

P500 PARAMETER SETTINGS

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INTRODUCTION

P500 Parameter Settings is an integrated program in the P500. All settings are done from the key board. It may be used to adjust output power, modulation, squelch level and battery level.

Basically, all you need is a radio test set, test box and power unit in order to align / check the station.

In other words, no PC is needed to align the P500 !

TEST EQUIPMENT

- | | |
|------------------------------|--------------------------|
| 1. Battery adapter | NIROS No N5903 |
| 2. Test box (LF, Mic & Ant.) | NIROS No N5900 |
| 3. DC power unit | 7.2V / 3A |
| 4. DC ammeter | |
| 5. DC voltmeter | |
| 6. Radio test setup | Stabilock, Marconi, etc. |
| 7. Test cable with TNC male | |
| 8. Test cables with BNC male | |

BAND SEPARATION

<u>P502</u>	B version	68 - 88 MHz	KRD 103 22/16
<u>P504</u>	C version	146 - 174 MHz	KRD 103 24/16
<u>P505</u>	<u>DL</u> version	403 - 423 MHz	5/KRD 103 25/16
<u>P505</u>	<u>DL</u> version	410 - 430 MHz	3/KRD 103 25/16
<u>P505</u>	<u>DL</u> version	422 - 442 MHz	KRD 103 25/16
<u>P505</u>	<u>DH</u> version	430 - 450 MHz	6/KRD 103 25/16
<u>P505</u>	<u>DH</u> version	440 - 460 MHz	4/KRD 103 25/16
<u>P505</u>	<u>DH</u> version	450 - 470 MHz	2/KRD 103 25/16

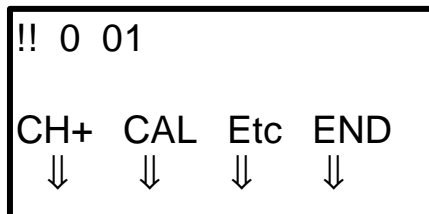
The only difference between versions of P505 DL and P505 DH, respectively, is the VCO and HF circuit; in all other respects the hardware is identical.

ALIGN INSTRUCTIONS

To enter the Service menu, do the following:

1. First press and hold the **RED ALARM** button and then press and hold the **ON/OFF** button, too. Keep both pressed down together for 3 seconds. When the name of the coach file in the station is displayed, release both buttons.
2. Then press **1 0 0 1 1 7 0 4***

Main menu



SELECTION OF TEST PROGRAM TEST FREQUENCIES

1. Select "Etc" to select test frequencies.
2. Select "Chg" for type of test frequencies (Test program or Coach program).
3. Select "X" for Test program frequencies and press **CH+** a few times.

!! A 01
CH+ CAL Etc END

4. Change the frequency with "CH+", (min, middle, max frequency).

P502 Test frequencies

CH. NO	Tx Frequency	Rx Frequency
01	68 MHz	68,1 MHz
02	78 MHz	78,1 MHz
03	88 MHz	88,1 MHz

P504 Test frequencies

CH. NO	Tx Frequency	Rx Frequency
01	146 MHz	146,1 MHz
02	160 MHz	160,1 MHz
03	174 MHz	174,1 MHz

P505 Test frequencies

DL

	5/KRD	103 25/16	3/KRD	103 25/16	KRD	103 25/16
CH. NO	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.
01	403 MHz	403,1 MHz	410 MHz	410,1 MHz	425 MHz	425,1 MHz
02	413 MHz	413,1 MHz	420 MHz	420,1 MHz	435 MHz	435,1 MHz
03	423 MHz	423,1 MHz	430 MHz	430,1 MHz	445 MHz	445,1 MHz

DH

	6/KRD	103 25/16	4/KRD	103 25/16	2/KRD	103 25/16
CH. NO	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.
01	430 MHz	430,1 MHz	440 MHz	440,1 MHz	450 MHz	450,1 MHz
02	440 MHz	440,1 MHz	450 MHz	450,1 MHz	460 MHz	460,1 MHz
03	450 MHz	450,1 MHz	460 MHz	460,1 MHz	470 MHz	470,1 MHz

SELECTION OF COACH PROGRAM FREQUENCIES

1. Select "Etc" to select test frequencies.
2. Select "Chg" for type of test frequencies.
(Test program or Coach program).
3. Select "Std" for Coach program frequencies, press **CH+** a few times.
Channel number and frequency correspond to information stored by the Coach program.

!! 0 01

CH+ CAL Etc END

4. Change the frequency with "CH+" (all channel frequencies can be accessed).

ALIGNMENT OVERVIEW

ADJ CAL. LEVEL			
D/A	A/D	Af	END

D/A P	SQ P	THRESHOLD LEVEL HYSTERESIS
	PA P	H, M, L OUTPUT POWER
<hr/>		
A/D P	BAT P	LOW BATT. VOLTAGE Tx BLOCKING
VOLTAGE		
<hr/>		
AF P	RX P	AF-OUTPUT LEVEL
	TX P	AF-INPUT LEVEL MOD.
	TON P	FREQUENCY MOD. PHASE MOD. CTCSS MOD.

NB.
"Selection

Use the test program frequencies in the alignment, see
of test frequencies".

AF MODULATION (TX-MODE)

Radio Test Set in Tx-mode.

Normal and standard deviation can be adjusted here.

The AF input of the test box is supposed to be used to modulate the radio.

!! A 01
CH+ **CAL** Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "AF" for AF adjustment.
4. Select "Tx" for transmission mode and "P/F" for selection of type of modulation.

Tx Modulation
FM **PM** Ret

5. Select type of modulation: PM = phase mod., FM = frequency mod.
In P500, **PM must be used for speech!** NB. *FM for tone.*
6. Select "Pk" = peak detector in the VOGAD circuit.
7. Select "**OFF**" to turn off the peak detector.
8. Select "Nxt".
9. Select "Mod".

Mod Level 1/ 2
1 2 Ret

10. Select "1" to adjust the max. deviation.

Level 2 is not used !

11. Select "Ch".
12. Select the channel with the lowest frequency with "Ch+" or "Ch-", then select "Mod".

Set Base Offs.		
Yes	No	Ret

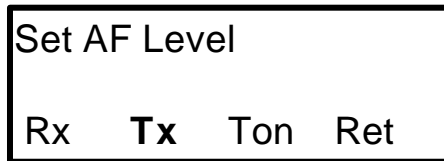
13. Select "Yes" to align the VCO at base offset.
14. Select "Ret".
15. Connect *1 kHz / 50 mV* to the microphone input on the test box !
Connect the accessory connector of the test box to the P500.
Check that the three-position switch on the test box is in position "E LS+MIC".
16. Select "Lev" to set the modulation for **speech**.

AF-Tx M1 Lev	XX
+	-
	↓

17. Adjust with + / - so that the deviation is max. *5 kHz*.
(This applies to stations with only 25-kHz channel separation.)
XX indicates a hex value for the deviation (00 - 1F).
18. Then select "↓" to return.
19. Next, select "Ch" and then the channel with the highest frequency with "Ch+" or "Ch-". Finish with "Ret" !
20. Connect *1 kHz / 50 mV* to the microphone input on the test box.
21. Select "Off" to adjust Tx-modulation Offset.
22. Adjust with + / - so that the deviation is max. *5 kHz*.
(Only 25-kHz channel separation.)

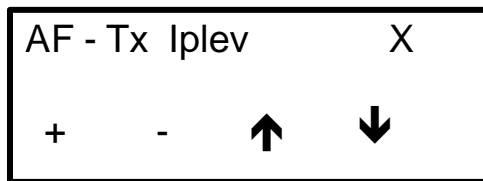
NB. It is important to adjust in steps back and forward, due to trunking.

23. Finish with "↓" and then "Ch".
24. If you wish you may select the centre channel, check the deviation and, if required, adjust it as described above.
25. Press "Ret" until this menu appears!



26. Select Tx; then **connect the peak detector again with "Pk" and "On"**.
27. Select "Nxt"; then connect *1 kHz / 5 mV* to the microphone input on the Test box.

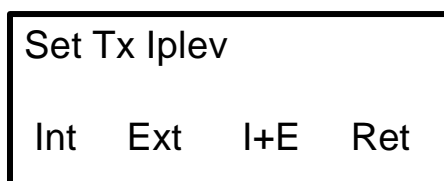
Select "Inp"



28. Adjust the AF-Tx input level with + / - until the deviation is *3.0 kHz +/- 0.1 kHz* at 25 kHz channel separation. (X is a hex value between 0 and F).

Increase the signal to approx. *50 mV*, check that the deviation is between 3,1 - 4,5 kHz !

29. Press "↑".



30. Select "I+E" to use the same values for Internal microphone and External microphone.
If you want to use different deviations, specify under "Int" and "Ext", respectively .

Then select "↓" and "Ret" until the picture shown below appears !

ADJ CAL. LEVEL			
D/A	A/D	AF	END

30. Select "END" and store data with "Sto" and "Yes".

CALIBRATION ?			
Adj	Def	Sto	END

31. You may now choose to stop align or to continue with another parameter.

TX TONE MODULATION

Radio Test Set in Tx-mode.

Normal and standard deviation may be adjusted here.

An internal AF tone generator is used for adjusting the modulation.

!! A 01
CH+ **CAL** Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "AF" for AF adjustment.
4. Select "Tone" for tone modulation.

TONE MODULA
FM PM Ctc Nxt

5. Select "FM" for tone modulation.

Test tone
500 **1k** 2k Ret

6. Select "1k" = 1 kHz, the transmitter is modulated with 1 kHz tone and starts transmitting automatically.
Adjust with + / - to 3.0 kHz deviation, limits = 2,8 - 3,5 kHz. (X = 0 -7).

Select "↓".

7. Select "2k" = 2 kHz, the transmitter is modulated with 2 kHz tone and starts transmitting.
Adjust with + / - to 3 kHz.

Select "↓" and "Ret" until this menu appears.

Set AF LEVEL			
Rx	Tx	Ton	Ret

8. To adjust CTCSS, select "Ton" and "Ctc".

Test tone			
75	150	250	Ret

9. Select "150" to adjust the modulation of the 150 Hz tone.
The transmitter starts transmitting, adjust the deviation with + / -.
The deviation should be between 0,65 and 0,85kHz.

Select "↓".

10. Select "Ctc" and "250" to adjust the modulation of the 250 Hz tone. The deviation should be between 500 and 1000 Hz.

11. Select "↓", "Nxt", "Ret" and "Ret" to this menu.

ADJ. CAL. LEVEL			
D/A	A/D	AF	END

12. Select "END" and store data with "Sto" and "Yes".

CALIBRATION ?			
Adj	Def	Sto	END

13. You may now choose to stop align or to continue with another parameter.

OUTPUT POWER

Radio Test Set in Tx-mode.

NB. This alignment is made on middle frequency; if required, you may check the output power at the minimum and maximum frequency.

To align the output power in low, middle and high, it is important that the voltage is 7.2V at the battery connector.

The voltage must be measured at the battery connector !

No test box needed !

!! A 01
CH+ CAL Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "D/A", the D/A converter controls Power Amplifier via control voltage.
4. Select "Pa" to adjust the output power.

Adjust the output power with + / - to **5W**. (Limits = 3,9 - 5,8W)

(When transmitting, the voltage must be 7.2V !)

Select "↑" and "H" for high output power.

SET H/M/L			
H	M	L	Ret

5. Adjust the output power to **2,5W**. (Limits = 1,8 - 3,4W)
Select "↑" and "M" for medium output power.
6. Adjust the output power to **1W**. (Limits = 0,7 - 1,4W)
Select "↑" and "L" for low output power.
7. Then select "↓" and "Ret" until the next picture appears !

ADJ CAL. LEVEL			
D/A	A/D	AF	END

8. Select "END" and store data with "Sto" and "Yes".

CALIBRATION ?			
Adj	Def	Sto	END

9. You may now choose to stop align or to continue with another parameter.

AF LEVELS ⇒ INTERNAL - EXTERNAL LOUDSPEAKER

Radio Test Set in Rx-mode.

The levels for Internal and External loudspeaker are adjusted here.

!! A 01
CH+ CAL Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "AF" for AF adjustment.
4. Select "Rx" and turn the volume control to **MAX** level.

Connect the test box between the P500 and the antenna outlet of the radio test set.

Connect the LS-output on the Test box to AF-in on radio test set.

Set the following levels:

RF frequency= One of the three test frequencies.

RF level = -50 dBm

AF frequency= 1 kHz

Deviation = 1.6 kHz

Press "#" to open the loudspeaker.

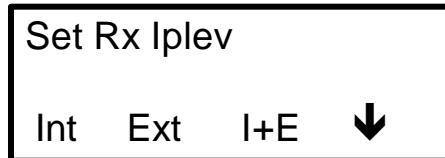
5. Select "P/F" for modulation selection.
6. Select "PM" for phase modulation.
7. Select "Lim" and "Off" to turn off the limiter; then select "Nxt".

AF-Rx LEVEL
Inp Pro Ret

8. To adjust the input amplifier, select "Inp".

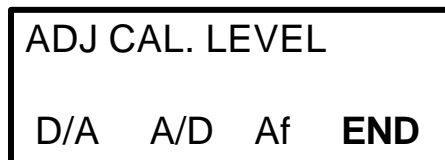
Adjust with + / - until the output level is $1.9 V_{RMS}$ with maximum 10% distortion.

Then select "↑".

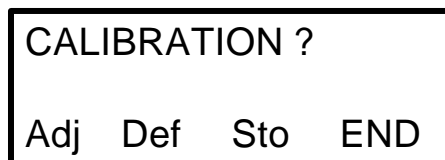


9. Select "I+E" to use the same values for Internal, External loudspeaker and microphone.
If you want to use different deviations, specify under "Int" and "Ext", respectively .

Then select "↓" and "Ret" until the next picture appears !



10. Select "END" and store data with "Sto" and "Yes".



11. You may now choose to stop align or continue with another parameter.

ALIGNMENT OF SQUELCH LEVEL AND HYSTERESIS

Radio Test Set in Rx-mode.

This is where you adjust the squelch level and squelch hysteresis.

Connect the following signals to the test box:

RF frequency= Middle frequency

AF frequency= 1 kHz

Deviation= 3 kHz

!! A 01

CH+ **CAL** Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "D/A", the D/A converter.
4. Select "Sq" to adjust the squelch.

Press "#" to open the loudspeaker.

SQUELCH SET

Lev Hys Tgl Ret

5. Measure the LS signal on the test box.
Select "Lev" to adjust the squelch level 3 dB below the RF level for 12 dB SINAD.

Adjust with "+" until the display shows 1F. The loudspeaker opens !

Adjust with "-" until the loudspeaker closes; then select "↓".
6. Increase the RF level 1.5 dB, select "Hys" for adjustment of the squelch hysteresis.

Adjust with + / - so that the squelch closes the loudspeaker
 3 dB (Limits = 2,3 - 3,7 dB) below the RF level for 12 dB SINAD and
 opens the loudspeaker 1-2 dB over the close level .
 Select "↓".

7. NB. Check the squelch level. It may be necessary to adjust level and hysteresis once more.

Then select "Ret" until the below picture appears !

ADJ CAL. LEVEL			
D/A	A/D	Af	END

8. Select "END" and store data with "Sto" and "Yes".

CALIBRATION ?			
Adj	Def	Sto	END

9. You may now choose to stop trimming or continue with some other parameter.

SETTING OF LOW BATTERY LEVEL AND TRANSMITTER BLOCKING LEVEL

Radio Test Set in Tx-mode.

This is where you adjust the level for battery-low signal and the level for transmitter blocking.

!! A 01
CH+ CAL Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "A/D", the A/D converter.
4. Select "Bat" to adjust low battery level.

XX	XX Batt	C5
Low	TxB	Ret

5. Adjust the external supply voltage to $6.8V \pm 0,1V$ measured at the battery connector and select "Low" to store battery level.
6. Select high output power "H" with "#" and "2" and adjust the voltage to $7.2V$.
Press PTT to transmit and adjust the voltage to $6.0V \pm 0,1V$.
Select "TxB" to store Tx blocking level.
7. Change the battery voltage to $7.5V$.

Decrease the voltage slowly; at 6.8V, the display must show the text "**CHANGE BATTERIES**".

Press PTT; at 6.0V, the display must show the text "**BATTERY EMPTY**".

Check also that the transmitter stops transmitting.

When the display has turned off, the station consumes around 50mA.

Then select "Ret" until the below picture appears !

ADJ CAL. LEVEL			
D/A	A/D	Af	END

8. Select "END" and store data with "Sto" and "Yes".

CALIBRATION ?			
Adj	Def	Sto	END

9. You may now choose to stop align or continue with another parameter.

FUNDAMENTAL ALIGNMENT

Normally, this alignment is not used but, if the "normal" alignment should result in input of incorrect data, you may use fundamental alignment in order to restore the default data quickly, thereby making the station work fairly well again.

NB.

You must always repeat the "real" alignment after this.

!! A 01
CH+ CAL Etc END

1. Select "Cal" for calibration.
2. Select "Adj" for adjustment.
3. Select "END" and "Def" for default data.
4. Select "YES" and "Ret" to store default data.

The station will now work tolerably well.

END ALIGNMENT PROGRAM

CALIBRATION ?			
Adj	Def	Sto	END

1. To end the alignment program, select "END" and "END".
2. Then select "Yes" to exit the program and "Yes" again if you want to enter the P500 program that is loaded in the station.