



N.E.W.S. LETTER



The Publication of the North East Weak Signal Group

MARCH 2006

VOLUME FIFTEEN

ISSUE TWO

Pres: KA1OJ, Mark Foster
V P: N1JEZ, Michael Seguin

CURRENT OFFICERS

Secretary: W1GHZ Paul Wade
Treasurer: K5GMX Bill Conner

NEXT MEETING

SATURDAY MARCH 18TH AT THE CROWNE PLAZA IN ENFIELD, CT

2006 SHOW AND TELL, BRING YOUR PROJECTS

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DON'T FORGET

THE NORTH EAST WEAK SIGNAL GROUP
2 METER VHF AND ABOVE NET
EVERY THURSDAY NIGHT AT 8:30 p.m. LOCAL
144.250
W1COT, WZ1V, OR K1PXE NET CONTROL

MEMBERSHIP in the N.E.W.S. Group is \$15 per year. Apply to Bill Conner K5GMX, K5GMX@arrl.net. You may download an application from our web page <http://www.newsvhf.com>

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PREZ SEZ **DE KA10J**

Our next meeting will be March 18th, 2006 at the Crowne Plaza Hotel in Enfield, CT. Due to popular demand, rather than a talk we will be having the 2006 Show-and-Tell session.

Please bring one or more show-and-tell items to the meeting. Suggestions for items include: new toys/projects, half completed projects, Power point slides of intended projects, or pictures of things that are too big to carry.

The NEWS Group shirts are in and are reasonably priced at \$10 each. (Bring a \$10 bill, please, if you want only one shirt). First dibs goes to the members who signed up for shirt(s) at the Jan meeting.

Keep in mind that the "32nd EASTERN VHF/UHF CONFERENCE" is fast approaching. On Saturday, 4/22, there will be a brief NEWS Group meeting during the conference.

73
KA10J

BOARD MEETING MINUTES **7 JANUARY 2006**

Board meeting called to order at 11:44

NEWSletter sent by email has no membership expiration date 20+ former members have not paid for years
- UGM has email list and will work on reminders

Boxboro Convention date conflicts with August NEWS meeting

W1GHZ could contact Boxboro committee about holding the NEWS meeting at Boxboro

Logo for T-shirt needs decision

Discussion of tower space for possible beacons
- Tower space on Wachusett is difficult
- K1MAP suggests Meridan Mtn
- W1FKF suggests Prospect Hill, Waltham

NEWS MEETING MINUTES **7 JANUARY 2006**

NEWS meeting called to order at 1:15 by KA10J

November minutes had K1MAP call wrong

Treasurers report - all dues are due in July, some members in arrears - will send reminders

K1MAP - spectrum committee - some spectrum committees in CT considering 902 plan

T-shirt discussion - reviewed Logo, a minor tweak was suggested

Motion by WA1MBA - give President authority to approve logo and order shirts for next meeting - unanimous
a signup sheet for orders, price \$12, was circulated

Discussion of August meeting conflict with Boxboro, possibility to combine

Motion - to have Secretary pursue holding the NEWS meeting at Boxboro - unanimous

Newsletter discussion -
Motion - to have link to current NEWSletter on NEWS web page - approved with one dissenting vote 1

N2LIV - Eastern VHF/UHF Conference update
- no antenna measuring this year
- band session moderators needed,
- KF6AJ looking for help with registration
- possible Paypal registration

WA2UMX beacon is back on the air, 144.289 MHz

Duct tape auction - some items were donations from WR1Y with proceeds to Red Cross disaster relief \$17,

Meeting adjourned 2:19

Followed by a talk on 78GHz signs by WA1MBA

WA1MKE SILENT KEY

It is with deep regret that I announce the passing of Dave , WA1MKE . We all new him as Doctor Dave . He had a sister living in Eastern Mass. that he would visit each year around the June contest(as well as making a stop to operate the event)

I will pass on more information as I receive it , it just happened yesterday from what I heard . He was a good friend , contester and operator . He was involved in many facets of our fine hobby . He will be missed

73---Walt
WA1HHN

A CHEAP AND EASY MICROSCOPE

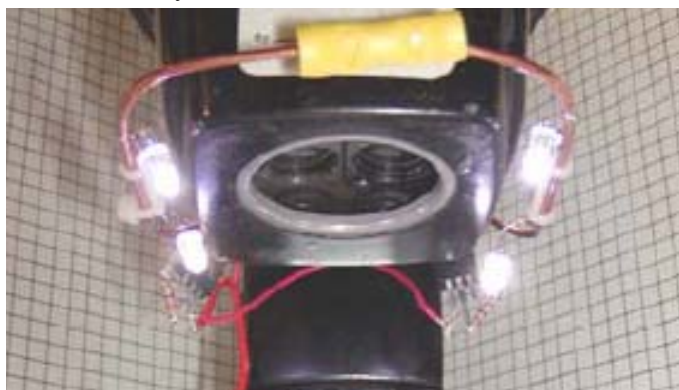
ILLUMINATOR

PAUL WADE W1GHZ ©2006

W1GHZ@ARRL.NET

Many of us are finding that microwave parts are getting harder to see – and it isn't just that the parts are getting smaller. All sorts of magnifiers are available, and the good ones do help, but a microscope is the real answer for aging eyes. Stereo microscopes made by B&L, American Optical, and others have been used in microelectronics for years, and they frequently show in surplus at reasonable prices.

The other requirement for working on small things is good lighting. Microscope illuminators are harder to find and many don't work very well. I found one with a burnedout bulb, and

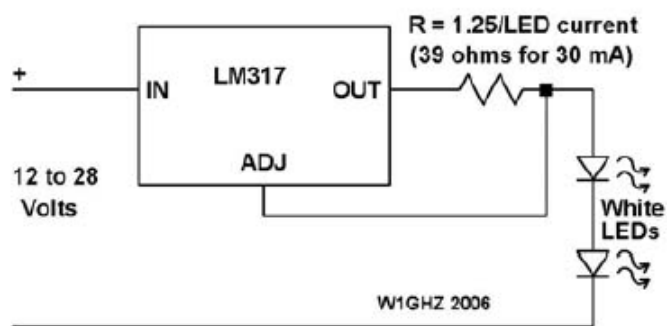


the replacement was special-order for \$25. The best ones have a small circular fluorescent light that mounts around the bottom of the microscope and provides even illumination – but I've never seen one surplus, and they are not cheap.

Now that white LEDs are readily available and cheap enough to use in disposable flashlights, it occurred to me that a ring of them might provide good microscope illumination. I experimented with some and they seemed to do pretty well. The problem was mounting them to the microscope.

I considered cutting a big hole in some perfboard and making a ring of LEDs, but couldn't find a good way to mount it. Finally, I just stuck a bolt and some big washers through the illuminator mounting hole in the microscope stand and used it to attach a hunk of #12 wire. I bent the wire around both sides and crimped the two ends together. Then I used solder, ty-wraps, and more wire to hold some LEDs in place. The heavy wire keeps them in place, but everything is flexible enough to bend the leads and get the light centered. I adjust them one at a time, blocking the others with cardboard. Four LEDs in a square seems to be bright and even enough for working comfortably under the scope, even if my hand blocks one. Figure 1 is a photo of this sophisticated arrangement.

Constant Current LED Driver



To try and get uniform output from the four LEDs, I drive them with a constant current. This takes the elaborate circuit shown in Figure 2. Each regulator drives two LEDs – three is possible, but not four from 12 volts.

I'm sure you can improve on this illuminator, while keeping it cheap and easy. It should also work fine with other types of magnifiers or whatever you use to help aging eyes.

3D FIX LCD

BY TOMMY SULLIVAN

W1AUV

In response to the article "A Simple GPS Stabilized Oscillator2" by N1JEZ, Mike Sequin I developed 3Dfix: a microcontroller which watched the GPS NMEA data stream and turned on an LED to indicate when the GPS had a 3D position fix^{3,4}. After I told Mike that I had a simple solution to 3D fix determination without a laptop, he was happy but suggested it might be nice to actually be able to display some of the other GPS parameters such as position. I finished the 3Dfix chip and went right to work adding a display to it. This next project became 3DfixLCD.

Interfacing a microcontroller to a parallel-interfaced LCD is straight forward. Inexpensive displays such as those made by OPTREX can be purchased for around \$15 or less. The OPTREX displays can be interfaced using a nibble bus or 4 bits. This helps to limit the number of I/O lines used on the CPU leaving extra lines for other functions such as control buttons.

I used the same microprocessor as I did for the 3Dfix (PIC16F688) because it is inexpensive and doesn't consume a lot of power. The 16F688 has only 12 I/O lines but by using the nibble interface for the LCD we have enough.

A problem with small microcontrollers is that their RAM is usually limited. Using a bigger processor with lots of RAM would be nice but bigger processors cost more money, consume more power and usually require expensive development tools.

Display Parameter	Display	NMEA Sentence	Comment
Time	02:10:11 UTC	GPGGA	
Latitude	LAT 42 21.7678N	GPGGA	
Longitude	LON 073 15.1273W	GPGGA	
Altitude	ALT 331.0 M	GPGGA	
Satellites Tracking	Satellites 05	GPGGA	
3D Fix	3D Fix Obtained!	GPGSA	or not.
Position Dilution of Precision	PDOP=1.17	GPGSA	3 coordinates
Horizontal Dilution of Precision	HDOP=1.40	GPGSA	2 coordinates
Vertical Dilution of Precision	VDOP=1.05	GPGSA	Just Height

Table 1 LCD information displayed

For 3DfixLCD limited RAM means that we don't have a lot of storage space to hold strings in memory in their entirety. One approach for this project might have been to read whole NMEA strings into memory and process them during the lull that occurs between the strings. With limited RAM, this approach wasn't possible.

An approach that works for limited RAM is to develop a structure to the software that supports operating on the characters as they are received, one at a time. We 'watch' the characters in the string and only grab what is needed as it goes by. This 'producer-consumer' approach is relatively easy to implement and saves RAM.

I chose to use a two line sixteen character display. This is a compromise between small size and a larger display which could have displayed more information. A 2x16 display is just large enough to display latitude on one line and longitude on another; other NMEA data fits easily.

Figure 1 - 3DfixLCD displaying latitude and longitude



from NMEA data.

The hardware design includes two buttons that can be mounted on the project enclosure. The buttons allow you to change the display for each line. Each line can display anything that

is extracted by the software from the NMEA strings. You can even display the same item on both lines. I did this to provide flexibility: you can display latitude and longitude or time and position fix type. Table 1 lists the displayable parameters I have programmed so far and their formats.

After the prototype software took shape, I designed a PCB. The first boards had a couple of mistakes but after a couple cuts and jumpers to fix my mistakes, they worked quite well. The PCB is designed to mate with the OPTREX DMC16204 LCD using a 15 pin 2mm pin strip. The overall size is 1.6" x 3.2". With standoffs added the whole assembly has a thickness of just over 1 inch.

The board requires 7-12 volts DC for the LM78L05 regulator. The LCD requires 5 volts and so the microcontroller runs on 5 volts too. A pair of NPN transistors are used to level shift the TX signal from the GPS. This will work for a 3.3 volt or a 5 volt GPS.

The assembled unit is shown in Figure 1. I can provide a schematic and a programmed chip for anyone who wants to solder their own version on a protoboard. Depending on the interest, I may make PCBs available or even assembled units. Anyone who is interested can contact me at tpsully@verizon.net.

I hope that 3DfixLCD will further enhance "A Simple GPS Stabilized 10 MHz Oscillator" and provide an alternate to a laptop when used in the field.

1. <http://www.jrmiller.demon.co.uk/projects/ministd/frqstd.htm>
2. A Simple GPS Stabilized 10 MHz Oscillator by Mike Seguin, N1JEZ; Proceedings of Microwave Update 2005 (ISBN: 0-87259-956-6)
3. 3Dfix; Tommy Sullivan, W1AUV; Proceedings of Microwave Update 2005 (ISBN: 0-87259-956-6).
4. 3Dfix; Tommy Sullivan, W1AUV; Proceedings of the Mid-Atlantic VHF Conference 2005 (ISBN: 0-87259-9523).

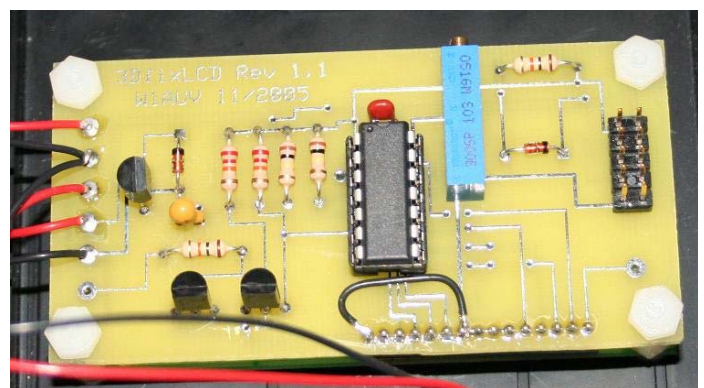


Figure 2 - The 3DfixLCD interface and control board.

RUMORED SCORES JANUARY CONTEST

Call	Grid	NEWS	Class	Total	6m	2m	222	432	903	1.2G	2.3G	3.4G	5.7G	10G	24G	47G	75G	120G	145G	240G	GLAS	
K3EAR	FM19	N	U	835566	610/71	629/73	179/44	279/42	33/13	37/12	19/6	16/5	11/5	13/6	5/3	-	1/1	-	-	-	-	1/1
N3NGE	FN20	N	U	527310	397/50	479/54	128/29	169/32	44/12	58/14	39/11	2/2	13/6	14/6	1/1	-	-	-	-	-	-	-
W2FU	FN13	N	U	393420	282/59	332/56	101/37	108/34	19/11	22/10	13/8	12/8	10/6	13/5	4/1	2/1	-	-	-	-	-	4/1
K8EB	EN73	N	U	164828	143/45	181/43	40/24	63/25	14/11	17/13	9/6	9/5	1/1	10/3	3/1	2/1	-	-	-	-	-	-
N2GCZ	FN31	N	U	18480	59/13	63/14	35/11	43/12	5/2	8/4	-	-	-	-	-	-	-	-	-	-	-	-
KQ6NO	DM04	N	U	2000	5/2	30/4	15/4	20/4	-	5/2	-	-	-	-	-	-	-	-	-	-	-	-
W3SO	FN00	N	L	284570	390/54	436/62	135/44	167/39	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K2AXX	FN12	N	L	74214	158/50	180/45	54/20	56/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KB1DFB	FN41	N	L	43040	202/25	150/23	42/17	51/15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N3DB	FM18	N	L	24357	180/40	173/29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W8RU	EN82	N	L	12261	46/17	61/21	17/10	30/13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K8ZIZ	EN81	N	L	10434	74/19	86/18	-	31/10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1MAT	FN42	N	L	5859	53/8	48/11	16/5	28/7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K1TEO	FN31	Y	H	432864	199/38	339/51	103/33	148/33	38/14	55/17	28/10	20/9	11/4	15/7	-	-	-	-	-	-	-	-
K1RZ	FM19	N	H	295659	163/26	220/32	87/25	134/27	43/14	51/16	28/11	16/8	9/4	13/8	-	-	-	-	-	-	-	-
K3TUF	FN10	N	H	265102	204/31	191/34	105/28	126/28	30/10	39/12	23/9	14/7	10/3	11/4	-	-	-	-	-	-	-	-
K1JT	FN20	N	H	172291	196/37	219/40	77/24	102/25	32/11	30/8	9/3	2/1	-	2/1	-	-	-	-	-	-	-	2/1
K3DNE	FM19	N	H	146916	136/25	197/31	81/23	109/22	30/13	26/9	18/7	4/2	-	-	-	-	-	-	-	-	-	-
WA3DRD	FN20	N	H	107082	74/9	128/17	60/11	92/14	37/7	43/6	30/6	12/5	10/3	7/2	-	-	-	-	-	-	-	3/1
K8TQK	EM89	N	H	106352	85/39	147/54	54/40	51/31	12/9	-	6/6	3/3	-	2/2	-	-	-	-	-	-	-	-
WZ1V	FN31	Y	H	97904	130/25	176/28	61/19	90/21	20/8	23/8	2/2	6/5	-	-	-	-	-	-	-	-	-	-
VE3AX	FN02	N	H	96849	87/28	186/46	70/34	84/36	-	13/9	-	-	-	-	-	-	-	-	-	-	-	-
K8MD	EN82	N	H	86112	108/36	118/33	47/22	67/26	13/11	15/12	1/1	2/2	-	1/1	-	-	-	-	-	-	-	-
W4WA	EM84	N	H	79872	120/42	130/43	39/27	58/30	-	17/14	-	-	-	-	-	-	-	-	-	-	-	-
N3HBX	FM19	N	H	78015	194/27	225/35	58/19	104/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K9EA	EN71	N	H	57589	66/27	111/34	32/24	52/27	11/11	11/10	-	-	-	-	-	-	-	-	-	-	-	-
KB8U	EN71	N	H	57330	99/31	92/29	28/21	54/26	9/8	6/6	3/3	2/2	-	-	-	-	-	-	-	-	-	-
NC1I	FN32	N	H	57340	60/18	160/25	55/17	76/21	2/2	22/7	2/2	1/1	-	1/1	-	-	-	-	-	-	-	-
N2GHR	FN30	N	H	45050	68/15	100/17	42/16	69/19	12/6	21/11	1/1	-	-	-	-	-	-	-	-	-	-	-
KN4SM	FM16	N	H	33250	103/35	105/34	-	71/26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W3KM	FN20	N	H	31005	50/9	127/20	59/16	43/14	-	10/3	7/3	-	-	-	-	-	-	-	-	-	-	-
W1GHZ	FN42	Y	H	30940	67/14	81/16	39/12	47/13	16/4	21/5	-	-	-	1/1	-	-	-	-	-	-	-	-
K7BV	FN31	N	H	28560	340/84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K8CC	EN82	N	H	27016	72/22	89/31	28/17	45/18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K5LLL	EM10	N	H	26488	30/17	54/21	25/17	33/16	9/7	4/3	3/2	2/1	-	2/2	-	-	-	-	-	-	-	-
W1RZF	FN42	Y	H	25926	92/12	137/21	51/13	58/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KT4JA	EL97	N	H	24864	72/26	62/18	13/8	36/15	5/1	9/3	4/2	2/1	-	-	-	-	-	-	-	-	-	-
N5ITO	EM23	N	H	24472	65/27	103/39	13/9	24/13	-	6/4	-	-	-	-	-	-	-	-	-	-	-	-
W1ZC	FN42	Y	H	12103	74/14	71/20	-	41/13	-	5/2	-	-	-	-	-	-	-	-	-	-	-	-
K1TOL	FN44	N	H	12084	212/57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1JJ	FN41	N	H	11051	257/43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KD6VNQ	CM88	N	H	8569	41/10	66/15	14/5	37/11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KB3HJA	FN20	N	H	6682	257	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K7CW	CN87	N	H	5643	89/16	82/17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W5UWB	EL17	N	H	2592	18/11	16/11	9/8	2/2	-	4/4	-	-	-	-	-	-	-	-	-	-	-	-
K2AAU	FN20	N	H	1520	24/7	36/7	-	10/5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K5DYY	EL07	N	H	400	3/3	6/6	3/3	3/3	-	1/1	-	-	-	-	-	-	-	-	-	-	-	-
KA1ZE	FN01	Y	H	4	2/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K2DRH	EN41	N	S	185680	140/47	180/53	59/33	93/36	22/18	30/18	4/4	2/2	-	-	-	-	-	-	-	-	-	-
N1DPM	FN32	Y	S	108612	85/23	117/25	51/19	63/22	22/10	30/11	13/7	8/5	-	7/4	-	-	-	-	-	-	-	-
AF1T	FN43	Y	S	91001	106/19	139/23	61/19	73/17	21/6	28/5	12/5	5/2	1/1	5/3	-	-	-	-	-	-	-	1/1
K1TR	FN42	N	S	88683	96/18	151/25	65/19	78/19	19/7	25/6	11/5	8/4	-	-	-	-	-	-	-	-	-	-
K8GUN	FM09	N	S	83700	118/22	143/25	66/20	95/22	19/9	29/10	-	-	-	-	-	-	-	-	-	-	-	-
WB2SIH	FN31	N	S	53380	60/13	140/21	61/18	77/20	20/7	18/6	-	-	-	-	-	-	-	-	-	-	-	-
K3EGE	FM29	N	S	51513	102/17	105/20	61/15	70/16	23/4	21/4	-	-	-	-	-	-	-	-	-	-	-	3/1
K9MU	EN44	N	S	50112	104/32	114/36	25/12	56/19	11/4	10/5	-	-	-	-	-	-	-	-	-	-	-	-
W4SHG	FM18	N	S	46092	68/18	83/18	42/17	59/18	11/7	16/9	5/5	-	-	-	-	-	-	-	-	-	-	-
N9DG	EN53	N	S	43505	77/27	136/42	40/23	46/21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K4TO	EM77	N	S	43080	25/16	60/32	29/24	32/22	9/9	5/5	3/3	3/3	2/2	4/4	-	-	-	-	-	-	-	-
W3EFH	FM29	N	S	41208	91/15	91/18	55/13	61/13	21/4	21/4	-	-	-	-	-	-	-	-	-	-	-	3/1
W1PM	FN41	Y	S	39196	63/15	69/17	35/13	40/14	13/7	16/8	7/5	-	-	3/3	-	-	-	-	-	-	-	-
K3DD	FM19	N	S	31084	73/16	82/20	41/16	60/17	-	13/7	-	-	-	-	-	-	-	-	-	-	-	-

W0AH	EM85	N	S	26544	117/29	73/20	23/15	30/16	-	5/4	-	-	-	-	-	-	-	-	-
K8SIX	EN82	N	S	25800	98/24	122/30	-	62/21	-	-	-	-	-	-	-	-	-	-	-
KC6ZWT	CM98	N	S	22330	65/12	85/17	46/12	68/11	5/2	-	1/1	-	-	-	-	-	-	-	-
W3STU	FM19	N	S	20160	55/17	65/20	37/16	47/17	-	-	-	-	-	-	-	-	-	-	-
WA2VNV	FN30	N	S	18792	61/13	137/18	2/1	61/18	1/1	3/2	1/1	-	-	-	-	-	-	-	-
N2CEI	FN20	N	S	17120	428/40	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VA3KA	FN15	N	S	16764	35/14	61/18	20/13	31/12	5/4	9/5	-	-	-	-	-	-	-	-	-
K8MR	EN91	N	S	13481	58/16	55/22	16/10	32/12	-	3/1	-	-	-	-	-	-	-	-	-
AG2A	FN30	N	S	9760	62/13	104/16	-	39/11	-	-	-	-	-	-	-	-	-	-	-
N1JEZ	FN44	Y	S	9184	30/13	50/20	22/13	20/10	-	-	-	-	-	-	-	-	-	-	-
K9DQ	EN62	N	S	9129	33/13	60/21	11/5	32/12	-	-	-	-	-	-	-	-	-	-	-
VE3CVG	FN25	N	S	8235	36/11	51/15	10/6	28/9	1/1	4/3	-	-	-	-	-	-	-	-	-
N0LL	EM09	N	S	6696	17/12	41/21	9/6	16/11	-	4/4	-	-	-	-	-	-	-	-	-
WB4UNA	EM93	N	S	5040	56/16	20/7	16/6	18/6	-	-	-	-	-	-	-	-	-	-	-
K4MSG	FM19	N	S	4847	25/10	50/17	-	28/10	-	-	-	-	-	-	-	-	-	-	-
K3VEQ	FN20	N	S	4284	54/7	62/8	7/2	25/3	-	6/1	-	-	-	-	-	-	-	-	-
K1LPS	FN34	Y	S	3910	16/7	21/9	11/5	12/7	4/3	4/3	-	-	-	-	-	-	-	-	-
K9AKS	EN41	N	S	3480	26/15	57/24	-	-	-	1/1	-	-	-	-	-	-	-	-	-
KF6KDA	DM06	N	S	3105	23/9	52/13	-	20%60/5	-	-	-	-	-	-	-	-	-	-	-
K3BEE	FN20	N	S	2816	80/13	48/9	-	-	-	-	-	-	-	-	-	-	-	-	-
KA1KOJ	FN41	N	S	2220	26/9	10/7	9/7	10/7	-	-	-	-	-	-	-	-	-	-	-
VA2RN	FN35	N	S	2277	20/10	21/10	7/7	7/6	-	-	-	-	-	-	-	-	-	-	-
N2FKF	FN30	N	S	2128	-	133/16	-	-	-	-	-	-	-	-	-	-	-	-	-
K2PS	FM29	N	S	2032	127/16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WV2ZOW	FN20	N	S	2016	21/8	41/10	-	11/6	-	-	-	-	-	-	-	-	-	-	-
WF4R	FM16	N	S	1824	9/7	18/12	7/6	8/7	-	-	-	-	-	-	-	-	-	-	-
WA3EQ	FM09	N	S	1700	-	14/9	9/6	8/5	2/2	3/3	-	-	-	-	-	-	-	-	-
W1DYJ	FN42	Y	S	1463	36/7	41/12	-	-	-	-	-	-	-	-	-	-	-	-	-
K3MQP	FM19	N	S	1360	14/5	16/6	9/5	10/4	-	-	-	-	-	-	-	-	-	-	-
W4R XR	EM65	N	S	1034	-	47/22	-	-	-	-	-	-	-	-	-	-	-	-	-
KA1OJ	FN42	Y	S	672	8/4	12/7	8/4	3/1	-	-	-	-	-	-	-	-	-	-	-
K2RMX	FN20	Y	S	396	16/6	15/5	-	1/1	-	-	-	-	-	-	-	-	-	-	-
K1DS	ROV	N	R	137697	73/7	158/17	87/9	97/9	40/5	50/7	31/5	20/5	14/3	18/4	2/1	-	-	-	13/3
N1XKT	ROV	N	R	84357	52/5	147/15	75/9	73/8	33/3	36/5	23/3	13/3	9/2	13/3	1/1	-	-	-	12/3
N6RMJ	ROV	N	R	74971	18/6	93/10	43/7	71/9	25/6	25/7	13/4	7/5	15/5	24/7	2/1	-	-	-	-
N5AC	ROV	N	R	47736	25/11	65/15	21/3	55/12	15/3	36/10	7/1	10/1	8/1	7/1	-	-	-	-	-
WY3P	ROV	N	R	36480	150/12	150/14	75/13	95/12	-	-	-	-	-	-	-	-	-	-	-
K2QO	ROV	N	R	29939	46/4	63/11	26/4	24/6	14/3	13/3	12/2	7/2	8/2	10/2	1/1	-	-	-	2/1
WB8BZK	ROV	N	R	20041	61/9	96/11	37/7	59/9	1/1	14/6	-	-	-	-	-	-	-	-	-
W0ZQ	ROV	N	R	4215	-	19/2	-	3/2	-	-	3/1	3/1	5/2	17/3	4/2	-	-	-	-
N2SLN	ROV	N	R	1488	22/8	16/7	7/4	5/3	-	-	-	-	-	-	-	-	-	-	-
N6ZE	ROV	N	R	330	5/1	16/5	-	6/2	-	-	-	-	-	-	-	-	-	-	-
W9SZ	EN50	N	Q	4875	-	21/11	8/7	12/8	5/5	5/5	2/2	-	1/1	-	-	-	-	-	-
N7IR	DM32	N	Q	192	9/3	7/3	-	-	-	2/2	-	-	-	-	-	-	-	-	-

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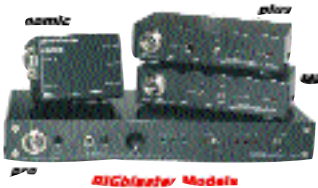
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