

PAMS Technical Documentation

NSK-3 Series Transceivers

Tuning Instructions

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Tuning Instructions

General

All tuning operations of the NSK-1/3 are carried out using the service software. The service software turns the phone into the locals mode, in which the phone can be outwardly controlled via the MBUS interface.

Tuning is based on the software communicating with the D/A and A/D converters of the phone. In some instances the phone processor will also calculate the required correction parameter.

The tuning values of the phone reside on the EEPROM. The contents of the EEPROM can be read by the service software and saved as a file. This is advisable when there is need to retain that information, e.g. in view of replacement of the circuit. The program also enables writing the default parameters on the EEPROM, in which case all tuning steps should be carried out.

During tuning, proceed as follows:

- Take care not to damage sensitive measuring instruments with excessive RF power.
- Carry out all tuning steps in the shortest possible time to avoid excessive heating of RF units.
- Perform all tuning steps in the order presented.
- Never try to mask a fault by tuning it out!

Required Equipment

- PC/AT computer with service software; see separate section for instructions on installation and use.
- Service accessories; see equipment setup pictures.
- Multimeter or DVM.
- GSM radio telephone test station or separate measuring equipment as follows:
 - RF generator
 - pulse power meter
 - spectrum analyzer
 - attenuator and branching unit

Equipment Setup

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 !

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

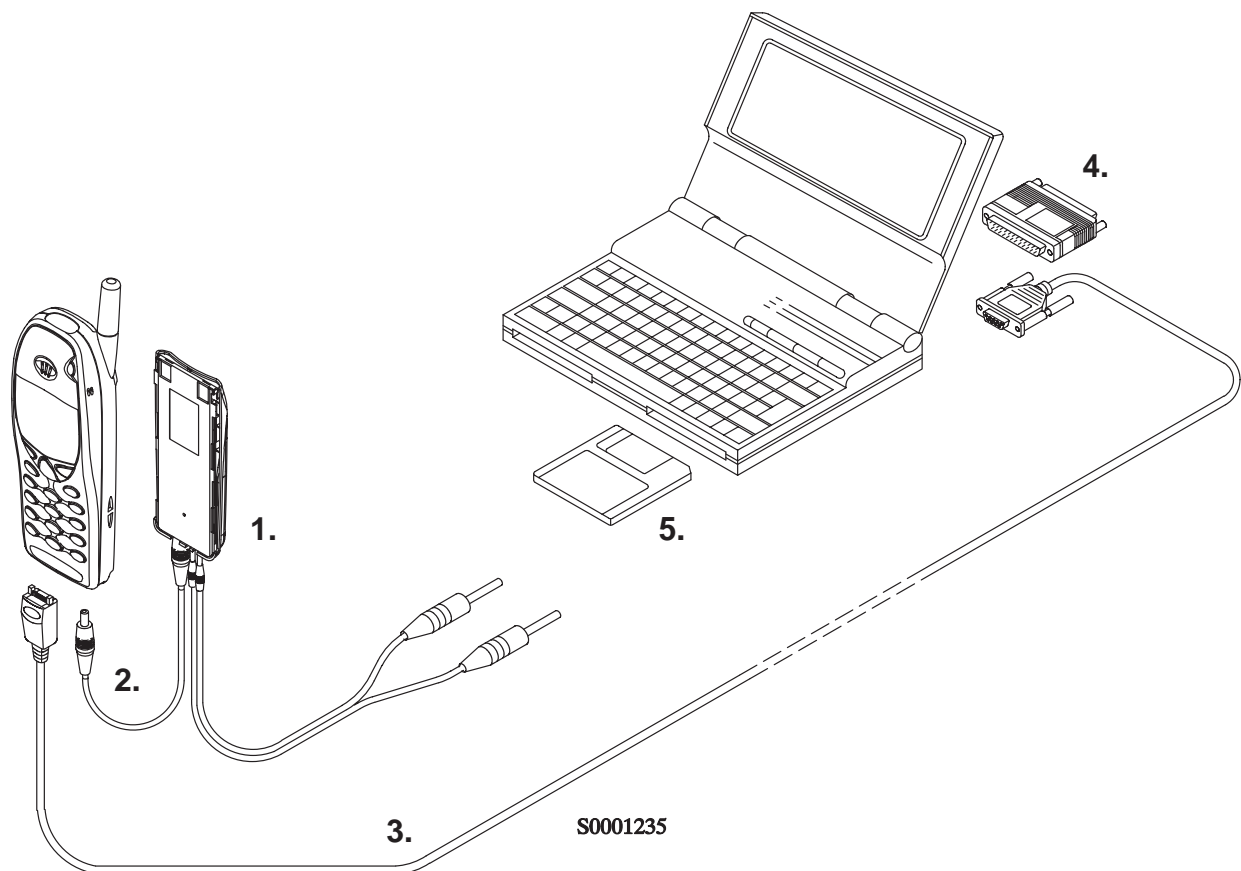
Next connect the M2BUS service cable, DAU-9P, to the serial port (RS-232) of the computer. Attach one end of the service cable to the PC serial port and the other end to the service box, JBA-4. For servicing the phone with the covers in place the service box should always be used.

When the phone covers are removed the jigs should be used.

For audio measurements connect the audio cable, ADS-1, as follows:

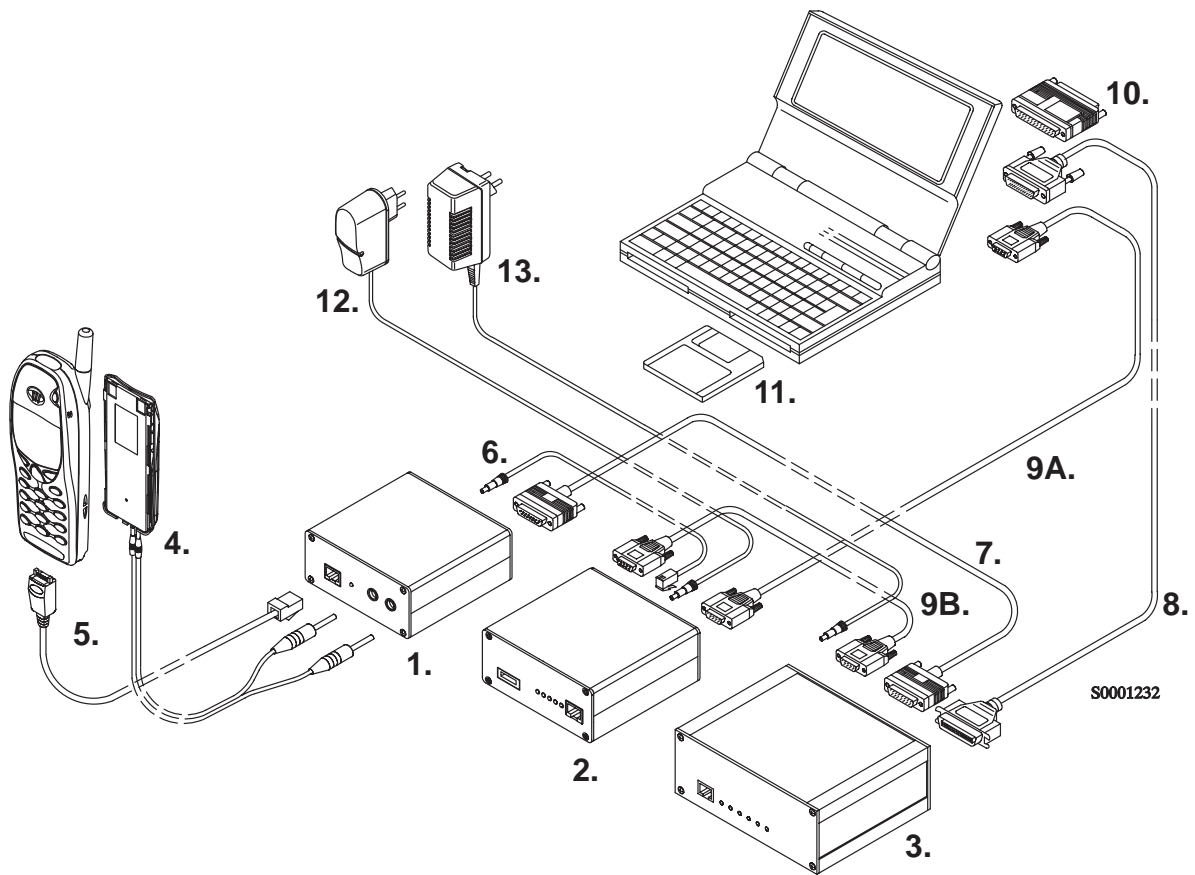
- EAR line to AF INPUT of test equipment
- MIC line to MOD GEN OUTPUT of test equipment

Equipment Setup for Tuning a Phone without Removing Covers



Item:	Service accessory:	Product code:
1	Service Battery BBD-3	0775071
2	DC Cable SCB-3	0730114
3	Service MBUS Cable DAU-9P	0730109
4	Software protection key PKD-1	0750018
5	Service SW diskette 3.5"	0774080

Flash Concept



Item:	Service accessory:	Product code:
1	Flash Loading Adapter FLA-7 (FLA-5)	0080326
2	Flash Security Box TDF-4	0770106
3	Prommer FPS-4S	0085095
4	Service Battery BBD-3	0775071
5	Service Cable SCH-5A	0730166
6a	DC Cable PCC-1B with FLA-5	0730053
6b	DC Cable AXD-1 with FLA-7 (AXD-1 included in FPS-4S sales pack)	0730144
7	D15 - D15 Cable AXS-5 (Included in FLA-7 sales pack)	0730091
8	Printer Cable (Included in FPS-4 sales pack)	0730029
9A	D9 - D9 Cable AXS-4 (Included in FPS-4 sales pack)	0730090
9B	D9 - D9 Cable AXS-4	0730090
10	Software protection key PKD-1	0750018
11	Service SW diskette 3.5"	0774080
12	Travel Charger ACH-6E (Euro)	0270381
	Travel Charger ACH-6U (USA/Japan)	0270382
	Travel Charger ACH-6X (UK)	0270380
13	AC Charger ACL-3E	0680015

NOTE: Changes in Sales Packs

In FPS-4S sales pack ACL-3E will be replaced by AXD-1 power cable. This cable makes it possible to power the FPS-4 prommer with ACH-6 type charger. Same charger has been used to power TDF-4 Flash Security Box and it must be purchased separately.

AXD-1 power cable will be added to FLA-7 sales pack. This makes it possible to power FLA-7 from TDF-4 power output or separate ACH-6 type charger.

Flash Concept Power Distribution Options

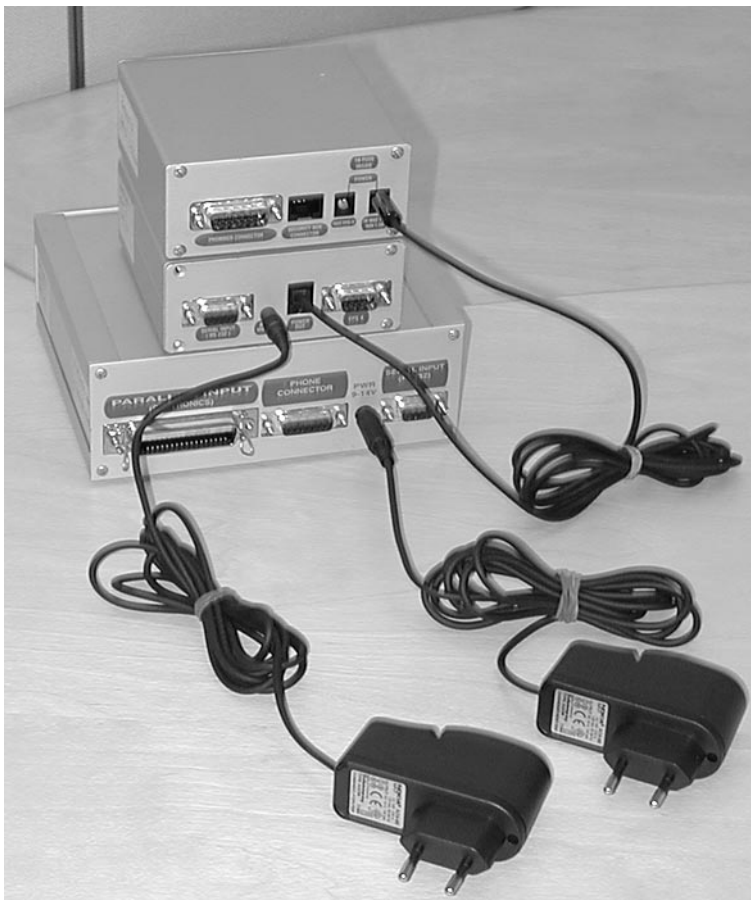
1. Two AXD-1 cables and two ACH-6 chargers – RECOMMENDED!
2. One ACH-6 and two ACL-3 chargers

1. Power distribution with two AXD-1 cables and two ACH-6 chargers:

FLA-7 powered by AXD-1 cable from TDF-4 “Power Out” connector (It is also possible to power FLA-7 with AXD-1 and *separate* ACH-6).

TDF-4 powered by ACH-6 Charger.

FPS-4 powered by AXD-1 DC cable and ACH-6 Charger.



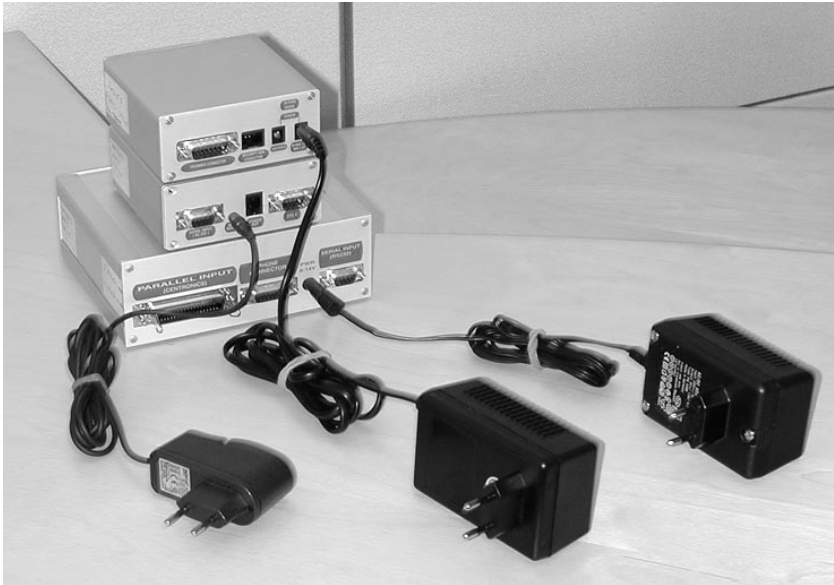
NOTE: Do not use SCF-7 cable to power FLA-7 and FPS-4 from one ACH-6 charger as done when using ACL-3!

2. Power distribution with one ACH-6 and two ACL-3 chargers:

FLA-7 powered by ACL-3 charger

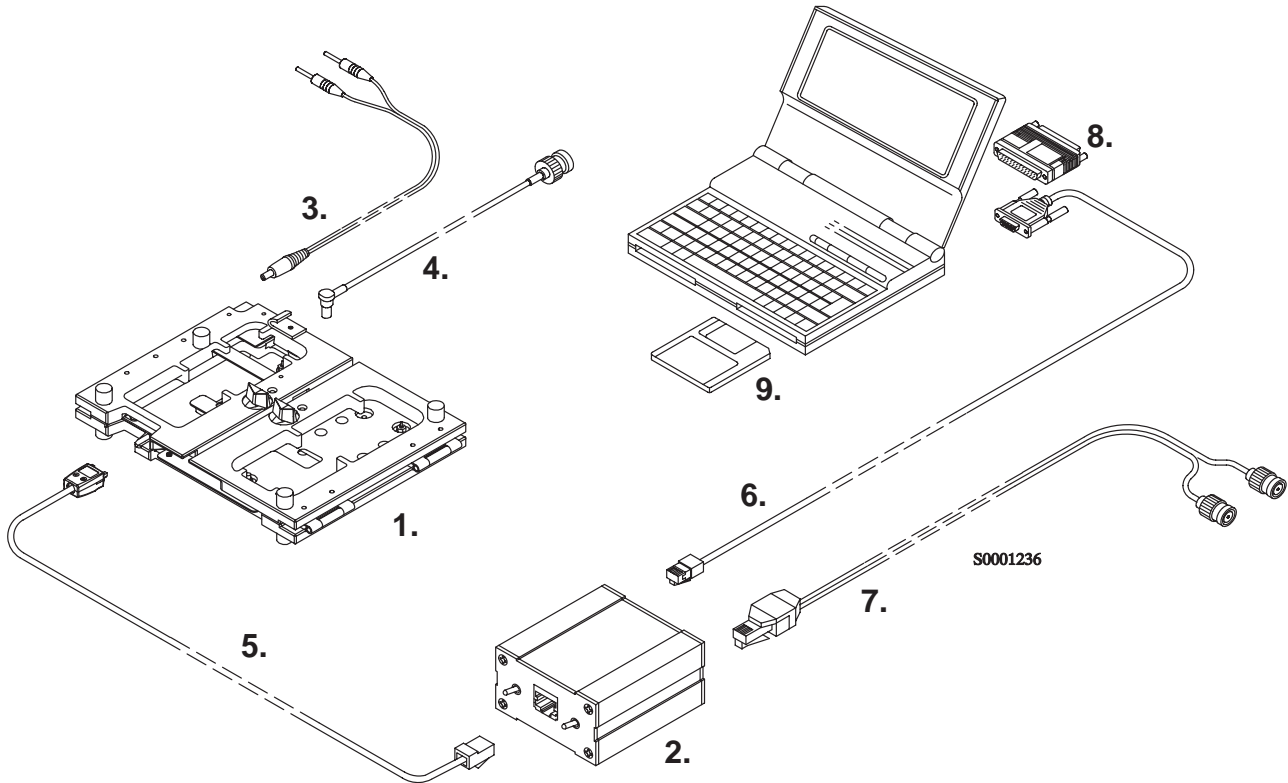
TDF-4 powered by ACH-6 charger

FPS-4 powered by ACL-3 charger



NOTE: It is recommended to use separate power supplies for FLA-7 and FPS-4.

Tuning With Covers Off – Using Test-frame JBS-19

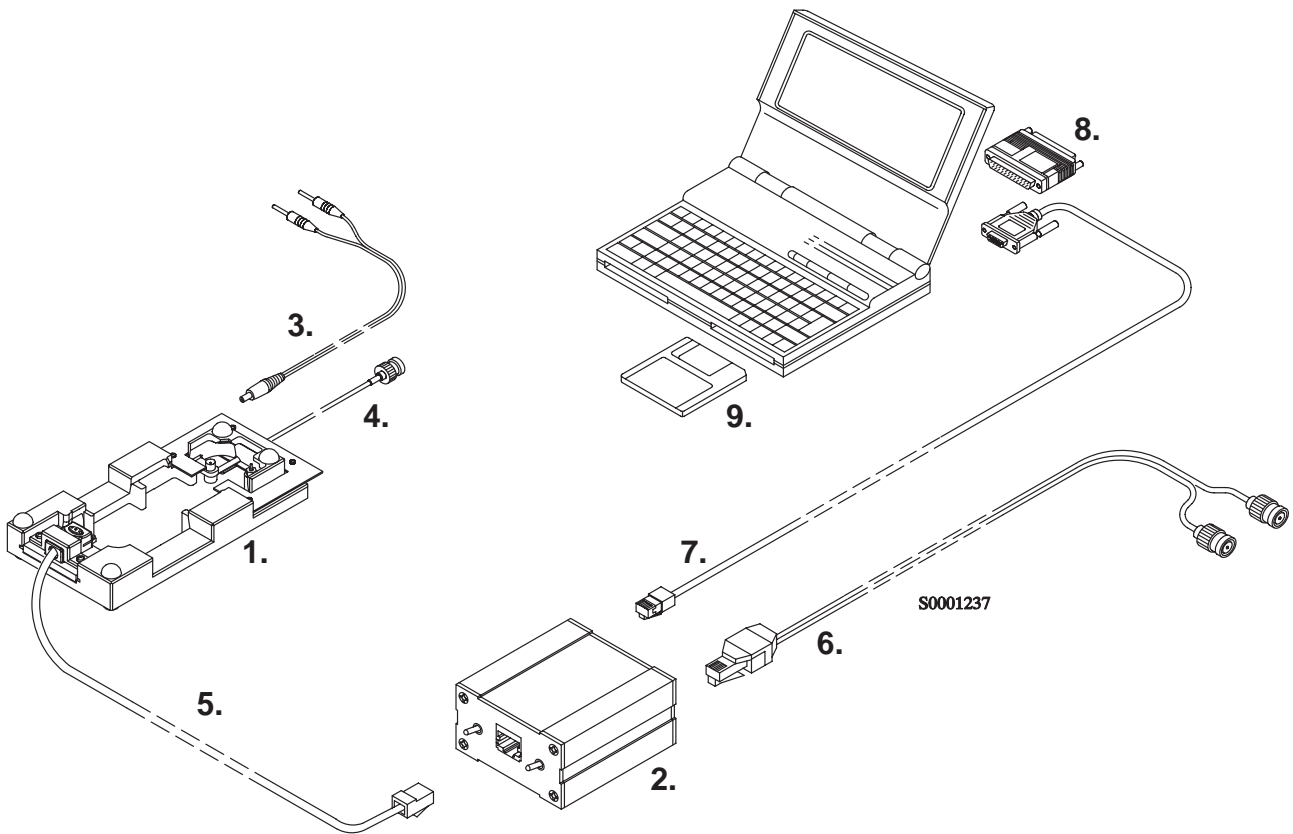


Item:	Service accessory:	Product code:
1	Module Jig JBS-19 *	0770098
2	Service Audio Box JBA-4 **	0770094
3	DC Cable PCS-1	0730012
4	External Antenna Cable XRC-1B	0730128
5	Service Cable SCH-5A **	0730166
6	Service MBUS Cable DAU-9S **	0730108
7	Audio Cable ADS-1	0730011
8	Software Protection Key PKD-1	0750018
9	Service SW diskette 3.5"	0774080

*) The nominal operating voltage for JBS-19 is 3.6 V.
The supply voltage for JBS-19 must never exceed 5.0 V

**) SCH-5A, JBA-4, and DAU-9S can be replaced with DAU-9P

Tuning With Covers Off – using Light Jig JBT-1

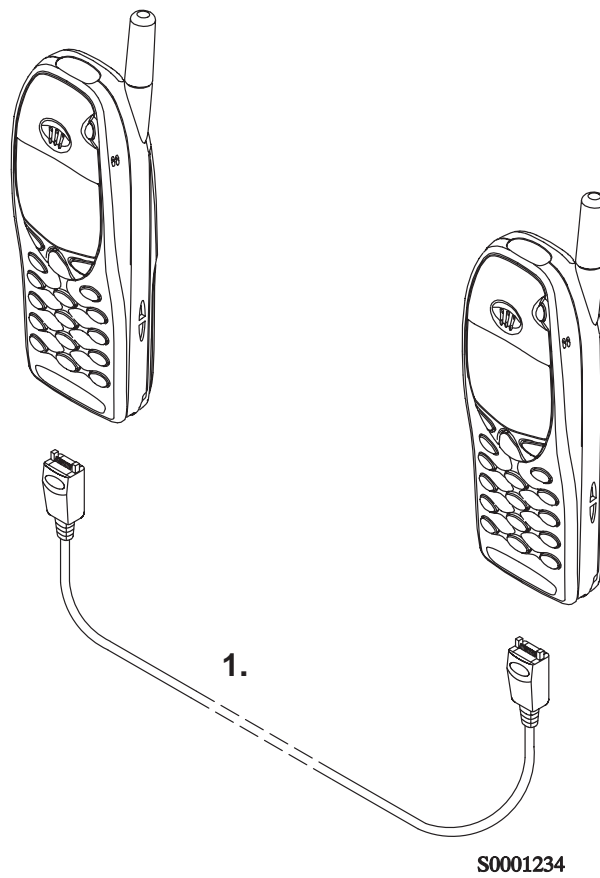


Item:	Service accessory:	Product code:
1	Light Module Jig JBT-1 *	0770109
2	Service Audio Box JBA-4 **	0770094
3	DC Cable PCS-1	0730012
4	External Antenna Cable XRC-1B	0730128
5	Service Cable SCH-5A **	0730166
6	Audio Cable ADS-1	0730011
7	Service MBUS Cable DAU-9S **	0730108
8	Software Protection Key PKD-1	0750018
9	Service SW diskette 3.5"	0774080

*) The nominal operating voltage for JBT-1 is 3.6 V.
The supply voltage for JBT-1 must never exceed 5.0 V

**) SCH-5A, JBA-4, and DAU-9S can be replaced with DAU-9P

Warranty Transfer



Item:	Service accessory:	Product code:
1	Warranty Cable SCH-6A	0730167

Tuning Steps

1. RX Calibration (AGC + AFC)

Reference values for the received signal strength meter are program tuned.

RSSI reference signal level programming:

- Select *Tuning* → *RX Calibration*
- Check that the program asks you to use 1850.867710 MHz.
If it doesn't, change the continuous mode channel to 740 in RF Controls window.
- Connect RF signal generator to the external antenna connector of the phone.
- Adjust signal generator to 1850.867710 MHz.
- Adjust signal generator level to –60 dBm + cable attenuation.
- Press *OK* button
- Adjust signal generator level to –90 dBm + cable attenuation.
- Press *OK* button.

Service software reports:

A Table of AFC Parameters:

AFC INIT Value
AFC Slope
PSW Slope

A Table for AGC Calibration:

AGC in 3 db steps 0...57 dB
DAC and voltage reading for each gain value
Each DAC step should be 12 to 25.

If Calibration fails Service software reports that with error message or some tuning value is fail.

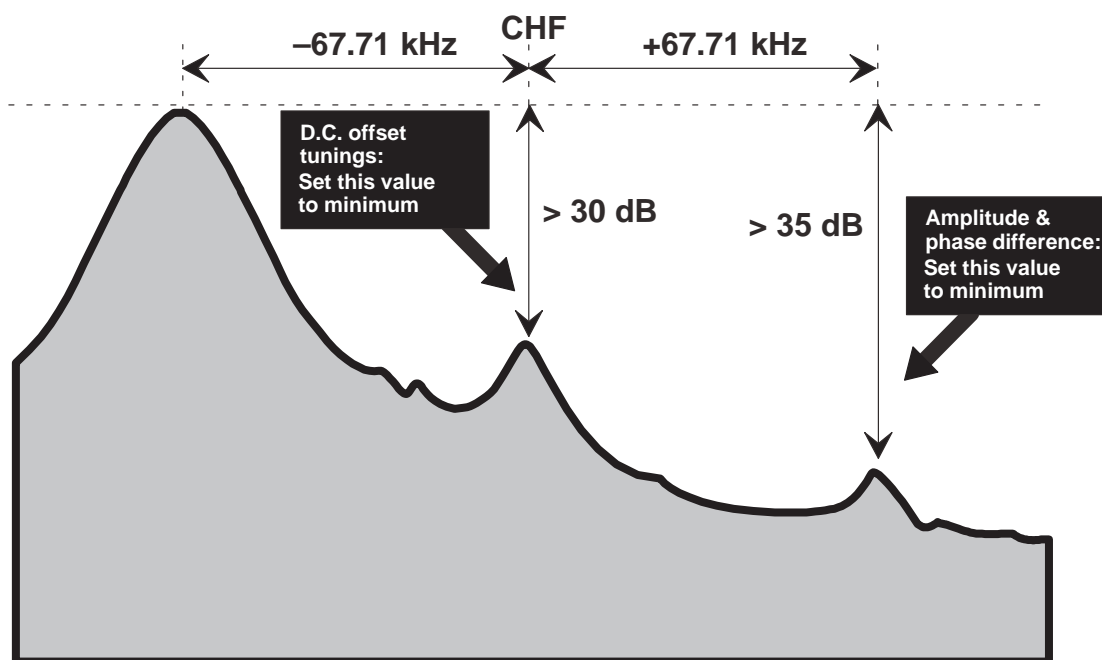
- Press *SAVE* button

2. I/Q Modulator Amplitude Balance and Phase Shift Tuning

The purpose of this tuning operation is to adjust the I/Q modulator d.c. offsets and the I/Q modulator amplitude balance and phase shift.

I/Q modulator d.c. offsets, amplitude balance and phase shift tuning:

- Connect spectrum analyzer (with an attenuator if needed) to the external antenna connector of the phone.
- Select *Tuning* → *TX I/Q...*
- Select I/Q tuning values from the PC's memory, the phone's EEPROM or factory default values.
- Check that the channel is 700 and the TX Data Type is 1.
If it doesn't, change it in RF Controls window.
- Adjust spectrum analyzer centre frequency to 1747,8 MHz, Span 200 kHz, Res BW 10 kHz, Video BW 1 kHz and Sweep time 0.5 s – 1s.



- Select the "TX I d.c. offset" option.
- Adjust the level of centre frequency (CHF signal) to minimum by varying D/A converter value with <- and -> buttons.
- The amplitude difference between CHF-67.7 kHz and CHF should be >30 dB.
- Select option "TX Q d.c. offset".
- Adjust the level of signal CHF to minimum by varying D/A converter value with <- and -> keys.

- Use the "Amplitude Difference" option.
- Adjust the level of signal CHF+67.7 kHz (1747.86771 MHz) to minimum by varying D/A converter value with ← and → keys.
- The amplitude difference between CHF+67.7 kHz and CHF-67 kHz should be >35 dB.
- Select the "Phase Difference" option.
- Adjust the level of signal CHF+67.7 kHz to minimum by varying D/A converter value with ← and → keys.
- When values are correct press *SAVE* button.

3. Tuning of Transmitter Power Levels

This adjustment loads the power levels of the phone transmitter into the EEPROM. When doing this, a pulse power meter or spectrum analyzer must be used.

- Adjust spectrum analyzer centre frequency to 1747,8 MHz, Span 0 Hz, Res BW 3 MHz, Video BW 3MHz, Sweep time <20ms and Marker peak.

Power levels programming:

- Set power supply voltage 8.4 V to service battery (or 3.6 V to jig).
- Connect pulse power meter or spectrum analyzer (with an attenuator if needed) to the external antenna connector of the phone.
- Select *Tuning* → *TX Power...*
- Select tuning values from the PC's memory, the phone's EEPROM or factory default values.
- Check that the channel is 700.
If it doesn't, change it in RF Controls window.
- **Increase base value by:**
For NSK-1: 0.012
For NSK-3: 0.005 for SW version 3.X
 0.012 for SW version 3.81 or later

NOTE: If you have WinTesla 1.90 or later, don't increase the base value.

- Adjust the power level (levels 0, 7, 8 and 15) by clicking the + and – buttons or and keys, and change levels with ↑ and ↓ keys.

Power level	Tuning P _{OUT} /dBm (CH 700) Note: attenuation!!
0	29,5
7	16.0
8	14.0
15	0

- Press *Calculate* button to calculate all other levels.
- Once all TX levels are correct, press *SAVE* button.

4. Energy Management Calibration

- Select Tuning → Energy Management Calibration
- Connect Service Battery BBD-3 to phone and dc cable between phone and service battery
- Set supply voltage to 10.5 V
- Run calibrations separately or all at once
- Select calibrations:
Battery & charger default values

- Select 1.Run Battery & charger default values checkbox
Battery voltage

- Select 2.Battery voltage checkbox
Charger voltage

- Select 3.Charger voltage checkbox
Battery size

- Select 4.Battery size checkbox
Battery temperature

- Select 5.Battery temperature checkbox
Charge current

- 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 8.4 V