



### Next Meeting:

**Tuesday, November 4, 6:00pm Bullock's BBQ  
Program: 3D TV, UHD 4K TV and Beyond  
By Stephen Toback**

Stephen Toback, Senior Manager and Media Architect for Duke University's Office of Information Technology will be presenting on emerging video platforms for education: 3D and Ultra High Definition Video (4k). He will have a demonstration of current experiments in using 3D technology with a 3D display and camera and will be discussing 4k video and beyond.

### President's Corner

Hello, Everyone!

It got cold all of a sudden. I thought the electric bill was paid, but I suspect Nature has other plans. One source of heat in my house is the subject of our next program -- television. Besides offering a relatively inefficient source of warmth it sends a bunch of those things called images on to the display. It's all about having a space heater with high resolution sports programming, right?

Like you, I'm waiting with bated breath as to the outcome of our Field Day results. It's 10:30 am on, 10/29 and I've set the shell script on the laptop to monitor ARRL so I get a popup message the instant this breaking news is released. I've given up that CNN might actually report something important for a change.

Contesting season is in full swing for many of you, and I've been hearing some impressive results from many of you. Now that we are in to the start of the downturn of the Sun spot cycle it's all the more impressive the patience some of you have at making these contacts overseas.

JARSFest is imminent. I trust you have all made your lists, both of what you wish buy/sell/trade. It's a definitive sign that you need to figure out what you and your family "need" for holiday gift giving. As for me, I need another tower and antenna -- I'm trying to grow aluminum structures in my yard and I just don't seem to be growing them very quickly.

I look forward to seeing you all at our upcoming meeting, JARSFest, and many other upcoming events!

Keep the spark going... - **Michael, KK4EIB**

### Why Do We Need So Many Repeaters?

On numerous occasions I have heard someone ask the question, "Why do we need so many repeaters? No one ever talks on them." I would like to offer my thoughts on this question, at first from a DFMA perspective.

The first DFMA repeaters were actually the 145.45 and 444.1 repeaters on the Durham VA Hospital rooftop. The Hillsborough 147.225 repeater was built and owned by Charlie Blair, K4RSH, a student in the dental school at UNC-Chapel Hill. When Charlie graduated and moved to the Kings Mountain area, DFMA purchased the 147.225 repeater and land lease from him. Over the years and the replacement of our Rohn 25G tower with the current (larger and stronger) tower, DFMA added repeaters on 444.45 and 224.26. The Hillsborough tower site is excellent for wide area coverage with ground elevation of 791 feet above sea level and antennas at 971 feet above sea level. Only the repeaters on towers in the 1500' to 2000' height range provided better coverage in our part of the state. As the voice ID says, we have coverage "on I-85 from Greensboro to I-95"!



**Hillsborough DFMA Tower  
Picture courtesy of NC4CD**

Last year DFMA moved the 145.45 and 444.1 repeaters from the VA Hospital to TV Hill, north of Durham by about 8 miles. This was done for several reasons. At TV Hill we gained about a hundred feet of elevation above sea level, free internet service for IRLP and Echolink, much easier access for maintenance, and the ability to have more antennas as

needed. TV Hill has much better coverage than the VA with a ground elevation of 692 feet above sea level and antennas at 852 feet above sea level.

None of these tower sites cost the DFMA anything for tower rent and Hillsborough actually provides income from rental of tower space to cellular phone companies. DFMA also has availability of 16 other tower sites at no cost. We will be using seven of those towers for remote receivers on 147.825 to feed into the 147.225 transmitter at Hillsborough. Most ham radio groups do not have this abundance of free tower space.

So the DFMA currently has five repeaters at two primary locations. At Hillsborough we have repeaters on 147, 224, and 444 MHz. At TV Hill we have repeaters on 145 and 444 MHz. One of our main purposes is to provide emergency or public safety communications to back up the commercial systems that might be overloaded or unavailable. Having repeaters at two different sites provides redundancy if one site fails. TV Hill has a generator to operate the repeaters during a power outage. We have the hardware to add a generator at Hillsborough and will probably look into its implementation next year. Presently

Hillsborough has batteries that will operate the repeaters for about 8 hours. We have repeaters at each site on different bands. This permits multiple functions to be conducted simultaneously during an event. After a major weather event, we could have a channel for dispatch of operators, a channel for communications with shelters, a channel for reports from mobile operators providing damage assessments, a channel for communications with the agencies we are serving such as ARES, Red Cross, Police, Fire, etc. When the weather is extremely bad, the cellular networks will be overloaded and will fail. We will need the channel capacity for multiple functions.

Having repeaters at two different sites provides geographical diversity also. Hillsborough provides wide area coverage favoring the western side of our area. TV Hill, being nearer to Durham, provides more coverage to the north and east of our area.

Hillsborough, with the remote receivers soon to be in operation, will provide truly wide-area coverage for mobiles and HT's in all of our area.

There is always high demand for frequencies by commercial users. We must use the frequencies allocated to amateur radio to avoid losing them some day. Remember, a few years ago, UPS wanted the 220 MHz band to track packages in their millions of brown trucks. We lost 220 - 222 MHz out of our 220 - 225 MHz band. The sad part is that UPS never used the spectrum but we did not get it back. It sits there today virtually unused.

Other comments I hear relate to the lack of use of our repeaters. In my opinion, amateur radio and repeaters took two major hits on useage. One was the **cell phone**. Before everyone had a cell phone, hams could make phone calls on the repeater autopatch. The Hillsborough autopatch had an advantage over others because it provided free local calls to Durham, Raleigh, and Chapel Hill, which at one time were long distance calls with a low per-minute cost. The disadvantages to amateur radio autopatch calls were that no "business calls" could be made and everyone could listen in to the calls like one big party line. Hams were

way ahead of the general public in making phone calls from a mobile radio or walkie-talkie.

The other big hit on repeater activity was the **Internet**. Many hams are "surfing the web" instead of talking on the repeater. I can remember when many of our members talked on our repeaters on the way to and from work every day. Now some only use their radio to check into the Possum Trot Net and many do not use the radio at all. I believe we should use our radios frequently to be sure that they are working properly for use in an emergency that might occur. Batteries can fail prematurely when they are not charged and discharged properly over time. Likewise, I run my generator once a week so I will know if it has a problem that will keep it from operating when I need it.

Think about it. DFMA has a net every Thursday night and out of over 90 members only 10 or 15 check in. That is a great opportunity to have a weekly radio



TV Hill Tower  
Picture Courtesy of NC4CD

check. If you don't like a night time net, the Possum Trot Net meets every morning Monday through Friday, another great opportunity for a radio check.

The other question I hear is “**why can't we link 147.225 to 145.45 to get more activity on the repeaters**”? Personally, I don't believe that linking the two repeaters on a full time basis will generate more activity. Maybe we should just decide which repeater will be the “calling channel” and everyone will monitor that repeater. Separate conversations can be moved to one of our other four repeaters.

From a perspective outside the DFMA, hams in other towns build repeaters to serve their areas. Many repeaters are linked together to provide wider areas of coverage. The PCRN system links 2 meter repeaters all over North Carolina, South Carolina, and Virginia. The Carolina 440 Repeater system links 440 MHz repeaters in the Piedmont and Coastal areas of NC. Repeater are also linked world-wide via IRLP and Echolink over the internet. Hams have progressed from analog repeaters to digital repeaters using D-STAR and DMR with linking via the internet.

So why do hams build all these repeaters? So we can build on existing technologies and experiment with new technologies **AND** to communicate with each other for the benefit of ourselves and others. It is a hobby with many useful purposes.....and it's a lot of fun too!

**73 de NC4CD**

## New Members

**Hams that have recently joined the DFMA:**

**Russ Ashley, KM4DVD**, Durham

**Noble Phelps-Breeden, N4UOQ**, Raleigh

**Rich Von Furstenberg, KM4ASD**, Hillsborough

*Say hello and welcome if you run into them!*

## Antennas for Everyone

*(Below is a copy of Max's article on “Where to Get Material”. Obviously some of the material and references are now out of date, but many of the ideas are as valid as ever. I am planning to put this series of articles on the DFMA web site in the Tech Repository. If you have any ideas to supplement this article, they can be included on the web with your byline. More reprints of Max's articles are planned for future editions of the Link. - Dee, KU4GC, editor)*

## Where to Get Material

**- Max, KO4TV (From the June 1997 DFMA Link)**

Building antennas can be the most rewarding aspect of Hamming, but frequently I hear the lament, “Where can I get the material to build an antenna? Most of the suppliers are out-of-town, expensive, shipping charges are outrageous, and many special pieces of hardware just aren't available.”

Well, my friends, if you go strictly by the plans in the ARRL handbooks, you are playing right into the hands of the advertisers. Nobody ever said that you must use 6061-T6 tempered aluminum, copperweld wire, factory-made mounting brackets, gamma matches, baluns and other such niceties. Antenna materials are right in your back yard, with just a little looking and imagination. For example, PVC or CPVC plastic pipe, available at you local building supply store at a very reasonable price, make fine insulators, coil forms, spreaders, booms and mounting frames for many types of antennas.

Insulated house wire, type TW or THHN, makes excellent antenna wire, for dipoles, slopers, inverted Vs, G5RVs and even Log Periodic beams. You don't even have to remove the insulation; it protects the wire from oxidation, reduces skin-effect loss and slightly reduces the length of wire required for resonance at a given frequency. Trap coils can be wound on PVC pipe forms, using commonly available coax cable for both the inductive and capacitive elements. Contrary to popular belief, low and medium power baluns can be airwound on PVC forms with ordinary coil wire, and will give excellent performance.

A trip to a local metal recycling yard produced an abundance of surplus TV mast, aluminum tent poles, rolls of surplus coax cable at dirt cheap prices (sold by the pound, not the foot). One trip even turned up the makings of an automatic antenna tuner, variable capacitors, drive motors, control board, etc.) which in its former life was a control unit for an industrial plasma heating unit, whatever that is.

There is even a electronic surplus dealer in this area, Joe Tabor, also known as “Trader Joe” between Wake Forest and Youngsville (Phone 919-556-4299), who carries a multitude of specialized parts and hardware. There is another parts dealer in Knightdale, but I've never been able to get through his voice mail phone system, so I will prudently omit him until he starts answering his own phone!

An excellent antenna wire is #17 tempered aluminum electric fence wire, available at farm supply stores for about \$11 per quarter mile! There is also a limited amount of connectors, cable, insulators and miscellaneous hardware available at Capitol Electronics in Raleigh, Electronics Unlimited in Raleigh and Durham, and of course the ubiquitous Radio Shack Store, although its connectors seem to be the cheaper TV or CB types).

If you really want some heavy duty commercial material, towers, etc., Harwood West Antenna Co., just East of Greensboro on Old US-70 is the place to go. Guy wire, dead-ends, screw-in anchors, step bolts and other electrical hardware can usually be found at many electrical supply dealers in the Triangle area.

One of my favorite Sources for such esoteric items as fiberglass poles and masts is the local power company's surplus disposal facility. I have purchased 12' to 20' fiberglass poles from CP&L for \$2 to \$5 each. They make excellent spreaders for Quads and Log Periodic antennas. A comparable fiberglass vaulting pole from your local sporting goods store costs about \$350 plus shipping, so that's quite a savings!

When it's time to assemble all the parts, its hard to beat muffler clamps from your local automotive supply store. They are generally heavier duty than the usual hardware store U-bolts, at about half the price, and come with a form-fitting notched saddle to grip the pipe snugly.

A trip to your local metal working machine shop will produce scraps of aluminum or steel for antenna brackets, usually at little or no cost. Likewise, a trip to a local plastic and fiberglass distributor turned up a wealth of Lexan and Plexiglas scraps in the dumpster at no cost! Even if you have to pay, most dealers sell scraps for \$0.50 a square foot or less, often MUCH less.

When it comes to feedlines, nobody ever said you had to use coax or commercial ladder-line. You can make your own open feedliue from #14 or smaller house wire, or coil wire available from motor rewinding shops or by dismantling old electric motors, using Plexiglas scraps or short sections of small CPVC pipe for insulators. This also allows you to make special impedances to fit your needs.

Remember, in "The Good Old Days", Hams made most of their equipment. Let's bring back that old spirit to Ham Radio!

**73, KO4TV Max**

## **Board Meeting Minutes**

(draft, not yet approved)

**Durham FM Association (DFMA)**

**DFMA Board Meeting Minutes -10/21/2014 - Dan, KR4UB, Secretary**

**Location:** 1920 Front Street, Durham

**Attending:** Michael, KK4EIB, president; Dee, KU4GC, vice president; MK, W4MKR, treasurer; Dan, KR4UB, secretary; Charlie, NC4CD, repeater manager; Dave, W4SAR, field day coordinator; Pete, K4PHS, at-large member; Bob, W4RWC, at-large member; Dan, KK4DMS, at-large member; Karen, KD4YJZ, at-large member

**President:** Michael, KK4EIB called the meeting to order at 7:05pm.

### **REPORTS**

**Treasurer - MK, W4MKR**

Current Members: 93 are paid up so far this year.

**Secretary - Dan, KR4UB**

The 9/16 Board Minutes (with one correction IFR-2000 should be IFR-1200) and 10/07 Club Minutes were reviewed and approved.

The MCU has been taken to Dick Shirley Automotive, a Chevrolet dealer with commercial truck repair facilities to repair the brake lines. This will also include flushing the brake system twice with new brake fluid. The rust issue on the MCU roof and right front side needs immediate attention. There is a noticeable increase in rust marks in the affected areas. Serial numbers of all equipment in the MCU are needed to complete the photographic inventory for insurance purposes.

**Vice President - Dee, KU4GC**

Dee reported on upcoming activities and presentations. Dick, WA2ROC is in contact with the Bankhead Military Convoy Military Vehicle Preservation Group on the behalf of DFMA and its participation in the event. Future club meeting presentations by speakers on automotive autonomous driving technology, RDU Airport communications, TV station chief engineer presentation on HDTV are in the queue.

The next club meeting presentation will be by Stephen Toback from the Duke University Office of Information Technology on three dimension HDTV.

**Repeater Manager** – Charlie, NC4CD

Charlie reported that Lowell, KK4PH has updated the Hillsborough repeater, adding club meeting announcements.

**Field Day Coordinator** – Dave, W4SAR

Expect Field Day results to be published by the ARRL at the end of October

**NEW BUSINESS**

Dee led a follow up discussion with the board on the Extra Class training session that 7 people indicated interest in at the last club meeting. The choice of text material for the license upgrade will be made by VEs Dave W4SAR and Dee KU4GC. The concept for the class is to ask the participants to volunteer to lead the training sessions for various chapters in the text based on their interest, expertise and experience.

Dee will provide an update at the next club meeting on the textbook selection for the class, cost, circulate a sign up sheet for the book order and poll the participants for a suitable time and place for the class meetings.

Bob, W4RWC brought up that at club meeting presentations it can be difficult for presenters to be heard, especially in some of the more distant seating locations. Bob agreed to contact Mike KK4BPH who has offered the use of a PA system for DFMA meetings with program presentations.

**Meeting adjourned at 8:11 pm.**

**Club Meeting Minutes****Durham FM Association (DFMA)**

**DFMA Meeting** - 10/07/14 -, KR4UB, Secretary

**Location:** Bennett Pointe Grill, Durham

**Attending:** KR4UB, Dan; W4MKR, M.K.; WB4P, Skip; KU4GC, Dee; WA2JLW, Roy; W4OFZ, Banks; KK4EIB, Michael; K4PHS, Pete; KK4PH, Lowell; W1GWL, Gary; KK4CCX, Dick; NC4CD, Charlie; KV7D, Adriano; NA4VY, Dave; KB4OT, Jim; WD4CEE, Terry; WA4AHR, Dewey; W4SAR, Dave; KD4YJZ, Karen; KA2DEW, Tadd; KK4BPH, Michael; KE4HIH, Rhett; KE4QOZ, Joanna; N7JLS, James; W4PEL, Pete; N8XU, Jack; N4UOQ, Noble; K2MZ, Duke and Nancy; WA2ROC, Dick; KD4WNZ, Bill; KE4JYJ, Sue; KM4DVD, Russell; W4BOH, Wilson; WA4OPI, Jim and Gail; KK4DMS, Dan; KK4UNZ, Tucker; KJ4OLI, Tim; KE4UVJ, Don; KI4QXY, Ken; WA4BVY, Terry

A total of 42 attending, 40 of them hams.

Prior to the meeting start, Dee KU4GC had another auction of various remaining items from the KO4T estate with the proceeds going to DFMA.

**President:** Michael, KK4EIB opened the meeting at 7:05pm with the call for officer's reports.

**REPORTS****Vice President** – Dee, KU4GC

Dee reported there will be a program next month; the program topic will be determined at a later date. He then polled to group to see how many people would be interested in a class for an Extra license upgrade. Seven people expressed interest.

**Treasurer** – MK, W4MKR

Members: 92 (whose dues are current).

**Secretary** - Dan, KR4UB

Dan made a short presentation and passed around a handout on the new PayPal option on the DFMA website. Existing members now have the option to renew their dues via the membership page. More website work will be needed to give new members the option to apply for DFMA membership and pay the prorated dues for the first year.

A brief status report on the MCU was given by Wilson W4BOH. It has been noticed that the brakes are intermittently pulling to one side or the other. A mechanics inspection has determined that the brake hoses are deteriorating, causing partial blockage and need to be replaced. That is scheduled to be done within the next month.

**Repeater Manager** – Charlie, NC4CD

Charlie reported that Adriano, KV7D and Lowell, KK4PH have tweaked up the audio levels of the IRLP on the 440.1 for improved audio quality.

**ARES** – Lowell, KK4PH, reported an ARES meeting is scheduled on Wednesday, October 15th at the Parkwood Fire Station. Jim Wagner, NN4JW has been appointed the Durham County AUXCOM coordinator.

**Field Day Coordinator** – Dave, W4SAR reported a VE session is scheduled for Saturday, October 11th.

**Show & Tell** – Pete, K4PHS showed his Eico 950B Comparator Bridge he found at the Fairgrounds Market.

**Presentation of the DFMA "Lid" Award**

Dave, W4SAR presented the Lid to Wilson, W4BOH for hosting the combined DFMA/OCRA 2014 Field Day event. Dave expressed thanks and passed on the compliments that have been made on Wilson and Dee



Ann's gracious hospitality and the amenities of the site.

### Door Prizes

Tim, KJ4OLI won the loaf of pumpkin bread, freshly baked and donated by Jean, KR4UB's XYL. Karen, KJ4YJZ won the extension cord 3 wire plug adapter. Jim, KB40T won the tape measure donated by Paul, KE4OXN. Dan, KK4DMS won the screw driver set. Duke, K2MZ won the flashlight.

### Program Presentation

Dee introduced Jeff Crews who gave his presentation on the "Mantis Milling" machine, a project from Splat Space in Durham. His presentation included some history of the evolution of the milling machines, the people and institutions involved and the advances in technology over time. Afterwards there was a discussion on many aspects of the project. Toolpath, CAM, Eagle were some of the recommended programs for producing artwork for circuit boards. Easel was recommended for engraving. Jeff has given numerous presentations on the project at various schools to promote interest in the technology.

**Meeting adjourned at 8:30pm.**

**73 - Dee, KU4GC, Editor**

**- MK, W4MKR, Proofreader**

Send copy to [ku4gc@amsat.org](mailto:ku4gc@amsat.org)

Deadline: one week before the Club Meeting

(Images and copy: KU4GC or as credited)

## Buy – Sell – Trade

### Wanted: Dead Microwave Ovens

I can use dead/dying/unwanted microwave ovens. The power transformers can be used for power supply construction. Thanks.  
Wilson – W4BOH

### For Sale: Gifts to the DFMA

At the last few meetings we have auctioned off a number of items. I will bring in the rest of the items to close things out. The current list can be found at <https://docs.google.com/spreadsheets/d/1i8CzPgNUycZhhQJ8sRae5Ob04cAUQwHqa2D00PhFJOk/edit?usp=sharing>

If you are interested in any item, you can make a bid by email. ([ku4gc@amsat.org](mailto:ku4gc@amsat.org)) Or just bid at the meeting. Everything will go, many items for \$1.  
– Dee, KU4GC

## Upcoming Events ([dfma.org](http://dfma.org) for details)

- 11/4 6pm DFMA Meeting, Bullock's BBQ
- 11/10 7pm VE Session, Orange County EOC
- 11/10 7pm OCRA Meeting, Orange County EOC
- 11/16 8am JARSfest, Benson
- 11/18 7pm DFMA Board Meeting, NC4CD Office
- 11/27 Thanksgiving
- 12/2 6pm DFMA Holiday Party, Bullock's BBQ

Web Site: **[dfma.org](http://dfma.org)**