ADAT

All Digital Amateur Transceivers
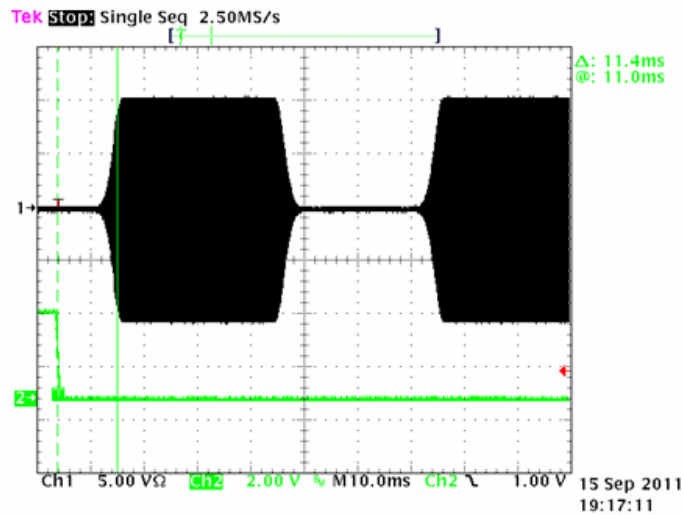
New Functionalities in Release 1.36

Version 1.0 from 10.01.2012

Content

1. Enhanced CW Transmit Functions

a) Iambic-Mode A and B (without and with Dash/Dot Memory)
b) The dot-length/pause timing is now exactly 1:1 for -3dB power
c) „first did" is transmitted with its correct length up to 60wpm
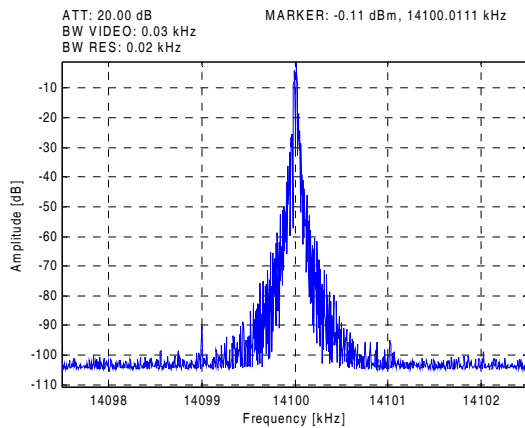d) The slope shaping is now adaptive for all speeds

Two did's at 40wpm, green: Key_A Input

e) the speed of a manual keyer is beeing measured and the pulses are formed accordingly
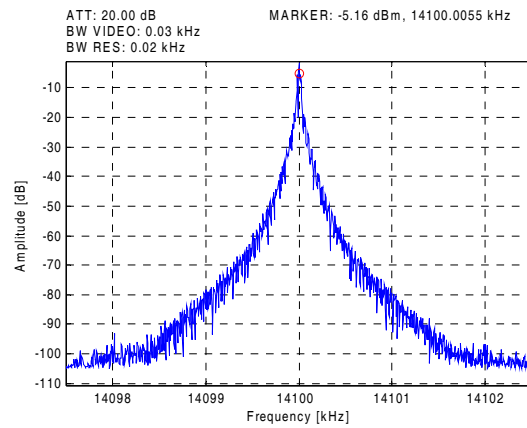f) the QSK-operation was improved and can now be used up to 24wpm (see below)
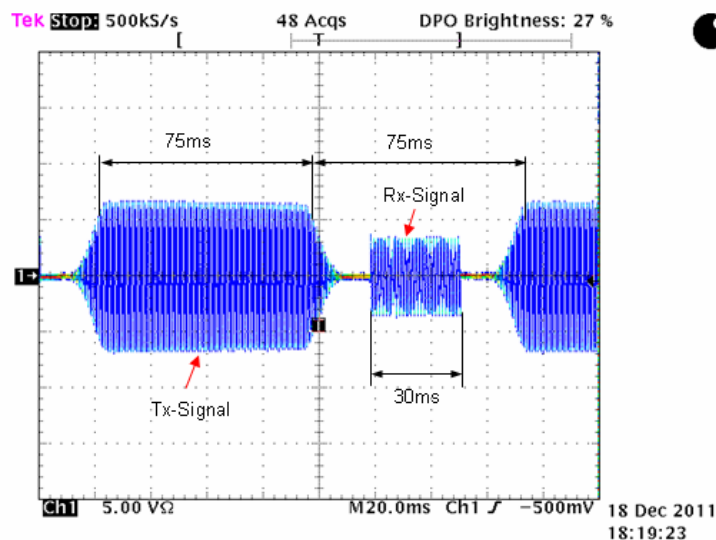
QSK-operation with 15wpm and B = 1000Hz

g) the routine for the Rx/Tx switch is now updated every millisecond and thus the delays are no longer evident.

h) the Tx transmit spectrum was improved by an additional narrow band Tx-filter

ATT: 20.00 dB   MARKER: -0.11 dBm, 14100.0111 kHz
BW VIDEO: 0.03 kHz
BW RES: 0.02 kHz

ATT: 20.00 dB   MARKER: -5.16 dBm, 14100.0055 kHz
BW VIDEO: 0.03 kHz
BW RES: 0.02 kHz

Tx spectrum at 12wpm   Tx spectrum at 40wpm

2.   CW-Decoder

The signal detection is based on a correlation filter, whose bandwidth is adapted to the CW receiving filter in use. Before the decode algorithm is started, the signature of the received signals is captured, containing the length of dots, dashes and pauses. This methode assures, that CW strings with speeds of 6…40 wpm are correctly decoded. The capturing process can be forced by pressing the F-TUNE button.

The decoded characters are transmitted though the USB interface in the ascii format and can be visualized by a terminal program, such as TeraTerm.

The decoder can be activated by the key stroke OPTION / M-SPEC / MORE / DECODER. When the decoder is switched on, the spectrum monitor is disabled, as this is using the same USB port. After the startup of the transceiver, the morse decoder is allways disabled.

3.   Transverter-Control:

a) With CONFIG / SYSCON and the options ext-TVL or ext-TVH, the transverter operation is enabled, whereas
   - ext-TVL -> Low Power Mode (-10…+10dBm)
   - ext-TVH -> High Power Mode (0.1…2W)

b) The ext-TVx setting is used for all VFO's and Config-Sets to avoid the unintended activation of the high power mode >2W.

c) The offset frequency can be programmed in the range from ±10.0MHz to ±3000MHz. The displayed resolution is 1Hz for f ≤1000MHz and 10Hz for f >1000MHz.

d) The displayed frequency can be calculated by using the following formula:

$f_{Display}$ = $abs(\pm f_{offset} + f_{VFO})$ f_{VFO} : operating frequency from ADT-200A

the value from f_{offset} must be positive, when the LO of the transverter (= f_{offset}) is < f_{Rx}, and negative, when the LO is > f_{Rx} (see the following example).

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abs(+116.000000MHz + 28MHz) = 144MHz
abs(-172.000000MHz + 28MHz) = 144MHz

e) For each of the 3 VFO's is a separate offset frequency programmable. This can be done by means of a terminal program, as TeraTerm. Tese entries are write only:

$FV1:xxxxxxxx<return>   for VFO1
$FV2:xxxxxxxx<return>   for VFO2
$FV3:xxxxxxxx<return>   for VFO3

The entries must always be done in Hz, without decimal point.

f) The programmed offset frequencies ($FVx) are not affected by a data base reset. They can only be modified by the procedure according to d). Thus, there is no danger to activate the high power unintentionally.

g) When a frequency input is outside the range, specified under c), then a value 0Hz will be set (no offset).

h) When the low power operation (ext_TVL) is selected, then the power amplifier is bypassed and thus the antenna switch is not accessible. Therefore, as port for the Tx-IF-signal must ANT 1 and for the Rx-IF-signal the ports Rx In or ext ANT be used. In the high power mode (ext TVH) the power amplifier is in use with limited power.

i) The settings under POWER and P-Tune are automatically scaled to the range of 0.1…100mW for low power and to 0.1…2W for the high power mode. Special surveilance is taken to avoid transient overshooting.

k) Transverter configurations can be stored in the memory.

l) Split operation is possible. As there are two offset frequencies needed, they must be previously be stored under $FV1 (channel A) and $FV2 (channel B).

m) We recommend to switch the preselector into the bypass mode. This gives the smallest amount of spuriies from the power supply.

n) After a Firmware download, the SYSCON is allways set to normal.

Remarks:

- before programming offset frequencies, set SYSCON = NORMAL.
- due to internal rounding errors, the accuracy of the displayed frequencies is limitted to 0.05ppm or 50Hz per GHz
- when you are recalling a memory channel which was stored with SYSCON = normal, then the transceiver will be reset to normal mode.
  Attention: full power is possible !!

4.   The Remote-Operation

The ADT-200A can be equiped with a Web-Module to allow remote control via the internet. A local ADT-200A (the client) is controlling a remote ADT-200A (server). More than one clients are possible, for example to profit from the quiet position of the server, whereas the clients are in a noisy region. The internet connection may be established via the free service DynDNS or by means of a dedicated IP-address, delivered by the internet provider.

The audio signals are compressed by the A-Law methode, standardized by ITU-T. They are transmitted togetter with the control signals in UDP/IP frames. The maximum required throughput on the internet is 120kbit/s. The latency is typ. 80ms per direction.

There are practically all functions from ADT-200A available for remote operation (exept the VOX). Some commands, as Audio Source, Mike Gain and the Keyer Speed must be set before connecting the server, as they are processed locally.

A Connect is switching on the server. After a Disconnect or, when the connection is lossed, the server is going into the standby mode after a timeout.

5.   The Spectrum-Monitor

This new feature consists of a high performance spectrum analyzer with a dynamic range of up to 130dB and a scan width from 10kHz uo to 2MHz. Simultaneously, a waterfall diagram is displayed.

The Spectrum is displayed on a PC by means of a special program, which is communicating with the ADT-200A over an USB interface. The whole processing is done by the DSP in the ADT-200A. Up to 1200 scaled pixels per row are transmitted every 100ms to the PC program.

The VFO4 is now exclusively used for the spectrum option, thus it allows to monitore a frequency range, independent from the other VFO frequencies. When the Rx-frequency is located inside the spectrum scan, its position is marked by a vertical line. This line can be moved by the cursor and is setting the receiver frequency accordingly.

The spectrum display is temporarely blocked during transmission, however, it is foreseen to display the transmit spectrum within normalized settings in a later version.

The Spectrum-Monitor program is only working, when the option S1 is unlocked within the personality file. This option requires a paid licence.
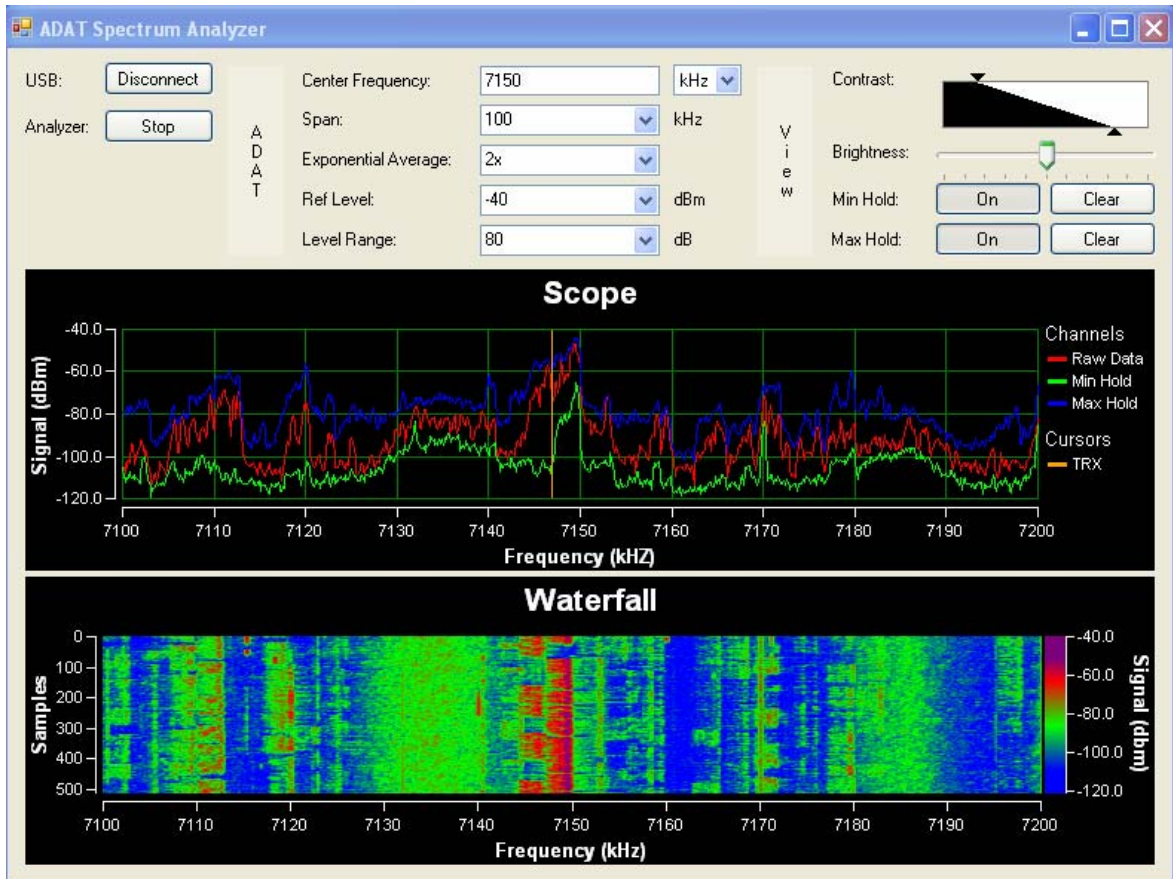
Quick Start Guide:

First connect the ADT-200A and the PC by an USB cable and start then the program "ADATSpectrumAnalyzer.exe". Connect to the ADT-200A by pressing the Connect button.

- type in the desired center frequency and press Enter
- select the Span Width
- set the level of averaging, for example 2x
- select the Ref Level, this value is equal to the max. displayed signal level (dBm)
- select the Level Range, this determines the range of the Y-axis

then confirm the settings by pressing the Start button. The spectrum, using the selected parameters appears now. If the frequency of the active VFO is inside the scanned range, then it will be displayed by a vertical bar, which is moving with the selected frequency. When you are picking this bar by the mouse and move it to a part of interest within the spectrum window, then the Rx-frequency will be set equal to the position of the bar.

When you point the mouse in the frequency field and press the rigth mouse key, then you can select either the center frequency (CF) = Rx or Rx = CF.

If you press the Start button after a restart and connect, then the settings from the last session will by reused.

6. Modifications

a) A new designed soft limitter scales the transmit power down to the selected power in case if an overshoot occurs. This requires, that the predistortion is properly calibrated.

b) The selection of side band in mode SSB is no longer dependant from the selected HAM band, but from the receiving frequency. This convention is also valuable for frequency settings in the categiries WIDE and BRCST and external controls, such as the spectrum analyzer.

c) The decay time of the AGC is now corrected, that the recovery time is nearly independant from the deepness of the amplitude step between -10dB and -100dB (see the following diagrams).
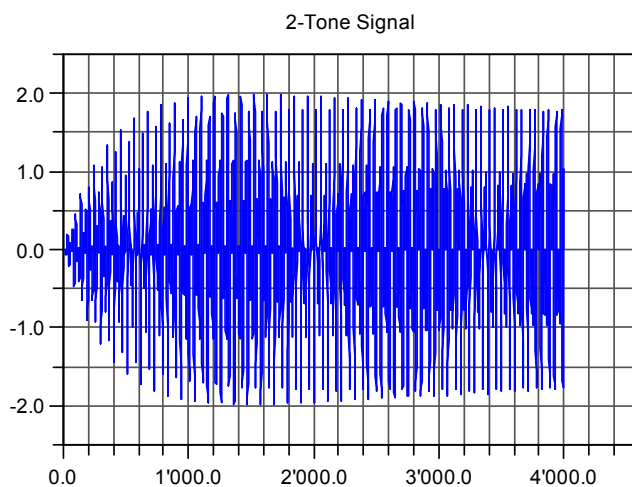

hor: 1s/div
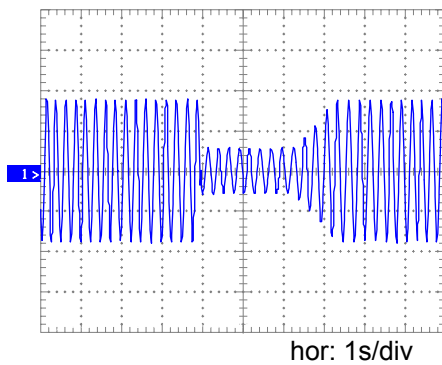
Step: **-10dB**
Attack: 5ms
Hold: 2s
Decay: 1s



hor: 1s/div
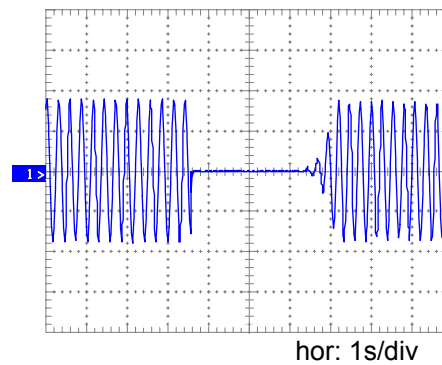
Step: **-60dB**
Attack: 5ms
Hold: 2s
Decay: 1s

d) The power on shaping was improved:

2-Tone Signal

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e)   The transient in the pep indication of the power meter is removed.

f)   The VOX control has been updated. The adaptive cancelling of the feetback from loadspeaker to the microphone is improved. The threshold range was changed to -4dB…+4db.

g)   The audio output power on the ports LS-A und LS-B is increased to 2W (see the following figures).

NF Ausgangsleistung

Pout [W]]
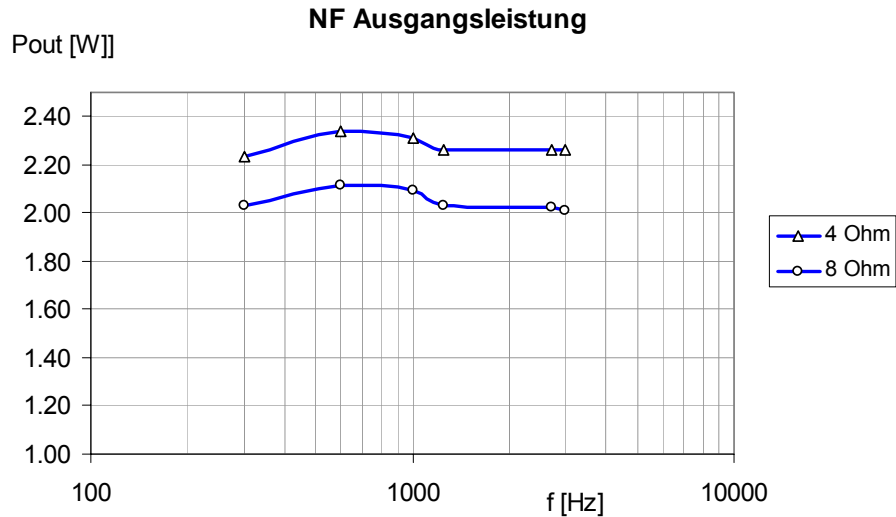
Sinus power at max. AF GAIN

Klirrfaktor

Klirrfaktor [%]

Pout = 2W
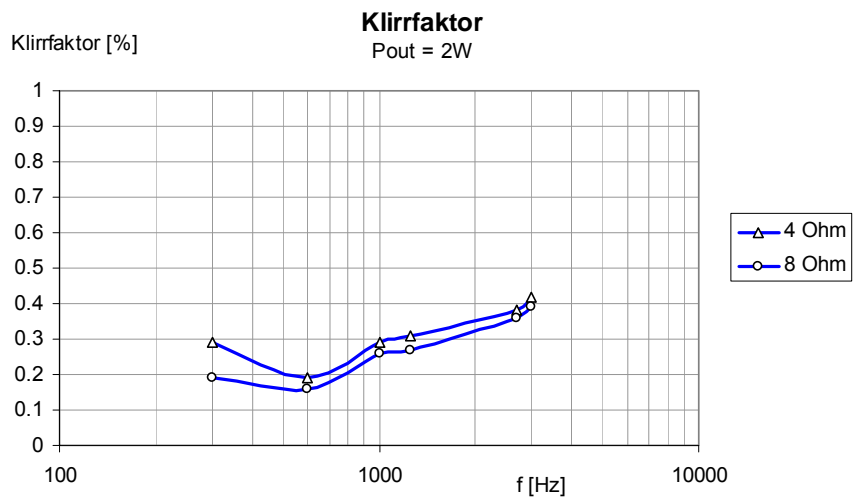
distortion at 2W power, measured with R&S CMS-52 and an input signal of -40dBm at 14.1MHz

h)   The on/off swich for the loadspeakers is corrected

i)   The maximal tolerable frequency error for the calibration by a broadcast station is increased from ±20ppm to ±50ppm.

j)   The function AN-TNR = AUTO is foreseen to control an automatic antenna tuner (as AT-140). The tuner is activated by pressing the F-TUNE button. The signal

KEY = low → high is now switching out the tune carrier automatically. The power is now set to 7W, indepent from the previous P-TUNE setting.

k) MODE is now set to SSB after a reset of the database (SYS-DB).

l) F-TUNE and the Frequency calibration have been corrected for proper function at all possible combinations of VFO settings.

7. Firmware Update to the Version 1.36

The added functions needs more program memory space. Therefore the space in the Flash memory had to be increased from 3 to 4 sectors (192 to 256kB).

Before the download the first time the version 1.36x the previously loaded version must be 1.35k or 1.35m

When you try to load the 1.36x with a previous version older than 1.36k, then you will get the message DN3 ERROR 3. This situation can only be solved by the backup program, avtivated by setting a jumper on the DSP board.

The file containing the version 1.36c is:

Download_Code_136c_p0.dat

After each download, the download program (ADAT Commander or TeraTerm) must be closed and then the ADT-200A restarted.

In the next step, the file containing the new Tx-filters must be downloaded:

Download_Filter_Tx_BP_136b.dat

Finally, the GUI (front unit) must be updated by the file:

adat_FRN_Download_124d.dat

It is strongly recommended to upgrade the backup program, to have a solution in case of a download failure in the future:

Download_Code_136c_p4.dat

After these operations your ADT-200A is up to date !