

DIGITAL HAPPENINGS #15

(October 2013)

By W0NAC ("Matt")

Over the last several months, several people have told me that they are planning on setting up a mobile station for digital operations. As far as I know, no one has yet followed up on their good intentions. I just purchased a new vehicle (Volkswagen Passat Diesel) a few days ago and I am deeply involved in installing antennas, radio, computer, etc. It's almost like starting from scratch since the car differs in many ways from the Honda Civic Hybrid that I had before. It occurred to me that others might be motivated and helped if I share some of the trials and tribulations during the installation process. The full story will have to be spread out over at least 2 articles because it will be fairly long and detailed. My hope is that a better understanding of the process will encourage some of you to go ahead and install (and operate!) a digital mobile station. As all of you probably know, having more mobiles out there is the key for anyone to complete the two new digitally related awards (**USA Digital Award & 5 Mode Award**). So, if you have ever considered putting together a digital mobile station, NOW is the time to put your intentions into action and "Git-R-Done"!

Challenge Department:

Last month I challenged you to solve the following puzzle:

If you had an infinite supply of water and a 5 quart and a 3 quart pail, how would you measure exactly 4 quarts? And what is the least number of steps you need?

There are at least 2 solutions to this puzzle, but the best one I came up with is as follows:

<u>Step #</u>	<u>Action</u>	<u>Amount in 3 Quart Pail</u>	<u>Amount in 5 Quart Pail</u>
0	Starting Point	0	0
1	Fill 5 Quart To Top	0	5
2	Fill 3 To Top From 5	3	2
3	Empty 3 Quart	0	2
4	Pour 5 into 3	2	0
5	Fill 5 Quart	2	5
6	Finish Filling 3 from 5	3	4** (Solved!)

The next best solution (Which takes 8 steps) is as follows:

<u>Step #</u>	<u>Action</u>	<u>Amount in 3 Quart Pail</u>	<u>Amount in 5 Quart Pail</u>
0	Starting Point	0	0
1	Fill 3 Quart To Top	3	0
2	Dump 3 into the 5	0	3

3	Refill 3 Quart	3	3
4	Fill 5 To Top From 3	1	5
5	Empty 5 Quart	1	0
6	Empty 3 Quart Into 5	0	1
7	Fill #3 To Top Again	3	1
8	Pour All of 3 Into 5	0	4 ** (Solved!)

Five people submitted solutions this month (in the order given below). Also shown is the number of steps their solution required.

- 1 - W2CC – Dave 8 Steps
- 2 - KB9VQM – Louie 8 Steps
- 3 – WA2DWP – Mike 8 Steps
- 4 – AD0H – Skip 11 Steps (Innovative approach using Marks)
- 5 – W8DCD – Kirby 6 Steps **THE WINNER!**

The key in solving this puzzle using the smallest number of steps was to choose the correct starting bucket! Kirby was the winner this month with only 6 steps required. Congratulations!

Here is a new puzzle for you all. Have fun with it. I challenge you to solve it without use of the internet!

“Crossing a Rickety Bridge at Night by Flashlight”

A group of four people (Annie, Bob, Carl, and Deral) need to cross a bridge. It is dark and they must light their path with a flashlight. No more than two people can cross the bridge simultaneously, and the entire group has only one flashlight. Different people take different times to cross the bridge and the slowest person in any group determines the time to cross.

- Annie can cross the bridge in 1 minute
- Bob can cross the bridge in 2 minutes
- Carl takes 5 minutes to cross the bridge
- Deral is the slow poke! It takes him 10 minutes to cross the bridge

How can the entire group make it to the other side of the bridge in 17 minutes maximum?

Watch for the solution in next month’s article along with a list of those that sent in their solution(s) to this puzzle. Send your solutions to w0nac@comcast.net .

THE STORY OF W0NAC’S NEW MOBILE INSTALLATION:

Before I dive into the story, let me say right up front that this will not be a complete “How To” book on mobile installation. I will only be hitting high points. Also, this story contains a lot of personal opinion based on many years of experience. I set up my first serious mobile rig in 1998 and over the next 15 + years have had HF rigs installed in 5 different vehicles including a Mazda pickup, GMC truck, Honda Ridgeline truck, Toyota Tundra truck, and the Honda Civic Hybrid. This story will be about installing a mobile rig capable of digital ops in a Volkswagen Passat Diesel.

1) PICKING THE VEHICLE

I realize that everyone doesn't have complete control over the vehicle they have to work with, but if you do have choices, I believe that being electrically quiet between 3 and 30 MHz is the single most important criterion you should consider (I'll list other important criteria later).

Vehicles, in general, have many devices that may cause electrical noise. These include pulse noise (ignition/spark plugs), "hash" noise from any DC motor with brushes, and Alternator "whine". These types of noises have been around for many years and ways to suppress them are well known and readily available. More modern vehicles have one or more computers onboard. These can present an entirely new set of problems with noise in the form of "birdies" or harmonics. Also, any DC to AC inverters and DC to DC converters can also cause "birdies". In essence, any device that has other than pure sine wave currents (i.e. square waves) will, by its very nature, produce multiple harmonics which can show up in your radio as "birdies" unless they are filtered out. Typically these harmonics will drift slowly through the frequency you wish to operate and sound like someone is tuning up on your frequency. Very irritating to say the least!

Unfortunately, even if a manufacturer may have conducted some EMI/EMC testing, it is all focused on controlling interference to the operation of their own installed equipment (AM/FM radios, Satellite radios, various computers, various RFID devices, etc. I know of no manufacturer's installed gear that operates in the 3-30 MHz range. As a result, they have little or no motivation to conduct expensive EMI/EMC tests in this frequency range just to make a few hams happy! Even if they do conduct tests, they are not willing to pay for special filters, etc. needed to mitigate electrical noise that affects hams. Let's face it – catering to ham radio operators is probably at the extreme bottom of their agenda and may not even be on their agenda at all.

Where does that leave the typical ham? You will have to do your own testing and noise mitigation. There are some relatively easy tests you can make, but if you are planning on buying either a new or a used vehicle, you will need the cooperation of the current owner to do these tests. In my case, the VW dealer was very cooperative and even let me have the vehicle overnight and half the next day to conduct my tests.

Assuming you have the owner's blessing, you will need the following equipment:

- 1) Small portable radio (like the ICOM IC-7000) that can receive SSB, AM, on at least 80M, 40M, 20M, 15M, and 10M.
- 2) Heavy power cord for the radio with heavy duty clamps for connecting to the main vehicle battery and long enough so that you can locate the radio on the front seat. (Do NOT use Cigar Lighter connector!)
- 3) Simple antenna magnetic mount with enough coax to reach the radio on the front seat.
- 4) At least 2 simple antennas (like "Ham Sticks") for 40M and 20M
- 5) An RF "sniffing" tool which is made from a 20-30 ft. long piece of coax with standard RS-232 male connector at one end (goes to the radio) and the other end with the braid stripped back 3-4 inches leaving 3-4 inches of center conductor (with insulation) exposed. Electrical tape is then used to cover any remnant of exposed braid and the tip of the exposed center conductor.

To conduct the tests, start by mounting the mag mount (with the 40M antenna) and running the coax through a window into the front seat. Clamp your power cable directly to the main battery posts and route the cable to the radio you have in the front seat. Connect the power cable to the radio and the antenna coax to the HF antenna connector.

The first thing you need to do is to establish a baseline environment noise level. With the vehicle engine OFF and ignition switch OFF, “fire up” your radio. Set all noise control features (ANF, DSP, filters, etc.) on the radio to OFF and tune it to around the middle of the 40M band on LSB (~ 7.150 MHz). If where you tune is occupied by a signal, tune away until no signal is present, just noise. Adjust the RF gain to full UP. Adjust the AF volume to where you hear a considerable level of general Noise. This noise will be a combination of noise from the sun and other space objects, and noise from your immediate surroundings (other cars, appliances, power lines, etc.). This is your baseline noise level.

Without changing anything else, just turn the ignition switch to the “Accessory” position (if you have one). Carefully note any increase in noise. Usually, there will be no change.

Now turn the Ignition switch to the ON position without starting the engine. Again, note any increase in noise level. This will “smoke out” noise from electric fuel pumps (a notorious culprit), other motor driven devices, and possibly computer noise.

Next, start the engine and rev it up to various speeds in addition to letting it idle. Note any increase in noise level and determine if it is related to engine speed. Also, drive the car at various speeds and check for electrical noises related to acceleration and deceleration, braking, shifting, etc. Keep notes!

Next, drive the vehicle to a spot that you believe is generally quiet (away from the city if possible) and repeat the tests listed above. Again, make notes!

If none of these tests produce an increase in general noise compared to your baseline, consider yourself very fortunate! Your vehicle is very quiet from a general noise point of view, but may have other problems which we will test later.

If you DO have higher noise levels with the engine running than with it stopped, you should next determine if it is “conducted” noise or “radiated” noise (in my experience it will almost always be “radiated”). The test to determine whether it is “radiated” or “conducted” is quite simple. With the engine running and the noise present, disconnect the antenna from the radio. If the noise all goes away, it is “radiated” noise. If the noise is still there with the antenna disconnected, it is “conducted” noise. Which type of noise you have is important to know, because each noise type will be cured using different techniques and devices.

Wait! You’re not done testing yet. You still need to test for harmonics (“birdies”) that the car and its equipment may be radiating. This test is somewhat tedious, but vital. Find the quietest location possible (away from the city if possible) and run the engine and ALL accessories. You can turn on limited noise filters at this time, but NOT automatic notch filters. The idea is to be able to hear very weak CW signals. Once set up, slowly tune across the entire 40M band and 20M band (you will need to change antennas) searching for harmonics (“birdies”). These will usually drift slowly in or out of your pass-band as the device producing them changes temperature. Also, they can be relatively “pure” notes or sound “rough” depending on the source.

Don’t forget that, even though the vehicle you are testing checks out as “clean”, any equipment you add later yourself (computers, inverters, power supplies, etc.) may cause noise problems to raise their ugly heads again.

A vehicle that is electrically “clean” is a rare bird indeed! All 5 of my previous vehicles had some kind of noise issues. So far, the new VW Passat has checked out to be totally quiet. I suspect that having a diesel engine (No spark plugs!) accounts for a lot of this quietness. Being so electrically quiet is the main reason I picked this vehicle over several other vehicles being considered.

Naturally, there are other factors that must be considered when picking a vehicle (new or used) for digital mobile. Some of these other factors include price, fuel economy, comfort, ride, handling, and useable places where you can install your radio(s), laptop, and antenna(s). You may never find the perfect vehicle, but for me, the Passat comes close. In addition to being total quiet (electrically), it is claimed to get over 40 MPG, is extremely quiet mechanically with low road noise, is very comfortable, handles well and comes with a great set of convenience features as standard equipment.

With the understanding that my next comments are based on my own experience, what others have told me, and very weak anecdotal evidence, here is some information to consider before choosing a vehicle. Any or all of these comments could have been corrected over time or when the manufactures came out with newer models.

2014 Volkswagen Passat Diesel – Extremely quiet electrically, great mileage, super car! Only drawback found so far is lack of an ignition switch accessory position to run radio without running the engine. (My Experience)

2008 Honda Civic Hybrid (Now called “Insight”) – Super mileage, lots of road noise, electrical drive system very noisy (have to shut engine off to hear weak signals), very durable, harsh ride, small cockpit & trunk, had to install trailer hitch to mount antenna. (My Experience)

Honda Ridgeline – Fair mileage, comfortable, quiet ride, extremely stubborn harmonic noise problem from servo motor driven throttle system (never cured it!), engine cooling fans noisy, heater motor noisy, had to have tilt down antenna mount in trailer hitch to clear rear hatch. (My Experience)

Toyota Tundra – Reasonably comfortable (for a truck), lots of cockpit space, but terrible mileage. Electrically quiet, excellent off-road capability, very pricey when fully equipped, had to have tilt down antenna mount in trailer hitch to clear rear hatch. (My Experience)

Dodge Rental Cars – Seemed to be electrically quiet (mostly used while parked with mag mount antenna in various spots on Hawaii (all 5 counties), nice ride, reasonable mileage, small cockpit space, mounting a permanent antenna may be difficult. (My Experience)

Chevy Diesel Truck – Owner claims that this vehicle is dead quiet electrically! Absolutely no noise! (Other’s Experience)

Fords in general – In the past Fords were notorious for a stubborn fuel pump noise problem caused by a brush type electrical pump inside a plastic fuel tank which failed to provide shielding. Problem took draconian measures to fix! (My Experience with Mazda truck using Ford parts plus anecdotal evidence)

Toyota Prius – Many different people have stated that the electrical noise problems with these vehicles render them essentially un-useable for county hunters. I would carefully test this vehicle before purchase. (Strictly Anecdotal Evidence)

If, for whatever reason, you really have no choice of vehicle and are stuck with whatever you currently have, don’t despair! Use the tests outlined earlier to determine what kind of noise problems you may have (conducted or radiated). Then, if radiated, you can use the “sniffer tool” described earlier to pin-point the source(s) of your noise. Once located, there are many fixes available such as common mode chokes (sometimes called ferrite beads), placing flexible ground straps around hood and trunk hinges, bonding, etc. I will be happy to provide you with advice over the phone if you are “stuck”.

2) INSTALLATION SO FAR

As this is being written, I have only had the new VW Passat for a few days. Some dealer installed options are going to be installed next week. While waiting for a Class 1 trailer hitch to come in and be installed, I have personally installed the computer mount and tray and the VHF/UHF antenna. I will be using the trailer hitch as a mounting point for the same hybrid antenna that I had on the Honda Civic. After the antenna is in place, the car will be scheduled for Car Toys to do a custom installation of all the wiring for the 2nd battery, battery isolation relay, 2-wire DC wiring from main battery (in engine compartment) to the Kinetik battery in the trunk. Also to be installed are a 12 VDC power distribution system for the linear amplifier, Icom IC-7000 radio (with 30 Farad voltage stabilizer), 300W DC to AC Inverter, and LDG Tuner. Miscellaneous other control cables and wiring will also be installed. I will try and have a complete functional flow diagram for next month's Digital Happenings.

Some recommendations: If you decide to install a 2nd battery (as I am doing), I recommend that it be connected to the main battery using 2 heavy duty cables (one for positive, one for ground). Naturally, BOTH of these leads should be fused at the main battery end. I have found that most installers will try and talk you into using the body of the vehicle as the ground return because it is easier. Insist on a 2-Wire system. This can prevent many issues with what are called "ground loops" where DC and AC currents may flow in unexpected paths through your vehicle frame and body. Ground loops can create undesired mutual coupling between the various pieces of equipment you have installed. In short, they can be bad news!

Also, I recommend that you use a heavy duty automatic relay to isolate the two batteries. The other choice is heavy duty (high amperage) diode isolation. The problem with diode isolation is that all diodes have a small, but significant voltage drop across them of ~ .4 volts regardless of current flow. This small voltage drop will cause the 2nd battery to always reach a lower state of charge than the main battery. Constantly running the 2nd battery with an incomplete charge will reduce its life through a process called sulfation.

By next month the installation should be complete. I plan on telling you the rest of the story then along with other tips on what to do and what not to do.

October Activities:

Digital activities during October were very low. The only stations operating digital spotted on W6RK were:

10/4	W0NAC/N0LXJ	Elbert, CO	PSK-63, RTTY-45, DOMINO-22
10/19	K2T	Suffolk, NY	RTTY-45
10/20	NS0A	Henry/Knox, IL	PSK-31

There were undoubtedly other digital stations out there (maybe working state QSO parties?), but they were not spotted on W6RK.

Support calls related to Digital setup, etc. were almost non-existent in October. Maybe this article will inspire some new people to call. As always, I stand ready to help anyone who has problems or wishes to get started with Digital operations. Just email me at w0nac@comcast.net or call me any time at 303-799-3658.

The updated Table 3 is given below:

Table 3 - Active Digital County Hunters Award Status

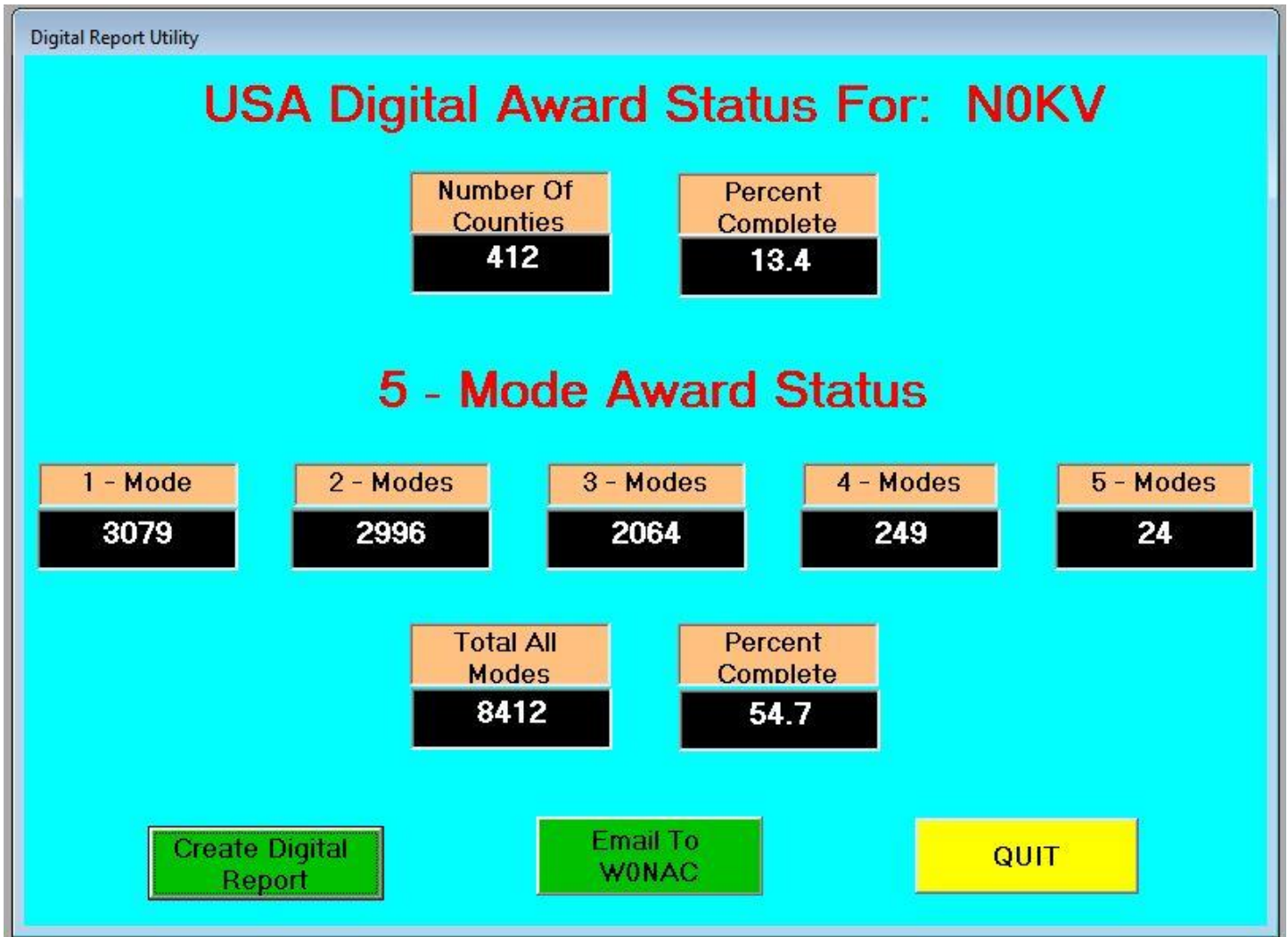
#	CALL	NAME	STATUS* (M,F,I)	USA - DIGITAL Counties (of 3077)	(1 MODE)	(2 MODES)	FIVE MODE COUNTIES (3 MODES)	(4 MODES)	(5 MODES)	TOTAL	% 5-Mode Completed	LAST UPDATED
1	AA8R	Randy	F	1000+	-	-	-	-	-	0	0.0%	9/30/2012
2	AC0B	Cliff	F	205	-	-	-	-	-	0	0.0%	12/10/2012
3	AD1C	Jim	F	-	-	-	-	-	-	0	0.0%	
4	K0DEQ	Bill	F	-	-	-	-	-	-	0	0.0%	
5	K0PVW	Rob	F	-	-	-	-	-	-	0	0.0%	
6	K0WJ	Lou	F	-	-	-	-	-	-	0	0.0%	
7	K4PBX	Jim	F	106	2575	84	6	0	0	2665	17.3%	10/15/2012
8	K5GE	Gene	F	26	1893	575	8	0	0	2476	16.1%	5/26/2013
9	K5SF	Dick	F	-	-	-	-	-	-	0	0.0%	
10	K5WAF	Bill	F	599	3044	?	?	?	?	3044	19.8%	5/2/2013
11	K7REL	Tom	F	-	-	-	-	-	-	0	0.0%	
12	K8QWY	Ed	F	-	-	-	-	-	-	0	0.0%	
13	K8ZZ	Ed	F	-	-	-	-	-	-	0	0.0%	
14	KA8JOP	Pamela	M/F	22	202	64	53	28	4	351	2.3%	9/12/2013
15	KC3X	Hollis	F	-	-	-	-	-	-	0	0.0%	
16	KC6AWX	Bob	F	450	3077	1592	264	59	14	5006	32.5%	5/7/2013
17	KC7YE	Jack	F	-	-	-	-	-	-	0	0.0%	
18	KD5YUK	Billy	F	-	-	-	-	-	-	0	0.0%	
19	KD7KST	Bill	M/F	1792	-	-	-	-	-	0	0.0%	9/30/2012
20	KF7PKL	Davis	F	379	879	211	48	15	1	1154	7.5%	10/9/2013
21	KG5RJ	Greg	F	606	3049	2079	559	192	62	5941	38.6%	10/2/2013
22	KM1C	Bill	F	-	-	-	-	-	-	0	0.0%	
23	KU4YM	Dave	F	30	2782	29	10	2	1	2824	18.4%	9/6/2013
24	KM6HB	Mark	F	714	3077	2936	694	87	1	6795	44.2%	2/3/2013
25	N0KV	Barry	M/F	445	3077	3026	2257	312	66	8738	56.8%	10/4/2013
26	N0LXJ	Sharon	M/F	1361	3077	2263	1208	472	236	7256	47.2%	10/27/2013
27	N1API	Al	F	483	3077	1706	384	196	115	5478	35.6%	10/24/2013
28	N3HOO	Ed	F	-	-	-	-	-	-	0	0.0%	
29	N4JT	Jim	F	736	3077	3064	743	235	150	7269	47.2%	10/21/2013
30	N5MLP	Ron	M/F	391	3077	409	54	37	9	3586	23.3%	5/19/2013
31	N6PDB	Dennis	M/F	664	3077	2768	745	420	305	7315	47.5%	8/27/2013
32	N8CIJ	Dick	F	676	3077	3014	668	303	229	7291	47.4%	9/5/2013
33	N8HAM	Jim	I	0	3077	0	0	0	0	3077	20.0%	4/2/2013
34	N9WNN	Steve	F	0	2180	0	0	0	0	2180	14.2%	2/24/2013
35	NA8W	Darl	F/M	579	3022	852	381	212	99	4566	29.7%	9/12/2013
36	NF0N	Mike	F	785	3077	3077	915	108	50	7227	47.0%	12/31/2012
37	NN9K	Pete	F	816	3077	859	78	1	0	4015	26.1%	3/23/2012
38	NT2A	Gene	F	-	-	-	-	-	-	0	0.0%	
39	NU4C	Paul	F	-	-	-	-	-	-	0	0.0%	
40	NW6S	Jim	F	722	3077	3077	743	59	35	6991	45.4%	9/7/2013
41	NX4W	Lloyd	M/F	1135	3077	1274	436	290	97	5174	33.6%	7/27/2013
42	W0NAC	Matt	M/F	1806	3077	2821	1960	1071	422	9351	60.8%	10/27/2013
43	W3DLM	Don	F	359	3077	2390	298	101	55	5921	38.5%	10/12/2013
44	W4IHI	Garv	F	-	-	-	-	-	-	0	0.0%	
45	W4SIG	Kerry	F	-	-	-	-	-	-	0	0.0%	
46	W4YDY	Dave	F	876	3077	3077	1035	353	175	7717	50.2%	9/5/2013
47	W5QP	Rick	M/F	244	3077	2598	252	113	83	6123	39.8%	10/6/2013
48	W6RK	Risto	F	-	-	-	-	-	-	0	0.0%	
49	W6RLL	Joe	F	-	-	-	-	-	-	0	0.0%	
50	W7FEN	Larry	F	25	3077	2975	32	1	0	6085	39.6%	10/3/2013
51	W7IN	Larry	F	-	-	-	-	-	-	0	0.0%	
52	W7QQ	Bill	M/F	-	-	-	-	-	-	0	0.0%	
53	W9JR	Rich	F	90	3077	1674	44	0	0	4795	31.2%	10/31/2012
54	W9SUQ	Larry	F	-	-	-	-	-	-	0	0.0%	
55	WA4EEZ	Leslie	F	1053	3077	1420	572	153	21	5243	34.1%	9/6/2013
56	WA4UNS	Doug	F	-	-	-	-	-	-	0	0.0%	
57	WA6OCV	Susan	M/F	328	3077	328	320	130	10	3865	25.1%	3/28/2013
58	WA7JHQ	Sterling	F	-	-	-	-	-	-	0	0.0%	
59	WB0M	Jeff	F	-	-	-	-	-	-	0	0.0%	
60	WB2ABD	Paul	F	-	-	-	-	-	-	0	0.0%	
61	WD4OIN	Jack	F	757	3077	3069	721	241	122	7230	47.0%	10/7/2013
62	WQ7A	Terry	F	201	3077	3028	206	132	112	6555	42.6%	8/24/2013
63	WY4D	Ben	F	229	3077	252	31	15	9	3384	22.0%	10/22/2013

As you can see, the table is gradually filling up with more people reporting their status.

How To Get Your 5 – Mode Statistics Updated:

Two months ago I gave you a new and easy way to update your Digital statistics for Table 3 by using a small program called "Digital Report Utility". This new program will create a report for you with your progress shown

for both the USA – Digital and the 5 – Mode Awards. Here is a sample screen shot of a typical report using N0KV's (Barry's) database:



Once your own report is showing on your screen and you are OK with the numbers, the program can also email your statistics to me so I can update Table 3. There is no longer a need for anyone to manually extract their statistics.

Installing and running the new utility is easy. Just download "Install Digital Report Utility Version 0.1.9.exe" from the MARAC Server (<http://www.marac.org/chdownloads>) or use the following Dropbox link (which is available 24/7) <https://dl.dropboxusercontent.com/u/26171574/Digital%20Report%20Utility/Install%20Digital%20Report%20Utility%20Version%200.1.9.zip> to get a zipped version of the same install file. You can save the file anywhere you wish on your computer (desktop, download folder, etc.) because it is not sensitive to location. When you execute this install file, just follow the default selections and it will install the new utility program in the proper folder (Program Files or Program Files (x86)) and place an icon on your desktop that you can use to run it.

Please Note: When you first run the program you need to make sure that it is pointed to your call sign database file (files if you are an OM/YL team). This file(s) will usually be found in your "C:\Logger Data" folder.

To point the program to your file(s), press F-10 while on the opening screen. Please see last month's article for more detailed instructions if you need them.

Since it is nice and easy now, I encourage everyone listed on the table to use the new utility to email me current statistics NLT November 27th so I can update the table with your information. If there are others not listed in Table 3 who would like their statistics included, just run the utility and have it email your numbers to me. I will get you listed!

During the month of October, 10 people used the new utility and emailed the results to me. These were: KF7PKL, KG5RJ, N0KV, N1API, N4JT, W3DLM, W5QP, W7FEN, WD4OIN, and WY4D. I encourage others whose status is out of date (or totally missing) to download/install the new utility and use it to email updated status to me.

Caution: The email portion of this program may not work with every email client out there, especially web based email clients. If that part doesn't work for you, just include your numbers in an email that you create manually using your own email client and send it to w0nac@comcast.net . Many Thanks!

Possible topics for the coming months include (in no particular order):

“Completion Of Digital Mobile Installation Story”

“How To Log Your Digital Contacts In Logger”

“Macros – Revisited”

“New Digital Awards?”

“Digital Software Installation – Revisited”

“Award Difficulty Index”

“Additional Digital Mode Test Results”

As always, I still need (and welcome) your suggestions on topics for future articles! Or if you have something you wish to contribute I will certainly try to include it. Short stories describing your experiences/frustrations/etc. in getting started in Digital ops would be especially welcome. Summaries of your Digital trips would also be good. I look forward to hearing from you.

Please email me with your comments/suggestions at w0nac@comcast.net and don't forget to send me your updated status for the **USA – Digital** and **5 - Mode Awards** so I can update the Digital County Hunter Status List again next month.

73's and we hope to see you on our waterfall again real soon!

Matt – W0NAC