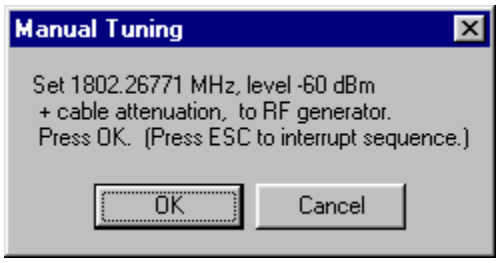
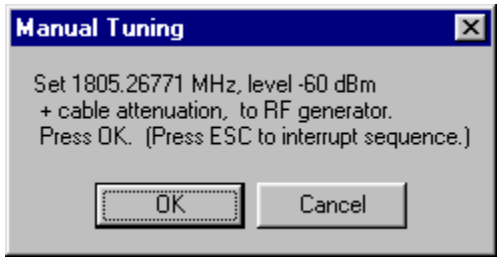
Manual Tuning

Press Manual tuning and a window pops up:



Connect an external signal generator to the RF connector of the phone and set the generator as told in the window.

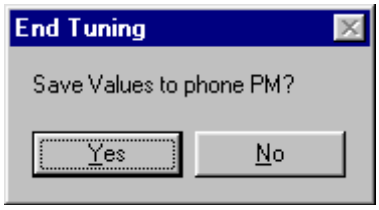
Press OK and a new window pops up:



Set the generator as told in the window.

Press OK and a new window pops up. Repeat this sequence **9 times** until all channels are done.

Press Stop, Write to PM Area (In the RX Band Filter Response Compensation window) and a window pops up:



Press Yes and the EGSM RX Band Filter Response Compensation is finished.

Auto Tuning

A faster and more convenient method for Band Filter Calibration can be performed by clicking on "Auto Tuning". This requires a signal Generator that can be programmed to seep a user defined list of frequencies.

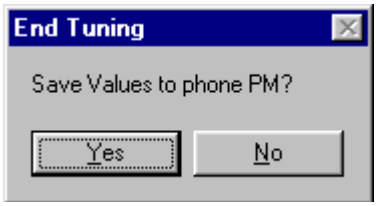
Program the signal generator to the list of frequencies that are visible in the column “Input Frequency (MHz)”.

Press Auto tuning and a window pops up:

Connect an external signal generator to the RF connector of the phone and let the signal generator step sweep through the programmed frequency list.

Press OK.

Press Stop, Write to PM Area (In the RX Band Filter Response Compensation window) and a window pops up:



Press Yes and the EGSM RX Band Filter Response Compensation is finished.

GSM1900 (PCS)

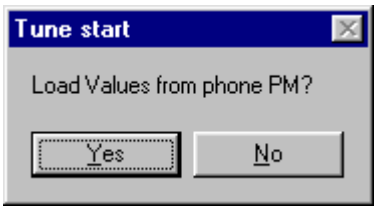
Set operating mode to local mode

Select	Maintenance		Alt-M
	Tuning		T
		RF Controls	F

Wait until the RF Controls window pops up

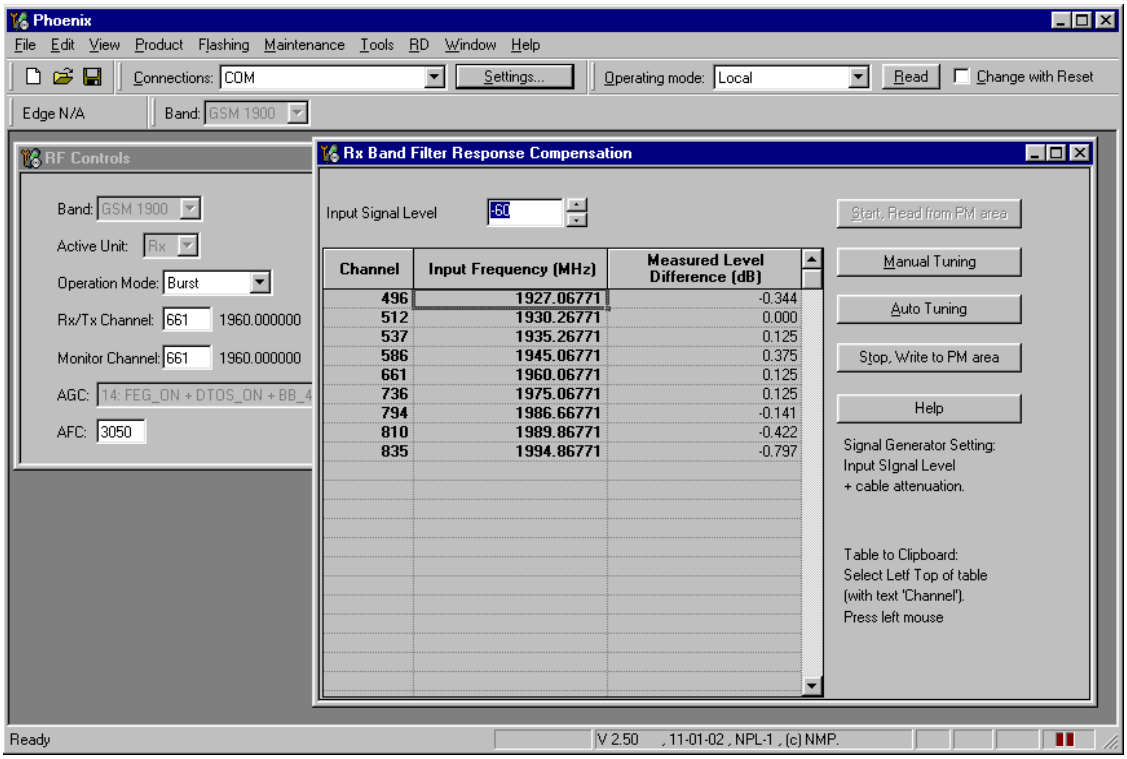
Select	Band	GSM 1900	
Select	Maintenance		Alt-M
	Tuning		T
		RX Band Filter Response Compensation	B

A window pops up:



Select Yes and the RX Band Filter Response Compensation window pops up.

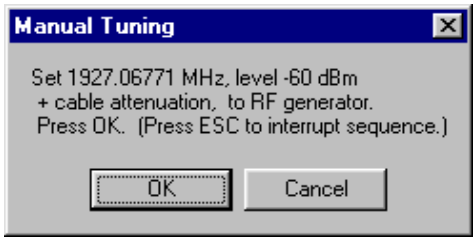
The setup should now look like this:



Select Input Signal Level -60dBm

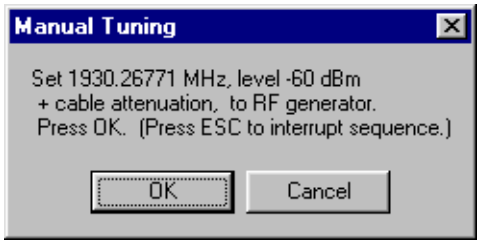
Manual Tuning

Press Manual tuning and a window pops up:



Connect an external signal generator to the RF connector of the phone and set the generator as told in the window.

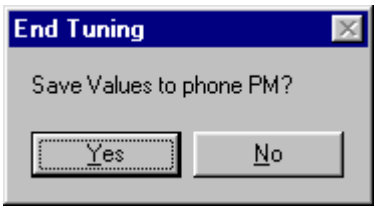
Press OK and a new window pops up:



Set the generator as told in the window.

Press OK and a new window pops up. Repeat this sequense **9 times** until all channels are done.

Press Stop, Write to PM Area (In the RX Band Filter Response Compensation window) and a window pops up:



Press Yes and the EGSM RX Band Filter Response Compensation is finished.

Auto Tuning

A faster and more convenient method for Band Filter Calibration can be performed by clicking on "Auto Tuning". This requires a signal Generator that can be programmed to seep a user defined list of frequencies.

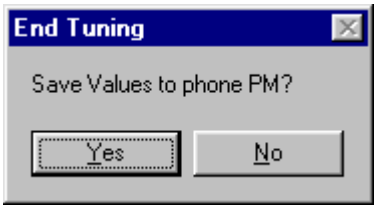
Program the signal generator to the list of frequencies that are visible in the column "Input Frequency (MHz)" .

Press Auto tuning and a window pops up:

Connect an external signal generator to the RF connector of the phone and let the signal generator step sweep through the programmed frequency list.

Press OK.

Press Stop, Write to PM Area (In the RX Band Filter Response Compensation window) and a window pops up:



Press Yes and the EGSM RX Band Filter Response Compensation is finished.

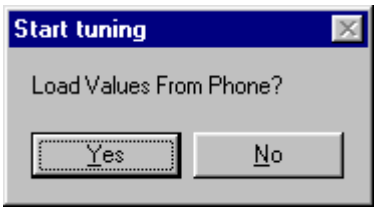
RX Channel Select Filter Calibration

This calibration is calibrating the Base band filter inside Mjoelner. It is done by internally measuring a prototype filter, for this reason the calibration is done once, not separately in 3 bands.

Set operating mode to local mode

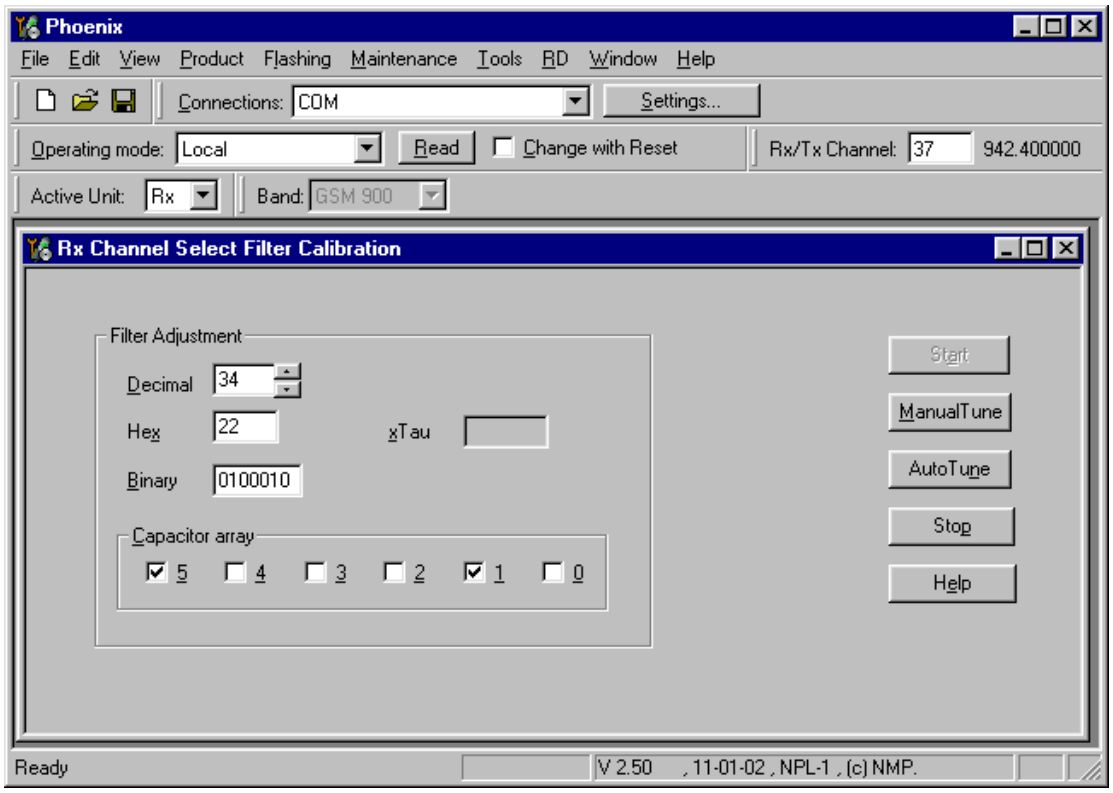
Select	Maintenance	Alt-M
	Tuning	T
	RX Channel Select filter Calibration	H

A window pops up:



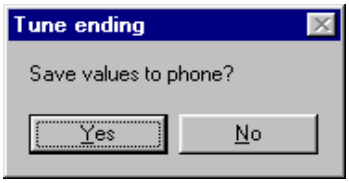
Select Yes and the RX Channel Select Filter Calibration window pops up.

The setup should now look like this:



Press Autotune and the optimal values are found.

Press Stop and a new window pops up:



Press Yes and the RX Channel Select Filter Calibration is finished.

RX AM Suppression

The NPL-1 RFIC Mjoelner does not require tuning of AM suppression.

TX Power tuning

This tuning must be done in all three bands.

Note: TX Power tuning must be done with a peak power meter, e.g. Anritsu model ML2408A with Anritsu Peak Power Sensor MA2442A 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 (EGSM900)

Set operating mode to local mode

Select Maintenance Tuning TX Power Level Tuning

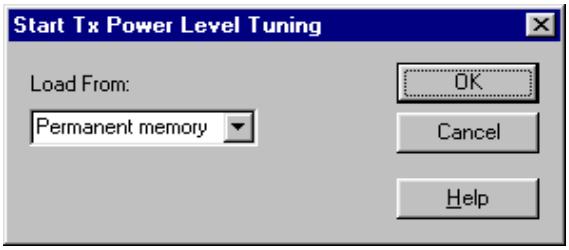
Wait until the TX Power Level Tuning window pops up.

Connect a **calibrated** powermeter to the RF connector of the phone.

Select Band GSM 900

Active Unit TX

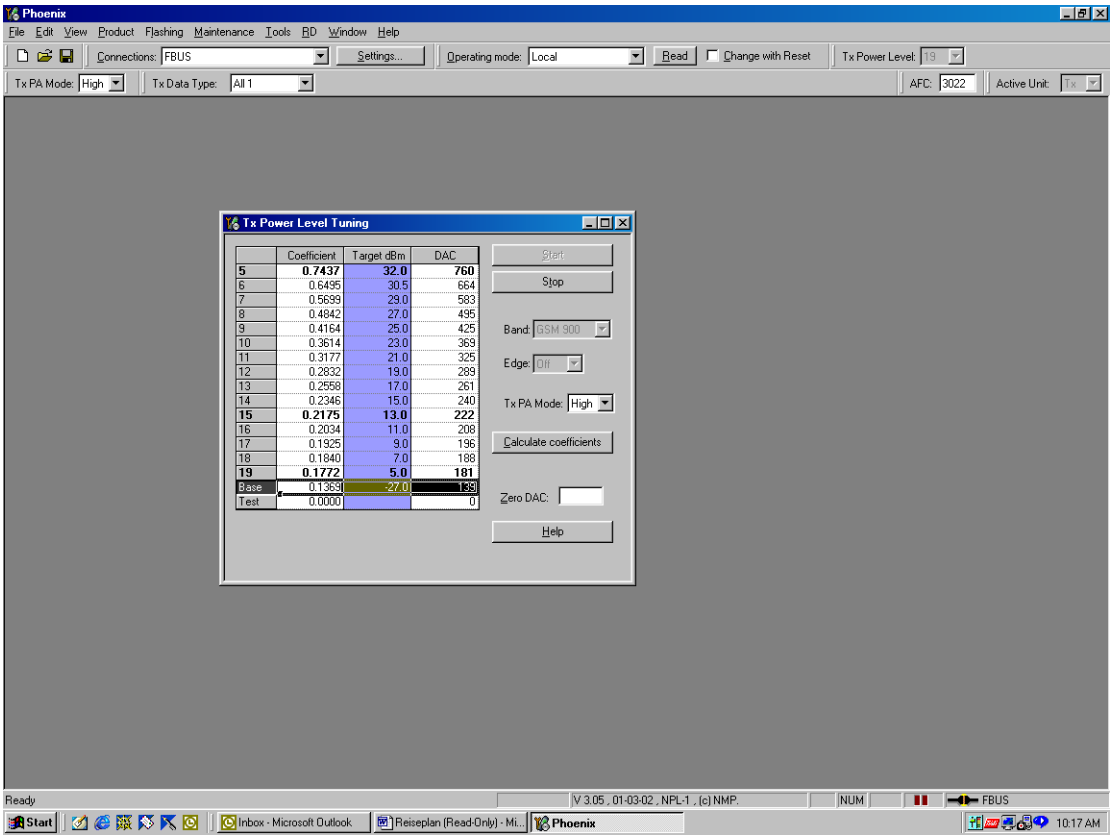
Press Start and a window pops up:



Select Permanent memory, press OK and the window closes.

Select TX Data Type Random

The setup should now look like this:



Select TX PA Mode High

Tune Base level to –27 dBm.

Adjust DAC Values for Power Level 5 (32 dBm), 15 (13 dBm) and 19 (5 dBm) according to Target values. The Power levels may differ from Phoenix mentioned target power levels.

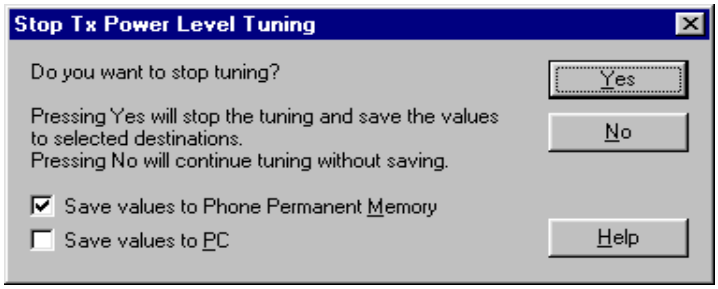
Press calculate, check if all levels match the target values, correct if necessary.

Select TX PA Mode Low

Adjust DAC Values for Power Level 7, 15 and 19 according to Target values.

Press calculate, check if all levels match the target values, correct if necessary.

Press Stop and a window pops up:



Select 'Save values to Phone Permanent Memory'

Press Yes and the EGSM TX Power Level Tuning is finished.

GSM1800 (DCS/PCN)

Set operating mode to local mode

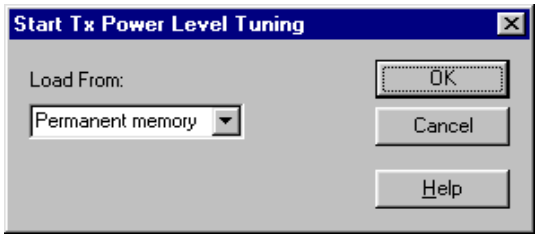
Select Maintenance Tuning TX Power Level Tuning

Wait until the TX Power Level Tuning window pops up.

Connect a **calibrated** powermeter to the RF connector of the phone.

Select Band GSM 1800
Active Unit TX

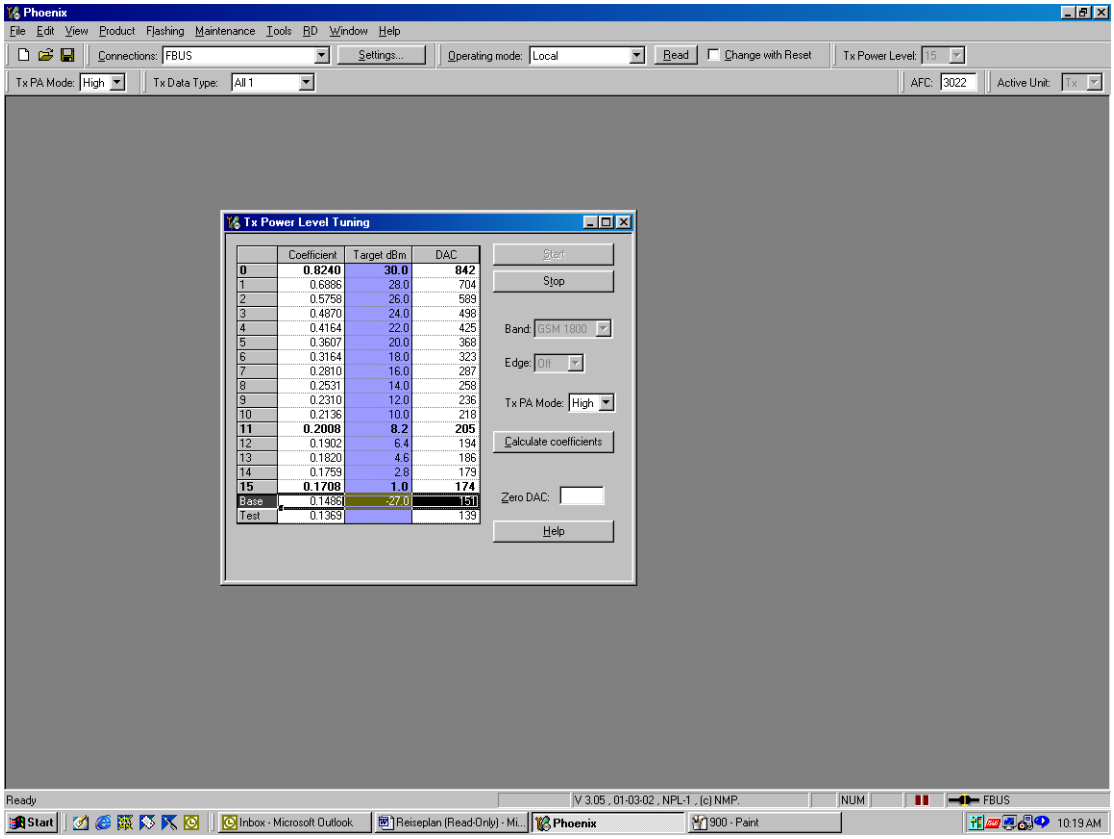
Press Start and a window pops up:



Select Permanent memory, press OK and the window closes.

Select TX Data Type Random

The setup should now look like this:



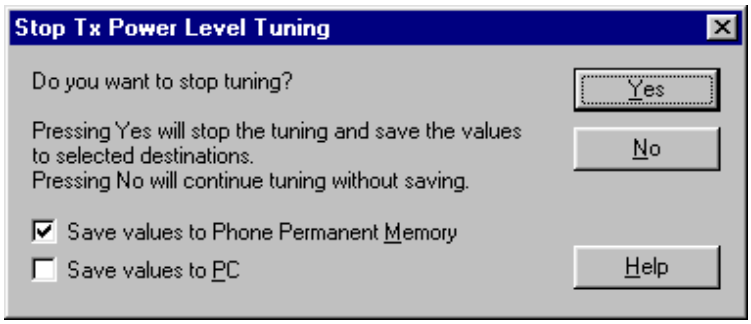
Select TX PA Mode High

Tune Base level to –27 dBm.

Adjust DAC Values for Power Level 0 (30 dBm), 11 (8.2 dBm) and 15 (1 dBm). The Power levels may differ from Phoenix mentioned target power levels.

Press calculate, check if all levels match the target values, correct if necessary.

Press Stop and a window pops up:



Select 'Save values to Phone Permanent Memory'

Press Yes and the GSM1800 TX Power Level Tuning is finished.

GSM1900 (PCS)

Set operating mode to local mode

Select Maintenance Tuning TX Power Level Tuning

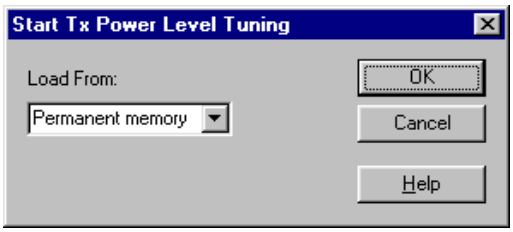
Wait until the TX Power Level Tuning window pops up.

Connect a **calibrated** powermeter to the RF connector of the phone.

Select Band GSM 1900

Active Unit TX

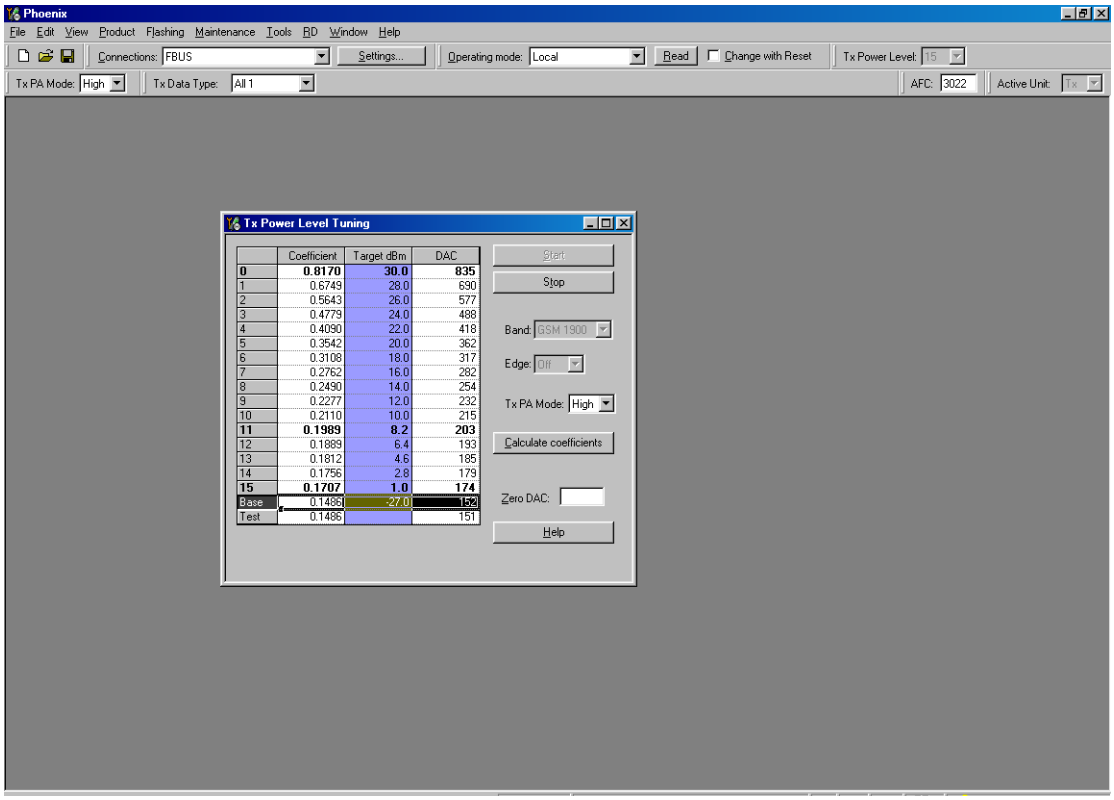
Press Start and a window pops up:



Select Permanent memory, press OK and the window closes.

Select TX Data Type Random

The setup should now look like this:



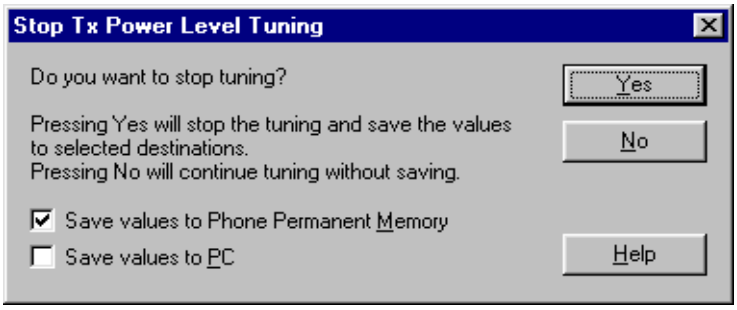
Select TX PA Mode High

Tune Base level to –27 dBm.

Adjust DAC Values for Power Level 0 (30 dBm), 11 (8.2 dBm) and 15 (1 dBm). The Power levels may differ from in Phoenix mentioned target power levels.

Press calculate, check if all levels match the target values, correct if necessary.

Press Stop and a window pops up:



Select 'Save values to Phone Permanent Memory'

Press Yes and the GSM1900 TX Power Level Tuning is finished.

TX I/Q Tuning

This tuning must be done in all three bands.

EGSM (EGSM900)

Caution: In case you use a spectrum analyser make sure that the external attenuation (20 - 30dB) between phone and spectrum analyser is high enough that the input of the analyser can't be destroyed. Adjust the reference level offset according to the insertion loss from the phone to the spectrum analyser .

PC/Phone operation:

Set operating mode to local mode

Select	Maintenance	Alt-M
	Tuning	T
	TX IQ Tuning	I

Wait until the TX IQ Tuning window pops up.

Select Maintenance Alt-M
Tuning T
RF Controls F

Wait until the RF Controls window pops up.

Connect a Spectrum Analyzer or GSM tester with the option *Narrow Spectrum' to the RF connector of the phone.

If a spectrum analyzer is used then use the following settings.

	EGSM/EGSM900
Center Frequency	897.4 MHz
Frequency Span	300 kHz
Resolution Bandwidth	3kHz
Video Bandwidth	3kHz
Sweep Time	3 sec.
Sweep Type	Clear/Write
Detector Type	Max Peak
Reference level	35 dBm
	EGSM/EGSM900
Marker 1	897.33229 MHz
Marker 2	897.4 MHz
Marker 3	897.46771 MHz

Select in the RF Controls Window:

Select Band GSM 900
Active Unit TX
Operation Mode Burst
RX/TX Channel 37
TX PA Mode Free
TX Data Type All1

Select in the TX IQ Tuning Window:

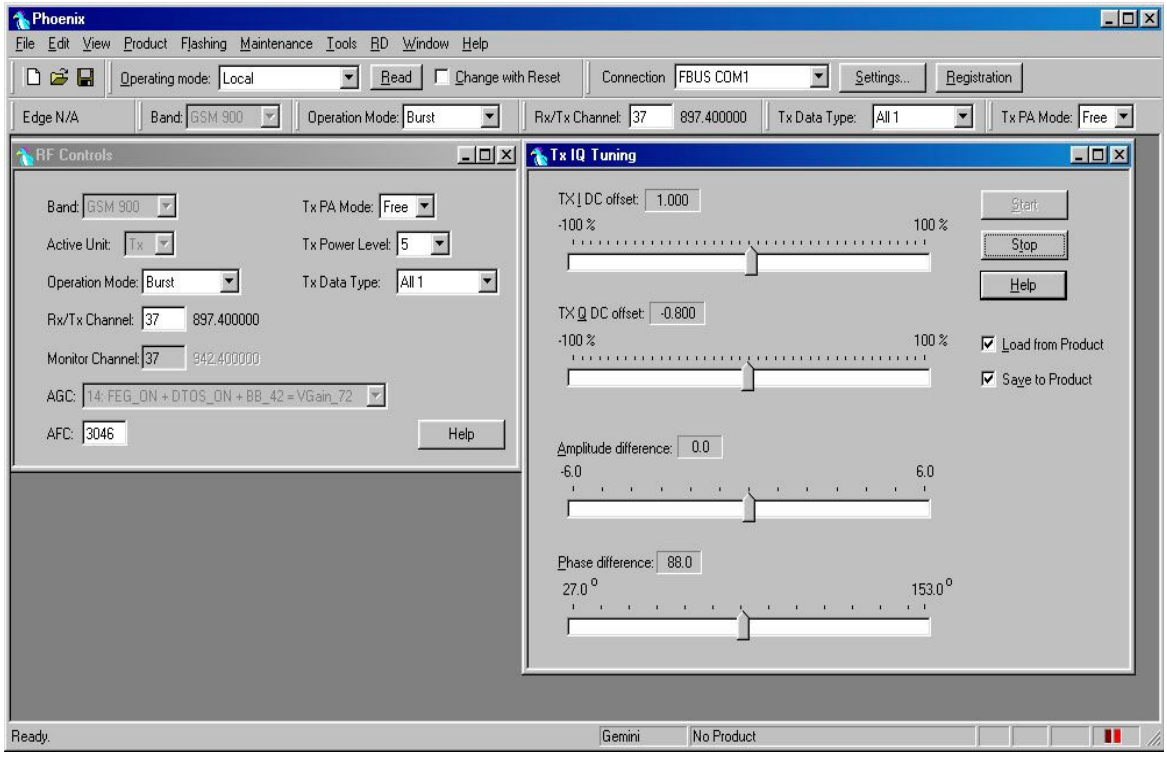
Select "Load from Product"
"Save to Product"

Press Start

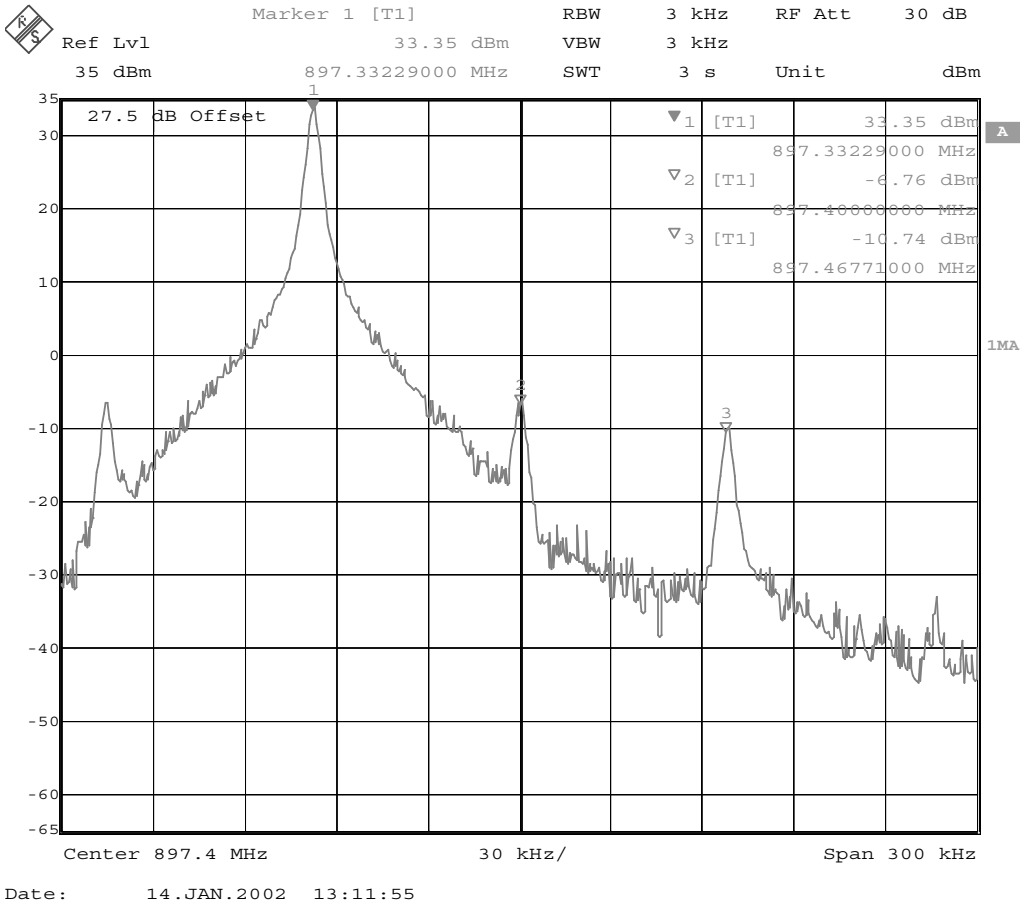
Select again in the RF Controls Window:

Select TX Power Level 5

The setup should now look like this:



The Spectrum Analyzer now shows a plot like this:



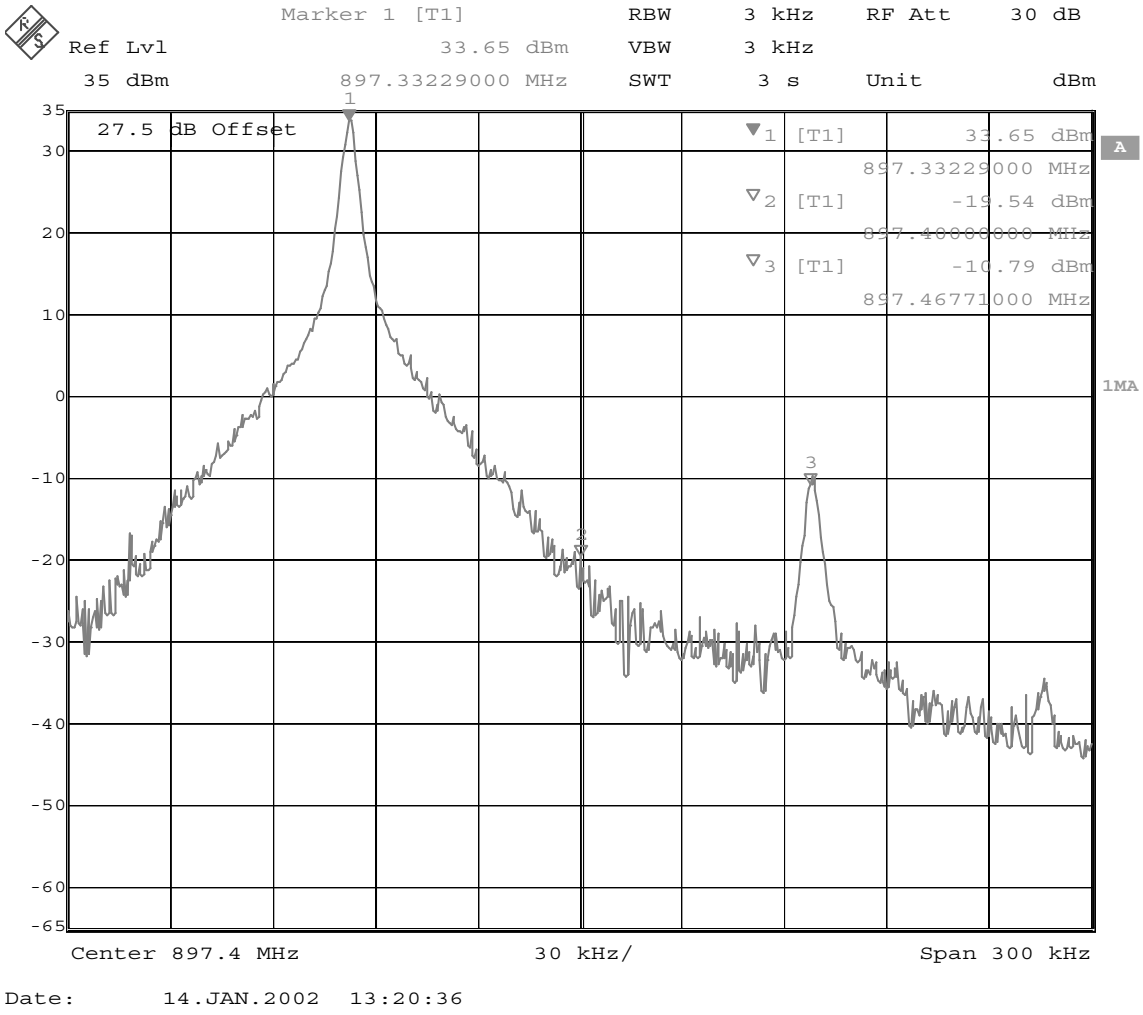
The purpose of this tuning is to tune the carrier signal and the +67kHz signal to a minimum level (Marker 2 and 3).

Use the variables 'TX I DC offset' and 'TX Q DC offset' to adjust the carrier signal to a minimum level (Marker 2).

After tuning to the minimum the level difference between the peak levels at marker 1 and 2 must exceed 40dB.

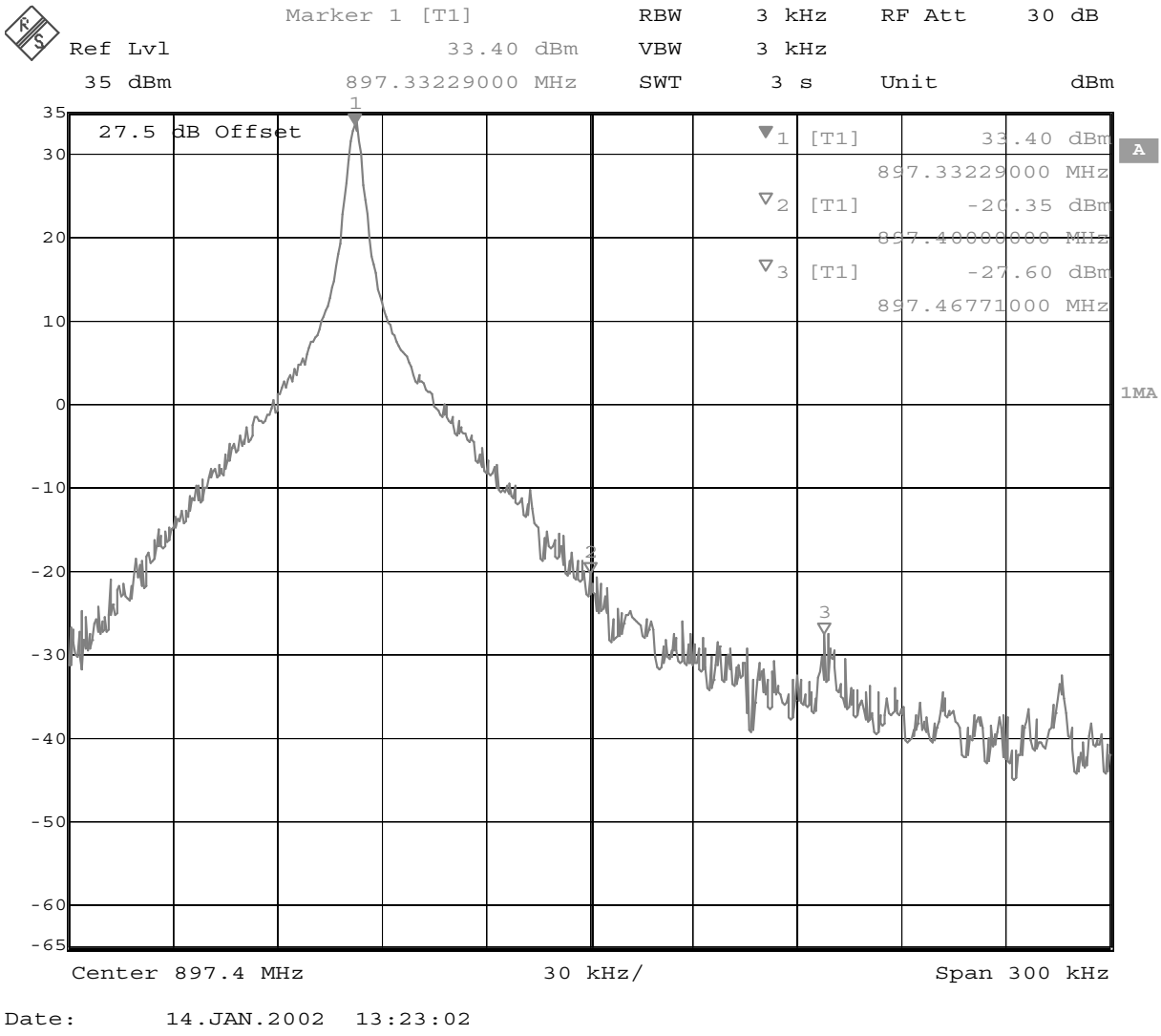
Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible.

The Spectrum Analyzer now shows a plot like this:



Use the variables 'Amplitude difference' and 'Phase difference' to adjust the +67kHz signal to a minimum level (Marker 3). After tuning to the minimum the level difference between the peak levels at marker 1 and 3 must exceed 40dB. Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible.

The Spectrum Analyzer now shows a plot like this:



Select again in the RF Controls Window:

Select "Save to Product"

Press Stop and the values are stored in the phone.

The EGSM TX IQ Tuning is now finished.

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

GSM1800 (DCS/PCN)

Caution: In the case you use a spectrum analyser make sure that the external attenuation (20 – 30dB) between phone and spectrum analyser is high enough that the input of the analyser can't be destroyed. Adjust the reference level offset according to the insertion loss from the phone to the spectrum analyser .

PC/Phone operation:

Set operating mode to local mode

Select	Maintenance	Alt-M
	Tuning	T
	TX IQ Tuning	I

Wait until the TX IQ Tuning window pops up.

Select	Maintenance	Alt-M
	Tuning	T
	RF Controls	F

Wait until the RF Controls window pops up.

Connect a Spectrum Analyzer or GSM tester with the option *Narrow Spectrum' to the RF connector of the phone.

If a spectrum analyzer is used then use the following settings.

	GSM1800
Center Frequency	1747.8MHz
Frequency Span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep Time	3 sec.
Sweep Type	Clear/Write
Detector Type	Max Peak
Reference level	35 dBm
Marker 1	1747.73229 MHz
Marker 2	1747.8 MHz
Marker 3	1747.86771 MHz

Select in the RF Controls Window:

Select	Band	GSM 1800
	Active Unit	TX
	Operation Mode	Burst
	RX/TX Channel	700
	TX PA Mode	Free
	TX Data Type	All1

Select in the TX IQ Tuning Window:

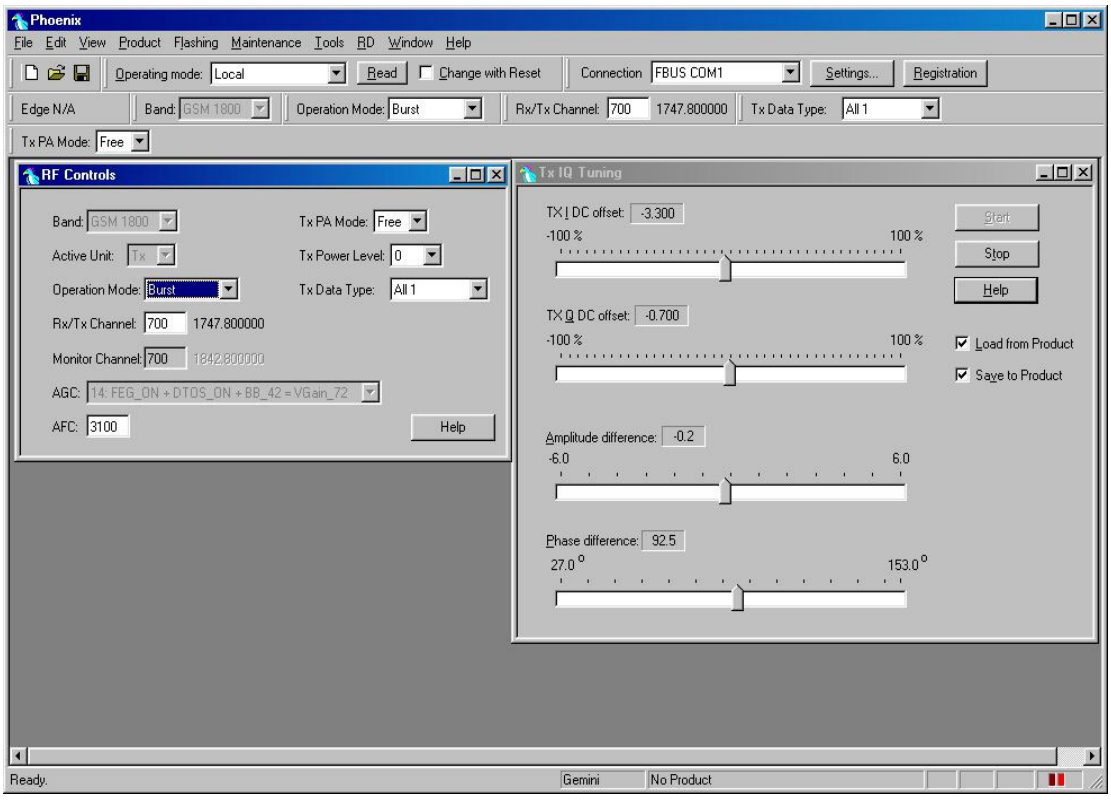
Select	"Load from Product"
	"Save to Product"

Press Start

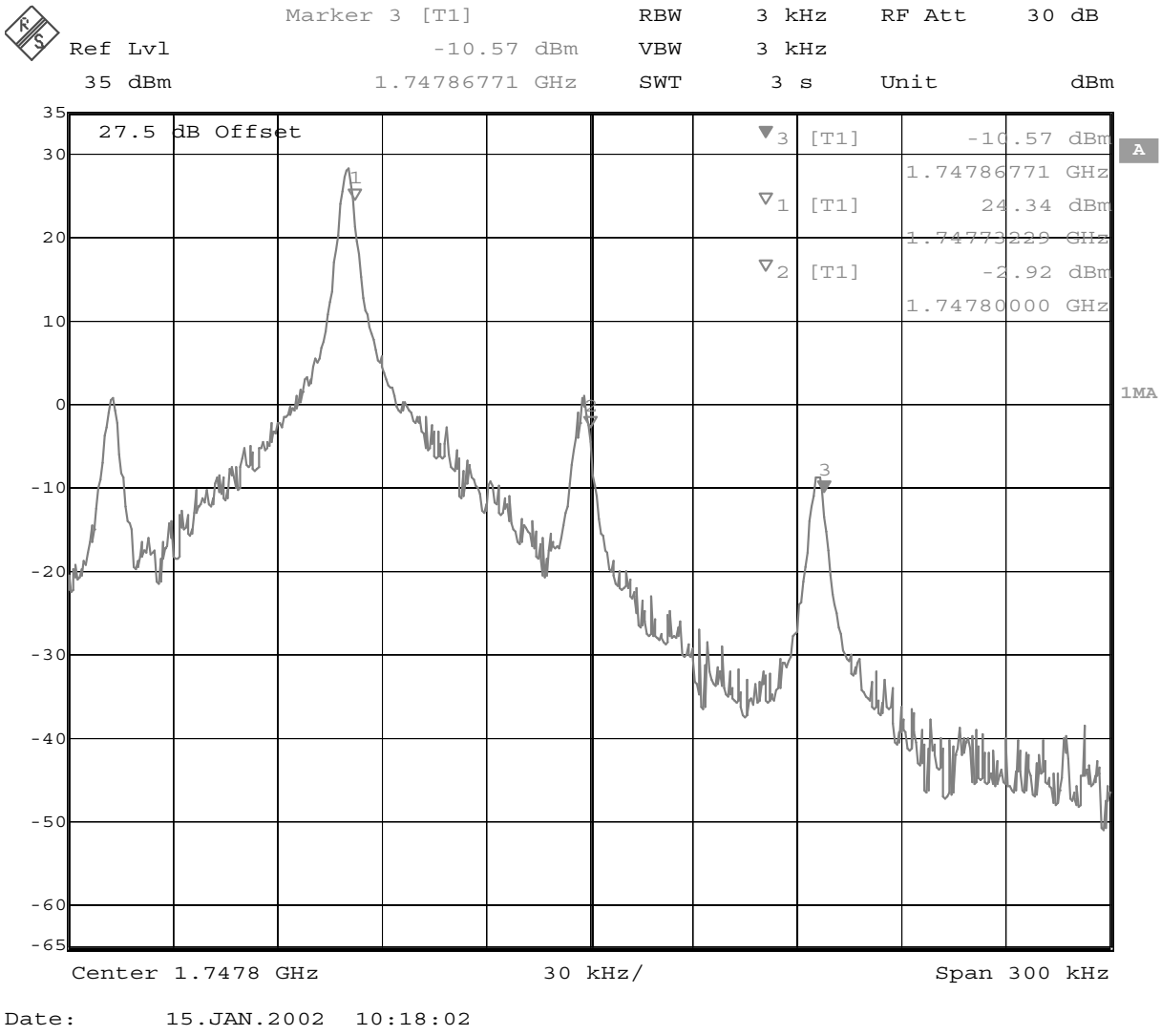
Select again in the RF Controls Window:

Select	TX Power Level 0

The setup should now look like this:



The Spectrum Analyzer now shows a plot like this:

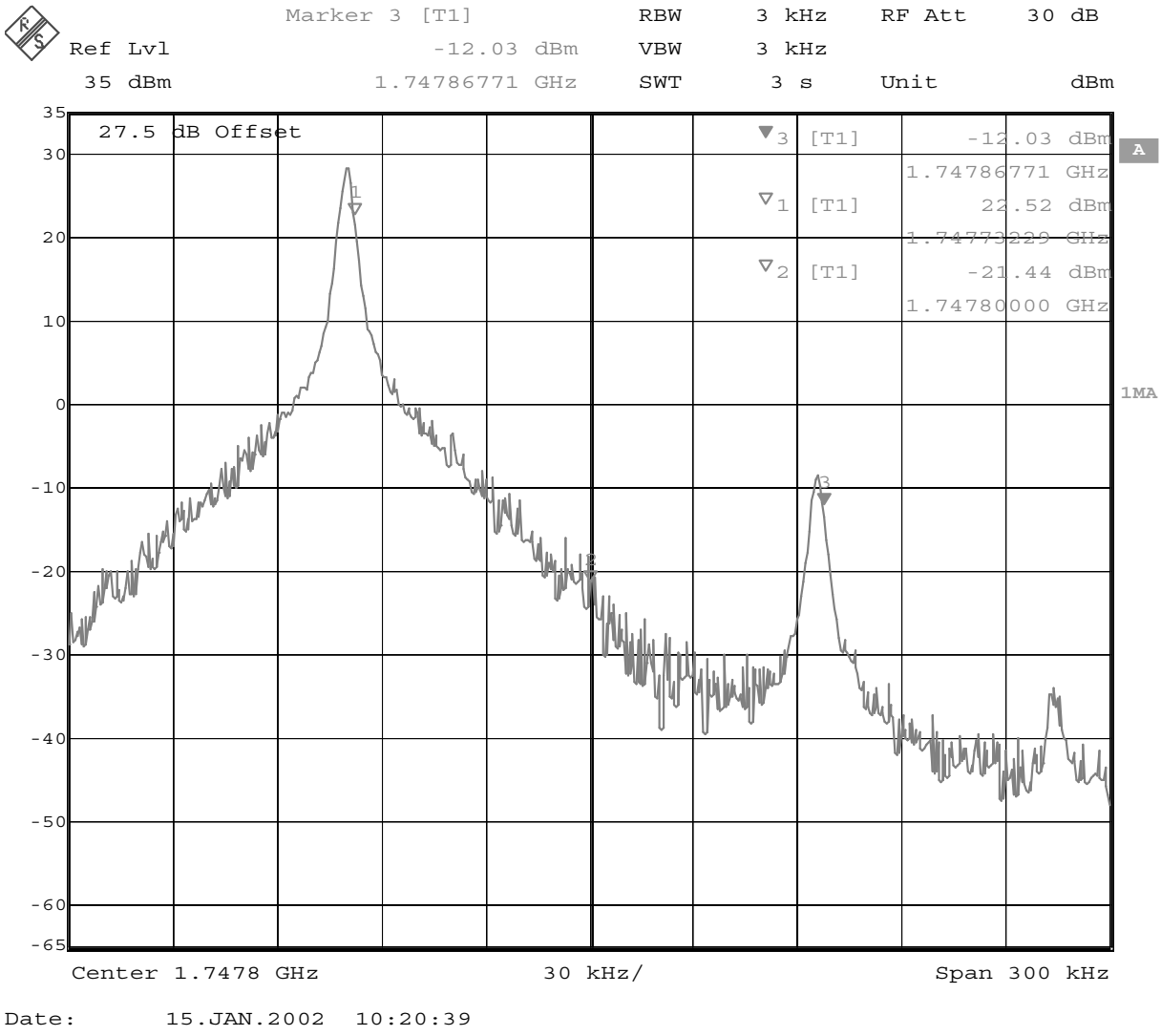


The purpose of this tuning is to tune the carrier signal and the +67kHz signal to a minimum level (Marker 2 and 3).

Use the variables 'TX I DC offset' and 'TX Q DC offset' to adjust the carrier signal to a minimum level (Marker 2). After tuning to the minimum the level difference between the peak levels at marker 1 and 2 must exceed 40dB.

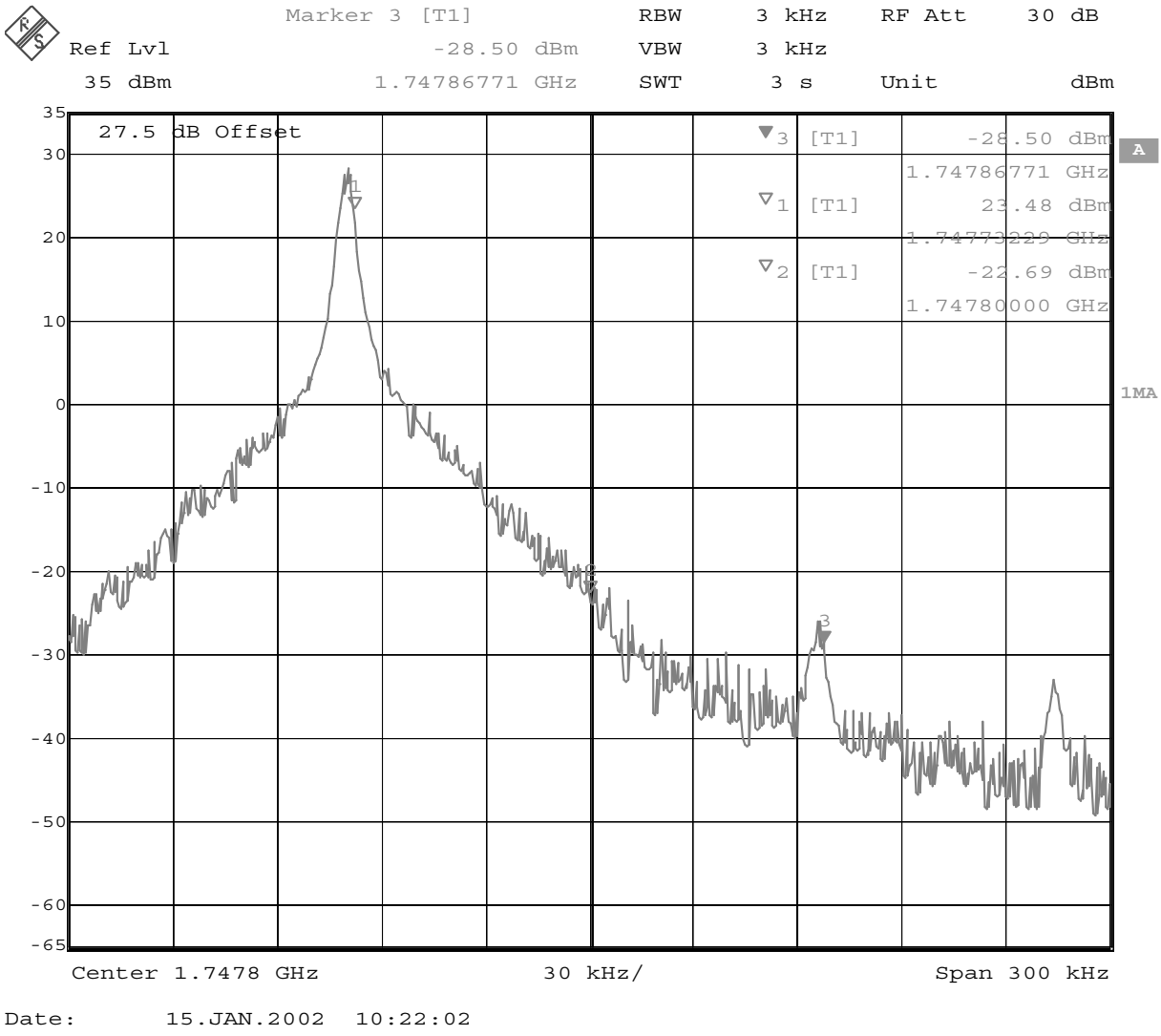
Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible.

The Spectrum Analyzer now shows a plot like this:



Use the variables 'Amplitude difference' and 'Phase difference' to adjust the +67kHz signal to a minimum level (Marker 3)..After tuning to the minimum the level difference between the peak levels at marker 1 and 3 must exceed 40dB. Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible.

The Spectrum Analyzer now shows a plot like this:



Select 'Save to Product'

Press Stop in the TX IQ Tuning Window and the values are stored in the phone.

The GSM1800 TX IQ Tuning is now finished.

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

GSM1900 (PCS)

Caution: In case you use a spectrum analyser make sure that the external attenuation (20 - 30dB) between phone and spectrum analyser is high enough that the input of the analyser can't be destroyed. Adjust the reference level offset according to the insertion loss from the phone to the spectrum analyser .

PC/Phone operation:

Set operating mode to local mode

Select	Maintenance	Alt-M
	Tuning	T
	TX IQ Tuning	I

Wait until the TX IQ Tuning window pops up.

Select	Maintenance	Alt-M
	Tuning	T
	RF Controls	F

Wait until the RF Controls window pops up.

Connect a Spectrum Analyzer or GSM tester with the option *Narrow Spectrum' to the RF connector of the phone.

If a spectrum analyzer is used then use the following settings.

	GSM1900
Center Frequency	1880MHz
Frequency Span	300 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	3 kHz
Sweep Time	3 sek.
Sweep Type	Clear/Write
Detector Type	Max Peak
Reference level	35 dBm
Marker 1	1879.93229 MHz
Marker 2	1880 MHz
Marker 3	1880.06771 MHz

Select in the RF Controls Window:

Select	Band	GSM 1900
	Active UnitTX	
	Operation Mode	Burst
	RX/TX Channel	661
	TX PA Mode	Free
	TX Data Type	All1

Select in the TX IQ Tuning Window:

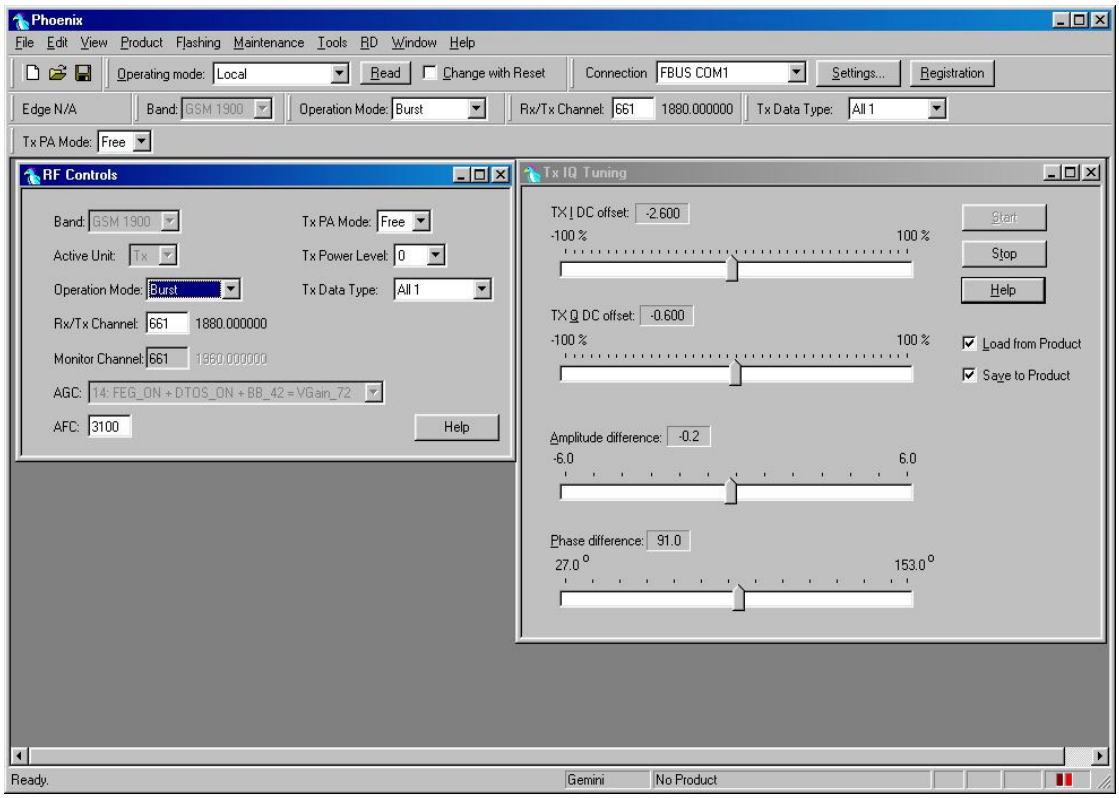
Select "Load from Product"
"Save to Product"

Press Start

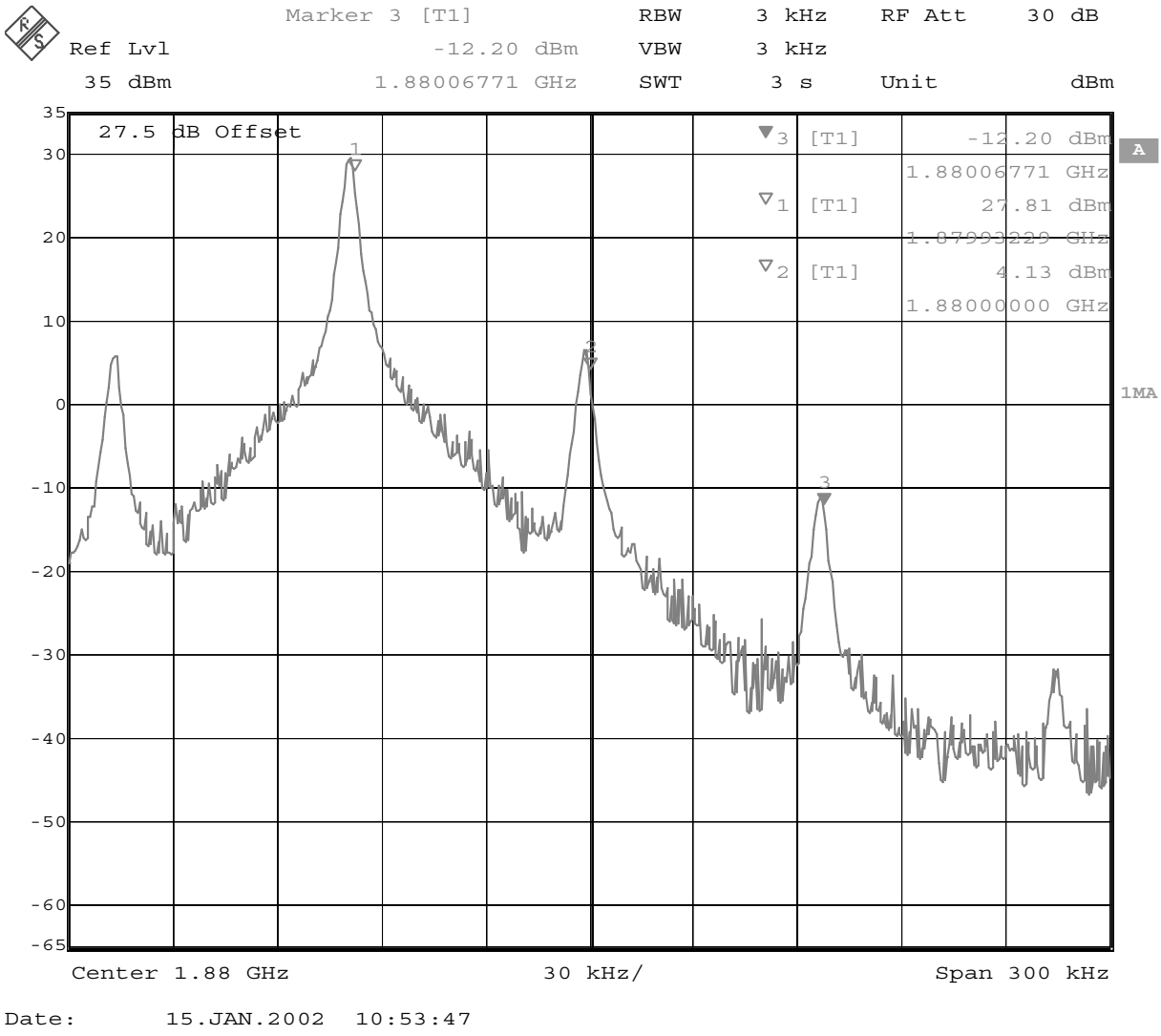
Select again in the RF Controls Window:

Select TX Power Level 0

The setup should now look like this:



The Spectrum Analyzer now shows a plot like this:



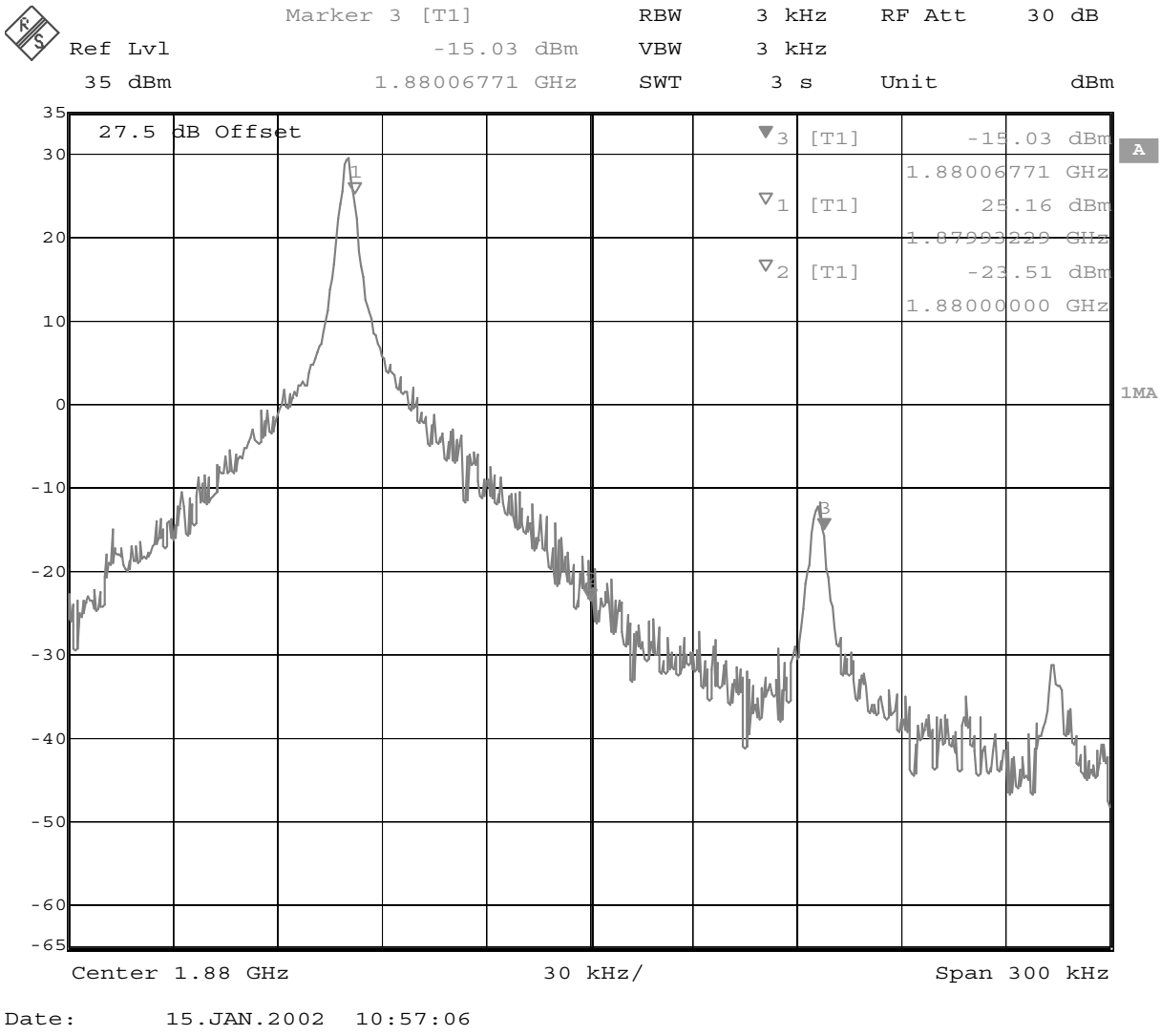
The purpose of this tuning is to tune the carrier signal and the +67kHz signal to a minimum level (Marker 2 and 3).

Use the variables 'TX I DC offset' and 'TX Q DC offset' to adjust the carrier signal to a minimum level (Marker 2).

After tuning to the minimum the level difference between the peak levels at marker 1 and 2 must exceed 40dB.

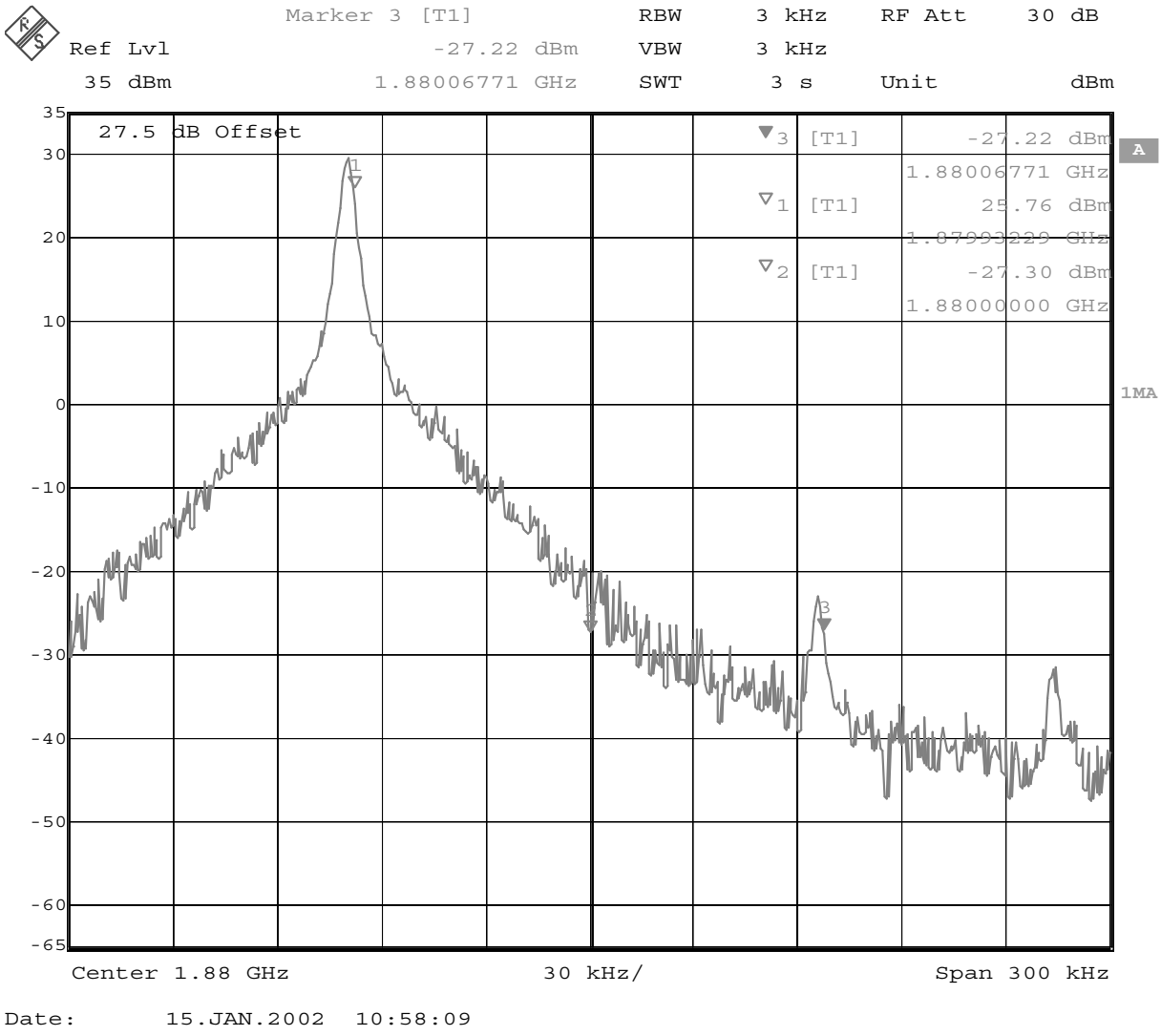
Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible.

The Spectrum Analyzer now shows a plot like this:



Use the variables 'Amplitude difference' and Phase difference' to adjust the +67KHz signal to a minimum level (Marker 3). After tuning to the minimum the level difference between the peak levels at marker 1 and 3 must exceed 40dB, Tuning is possible by using arrow keys on the keyboard. Pushing the sliders by using the mouse is less sensitive but even possible'

The Spectrum Analyzer now shows a plot like this:



Select 'Save to Product'

Press Stop in the TX IQ Tuning Window and the values are stored in the phone.

The GSM1900 TX IQ Tuning is now finished.

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