ZERO RADIO CLUB

RADIATORS

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www.rigpix.com

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Contest Station 2020

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Contest Station 2020

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Presentation for OHDXF Cruise
Stockholm harbor, Viking Mariella
31st January 2015
OH6LI Jukka Klemola

Thanks to contributors

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OH1TV, OH1XX, OH2BO, OH2RA, OH3FM, OH6BG, OH6KN, OH7MS

K1DG, K3LR, W3LPL, W8JI

.. for answering my questions on what and how to develop at ham stations till 2020

Contents

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- The Good Old Days
- Now and up 5 years - Overview
- Current State in Detail + development to 2020
  - Antennas, connectors, towers, switches, filters
  - Radios, receivers, transmitters, amplifiers
  - Externals, software, plugging in the operator
  - Wetware improvements
  - View 2020
  - Expedition 2020
  - Questions

The Good Old Days

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Galaxy 550 product brief
7.7kg
All bands
9MHz IF
Second VFO – 2 knobs
550W pep

www.casualham.com

Now and up 5

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- Any 5 year improvement is available now
  - Technology is in use
  - Implementing to contesting takes time
- Recognising the unused
- Developing the existing
- Keeping the good
- Changing the inefficient

- Concentrating at things that will develop

Antennas

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- Better weather resistance - research projects
- Phasing vs. parasitic element antennas
  - Currently no known gain / take off angle benefits
  - Opportunity in fast direction control
  - Difficult to make and tune = development needed
- Tuneable element concepts
  - Possibility to tune for different beamwidths
- Dedicated receiving antennas
  - Smaller than beverage, smaller than 4SQ
  - Performance currently comparable

Connectors, towers, switches

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- UHF connector not optimal
  - Braid connection development needed
- Hot dip galvanized steel for towers – mature
  - Better corrosion resistance - research projects
- Rotation control concepts developing
  - Log software controlled; N1MM command Alt-J
- Antenna switching automated; N1MM configurer
- Relays
  - Development towards pin diode switches for better mechanical properties

Filters

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- Receive only, 200W power and high power
- Providing better multi-radio operating

- Throughput loss, stopband attenuation, reliability

- Triplexers now
  - Hexaplexer = All contesting bands by a single antenna and a single feedline

Radios

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- SO2R
  - Many new users
  - New details in user interface
  - More screens, keyboards
  - SO2R on a single band for top scorers
- SOnR
  - n>2 radios spectrum + waterfall on other bands
  - One receiver for all bands - - simultaneously

Radios - receivers

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- Good Old radio was with 9MHz IF
  - 1980 – 2010 main stream 70MHz replaced by 9MHz
  - DSP walk-in for better receivers
- Current spectrum performance focus on receiver
- Band scopes, pan-adapters developing
- Modern receivers can provide spectrum + waterfall for all bands on one screen
  - Feature is entering contest stations
- Receivers can decode signals
  - RTTY existing, CW developing, SSB unused

Radios - transmitters

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- Good Old radio 550W pep
  - Current main stream 100W out – will develop
- Development towards cleaner transmitter output
- DSP for transmit audio equalisation
- DSP for transmitter efficiency with linearisation
  - Smaller, less weight and less heat

Radios ....

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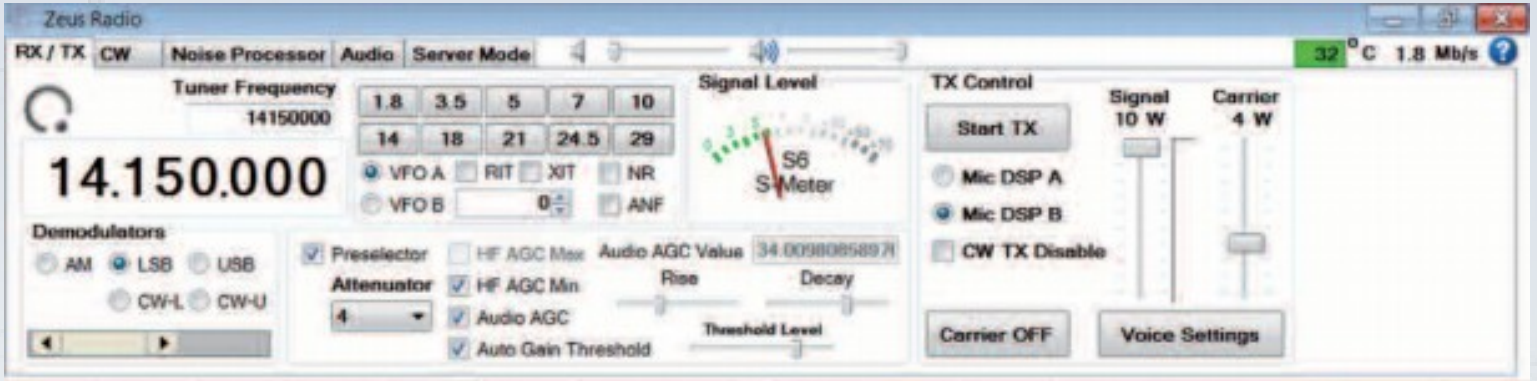
- Radios with full computer control
  - UI transformation from separate box to computer
  - Remote by duplicating computer UI over IP



http://ssb.de/pdfs/9370.pdf

PHOTO 2: Zeus ZS-1 interconnections on the rear panel.

Radios .....

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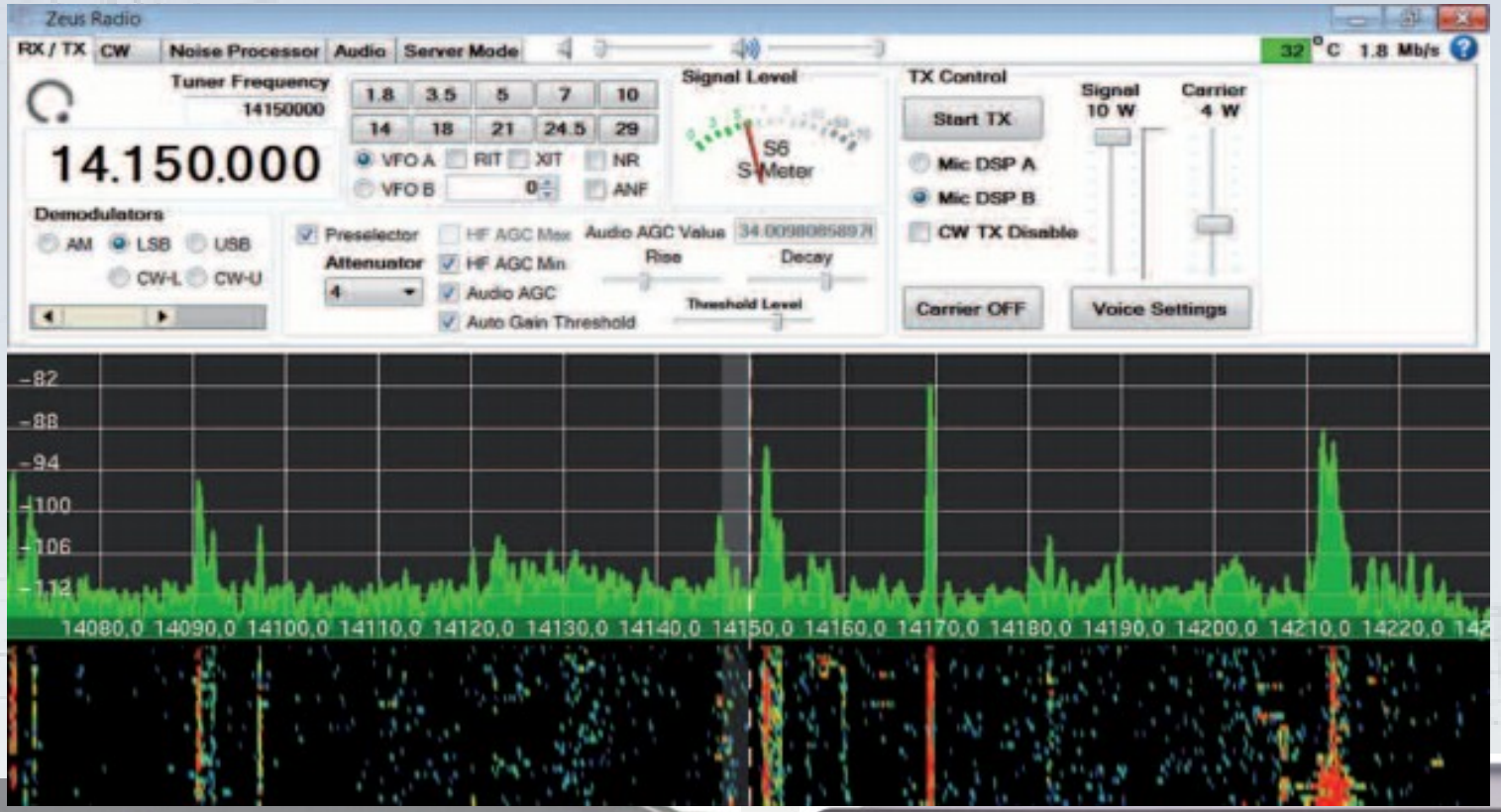
- Pan-adapter is disappearing as a separate box



http://ssb.de/pdfs/9370.pdf

PHOTO 2: Zeus ZS-1 interconnections on the rear panel.

Amplifiers

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- Benchmark Good Old Radio had enough power
- Current state 25+kg amplifier boxes
- Auto-tune advertised, semi-automatic 2015 reality
- Over power stations
  - Development towards Power Category Certified
- Development towards integrating the amplifier into radio's physical box
- Weight reduction through SMPS and linearisation
  - FT1000D level package at 1500W Certified output
- Power dissipation from ~50% to less than 10%

Externals

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- SCP development potential
  - Currently supporting only calls
  - Pre-contest activity information
  - History information, when on what band
  - Automatic suggesting skeds for known all band stations
- Integrating propagation forecasting to SCP
  - Agile propagation forecasting on real live QSO: data

Externals

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--- then the assisted concepts

Externals ..

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- DX Summit shares call/QRG/QTR information
  - Manual plus a frontrunner; W3LPL
- Propagation services
  - VOACAP, K6TU and other – prediction services
- Live data integration to propagation service
  - Currently top stations monitor RBN manually
  - Automatic own call S/N monitoring in target area
  - Huge development potential
- Solar & geomagnetic data 2015 only source
  - GPS or other satellite signal fluctuation by 2020 ?

Software

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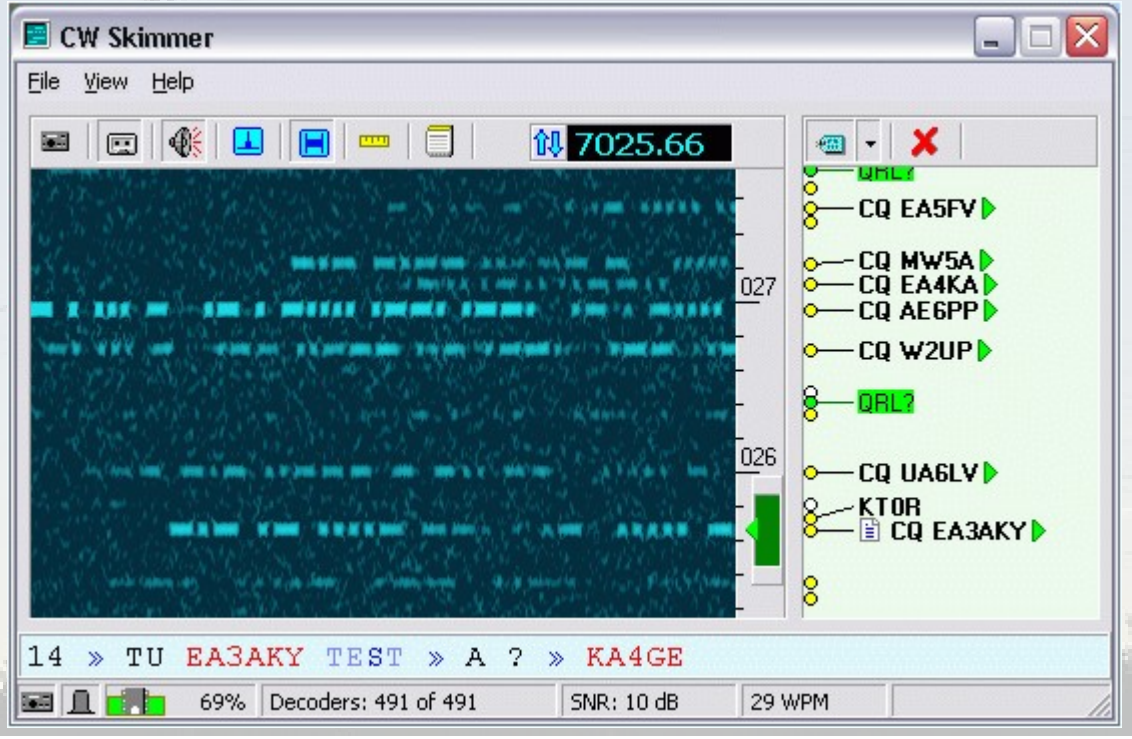
- Currently logging with 1kHz QRG, 1min QTR
- 2020 Cabrillo logging to 1Hz, 1s
- Decoding moving from operator to radio to software. Software wins.



www.dxatlas.com/CwSkimmer/

Software ..

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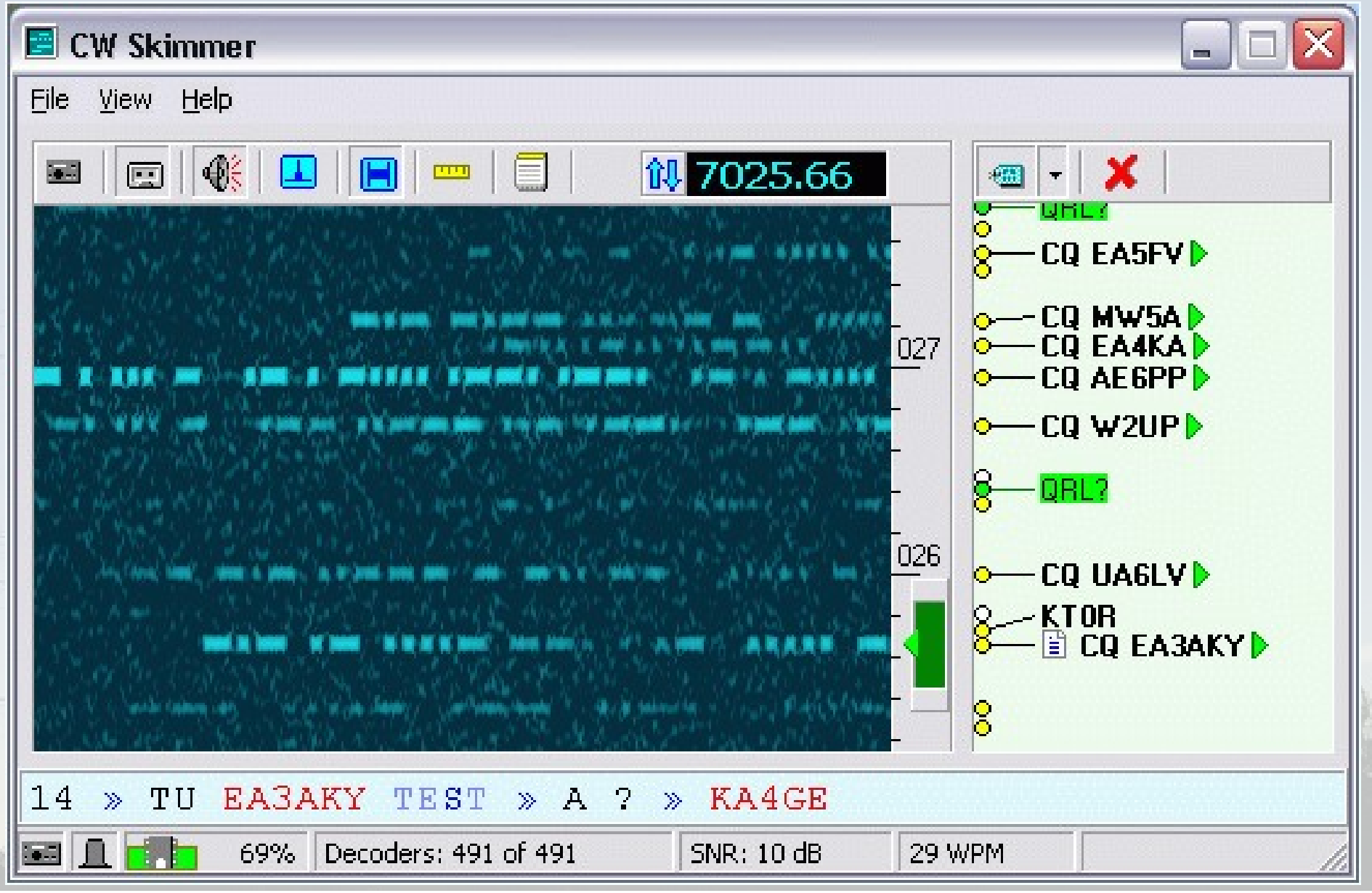
www.dxatlas.com/CwSkimmer/



Software ...

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- In-station SDR with decoding and spotting
  - Real live call database for SCP
  - Real live information on who is where doing what
- Decoding capability better than human on CW
  - Even RTTY decoding still improving
  - SSB decoding unused
  - SSB live translation unused
- Software tells if it agrees with logged call & msg

Software ....

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- Software 2020 can
  - Suggest a a new Run frequency for more pts/h taking into account propagation status, forecasts and trend
  - Suggest S&P actions for more pts/h taking into account what the multiplier is doing and is likely to do
  - Suggest S&P fine tune TX frequency based on pileup
  - Monitor multiplier behavior and suggest actions

  - Bring in new contesters – copying not mandatory
  - Translate SSB for contest & DX communications

Copying

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- RTTY copying already machine based
- CW changing to machine aided
  - Dayton 2009 pile up contest

Kansas City DX Club

Nihiles Ante Unum!
(Zeroes before Ones!)

Home of the Annual Dayton CW Pileup Competition

The Basics

Home

CW Pileup Competition Results 1995-2014

http://www.kcdxclub.com/pileup2009.html

2009

(111 Participants)

Skimmer 61

1	VE3DZ	51
2	W9WI	49
3	K4BAI	47
4	N2NC	46
4	KL9A	46
6	VE3XB	44
6	K1VR	44
8	N9RV	43
8	KE3Q	43
8	K1DG	43

Software .....

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- 2015 bandmap uses mainly external data
  - Few contest stations have own SDR + decoder
- 2020 bandmap improved with station's own decoder providing additional information
  - Multiplier Priority
    P = a*S/N + b*propagation status + c*propag. trend + d*likely future availability + e*rarity + f*...
  - Algorithm configurable
  - Sorted by Call, QRG, beam heading, Priority
- SW purpose to help operator to make decisions

Plugging in the Operator

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- Focus to serve the operator
  - Add contest fun for those who want to have fun
  - Exploit the operator to full potential for top scorers

- System guidance to
  - CQ, S&P
  - Drink, eat, take a break
  - Exercise, rest
  - Skeds with family – dinner ?

Plugging in the Operator

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- BIC most important measurable
  - Set target and achieve xx/48h or zz/24h
- Alertness monitored
  - Station monitors QSO rate, accuracy
  - Reaction time to suggestions
- Brain-computer interface beyond 2020
  - Development will happen

Operator interface 2020

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- Information on screen, earphones
- Main input device keyboard
- Traditional mouse disappears

https://www.leapmotion.com/

Operator interface 2020 ..

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- Radio controlling device

http://www.numark.com/product/omnicontrol

Wetware improvements

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- Wetware is the human organ in the system
- Operating, logging, deciding are cognitive actions
- Operator physical condition
- Best possible use of the station investment
- Performance enhancements
  - Caffeine, other chemicals; 2020 DoctorDX pill ?

Wetware improvements ..

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- www.foc.us
- Computer gamers and athletes use in 2015

Wetware improvements ..

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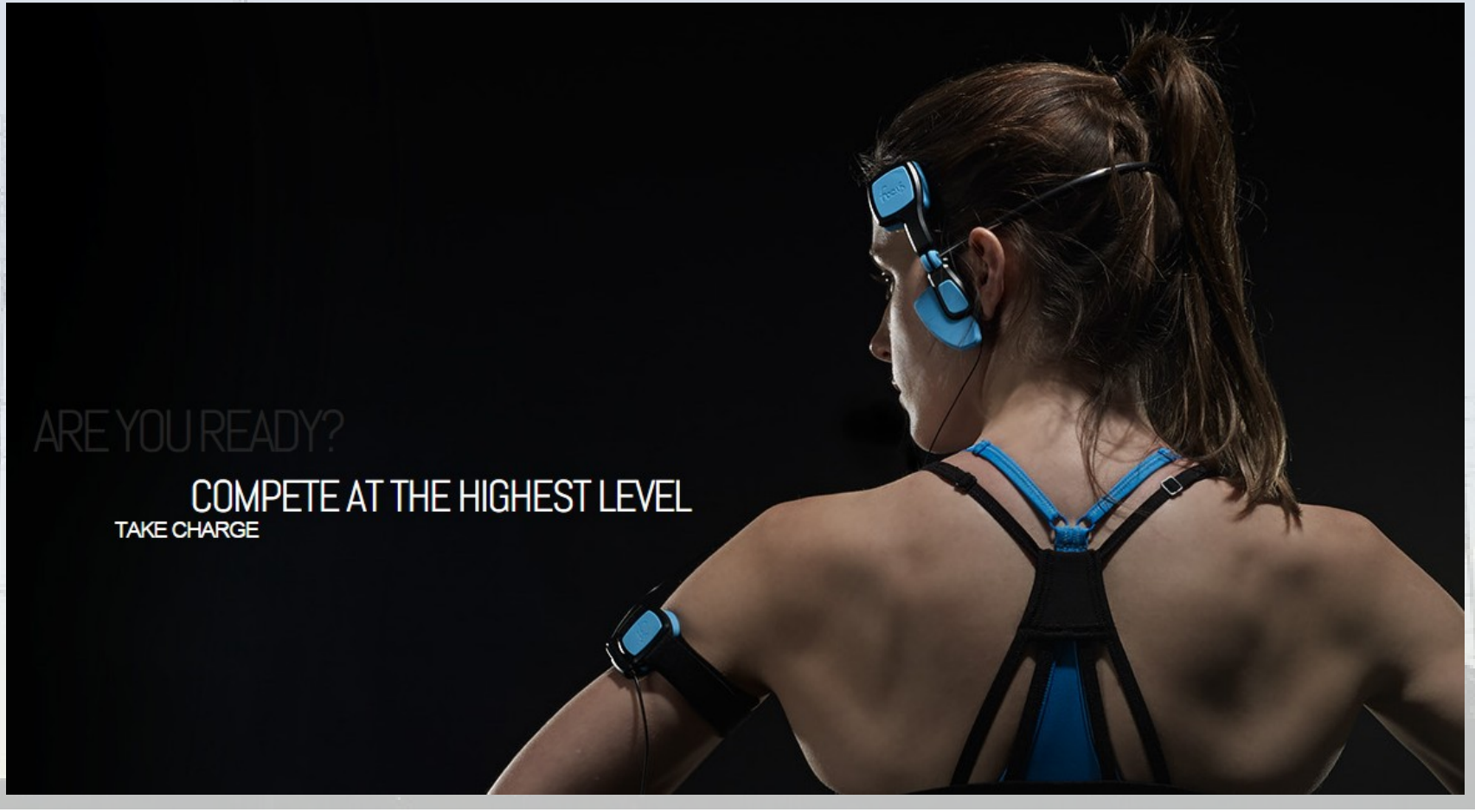

Wetware improvements ..

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- Is this picture taken after 24 hours BIC in 2020 ?

www.foc.us

tDCS

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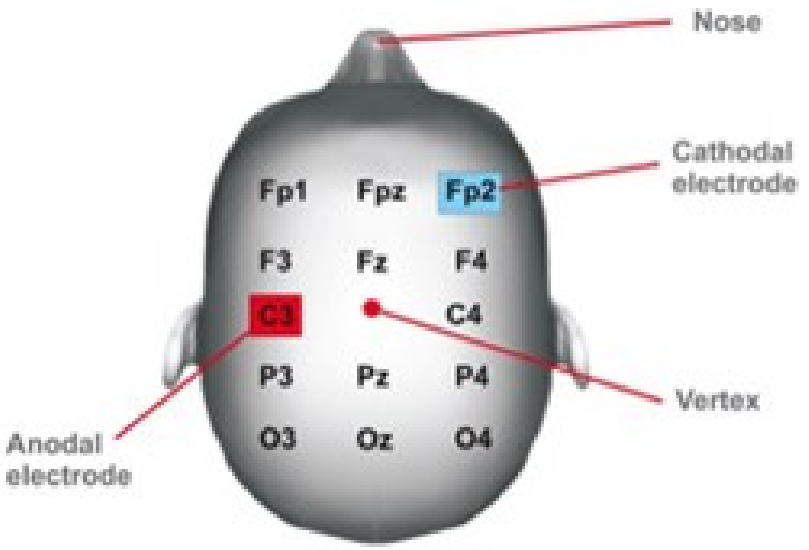
tDCS Montage	Anodal Stimulation	Cathodal Stimulation
C3 - Fp2	123	80
O3 - C3	107	93
O3 - Fp2	107	107
O3 - F3/Fz	101	101
C3 - C4	107	108
Fp2 - P3	111	112

MEP size in % after stimulation compared to no stimulation



http://www.jove.com/video/2744/electrode-positioning-montage-transcranial-direct-current

View 2020

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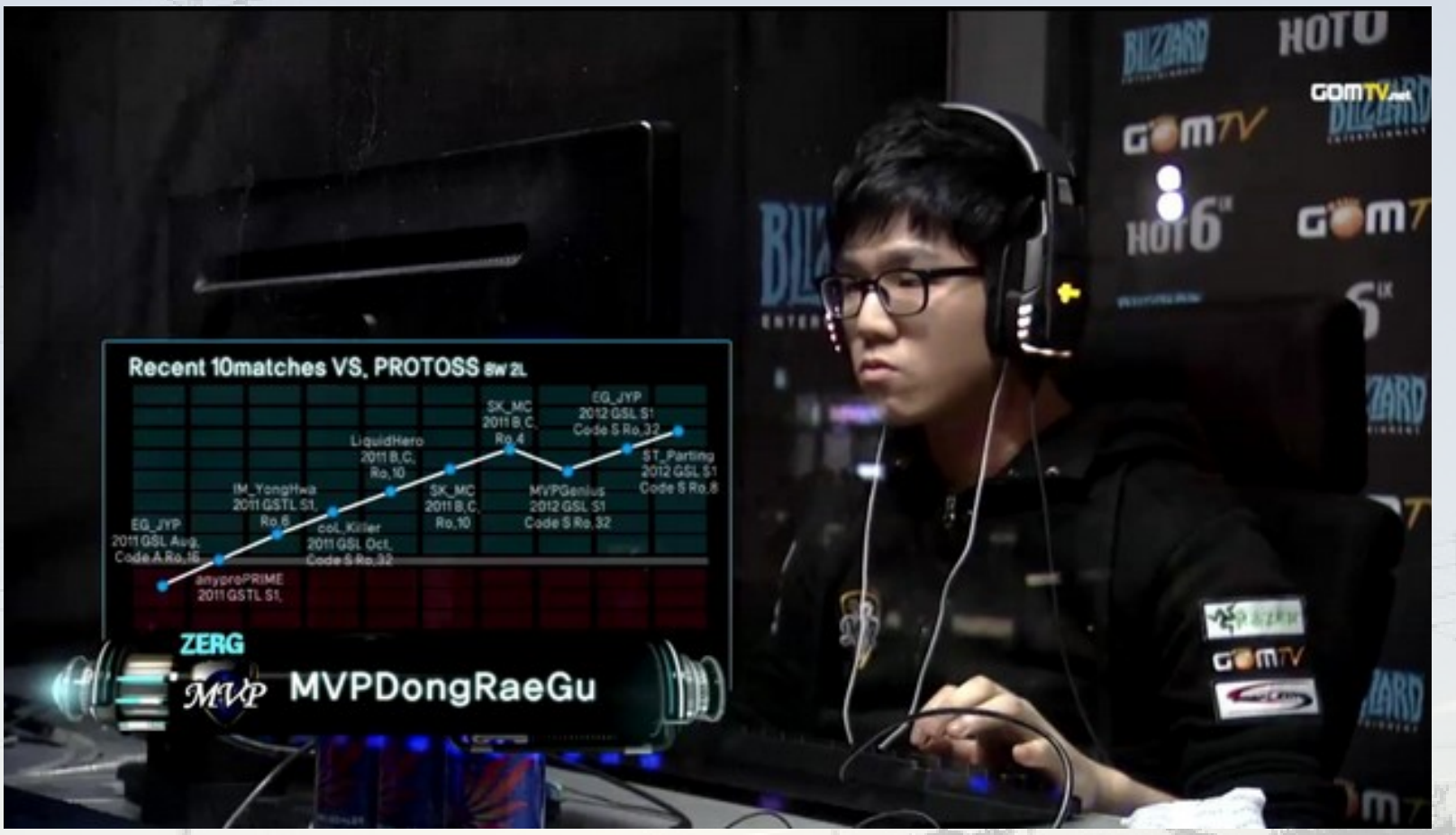
- This 2014 computer gamer used two headsets



http://gaming.stackexchange.com/questions/53292/why-do-pro-gamers-use-two-pairs-of-headphones

Expedition 2020

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- Radio hardware can be in a container or two
- Operators can be at a hotel or elsewhere
- Two-three antennas to different directions
- Hexaplexers to simplify station build-up

Expedition 2020

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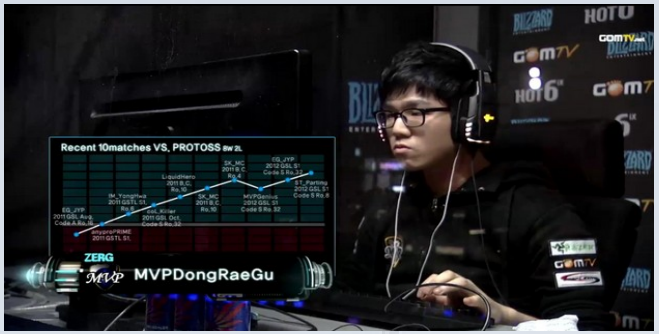

Six band antenna 1

Six band antenna 2

http://gaming.stackexchange.com/questions/53292/why-do-pro-gamers-use-two-pairs-of-headphones

http://ca-containeralliance.com/containers/40ft-container-rental/

Thank You for Listening

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- Questions ?