

CW Skimmer – One

Pete Smith, N4ZR

Dayton Hamvention Contest
Forum

May 16, 2009

What's Happened to ...

- “Contesting as We Know It” – not much
- The Rules – at least we're clear
- The Software – improved
- The Hardware – reaching consensus?
- Operating Techniques – lots to learn
- Breaking news – shhh.....

The Rules

Rules clarified - Skimmer basically treated like packet

- ARRL says remote Skimmers OK so long as not closed systems – some club systems already in use, other shared remote Skimmers planned
- Other major contest sponsors likely to follow suit

Software Improvements

- Early experience – too many busted calls, too many S&Pers spotted
- Revisions made in version 1.4 – greatly improved callsign validation
- Some problems remain – i.e., SoftRock-IF bandwidth limitation

Hardware – Direct vs IF

- SDR From IF Tap on Transceiver
 - K3, TS-850, TS-950 some others already have the IF output
 - Automatically tracks your radio (BPFs, etc.)
 - Excellent ready-made hardware available

But ...

Radios...

- SDR-IQ



- Plug-and-play with Skimmer
- Add-ons by W2RF, W3OA provide for unattended operation of Skimmer, better integration with logging software and radios

Still More...

- Perseus



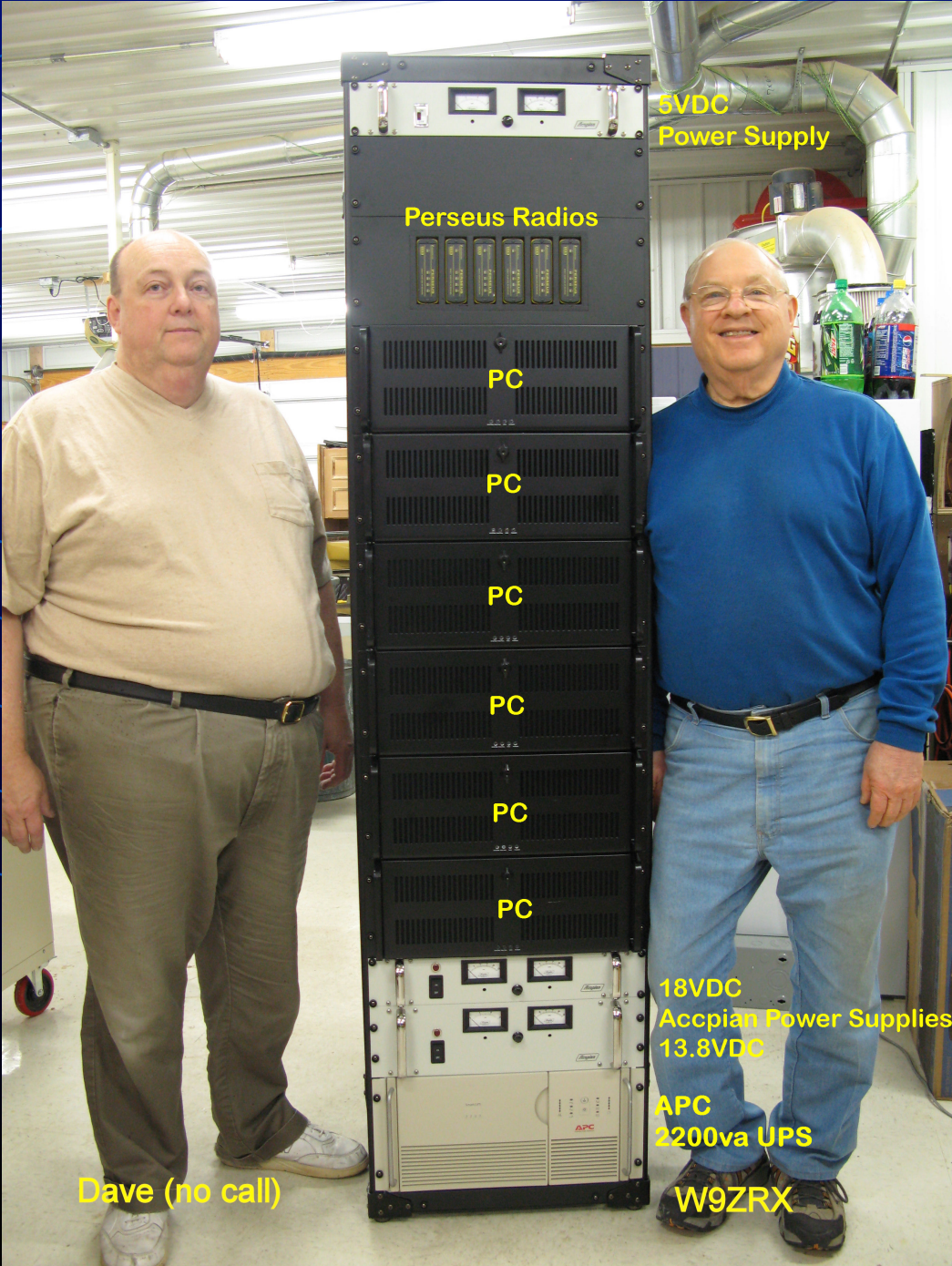
- High-performance SDR, price 2X
- Can work with Skimmer with two additional pieces of software and a little effort
- N6TV is the expert – see www.qrz.com/N6TV

Computers – Godzilla required?

- No, but your 600 MHz P3 won't cut it
- My dedicated Skimmer box – the cheapest P4 dual core, 2 GB memory, 250 GB hard drive, XP Home - \$375
- Didn't get over 50 percent CPU utilization even at ARRL DX CW peak

Skimmer Station Design

- Majority of Skimmer setups in use or planned by contesters so far use SDR-IQ, Perseus and LP-Pan/K3.
- Omni-directional or quickly steerable antennas best
- All but SO1R will need ways to manage same-station interference



5VDC
Power Supply

Perseus Radios

PC

PC

PC

PC

PC

PC

18VDC
Accpian Power Supplies
13.8VDC

APC
2200va UPS

Dave (no call)

W9ZRX

Cluster/Skimmer Integration

- Easiest solution is to use WintelnetX by K1TTT
- Merge spots from cluster nodes and Skimmer
- Need a way to easily tell which is which

Operating Techniques

- What's different about Skimmer spots?
 - 10-100X more spots than cluster
 - Not just what someone thinks “worth spotting”
 - If Skimmer is local, spots will always be copyable

S&P with Skimmer

- Step through the bandmap – all Skimmer spots at the same beat frequency +/- 50 Hz.
- Rates of >100/hour S&P readily achievable, even late in a contest

Skimmer Spot Tips

- Keep Skimmer off-screen – or risk a new high in “single-op distracted”
- Keep logging program spot timeout short – no more than 10 minutes
- Use logging program or W3OA SkimScan to monitor and control Skimmer

This....

FT-1000MP

14030.20 SH/DX Wide

0.00 RIT XIT CW

14000 6Y1V 177° NEW
WX3B 102°
14005 HG4I 47° NEW
W1UE 57°
SX1L 53°
14010 RK3SWB 33°
N4PN 220°
14015 DL1IAO 47°
DL1EKO 47°
14020 SK3W 36° NEW
UR3IFD 40°
KT3Y 102°
14025 RK3MWI 30° NEW
LY3BN 38°
14030 RK1QWA 25°
TA3AX 47°
14035 IK8UND 55°
LZ9X 50° NEW
EF1A 63°
14040 RZ6HV 38°
V47NT 144°
14045 VE1OP 59°
KG9N 287°
14050 G4RCG 49°
K3WW 102°
YU5M 49°
14055 IOTIC 55° NEW
HA1VE 47°
14060 ES2DJ 34°
UA3RN 33°
RA2FN 40°
14065 K1DG 57° NEW
NY4A

OR

Available - 32 Mults 216 Qs (No Spot Focus C...)

Mults	Qs	
0	160	0
0	80	0
0	40	0
32	20	216
0	15	0
0	10	0

Not This...

The screenshot displays the CW Skimmer 1.4 software interface. The main window shows a waterfall plot with a frequency scale from 024 to 030 MHz. The current frequency is set to 14025.00 MHz. The plot shows several active callsigns, including CQ LN3Z, CQ DK3KD, 599, CQ RT3T, DE LA6DW, CQ KODXC, F6BEE, 599, S59ABC, CQ RG9A, AC5K, CQ DL8SCG, SP9DUX, CQ HB9DHG, YD5CBX, RU3DM, OK1DOT, CQ RW4WN, DL1DQY, F5IYJ, YL2TB, DE N3UM, 599, CQ UA2FL, and DL6P. The status bar at the bottom indicates the current callsign is YL2TB, with a signal strength of *ES EI5EB and a mode of *E55. The system tray shows 52% volume, 484 decoders, 14 dB SNR, 17 WPM, and 1 user.

The Callsigns window on the right displays a list of detected callsigns with their corresponding frequencies and UTC times. The list is as follows:

Freq	Utc	Call
14031.2	13:05:14	403A
14044.6	13:05:50	9A1UN
14030.8	13:05:29	9A5X
14029.3	13:05:19	9A9A
14052.8	13:04:50	CT8K
14039.5	13:04:37	DF0SAX
14066.8	13:04:46	DH0GHU
14060.0	13:04:54	DJ5TT
14036.4	13:05:33	DK1QH
14029.4	13:04:19	DK3KD
14004.1	13:05:26	DL1EKO
14046.7	13:05:16	DL1IAO
14027.0	13:04:28	DL4CF
14032.9	13:04:32	DL5JS
14037.2	13:05:25	DL5RDO
14057.0	13:04:31	DL5YM
14026.8	13:05:27	DL8SCG
14041.5	13:05:20	DR5N
14066.3	13:04:20	EA8EW
14021.4	13:04:19	EF1A
14041.0	13:04:26	EF3A
14012.0	13:04:43	ES2DJ
14031.9	13:05:23	ES6Q
14068.9	13:05:11	EU1CL
14003.9	13:04:19	EV1R
14051.5	13:05:11	FG1RA
14049.1	13:04:56	HB9BXE
14069.0	13:04:09	HB9FMU
14047.3	13:04:31	HG6N
14019.4	13:04:13	HG7T
14011.4	13:05:54	I0TIC
14004.8	13:04:32	I1YRL
14032.8	13:04:18	IK2SND
14039.3	13:04:24	IW1QN
14058.8	13:04:48	IZ5EKV
14028.5	13:05:50	KODXC
14053.0	13:04:33	K5NA

Reverse Beacon Network

- Volunteers, using Skimmer, reporting stations heard to <http://reversebeacon.net>
- Initial idea was to map spots, like this...

CQ WPX 2008



But now.... Something new

Signal Comparison Tool

STEP 3: results for your query:

DATE: 2009-02-22 - DE: OY3JE/20m - DX: W3LPL,K3CR,N3RS,K3LR

[go back one step](#)

de	dx	freq	cq/dx	snr	time
OY3JE	W3LPL	14019.1	CQ	2dB	2009-02-22 11:45:14
OY3JE	N3RS	14013.6	CQ	8dB	2009-02-22 11:47:33
OY3JE	W3LPL	14019	CQ	7dB	2009-02-22 14:12:22
OY3JE	K3LR	14020	CQ	9dB	2009-02-22 14:30:50
OY3JE	N3RS	14013.6	CQ	8dB	2009-02-22 14:33:59
OY3JE	W3LPL	14019.1	CQ	12dB	2009-02-22 14:58:16
OY3JE	K3LR	14020	CQ	8dB	2009-02-22 14:58:56
OY3JE	N3RS	14013.6	CQ	15dB	2009-02-22 15:08:07
OY3JE	W3LPL	14019	CQ	18dB	2009-02-22 15:08:58
OY3JE	K3LR	14020	CQ	8dB	2009-02-22 15:27:13
OY3JE	W3LPL	14019.1	CQ	10dB	2009-02-22 15:28:00
OY3JE	K3LR	14020	CQ	12dB	2009-02-22 15:49:09
OY3JE	N3RS	14013.6	CQ	14dB	2009-02-22 16:00:43
OY3JE	W3LPL	14019	CQ	14dB	2009-02-22 16:00:47
OY3JE	K3LR	14020	CQ	7dB	2009-02-22 16:00:48
OY3JE	K3LR	14020	CQ	4dB	2009-02-22 16:38:20
OY3JE	W3LPL	14019	CQ	6dB	2009-02-22 16:38:37
OY3JE	N3RS	14013.6	CQ	8dB	2009-02-22 16:51:25
OY3JE	W3LPL	14019.1	CQ	10dB	2009-02-22 16:51:36
OY3JE	K3LR	14020	CQ	7dB	2009-02-22 16:51:51
OY3JE	W3LPL	14019.1	CQ	5dB	2009-02-22 17:11:41

Signal Comparisons

- All spots now include SNR (signal to noise ratio) – thanks, VE3NEA
- Near-simultaneous spots may yield useful comparative data
- Of course, SNR is affected by QSB, QRM, QRN – not a measure of absolute signal strength

Making it better

- Need more “Reverse Beacons” on more bands, especially during contests
- Data can be passed to reversebeacon.net with zero interference to any other use

The image features a dark blue background with three sets of concentric circles. Each set consists of four circles: an innermost dotted circle, followed by three solid circles of increasing radii. The circles are arranged in a triangular pattern, with one set at the top left, one at the top right, and one at the bottom center. The text "And now ... drum roll" is centered horizontally across the middle of the image, overlapping the circles.

And now ... drum roll

Skimmer and Log-Checking

- Whole-band recordings make a new level of precision possible
- First full-scale test done during CQ 160 CW

The Test

- CQ Committee recruited 5 Skimmer stations: 3 in North America and two in Europe
- Entire 160M band recorded for 48 hours from multiple locations - ~96 GB each
- Hard drives sent to contest committee for review

Excerpts from K1DG CQ 160 UBN

CALLSIGN CHECK RESULTS

S50TA is incorrect. Should be S51TA.
F5NTV is unique.
W1AMU is incorrect. Should be W1AMF.
K2FFH is incorrect. Should be K2FF.
W7QHE is unique.
K5AY is unique.
W5IF is unique.
UR6IOK is incorrect. Should be UR5IOK.
SP1I is incorrect. Should be SP1S.
K6JV is unique.
OK1NZ is unique.
W7SY is unique.
4Z5MV is incorrect. Should be 4Z5MU.
LY2W is unique.
N8SP is incorrect. Should be N8HP.
OK1FP is incorrect. Should be OK1FPS.
SK5CR is unique.

Can we test these?

Remember...uniques are NOT removed from logs

What does Skimmer hear and see?

The screenshot displays the CW Skimmer 1.3 interface. The main window shows a waterfall plot of radio signals with a yellow oval highlighting a specific signal. The frequency is set to 1813.96. A list of detected stations is visible on the right, with a red oval highlighting the entry for CQ K1DG 599. The I/Q Recorder window is also open, showing the file name 2009-01-24 005916.wav and the UTC time 2009-01-24 01:32:44. The status bar at the bottom indicates the current signal is CQ TEST K1SM K1DG EESE.

CW Skimmer 1.3 - Registered to Doug K1DG

File View Commands Help

1813.96

815

814

813

812

811

810

809

808

CU NR4M 599
K1IM 599
UTSUTK
W3KB
CQ CT9D
N1AEN TT5CTE W6YX 599
CQ N6RO
G3RVL G3RW 3A3L
CQ K1DG 599
W7QHE 599
DD6MTA
GK4PU E0EFR KOEF 599
AA6YQ 599
SR0RTE NV30R SB0A
MY2VA 599
CQ K2FU 599
TA5TTOR 599
CQ OH0E
CQ I4TUE
CQ KE0UI 599
CQ K8FH 599
NK7S TN7U
DN2IT
CQ K9RS
K9MA
VE3CX 599
K9MAT IW6UB MW3POI 599
HB9MFM
K8YTO
K0RN 599
N4ND 599
G3YW 599
N9BX
AA3B 599
VE3ME K8ZETE VE3MI 599
W2YC 599

I/Q Recorder

File: 2009-01-24 005916.wav
UTC: 2009-01-24 01:32:44
33.28 / 1:02:05

EU4CZ
UW2ZM
599
AR3E
CQ N8II 599

» CQ TEST K1SM K1DG EESE » CQ TEST K1DTE K1HG TEST » WN EEM THE IINN ME »

Decoders: 762 of 762 SNR: 6 dB 33 WPM Th: OFF

start LY2W really LY2X - Paint W7QHE - Paint CW Skimmer Norton 12:25 PM

What does Skimmer hear and see?

The screenshot displays the CW Skimmer 1.3 software interface. The main window shows a waterfall plot of radio signals with a frequency scale on the right ranging from 808 to 815 MHz. A yellow oval highlights a specific signal in the plot. A red oval highlights a list of detected stations on the right side of the interface. The list includes call signs and their corresponding frequencies, such as CU NR4M 599, K1IM 599, UTSUTK, W3KB, CQ CT9D, N1AEN TT5CTE W6YX 599, CQ N6RO, G3RWL G3RW 3A3L, CQ K1DG 599, W7QHE 599, DD6MTA, GK4PU E0EFR KOEF 599, AA6YQ 599, SR0RTE NV3OR SB0A, MY2VA 599, CQ K2FU 599, TA5TTOR 599, CQ OH0E, CQ I4TUE, CQ KE0UI 599, CQ K8FH 599, NK7S TN7U, DN2JT, CQ K9RS, K9MA, VE3CX 599, K9MAT IW6UB MW3POI 599, HB9MFM, K8YTO, K0RN 599, N4ND 599, G3YW 599, N9BX, AA3B 599, VE3ME K8ZETE VE3MI 599, and W2YC 599. Below the waterfall plot, there is a status bar showing the current frequency (1813.96) and a list of detected stations: CQ TEST K1SM K1DG EESE, CQ TEST K1DTE K1HG TEST, WN EEM THE IINN ME. At the bottom of the window, there is a taskbar with the Start button and several open applications: LY2X really LY2X - Paint, W7QHE - Paint, and CW Skimmer. The system tray shows the Norton logo and the time 12:25 PM.

CW Skimmer 1.3 - Registered to Doug K1DG

File View Commands Help

1813.96

815

814

813

812

811

810

809

808

CU NR4M 599
K1IM 599
UTSUTK
W3KB
CQ CT9D
N1AEN TT5CTE W6YX 599
CQ N6RO
G3RWL G3RW 3A3L
CQ K1DG 599
W7QHE 599
DD6MTA
GK4PU E0EFR KOEF 599
AA6YQ 599
SR0RTE NV3OR SB0A
MY2VA 599
CQ K2FU 599
TA5TTOR 599
CQ OH0E
CQ I4TUE
CQ KE0UI 599
CQ K8FH 599
NK7S TN7U
DN2JT
CQ K9RS
K9MA
VE3CX 599
K9MAT IW6UB MW3POI 599
HB9MFM
K8YTO
K0RN 599
N4ND 599
G3YW 599
N9BX
AA3B 599
VE3ME K8ZETE VE3MI 599
W2YC 599

I/Q Recorder

File: 2009-01-24 005916.wav
UTC: 2009-01-24 01:32:44
33.28 / 1:02:05

EU4CZ
UW2ZM
599
AR3E
CQ N8II 599

» CQ TEST K1SM K1DG EESE » CQ TEST K1DTE K1HG TEST » WN EEM THE IINN ME »

Decoders: 762 of 762 SNR: 6 dB 33 WPM Th: OFF

start LY2X really LY2X - Paint W7QHE - Paint CW Skimmer Norton 12:25 PM

What does Skimmer hear and see?

The screenshot displays the CW Skimmer 1.3 software interface. The main window shows a waterfall plot of a radio spectrum with a frequency marker at 1813.96. A yellow oval highlights a specific signal in the plot. On the right side, a list of detected stations is shown, with a red oval highlighting the entry for CQ K1DG 599. Below the main window, a status bar displays the following information: CQ TEST K1SM K1DG EESE » CQ TEST K1DTE K1HG TEST » WN EEM THE IINN ME ». At the bottom of the screen, the Windows taskbar shows the Start button, open applications (LY2X really LY2X - Paint, W7QHE - Paint, CW Skimmer), and system tray icons (Norton, network, volume, 12:25 PM).

Station List (Right Panel):

- CU NR4M 599
- K1IM 599
- UTSUTK
- W3KB
- CQ CT9D
- N1AEN TT5CTE W6YX 599
- CQ N6RO
- G3RVL G3RW 3A3L
- CQ K1DG 599**
- W7QHE 599
- DD6MTA
- GK4PU E0EFR KOEF 599
- AA6YQ 599
- SR0RTE NV30R SB0A
- MY2VA 599
- CQ K2FU 599
- TA5TTOR 599
- CQ OH0E
- CQ I4TUE
- CQ KE0UI 599
- CQ K8FH 599
- NK7S TN7U
- DN2JT
- CQ K9RS
- K9MA
- VE3CX 599
- K9MAT IW6UB MW3POI 599
- HB9MFM
- K8YTO
- K0RN 599
- N4ND 599
- G3YW 599
- N9BX
- AA3B 599
- VE3ME K8ZETE VE3MI 599
- W2YC 599

I/Q Recorder (Bottom Right):

- File: 2009-01-24 005916.wav
- UTC: 2009-01-24 01:32:44
- 33.28 / 1:02:05

Status Bar:

Decoders: 762 of 762 SNR: 6 dB 33 WPM Th: OFF

Closeups of Skimmer Screen



D E W 7 Q H E



*CONCLUSION: W7QHE is a good QSO –
the log-checking software did the right thing*

Sometimes you get away with one...

CALLSIGN CHECK RESULTS

LY2W is unique.

QSO: 1813 CW 2009-01-24 0519 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG

599 ME	DL1YD	599 14
599 ME	LY2W	599 15 ←
599 ME	DK3WW	599 14
599 ME	LY2X	599 15

As heard in W3

As heard in Zone 14

As "seen" in Zone 14



L Y 2 X 5 N N A 5

Sometimes you get away with one...

CALLSIGN CHECK RESULTS

LY2W is unique.

QSO: 1813 CW 2009-01-24 0519 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG

599 ME	DL1YD	599 14
599 ME	LY2W	599 15 ←
599 ME	DK3WW	599 14
599 ME	LY2X	599 15

As heard in W3

As heard in Zone 14

As "seen" in Zone 14



L Y 2 X 5 N N A 5

Sometimes you get away with one...

CALLSIGN CHECK RESULTS

LY2W is unique.

QSO: 1813 CW 2009-01-24 0519 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG
QSO: 1813 CW 2009-01-24 0520 K1DG

599 ME	DL1YD	599 14
599 ME	LY2W	599 15 ←
599 ME	DK3WW	599 14
599 ME	LY2X	599 15

As heard in W3

As heard in Zone 14

As "seen" in Zone 14



L Y 2 X 5 N N A 5

A busted exchange caught

EXCHANGE CHECK RESULTS

NR4M : A should be VA ← obvious typo

WA2RZJ : NJ should be NY

QSO: 1813 CW 2009-01-24 0516 K1DG

599 ME LZ9A 599 20

QSO: 1813 CW 2009-01-24 0516 K1DG

599 ME WA2RZJ 599 NJ

TU K1DG

WA2RZJ LZ9A both calling

LZ9A 599 ME

TU 5992T

TU K1DG

DE WA2RZJ

WA2RHJ 5NN ME ← DG COPIES CALL WRONG

R 5NN NY TU WA2RZJ

RZJ TU K1DG

← DG CORRECTS SUFFIX

The log checking software did the right thing

A busted exchange caught

EXCHANGE CHECK RESULTS

NR4M : A should be VA ← obvious typo

WA2RZJ : NJ should be NY

QSO: 1813 CW 2009-01-24 0516 K1DG

599 ME

LZ9A

599 20

QSO: 1813 CW 2009-01-24 0516 K1DG

599 ME

WA2RZJ

599 NJ

TU K1DG

WA2RZJ LZ9A both calling

LZ9A 599 ME

TU 5992T

TU K1DG

DE WA2RZJ

WA2RHJ 5NN ME

← DG COPIES CALL WRONG

R 5NN NY TU WA2RZJ

RZJ TU K1DG

← DG CORRECTS SUFFIX

The log checking software did the right thing

Fearless Predictions

- Skimmer will be essential for top-tier multi-ops and Assisted/Unlimited competitors
- Skimmer will have a decisive impact on single-op competition in contests where there is no “unassisted” category
- A Top Ten SS operator will decide that using Skimmer on Sunday will let him jump past his competition and win the whole thing.