PAMS Technical Documentation RAE-3 NU* Series PDA

7. Service Software Instructions

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PAMS

AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments
	03/2002	OJuntunen	

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7. Service Software Instructions

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Service Software

General

Wintesla software is used to perform service functions of the RAE–3 PDA. This SW consists of Wintesla service software and product specific DLL's (Dynamically Linked Libraries).

To run WinTesla SW, a parallel port software protection device (PKD–1) must be connected to the PC to perform flashing functions. If only controls are necessary, RAE–3 can be controlled using equipment setup described in the WinTesla RS chapter.

The test functions send test messages from PC to MS and receive results and show them in the PC display. The messages to the phone can be sent via DAU–9C cable.

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 95/98 and NT. Detailed information about Windows and application usage can be found from the Microsoft Windows Users Guide.

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: 0774080)

Rest of the needed service equipment depends on what kind of operations service personnel wants to perform.

*) 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.

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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 RAE–3 via a separate adapter connected to the serial port of the PC, and to the phone bottom connector (DAU–9C cable).

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.

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.

Installing the software on PC Hard Disk

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 compu	Iter	
2.	start Windows, and open File Manager		
	log into drive a:	type A: and press <enter></enter>	
3.	start INSTALL.EXE and	type C: and press <enter></enter>	
	install Service software to drive C:		

To install product specific DLL's, take your RAE–3 DLL disks, and repeat the steps above.

Common Properties of the User Interface

This chapter describes how the User Interface CLF must appear to the user.

The User Interface MUST be capable of being driven without the use of a mouse, as the service engineer rarely has space on the bench to use a mouse.

Login Dialog

When the Service Software application is invoked, by checking on the Service Software icon, the **Login** dialog box (Figure 1) will be displayed on the screen.

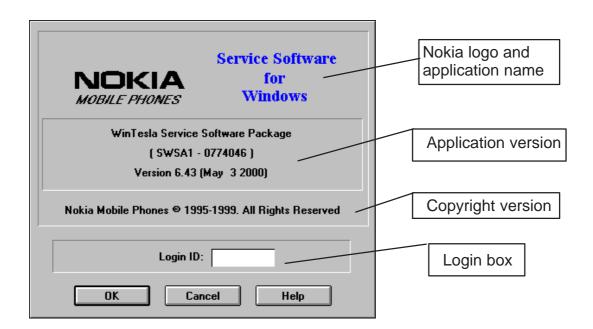


Figure 1. Login dialog box

Nokia logo and application name bitmap (-)

Displays Nokia logo and name of the application.

Application version static text (-)

Contains the name and version of the application.

Copyright notice static text (-)

Copyright is informed as: "Nokia Mobile Phones (c) 1995–1999. All Rights Reserved".

Login Box edit box (-)

The user Login ID edit box, where the user enters his faultlog user name. (See Faultlog User Guide)

OK button (default key)

The user name is stored in memory and the dialog box is closed. When the dialog box is closed, the application starts.

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Cancel button (ESC)

The Dialog box is closed and application is started, but the Faultlog feature is disabled.

Help button (F1)

Activates the Windows Help application and displays context sensitive Help.

Main Window

When Wintesla opens the basic screen, product specific DLL's must be activated using mouse to select Product -> Open and select RAE-3

Using Help

When DLL's are active, the menu bar contains several items, including help texts, as shown in Figure 2.

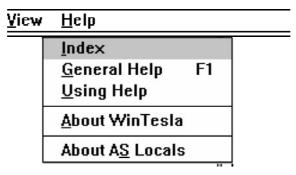


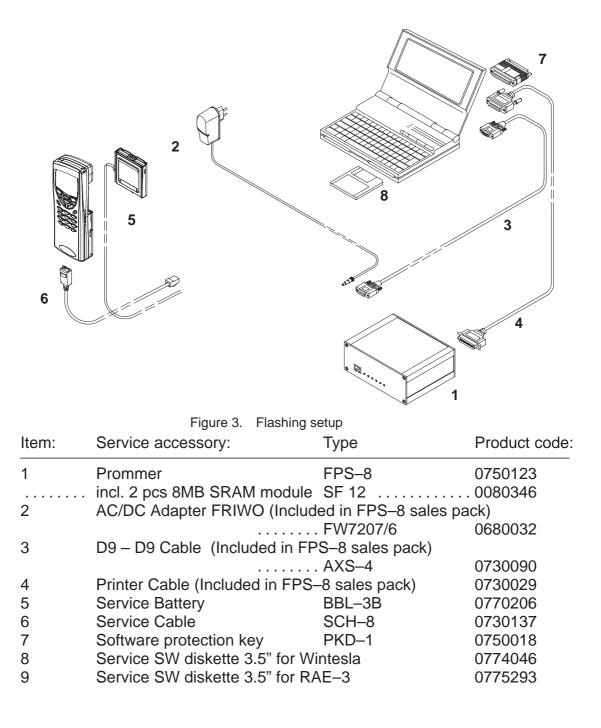
Figure 2. Menu bar

Instructions for service software use can be found in the help texts. Step by step instructions for complex operations like SW upgrades and tunings can be found in the end of this chapter.

Software upgrade guide

Equipment Setup instructions

- 1. Once a FPS–8 box is used for the first time it has to be activated according to the instructions included in the FPS–8 package.
- 2. Connect the box, cables and PC according to the drawing (see Figure 3)



Setting up the PC

1. Install dongle drivers from CD-ROM (d:\32bit_Dongle_Driver\dk2wn32.exe –directory)

2. Install WinTesla version (version 6.43 or later) from CD-ROM (d:\wintesla\wt_inst.exe –directory)

3. Install the RAE–3 DLL's from CD-ROM (d:\dlls\v04_X0_00\Disk1\setup.exe –directory)

Setting up BUS Configuration for WinTesla

Once Wintesla is first time used the Connection from PC to FPS–8 has to be configured according to the instructions bellow (see Figure 4, Figure 5).

1. Start WinTesla software (c:\WinTesla\Stesla.exe)



Figure 4.

2. Set Bus Configuration for WinTesla according to Figure 2 below:

Open Bus Configuration -window by going "Configure" -> "Buses..."

Set COM port "1" , Hardware Type "COMBOX" and Media "MBUS" (see Figure 5).

BUS Config	uration		×
COM Port	<u>H</u> ardware T None	ype <u>M</u> edia	•
Add	COMBOX	Scanning Priority List	<u>R</u> emove
COM1	COMBOX	MBUS	
OK		Cancel	Help

Figure 5. Set Bus Configuration

Programming with WinTesla Interface

WinTesla Interface

These instructions are valid when using:

- WinTesla version 6.43 or later
- RAE-3, RAE-5 and RAB-3 AMS dll release v04.00.00 or later
- PKD–1 dongle

Before programming

Save backup data to memory card. Note that the memory card must be inserted in the Communicator.

1. Press the Office application button, select the File manager application and press Open.

- 2. Press the Menu key and select Memory card > Backkup to memory card...
- 3. Press Backup to backup all the Communicator data to the memory card.

Programming procedure

ROM/MCU image

- 1. Start WinTesla software
- 2. Insert BBL–3B service battery in the Communicator.
- 3. Connect SCH–8 cable to the Communicator bottom connector.
- 4. Select *Product -> Open -> RAE-3* for N9290 (see Figure 6)

F	roduct Open	×	l
	Name RAE-3	Description	l
	RAE-3		l
			l
			l
			l
			l
			l
			l
			l
			l
			l
	OK	Cancel Edit Help	



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Note: If Win Tesla is already running, and the Communicator is on, press "F5" to initialize connection.

2. Select Dealer -> Flash Phone...

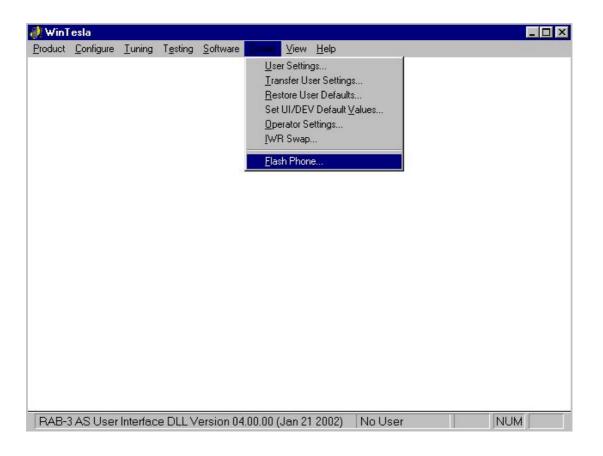


Figure 7. Wintesla user interface when the Communicator is running and initialization has been successful.

6. *Flash Phone* dialog opens.

7. Select *Market Area* (or select the correct PPM image by pressing the lower '...'.

8. Select *MCU Image* by pressing upper'...' (if the correct MCU image is not automatically selected.

9. Press the **Flash** button (see Figure 8)

Market Area	Elash
Europe NX Scandinavian 🛛 🚺	
MCU Image File	
C:\WINTESLA\RAE-5\rae53005.220	
√ersion in File:	$\overline{\mathbf{v}}$
V 05.22 12-22-02 RAE-5 (c) NMP.	D
PPM File:	Promming options
C:\WINTESLA\RAE-5\RAE33005.22X	
Version in File:	<u>Erase Only</u>
V 05.22 12-02-02 RAE-5 (c) NMP.X	Prommer Options
Version in ME:	SRAM Only
Not read	Force Download
Package Versions:	
LPCS:V141099	
GSMC:V141099	
FONT: fconv	
TEXT: L180102	
AORD: V040697	
TONE:version	
PLMN: V9.00	LPT Port: 1 V

Figure 8. Flash phone –dialog

10 . Once the program is prompting for restoring user data choose NO if you do not want to save the exixting user settings, else select YES . (see Figure 9)

-lash Phone	2
Market Area	Flash
Europe NX Scandinavian	
MCU Image File	Close
C:\WINTESLA\RAE-5\RAE33005.220	<u>H</u> elp
Version in File:	
V 05.22 12-22-02 RAE-5 (c) NMP.	
PPM	Promming options
File:	
C:\WINTESLA\RAE-3\rae53005.21X	
Version in Flash Phone	Erase Only
Do you want to save user settings to file.	Prommer Options
Version in	<u> SRAM</u> Only
<u>Yes</u> <u>No</u> Cancel	Force <u>D</u> ownload
Package \	
	LPT Port: 1 V

Figure 9. Saving user settings to file

11. Programming starts (takes about 10 minutes)

12. If you have selected NO to answer the previous question in step 10 the user settings will be updated after flash programming . Press the OK button (see Figure 10 .)

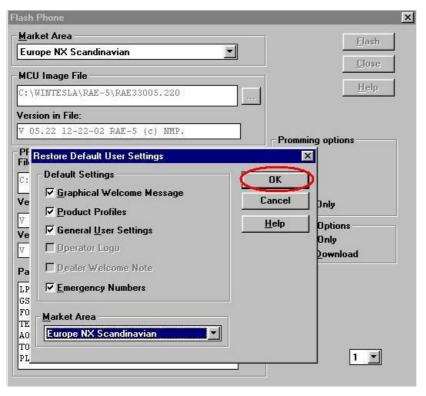


Figure 10. Restoring Default User settings

13. After Flash programming complete message press OK button and close the *Flash Phone* dialog (see Figure 11)

lash Phone	
Market Area	Elash
Europe NX Scandinavian	Close
MCU Image File	Libse
C:\WINTESLA\RAE-5\RAE33005.220	
Version in File:	
V 05.22 12-22-02 RAE-5 (c) NMP.	- Promming options
PPM File:	
C:\WINTESLA\RAE-5\RAE33005.22X	
Version in File:	 <u> </u>
▼ 05.22 12-02-0	Prommer Options
Version in ME:	SRAM Only
V 05.20 18-01-0	Force Download
Package Versions:	
LPCS: V141099	
GSMC: V141099	
FONT: fconv	
TEXT: L180102	
AORD: V040697	
TONE:version	LPT Port: 1
PLMN: V9.00	

Figure 11. Flash programming completed

14 Disconnect the BBL–3 service battery and the SCH–8 cable from the Communicator.

Formatting the User memory

- 15. Insert the BLL–3 standard battery to restart the Communicator.
- 16. Open the cover.

17. When you see the Welcome screen, immediately press and hold down the **Ctrl+Shift+F** keys. The "F" key must be pressed last. Then press the 'Format* button (see Figure 12)



Figure 12. Flash programming completed

Installing All_Nokia_92XX_data_XX.SIS -package

18. Insert the MMC that includes the correct SIS package. The same language and version as in the ROM image (same as 'Market Area' in Figure 8.

19. Install All_Nokia_92XX_data_XX.SIS

- Open the Install/Remove program
- press the Extras application button
- Select the Control Panel application and then the Install/Remove application.
- Install SIS package.
- Press Install new button
- Press Browse button,
- Select Memory card by pressing Arrow key once
- Press OK button
- Select All_Nokia_92XX_data_XX.SIS and press OK.

After Programming

Restore data from the Memory Card.

- Press the Office application button, select the File Manager application and press Open
- Press the Menu key and select *Menory card > Restore from memory card...*
- Press **Restore** to restore all the backed–up memory card data to the Communicator.

Now you have new software in the Communicator !

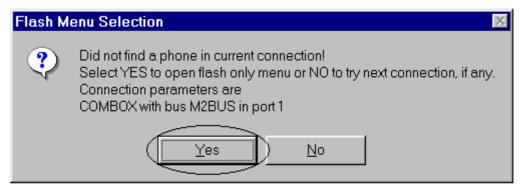
Troubleshooting for the N9210 SW upgrade

If something went wrong during flashing:

If you have a dead RAE-3

- 1. Do not try to switch phone on
- 2. Use product-> Open-> RAE-3. (Figure 13)

Wintesla will prompt you " Did not find a phone in current connection! " Answer Yes.



- Figure 13. Flash menu selection
- 3. Then use Dealer > Flash Phone (Figure 14)

📣 WinTesla	Liele		
<u>P</u> roduct <u>C</u> onfigure <u>D</u> ealer Flash	Help Phone		
		· · · · · · · · · · · · · · · · · · ·	
AS User Interface DLL Version	03.20.00 (Nov 17 2000)	No User	NUM

Figure 14. Wintesla dialog when the RAE–3 is not running

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4. Because user settings cannot be read, Wintesla will prompt you " Failed to communicate with phone. Settings cannot be saved. Do you want to continue? " Answer Yes.

📢 Win T	[esla			<u>- U ×</u>
Product	<u>C</u> onfigure	<u>D</u> ealer	Help	
L Win1 Product		_	Flash Phone Market Area Europe NA English MCU Image File C:\UINTESLA\RAE-3\rae32502.750 Version in File: V02.75 PPM File: C:\UINT Version i Version i Version i Version i Version i Version i Detree Pownload Package Versions: LPCS:V141099 GSMC:V141099 FOWT: fcomv ItXT:L241100	
			LARD: Y040697 TONE: version PLMM: V9.00	
ASU	ser Interfa	ce DLL	.Version 03.20.00 (Nov 17.2000) No User NUM	
			Figure 15 Wintesla cannot read user settings	

Figure 15. Wintesla cannot read user settings

5. If Flash authority ID writing fails () after flashing: FPS–8 may not be activated,

Flash Phone			×
<u>M</u> arket Area			Flash
Europe NA Eng	glish 🗾		Close
-MCU Image File	e		Linse
C:\WINTESLA\	RAE-3\RAE32502.780		Help
Version in File:			
V02.77			,
- PPM - Flash I	Phone	×	
File:	There was an error during flashing.		
C:/WIN 🕗	Reason:		
Version	 Flash authority id writing failed. Reason: Communication error, when writi 	ng Authority ID.	
V 2.13	Recommended actions:		Options
Version	Put phone power off and on, then try to r	eflash.	
Not re	OK 1		<u>D</u> ownload
Packag			
LPCS: V141099			
GSMC:V141099			
FONT: fconv TEXT: L011200			
AORD: V040697			
TONE:version			
PLMN: V9.00		LPT Port	t 1 💌

Figure 16. Flash authority ID writing failed

Wintesla Tuning

Prior to a	any tuning t	he phone n	nust be initialized:	
Connect	the phone	to a PC wit	h a DAU–9P cable	
Start Wintesla–Service–Software and				
Select	Product			Alt+p
		Open		
			RAE–3	
Select:	Product			Alt+p
		Initialize		Alt+I
			Normal Mode	F5

RF tuning after repairs

Different repairs require different tuning. In general it is necessary to determine in which section the repair was done to establish which tunings to perform. To determine if RF tuning is necessary after repair it is important that the functionality of the repaired circuit is understood well. In case the circuit is not fully understood it might be wise to play it safe and do RF tunings in accordance with the table below.

In general repairs in the TX part will require tuning of "TX Power" and "TX I/Q" tuning.

In general repairs in the RX part or PLL will always require "RX Calibration" and in some cases require AM Suppression tuning (Automatic) and RX Filter Calibration (Automatic).

Other parts interfacing to TX, RX or PLL might require tuning, but common sense should be used.

If it can be ruled out that a component change affects RF performance, e.g. the microphone B200, there is no need to do any RF tuning.

Equipment Setup for RF Tuning without Removing Covers

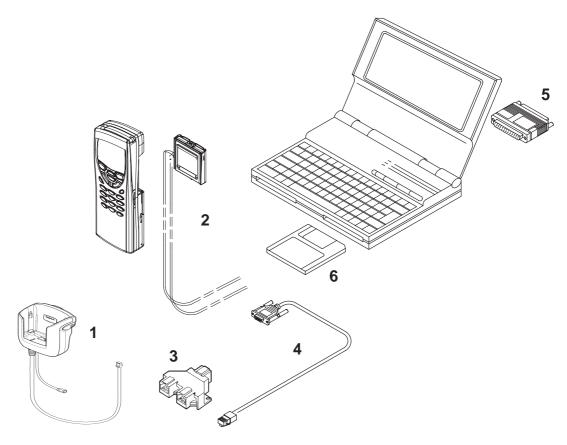


Figure 17.	Tuning set-up 1

Item:	Service accessory:	Туре	Product code:
1	Service car kit	HCL–1	0770265
2	Service Battery	BBL–3B	0770206
3	Modular T–Adapter		4626134
4	Service MBUS Cable	DAU–9S	0730108
5	Software protection key	PKD–1	0750018
6	Service SW diskette 3.5" for	0774046	
7	Service SW CD for RAE–3		0775291

RX Calibration

The "RX calibration" is used to determine gain at different gain-settings for front-end and Hagar and needs to be done in both bands, but the calibration only have to be started once, it will automatically proceed to the PCN band after EGSM.

Select:	<u>T</u> uning		Alt+t
	<u>R</u> X Ca	alibration	r
RX C	alibration	×	
	Set RF genera	tor to high reference:	
	Frequency Level	947.06771MHz -55.000000 dBm	
	Note: attenuat	ions	
	OK .	Cancel	

Figure 18.

Note: Always use the latest Wintesla support DLLs

Connect an external generator to the phones RF connector and set the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

Change the level on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

RX Calibration			
	tor to low reference:		
<u>•</u>	Frequency 947.06771 MHz Level –86.00000 dBm		
Note: attenuations.			
Cancel			



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AFC	information:	Save
AFC AFC	init value5 slope 240 slope 234	<u>C</u> ancel <u>H</u> elp
Iro	Gains(Q6)	<u>R</u> epeat
0	31.33	
1	41.33	
2	51.33	
3	60.33	
4	70.33	
5	79.92	
6	89.81	
7	100.06	
8	109.80	

Figure 20.

Difference between the gain steps should be ~10dB \pm 1dB .

Change the level and frequency on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

RX Calib	ration	×	
	Set RF generator to high reference:		
	Frequency Level	1842.867710 MHz -55.000000 dBm	
	Note: attenuat	ions	
[OK	Cancel	

Figure 21.

Change the level and frequency on the generator as the window tells you. Click OK in the Wintesla window, now a new window pops up:

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RX Calibration 🛛 🗙				
	Set RF generati	Set RF generator to low reference:		
<u>•</u>	Frequency Level	1842.867710 MHz .86.000000 dBm		
	Note: attenuatio	ons.		
[Cancel		



Change the level and frequency on the generator as the window tells you.

Click OK in the Wintesla window, now a new window pops up:

RX Calibration	×
AFC information: AFC init value	<u>S</u> ave <u>C</u> ancel <u>H</u> elp
Nro Gains(Q6)	<u>R</u> epeat
0 27.53	
1 37.53	
2 47.53 3 51.53	
4 61.53	
5 101.34	
6 107.58	
7 107.69	
8 107.73	



Difference between the gain steps should be ~10dB \pm 1dB .

Click Save in the Wintesla window.

RX calibration is now completed.

RX Filter Calibration (Automatic)

This calibration is calibrating the Baseband filter inside Hagar, for this reason the calibration is not done in both bands.

Select: <u>T</u>uning Alt+t

RX Measurements

A window now pops–up:

3X Measurements	×
Select <u>F</u> unction	<u>M</u> easure
RX AM Suppression (Automatic)	<u>S</u> ave Defaults
RX AM Suppression (Manual) RX Filter Calibration (Automatic) RX Filter Calibration (Manual)	Load Defaults
Value Decimal:	
Hex:	<u>H</u> elp
Binary MSB Binary LSB	
	Close

Figure 24.

In the "Select Function" frame select RX "Filter calibration (Automatic)". No external signal is needed for this, just click "Measure", wait a few seconds and then click "Save Defaults".

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RX Measurements	×
Select Function	Measure
RX Filter Calibration (Automatic)	<u>S</u> ave Defaults
Registers	Load Defaults
Name: Value Decimal:	<u>H</u> elp
	<u>C</u> lose



RX filter calibration is now completed and the "RX Measurements" window can be closed by clicking "<u>C</u>lose"

RX AM Suppression (automatic)

This calibration is tuning the AM suppression performance of Hagar mixers and will have to be done in both bands. If flash or Hagar have been replaced or Full Factory settings have been performed RX AM Suppression must be done.

EGSM

Select:	Product			Alt+p
		<u>B</u> and		b
			<u>E</u> GSM	е
Select:	<u>T</u> uning			Alt+t
			RX Measurements	

A window now pops-up:

RX Measurements	×
Select Function	<u>M</u> easure
RX AM Suppression (Automatic)	<u>S</u> ave Defaults
RX AM Suppression (Manual) RX Filter Calibration (Automatic) RX Filter Calibration (Manual)	Load Defaults
Value Decimal:	
Hex:	<u>H</u> elp
Binary MSB + - Binary LSB + - - - - - - - - - - - - -	
	<u>C</u> lose

Figure 26.

In the "Select Function" frame select RX "RX AM Suppression (Automatic)".

Click Measure, A window now pops-up:

RX Meas	surements	×
	Set the following fmod = mod depth = P = f =	AM modulated signal to antenna: 1 KHz 83% -23 dBm 956.200MHz
		0K



Note: Always use the latest Wintesla support DLLs

Connect an external generator to the antenna connector of the phone and set– up the generator.

Click OK in the Wintesla window, the RSSI value is updated in the RX Measurements window.

RX Measurements	×
Select <u>Function</u>	<u>M</u> easure
RX AM Suppression (Automatic)	<u>S</u> ave
Registers	
Name:	
Value	
Decimal:	<u>H</u> elp
Binary MSB Binary LSB	
LOP_I_G: 99 LOM I G: 0	
LOP Q G: 165	
LOM_Q_G: 0 RSSI value: -114.1 dBm	
	<u>C</u> lose



Click "Save ". The "RX AM suppression tuning" is now completed in EGSM.

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PCN

Select:	Product			Alt+p
		<u>B</u> and		b
			<u>P</u> CN	р
Select:	<u>T</u> uning			Alt+t
			RX Measurements	

A window now pops-up:

3X Measurements	×
Select <u>Function</u>	<u>M</u> easure
RX AM Suppression (Automatic)	<u>Save Defaults</u>
RX AM Suppression (Manual) RX Filter Calibration (Automatic) RX Filter Calibration (Manual)	Load Defaults
Value Decimal:	
Hex:	<u>H</u> elp
Binary MSB Binary LSB + Binary LSB + Binary LSB - Binary	
	<u>C</u> lose

Figure 29.

In the "Select Function" frame select function "RX AM Suppression (Automatic)" Click <u>Measure</u>, A window now pops–up:

RX Meas	euramants 🔀
	Set the following Africation ared signal to enternation fined = NHz motified HT = NHZ P = -26 LB () f = 1552,800MHz
	10K



Note: Always use the latest Wintesla support DLLs

Connect an external generator to the antenna connector of the phone and set– up the generator.

Click OK in the Wintesla window, the RSSI value is updated in the RX Measurements window.

RX Measurements	×
Select Eunction	Measure
RX AM Suppression (Automatic)	<u>S</u> ave
Registers	
Name:	
Value	
Decimal:	
Нех:	<u>H</u> elp
Binary MSB Binary LSB	
LOP I P: 396	
LOM_I_P: 0 LOP_Q_P: 264	
LOP_Q_P: 264 LOM_Q_P: 0	
RSSI value: -113.4 dBm	
	<u>C</u> lose

Figure 31.

Click "Save ". The "RX AM suppression tuning" is now completed in PCN.

TX Power Tuning

This tuning must be done in both bands.

Note: TX Power tuning must be done with a peak power meter, e.g. Rohde & Schwarz model NRVD with a Rohde & Schwarz Peak Power Sensor TDMA Model NRV–Z31 and a suitable attenuator.

The use of power meter in GSM testers is likely to cause larger error than the use of a dedicated power meter and might cause the phone to be non–compliant with GSM specifications.

EGSM tuning

Select:	Product			Alt+p
		<u>B</u> and		b
			<u>E</u> GSM	е
Select:	T <u>e</u> sting			Alt+e
		<u>R</u> F Con	trols	r

A window now pops-up (Figure 32):

RF Controls	×
Active Unit Operation Mode Image: Big state of the stat	Close <u>H</u> elp
TX Data Type: Contl I TX Power Level: BASE	<u>A</u> pply <u>S</u> et Defaults
Cont. Mode Ch: 60 947.000000 Channel: 60 947.000000 Monitoring Ch: 1 935.200000	G <u>e</u> t Defaults
Gain Step Va <u>l</u> : 0 A <u>F</u> C: 103	
Multislot On	
TX Power Level 2: BASE Gain Step 2 Val: 0 Settling Time: 0	

Figure 32. RF Controls

Technical Documentation

Set Active unit to	<u>T</u> X
Set TX <u>D</u> ata Type	: to Rand
Click <u>A</u> pply	
Click Close	
Select: <u>T</u> uning	
	TX <u>P</u> ower…

Alt+t

Alt+P

A window now pops-up (Figure 33):

X Powe	Tuning		×
<u>L</u> evel	Coefficient	Targets	<u>S</u> ave
5	0.762	32.0 dBm	Cancel
6	0.675	31.0 dBm	
7	0.579	29.0 dBm	<u>H</u> elp
8	0.502	27.0 dBm	
9	0.441	25.0 dBm	
10	0.392	23.0 dBm	
11	0.354	21.0 dBm	- +
12	0.323	19.0 dBm	
13	0.299	17.0 dBm	C <u>a</u> lculate
14	0.284	15.5 dBm	
15	0.274	14.0 dBm	
16	0.262	12.5 dBm	
17	0.254	11.0 dBm	
18	0.247	9.5 dBm	
19	0.242	8.0 dBm	
BASE	0.213	-25.0 dBm	
TEST	0.228		
		Figure 33	

Figure 33.

Tune levels 19, 15, 5 and Base in accordance with the target values.

Click calculate, check if the other levels match the targets, correct if necessary. Click <u>Save</u> when all values matches the targets.

7. Service Software Instructions

PCN tuning

Select	: <u>P</u> roduct	Д	Alt+p
	<u>B</u> anc	d b)
		<u>Р</u> СN р)
Select	: T <u>e</u> sting	Д	Alt+e
	<u>R</u> F C	Controls r	
A wind	dow now pops–up (F	igure 34):	
RF	Controls	×	
	Active Unit Operatio	nuous Close	
	⊙ <u>T</u> X <u>⊙ B</u> urst	<u>H</u> elp	
	TX Data Type: Contl	Apply	
Ŀ	Image: Content IX Power Level: BASE	<u>Set Defaults</u>	
Г	Cont. Mode Ch: 60 9	47.000000	
	Cha<u>n</u>nel : 60 9	47.000000	
	Monitoring Ch: 1 9	35.200000	
	Gain Step Va <u>l</u> : 0		
		A<u>F</u>C : 103	
	🗌 M <u>u</u> ltislot On		
	TX Power Level 2: BA	SE 🔽	
	Gain Ste <u>p</u> 2 Val: 0		
	Settling Time: 0		



Set Active unit to <u>T</u>X Set TX <u>D</u>ata Type: to Rand Click <u>A</u>pply Click Close Select: <u>T</u>uning Alt+t TX <u>P</u>ower... Alt+P

Technical Documentation

A window now pops–up:

<u>L</u> evel	Coefficient	Targets	<u>S</u> ave
0	0.678	29.3 dBm	<u>C</u> ancel
1	0.614	28.0 dBm	
2	0.530	26.0 dBm	<u>H</u> elp
3	0.464	24.0 dBm	
4	0.412	22.0 dBm	
5	0.370	20.0 dBm	
6	0.338	18.0 dBm	- +
7	0.313	16.0 dBm	
8	0.292	14.0 dBm	C <u>a</u> lculate
9	0.275	12.0 dBm	
10	0.265	10.0 dBm	
11	0.258	8.0 dBm	
12	0.251	6.5 dBm	
13	0.246	5.0 dBm	
14	0.241	3.5 dBm	
15	0.237	2.0 dBm	
BASE	0.221	-20.0 dBm	
TEST	0.236		
			1

Figure 35.

Tune levels 15, 11, 0 and Base in accordance with the target values.

Click calculate, check if the other levels match the targets, correct if necessary.

Click <u>Save</u> when all values matches the targets.

7. Service Software Instructions

TX I/Q Tuning

This tunir	ng must be	done in both bands.	
Select:	Product		Alt+p
		<u>B</u> and	b
		<u>E</u> GSM	е
Select:	T <u>e</u> sting		Alt+e
		<u>R</u> F Controls	r

A new pop up window appears

RF Controls	×
Active Unit Operation Mode • <u>BX</u> • <u>Continuous</u> • <u>Burst</u>	Close <u>H</u> elp
TX Data Type: Contl TX Power Level: BASE	<u>A</u> pply <u>S</u> et Defaults
Cont. Mode Ch: 60 947.000000 Channel: 60 947.000000 Monitoring Ch: 1 935.200000	G <u>e</u> t Defaults
Gain Step Va <u>l</u> : 0 A <u>F</u> C: 103	
Multislot On	
TX Power Level 2: BASE Gain Step 2 Val: 0 Settling Time: 0	

Figure 36.

Set Active unit to $\underline{T}X$ Set TX \underline{D} ata Type: to Cont1 Click \underline{A} pply Click Close and continue to next stage

Common tuning procedure

Select: <u>T</u>uning

Alt+t

TX I/<u>Q</u>... Alt+q

A window now pops-up (Figure 37) :

TX I/Q Tuning		×
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX <u>I</u> DC Offset:	<u>Amplitude Difference:</u>	<u>C</u> ancel
· · · · · · · · · · · · · · · · · · ·	· · · · · · · · 0.0 · · · · · · · · · · · · · · · · · · ·	<u>H</u> elp
TX <u>Q</u> DC Offset:	Phase Difference:	
€ _9	⊻ 90.5 [°]	
-100 100	85 95	

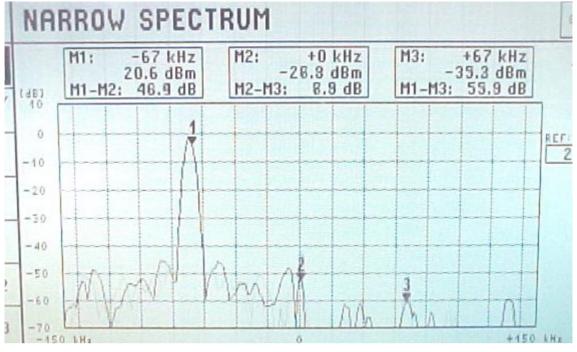


The carrier and +67kHz signal should now be tuned to a minimum. (Figure 38)

The buttons in the "TX I and Q DC Offset:" will change the level of the carrier.

The buttons in the "Amplitude and Phase Difference:" window will change the level of the +67kHz signal.

When minimum values are reached, click <u>Save</u>.





7. Service Software Instructions

Initial set-up PCN

Select:	Product			Alt+p
		<u>B</u> and		b
			<u>P</u> CN	р
Select:	T <u>e</u> sting			Alt+e
		<u>R</u> F Con	trols	r

A window now pops-up (Figure 39):

RF Controls	×
Active Unit Operation Mode Image: Comparison of the second seco	Close
<u>○ IX</u> <u>● B</u> urst	<u>H</u> elp
TX <u>D</u> ata Type: Contl v	<u>A</u> pply
	<u>S</u> et Defaults
Cont. Mode Ch: 60 947.000000	G <u>e</u> t Defaults
Cha <u>n</u> nel: 60 947.000000	
Monitoring Ch: 1 935, 200000	
Gain Step Va <u>l</u> : 0 A <u>F</u> C: 103	
🗖 M <u>u</u> ltislot On	
TX Power Level 2: BASE	
Gain Ste <u>p</u> 2 Val: 0 Sett <u>l</u> ing Time: 0	

Figure 39.

Set Active unit to $\underline{\mathsf{T}}\mathsf{X}$

Set TX <u>D</u>ata Type: to Cont1 Click <u>Apply</u> Click Close and continue to next section

IQ Tuning using Spectrum Analyzer

EGSM

Spectrum Analyzer Settings

Use an appropriate attenuator 10 or 20dB insertion loss and set the Reference Level Offset according to insertion loss from the phone to the Spectrum Analyzer.

Set the Spectrum Analyzer according to the following settings.

Parameter	EGSM
Center frequency	902 MHz
Frequency span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep time	3 s
Detector type	Max. peak
reference level	35 dBm
Marker 1	902.06771 MHz
Marker 2	902 MHz
Marker 3	901.93229 MHz

Phone Settings

Connect the phone to the computer and to the Spectrum Analyzer.

Using WinTesla to select the following:

Product

<u>B</u>and

<u>E</u>GSM

This selects the EGSM band. Then select the following: Testing

<u>R</u>F Controls...

7. Service Software Instructions

A window pops up (Figure 40):

RF Controls	×
Active Unit Operation Mode • <u>BX</u> • <u>C</u> ontinuous • <u>B</u> urst	Close <u>H</u> elp
TX Data Type: Contl I TX Power Level: BASE	<u>A</u> pply <u>S</u> et Defaults
Cont. Mode Ch: 60 947.000000 Channel: 60 947.000000 Monitoring Ch: 1 935.200000	G <u>e</u> t Defaults
Gain Step Va <u>l</u> : 0 A <u>F</u> C: 103	
Multislot On TX Power Level 2: BASE Gain Step 2 Val: 0 Settling Time: 0	



Set "TX \underline{D} ata Type" to "Cont1", press "<u>A</u>pply", then press "Close". The window closes.

Select the following:

Tuning

Tx I/<u>Q</u>...

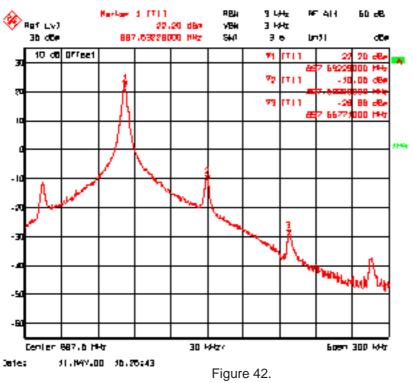
A window pops up:

TX I/Q Tuning		×
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX L DC Offset: Image: Constraint of the set	Amplitude Difference: ▲ ● 0.2 -1 1 Phase Difference: ● 92.0 85 95	<u>C</u> ancel <u>H</u> elp

Figure 41.

This is the "Tx I/Q Tuning" window.

Set the Power Level to "10". Then the Spectrum Analyzer shows a plot like this (Figure 42):



Marker 1 shows the wanted signal. Marker 2 and marker 3 show the unwanted signals.

In the "Tx I/Q Tuning" window use "TX $_$ DC Offset" and "TX $_$ DC Offset" to adjust the spurious at 902.0MHz (Marker 2) to the minimum level.

TX I/Q Tuning		×
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX I DC Offset: ▲ ▶ -12 -100	Amplitude Difference: ▲ ▲ ▲ ▲ 0.2 -1 1	<u>C</u> ancel <u>H</u> elp
TX Q DC Offset: ▲ ▲ → 6 -100	Phase Difference: ▲ Phase Difference: 92.0 85 95	



Then the Spectrum Analyzer shows a plot like this (Figure 44):

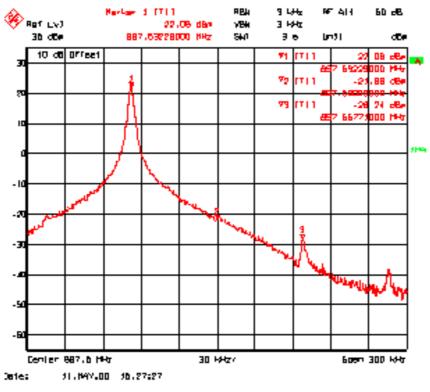
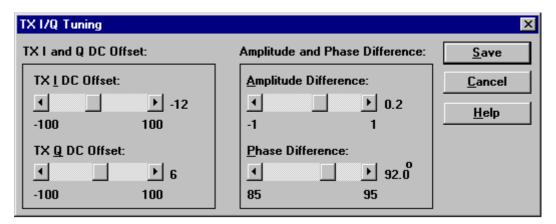


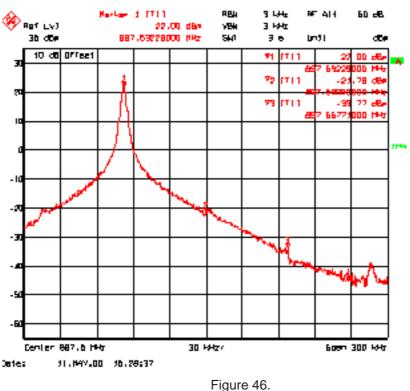
Figure 44.

In the "Tx I/Q Tuning" window use "<u>A</u>mplitude Difference" and "<u>P</u>hase Difference" to adjust the spurious at 901.93229 MHz (Marker 3) to the minimum level.





Then the Spectrum Analyzer shows a plot like this (Figure 46):



In the "Tx I/Q Tuning" window press "Save" and the optimal values are stored in the phone. The window closes.

Note: The optimal values for "TX I and Q Offset" and "Amplitude and Phase Difference" vary from phone to phone.

PCN

Spectrum Analyzer Settings

Use an appropriate attenuator 10 or 20dB insertion loss and set the Reference Level Offset according to insertion loss from the phone to the Spectrum Analyzer.

Set the Spectrum Analyzer according to the following settings.

Parameter	PCN
Center frequency	1747.8 MHz
Frequency span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep time	3 s
Detector type	Max. peak
reference level	35 dBm
Marker 1	1747.73229 MHz
Marker 2	1747.8 MHz
Marker 3	1747.86771 MHz

Phone Settings

Connect the phone to the computer and to the Spectrum Analyzer.

Using WinTesla to select the following:

Product

<u>B</u>and

<u>P</u>CN

This activates the PCN band. Then select the following:

Testing

RF Controls...

A window pops up:

RF Controls	×
Active Unit Operation Mode © <u>BX</u> © <u>Continuous</u> © <u>IX</u> © <u>B</u> urst	Close <u>H</u> elp
TX Data Type: Contl TX Power Level: BASE	<u>Apply</u> Set Defaults
Cont. Mode Ch: 60 947.000000 Channel: 60 947.000000 Monitoring Ch: 1 935.200000	<u>Ge</u> t Defaults
Gain Step Va <u>l</u> : 0 A <u>F</u> C: 103	
Multislot On	
T <u>X</u> Power Level 2: BASE ▼ Gain Step 2 Val: 0 Settling Time: 0	

Figure 47.

Set "TX Data Type" to "Cont1", press "Apply", then press "Close". The window closes.

Select the following:

Tuning

Tx I/<u>Q</u>...

A window pops up:

Start Tuning	×
Start TX I/Q Tuning With:	OK
1 EEPROM Values 2 Factory Default Values 3 Current Values in PC Memory	Cancel
	<u>H</u> elp



Select "EEPROM Values" and a new window pops up:

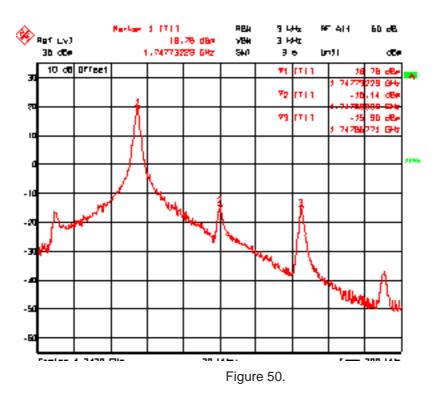
7. Service Software Instructions

TX I/Q Tuning		X
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX <u>I</u> DC Offset:	<u>Amplitude Difference:</u>	<u>C</u> ancel
-100 100	· · 0.2 -1 1	<u>H</u> elp
TX <u>Q</u> DC Offset:	Phase Difference:	
·100 100	1 1 1 1 1 1 1 1 1 1	
100	55 55	



This is the "Tx I/Q Tuning" window.

Set the Power Level to "5". Then the Spectrum Analyzer shows a plot like this (Figure 50):



In the "Tx I/Q Tuning" window use "TX $_$ DC Offset" and "TX $_$ DC Offset" to adjust the spurious at 1747.8MHz (Marker 2) to the minimum level.

TX I/Q Tuning		×
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX I DC Offset: ▲ ▲ -12 -100	Amplitude Difference:	<u>C</u> ancel <u>H</u> elp
TX Q DC Offset: ▲ ▲ -100	Phase Difference: ▲ ▶ 92.0 85 95	

Figure 51.

Then the Spectrum Analyzer shows a plot like this (Figure 52):

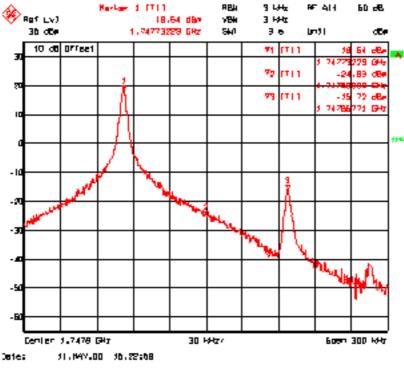


Figure 52.

Marker 1 shows the wanted signal. Marker 2 and marker 3 show the unwanted signals.

In the "Tx I/Q Tuning" window use "<u>A</u>mplitude Difference" and "<u>P</u>hase Difference" to adjust the spurious at 1747.86771MHz (Marker 3) to the minimum level.

TX I/Q Tuning		×
TX I and Q DC Offset:	Amplitude and Phase Difference:	<u>S</u> ave
TX <u>I</u> DC Offset: ▲ → -12 -100 100	Amplitude Difference: • • • 0.2 -1 1	<u>C</u> ancel <u>H</u> elp
TX <u>Q</u> DC Offset: ▲ ▶ 6 -100 100	Phase Difference: ▲ ▶ 92.0 85 95	



Then the Spectrum Analyzer shows a plot like this:

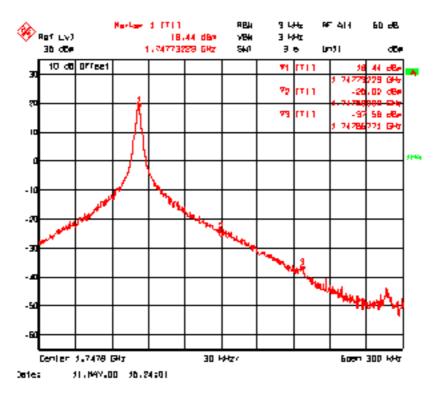
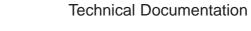


Figure 54.

In the "Tx I/Q Tuning" window press "<u>Save</u>" and the optimal values are stored in the phone. The window closes.

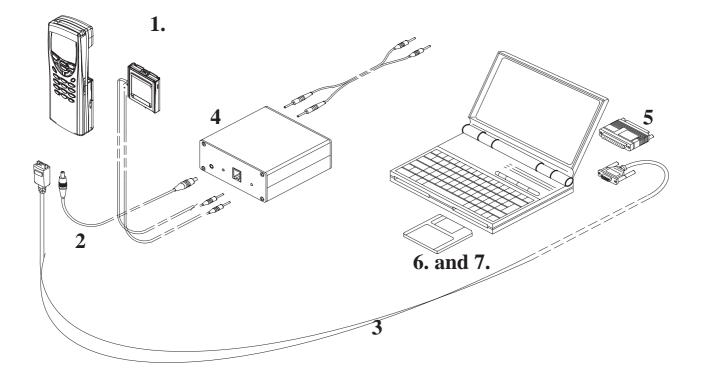
Note: The optimal values for "TX I and Q Offset" and "Amplitude and Phase Difference" vary from phone to phone.



Energy Management (EM) Calibration

Equipment Setup for Energy Management calibration

NOTE: EM values can not be tuned in module jig MJS-14



	- ·	
Figure 55.	Tuning	set–up 2

Item:	Service accessory:	Туре	Product code:
1	Dummy Service Battery	BBL–3B	0770206
2	DC Cable	SCB-3	0730114
3	Service MBUS Cable	DAU-9C	0730138
4	Calibration unit	JBE–2	0775290
5	Software protection key	PKD–1	0750018
6	Service SW diskette 3.5" for Wintesla		0774046
7	Service SW CD for RAE–3		0775291

Energy Management Calibration procedure

NOTE: This can not be done in module jig MJS–14. EM calibration is possible only when phone is completely assembled.

- Connect DAU-9C cable and BBL-3B battery to the Communicator

– Connect BBL-3B to the calibration unit JBE-2 and DC cable SCB-3 between phone and calibration unit.

- Connect JBE-2 to laboratory power supply which is adjusted to 8.0V
- Start Wintesla service SW
- Select Tuning -> Energy Management Calibration

Run calibrations separately or all at once as described in the following list.
 Connect 10.5V to the calibration unit JBE-2 as prompted by service SW.

- Select calibrations:
- Select 1.Run Battery & charger default values checkbox
- Select 2.Battery voltage checkbox
- Select 3.Charger voltage checkbox
- Select 4.Battery size checkbox
- Select 5.Battery temperature checkbox
- Select 6.Charge current
- Select Save without confirmation, if you don't want
- confirm all the selected calibration values before saving
- Run calibrations by pressing Run button
- Set supply voltage back to 8.0 V

Technical Documentation

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