Digital
Smart
Technology for
Amateur
Radio

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To the Readers:

The evolution of this document is quite interesting. I originally started 'D-Star for Dummies' as simply put, so I didn't have to play Tech Support, every time I went on air. In the beginning, there was the odd D-Star person and one repeater. Hardly anyone truly understood what D-Star was about, and how to make it all work.

My father, W8JNE, Chuck to most, bought an ID-800H, and the one repeater we had in town, wasn't the greatest. There was quite a drama with that tale and this isn't the place for it. The ID-800H was the first single VFO D-Star rig. When you understand how D-Star works, and understand how things evolved, then 800H shows its problems. Looking at the 880H its replacement, you can see where things where learned.

So after banging his head, he bought the 880H and passed the 800H to me, and the confusing D-Star books to me.

Now I have been a System Administrator since the days of Windows 95, and a power user of computers since the days of the 286, before multi-tasking came out. Computers I knew. Ham Radio I was still learning. So I came at it from the PC world side, as opposed to the Ham side.

To make a long story short, I read the "Nifty EZ Guide to D-Star" and thought it was anything but. Even I was confused, and had to re-read it multiple times to try to understand what that author was trying to tell us.

So I worked over and tested each concept until I got the idea of what he was trying to convey. My neighbors no doubt heard me gripe loudly 'why didn't he just say ….' then it was followed by a few curse words.

Then Jason (KD8GES) bought an 880H and we began to rack some things together and discovered some of the things they didn't tell you, but should have.

Then D-Star in Columbus took off. One after another people where seeing what D-Star could do. Enough that on April 10, 2010, W8CMH went D-Star and this was the analog system that we all hung out on. Only this time it was set up right.

It quickly got to the point that I would go on the air and be deluged with D-Star questions, and when listening be referred to as the local 'D-Star Expert'. There were many nights I just wanted to Rag Chew, but got hit with 40 questions.

Then the idea came up, I should write all this down and just send it to them.

It quickly became apparent, that most hams, rarely read the manual. Not only that it didn't help that the manual's where more confusing than the subject matter. Even of those hams that did read the manual, they left even more confused than was needed.

So thus I created the D-Star for dummies. I only had the ID-800H, and the software to work with. So I took what was broken in the 'Nifty guide' and the Manual, and re-wrote it from scratch. Each concept had its section, and I took people through it all. Concept by concept.

Now to me it was simply a way to hand it to a new D-Star person, to save me 400 questions, so I could rag chew. I was more concerned with answering the common questions, so it didn't eat into the rag chew.

This had some strange effects. Before people where trying D-Star hitting that hurdle, and instead of sticking with it, they were getting rid of it, without learning anything, and anyone trying it, they were trying to warn off. Not to mention someone asking 400 questions having trouble with the new mode, is not the greatest thing for advertising said new mode.

So if I could get all the concepts down, get them quickly in the new guys hands, answer their questions, before they ask them, their happy and get up to speed very quickly. I'm happy because now I didn't have to play tech support so much, and more people are using the mode every day.

There are also some strange side effects, I had not planned on. This document didn't just stay local. It's gone all over the place as far as New York, and I heard last week that the ARRL know about the document. I even had a repeater owner track me down to say thanks. One repeater owner noticed me at Hamvention, all from that simple D-Star for dummies e-book.

Now the book is evolving yet again. When I wrote it, it was from the ID-800H, probably the trickiest rig to do it on, and the one with the most quarks. The 880H seems to be the most popular D-Star mobile rig these days. So people had to work out the difference to.

The folks around central Ohio are really good for ideas. Someone, and I don't recall who, had asked, "Why not expand it to the other radios, and other things like DV-Dongle etc."

Notice I didn't mention any volunteers to help with those sections. Writing books takes time, a lot of it. Then the first volunteer stepped forward George (N4DLR), he had the 880H, and the RT-Systems, as well as the Travel plus. So he added two sections to it.

As I edited it, some questions began to arise. Won't this confuse them? While we were working on it, a few more people volunteered to write about their rigs, programing software too.

The question then became, 'how do I set this up, so it's simple and Easy for the new user?'

So we will basically break it down into sections, or core concepts, then how to stuff said concepts into rigs. I also noticed a lot of hams liked to print this document out and refer to it quite a bit like a big reference manual.

So that's how this document is going to be set up. The first section covers the basic concepts etc., then into specific radios with specific Software.

First and foremost, this book, in electronic format will always be free. That's the first helpful way I could think to help out the hams. (Rigs aren't cheap) Another ham brought up the possibility of say ARRL, or another publishing house wanting to print it.

Like I said there's always going to be an electronic version free. If I am approached by a publishing house, that part is non-negotiable. If it does get

printed, then the profits, well most of them will probably go to either a ham club or a charity or something along those lines. But let's not put the horse before the cart. Hams that have worked on this know a head of time, that I retain the rights, and that there will always be a free version available electronically. The way I see it, any publishing done will be for those who simply want it in a book format instead of printing it out themselves. Isn't that what all ham books should be?

Acknowledgments

 First off I want to thank my father Chuck W8JNE for all of his help, not just in getting me into amateur radio, helping me get rigs, but also helping me proof what you are reading here. I have probably spent more time in writing and re-writing this document then quite a lot of people would think was worth it.

 I also want to thank George Foy N4DLR for his work with the 880H with RT-Systems Software, and the ARRL Travel Plus.

 I don't ask for any money on this, and yes it has been offered to me. I wrote all of this simply to help others get on with D-Star. That's right folks this document is for you, ham radio operators in the surrounding Columbus area, to get you up to speed on the new mode of operation.

Table of Contents

1 INTRODUCTION

Hello everyone and welcome to D-Star for dummies (the Reference Manual. There have been a lot of changes since the very first revision went out. Some confusion, flame wars, and quite a few questions have popped up since the first revision, and some things have changed and some things where learned. This document here is called D-Star for Dummies and is designed to get you going from ground up into the world of D-Star. There are a lot of things going on and it all can be confusing. I'm have broken it down into hopefully simpler terms including some screen shots, to show you step by step what to do, and how to get there, as well as bring you somewhat up to date here in Columbus Ohio.

Since the first version of this went out, it has really become a monumental prospect. Hams have wanted a 'D-Star for Dummies' to get up to speed, and some kind of dedicated D-Star Reference manual of sorts.

So we are taking what we know and building on it. Think of it as a kind of collective knowledge. At first you start out with the basic concepts, and then move on to the rigs. This book doesn't replace your manual. Think of it as a kind of Add-on that the manual should have had but didn't. We cannot cover all of the rigs, so as hams get rigs, if it isn't covered here, it is a matter of a volunteer of a rig, and software combo, stepping forward to volunteer.

It is understood by each volunteer, I hold the exclusive rights to this document. I promise to credit the ham's work in whatever section, so that credit is given to the right person for the right sections. That there will always be a free version available for download. If you spot a section and software combination you have, that isn't covered here, contact me, and if no one is doing it, you're welcome to do so as well and get credit for it.

This manual focuses mainly on the Gear, and getting up to speed quickly. Hence we show you core concepts, and how to put them into your rig via different software/methods. From then on you are on your own.

As new hams get new gear, more sections will be added to the document. As goofs are found, they get fixed in the next version. Basically it's up to other hams, and me to keep this manual growing.

Here we specialize, specifically on D-Star, not the other modes, so all the information you get here is d-star specific. If you want analog information, then read your manual.

February 27, 2011

2 DEFINITIONS & EXPRESSIONS

AMBE – This is the chip that encodes it. (3600 bits per second data stream) made by Digital Voice Systems Incorporated (Its proprietary) and about $20

Busy Lockout – It is a function that has the rig check to see if a frequency is busy. If it is then helps prevent you from doubling with another ham.

Call Sign Routing – A method to send a voice 'Envelope' to another user by sending it to the gateway system to find out where that last call sign was heard and spiting it out there, or if not found where that call sign is registered at.

D-STAR - (Digital Smart Technologies for Amateur Radio) is a digital voice and data protocol specification developed as the result of research by the Japan Amateur Radio League to investigate digital technologies for amateur radio. While there are other digital on-air technologies being used by amateurs that have come from other services, D-Star is one of the first on-air and packet-based standards to be widely deployed and sold by a major radio manufacturer that is designed specifically for amateur service use.

DD – Digital Data mode: currently used on the 1.2G side. It means its data only no voice.

DV – Digital Voice mode: basically your transmitting voice and Data at the same time.

DVADAPTOR – A Device plugged into the Antenna line of an HF rig to add D-Star capabilities to another rig (Typically HF on 6-10 meters)

DVAP – A device plugged into a USB port on a computer to allow another D-Star rig (typically an HT) to use the computer to connect to the D-Star Gateway network.

DV-Dongle – A device plugged into a USB port allowing an operator to talk to other DPlus enabled gateway repeaters though a computer with a broadband connection.

Falling off the cliff – A term used to describe when someone has moved out far enough that no single can be received / sent. (This is similar to the FM Analog

term of 'Falling into the static' because of the abrupt nature that this has, hence the term 'Falling off the Cliff.')

Gateway 2.0 – The software on the repeater's Gateway system that makes it all possible. It runs on Linux, and CentOS is the Linux distribution that it recommends.

Linking – Creates a link from one repeater node to another repeater node or Reflector allowing for everyone on the node (who is registered on a gateway) to communicate with the other target.

My Call – One of the 'Magic 4 Fields' normally the operator using the rig.

Memory Bank/group – A method of organizing memory entries.

Node – Often used to refer to a node or module of a Repeater stack. IE. W8CMH Node C (145.490)

Node Routing – Sends a 'Voice envelope' to a node on either the same repeater or another node on another repeater.

One Touch Reply – A function of a D-Star rig to be able to quickly answer a call sign route, or a Node route, by pressing a button putting the caller's call sign into your "Your Call" field. This way you can 'call sign route back to them.

R2D2 – A term used to describe 'Noise' in a D-Star communication. "I got a bunch of R2D2 on that" meaning that some of the signal made it through but not all of it, thus it creates a lot of robot like noise when that happens. It also happens when doubling, and if enough power to trip the repeater but not enough to get a full signal into it.

RPT* - Shown on a rig when the gateway confirms transmission. Different models tend to show different things.

RPT1 – Normally the repeater node your calling in from (W8CMH   C) for example. (It's what repeater node you're talking into)

RPT2 – Normally that repeaters Gateway, usually the call sign with a G in the 8th position.

Slash Field – The field following the call sign field that contains 4 spaces to put letters or numbers after my call. (Ex: W8KWA /800H) normally this is where you

put your rig's model number. Dongles use /DNGL and Dvap use /DVAP automatically.

Text Insert – A 20 character field that you turn on and when you key down, your 'my call' then Slash field, then what ever is in the Text Insert that you have selected. Normally it is, "Name, Location, Country" ie, Charles, Cols Oh US. This way all who look at the screen when you key down, have that information. Sometimes it is used for stating who net control is, or for special events.

Your Call – the most volatile field, used to direct what you want to do.

3   D-STAR (WHAT IS IT?)

3.1   HISTORY

D-Star was created by the JARL (Japanese Amateur Radio League) in 2001 after three years of research. To try and get the commercial Amateur radio manufacturers to use it, they made it an 'Open Standard'. Icom did help fund the design with equipment, but that's as far as they were involved in its creation. When it was ready Icom simply used it and began adding it to their line of radios and repeaters.

It isn't an Icom only thing, which is a very common misconception. Right now in Japan, Kenwood has two rigs that they asked Icom to make for them, and then they re-branded them as Kenwood. Kenwood is also rumored to be gearing up to offer D-Star on their rigs as well. Right now Kenwood has TMW-706S (50 Watts) and TMW-706 (20 watts), which are the ID-800H, but with frequency and power differences for the Japanese region. In fact Kenwood is already producing D-Star commercial repeaters. (http://kb9mwr.blogspot.com/2008/06/second-roll-of-d-star.html)

Also on the market is the DV-Adaptor found at http://dstarradioclub-international.com which works with any radio with a 9600 data port. So yes not just Icom but also other companies as well. Just Icom is the one that sells the rig as "Everything included".

D-Star also stands for, Digital Smart Technologies for Amateur Radio

3.2 WHAT IS IT EXACTLY?

It sounds complex but in reality it isn't. The simplest way to say it is, "D-Star is the new FM" and that's technically true, here is an overview on how it works simplex.

My Voice → AMBE Chip → GSM Chip → Narrow FM   Narrow FM ← GSM Chip ← AMBE Chip ← Voice out of speakers

In DV (Digital Voice mode) your voice goes through the Advanced Multi-Band Excitation (AMBE) chip where it is encoded digitally plus text, and any other data, into GSM (the same process happens in cell phones) then stuffs it out the Antenna as Narrow FM.

Then the other radio, pulls in the Narrow FM, runs it through the GSM, stuffs it to the AMBE chip that splits the Voice/Data part, sending it where it needs to go.

Why GSM? The GSM takes the Data from the AMBE that has taken voice and data, and put it together digitally, the GSM is the chip that gets it ready for the air. Just like in your modern GSM Cell phone, that chip takes you voice (encoded by other chips, with the cell data, and the GSM puts it out to the cell tower.

So think of the AMBE chip as the part that takes your voice, and your 'D-star Data' and combines it together. The GSM then packages it, to shove out the antenna.

Now the AMBE does have some error correction, called forward correction, meaning if the first packet aint right, then it sends or waits for the second copy of the packet, if none are found it uses the original. This is very high speed. Those with a DV-Dongle and can see the data side of it, (the black screen with the 2.0 Beta) you will notice a lot of 'Ignoring double' when only one person is on the air. This is the error correction process.

AMBE is a "Proprietary Codec/Chip" made by Digital Voice Systems Inc. There are a few groups who are trying to make an open source compatible alternative. This is why the chip itself runs from $20. Until they do manufactures (Icom, DV-Dongle, DVAP, and hobbyist) have to buy the chip to get our devices to work. Right now it's the real difference for the 'D-Star' equipped radios and the prices on the DV-Dongle, and DVAP's.

Yes, once out of the antenna it is not only Narrow FM but also a type of packet. If you listen to a QSO it sounds very similar to an old style dial up modem after the handshake is established.

3.2.1 MORE DETAILS

It is important to keep an idea of what it is exactly, when you operate. Some people tend to get confused about certain aspects of just 'What' it is specifically.

Remember every time you key up what's happening.
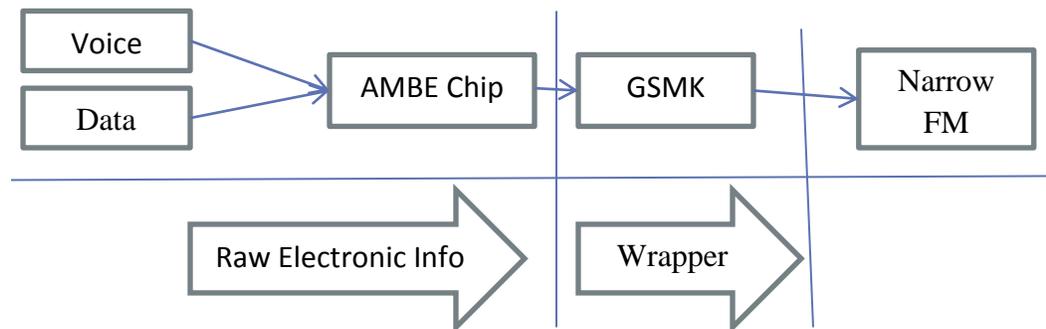
Voice and Data are combined in the AMBE chip (voice coder chip), it then takes that raw data, and passes it to the GSMK, which puts it into an envelope, or wraps the packet, and when you listen, that sound of static is the GSMK your hearing. It is the same chip/technology used in that cell phone. The other end basically takes it in reverse, the other GSMK, unwraps the packets, takes the data in there, passes it to the AMBE, which spits the two, the voice to voice circuits, the data to the data circuits.

As a Systems Administrator, I know networks, I know TCPIP, I live and breathe the stuff. In your PC, there's the TCIP wrapper, when you got to any website like Google, it passes the information down the OSI line, to the Networking layer through the program. In the networking layer, the data's wrapped up, and address information, and other information are stamped on the packet, and then shoved out the door. It doesn't matter if it is email, web, irc, usenet, a game; independently the Networking layer of the OSI model handles all of it.

The AMBE chip is like your web browser, when it gets a 'Instruction', it passes it to the GSMK, who wraps the packet up and then shoves it out the door. Same concept.

3.2.2 DV THE PACKET

D-Star radio packet structure for the Digital Voice (DV) mode

by Dick Rucker, KM4ML
date: 07-Sep-06   version: 1

source: JARL protocol for D-Star; downloaded from here:
http://www.arrl.org/FandES/field/regulations/techchar/D-STAR.pdf

Structure of a D-Star voice packet:

sync	64 bit	Bit sync	1 0 1 0 … for GMSK; 1 0 0 1 … for QPSK
pulses	14 bit	Frame sync	
flags	1 octet	Flag 1	same as DD mode
	1 octet	Flag 2	same as DD mode
	1 octet	Flag 3	same as DD mode
r o u t i n g	8 octets	RPT2	Destination repeater ≤ 8 ASCII chars; fill blanks with space characters
	8 octets	RPT1	Departure repeater ≤ 8 ASCII chars; fill blanks with space characters
	8 octets	UR	Companion's call sign ≤ 8 ASCII chars; fill blanks with space characters
	8 octets	MY call 1	Own station's call sign ≤ 8 ASCII chars; fill blanks with space characters
	4 octets	MY call 2	Own station's call suffix ≤ 4 ASCII chars; fill blanks with space characters
	2 octets		Packet Forward Check Sum (FCS) = CRC-CCITT checksum: $G(x) = x^{16} + x^{12} + x^5 + 1$
p a l o a d	72 octets		20 ms of digitized voice from the AMBE codec with Forward Error Correction
	24 octets		1st data frame
	72 octets		next 20 ms of digitized voice
	24 octets		1st & every 21st data frame are used for synchronizing data across the link - see spec
	…		voice + data frame repeats until…
	24 octets		last data frame contains a unique terminating bit pattern

Octets

Before we tear it apart, let's walk through what an Octet is. As we all know computers and electronics understand binary. Yes or no, 1 and 0.

ASCII is a standard worked out a long time ago. Eight binary places equates to one Octet (8). A = 01000001, so think 1 octet is one letter or number (not binary)

Let's give you an analogy to break this down.

Sync Pulses

"Hey you!" "Who me?" "Yah you!" "What do you want?"

In a conversation first thing we do is get attention of the party we are trying to speak to. This is just what sync pulses do.

Flags

This is basically a check list like a piece of mail 'Postage there?" "Return Addy" "is it open?' it's a yes or no check list.

Routing

This section is pretty self-explanatory; it's where things get stamped onto the packet.

Payload

p	72 octets	20 ms of digitized voice from the AMBE codec with Forward Error Correction
a	24 octets	1st data frame
l	72 octets	next 20 ms of digitized voice
o	24 octets	1st & every 21st data frame are used for synchronizing data across the link - see spec
a	...	voice + data frame repeats until...
d	24 octets	last data frame contains a unique terminating bit pattern

This is where that AMBE's stuff gets wrapped up, that's our goodies, the DATA and Voice missed together. Then when you're done, that last 24 has a code in it that basically says, packet over.

3.3 QUALITY VERSES DISTANCE
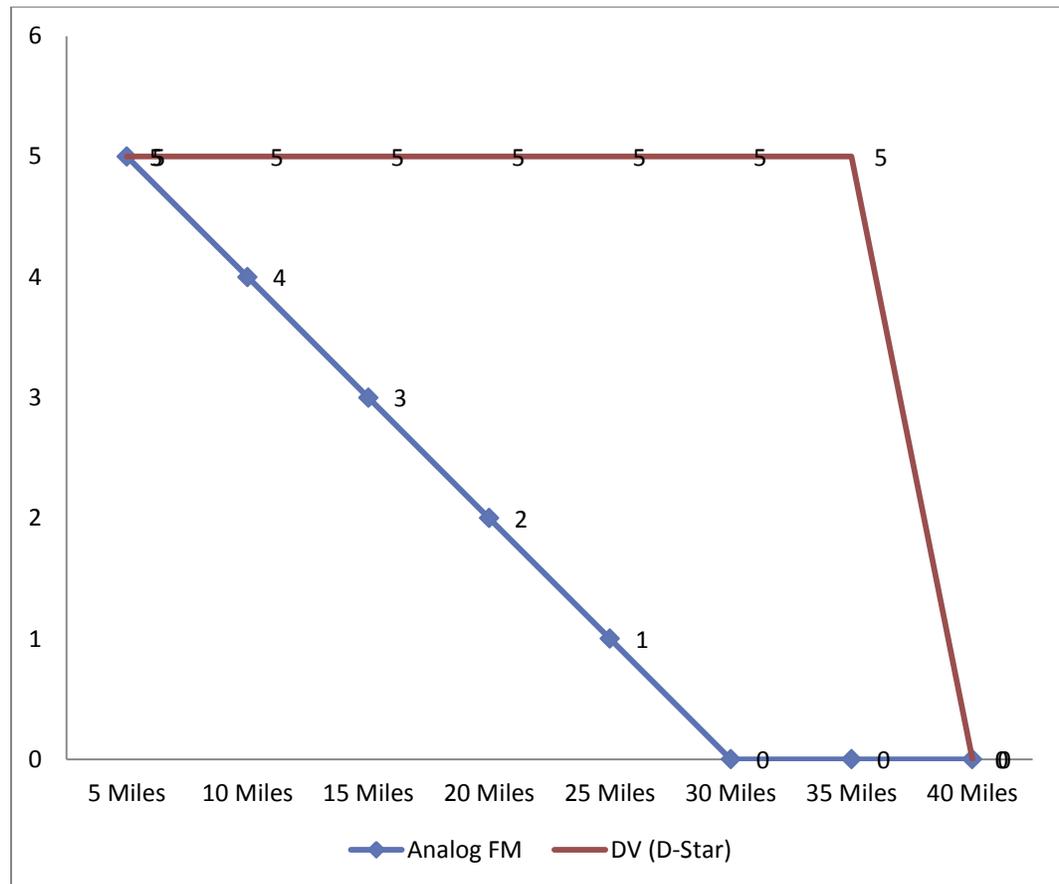
Now do I have your attention? To the Left is our S values, 5 is perfect, 1 is below the static you know something is there but can't really hear it, 2 is you can make out the words if you strain your hear for them lots of picket fencing etc.

The Data you're seeing above is representational of the comparative difference between a D-Star (DV) voice and FM Analog Voice with the same watts, same antenna. Don't believe me yet; let me give you a real life example.

Example
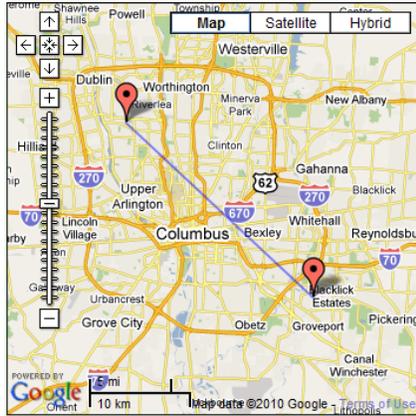
- Station 1 W8KWA (Upper Right)
- Station 2 KD8GES (Lower Left)

I have known Jason since right after I first got on the air. His QTH is about 16 miles from me, through Downtown Columbus. We met on the '5.49' repeater.

We had tried over the years to be able to reach out and hit each other FM Simplex with no joy. Even with a 5/8 wave ground plane (30 feet in the air for him, 12 feet in the air from me) using same antenna and feed lines. (Yes both Vertical antennas) Here are the results of one evening of testing so the band conditions are the same for each one.

Mod (Rig Sp)	PWR	Result
FM Simplex	50W	No Contact
FM Simplex (746Pro)	100W	No Contact
FM SSB 2M	100W	S1-S2 (At best)
DV Simplex	5W	S5!!!!!!

That's right It isn't a typo, 5 watts clear signal same antenna, no noise. On really bad propagation nights it's up to 15 watts.

I know what you're thinking, too good to be true, it has to be a fluke right? Well we went on to further test it, and others who had gotten D-Star rigs and found out that your range could go on average 30% or farther than before.

To a lot of us Hams this was the biggest selling point of DV mode of operation.

Give you another example, the old 5.49 when I got out west on I-70, right as I hit the 25 mile marker I could no longer be heard on the 5.49. When it went digital, I could make it to roughly the 35 mile marker and still be crystal clean before I 'fell off the cliff'.

This is the drawback to this mode of operation. FM analog the farther you go out, the more into the static, and picked fencing you go. With DV Mode operation, you simply fall off a cliff, one moment your signal is there the next poof you're gone.

This phenomenon is the difference between the two. DV is a form of Packet radio, so as long as the other side knows there's a packet, and can pull the data out of the packet, the whole thing is golden. When the packet is damaged

enough to where it's unreadable, it simply is unreadable. Because a machines ability to detect signal in some ways is better than a human's ear in this case, it works.

Now you add on to that it uses Narrow FM, on top of that… All of you at least have your Tech License; you know that the wider the signal the more power it takes to push it. Narrow FM is HALF the size of regular Wide FM we use for standard 2 meter and 440 operation, so all of that power gets sent along a smaller size and *adds* even more distance to the signal, so those two qualities is what gives you that approximately 30% distance gain. The fact that it's encoded to packets, then transmitted, then reconverted gives you the better sound quality. That in essence is why Ham's all over the world are adding DV mode (D-star) to their ham shacks, and cars.

3.4 THE RIG AND THINGS YOU NEED TO KNOW FIRST BEFORE POWERING IT UP.

In this section we are going to talk some basic hardware stuff, and things to do before we go full tilt into the nitty-gritty of D-Star.

	80D	92AD	800H	880H	2820	Kenwood TMW-706S	Kenwood TMW-706
HT	X	X					
Mobile			X	X	X	X	X
USE OPC-478UC	X	X	X	X	X	X	X
Programming Software	Buy	Free	Buy	Free	Buy		
Programming Slots			500	1000	20	500	500
• **Your Call**			99	60	60	99	99
• **Repeater Call**			54	300	60	54	54
• **Repeater List**			NA	300	NA	NA	NA
Dual VFO					Yes		
Price	Disc	$300-400	Disc	$500	$900	500	600

The above chart is a quick and dirty guide right now as far as the different D-Star rigs go. Right at the moment as I am writing this the ID-880H, seems to be the most popular out there as far as rigs go as it is also the latest.

With the points laid bare you can see a kind of system. Yes the 2820 as twin VFO's but notice its Programing slots are rather small. The two Kenwood's on the end are Japanese made and single band versions of the 800H. You can also notice that ICOM tried selling the programing software but after the 80D, 800H (both discontinued) and the 2820, all of the newer rigs after that offer free programing software? They learned one lesson alright.

3.5   THE PROGRAMMING CABLE

Haven't bought the programing cable yet? Stop and read this!

There are issues with the USB OPC-478UC. For one there is no 64 bit driver for it at this time. This means if you have a 64bit operating system, you can't use it. (Not without a lot of hoop hopping.)

Now with that out of the way, some issues need to be brought up. I'm going to tell you by experience and by others experience. Don't try to program the rig by the face plate for D-Star use, unless you are EXTREAMLY familiar with the rig. It isn't something you can whip out on an afternoon and program. There are more trips, tricks, and bizarre things going on under the hood than you can see. You will get frustrated angry, and that sledge hammer on a $600 rig will look very tempting.

I do not advise at all anyone new to D-Star to attempt to program D-Star functions from the front face plate. Yes I know I am repeating myself, but this is one of the VERY common complaints.   Are you ready to avoid a massive headache? Good.

The next decision is how you are going to program your rig. Since front face plate programing is out, there are two options.

- Option 1: Manufacture Programing Cable and Software
- Option 2: RT-Systems software and programing cable

There are pro's and con's to both of these options. We will go down each.

Option 1: ICOM or Manufactures cable + Software

Icom's Cable is 32 bit only (for the moment). So if you only have access to a 64 bit machine, then you're going to have to either A) run a Virtual PC Emulator that allows direct hardware access to the USB. Then install a 32 bit version of windows on that, trouble shoot it, and run your programing software on the virtual machine. (Yes it can be done, but I do not advice it unless you have some experience with virtual machines). Or there's B) take it to a friend's house that is running 32 bit, or borrow your kids. Or Option C) formats your hard drive and install the 32 bit version of the OS or set up Dual Booting, or D) Prey for Icom to see sense in producing a 64 bit driver.

Quite a few people have tripped over this gotcha (yours truly included). I ended up running 32 bit OS, SPECIFICALLY because of that. (The re-install was painful)

Now the other cons, the 800H and the 2820H, you have to BUY the software too, (40+40=80). True I can say I am using the ICOM supplied equipment, Icom supported software etc. If something goes wrong I got one culprit on the list.

The pro's of using this method, for one its simple, no frills, easy to use (once after you get it in there) and you got only one person to complain to about any glitches.

Option 2: RT-Systems

The cons are simple. This is what we in the computer field call 3rd party. The problem with this is, if there is a glitch, you end up with an 'Its Icom's fault' or 'its RT-systems fault, if you used our software you wouldn't have this problem.' Or "It's all Microsoft's fault!" I've been there and done that more times than I care to count.

The pros of these are, you buy your cable from them, and your software from them. Their cable doesn't have the 64 bit issues, but then again any problems you have with them there more than likely going to make someone else's fault. (Blame Icom or Microsoft etc…) Their software and cable, after all is said and done, is cheaper for the 800H, and the 2820, but more expensive for the 880H. So basically you want RT Systems, you buy their cable, and their software in one chunk. The Icom 880h software (by Icom) is free, but you do have to by the cable (which is universal for all of their D-star rigs for the moment) just the 80D, 800H, and the 2820 you have to buy a licensed copy of their software.

Now it also works with ARRL Travel Plus (which I own) and Icom's software doesn't. It also allows you to work with multiple files at once, Icom's doesn't. If you buy a new rig, you also have to buy a new bit of software to go with it. I think you can use the same cable.

Now the RT-Systems Software does have an interesting perk. If you have multiple rigs, like most hams who been in it for a few years, if you use their programing system on all your rigs, it makes it a breeze to Sync so all the memory slots are identical.

For now in the core concepts, we are going with the ICOM cable and the ICOM software, but that's just for simplicity. See other sections for more how to on the RT-Systems software.

3.6 GATEWAY REGISTRATION

Since Version 1 of this document several things have changed, and we have discovered a few new things. In order to get out and talk to the world, you need to be registered on a gateway. This is true for a rig, DV-Dongle or the new Digital Voice Access Point (DVAP) or any of the other DV (D-Star) toys you either build or by that connects to a repeater. (Non Simplex)

One of the misconceptions out there is 'it's all a bunch of power hungry people who want power over the way you operate'. One of the things that happens when you register to a repeater is it fills in an 'I don't know what to do' clause in the protocol. If another ham *Call Sign routes* you, the gateway first checks the last heard lists, if it finds you, it shoves it out the last place it heard you. If it doesn't find you it asks 'Where is he registered' the software then tells itself 'he is registered on this repeater' and then stuffs it out there. The second function of registering is to allow gateway access. You want to talk on other repeaters, link, node route, talk on a linked repeater. You have to register.

If you don't register with a repeater, you can't use a hotspot, talk on a linked system (locally they hear you but across the link they don't), you won't be able to communicate to A DV-Dongle user or a DVAP user. Even they have to register before they can use it.

Also you register to one repeater, that's it. If you find yourself having to move out of state etc., you need to unregister, and register back in your new local. We are talking permanent moving, not trips etc.

3.6.1 WHAT IF I AM NOT REGISTERED? WHAT CAN I DO AND WHAT EFFECTS CAN I EXPECT.

If you aren't registered, you can still talk simplex, and kind of talk on a repeater. I say kind of cause there's a few gotcha's. Anyone using the DVAP, and DV-Dongle, or linked, will not be able to hear you, and may step on your transmission. I know you just got your rig you want to show it off and test on your local repeater. Believe me I can understand that. However, like I stated if you're not registered on a gateway or in the system, DV-Dongle, and DVAP users or any one linked on the system cannot hear you and will more than likely key down when you're trying to speak, thus doubling, and trashing both your transmission and you will trash there's. They can't hear you and thus don't know when you're talking but you can hear them.

If you're not registered on the gateway system, you cannot participate in linked conversations, meaning you can listen but if you key up chances are you're going to be stomping on someone else and running it for the local hams. Also you can't call sign rout, node route, or even use a hot spot. You also can't use one even if you bought a DV-Dongle or a DVAP without registering.

3.6.2   So how does it work?

There are two methods, both work the same. Some repeaters have a website you can go to (found on Dstarusers.org) or an email address. The website link basically takes you to a form you fill out then click submit. It basically sends a message to the repeater admin who double checks it.

The second method is sending them an email; both of these methods put it in the repeater admin's hands. From there he adds it in on his end.

What he does with that information is put it into the gateway software which synchronizes every so often so all the repeaters get the list, just the call signs. Please bear in mind you are running with Email's so sometimes, the mail may not get there, or real life pops up, or the email ends up getting caught up in a junk mail filter.

When he gets the message and adds you in, he's going to send you a conformation message saying you're in and you're good to go.

With your rig, until you get conformation, and it's in the system, you can only talk locally, even if the repeater is linked up. Think of it as a list of who can go on the gateway network. If your call sign isn't in the list, the repeater ignores it. This isn't the fault of the Repeater Admins, but a security feature written into it by the Japanese folks who are writing the repeater/gateway software.

Also when you register, just register your FCC call sign, no W1AW-4 or anything wonky like that, just your FCC CALL sign.

3.6.3   Check to see if you actually are registered:

There is a website http://query.ki4swy.org/index.php up by KI4SWY, there you can enter a call sign and it can look in the propagation database for it and tell if your registered, to which repeater, and also the 'last heard'. If you enter your call sign in there, and it finds it, then you know your registered and in the system. Then if you run into trouble, you know it's a settings problem, or a repeater problem. It is great for helping figure out what went wrong and to begin trouble shooting what's wrong. (Basically you can eliminate the (am I registered, has it been propagated) issue.

3.6.3.1   W8CMH

Website: (Under Construction)
Gateway Registration URL: https://w8cmh.no-ip.org/Dstar.do
Email: k8nio@arrl.net

This went up on the week of the 10th, of April 2010 and is fully operational.

3.6.3.2   W8BAP

Website: http://w8bap.ham-radio-op.net/
Gateway Registration URL: https://w8bap.ham-radio-op.net/Dstar.do

This only has a B node at the time of this edit, he does have the C node frequency pair set up and is working on getting the C node up and functional. Some people have difficulty reaching it as it only has a 440 node at the moment but it is fully up and operational, and wide area coverage.

3.7 A SPECIAL NOTE ABOUT GATEWAY REGISTRATION (PLEASE READ)

When you register with a gateway, to the system you're telling the gateway system, "Hello this is my home repeater, if someone tries to reach me, and all else fails send it here."

Especially getting started and DV-Dongle users especially, you tended to pick a repeater that allowed you to do it over the net. This got you in the system and got that $299 piece of plastic to work. Remember DV-Dongles, and DVAP cannot be call sign routed to, or Node Routed to. Those are the two procedures for a traveling ham to get to you, or someone DX'ing without forming a link. Since the DV-Dongle couldn't do those anyways it didn't matter. But for your rig, yes it does, as this is the repeater that you're going to spend the most amount of time on.

It's a difficult concept to explain without really going out into technical jargon. Think of it as a 'If all else fails deliver here'.

An Example:

Let's say we have Homer Simpson W1SIM, (Scary thought I know). Homer here buys the DV-Dongle, and finds a repeater in Maine that has an automated form to add him to the gateway. Homer's worked out all of his technical issues and he's dongling away. (not going for the pun) Now Homer buys an 880H there in Springfield from Universal Radio. He thinks 'I'm already registered, so let's rock' and he's technically able to all of the things that you can do with D-Star. Now Larry he's at the Hamvention in Dayton Ohio, he says 'Why don't I call up homer' and 'Call sign routes him'. Well homer hasn't been chatting on the local repeater for 3-4 days but his rig is listening. His call sign has fallen off the 'last heard' lists. Now Homer hangs on the 6.66 N3UK repeater in Springfield. Remember he is registered in Maine. So Larry's call back to him to tell him about the free beer, goes out to the gateway system, it says "Nope I aint seen homer, but here is his home repeater W1AW in Maine I'll stick it there!" and that call to homer about the free beer, just went to Maine, cause that's the repeater he is registered to.

Doh! (Ok I couldn't resist)

So what should Homer do? Homer needs to go to the Maine repeater and figure out how to get himself unregistered. Once the repeaters Admin takes him off, it has to propagate in the system, (Takes about a day), then he needs to register to N3UK repeater there in Springfield, and then that propagates.

The system doesn't have a voice mail option, and homer has to be actively listening to his home repeater and catch it and at the same time it is transmitted, there can't be someone keying down at the same moment or it gets sent to the

rubbish bin and ignored by the local repeater. But well if someone offered you free beer… need I say more.

So at this point, you got your rig, and sent out your registration to your home repeater. I know we still haven't gotten to the 4 magic fields, but we will one topic builds on another here. So let's go into Memory Banks vs. Memory Slots.

3.8   BANKS VS. SLOTS

To grasp the concept let's get some terms strait. Memory Slot is old school term. Remember your old rig, you laid out your memory information in a chart; Name, Frequency, PL tone, Offset, power etc. That is called a memory slot. Banks are list of 'mini slots' to put information in. That memory location can sometimes be put on a different memory chip all together. So Slot is 'old style repeater memory' banks are 'quick short lists'.

Confused still? Let me break it down farther. You're filling out a list where one of the fields all has the same data. So you want to make a drop down list so all you have to do is click, scroll, find it, and click to drop it into place. Now that short list is a 'Memory Bank' for our explanation.

This is where makes and models tend to vary. You normally have the following banks.

My Call – This is where you put your call sign, and other call signs of people you physically let use the rig.

Repeaters – This is where you stuff repeater nodes and the gateway call sign of the repeaters you will be accessing. (Node and gateways of repeaters you listen to)

Your Call – This is where you put the information of the stuff you're going to be doing.

4 CORE CONCEPTS

Before we get into stuffing things into the rig, we need to sit down and have a few words about WHAT we are going to put in the rig, and why. By now you should have your rig, and chosen the programing cable and concepts, and got yourself registered at a D-Star repeater. So we are going to assume all of that is done.

While D-Star is similar to analog radio, it has another side entirely, one more complicated than simply filling out a chart. This is because D-Star can do a lot of things analog systems can't.

When the JARL worked all this stuff out, they kept it simple, really simple. Unfortunately ICOM in the manual doesn't cover the core concepts very well, and without a good working knowledge of them, the rest is useless.

This section is probably the one you're going to refer to the most.

4.1 THE MAGIC FIELDS

I call this concept the Four Magic Fields. In reality its 3 Major Magic Fields, and one Minor. Your 'MyCall' field is static, which means it doesn't change for you. No matter what you're doing on that radio, your 'MyCall' doesn't change. Yep a set it and forget it field. The other three magic fields do. Yes there is logic to it, and once you comprehend the logic, the rest is easy.

The other three fields are, Rpt1, Rpt2, and Your Call. These three fields change depending on what you are doing. There are also some rules about how things are entered into these three fields called the magic 8th character. You're going to learn to hate this 8th character rule trust me on this one.

For right now ignore frequencies, PL tones and everything else. We are going to talk about the fields alone. This is the part that tends to screw everyone up. It also is the way you need to start thinking about D-Star repeaters. So let's see an A-Typical 'D-Star repeater Stack'

This is how you need to think of a repeater stack. There is a standard convention that all of them follow:

- Call sign A – 1.2 DV Digital Voice
- Call sign A – 1.2 DD (Digital Data)
- Call sign B – 440 (70cm)
- Call sign C – 2 Meters

Each repeater is called a "Stack" and one call sign rules over it. Each box plugged into the controller is referred to as a 'Module' or 'Node', and then you have the Controller which controls the whole stack and that reports to the Gateway for orders. (Hence you see why the term 'Stack' is used)

ID-RP2C (Repeater controller)

Gateway server

ID-RP2V (1.2GHz Digital voice module)

Internet

ID-RP2D (1.2GHz Data module)

ID-RP2000V (2m Digital voice module)

ID-RP4000V (70cm Digital voice module)

Up to 4 modules can be connected to 1 ID-RP2C
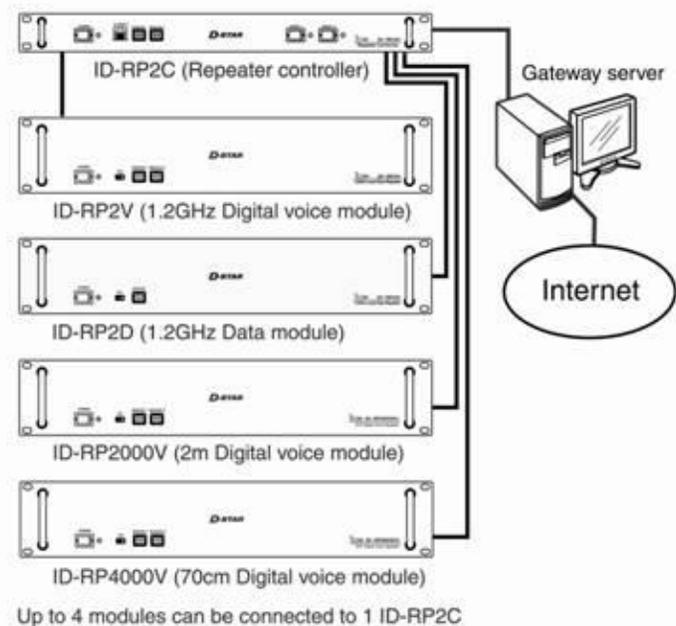
Now the best way I have found to explain the 'Magic Four Fields', is like a Path. You're marking each step along the way. Here are the 4 fields set up to talk local typically.

My Call W8KWA	RPT 1: W8CMH●●C	RPT 2: W8CMH●●G	Your Call: CQCQCQ

First thing is the operator, me W8KWA, I'm talking to the 145.49 otherwise known as W8CMH Node C, it then is going to the gateway of the repeater W8CMH G, and CQCQCQ says, "I want to talk to everyone on Node C or whoever is connected to it." The Gateway says 'Ok, I'll mark you down as being here in case anyone routed from the internet wants to talk to you to' then spits it out on Node C, and whatever else is linked up to Node C.

Right now you're asking, "What's with the Dots Charles?"

Along with the Magic 4 fields, you have the magic 8th position. Programming a rig, this can be your pain, especially for some reason these programming applications don't use fixed Fonts. For RPT1 you need the node letter (A B or C) in that 8th character position. If not it won't work. RPT2 is where you put that repeater your coming in on, the gateway, which will always be call sign, with G in the 8th position. This is where you have to count letters, and adjust spaces. Get it wrong and it won't work, screw it up in the 'bank' and you got to correct every memory slot it referenced. So remember that magic 8th position.

As far as the Your Call field goes, some have to have that 8th position, some don't. Yes I'll remind you of the instances. But let's move on.

For the most part "My Call" doesn't change unless you hand your rig to another person. It happens every so often, but not that often. So when it comes to working the rig, the program, and the rig keep that separate. So when you look at the memory slots on the software, you will notice it is missing. You obviously can't have more than one call sign, nor use a different call sign on a different repeater. So they simply reference it differently, meaning put it in a different part of the program.

4.1.1 REVIEW:

So for the next step we will do a review however for the review we too will leave out the "my call" field. So let's say I got on W8CMH's B node. My memory slot would have the 440 frequency, any PL tones or other access information but what would my fields look like?

| RPT 1
W8CMH●●B | RPT 2
W8CMH●●G | YourCall
CQCQCQ |
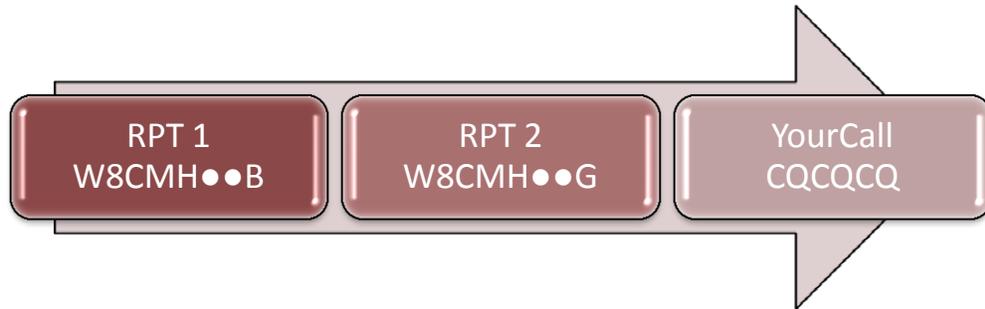
That's right, the first field RPT 1, put B in the 8th position, Rpt 2 stayed the same because I am reporting to the same gateway on the stack.

This form is the basic layout to 'talk to the node' or 'talk to the repeater' so for every D-Star repeater you put into your rig, you need entries in the 3 fields. RPT1 will be the Node you're calling in from, with the letter (A for 1.2G, B 440, C 2 Meters) in the 8th position. Rpt 2 will be the gateway of <u>that</u> repeater, with call sign, and a G in the 8th position. The *Your Call* field is CQCQCQ. This is a minim you will have for every D-Star repeater in your Memory Slots.

Also note that this RPT2 field has nothing to do with the repeater stack you registered on. This is Per REPEATER/NODE

This also means that you have to have an entry for RPT1 & RPT2 in your "Repeater Bank" and "CQCQCQ" in your "Your Call" Bank.

I know it's a bit confusing but bear with me, this pathway is the basis for everything D-Star Related. Just remember, Rpt 1 is the "Node your calling in from" Rpt 2 is the "Gateway of the repeater you're calling in from" and the Your Call, tells the gateway what to do. Oh and remember that pesky 8th position. Nothing like having to re-edit 50 some memory slots because you didn't put enough spaces in one field. (Yes speaking from personal experience) Now can you imagine having to do that from the front face plate? Yes the programming cable is your friend.

The Magic 8th position rule is there because of simple hardware programming convention. 8 bits, 8 slots is a good way to remember. It does what it does by looking at that field before and that 8th position. So when we see W8CMH●●C (where the ● is a space) the computer sees [W8CMH] and then checks what's in the 8th position [C]. The 8th position is the 'location' or 'instruction'. Computers as you know are extremely command sensitive and spaces, and characters count, big time.

4.2 SIMPLEX AND THE MAGIC FIELDS

By now you got the very basics of how to get into a repeater (once registered) so why am I talking about Simplex here? Simple, it uses fields too. (Collective Groan)

Nah it's the exception that annoys the rule. For every simplex frequency you enter in your fields will be this…

RPT 1 <Unused>	RPT 2 <Unused>	YourCall CQCQCQ
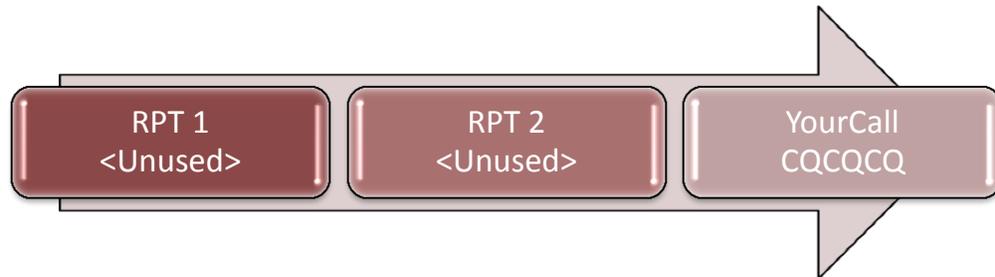
That's right, it's not a typo, this is the only time when you're RPT1 and RPT2 fields are blank. This is your Generic Simplex field layout. Since you're not coming in on a Node (RPT1) not reporting to a gateway (RPT2) there is nothing to put in there so you leave those two fields blank. You do have to put in CQCQCQ into your Call Field.

Yep we also have the exception to the Exception. All of the D-Star rigs come equipped with a 'Call Sign Squelch' Function. This means what you expect it to. It feeds back on your 'My Call' Field. So when activated (completely independent of memory settings), your squelch won't open unless someone puts your call sign in their "Your Call" field. If someone keys up with CQCQCQ on the same frequency, you won't hear it. You will continue not hearing it until you either de-activate that function, or they put in your call sign into their 'Your Call' field.

This isn't much use for this unless you and your group/club/family have a rig that you constantly monitor for such things, and agree ahead of time to do so. (Kind of like FM analog digital squelch but call sign based.)

4.3 NATIONAL DV CALLING FREQUENCY

FM has it, by the ARRL Band Plan, but yet there is no "Official" calling frequency for DV. It has been pretty much narrowed down to three frequencies by the other hams. The majority or the one that looks like it is most likely to become the official one is 146.580, the same holds true around central Ohio, and the East coast. The 440 one is all over the place and there's no real clear majority at this time.

DV has been around since roughly 2001, it's only been with in the past 3-4 years where it's really begun to bloom nationwide. So DV has to duke it out with Analog FM over the band plan. See the FM Analog vs. DV section for more information about current issues.

Now let's get to the "Your Call" Field, this is where things happen.

4.4 Common Your Call Entries

This field is the one that's going to be changing the most. We know that Rpt1 and Rpt2, when using a repeater is pretty much fixed on a per repeater/node basis. I can only come in one node and talk to the gateway etc per node/repeater.

The "Your Call" is where we get our hands dirty. We will run this down step by step.

CQCQCQ – Your basic call out

W8CMH●●E – Runs an Echo test on W8CMH. This is per repeater, so if you were on W8BAP, it would be W8BAP●●E, so on and so forth, it only works to the repeater your connected to and that repeater has the DPlus software installed, so I can't run an echo test through W8BAP from CMH. Also be advised sometimes the echo tests don't work for some reason or another. Remember the E needs to be in the 8th position or it won't work.

W8CMH●●I – Returns information on Link Status. Again this is repeater specific and depending on the "I" (I as in Info) being in the 8th position. If it's connected to another repeater, or reflector it will either tell you or show you on your screen. (Good to use to check before you do any serious rag chewing because someone else may have accidently left it linked.)

●●●●●●●U – Unlinks all links. It is a simple command universal. The U is in the 8th position. All you have to do is key down for a moment, and it will unlink everything.

REF01CL – Links to reflector 01C. Key down for a second, and then switch your Call back to CQ to talk, if the repeater allows linking it will link you to the reflector. Notice the L in the 8th position, which tells the repeater that it's a link command. Remember to switch this back to CQCQCQ in order to talk. When done, UNLINK IT.

W8BAP●CL – Links to W8BAP Node C. (Self-explanatory) It works similar to the REF01CL command but instead of linking to the reflector, links to a specific node. To activate just key up for a few seconds, then shift to your CQCQCQ, have your rag chew, then UNLINK IT.

/W8BAP●C – Node Routes to W8BAP Node C. This is different than a link command, this is ROUTING, When you key down with this in your 'Your call' field, it sends just your speech to the destination node, in this case 'W8BAP node

C' Remember the 8th position. See routing section for more info. You don't have to unlink this one.

W8JNE – Call sign routes to W8JNE

Got all of that? No well don't worry we will break it down subject by subject.

4.5 BASIC REPEATER OPERATIONS

For every repeater node you work with, you should have at least 4 lines with following commands:

CQCQCQ

This is your general usage, the one you use the most. By now you should know this one by heart. (CQ 3 times)

W8CMH●●I

The format is, [Call sign] and [I] as in info in the 8th position. This when keyed down asked the gateway, "Hey are you linked to anything". And if the gateway is operational it will return to you either via audio, or on the screen of your rig, if it is linked up to anything. You use this command to basically see if a link is active and in use. (More on this in the linking section)

W8CMH●●E

The format is, [Call sign] and [E] as in echo in the 8th Position. When key down you speak into the microphone, and your voice should come back to you. Again this is if the gate way is operational. If you don't hear anything back, then perhaps the gateway server is down. Or the repeater does not have DPlus installed. Or you just can't get in.

Remember the I and E commands only work on the repeater you're on, so make sure you have the entries set up right, and not trying to run an Echo test on a different repeater.

●●●●●●●U

The Format is, 7 blank spaces, and in the 8th you put a U. This is the Unlink Command; it takes down all links to the repeater. (If you linked a repeater, unlink it, don't leave it up because it won't come down unless the net connection stops, or someone else unlinks it) because of others leaving links up and walking away, a few repeater owners have disabled linking, just for that reason. It is an OS thing with the Gateway Software, there is no timer. So if you're unsure if anyone locally is using the link that seems to be there ask. If no one speaks up, take it down.

In my rig, I put these 4 slots <u>for every repeater</u> because nothings worse than to stumble on an open repeater, key up and get the west coast reflector when

you're expecting to just talk locally. When you're done using these commands, flip back to your CQ, slot, or you're going to feel silly very quickly.

4.6 CALL SIGN ROUTING

This is probably one of the coolest options on the D-Star repeater. Ever been on a trip and wanted to talk to a friend back home, over the air. Well that's what call sign routing does. You set up your fields for that local repeater as per normal. Then you put in your friends call sign, in the "Your call" field. If he is on a repeater's last heard list and still there, when you key up with his call sign in "Your call" field, then it's going to get routed to him there. Also if he is listening on the repeater that he is registered to, then he is going to hear it. To talk back to you, he simply changes his "Your Call" field to your call sign, and away you two go. When you're done, just switch back to CQCQCQ.

Also if you hear someone call sign routing to you, use the one touch reply feature on your radio. (See the One Touch Reply Section for more information.) You can also use that function if you hear someone call sign routing on your repeater to talk to that person (the person calling).

W8JNE   The format is [Call Sign]. Sends your voice to W8JNE, by first checking the last heard on the local repeater's last heard, then to the Gateway system, and then if that fails to the repeater where W8JNE is registered.

4.7 NODE ROUTING

Simple concept, route your voice to a repeaters specific Node

/W8BAP●B   The Format Is, [/(Call sign)] and the Node letter in the 8th Position

This works the same way Call sign routing does, the people on the other end has to change their "Your call" field to point to your node. (Via their 1 touch reply)   Remember when you do use this, to announce what repeater you're calling from so they can change theirs to get back to you.

"This is W8KWA calling from W8CMH Node C Node routing to W8BAP node C, this W8KWA calling from W8CMH Node C"

Notice I said where I was calling from twice, just in case they missed it the first time. It also gives them more time to activate their "One touch reply"

When you're done with the QSO, change your "Your call" field back to CQCQCQ by going back to your CQCQCQ memory slot.

Of special note, this works on all D-Star Repeaters connected to the internet. It doesn't matter if they have the DPlus installed or not. For some repeaters, in Japan, it's the only way to get there.

4.8 LINKING

When it comes to D-Star repeater operations, this is probably the most heated argument topic out there. Some D-Star repeaters allow you to create a link, others do not. The reasons vary from 'other users kept forgetting to take the link down' 'other users kept linking it up to the reflector and leaving it there,' to an owner just wanting it for local use.

The old adage "When you play in someone's house, respect their rules, you didn't pay for their house so you have no real say on how they run their house" Comes to mind.

Some repeaters do allow linking. W8CMH's Gateway does at this current time. Linking is very similar to Echolink, and IRLP where you connect the two repeaters together and anyone who are registered on a gateway, and "plugged' into their local repeater node, can chat back and forth without any real change in settings on their rigs. That simple.

Your voice goes into the node, talks to the gateway, gateway says hey node C is linked to node C on this other repeater, or node C is linked to reflector 001c, I'll pass it there too. And any traffic on the other side is also passed back and comes out the node that it's linked to.

Now this can be a lot of fun, but it can also be extremely misused. You remember your technician's exam. Every repeater has a control operator. That's they guy who's call sign is on the repeater. If something goes on, on his repeater, the FCC will go after him. So if two hams connected to N4LL in Florida, and Joe here left the link up from W8CMH C to N4LL's node C, and two guys on the other end start talking about which adult dance club has the hottest stripers and which ones put out, or let's just say their topic of conversation falls over the legal definition of "Offensive". Then that conversation comes right out W8CMH, and if an OO (Official Observer) hears it, W8CMH (Or rather K8NIO) is the one who's going to get the ticket on it as well as the offenders. It's one thing if it's just you who loses your license, but imagine dumping over ten grand in a repeater as well, and then getting your license yanked because Joe left the link up. Well you might take that risk, but there are a few repeater owners who don't want to take that risk.

It also can be said it's a lot of fun connecting up to reflector 001 C, and talking to people from Great Britain, Scotland, Japan, Germany, Australia, and other places

you never heard of, all from your local repeater. So remember, linking is not a right, it's a privilege and clean up after yourself.

4.8.1 How To
REF001CL

Format: [Target] spaces to fill [X] x being the target node and [L] in the 8th position, L for link, pretty simple.

Examples

YourCall: W8CMH●CL

This is the link command to link to W8CMH Node C. C is in the 7th space, L is in the 8th space. If you have a shorter one say w1ix then its W1IX●●CL Notice 2 spaces.

YourCall: REF038AL (Links to the Reflector 38A)

This link command doesn't have any spaces, but you see the pattern.

4.8.1.1 Sample walkthrough:
1: CQCQCQ
2: W8CMH●●I
3: ●●●●●●●U
4: REF038A
The above is the 'Memory slots' with the corresponding Your Call fields set up.

4.8.1.1.1 To Create a Link:
We want to set up a link to the Ohio Wide Area Reflector 38A. We just powered up the rig.

1. Turn to the 1 position, and listen, make sure there isn't a QSO going on, or ask
2. Turn to the 2nd position, key down. Wait, if you hear nothing, then its not linked and free.
3. Turn to the 4th position, key down and say "W8KWA Linking to Reflector 38A" and release. Wait for conformation. It should say "Link Established"
4. Turn to the 1st position, and go ahead with your QSO

4.8.1.1.2 To Take it down
1. Turn to the 3rd position, key down (it's nice to say you're doing it, but sometimes it's not practical.)

2. Turn back to the 1st position and carry on.

Remember to ask first locally if any one minds if you link first. Then switch to the memory slot with this in the "Your Call Field" Key up and say "[Call sign] Linking to [target]" the command goes with it. You will get told wither it succeeded or failed by either Audio or screen. **REMEMBER TO USE THE UNLINK COMMAND WHEN YOU ARE DONE.**

4.8.2 TROUBLE-SHOOT LINKING

WHY CAN'T THE OTHER GUYS ON THE LINK HEAR ME?

Remember a few things first. If you recall how I listed the magic 4 fields and technically you can get away with leaving rpt2 blank(See old vs New D-Star). Well here is where those folks get frustrated.

In order to use and participate in the discussion of a linked repeater, all users must have these fields filled correctly and you have to have your call sign registered somewhere.

1. Rpt1 is filled with the repeater call sign, and the node in the 8th position, with spaces filling it up like so.
2. Rpt2 is filled with the current repeaters call sign and the G in the 8th position. THIS IS A MUST.
3. Your field is filled with CQCQCQ.

If you aren't being heard check the following:

1. Are you registered? Double check http://query.ki4swy.org/index.php and do a search on your call sign. If it comes up then you know you're registered.
2. Rpt1 field is correctly set. It's the repeaters call sign, and spaces till the 8th position. In the 8th position is the Letter of the Node your trying to access. C, B, or A. Double check, remember C is 2 meters, B is 440, and A is 1.2G. If there is an error in the spacing, you won't be heard on the other side.
3. Rpt2 field is set correctly. The format is the repeaters call sign, and a G in the 8th position. Double check those spaces.
4. Your call field must be CQCQCQ.

If any of these 4 items is off, then you're not going to be heard. You wouldn't be the first ham to miss a space in the field.

An extra step if you have the DV Dongle, use the 2.0 beta 4 (windows). Connect to the node your testing. See the second window. If it says hears (your call) on (repeater node) on a one line entry in the black window and you have double checked your registry that you are registered, and then you KNOW it is either your RPT1 or RPT2 entries that are screwed up. If your fields are set up correctly, you're going to see a bunch of lines. Think of it as a nice litmus test to see if everything is working.

4.8.3 Why can't I link this repeater to…?

Things to double check
1. Are you registered? Check out http://query.ki4swy.org/index.php to be 100% sure
2. Are your 4 fields correct. Double check your spacing in rpt1, rpt2. Remember rpt1 the node letter HAS to be in the 8th position, and rpt2 has to have the G in the 8th position or it will not work.
3. Check your "YourCall" field for that space, remember target node is 7th position, L is 8th position, there are no / marks.

Now if you checked those three things then the reason it's not connecting can be

1. Too many users on the target system that are eating up the bandwidth. DV-dongle, Dvap, and repeaters take up roughly the same amount of bandwidth to connect up with.
2. Internet Congestion between the repeaters
3. Does the remote system have DPlus installed, if not, then you won't hit it. (double check with a DV-Dongle)
4. Does the system allow linking? Some repeaters don't allow incoming or outgoing or both.

Some repeater stacks even shut down at certain times of day as well.

4.9 MULTICAST

This is one of those rarely used type of things. By now you got an idea what node routing is, and call sign routing. Multicast runs along those same lines.

It is something that repeater owners set up on their end. Think of it as 'Node routing' to a 'set list'

Let's give a hypothetical example. Let's say repeaters W8CMH, KD8BIG, W8BAP decide to create a multicast group called BOB.

To use it, change your "Your Call" field to "/BOB".

When you key up, that packet of your voice goes to the gate way and says 'I'm destined for "/COLS" and the gate way says ok, you go out on W8CMH C, W8BAP B, KD8BIG B. So your voice goes out those three Repeaters. People on those nodes/repeaters hear your voice packet. If they know about the multicast group, they use their memory settings to turn it to "/BOB" and they reply back, thus everyone who has the "/BOB" and on those nodes can talk to each other. That's all there is to it. To my knowledge none of the Columbus repeaters have a multiclass group set up, nor any in the state at this time.

4.10 ZONES

Zones, sounds like a great buzzword and Icom usually spends about a page or two trying to explain it. Personally I think they go overkill in that part. One of the big questions people ask is "What's a Zone" and "How do I use it".

Simply put a "Zone" is a set of "Linked repeaters", confused? Remember the old 5.19. You had repeaters in Toledo, Cleveland, Columbus, Cincinnati, and other locations. They were all linked up like a big party line. Congrats your 90% there in working out a zone. Yes linked repeaters. Icom went overboard trying to explain it.

So let's make up a hypothetical situation. 5 repeaters strung from Cleveland to Cincinnati on I-71. All of the B-nodes are linked to each other. Now in your repeater you would have 5 memory slots, one for each repeater set up just like you would talk locally. Start on repeater 1 in Cleveland, drive south, when you fell off the cliff from repeater 1, you changed to repeater two, and hopefully it's in range, when you passed out of that, then repeater 3 here in Columbus. Since all of the 'Linked' repeaters are close, Icom likes to refer to them as Zones. They also call the area a single repeater stack can reach, a "Zone" which even makes it more confusing. But essentially that's all there referring to. Simply put a few repeaters that link to each other close together in order to have a party line and to drive from one end of it to another.

Why they just couldn't call them 'Linked Repeaters' is beyond me.

4.11 ONE TOUCH REPLY

This one even had me stumped for a while as to exactly what it did. Most Icom rigs have them. What they do varies rig to rig. So I'll give you the basics.

Say you have a call from KC8VWO who is node routing from W8BAP Node B into W8CMH node C. You can guess the 4 fields he is transmitting.

My Call	Rpt1	Rpt2	Your Call
KC8VWO	W8BAP B	W8BAP G	/W8CMH C

On most rigs it stores the last transmission into a 'Volatile' memory, the 880h, can store up to 10. But the last one that came first is the one by default it grabs. So here I am on W8CMH, he's node routing in. I activate my one touch reply button. (My BK / Tone / T-scan) by holding it while two short then two long beeps are heard. My rig then goes and grabs the 'My Call' field of the last caller, and then drops it into the 'Your Call' field to call sign route back. Some rigs will actually grab RPT1 value and use that, it's one of those look it up in your own manuals.

So he calls I press and hold my button and my rig then sets up the 4 call fields like…

My Call	Rpt1	Rpt2	Your Call
W8KWA	W8CMH C	W8CMH G	KC8VWO

Hence my call goes out, through the gateway, to the repeater node KC8VWO called from and everyone there on that node can hear me. They just have to either node route me, or hit their one touch reply.

During this operation, people listing to W8CMH can hear him, and me. KC8VWO can't hear the others on W8CMH C, unless they either one touch reply him, put his call in their 'your call' field or node route to where he is at. Pretty simple. Just double check your manual, to make sure you know how your rig is going to manipulate the fields for this. The 800h just has the one option but the 880h has two options etc.

When you're done with this, rock the memory slots back to CQCQCQ to speak locally.

4.12 BUSY LOCK OUT FUNCTION

4.12.1 WHAT IS IT?

Busy lock out function is an extra step to help prevent doubling. It is actually a good idea that many hams have been wondering 'why didn't anyone think of this before.

"The Busy lockout function inhibits the transmission while receiving a signal on the selected frequency to prevent interference to other stations." – Icom Manual.

4.12.2 WHAT DOES IT DO?

Take two hams, ham A and Ham B, there in a group QSO. Both key down exactly at the same time, as hams we know this is doubling. The odds of it happening at exactly at the same time are slim. Most of the time we get into old habits, and key down wanting to add our two cents into it, and we end up doubling over another. Most of the time there is a half second delay, we normally don't realize this, perhaps he keyed down and didn't say anything for half a second and we aren't staring at the screen. That's where this function comes in. When you key down your rig asks itself, is anyone transmitting? (see the if the busy indicator is on) If no, then out your signal goes as per normal. If it detects a signal then it sends your voice into the bit bucket (dev null/trash can), then gives you a warning. On the 880h, 800h you get 5 rapid fire beeps, believe me you will notice it. Your rig won't send anything out thus preventing you from doubling. With the 92AD, you get a single beep, and the VFO remains open even with you pressing the key down.

4.12.3 HOW DO I KNOW IF IT IS TURNED ON OR NOT?

Well the litmus test is try to double, wait a half a second at least after someone has keyed down, and try transmitting, if you can then it's not turned on. Or open your squelch till the busy indicator thinks there's a signal and try to key down.

4.12.4 WHAT HAPPENS IF TWO PEOPLE WHO HAVE BUSY LOCKOUT TURNED ON KEY DOWN EXACTLY AT THE SAME TIME?

You double.

4.12.5 SO WHY SHOULD I TURN IT ON THEN?

More often or not doubling happens not at the exact same time. (most of the time). This is an extra layer of protection. In Nets when they call for stations, it also helps smooth out call ins, it also helps you out. On CODSN (Central Ohio D-Star Net) we ask you use it.

	How To on 800H
Specific Radio instructions	You need to have the firmware update or this function isn't installed. Unless the 800 is older than 2005, you should aready have it updated from the factory. If it isn't there, then you need to update the firmware to get it. (A kind of litmus test) **First step** is to get into Initial setup mode. Press and hold [SET LOCK] and press power for 1 second. If you did this right "BEP ON" will be on the screen. **Second Step** is Press [Set-lock] to scroll through the menu, should be the first one, if not press the same button and scroll through the menu items. The menu item you're looking for is BCL, set it to on by turning the dial to "On" and turn it off, then turn it back on again. Test by intentionally trying to double. If it beeps at you and doesn't transmit, you're golden.

4.13 Auto Text Insert

You have roughly 3 fields in full operation.

My Call – This your call sign only (you know about this one)

/ Or "The slash field" – field, this is a 4 character text field independent. Convention (what others do normally) is to use those 4 characters to state what rig your running. I'm on an ID-800H, so my "Slash field" is normally 800H. If you run an ID-880H, then its 880H, if someone's on a "Dongle" then the dongle automatically puts DNGL, if you're on a DVAP, which DVAP automatically puts in DVAP. This performs two functions, one it tells others what rig model you're on. The second if you need help then tada, the person who is helping thus knows what rig you are on and will be easier for them to help you with specifics.

Auto Insert Text – This is a 20 character field, many rigs actually have a 'bank' of them you can select on the fly. (See your manual for how to.) You need to first check to make sure the function is turned ON, then which 'field' in the 'bank' you have selected. The Standard convention, (the way everyone does it) is [Name, Location, Country].

Please Note: The Slash field, and Auto insert text field doesn't change the functionality, and is independent of the rest of the settings.

This insures that for me, when I key down, everyone else sees on the screen,

W8KWA   /800H

CHARLES, COLS OH, USA

Thus a person sees my call sign, knows I'm on an 800H, my handle or name is Charles, and I'm in Columbus Ohio USA, all without me having to utter it over the air. For most rigs it is a set it once and forget it, but if you are feeling creative, for special events you can put other information in it like Happy solstice, happy Samhain, happy New Year, etc. I have seen people put things in there like "Jesus Loves You!" and other things some find offensive. (I personally found it offensive as I'm not Christian).

Also bear in mind that not all Rig's understand lower case. It has to do with the Generation of radio. If someone puts a <> on my 800H I see what looks like a 7 that's been flipped upside down.

4.14 CROSS NODE (BAND) OPERATION

There is a couple of ways to get this effect.

Create a link
Think of the other node as another repeater and treat it as such

Node Route to the other node
Think of it as another repeater node, same limitations; have to one touch reply to talk back.

Use Simulcast (see that section)

The way NOT to do it.

The old way with D-Star was for two hams to do the following:

MyCall	RPT1	RPT2	YrCall
HAM1	W8CMH**C	W8CMH**B	(Not Used)
HAM2	W8CMH**B	W8CMH**C	(Not Used)

See anyone reporting to a gateway? Using this configuration, avoids talking to the Gateway PC. This means people Linking, Node Routing, Call Sign linking, on DV Dongles, DV-Adaptors, DV whatever plugged in, cannot hear or see you, and you will stomp on them and they will stomp on you.

This system was the way to do it before Gateway 2.0 and Dplus.

If your hearing two guys talking, and someone coming in off of the gateway/reflector etc., and they can't hear you, then they may be doing this. This while technically works is bad operating practices.

4.15 LOCAL SIMULCAST

What does it do?

Put simply it takes your voice and stuffs it out all of the nodes of that repeater stack. This doesn't mean you can hear it, just sends it.

How

MyCall	RPT1	RPT2	YrCall
Ham1	W8CMH**C	W8CMH**G	W8CMH***

Set up your rpt1 and rpt2 as per normal. In the YrCall spot, the callsign of the repeater only and enough spaces to fill out the 8 positions.

What good does it do, or what could I use it for?

Ah, good question. Lot of better ways to do that, and why you would want to try that. Other than possible emergancy's, I think this was more of a 'hey its cool we can do this option.

4.16 EMERGENCY BROADCAST

This is particularly useful especially with ICOMS. How many of us sit and listen then when distracted turn the volume down. The EMR function when pressed turns every D-Star radio listening up, to get their attention. Even if there Call Sign Squelched, it opens it up.

On my IC-800H just push and hold the EMR button.

5 OLD D-STAR VS. NEW D-STAR, THE CONFUSION

When you read other books there is a lot of confusion. You have the raw basic Gateway software from Icom, and then you have Dplus enabled repeaters. Most of the repeaters you're going to encounter will have DPlus and will be connected up to the internet. Because of this the document is structured the way it is. Yes I know you can put another node of the same repeater stack into your repeater 2 field and cross band your QSO. The problem there is that you're not reporting to the gateway, since you're not, people on DVAP, DV-dongles, and linked repeaters won't be able to hear you. So I prescribed if you wanted to cross band you put the gateway call sign in Rpt2 and node route, with putting the /W8CMH●C in the Your call field, your transmission goes to the same place, and the others can hear it. This method works on both "DPlus" systems and Non DPlus Systems. But if you start with the (put the call sign in rpt2) you stomp on people linking, dangling, and Dvaping into the repeater. It's one of those 'technically it will work but its bad operating practice.'

So since you're mostly going to run into DPlus enabled systems, I have shown you the procedures to do things that won't stomp on someone else, and the best way I have found to go about doing things that allows others to participate. If you want to learn about how to do the other methods, feel free to pick up other books on D-Star and read up on them. Basically the method's I prescribed in this document is the current method that doesn't stomp on as many toes.

6 D-STAR OPERATING PRACTICES

With a new mode comes a new way of doing things, not just on the technical side but on the speaking side as well. Since D-Star refers to repeaters by Call signs and Nodes, so do we. In the FM Analog world it was the '549'. In the D-Star world it's "W8CMH Node C"

The 'why' should be bluntly obvious, you could be linked to a reflector, you could be routing, and telling the other person in another state that you're on the 5.49, will bring up the obvious question, "Which 5.49 do you mean?"

The next one to go over is the "W8KWA Listening" when you're calling a CQ of sorts to see if anyone's listing on 2 meters. Now it's "W8KWA on W8CMH Node C" you add to it, "Monitoring" "Listening" or "Calling CQ". This lets everyone know, who you are, and if it's linked up, where you're calling from, what repeater and node. You may be talking on a linked system, or someone just put up a link, or it may be plugged into the reflector. It is just good practice.

'Be proud of your call sign, state it often and clearly'. Whelp this is probably the biggest change operational wise other than referring to repeaters by call signs instead of frequency. Every time you Key Down, out goes your call sign on the screen. Now legally speaking FCC requires you to give your call sign out every 10 minutes. You do that with every transmission. But the finer points of FCC rules say you have to give it audibly at the beginning, and at the end. Guess what, we get to toss that 10 minute rule out the window. But we still have to give it audibly at the beginning and at the end.

The next item is one you already know about. Leave a space after each transmission… you know the drill, for one big important reason, that you probably didn't think about. If you key up too quickly, the repeater will screw up the packets, and all of your speech will come out R2D2 (Noise) so leave a 2-3 second space at least, or at the very least use the busy lockout function.

Finally, one you tend to notice the new folks doing. Just because when you key down it automatically sends out your call sign, that doesn't mean you will get recognized to join in a QSO or calling CQ. It is still considered Kerdunking the repeater. People in the QSO or listening will assume you sat on your microphone. So you want to join in a QSO, Audibly state your FULL call sign, not just your suffix, or "Dear gods in heaven forbid you ever say break," but use your full call sign. (If you don't know how to properly and legally use the term "break", hand in your license, you're done.

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You ID every time you Key down!!!

In the beginning when I got my ham ticket, with in one month I got an OO notice for not ID-ing ever ten minutes. Despite the fact I swore I did, now in DV mode I ID every time I Key down. To me this is worth the price of a D-Star rig, no longer having to worry about that particular note.

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Also of note when someone is using the Data side, like DV-Dongle can send text to other DV Dongle users, there is no audio that goes with it. Still even when they do that, we can see their call signs on the screen.

7   ANALOG VS. D-STAR

Keep in mind when dealing with just about any issue, they tend to form into two groups "Old school/It is good enough" and "New School/Keep up with the times old man". When it comes to implementing new technology, this is where worlds collide.

Freq	Description
144.00-144.05	EME (CW)
144.05-144.10	General CW and weak signals
144.10-144.20	EME and weak-signal SSB
144.200	National calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.30-144.50	New OSCAR subband
144.50-144.60	Linear translator inputs
144.60-144.90	FM repeater inputs
144.90-145.10	Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20	Linear translator outputs
145.20-145.50	FM repeater outputs
145.50-145.80	Miscellaneous and experimental modes
145.80-146.00	OSCAR subband
146.01-146.37	Repeater inputs
146.40-146.58	Simplex
146.52	National Simplex Calling Frequency
146.61-146.97	Repeater outputs
147.00-147.39	Repeater outputs
147.42-147.57	Simplex
147.60-147.99	Repeater inputs

There has been quite the heated debate on where DV or D-Star fits in. Technically it is Packet, Technically it is a repeater, and technically it is also FM. Most fall into the 'it goes where FM' goes since at its very basic it is a Frequency Modulated Signal. I'm not going to debate it here but simply stating the majority of what I seen and what I have grasped as their reasoning for it.

Some have even attempted to argue, (Mostly uninformed D-Star hating Trolls) that it goes into the Experimental modes. But the definition of what the plan list is for those that haven't been published yet, and DV (D-Star) has been a standard since 2001.

So DV has to duke it out with FM Analog in the same plan. That's where the repeaters are getting put in, just like regular FM Analog gets put in. That is where we hit the second big issue, Repeater Pairs.

There is two parts to this issue, remember DV mode takes up one half of the space that FM analog takes, so as a rule of thumb, you can take out one FM Analog and put in two D-Star repeaters. Right now there are a lot of them going up. We in Columbus know we got a few ourselves, and several are "Paper Repeaters". That means they exist only on paper. The 5.11, and 5.19 are prime examples of 'Paper repeaters'. Because they exist on paper, their pairs aren't free to put up a repeater on. Simply put, on paper we are full. Every time someone wants to put in a D-Star repeater they run into that.

Either some frequency coordinators don't care, or they have a 'hand shake deal' etc. with the paper repeater owners, even though there has been no equipment running there in years.

A while back, W8BAP in Stoutsvill was running into that problem, he has a 2 meter module, but because of so many 'paper repeaters' in the area, he can't put it up for fear that one of these paper repeater owners may use that as an excuse to file litigation, as we know from our exams, the 'coordinated repeater' wins out. It's also expensive to get a repeater set up with the antenna price, the trimming, and the coils that have to be made out for a repeater. W8BAP isn't the only one discovering this. It is happening all over the place. You see a repeater with only a B node; chances are there in the same predicament. Too many paper repeaters, no open pairs.

(Note that of this edit, BAP has a frequency for the node C and it will be up and announced "Soon")

Because of a lot of misinformation and guess work there are a lot of opponents to D-Star/DV out there. Some base this on the fact they see others moving to D-Star, and can't afford to buy a new rig, or they bought one, couldn't figure it out, thus it must be crap, some just flat out hate change. Others are the end result of the old grapevine game, that by the time information got to them it was extremely distorted that they pass on the 'Icom secretly controls the death star and will be signing up tickets for ham radio.' By the time it gets to the guy who was curious about it he ends up getting told the strangest things.

My personal favorite was "D-Star allows everyone to track where you are at all times". He went on about Icom being in league with the "Bush administration" to keep tabs on people. This is what he told me with a straight face (or rather voice) that someone had told to him.

Let's face it, we ham's love gossip, but when we pass on information half heard while we were doing something else, it just tweaks the snot out of information.

When the 145.49 went digital while I was away in Virginia for my Certs, (which I got thanks,) I found out through the grapevine, that the COTN (Central Ohio Traffic Net) which the 5.49 was the 4th in line back up repeater, had some difficulty with their 7.24, and started to freak out about the 5.49 going digital. A whole lot of half-baked ideas flew out then from conspiracy theories, bribes, Icom only, you name the misconception and it went flying. So anyone listening to the COTN, over heard that, and didn't know any different, is now most likely passed on the same information to others and probably added a twist of their own.

This flurry of misinformation, can be expected, especially by hams, like I said we love to gossip. After you have finished reading this and understanding this document, at least you can help stop out the misinformation and get some correct information into other's hands.

D-Star or DV, isn't going away, it's something that ARRL, their band plan, and the Frequency Coordinators are going to have to deal with. Give us 20 years, and I would be surprised if you could buy a 2 meter 440 rig without DV. People said the same thing about PL tones 20 years ago. Change happens.

8 FINAL CHECK LIST

8.1.1 REGISTERED

Are you registered?

8.1.2 MY CALL

Is it filled out properly only using your Call sign (you didn't add to it) <Slash field doesn't count>

8.1.3 BUSY LOCKOUT

Check to see if you turned this function on, it's a set it once and forget it as it helps prevent doubling.

8.1.4 DV NATIONAL CALLING FREQUENCY

Check to make sure you have this listed in there (146.580 2M), at the very least, it can make it easier to 'quickly switch to simplex' or to monitor simplex frequency.

8.1.5 AUTO TEXT INSERT

Is it turned on?

Is the right field selected?

8.1.6 SLASH FIELD

Is it filled out properly? Did you put in your 4 digit model in there? If you didn't, we will all know.

9 ID-800H & ICOM SOFTWARE

Welcome to the new section. This was where I cut my teeth. Yes I do know that the ID-800H is discontinued, but there are many still out there. It is also the rig known for the most set up problems. So let's go down our check list.

1. ID-800H (With the firmware update)
2. USB programing Cable ($40)
3. CS-D800 Software ($40)

9.1 THE CABLE

Your first steps depend on a few things, your O.S. for starters. The USB programing cable only has a 32 bit driver. This section assumes your running 32bit OS. You have also bought the Cable and it came with the driver, and you have bought the software.

If on Vista or XP
1. First Step is to go to Icom's website and get the updated driver, regardless if you have XP, Vista. I have installed this on Vista and I know the driver supplied with the disk tends to have quarks with Vista. Be safe and get the latest drivers.
2. Next install the drivers. Yes I know sounds stupid, not supposed to work that way, but blame that on Icom. If you try to plug it in, and then feed it the drivers, it won't install right.
3. Now you plug in the cable (See the next Step)

Windows 7
1. Plug cable in, Windows 7 goes gets the drivers and installs them.

Congratulations the cables installed.

9.2 INSTALL SOFTWARE

This section takes for granted; you installed the cable and drivers already. [Note Windows 7 has the 32 bit driver built in]

The programming cable is USB > Serial > to a headphone jack. Windows will see it as a USB to Serial cable and assign it a com port. We need to know what com port it assigned it to.
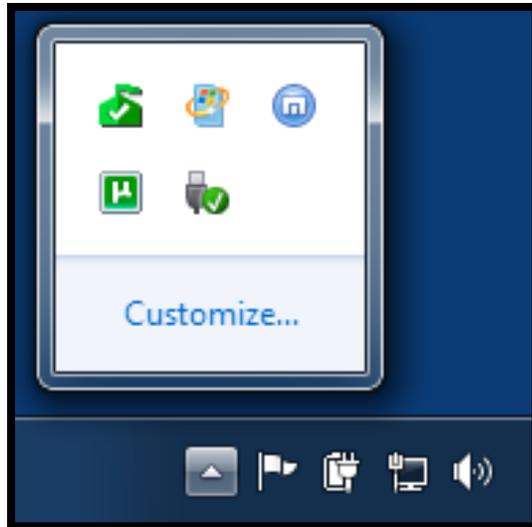
Click on the Triangle (Otherwise known as the system tray expander). See the Icon of the USB cable with a green check mark? Click there.
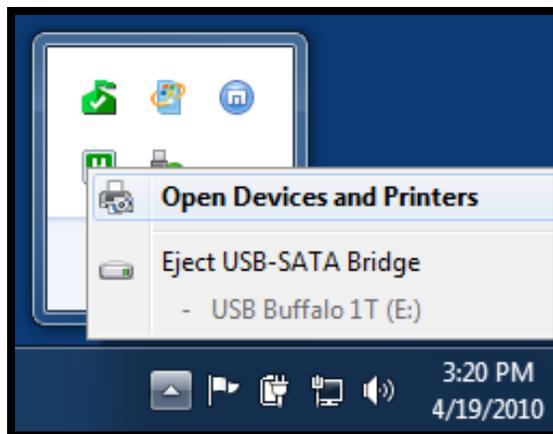
Here you see everything 'Plugged in' including my External hard drive. We want to "Open Devices and Printers" so click there.
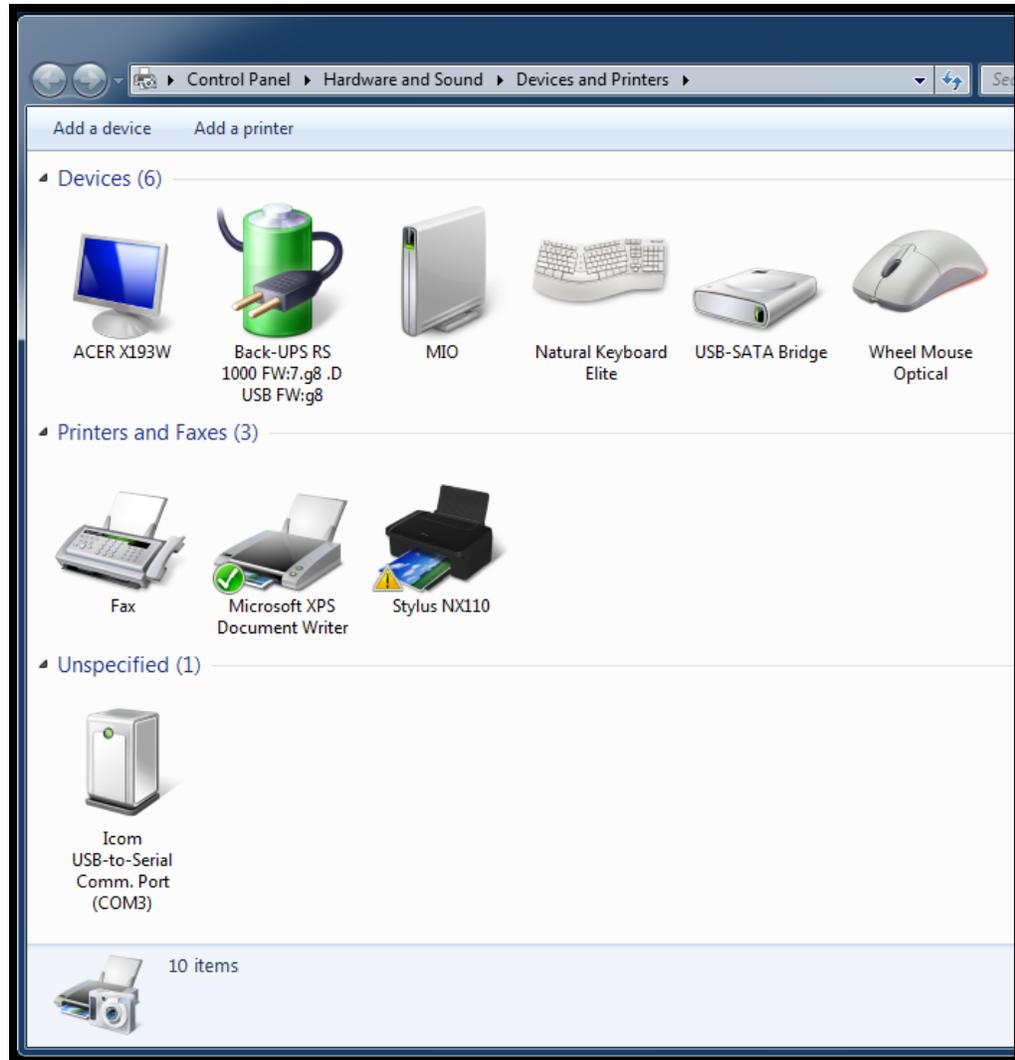
See it listed in the "unspecified" category, that's what we want, we can see its showing up on COM3. Systems may vary, as long as there's no 'flags' we are good to go. So let's move on to the next step.

Take your rig, turn it on, and stuff the cable into the right socket.

Install your programming application. Then start it.

9.3 CS-D800

Now we know what comport the cable is registered to. So let's start the program. If you missed the first window and aren't sure where you connected, check the Com Port Section, make sure your right where you should be.
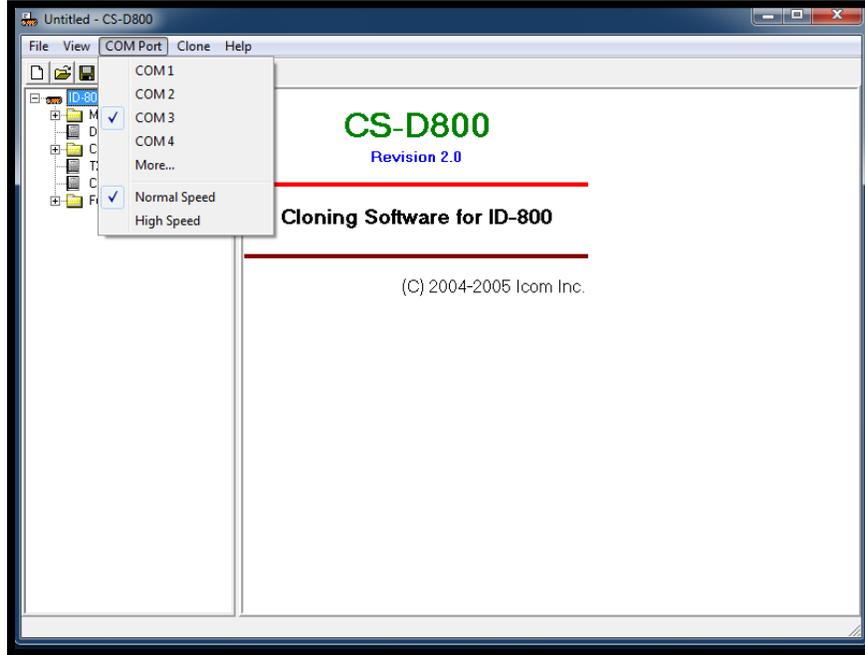
Now let's read from the rig by clicking the icon.
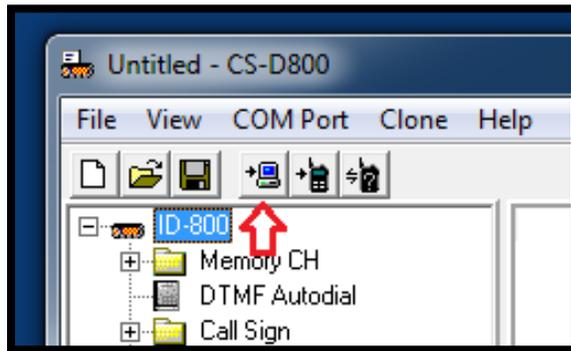
We will see letters on the rig and it's going to chunk right along.

Now for the most part, this setup is similar to quite a lot of rigs, and for experienced Hams should be self-explanatory, and old hat. I'm not going to bother to explain how to fill out for standard FM repeaters and by now you should be familure with the Core Concepts

9.3.1   MY CALL
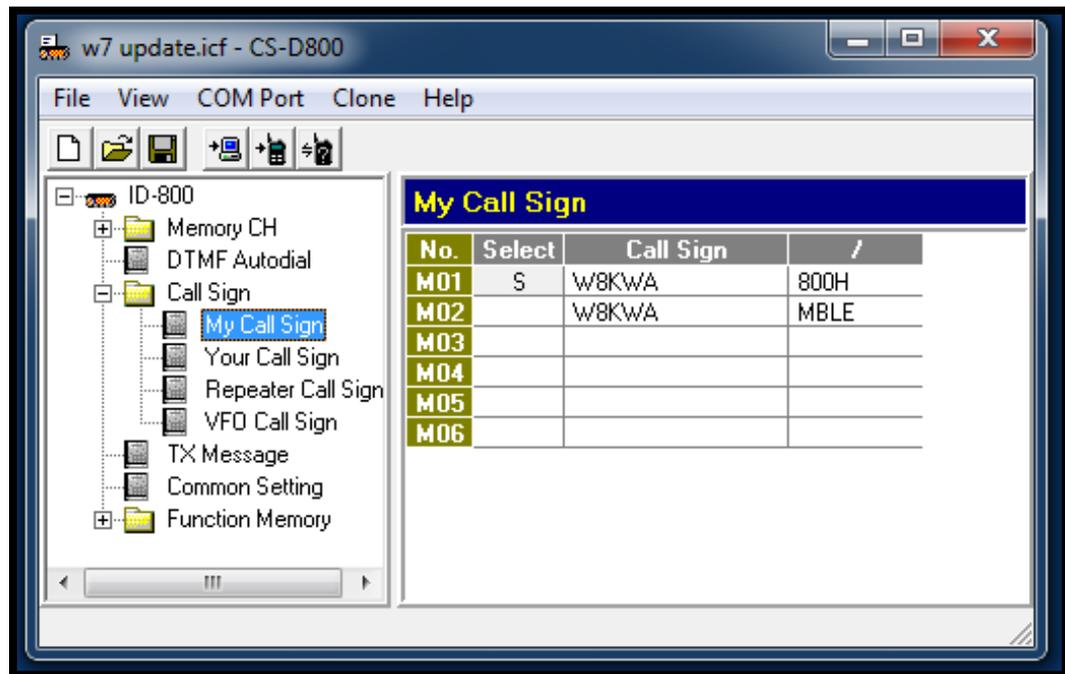
The software puts things in a tree. We need to get some basics set up. First step is the My Call, and slash fields.

Simple right, enter it in and hit enter when done. If you try to add a 5th character in the slash field, it will chop off the extra characters.

9.3.2   REPEATER CALL SIGN

Repeater Call Sign

No.	Rpt Call Sign	Gateway	Use	No.	Rpt Call Sign	Gateway	Use
r01	W8DIG G	ON	Use	r28	W8BAP G	ON	Use
r02	W8DIG C		Use	r29	W8BAP B		Use
r03	W8DIG B		Use	r30	W8CMH G	ON	Use
r04	W8RTL G	ON	Use	r31	W8CMH C		Use
r05	W8RTL C		Use	r32	W8CMH B		Use
r06	W8RTL B			r33			
r07	W8RNL G	ON	Use	r34			
r08	W8RNL C		Use	r35			
r09	W8RNL B		Use	r36			
r10	KD8BIG G	ON	Use	r37			
r11	KD8BIG C		Use	r38			
r12	KD8BIG B		Use	r39			
r13	KT7APR G	ON	Use	r40			
r14	KT7APR C			r41			
r15	KT7APR B		Use	r42			
r16	W9ICE G	ON	Use	r43			
r17	W9ICE C		Use	r44			
r18	W9ICE B			r45			
r19	W8BI G	ON	Use	r46			
r20	W8BI B			r47			
r21	W8BI C		Use	r48			
r22	WB8THD G	ON	Use	r49			
r23	WB8THD C		Use	r50			
r24	WB8THD B		Use	r51			
r25	KD8DRG G	ON	Use	r52			
r26	KD8DRG C		Use	r53			
r27	KD8DRG B		Use	r54			

Tree panel: ID-800 — Memory CH, DTMF Autodial, Call Sign (My Call Sign, Your Call Sign, Repeater Call Sign, VFO Call Sign), TX Message, Common Setting, Function Memory. Window title: w7 update.icf - CS-D800. Menus: File View COM Port Clone Help.

First let us set up the repeater bank. This "Quick sheet" or bank is what my software pulls from to put in to RPT 1 and RPT2. You can see after a certain amount of time I got a system I worked out. I list the gateway first, and then the nodes, you can do whatever order you want, but the Gateway needs to be in there. What I did, is go to Dstaruser.org, got a list for the Ohio Repeaters, who had what nodes, and what frequencies, then just put them in.

My 800h programming software has a quark to it, see the gate way "on" column, it drops a G into the 8th position. (Too bad they couldn't have made it G,A,B,C and solved my space dilemma. Just by looking at it, it is hard to tell how many spaces you put in there or how many characters a line makes up so you have to count them. Too little, and it won't work, two much and it will clip off. This is one of those areas you bay extremely close attention to and watch those spaces.

You will also note the "Use" Colum. If you have your memory slots fill out, it's simply a flag that tells you which ones you have used. Hence if you see a blank, which simply means you have not used it yet in the memory slots.

So in short, if your going to have it listed in RPT1 or RPT2, you need an entry here!

9.3.3 YOUR CALL

No.	Call Sign	Use	No.	Call Sign	Use
U01	CQCQCQ	Use	U51	/W8DIG C	,
U02	U	, Use	U52	/W8DIG B	, Use
U03	W8DIG C	,	U53	/KD8DRGC	, Use
U04	W8DIG B	,	U54	/KD8DRGB	, Use
U05	W8DIG A	,	U55	/KT7APRB	, Use
U06	W8DIG I	, Use	U56	/W8BI C	, Use
U07	W8DIG E	, Use	U57	/W8THDC	, Use
U08	W8CMH I	, Use	U58	/W8THDB	, Use
U09	W8CMH E	, Use	U59	/K8BIG B	, Use
U10		,	U60	/K8BIG C	, Use
U11		,	U61	/W8RNL C	, Use
U12		,	U62	/W8RNL B	, Use
U13		,	U63	/W8RTL C	, Use
U14		,	U64	/W4CLL C	, Use
U15		,	U65	/W8BAP B	,
U16		,	U66		
U17		,	U67		
U18		,	U68		
U19		,	U69		
U20		,	U70		
U21		,	U71		
U22		,	U72		
U23		,	U73		
U24		,	U74		
U25		,	U75		
U26		,	U76		
U27		,	U77		
U28		,	U78	REF001CL	, Use
U29		,	U79	W8BAPBL	, Use
U30		,	U80	W8DIGCL	, Use
U31		,	U81	W8DIGBL	, Use
U32		,	U82		
U33		,	U83		
U34		,	U84		
U35		,	U85		
U36		,	U86		
U37		,	U87		
U38		,	U88		
U39		,	U89		
U40		,	U90		
U41		,	U91		
U42		,	U92	N8CXI	, Use
U43		,	U93	WG8I	, Use
U44		,	U94	KD8BZF	, Use
U45		,	U95	KC8ZYB	, Use
U46		,	U96	KD8GES	, Use
U47		,	U97	W8KHW	, Use

This is where you put your "Your Call" fields. Again you can see a System starting.

U01: CQCQCQ

U02: ●●●●●●●U

The next set is for the I's and E's of the repeaters I'm setting up for.

The next set of call signs or rather commands is for the Node Routing use in the memory slots.

The next set of call signs or commands is for the things I want to create a link to. This is where I tend to put link commands for the reflector and other repeater systems.

And finally at the bottom, this is where I put my Call sign list for call sign routing. I left enough space to grow on either side and keep them organized. Remember you're going to be putting a lot of slots in for one repeater. So if you got a system that means you can fill in the blanks faster.

Also of note is the "Use" field again. It is the same thing as the repeater banks. All it shows is if I have used it in one of the memory slots.

9.4 MEMORY SLOTS
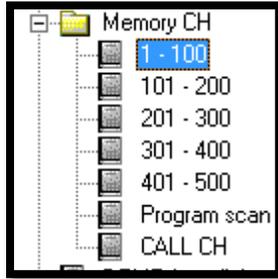
Decision time, how to set up the banks, in version 1 I suggested the first bank for standard FM. Since my home repeater went digital, I put the first bank as Local D-Star repeaters. My Second Bank is FM Repeaters + Simplex. This leaves me 3 banks of slots, for trips etc. It's my organization system, you're free to incorporate your own. The key thing is to remember to leave space in case you need to add that quick command, and of course keep organized so you can operate efficiently.

CH	Operating Freq	DUP	Offset Freq	TS	RF Power	Mode	Tone	Tone Freq	TSQL Freq	DTCS	DTCS Polarity	DSQL	Code	Your	Rpt1	Rpt2	Name ON/OFF	Name	Skip
1	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U01: CQCQCQ	r31: W8CMH C	r30: W8CMH G	ON	W8CMH	
2	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U08: W8CMH I	r31: W8CMH C	r30: W8CMH G	ON	CMH-I	Skip
3	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U09: W8CMH E	r31: W8CMH C	r30: W8CMH G	ON	CMH-E	Skip
4	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U02: U	r31: W8CMH C	r30: W8CMH G	ON	CMH UL	Skip
5	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U78: REF001CL	r31: W8CMH C	r30: W8CMH G	ON	L:01C	Skip
6	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U79: W8BAPBL	r31: W8CMH C	r30: W8CMH G	ON	L:BAPB	Skip
7	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U80: W8DIGCL	r31: W8CMH C	r30: W8CMH G	ON	L:DIGC	Skip
8	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U81: W8DIGBL	r31: W8CMH C	r30: W8CMH G	ON	L:DIGB	Skip
9	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U78: REF001CL	r31: W8CMH C	r30: W8CMH G	ON	REF01C	Skip
10	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U93: W8G8I	r31: W8CMH C	r30: W8CMH G	ON	*WG8I	Skip
11	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U94: KD8BZF	r31: W8CMH C	r30: W8CMH G	ON	*D8BZF	Skip
12	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U95: KC8ZYB	r31: W8CMH C	r30: W8CMH G	ON	*C8ZYB	Skip
13	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U96: KD8GES	r31: W8CMH C	r30: W8CMH G	ON	*D8GES	Skip
14	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U97: W8KHW	r31: W8CMH C	r30: W8CMH G	ON	*W8KHW	Skip
15	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U98: W8DLO	r31: W8CMH C	r30: W8CMH G	ON	*W8DLO	Skip
16	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U99: W8NE	r31: W8CMH C	r30: W8CMH G	ON	*W8NE	Skip
17	145.490000	-DUP	0.600000	5k	Low	DV		88.5	88.5	023	Both N		0	U92: N8CXI	r31: W8CMH C	r30: W8CMH G	ON	*N8CXI	Skip
18																			
19																			
20	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U--: CQCQCQ	r32: W8CMH B	r30: W8CMH G	ON	4CMHCQ	
21	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U09: W8CMH E	r32: W8CMH B	r30: W8CMH G	ON	4 ECH	Skip
22	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U06: W8DIG I	r32: W8CMH B	r30: W8CMH G	ON	4 INFO	Skip
23	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U02: U	r32: W8CMH B	r30: W8CMH G	ON	4CMHUL	Skip
24	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U78: REF001CL	r32: W8CMH B	r30: W8CMH G	ON	4 ECH	Skip
25	442.800000	+DUP	5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	r31: /W8CMH C	r32: W8CMH B	r30: W8CMH G	ON	CMH B	Skip
26																			
27																			
28																			
29																			
30	146.580000		0.600000	5k	High	DV		88.5	88.5	023	Both N		0	U--: CQCQCQ			ON	NF2MDV	
31	145.550000		0.600000	5k	High	DV		88.5	88.5	023	Both N		0	U--: CQCQCQ			ON	W1IX C	
32	441.050000		5.000000	12.5k	High	DV		88.5	88.5	023	Both N		0	U--: CQCQCQ			ON	W1IX B	
33																			

Look at that, the first 17 slots are used for one repeater alone. You can see the pattern forming here. Also notice the skip function. This prevents the rig in scanning mode, from scanning the same frequency 17 times; it only needs to scan it once. So I rag chew on 1. This is where I listen. If I need to echo test, I shift to 3, key up speak, and when done back to one. If I want to call sign route to Garrett, N8CXI I just turn it to 17, key up and speak, when done with the QSO, back to 1. I want to make that link to the reflector, I turn it to 2, to check it, if ok then 8, key and say I was trying to connect to ref 01 c, then back to 1, to talk, when done over to 4, key up to unlink. At this point you should see where all that came before was leading to.

The name section is one of the hang up's on the 800h. 6 Character max, so I had to figure out a system to remember where I was and what I was doing. Also note number 30, that's the National Calling Frequency 2 meters for Digital voice.

With D-Star you're going to get to know that programming software very well, and it's not standardized, each one has their own quarks.

Now you got a basic idea how to get the stuff, stuffed into your rig. Follow the above and you should be well on your way. If you're like me, you probably are going to stuff this in the rig, then get on the air, but I advise you to read the "DV/D-Star Proper Operating Practices", section. It covers the new way of saying

things over D-Star and then read the final check list, and make sure you have done that.

9.5 FINAL NOTES ABOUT THE SOFTWARE

Working with this software for so long you get a feel for how it's designed. The people who did write it where in love with drop down menus. You will find the RPT1 & RPT2 & YrCall fields get screwy when you try to put them in manually, without putting them in the 'banks' first. This they fixed with the 880 software where you could do that.

There is also the fact the nitwits didn't make the font's Fixed Width, so we could see at a glance if the spaces are out of sorts. It doesn't sound like much but if spacing is crucial, to me it's a no-brainer.

Also it takes a while to find out where they stowed all the settings, and yes all the common ones for text insert, busy lockout, changing the color of the screen, including the microphone on low or high (one of the first things you do need to change, Low is way to quiet). But they really are all in there, just takes some rooting around in it to find it.

You also can't really import anything. To me, a Professional who has been in the computer field for years, my professional opinion is that it's stable; however a lot of work needs to be done on it to make it more user friendly. It seems to me they simply went "Is it stable" yes, "Does it fill in the field's right" yes, then ship it and charge for it. It really does have the feel for beta software, and if this software had to stand on its own merits against competition, it would fall on its face. Basically someone said 'Good enough' and tossed it out the door.

Other than all that, it gets the job done, takes a little planning ahead to set up the banks etc., but once you understand that then it's as simple as filling out a form.

10 ID-880H & RT SYSTEMS SOFTWARE

Prepared by George Foy, N4DLR

Before reading further, this section is using software packages that only are supported in Windows, Vista, or XP for the IC 880H and ARRL Travel Plus. Windows 7 is used here.

The 880H memories can be set using only the user's manual and front panel; however, the process is long and can be confusing. So rather spending time setting up the radio without a method to back-up the memories, easily see all the memories or change settings one can use a commercial software program.

This section is using RT Systems ID 880 version 4 software for radio programming of the ICOM 880H. An advantages of this software is it can have two or more radio memory tabs open allowing the creation of a new tab of memory by using "cut and paste" methodology. The free ICOM software cannot. Another is copying FM and D-Star repeater information from the ARRL Travel Plus package into the program and exports the data into the radio, saving much manual data entry time. The free ICOM software cannot. Further the software does not use a COMM port as the ICOM free software, e.g., no drivers to worry about.

This is meant to be a basic set up section. That is, hundreds of stations and D-Star gateways can be added using the basic steps given here.

10.1 Buying The "RT Systems" Software

From the internet enter www.rtsystems.com. The company home page should be displayed.

Looking further down the home page one can view five short videos titled "What's new in Version 4", explaining some basics of its operation.

At the top of the home page select the ICOM button at the upper right, under Sales to purchase software for the IC 880H.

After pressing the ICOM button the screen will show available ICOM radio software packages available.

Highlighted is the software available for the IC 880H.
Clicking on or open the WCS D880 will result in opening the ordering page.
From this point, follow through to the ordering pages and shipping.

Radio Programming Software

ICOM

CERTIFIED USB

Sales

- Home
- Icom
- Yaesu
- Kenwood
- Cables

Product Selection

Select from the products listed for more details and purchasing

D-Star Radios

D-Star Settings and the New D-Star Repeater Locator with repeater details right in the Programmers.

Support

FAQ

Software Updates

Install RTS-03
USB Drivers

Install Programming
Cable Drivers

Install VX-8D
Cable Drivers

View Cart

Tech Support:
404-806-9561

Sales:
1-800-921-4834

WCS-80 — Programming Software for the IC-80
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings and new D-Star Locator.

WCS-91 — Programming Software for the IC-91
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings and new D-Star Locator.

WCS-92 — Programming Software for the IC-92
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings and new D-Star Locator.

WCS-2200 — Programming Software for the IC-2200
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings. Does not include the D-Star Repeater Locator.

WCS-D800 — Programming Software for the ID-800
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings. Does not include the D-Star Repeater Locator.

WCS-D880 — Programming Software for the ID-880
Version 4.00
for Windows 7 (64 and 32 bit), Vista and XP.
with D-Star settings and new D-Star Locator.

10.2 INSTALLING PROGRAM

It is your standard Windows software, no known installing quarks at this time, so if you know how to install software skip to the next section.

The software package arrives with an interface cable, software disk and basic instructions.

1. Insert the CD into the CD-ROM drive.
2. Allow time for the computer to read the CD

Follow instructions on the screen.

Finally click Finish to complete installation.

This icon will be on the computer desktop screen.

10.3 INITIAL SETUP

10.3.1 SETTING 'MY CALL'

The first step is opening the program to a new screen and setting 'MY CALL'. This is the call-sign of the operator using the radio. 'MY CALL' is transmitted every time the radio transmitter is keyed.

Double click the ID-880 Programmer icon to begin the program. The screen should be as shown below. There are two reprogrammed assignments in memory zero and one.

Above the window tab are: File, Edit, Communications, Settings, DStar, Window and Help.

Click and open "DStar" then select "Digital (D-Star) Settings"
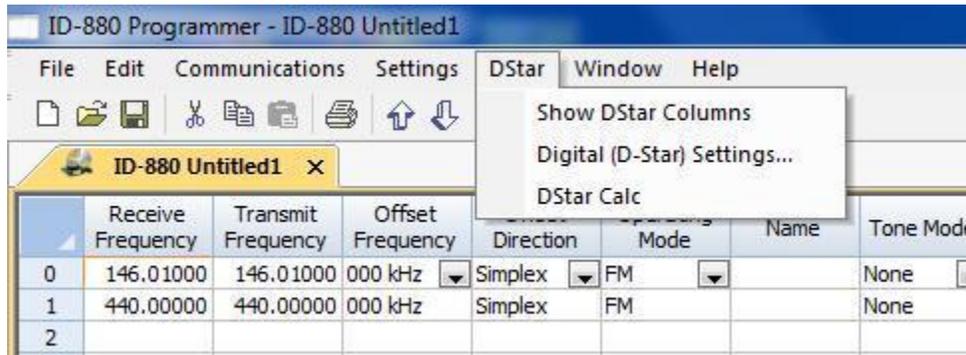
Enter the radio operator's call-sign. Here we used N4DLR. Then press OK at the bottom of the display. This call-sign will be transmitted each time the radio is keyed.

Also see the "Note" that is the slash field, put in 880H.

Then turn on the "Check mark" for "TX Message On". There the TX Messages is the "Auto Text Insert Field." Fill it out like so

NAME, LOCATION, Country abbreviation

10.3.2 HOME D-STAR GATEWAYS

The program is used to configure the radio to the local D-Star gateways and save them into memory.

From the main screen select tab D-Star again and press "DStar Calc". Tab through the shaded area to select state, city, etc. Selected is the Gateway in Columbus Ohio, W8CMH.
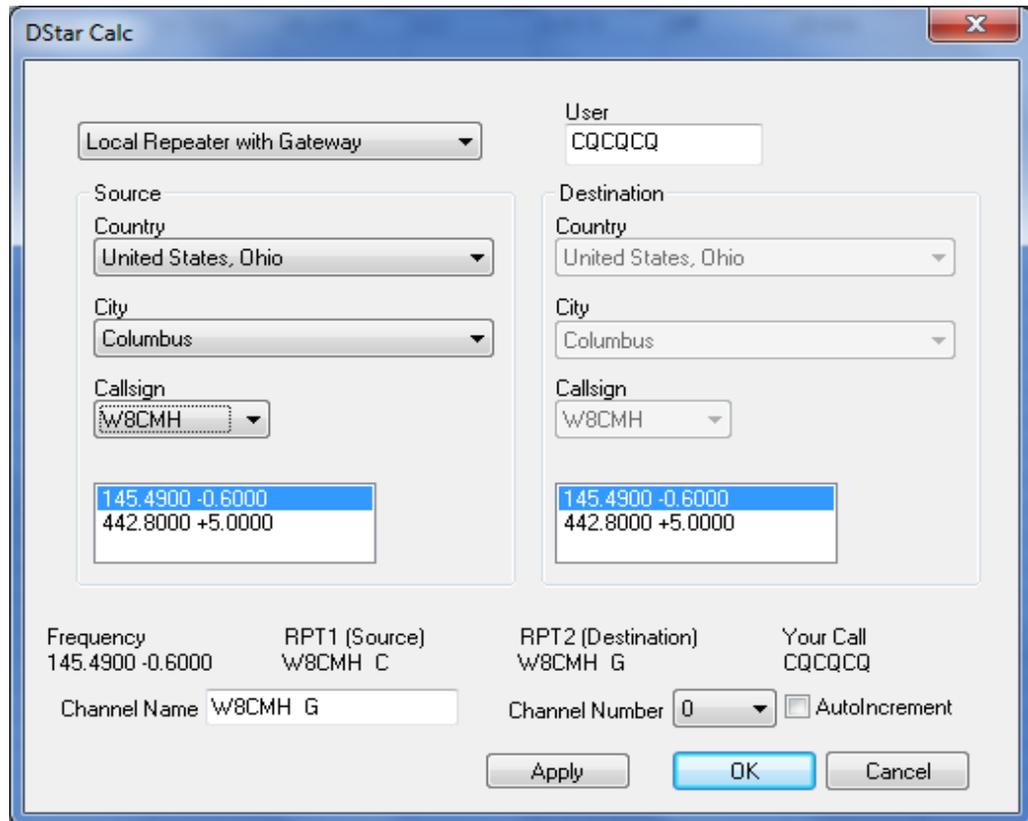
Notice on this page is all the information needed by the radio. Shown above Channel Name is the Frequency setting, RPT1, RPT2 and User (a.k.a. 'UR CALL'). Also W8CMH will be stored in Memory Channel Number 0. Press "OK".

We repeated this step and added W8DIG in Columbus into Memory Channel 1.

The results are shown in our Memory Table.

10.4 MANUALLY ADD FREQUENCIES

Next we want to add a 2 Meter FM repeater and the 2 Meter FM National Calling frequency. Pull downs in the rows will suggest plus, minus or simplex operation, etc. Normal repeater frequencies will usually auto populate the correct operation.

On the memory page we simply fill in the columns.

10.5 Bank Names

Banks are a way to group the memories for usage. For example a group of stations in Columbus, or a group of 2 meter FM stations, 2 meter and 440 D-Star stations, 440 stations, or stations for your trip to the Dayton Hamvention.

Under "Settings", select "Bank Names and Linking" can click..
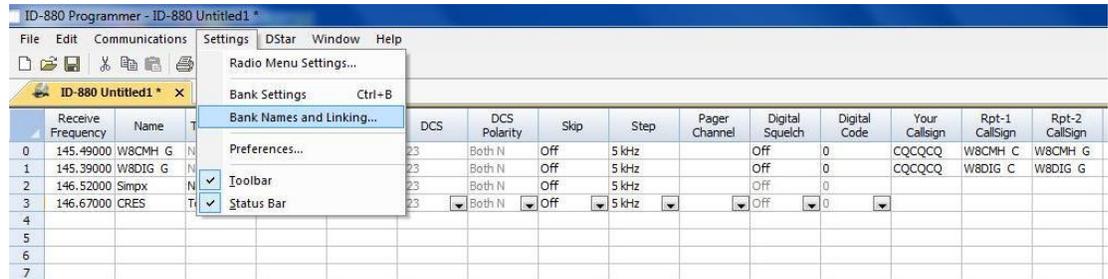
The resulting screen is below.
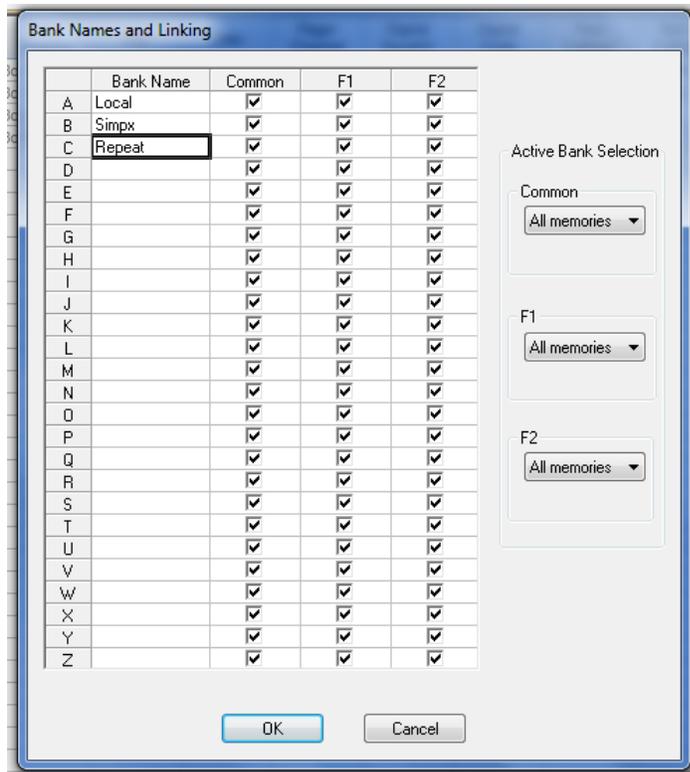
We have entered Local in Bank A; in B we entered Simplex; in C we entered Repeat. There are only six character spaces for the Bank name, so be creative.

After we complete the names, press "OK" to save and exit this window.

Next, move the mouse over to the Bank column for Memory 0.

This is the Columbus D Star repeater to store in the Bank named Local.

Next with the pull down tab select Bank, to select A:Local. Repeat this for the remaining channels for simplex and repeater.

We also added our optional Comments.

Rpt-1 CallSign	Rpt-2 CallSign	Bank	Bank Channel	Comment
/8CMH C	W8CMH G	A: Local	0	Columbus D Star
/8DIG C	W8DIG G	A: Local	1	Columbus D Star
		B: Simpx	0	National calling 2 meter frequency
		C: Repeat	0	CRES Radio Club in Columbus

10.6 SAVING THE WORK SO FAR

Much work and data entry has been input so far and now would be an excellent time to save it all. The name of your file is your decision. Here we will use the file name Jan 24a to indicate the work was saved on January 24 with the alpha character 'a' to indicate the first save of today, since we will be doing later entries to the radio.

From "File", select "Save As", since this is the first save for today using the program.
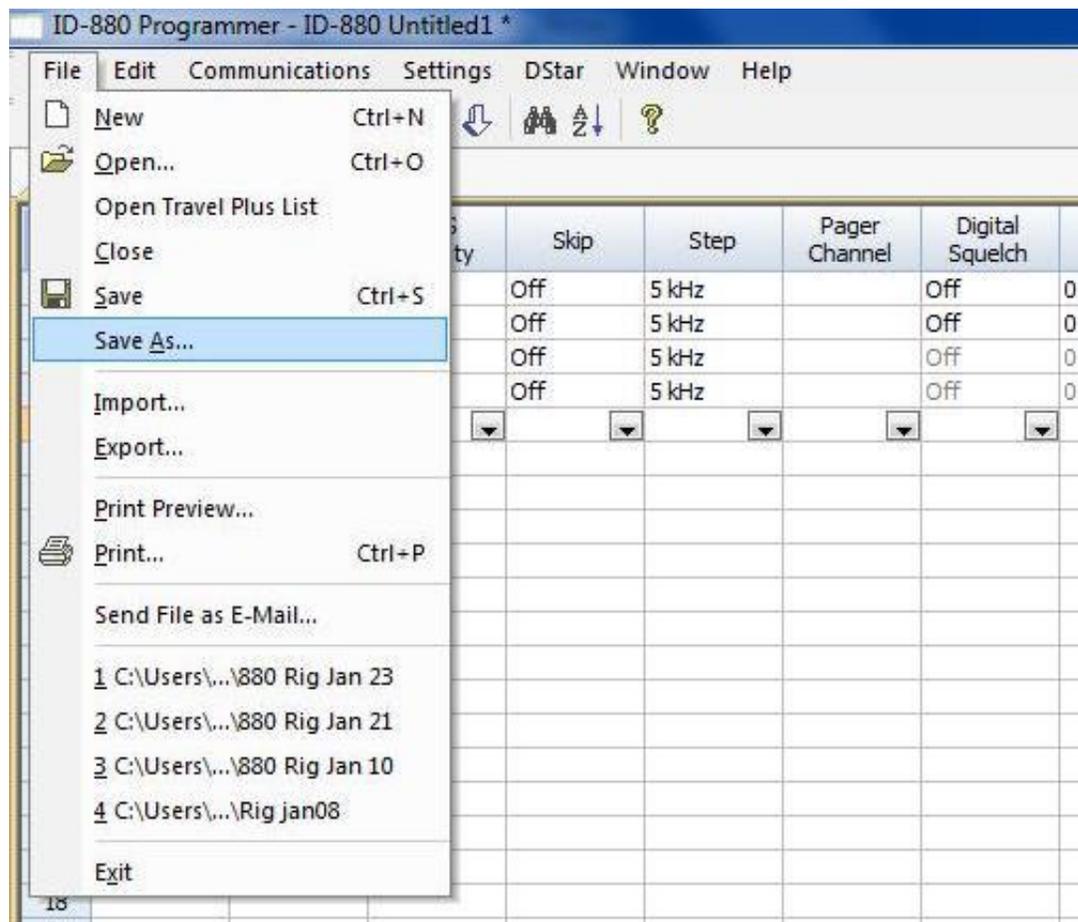
A recommendation is to save a new file name after any major changes.

10.7 Send Data To The IC-880H

Now we have the basic programing done to begin using the 880H. Under the Communications menu, Select Send Data to Radio...

NOTICE: All internal 880H data is replaced with data about to be sent.
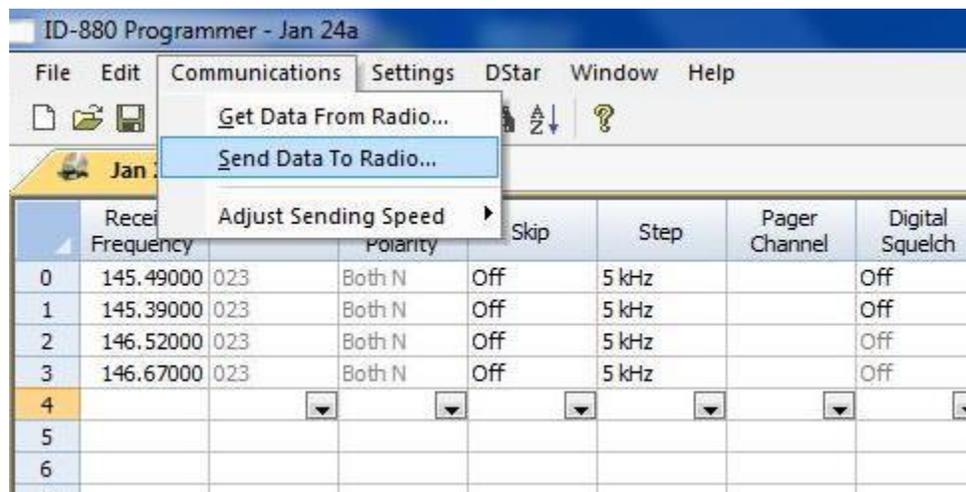
Next the window displays instructions to send to the radio.
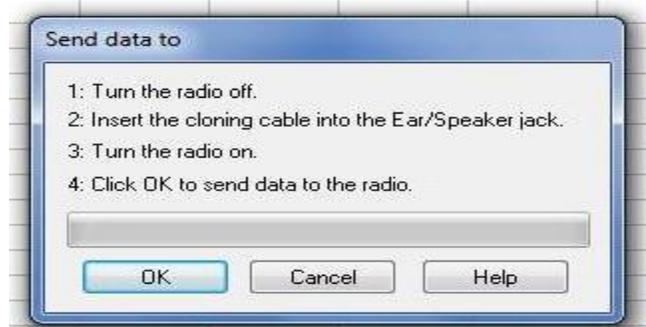
Connect the cloning cable to the USB port on you computer. Then follow the above directions.

The speaker jack is at the far right, under the power cable.

The rig screen will display the message.... Clon In. After data is loaded, power off the 880H, wait a few seconds, then power it up. The 880H now has all the data created above. Now the program can be closed / exit.

11 ARRL Travel Plus software with the RT Systems Software

Prepared by George Foy, N4DLR

In this section, we will use the ARRL Travel Plus (repeater directory), to plan our route for example between Columbus and the Dayton Hamvention. Next we'll import the repeaters into the RT Systems software and into our 880H radio.

There are many places to get the Travel plus software, such as arrl.org, and Hamvention, etc. If you're reading this section, then you either have it already or going to buy it. The install is pretty strait forward. If you need help read the manual there. Here we will show you an A-Typical use for it, and how it works together.

In this section we will take a few things for granted. One that you already know how to use the software, meaning setting up QTH, choose the bands, create the trip and generate a repeater list.

Tips for the software:

1. Have a good idea of the range of your mobile setup, and the route you're going to take. The Travel Plus does an OK job of putting the common repeaters that you're in range for on the trip. However it is a list, and it is as only as good as the 'data' that it builds the lists from. So if there is a paper repeater, that's still in the directory, it is going to pull it up and stick it in your list. If your "Range" setting is too large, it will pull all the repeaters from there as well.

2. Choose the band's wisely. If your rig is 2 meter only, then only have the 2 meter and D-Star. Travel plus has a lot of bands in it, and stuffing all that extra stuff may cause more hassle than its worth. So make sure the list you generate, is the list you want.

11.1 EXAMPLE: HAMVENTION TRIP

Generate your route data.
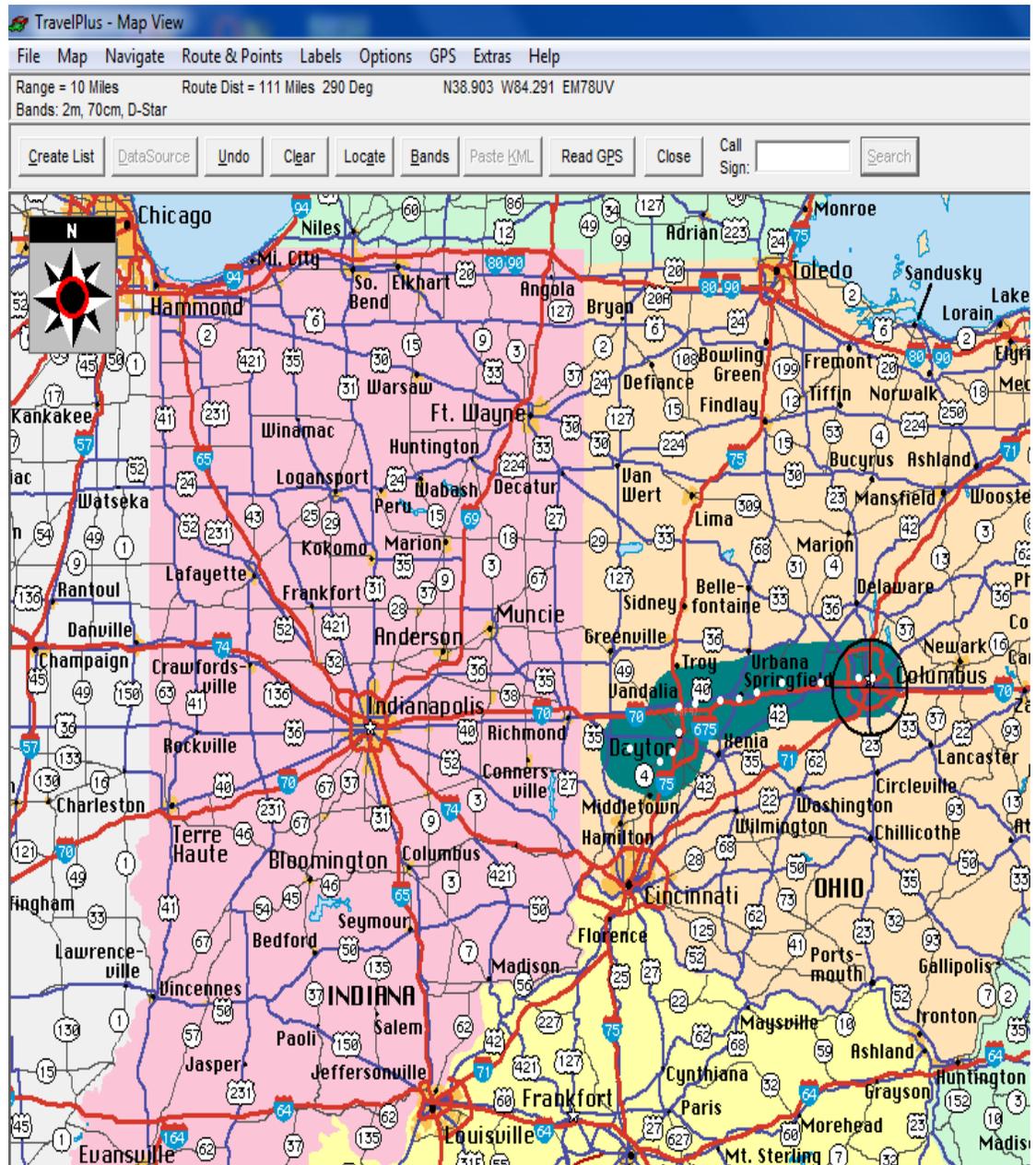
** An easy way to map 'Columbus to Dayton' is move the mouse pointer along the route you are going to take and press the mouse button making white dots and preset repeater radii to search for repeaters.

After the route is highlighted as above, click Create list on the left side of the window.
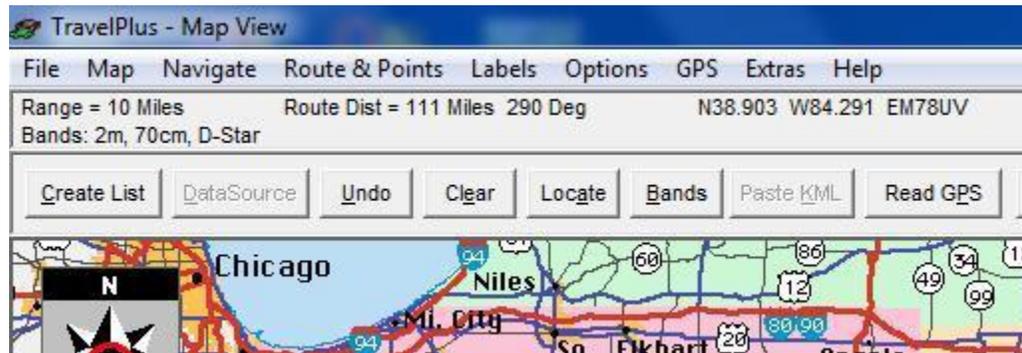
Immediately afterward the window will be showing repeaters along the route and shortly afterward show a table format of the repeaters.
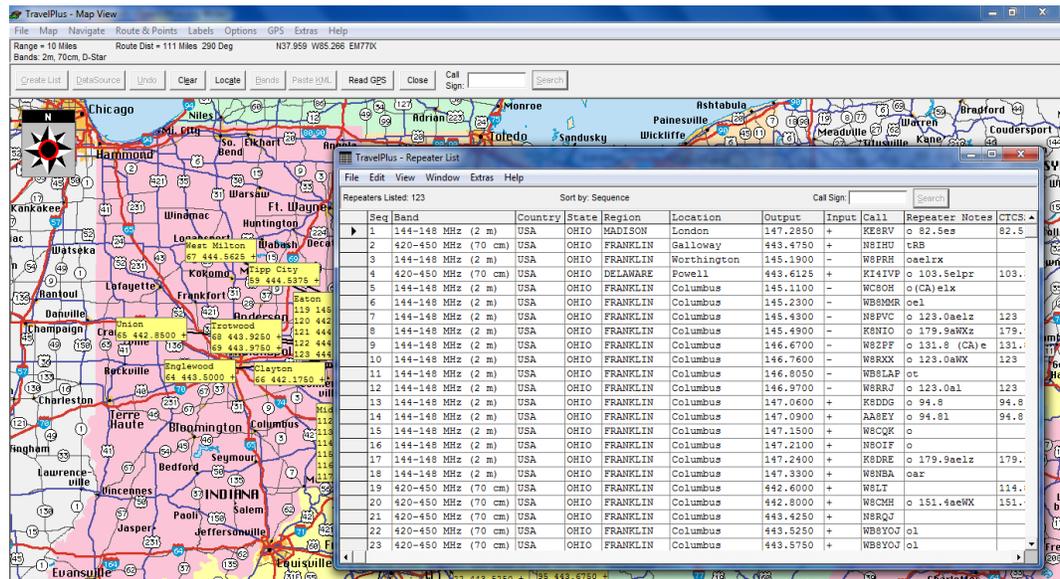
Without doing any further action in the Travel Plus program, open the RT Systems program as discussed earlier.

11.1.1 MERGE ROUTE AND REPEATER INFORMATION INTO RT SYSTEM PROGRAM
After the program opens, under "File" click "Open Travel Plus List".

The program will automatically import the ARRL route and repeater lists then create a new tab named Travel Plus list as shown below.
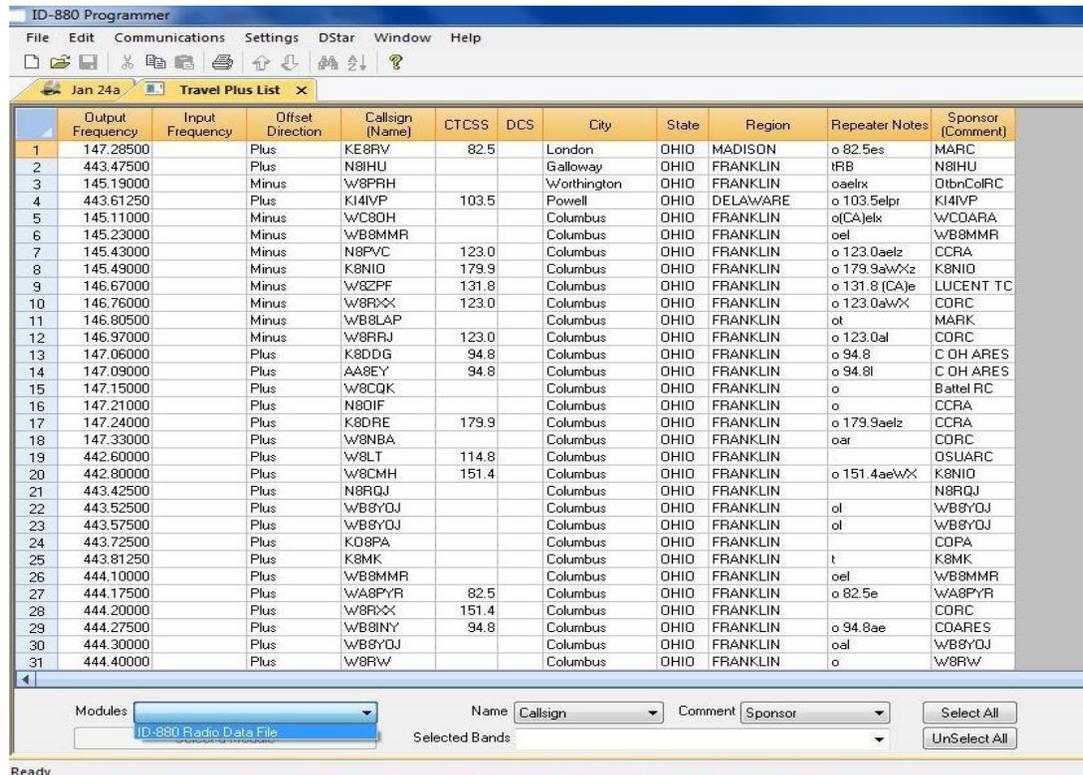
At the lower left of this tab is "Modules". Click the drop down and 'ID 880 Radio Data File' will appear. Next the tab below will have Create Files for ID800. Select this entry.

A new tab is opened in the program named 'ID 880 Untitled'. This is a listing in the program format of the repeaters between Columbus and Dayton Hamvention. Note D-Star station on line 37 and 38.

Using the mouse, we can highlight some or all the stations we want for our trip.

After the some or all the repeaters are highlighted; Move the mouse to "Edit" and click "Copy". Now those "Cells" are loaded into memory.

Click the "Jan 24a" tab, or your current file, to open our previous frequencies and repeaters that are in the rig. Move the mouse pointer to the left side of the window to select which memory slot will be the starting of the repeater list from tab ID-880 Untitled.

Now move the mouse to Edit, and then press Paste.

The Jan 24a tab now has the repeaters we selected.

At this point of completing major changes to the program, you should save your work.

Next load the new data into the 880H. (See the Section Icom 880H &RT systems if you are unsure how to do this.)

That's all there is to it, pretty simple eh?

12 DV-Dongle

The DV Dongle costs about $299. It is essentially an AMBE chip plugged on a card that allows a user to connect to any DPlus enabled gateway. In short if the repeater has a gateway with DPlus on it, you can connect to it.

The basic premise is you plug it into your USB port and Talk via PC's speakers and microphone. There are a few gotcha's you should know about.

- It does not call sign route
- It does not Node Route
- It cannot link a repeater
- It cannot Cross-band a repeater
- It requires the target repeater/reflector to be connected to the internet
- It requires you to be able to maintain a 34K a second steady connection (dial up won't cut it)
- The Java 'Stable' version of the program stinks
- And people have trouble getting it to work if you don't have the microphone plugged in. (ESPECALY THE JAVA VERSION)

So just what is it that you get, I mean why shuffle out $299 for a chunk of plastic?

The beta is a lot better than the 'stable'. The stable one, where the main website points you to is a java program. (Don't get me started on why I hate java). The Beta of 2.0 is written in .NET (if your running windows 7, then chances are .net is already installed)

The 2.0 beta gives you a lot more options. When you launch the software, it has a black terminal window and you can see what's going on. Plus you can see what other users fields are set to. This greatly helps you pin point another hams configuration issues. It can also tell you who are linked to the repeater or

reflector (dvap or Dongle or other repeaters) plus pulls up the last heard, as well as let you send some data across.

Not to mention for some, when traveling, and you want to get back home to your other repeaters, and you're in an area that doesn't have D-Star? You can do so with the box, without lugging around your HT, and charger.

To install it in windows 7 just plug it in. Microsoft already has the drivers for it.

Then go to: http://www.opendstar.org/tools/

Grab the latest beta. At the time of this writing it was DVTool-2.0beta4.exe.

Put the file somewhere where you can't miss it. There is no install, one file one program.

Double click:
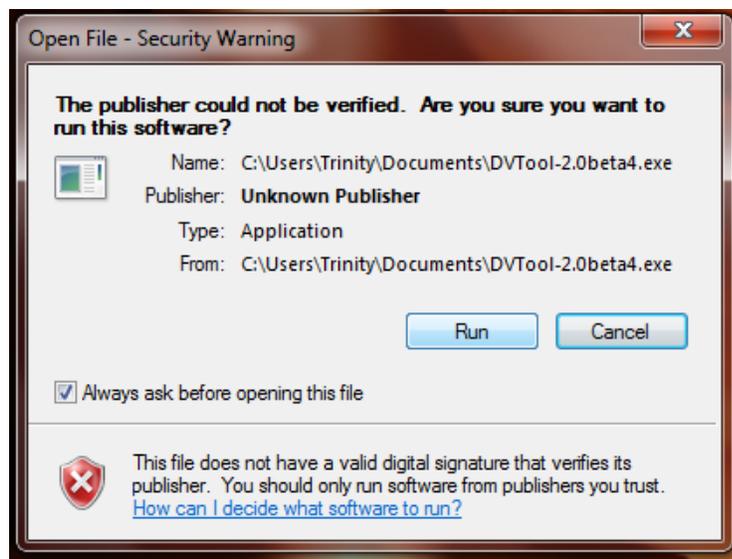
Remember this is a beta, so Microsoft wants to make sure you are aware it hasn't 'cleared it' click run.
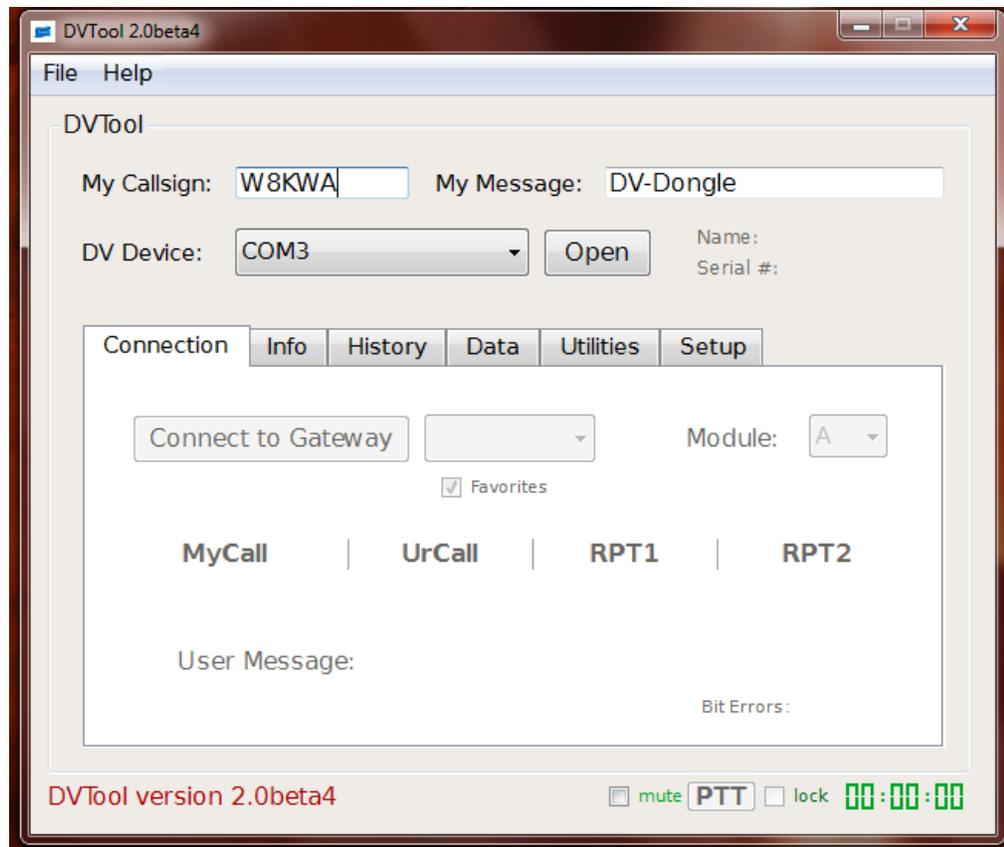
Check and make sure you know which com port, it put it on. (See the 800H section if you're not sure) A second window will also pop up. This is called the 'Terminal Window'. For the most part you can ignore that when trouble shooting.

The software is pretty Self Explanatory. Choose your com port, and then open. The box should then flash. Under Setup, you can tell it where to send the audio to, and take audio from.

The connection Screen is also pretty simple. Connect to Gateway window, will populate. IF it doesn't then you have internet connection problems.

Choose your repeater/reflector, and its module.

* means you listen to streams coming from all three modules but not talk on them

As others use it, you will see information pop up on this screen. The rest is strait forward.

If you're having trouble configuring your microphone, and have Windows Live Messenger then Messenger has an Audio Tuning Wizard, which walks you through calibrating, and auto adjusts your microphone level.

Also of note the data screen, you can type something in, however to people on the reflector, or repeater, it looks like your kerdunking a lot. Also it doesn't send your call sign on the screen, so you're going to see lines from others, who if they forget as well, you can get lost with who said what, so prefix your message with your call sign.

You can also send a file, please bear in mind, C node is 2400 baud, and B is 9600 baud, and you do have a 3 minute limit. You can do it, but it isn't much use.

12.1 TROUBLESHOOTING

1. Is it plugged in?
2. Is the green light slowly flashing
    a. If it isn't, then you have a driver issue, its not installed correctly
3. Does the program open?
    a. If it is Java, do you have Java installed, are you clicking the correct .jar file
    b. If so do you have your microphone plugged in.
    c. If you're running the .net beta, do you have .net installed, if not go and get it.
    d. If it's not running after that, check your microphone, see if your computer sees it and knows what to do with it.
4. Is the Comport set right, to the correct com port? If not it won't open, check your usb section in the system tray to double check.
5. Look in the set up tag, I prefer the sound mapper and tell the computer what to do instead of per program. Just make sure there set where you want them.
6. Can you connect to a reflector, or anywhere? If yes move on, if not you may have net problems.
7. You can't connect, and know your net is ok.
    a. Check to see if you are registered in the system. (don't get fancy with your call sign, just your call sign nothing else.)
    b. Check by connecting to a known good reflector like 01C
    c. Can you hear them? Yes, then it may be that the other target repeater is having network problems.
8. You can hear them they can't hear you.

a. Check your Speaker / Recording properties. Is the microphone muted?

b. When you speak, can you see the microphone level move? If not adjust the level, or use Microsoft Live Messenger's Tune Audio and Video, or the microphone configuration wizard in windows 7, or crank it up by hand with another ham.

  i. Please note: I don't advise having another ham HELP with the volume levels. I have seen this happen to many times, that the microphone gets set up way too high, and the cheap microphone now sounds worse because with pc's you over modulate the volume with a microphone it sounds really bad really fast.

  The other ham can't see what's on your system, and he has his own listening levels. He doesn't know what kind of microphone, or how your computer sees it. Very few hams have a grasp of PC microphones for audio quality.

  When I have seen others do this, it always ends up sounding worse with over modulation, making your voice sound a lot worse than it needs to be.

9. If other repeaters are not populating your repeater drop down window, that's a network connection issue, not d-star, your internet connection

10. Some transmissions go through some don't.

a. Bear in mind DV-Dongle, and Dvap, have latency issues, especially the DV-Dongle. When you PTT, then there's a bit of lag added on, and the time to get to the site. Hams tend to quickly key down, and if they key down at the right point, they block you. Nothing you can do about it, just bare it in mind when you operate.

11. I'm at a Hotel…

a. Been there done that, Wi-Fi can be tricky with the dongle, yes it can be done with a strong connection, and if there is not to many people on it. I have done this myself with a hotel's wireless network. Sometimes the repeater list wont fill up, or the signal goes to garbage and your bumped off the repeater. It's not advised but it is doable.

13 DVAP $249

This is pretty new to the market. It works as a hotspot. Basically it works similar to a DV-Dongle except you don't use a head set and mic, you use a D-Star radio. It has a 10mW (that's milli watt) radio inside that works on a simplex frequency. So if you want to use your D-Star radio, but no repeaters around you can use this to get you out similar to a DV Dongle. So all of the limitations with DV-Dongle, just you can use a D-Star radio to go in and out.

"The DV-AP is 2M transceiver with a 10 mW maximum output; an integrated GMSK modem; and a USB 2.0 interface. Using a PC connected to the internet a licensed amateur radio operator can use a D-STAR equipped radio to access the global D-STAR network and connect to voice gateways and reflectors around the world. The DV-AP gives a Local Access Point to use a D-STAR equipped handheld radio to access the D-STAR network even in places where there is no local D-STAR repeater."

If you want more information on these, Google is your friend; you can get both at HRO (Ham Radio Outlet) neither of these is made by Icom.

There are other projects out there for D-star, like D-Rats etc., so you're on your own with that, but you will hear these two items talked about a lot, so I thought I should give a short explanation about them.

February 27, 2011

14 ADDITIONAL RECOURSES

http://www.dstarusers.org/ - The place you can see 'Last Heard' plus the current directory of D-Star repeaters.

Nifty E-Z Guide to D-STAR Operation – A book about D-Star, there's a new version out of March 2010, I used the previous version to learn about all of this stuff.

http://query.ki4swy.org/index.php - The place to double check what's in the gateway system.

http://sites.google.com/site/codsnet/ The Place where the current version of this document is.

14.1 THE CENTRAL OHIO D-STAR NET

http://sites.google.com/site/codsnet/

Thursdays 8pm W8CMH C & Reflector 38A

A few years back, there was a small D-Star net, it had about 3-4 people who regularly checked in, and it went silent about 1-2 years ago. Since the reassurance of D-Star users here in Columbus, the idea has re-surfaced. Also since then I seemed to be tagged with the Dubious Nickname of the "D-star Expert". Well I am far from an expert, and there are a few others more knowledgeable about the subject than I am. But I seem to be the most active of them locally.

The net his held is on Thursday nights at 8PM on the W8CMH Node C repeater. This net has a threefold purpose.

1. To discuss News topics related to D-Star and Topics covering Amateur Radio in the Central Ohio Area
2. A Place for New D-Star Users to ask questions, and get answers if not pointed in the right direction.
3. For us in Central Ohio to Socialize

Thursday night was chosen because there were no active nets at the time. We had thought about a weekend evening but a lot of D-Star users check into "Connie's Net" on reflector 1C on Sundays, Saturdays has always been a bad night for nets, and Friday nights don't work out as well due to people getting home to their families, and family things on Friday night. So Thursday was set in. Also 8pm, gives 45 minutes for those who are part of the COTN, to do their evening message handling and then come over to our net at 8pm.

Each evening will have a topic or a news item including status of the local repeaters. Then it's a round table discussing the topic, questions, or whatever, then a second round of discussion of any topic. Another idea was to also do an ARRL News line, or the ARnews line, thus we get it in digital sound. Right now we have a volunteer to test the Viability of this (Don KB8RUN), but at the moment there's a 3 minute time out window built in to D-Star that can't be turned off, and it means chopping them down to size. Stay tuned to the net for further info.

Right now W8CMH is connected to the gateway, so feel free to link your repeater up to it and connect with a DV dongle or Dvap and join in the fun.

Also note we have a mailing list for D-Star news, Rag chewing and assistance. http://groups.google.com/group/codsn all are welcome to join. Also the Net linked to Reflector 38A (the Ohio Wide Area Reflector). So come join us and meet new friends.

14.2 D-Star Club

There has been "Discussions" About setting up a D-Star club. Setting up a Radio club is a lot of dedicated work. There has been a lot of interest locally here to join one but no one has stepped forward to take up that mantle of responsibility and get the ball rolling.