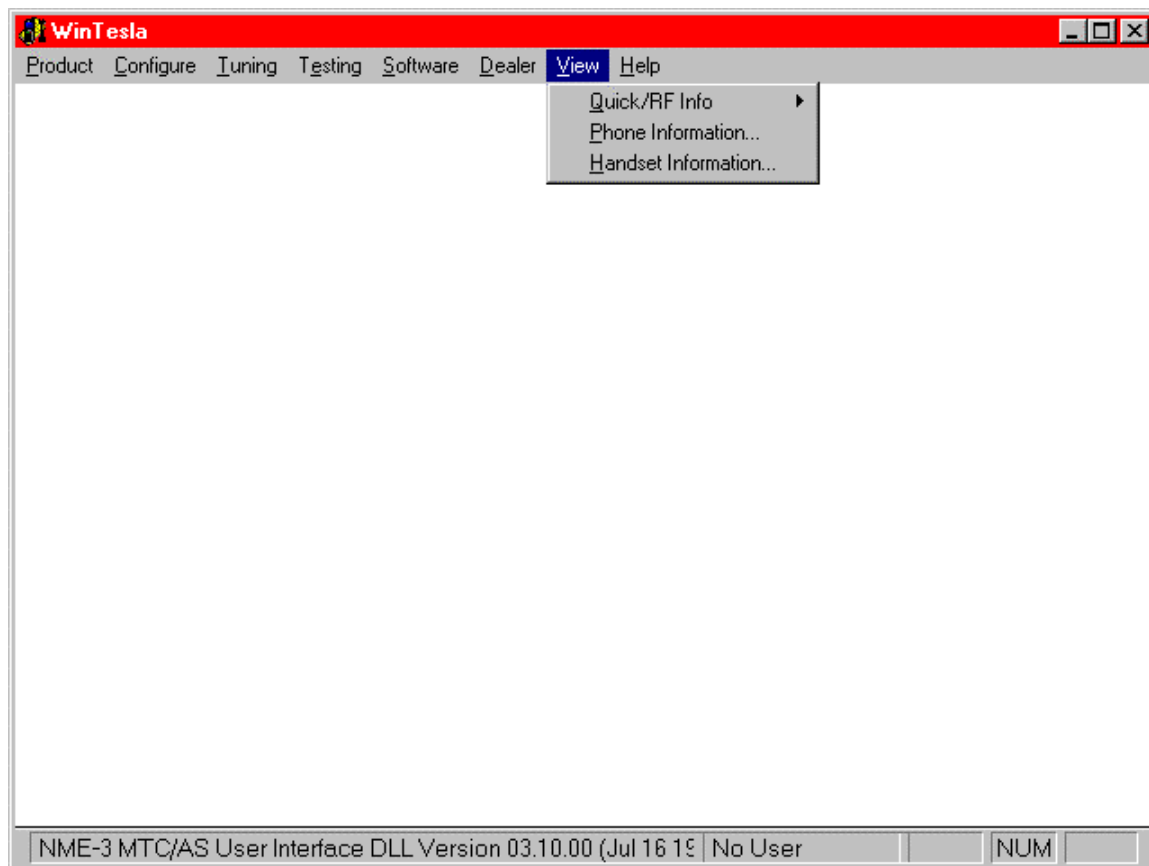
Save button (ALT+S):

Saves settings to phone and closes dialog..

Cancel button (ESC):

Closes the dialog box and do not save settings to phone.

View

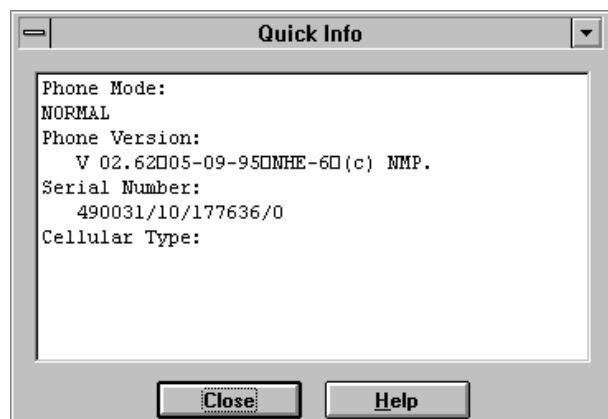


Quick/RF Info... command

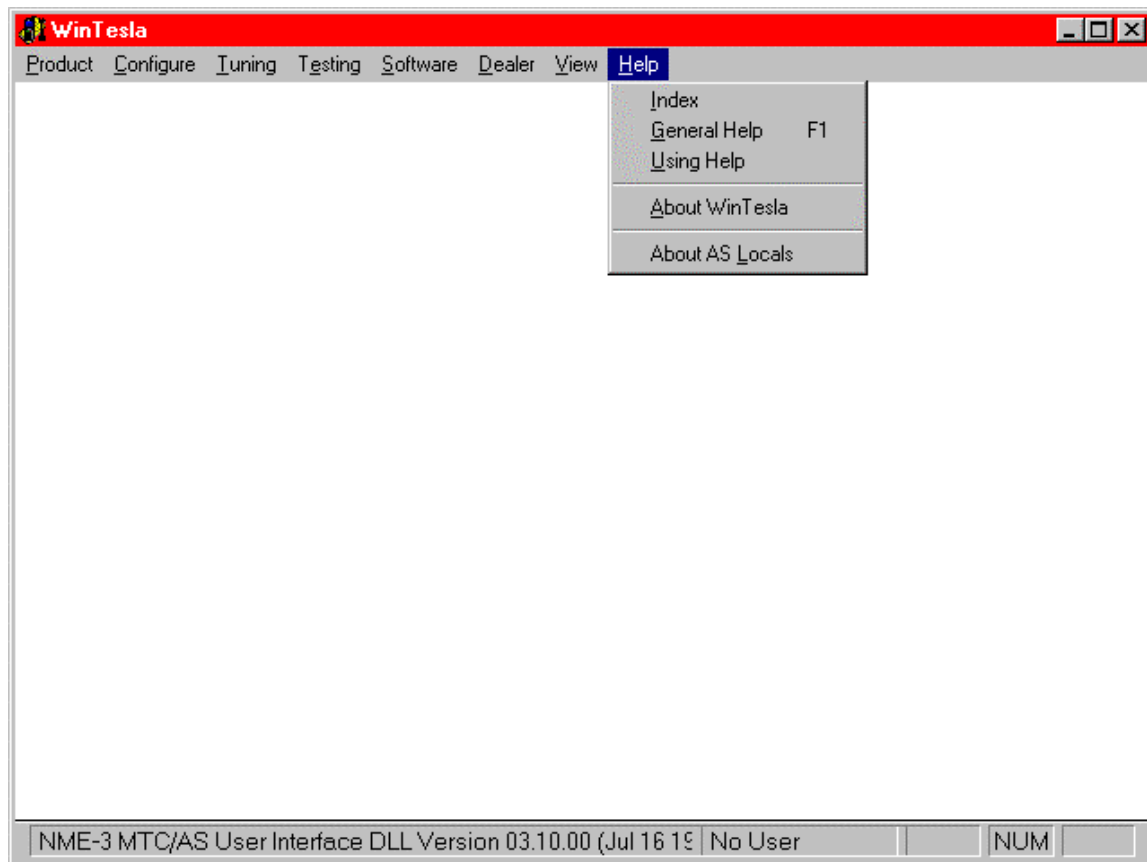
Activation Status Bar Text

Alt, V,Q, R View Quick/RF information.

If phone is in *normal* mode following **Quick Info** is shown:



Help



Appendix 1, Vocabulary

Abbreviation	Description
ASIC	Custom circuit which for instance controls communication between MCU and DSP
JBU-5	Service box
CLF	Common Look and Feel
CLI	Calling Line Identification
COBBA	Common Base Band Analog
DATA	DATA interface module
DAU-9S/P	MBUS/FBUS cable
DLL	Dynamic Link Library
DSP	Digital Signal Processor which controls radio interface and speech coding/decoding
EEPROM	Memory for adjustment parameters (Electrically Erasable and Programmable Read Only Memory)
FBUS	Fast serial bus
IMEI	International Mobile Equipment Identification code
IR	Infra Red transmitter
M2BUS	Serial communication bus which can be connected to accessory devices and test PC
MCU	Master Control Unit processor
MDI	MCU DSP Interface; message interface via ASIC registers
ME	Mobile Equipment
MODAL (dialog box)	A modal dialog box requires the user to complete interaction within a dialog box, and close it before continuing with any further interaction outside the window.
MODELESS (dialog Box)	A modeless dialog box allows the user to interact with other windows and applications.
MS	Mobile Station

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PC	IBM PS/AT or compatible personal computer
PCI	Phone Controlling Interface SW for PC
PKD-1/1NS/1CS	Hardware protection key (DESKEY DK2) for protecting service software from illegal copying. The software will not work without this key !
RF	Radio Frequency parts
RTC	Real Time Clock
SW	Software
TDF-4	Flash security box
UI	User Interface