Morse code – Alive and Kicking!

Translated from the original presentation
„Betriebsart CW – Morsen lebt!“

Version with verbose annotations:
http://fkurz.net/ham/fn2011/

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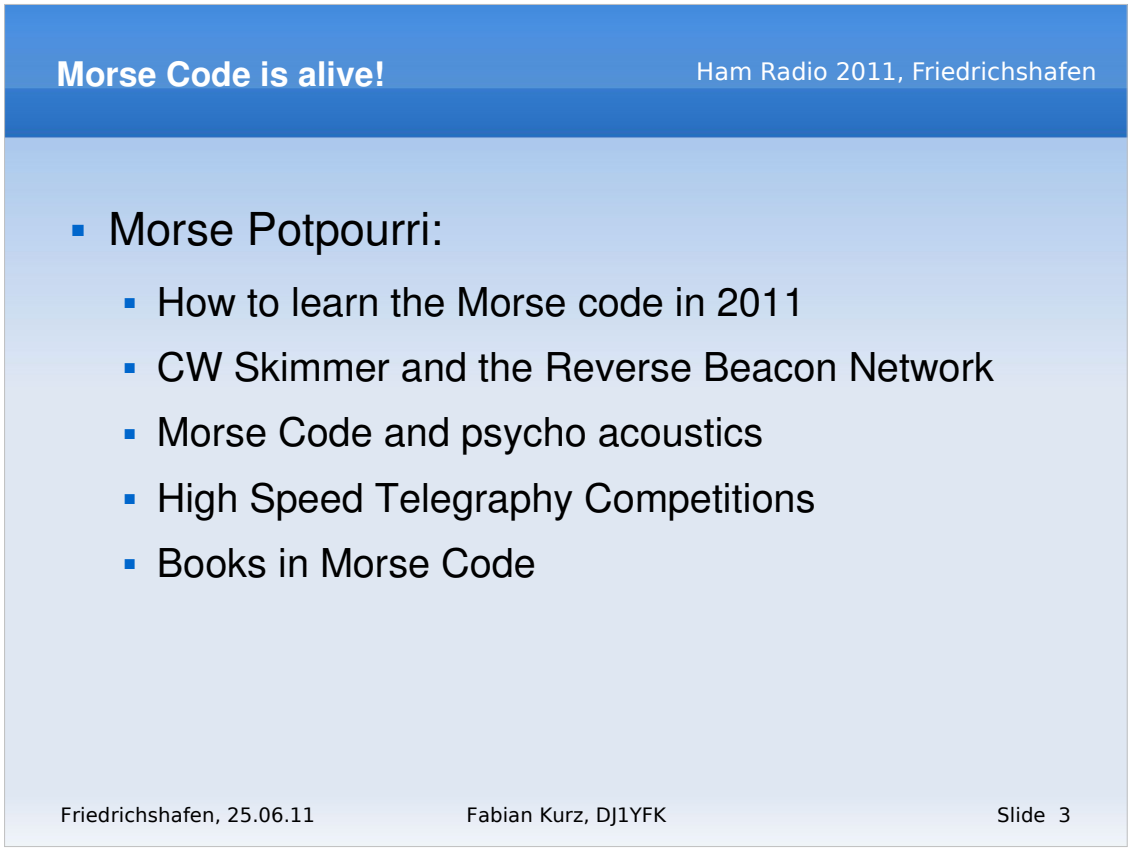
This is the annotated version of the slides.

About the author: Fabian Kurz, DJ1YFK

- Born 1983, licensed since 1997
- Self-taught in Morse Code
- Activities related to Telegraphy:
  - Contesting (DL1A, DM7A, DA0HQ, etc.)
  - Ham radio software development (LCWO.net, ebook2cw, ...)
  - High Speed Telegraphy Competitions (DTP, HST)

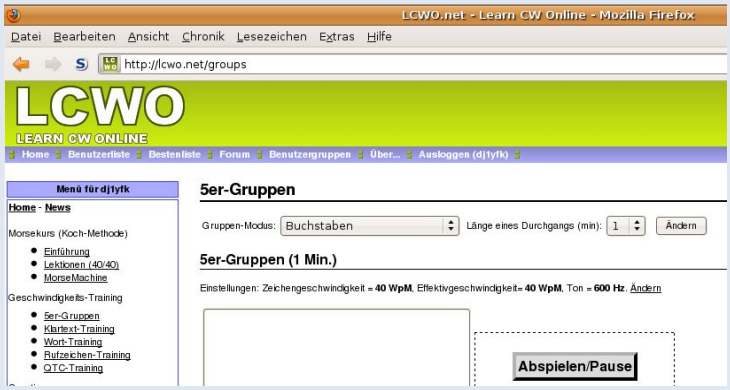


Instead of boring the audience with a long and dry presentation about a selected topic, I tried to select a „potpourri“ of various topics, mostly about recent developments in the world of Morse code.

Potpourri, topic 1:

Learn CW Online

- Learn CW Online – In your web browser!
  - Full Morse code course (Koch method)
  - Callsign-, Word-, Plain text training, etc.



„Learn CW Online“ is a web-based Morse course and training tool which the author created in 2008. It features a Morse code (using the Koch method) which can be used to learn CW from scratch, but also various training modes for proficient CW operators.

All training results of the users are saved in a database, which allows for the easy creation of statistics in order to observe the learning progress. High-score lists are available in order to compete with other users, forums and user groups can be used to communicate with other users.

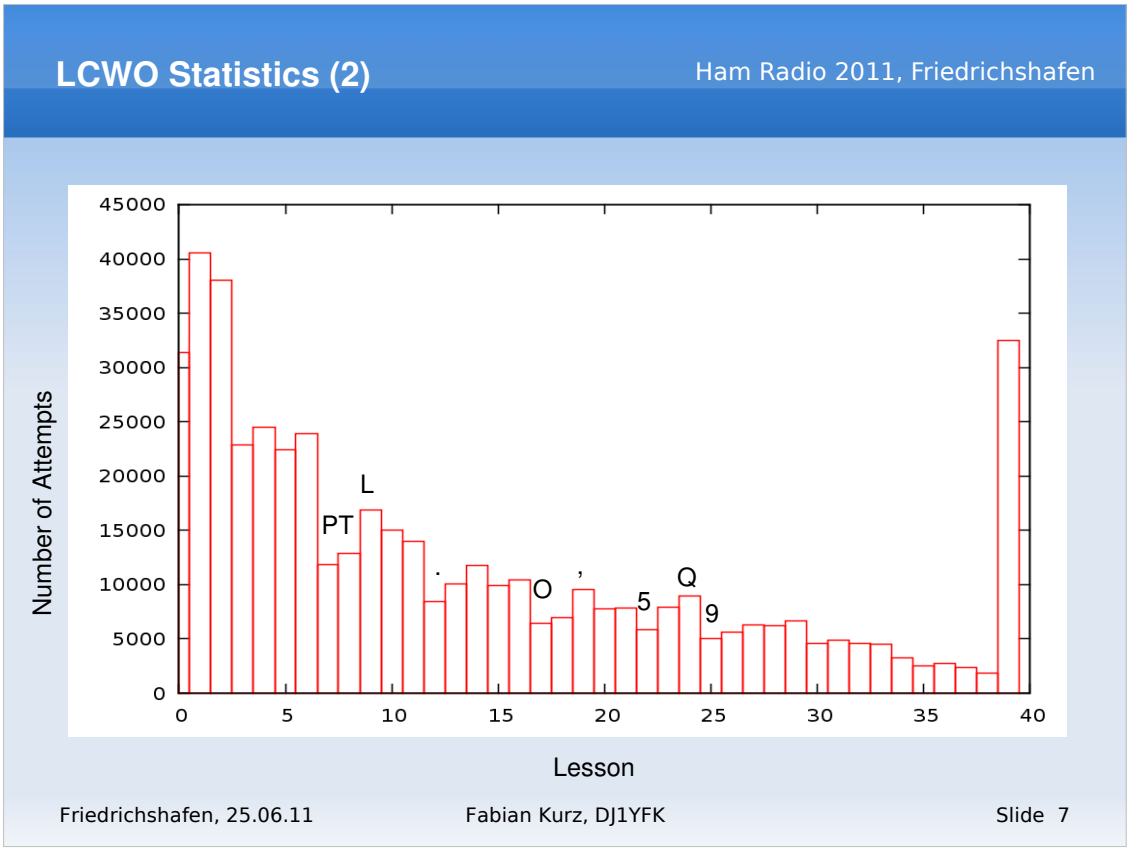
Since it went online, lcwo.net attracted over 25000 unique users who signed up for a (free) account.

LCWO Statistics (1)

- ca. 10k active users (not only learning, also training)
- Results are saved on the server: Over 1 million datasets available to generate statistics
- Koch course: ca. 2000 „serious“ users (more than 100 attempts over more than two weeks, 480k datasets)
- Question: Which letters are easy, which difficult?
- Where do most learners give up?
- **How to improve the learning experience?**

More than 10k of these users can be considered „active“ (many just sign up, use the site for a day or two and never come back). With a database of over one million training results of these users, there's a data basis to do some statistical observations of the Morse learning behaviour.

The results of over 2000 unique users who were using the Koch course were used for the following statistics. The users were chosen based on their level of activity. Users with more than 100 attempts (e.g. listening to 100 times one minute of code groups) were considered to be „serious“. About 480.000 attempts were saved in the database of these users.



The graph shows the number of attempts done in particular lessons. Each lesson introduces a new letter, figure or symbol, starting with „K“ and „M“ in lesson one. The full series is:

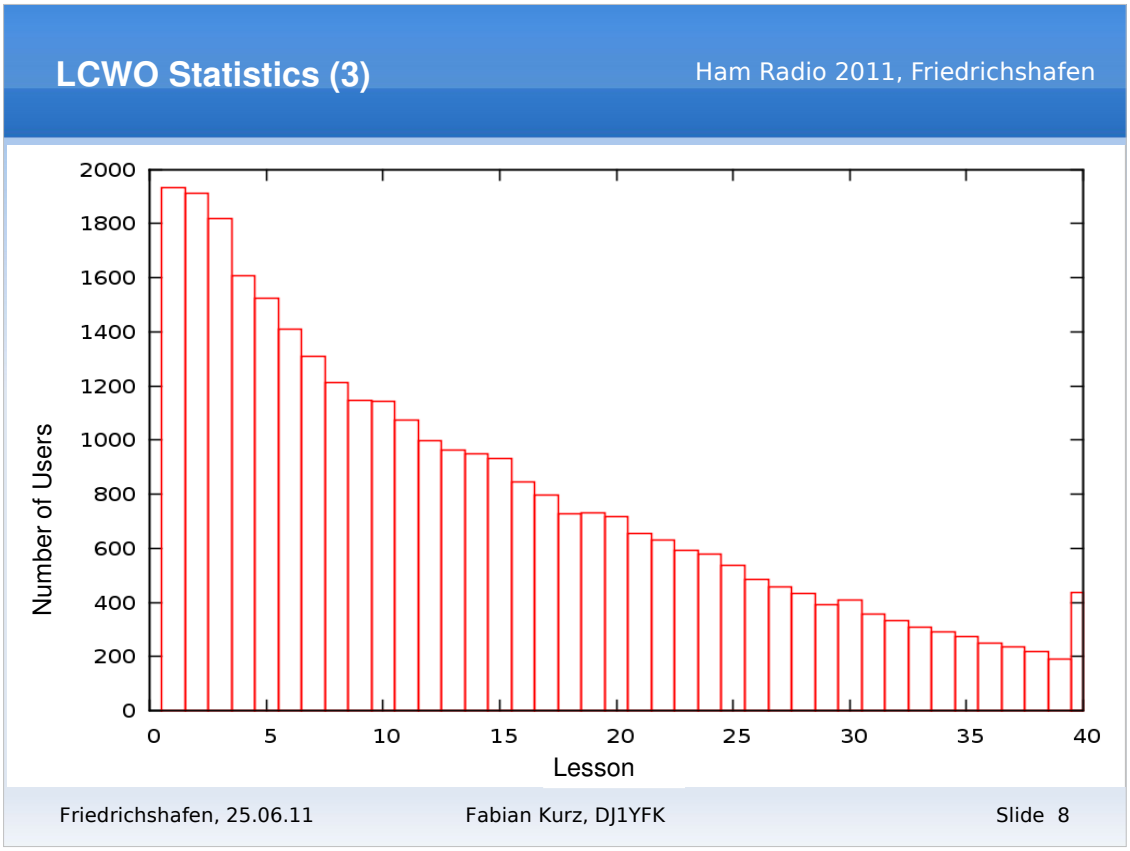
K M U R E S N A P T L W I . J Z = F O Y , V G 5 / Q 9 2 H 3 8 B ? 4 7 C 1 D 6 0 X

Of course the main effect that can be seen is that the higher the lesson, the less attempts are done. For one, this is because many people drop out and give up learning CW. For another, it's because people actually gain speed in the course of the lessons, i.e. they will take less time and attempts in order to learn a new letter once they already know many letters.

The most interesting thing about this graph is that the decline is not steady. Some letters seem to take very few attempts (like the „P“ and „T“) while others seem to be more difficult to learn and require more attempts, e.g. „L“.

To an experienced CW operator these results are stunning. The „L“ has a very distinct and rhythmic sound, and one would expect it to be an easy one. The full-stop / period on the other hand, seems to be surprisingly easy to learn.

The anomality for lesson 40 can be explained by people who use the Koch course in order to gain speed, after finishing the lessons.



This chart looks similar, but it doesn't show the number of attempts done, but the number of unique users who are practising in a particular lesson. There were two motivations to make this chart:

For one, to find out if the chart in the previous slide really shows that I thought it does: That certain letters pose much less problems than others. The fact that the decline in this chart is rather steady and doesn't show any anomalities in the lessons which were identified to have very easy or difficult letters previously seems to confirm that this is true.

The second idea was to see how many of those who start (about 2000) make it to which lesson, and how many will finish? It can be seen that about 10 percent make it to lesson 39. A little anomality appears again at lesson 40, where a good 20% of the users have made some attempts.

Most users quit early, in the first few lessons, as expected. The steepest step is after lesson three, where four letters (KMUR) should be known.

LCWO Statistics (4)

- Most quit very early (as expected).
- Only 10% finish all lessons?
  - In the higher lessons, pupils often skip lessons!
  - The statistics include many who are still studying!
  - Threshold to identify „serious“ users too high?
    - 300 attempts: 370 users, 100 in lesson 40, ca. 100 still learning and on their way to lesson 40.
- Easy letters (P, T, O) vs. difficult letters (L)
- Results of statistics will influence further development

Everyone who has taught Morse code knows about the high drop-out-rate. But is it really as high as 90%? There are some things that need to be kept in mind: It was observed that many users skipped lessons towards to the end. That's maybe why there are twice as many users in lesson 40 than in 39. Also, the statistics are taken from the „live“ database, which means that a good number of the users may still be on their was to lesson 40.

As usual with statistics, an almost arbitrary rate of quitters can be calculated by changing the threshold which is used to determine whether or not a user is „serious“ enough to be included. For example, of not 100 but 300 attempts are used as the threshold, the number of users drops to only 370. But 100 of them made it to the end (27%) and another 100 of them are still studying. This sounds a lot better, but again, it's a figure created by an arbitrarily chosen threshold...

What are the conclusions that can be drawn from these statistics? For one, that there are indeed „easy“ and „difficult“ letters. And that they might be different ones than an experienced CW operator would guess.

These findings will influence the future development of LCWO, and it can be hoped that the rate of users who drop out on the way to CW proficiency will be reduced.

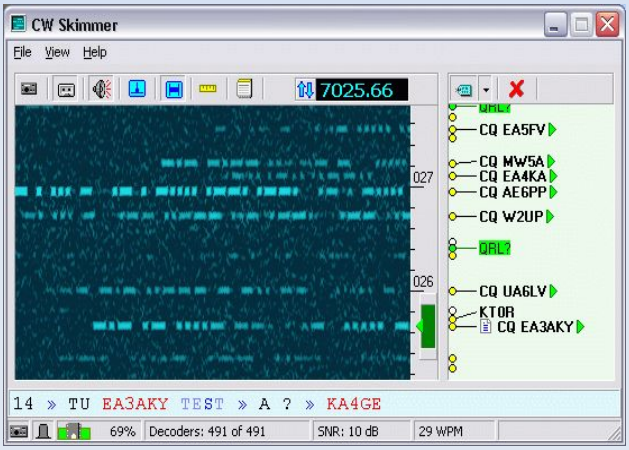
Potpourri, topic 2:

CW Skimmer

... and now for something completely different!

CW Skimmer

- Multichannel CW decoder, written by Alex, VE3NEA
- Allows to observe a whole band in real time (with a SDR)



A piece of software, released by the well known ham radio software author Alex, VE3NEA a few years ago has sparked a lot of controversy among CW operators, mainly contesters and DXers: „CW Skimmer“. Using a wideband SDR receiver, it allows for observing all Morse signals on an amateur radio band at once, with automated decoding.

Reverse Beacon Network

- Aggregated data of many Skimmers: RBN
- Role reversal: „Receiving Bacons“
  - *All* stations that call CQ in CW are „spotted“
- Information exchange over the internet
- Current status:
  - ca. 50 Skimmers QRV and online, 160m to 6m
  - all continents covered

A single CW Skimmer is an interesting tool, but the Reverse Beacon Network (RBN) takes the concept a step further: Data coming from many CW Skimmers, all around the world are aggregated into a single source. It's a role reversal from the old concept of radio beacons. Instead of listening for the beacons, the „reverse beacons“ listen for you, and report your callsign, frequency and signal strength. And not only one of them; a strong station may be heard by a dozen skimmers at once!

RBN example

- DJ6ZM calls CQ on 20m: 13 spots from 3 continents

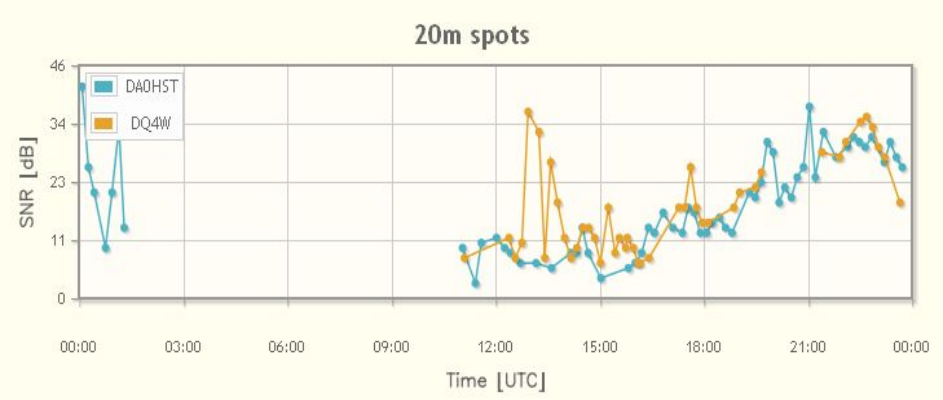
de	dx	freq	cq/dx	snr	speed	time
DL8LAS	DJ6ZM	14022.0	CQ [LoTW]	12 dB	32 wpm	1554z 22 Jun
S50ARX	DJ6ZM	14022.1	CQ [LoTW]	11 dB	31 wpm	1554z 22 Jun
SV8RV	DJ6ZM	14022.1	CQ [LoTW]	6 dB	32 wpm	1554z 22 Jun
G0KTN	DJ6ZM	14022.0	CQ [LoTW]	17 dB	32 wpm	1554z 22 Jun
JA4ZRK	DJ6ZM	14022.0	CQ [LoTW]	23 dB	32 wpm	1553z 22 Jun
RN4WA	DJ6ZM	14022.1	CQ [LoTW]	21 dB	32 wpm	1553z 22 Jun
UA9CLB	DJ6ZM	14022.1	CQ [LoTW]	34 dB	29 wpm	1553z 22 Jun
TF3Y	DJ6ZM	14022.0	CQ [LoTW]	16 dB	32 wpm	1553z 22 Jun
LA5EKA	DJ6ZM	14022.0	CQ [LoTW]	41 dB	31 wpm	1553z 22 Jun
GW8IZR	DJ6ZM	14022.0	CQ [LoTW]	31 dB	31 wpm	1553z 22 Jun
HA6PX	DJ6ZM	14022.1	CQ [LoTW]	9 dB	32 wpm	1553z 22 Jun
WZ7I	DJ6ZM	14022.0	CQ [LoTW]	6 dB	33 wpm	1553z 22 Jun
VE2WU	DJ6ZM	14022.0	CQ [LoTW]	16 dB	32 wpm	1553z 22 Jun

http://www.reversebeacon.net/

Here's an example of what happens when DJ6ZM calls CQ on 20m with his prominent signal from his station near Munich (aka DL1A in contests).
Not one, not two, thirteen Skimmers from three continents receive the call, decode it and report it to the Reversebeacon website along with the SNR of the received signal.
This is not only an excellent tool to test antennas but also serves as a great source for propagation studies. Last not least, it allows for a very objective comparison of the signals between different stations.

Reverse Beacon Network

- RBN offers signal strength comparison tools



Here's an example of the tools that the RBN offers to compare signal strengths. DQ4W and DA0HST both took part in the CQ WPX CW 2011 contest and were „skimmered“ a lot at K3MM on the US east coast. The signal strength over time shows which hours of propagation are the best, and when which of the two stations was the stronger one. While the signals are almost the same for most of evening and the night, something weird apparently happened in the early afternoon, when DQ4W was significantly stronger than DA0HST...

RBN: Statistics

- Statistics were generated from raw data from the RBN
- Time range: 01.01.2011 – 22.06.2011
- 20.5 mio. (!) CQ spots recorded!
- How many unique calls do you guess there were?

“ *Never trust a statistics you didn't forge yourself...*

Of course, the RBN can not only be used for signal comparisons, but also in order to make a general inventory of the life on the CW bands. All raw data from the RBN can be downloaded and then used to generate statistics. This has been done for the first half of 2011.

So, how many unique calls might there be active on the bands?

RBN: Statistics

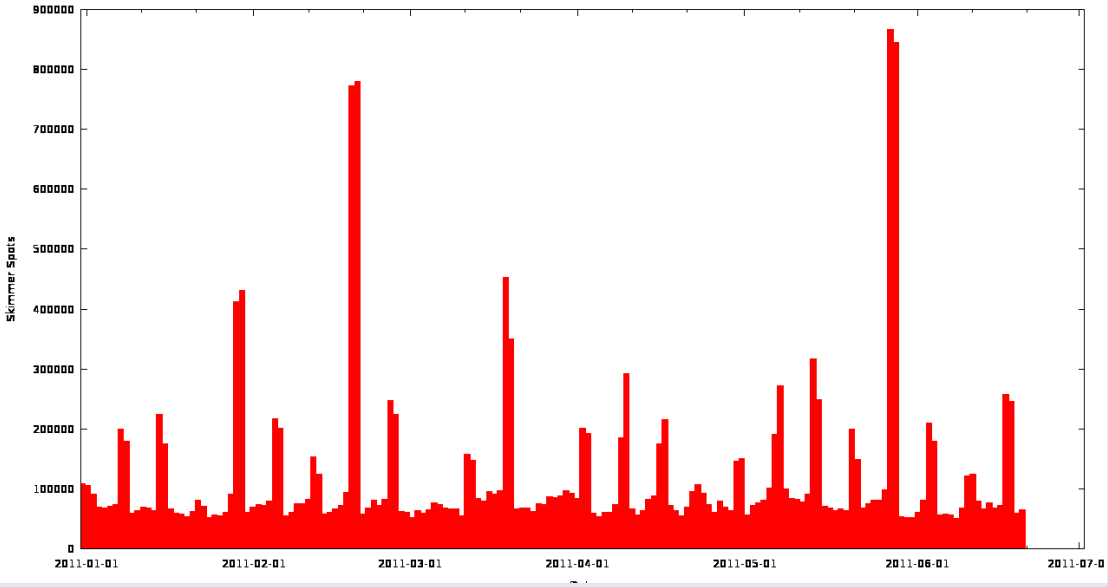
- Statistics were generated from raw data from the RBN
- Time range: 01.01.2011 – 22.06.2011
- 20.5 mio. (!) CQ spots recorded!
- 163,453 unique calls (unfiltered)

“ *Never trust a statistics you didn't forge yourself...*

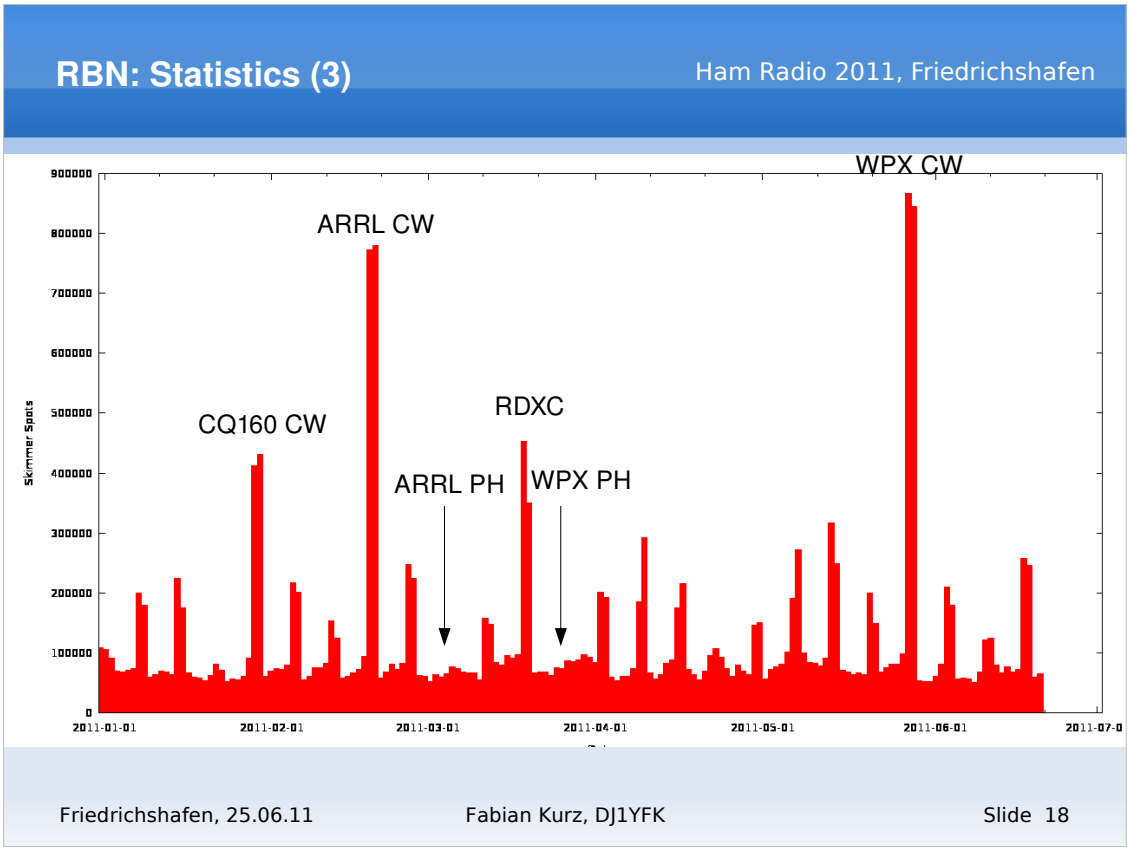
Guesses in the audience were between one thousand and one million. What does the Skimmer say?

163,453 unique calls were skimmed. And many of them on particular dates, as the following slides show.

RBN: Statistics (2)



Spots versus the date, January to June 2011. The pattern can easily be explained ...



Contests! Each of the peaks is a weekend on which a contest that included CW took place. On the weekends with phone contests, no anomalities can be observed (ARRL Phone, WPX Phone).

Contests are indeed a major source of activity in ham radio. Not to everyone's delight, that's for sure, but the figures speak for itself: Contesting is!

RBN: Statistics (4)

- Strange distribution of spot frequencies?

Top Ten Spots		Spot #	Frequency
55079	F5IN	>10000	176
31977	LZ9W	>5000	681
30669	NR4M	>1000	4933
29210	NQ4I	>500	8052
27968	AA3B	>100	18177
25446	RL3A	>50	24138
25241	CO8LY	>25	31353
25229	UA2FL	>10	43593
24085	LZ5R	>1	77101
23323	EA6UN	1	163452

So, now that we „know“ that there are over 160k calls on the air, let's have a closer look at it.

Sorted by the number of spots, we see that there are some stations that obviously make a lot of QSOs. F5IN was spotted over 55k times by the CW Skimmers! Overall, there were 176 calls that had more then 10000 spots, 681 with more than 5000 spots, and so on (see above).

But what is happening on the low end? About 86k calls are only spotted *once*. 120k less than ten times. Are there so many people who only work one or two QSOs in half a year? Let's have a look at it!

RBN: Statistics (5)

- Automated Morse Decoders and their limits...

Count	Call	Count	Call
5948	5B/US7IDX	1	5B/US7IX
102	5B/US7ID	1	5B/US7INX
5	5B/US7TDX	1	5B/US7IN
4	HB/US7IDX	1	5B/US7IE
4	5B/US7IT	1	5B/US7IDV
3	5B/US7I	1	5B/US7IDT
3	5B/US7DX	1	5B/US7IDD
2	5B/US7ITX	1	5B/US7EDX
1	HB/US7ID	1	5B/US7DN

5B/US7IDX was QRV during the Russian DX Contest and was skimmered about 6000 times with his correct callsign. But more than 100 times, the CW Skimmer failed to recognize the X at the end of the call, and another dozen of misinterpretations of the callsign show up in the raw spot data.
This shows that machine-CW-decoders are not quite perfect, and explains why there were so many callsigns that only appeared once or twice in the Skimmer data: They were wrong calls, caused by decoding errors.

RBN: Statistics (6)

- Stations with more than 10 RBN spots so far (January to June) in 2011: **43593**
- EU: 54%, NA: 30%, AS: 11%
- K: 26,5%, UA: 8,6%, DL: 7,4%, JA: 5,5%
- RBN *only* detects CQing stations
- Guesstimate: over 50,000 stations active in CW

In order to make a guess of the active CW fraternity, a threshold of 10 Skimmer spots was used, which leads to 43593 callsigns that are *most likely* correct. This may include some wrong calls, but also some of the calls left out might have been correct.

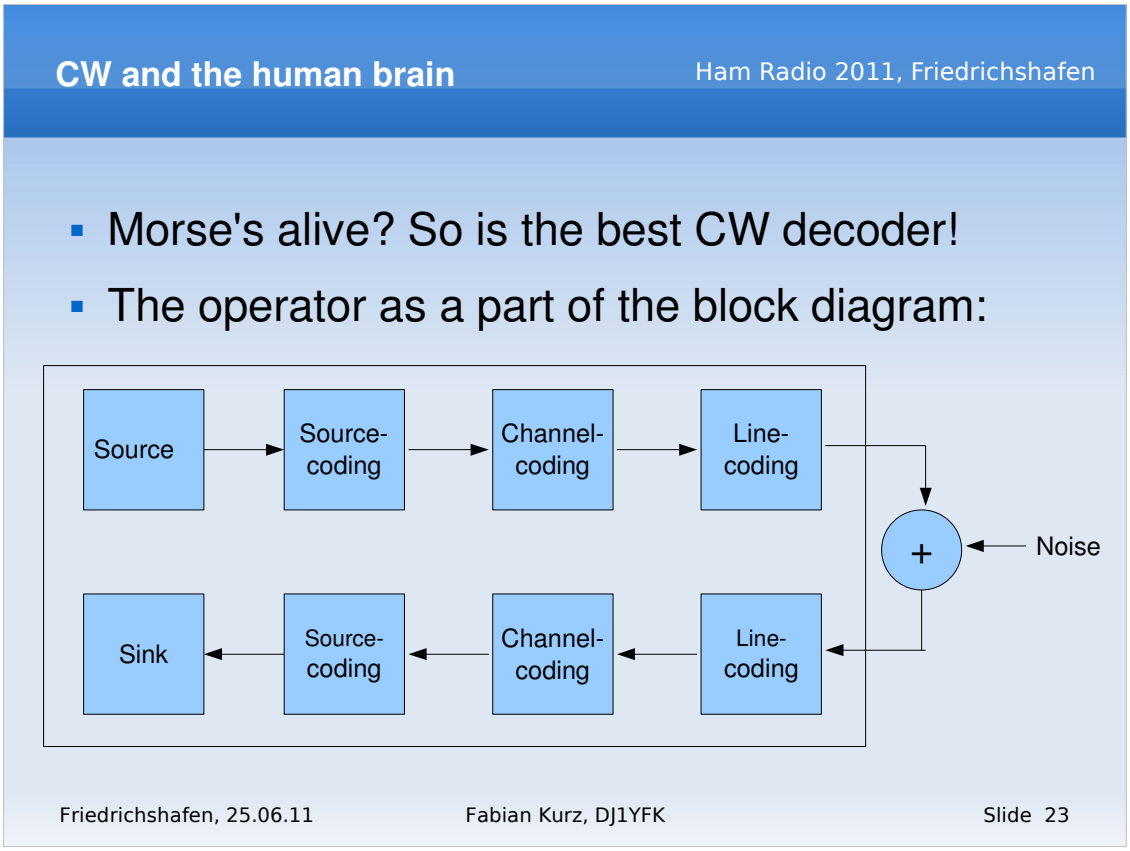
More than half of these callsigns are from European stations, about a third from North America.

Considering that the CW Skimmer / RBN only records stations that call CQ, and some may never do that, it's safe to add some more to the 43k calls for a guesstimate of the CW population on the bands. Without any claim for scientific methodology, the figure is somewhere over 50,000.

Potpourri, topic 3:

Morse Code and Psychoacoustics

... and now for something completely different ...



Not completely different, because there's a bridge from the previous topic. The CW Skimmer obviously made a lot of errors in decoding, and any decent CW operator knows that there's no CW decoder software available that can keep up with a human. Morse code is alive, and so are the best decoders!

Indeed, that's partly because there's so much more involved than just decoding the Morse code. Communication in Morse code is sketched in the block diagram above. Only the „Line coding“ blocks are actually sending and receiving Morse...

- Source coding: Reduction of redundance
  - e.g. using abbreviations
- Channel coding: Protection against errors
  - e.g. repetition of important words
- Line code: „Morse code“ itself

Many complicated processes which an experienced CW operator intuitively handles.

CW and psychoacoustics

- Ear and brain: Ingenious „Signal Processor“
- Optimization of CW operation possible!
- The ear works as a filter band: „Critical bands“
  - Each about 100 Hz wide up to approx. 500 Hz
  - Above: About a minor third (freq ratio 1.19)
- Copying Telegraphy in Noise, effective SNRs
    - CW signal at 1 kHz: eff. BW = 160 Hz
    - CW signal at 500 Hz: eff. BW = 100 Hz
    - „Gain“: 10 log (160/100) = 2 dB!

We can take advantage of our great ear-brain-system by taking the specifics of its operation into consideration.

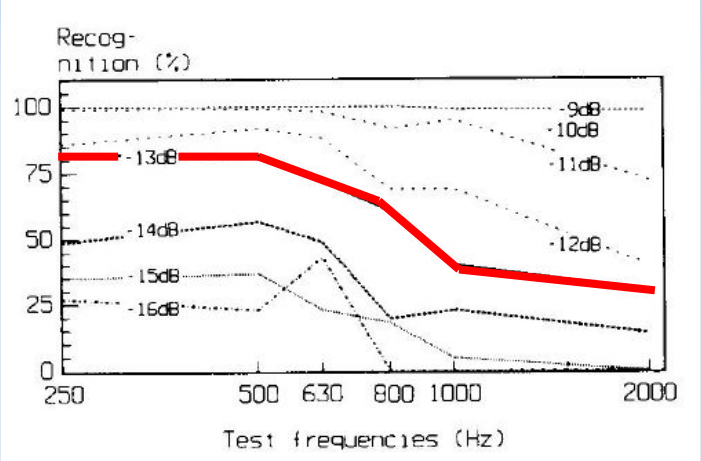
The „filters“ built into the ear have a rather narrow bandwidth of about 100 Hz below 500 Hz and get wider above this frequency.

When a signal in noise is received, the ear-brain-signal processor only needs to discern the signal from the noise within the bandwidth of the built in filter in which this signal is located. At 500 Hz, it's within a 100 Hz wide filter, at 1kHz the filter is wider, about 160 Hz. That means that there's more noise power within the ear-filter at 1 kHz, to be precise the relation is exactly the relation of the bandwidths. The additional noise power in the wider filter can be calculated as shown above, the difference is about 2 dB.

CW and psychoacoustics (2)

- Gray theory or can it be demonstrated?
  - And what's 2 dB anyway?
- „Signal Detection in Noise with special reference to Telegraphy“
  - Dissertation of Peter Montnémery, SM7CMY
  - Influence of various parameters (SNR, tone frequency, loudness, usw.) on CW reception
  - Researched with scientific methods

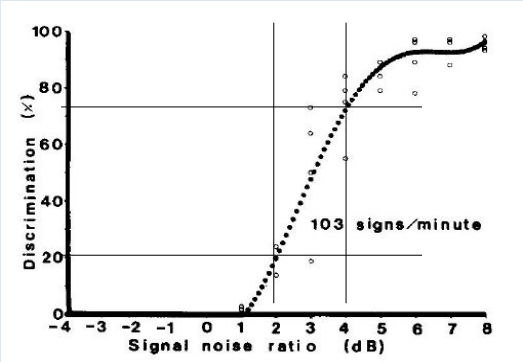
- Recognition rate vs. tone frequency



This chart from Peter's research shows the effect of CW recognition rate vs. Tone frequency in presence of noise, at different SNRs. It was tested with ten CW operators.

Take the red line as an example. It shows the rate of recognition at a fixed SNR of -13dB. It's at about 80% at frequencies below and equal to 500 Hz (remember: 100 Hz bandwidth of the „ear filters“). At 1 kHz the rate drops to below 50%. The signal-to-noise ratio stays the same, it's just a different frequency! It can also be seen that the line for a SNR of -11dB (e.g. 2 dB better) reaches about the same recognition rate at 1 kHz as the -13dB-line reaches at 500 Hz.

- Discrimination rate vs. SNR
  - Tested with 10 experienced CW operators



Another illustration of how much a difference 2 dB can be is shown here. The tone frequency stays fixed, the SNR is changed. Over a span of about two dB, the rate rises from about 20% to about 75%.

CW and psychoacoustics (5)

- Conclusions
  - Best frequency for Morse code: about 500 Hz
    - „Standard“ (TRXs, software, ...) at 700 – 800 Hz
    - By optimum parametrization, 2 dB of „passive gain“
  - Narrow CW filters are not always useful
    - Without any interferers in the passband, the ear does the job already
    - Very narrow filters, below the critical bandwidth, do help
- Other topics
  - CW volume is important (temporal masking effects)!

A suitable frequency for CW operation is 500 Hz. Many transceivers but also Morse programs use a default of 700 to 800 Hz, which is not a good choice, considering psychoacoustics.

By simply chosing the correct CW beat tone frequencies, it's possible to have a „gain“ of 2 dB over a poor choice. And it has been shown that this can make the difference between success and failure in a CW QSO.

The filtering properties of the ear also suggest that narrow filters, in the presence of only noise and without any interferers, are not helping much. They do help if their bandwidth is below the critical bandwidth of the ear, but narrow filters are often not practical, both because of their physical properties (ringing, insertion loss...) and also because in ham radio it's a good idea to know what's going on close to your own frequency.

Finally, there are other aspects of psychoacoustics which can be considered for good CW operation which are beyond the scope of this presentation, such as masking effects.

Potpourri, topic 4

High Speed Telegraphy Competitions

... and now for something completely different ...

Morse code as sport: HST

- High Speed Telegraphy
- History:
  - Since abt 1935: Contests in the USSR and the USA
    - Copying code groups, often professional CW operators
    - 1939: Ted McElroy (USA): 376 CpM (typewriter)
    - 1954: Fedor Rosljakow (USSR): 440 CpM (typewriter)
    - 1954: Wesselin Borisov (Bulgaria): 400 CpM (pencil!)
  - New era: IARU HST Competitions since 1995
    - 2011: First IARU HST World Championships in Germany

High Speed Telegraphy is not only something that hams enjoy on the bands, it's also a „radio sport“ which is done in competitions which actually do not involve radios at all.

Such competitions have probably been held for almost as long as telegraphy exists, but some prominent events are still well known today, such as the 1939 „World record“ by Ted McElroy. Sources from the USSR indicate that much higher speeds have been achieved in the fifties, but they're not widely recognized.

Ham Radio HST competitions have been held pretty much during the whole Cold War era, with mostly participants from states from the Eastern Bloc. But as of 1995 there are competitions organized by the IARU. In 2011, the first competition of this kind will take place in Germany.

HST: IARU-Competitions

- Stronger focus on ham radio than classic competitions
  - New disciplines: Callsign receiving, Pileup competition
  - Participants must be licensed radio amateurs
- World- and IARU R1-championships each other year
- The DARC team took part in 12 competitions ('97-'10)
  - Results: 2 x gold, 4 x bronze
- HST dominated by teams from eastern EU (EW, UA, YO)
- HST in October 2011 in Bielefeld, Germany
  - About 150 participants from 19 nations registered
  - Website: http://www.hst2011.de/

Compared to the previous competitions, a stronger focus on ham radio was enforced by adding callsign receiving and pileup competitions. Previously only code-groups (TX, RX) were used, and often the Morse competitions were done in combination with other fun sports, such as hand grenade throwing.

Since 2006, there's an IARU worldchampionship each odd, and a Region 1 championship in each even year. Originally there were only the former events, but due to the high popularity, the regional championships were added.

Still today, the most successful HST teams are from eastern Europe, most notably Belarus, Russia and Romania. HST is taught and practiced as a separate sport there, only losely connected to ham radio. Some of the top competitors have never made a single „real“ contact on the radio; they regard Morse code itself as their sport. In some countries, the „athletes“ are supervised by professional trainers, making it difficult for „normal“ hams to compete with them!

HST: Categories

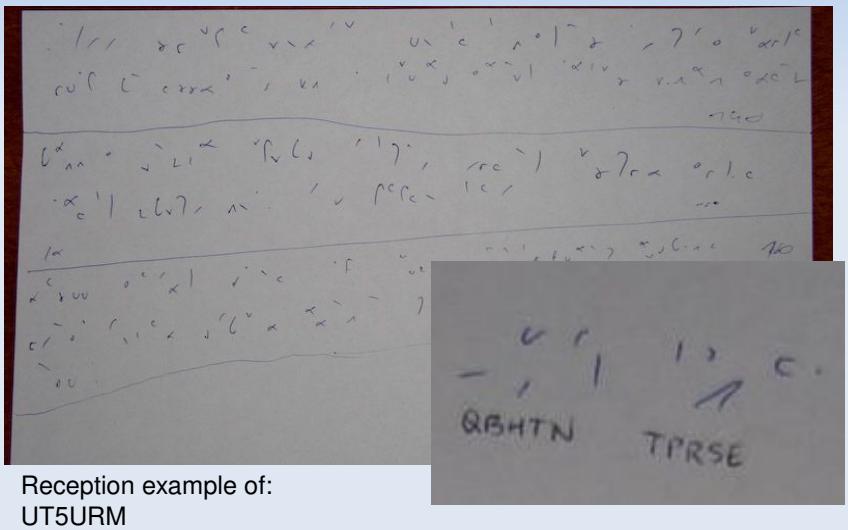
- Classic disciplines:
  - Code groups (Letters, Figures, Mixed text)
    - Reception (QRQ by 10cpm until the last one gives up)
    - Transmission (speed chosed by participants)
- Amateur radio competitions:
  - RufzXP – Callsign receiving (by DL4MM)
  - MorseRunner – Pileup competition (by VE3NEA)
- Why no head-copy competition?
  - Doesn't allow objective scoring, language barriers!

Unfortunately, one of the disciplines where „normal“ hams could do very well, is not a part of the competitions: There's no head-copy competition, because the participants at the HST are coming from many different countries and speak different languages. Holding the competition in English would be a disadvantage to some; using the native language for everyone wouldn't give a good metric for a fair comparison.

So there are only the „classic“ disciplines of copying and transmitting code groups, and the two Amateur radio competitions.

HST: Shorthand for code groups

- Code groups: The challenge is to write, not to hear!



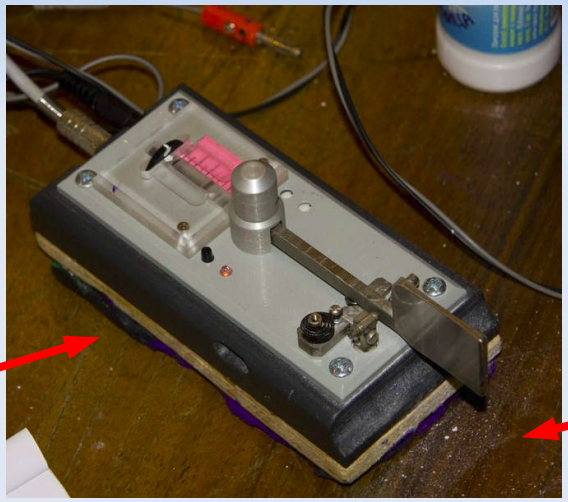
Reception example of:
UT5URM

In receiving code groups, the Morse speed is not the limiting factor for most participants; writing it down is!

While most competitors from the „western“ countries use a laptop to copy, and only achieve mediocre results, the real pros use their special short hand system. The photos above show an example from Svitlana, UT5URM, along with a translation. Competitors from different countries use different systems, and probably everyone has got his own characteristic handwriting. At the top speeds (for letters that's around 300 characters per minute, about 375 CpM / 75 WpM PARIS) it certainly takes a high level of concentration to get the groups on the paper; and it's also an exhausting exercise. After a run of code groups is done (one minute per speed, then one minute break and it continues with the next speed, 10cpm faster), it's not uncommon to see a competitor grab his towel to dry his sweaty fingers.

Finally, it takes considerable time for the competitors to decode their scribbling at very high speeds. Ten minutes to decode the code groups that were jolted down in one minute is not uncommon!

- Transmission: „forceful precision“ engineering



Also the keys at HST events differ a little from what can be found in most shacks. For one, most competitors are using single lever keys; it's supposed to reduce the error rates at high speeds. Also, the keys are very solid and fixed to the table somehow (e.g. with putty or sometimes even with a clamp!). That's needed because the keying is done with a lot of force, compared to what we're used to in ham radio. There are some videos showing this keying style on youtube (search for „HST 2008“).

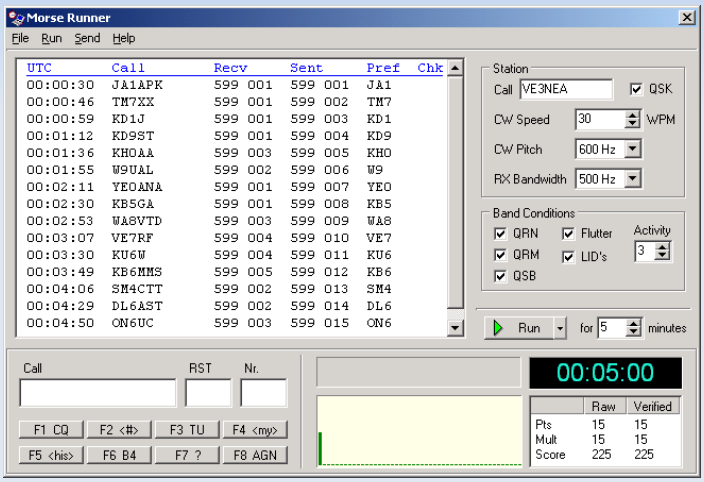
HST: RufzXP

- RufzXP – Callsign reception without a speed limit

Errors (37)	Transmitted callsigns (50)	Received callsigns	Speed	Max points	Gained points	Elapsed time [ms]	Frequency
0	PY1ARS/4	PY1ARS/4	723 CPM	7641	7276	1542	800 Hz
1	W3GM	W2GM	745 CPM	6284	1516	1091	786 Hz
0	G0DEH	G0DEH	723 CPM	6393	6187	1011	836 Hz
0	PY7GK	PY7GK	745 CPM	6788	3259	1262	637 Hz
0	ER/UT7ND	ER/UT7ND	767 CPM	8599	8072	2022	757 Hz
0	N8BB/M	N8BB/M	790 CPM	8160	7744	1652	734 Hz
0	AA1CA	AA1CA	814 CPM	8104	7792	1222	825 Hz
0	LA7IJA	LA7IJA	838 CPM	9181	8716	1642	784 Hz
1	EA3URO	EA3ARO	863 CPM	9738	2272	2223	874 Hz
0	SV8/OE3MZC	SV8/OE3MZC	838 CPM	11245	10546	2053	606 Hz
0	AA6M	AA6M	863 CPM	8433	8040	1502	788 Hz
0	EA8/DL7AU	EA8/DL7AU	889 CPM	12117	11334	2143	874 Hz
1	AB2BK	AB2SK	916 CPM	10262	2351	2864	679 Hz
0	W1ZA	W1ZA	889 CPM	8949	8689	911	817 Hz
1	UA9FAR	UA9FAN	916 CPM	10970	2616	1483	902 Hz
0	CT3/OK2BOB/P	CT3/OK2BOB/P	889 CPM	13670	12810	2083	907 Hz
0	W8SSI	W8SSI	916 CPM	10262	9554	2304	973 Hz
0	DL7VZF/m	DL7VZF/M	943 CPM	12999	12408	1463	954 Hz

RufzXP, one of the „practice tests“ is a callsign trainer with an easy but develish concept. Starting from an user-chosen initial speed, it transmits a random callsign from a database. If the callsign was copied correctly, the next callsign is transmitted at an increased speed and points are awarded. If the callsign wasn't copied correctly, the speed for the next callsign decreases. This ensures that the competitor is always at his own personal speed limit.
Speeds in excess of 1000cpm (200wpm) have been demonstrated to be copied at HST competition, but the normal speed range is „only“ somewhere up to 800cpm (160wpm).
Contrary to the code groups, the main challenge here is to hear the callsign at the high speed, not to type it into the computer. The program waits for the user to do this, only after hitting Enter the next call is transmitted.
At extremely high speeds, various strange effects appear. For example, it often happens to make mistakes between the figures 1 and 9, which would almost never happen at low speeds. The reason is simply that the dot gets lost and only the four dashes are detectable at the speed. Also, since the level of consciousness on which copying the callsigns shifts down, and is more or less done by „muscle“ memory, it often happens that a certain „sound“ provokes two keystrokes. E.g. a „F“ might be copied as a „F“ and the left hand types it, but at the same time the right hand types „ L“, because somehow also the „detector“ for the L was triggered somewhere in the synapses!

- MorseRunner – Pileup competition



HST: No lack of young blood!

Team YO

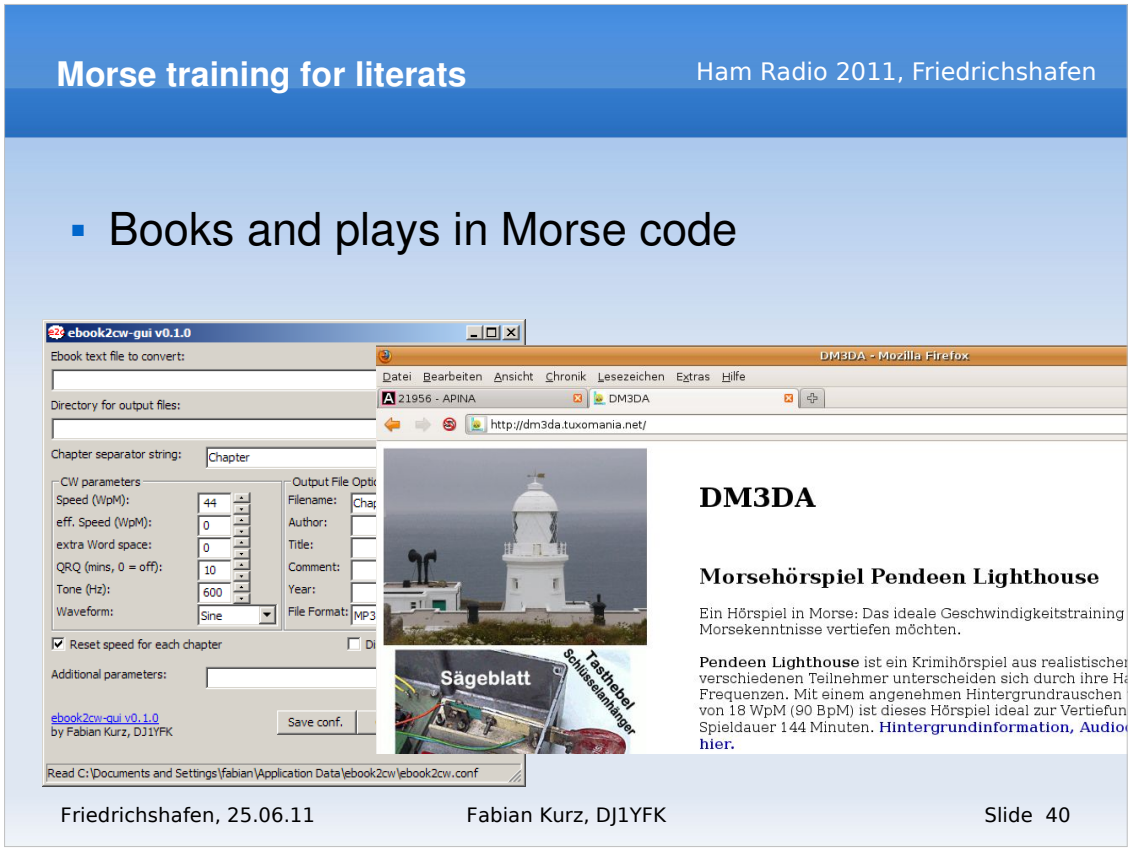
Team EW

Two pictures say more than a thousand words...

Potpourri, topic 5

Audio books in Morse Code

... and now for something completely different ...



After considering how to learn CW, modern technology for sophisticated CW decoding, psychoacoustics and finally Morse code as a sport, it's time to have a brief look at a most pleasant aspect of CW before we finish: Audio books in Morse code!

The idea is not new, the first Morse code audio books were produced almost ten years ago, but it didn't become very popular before portable MP3 players were available, and carrying a CW-book around with you got easier than ever before.

Nowadays there's free software available to convert an arbitrary „ebook“ to Morse code audio files, like ebook2cw, and many people are converting anything from the Bible to Science Fiction to Morse code. The links in the appendix show some more examples.

Thanks!

Slides (PDF) and links:

`http://dj1yfk.de/ham/fn2011/`

Well, this concludes the little „Morse Potpourri 2011“. On the website (http://fkurz.net/ham/fn2011/) you'll find various versions of this presentation (with or without annotations; German and English) and a number of links related to the various topics.

I'm grateful for any kind of feedback.