In this issue, we go back to our original goal of providing material that is different but useful in a practical sense. Yet, the big news of 2012 will indeed be the procession of VHF/UHF narrowbanding as well as perhaps a long awaited Congressional determination for whom ultimately secures the highly prized 700MHz D-Block…. and at what price.

Year 2011 was again one of great challenge to the nation and the public safety radio industry, but there are glimmers of light ahead, to where consumers are sensing a renewal of optimism. Not from any positive, stimulating activities coming from Washington, but from a fundamental necessity to rebuild lives, finances and dreams.

NARROWBANDING OF OLDER LMR EQUIPMENT

A number of third party vendors are producing kits to modify the receivers in early General Electric, Motorola, Kenwood, ICOM and other stations to allow continued commercial use of this equipment after the January 1st, 2013 sunset of wideband VHF/UHF FCC Part 90 allocations.

Principally, the modification requires a reduction of transmitter deviation to 2.5KHz (as compared to the current 5KHz deviation rate) and the replacement of receiver intermediate frequency (IF) bandpass filters.

The conversion of the receiver IF to correspond to the new channel bandwidth requirements is essential to prevent interference from newly operational adjacent channel narrowband system(s). Additionally, the receiver modification is necessary to recover 3db of as much as 6db of system gain that would otherwise be lost due to narrowbanding, itself. When purchasing such kits, the system owner must ensure that the third party source has secured the appropriate FCC approval to alter the configuration of these previously FCC type approved radio devices.

The narrowbanding of older equipment may have the downstream effect of requiring more aggressive maintenance, particularly for those sets using compensated crystal-oscillator packages termed ICOMs. When originally manufactured by General Electric, ICOMs and crystals were temperature compensated as a package to meet FCC stability requirements (see the TCS website for more details).

Changing only the crystal within an ICOM is likely to upset the temperature compensation balance and result in unwanted frequency drift. If the temperature within the base station site is well maintained to a set temperature, say 72 degrees, then frequency drift after initial equipment warm up will be slow and manageable.

If, however, the equipment is likely to see large temperature excursions (as is typical for unheated/cooled buildings during winter and summer months), then all bets are off and large amounts of ICOM frequency shift are possible. Frequency drift for receiver ICOMs means a loss of effective receiver sensitivity, reduced range and the potential for increased interference reception from adjacent channel systems. Excessive transmitter frequency drift, particularly in a narrowband environment, unfortunately could result in interference to other licensed radio systems and gives rise to the potential for FCC fines.

Technically speaking, if the ambient temperature within equipment shelters can be held within reasonable limits (i.e., 70-75 degrees year round) and a few more service calls than normal are thrown into the equation, it is possible to breathe continued life into obsolete workhorse base/repeater station equipment.

Yet, when given the choice, what public safety agency would knowingly embrace radio gear that was first designed and manufactured before the advent of cellular telephony and the home computer? Or, worse, is passed up by radio amateurs at the Dayton Hamfest for pennies by the pound?

700MHz BROADBAND: LET PUBLIC SAFETY RULE, NOT SPECIAL INTERESTS

We all have been following the progression (if you’re into watching grass grow) of House and Senate bills relative to assigning D-Block 700MHz spectrum to Public Safety. Agencies across the Nation desire a combined 700MHz wideband and new D-Block spectrum allocation, which is necessary to construct a private, secure and environmentally hardened broadband data/video network specific to public safety needs. But, linking broadband legislation by either the House or Senate to a forced elimination of narrowband 700MHz trunked voice radio networks is just plain dumb.

Continued next page
While some pure 700MHz trunked radio networks exist (i.e. the State of Louisiana), the majority of 700MHz voice channels are being used to expand existing 800MHz radio systems. In many areas, the currently licensable 700MHz voice channels are a godsend in relieving congestion and loading on established voice radio networks. With the widespread availability of user radios capable of both 700/800MHz operation, coupled with the final 800MHz Rebanding band plan that effectively merges public safety 700/800MHz voice spectrum resources, any proposed legislation that eliminates 700MHz narrowband voice operations would be self-defeating and a major step backward.

Many agencies have invested vast sums into 700MHz narrowband technology and more dollars are spent each day. The State of Louisiana, for example, has over 60,000 user radios operable on its statewide 700MHz voice network. Congress’s action exposes Louisiana to potentially eating a $130,000,000 user equipment investment (not to mention the $200M+ in 700MHz tower site infrastructure) and for what? Play this out in other states and regional settings and the numbers and angst is staggering.

Finally, who actually believes the broadband crowd will conjure up rugged and reliable broadband/PTT-like devices anytime soon? What standards exist that would provide for comparable facilities (using a term we in 800MHz Rebanding know all so well) with respect to functionality, audio quality and coverage? What about the less visible issues such as Factory Mutual’s move last year to rationalize the power levels of land mobile radios that are operated by fire departments in hazardous environments (see any Factory Mutual green labels on those iPads??).

Fact is that broadband technology will eventually evolve where it will be possible to integrate Project-25 voice features onto handheld broadband devices...but when? It certainly isn’t anytime soon and, given the FCC’s originally-advertised position that 800MHz Rebanding could be accomplished in three years, Congress’s thoughts of public safety broadband being viable nationwide within ten years seems patently disingenuous.

If one spends any time listening to C-SPAN, it becomes apparent that legislators pushing these take-away/give away bills have no concept of the issues, technologies or the value of existing land mobile radio resources allied to public safety. Which begs the question: who’s calling the shots?

Once again, follow the money.

VHF/UHF NARROWBANDING...TIME IS FAST RUNNING OUT

By the time this issue of Backscatter is posted, there will be less than one year remaining for agencies to comply with the FCC’s Order to narrowband VHF/UHF radio systems licensed under Title 47 Part 90. If your agency has radio systems operable between 512MHz and 150MHz, it is potentially responsible for bringing those systems in to regulatory compliance.

The TCS website has information specific to the Order and how it can adversely affect analog radio operations. In a nutshell, narrowbanding does nothing positive for an analog radio system except to bring a higher degree of technical attention to issues such as noise sources and co-channel or adjacent channel interference that could be degrading radio network performance. Most analog radio systems, when narrow banded, will see a net decrease in coverage performance. Fortunately, these shortfalls can be overcome through more advanced antenna systems, new tower sites or technology such as receiver voting.

The important thing, though, is for agencies to get started NOW. The FCC is serious about enforcement of its narrowbanding order and the hammer will fall on some. Make sure your agency isn’t making TV headline news...the wrong way. Not sure what to do? Call or e-mail the TCS consultant nearest you as the first consultation is free.
The United States Government has printed billions of dollars and thrown it at banks and special interests believing we could print our way to prosperity. Sadly, it hasn’t happened quite as planned. Banks have hoarded cash and have made lending a bad word—at least with respect to small business and the shrinking middle class. Studies have shown that major corporations are standing by, with loads of cash on hand, waiting, it seems for someone or something else to start the economy rolling in a big way. In other words, caution is the keyword and with in growth in the US economy is shallow at best.

Sadly, it seems like people are waiting for the other guy to make the first move…take some risk. Somehow, we need to induce people and corporations into spending their money to make a brighter future for all of us. The key is for major corporate incentives specific to research and development. Not, just throwing newly printed money into the mix, but by providing strong incentives to make cash-flush corporations dig into their own wallets.

No one likes being taxed, and most everyone with money (or who prefers to keep some of what they have) is less than eager to throw caution to the winds. But, when faced with the alternative of forking over great sums to our friends in Congress and allowing them to spend for us or spending it ourselves through reasoned decision making and potentially enjoying a downstream profit, what business manager, entrepreneur or garage shop inventor wouldn’t go for the latter?

It takes money, guts and people to innovate new products. The garage inventor invests sweat equity and savings to stumble into the next great idea…from Pet Rocks to a ground-breaking technical innovation.

Likewise, major corporations can direct engineers and scientists to refine old or new processes to yield greater discoveries. Endeavors such as these represent costly risk. But with successful innovation there soon follows manufacturing and support industries to bring new products to market and service related jobs (sales, marketing, software/hardware maintenance) to ensure each new product or idea achieves widespread (profitable) acceptance.

These sorts of activities require people and that should be our most immediate, accelerated goal: get people thinking, innovating and investing in ourselves to bootstrap our own economic well-being. In theory, stimulus dollars should do this. However, it is clear to see that if a guy (or company) finds money on its doorstep, one has the far too attractive alternative to simply put it in his pocket and go whistling away.

Now that the Great Recession has taken a breath, the United States Congress and the Administration should consider looking toward ways that turn the fiscal tables and make digging into our collective wallets a far more attractive option. Which “wallets”? How about those overseas wallets that house corporate profits to escape US tax law? Amnesty for Investment might do the trick. Or the wallets in the form of factories and sweat shops in foreign lands that circumvent fair US labor rates and the protections that actually safeguard the health and well-being of Americans? Federal corporate tax relief or real estate trading in step with a return of service and manufacturing jobs to the US might too precipitate a needed incentive. A layered plan for tax credits that tracks R&D investment could likewise provide fiscal fuel to offset the risks associated with bringing new technologies and ideas to market.

Developing innovative “carrot-stick” strategies that genuinely encourage aggressive investment into research and development by corporations and individual business owners, large and small, is what is so sorely needed. And these new incentives must benefit not only the business sector whales but also the smaller fish as small business is the fabric of America. Well-fed small fry can potentially morph into new, profitable whales. Capitalism and the US economy must provide an optimized, level playing field for both ends of the business evolutionary cycle.

An employed middle and lower class requires far fewer social and support services from government. People that are working 40+ hours a week and attending classes (corporate sponsored or through private funds) to climb the corporate ladder generally don’t populate prisons, buy drugs or tear apart neighborhoods or families. Encouraging personal investment in current business and expediting development of tomorrow’s technologies are key steps toward breaking the nation’s cycle of poverty and growing the economy.
HOW TO GET HIGH QUALITY RESULTS USING AEROSOL SPRAY PAINT

The weekend do-it-yourselfer seems to always find a small project needing a decent coat of spray paint to finish things off. Yet, few really master the art of aerosol spray painting and the results are generally less than spectacular...often found discarded in garbage cans, preceded by vigorous curses and major high blood pressure spikes. I know...I’ve been there and figured there must be a better way. Through many years of successfully refinishing small parts and projects for my British sportscar and ham radio hobby, the time has come to describe what works for me and the pitfalls to avoid that seemingly result in 100% failure.

A decent, near spectacular paint job can actually be achieved using high quality aerosol paint products but it takes attention to small details. And, you must keep matters in their proper perspective. Aerosol can spray painting is designed for small jobs. If the item you wish to paint is larger than 2 cubic feet, consider using a true compressor/spray gun rig or having the job done by a professional powder coating firm.

Why? Well, for one thing the human index finger is not designed to modulate the can’s little spray head to the degree necessary to paint large objects....your finger simply gives out after long spray sessions! And, per square-inch of finish, aerosol spray painting is costly compared to systems designed for high volume painting. So, be realistic with respect to the desired end result. Every town has a guy who has tried painting his fishin’ car with a crate of spray cans...and the result smells up the highway. Don’t be that guy.

Now, here are the steps I recommend, based on the Tusa School of Hard Knocks:

- The surface to be painted must be thoroughly cleared of all old paint. That means paint strippers, sand handling or the best paint/ funk removal method of all: glass bead blasting. Once you have a bead blaster in the home workshop, you’ll wonder how you did anything without one. They are great and can leave the project’s work surface rust free and absent of all old paint. This step is necessary to ensure the new paint does not chemically react with the old and cause lifting, wrinkling and other blemishes sometimes called fish eyes (for their general appearance).

- Once the initial sanding work is done, clean the surface thoroughly with a clean rag moistened with paint thinner (I normally use lacquer thinner) and the follow up with a tack cloth. This will remove small dust particles that, as small as they might seem, look like mountains in the shiny finished product. Dust related blemishes always ruin an otherwise good paint job. Be clean and tidy.

- Now, we’re ready to paint, right?? …Nope, and here comes one of the major steps many skip over and cry about later. The surface should then be prepped with a sandable primer that is chemically compatible with the finish paint. Sandable primers are designed to fill small surface blemishes in the item, which would otherwise stand out like sore thumbs after the finish paint coats are applied. Once the primer dries, usually within 30-45 minutes, sand the surface lightly with 600 grit wet/dry sandpaper. Try not to sand through the primer coat, but if this happens you can simply spray on additional primer and repeat the sanding operation.

- Again, clean the primed surface thoroughly to remove all dust and sanding particles as you have now reached The Moment of Truth: Finish Application.

- Before doing anything next, again survey your painting work space. It must be clean and absent of particles that could be blown onto the painted surface while spraying. Next, make sure the spray paint can is a normal room temperature (70 degrees). Ideally, the work surface should be at a higher temperature. I often use work lights trained on the project or a few minutes in the trusty electric oven at 150 degrees to get it warm to the touch. DO NOT use a gas oven to dry freshly painted objects…unless you really don’t like your home. Paint fumes are flammable and open flames must be avoided, ALWAYS.

- When spraying, it is important to always keep the can moving and not stay trained on any one spot. In fact, I generally spray from left to right in overlapping passes. Continue spraying a little beyond the object as you pass left to right and always release the paint spray button when you change the direction of movement. This is a good habit to learn as it prevents piling up paint in a single spot….a sure-fire way to get a paint run and a totally ruined job.

- Make sure the first finish coat is light and even. Let it dry for about ten minutes and then apply two more coats. This is not a one shot process and any attempt to load on paint to skip a few finishing layers results in paint runs, sags or a host of other artifacts that negate all of that hard prep work. Recovery after a paint-run means going back to Step One, so concentrate and plan your work before doing anything!

- If possible, speed the drying process by using heat lamps or an electric oven. The longer a painted object “flaps in the breeze” to dry, the greater the opportunity for a nasty, ten-legged bug to land onto your wet, mirror-finished paint job. That’s when the screams of anguish generally crank up for me. The oven’s temperature should be in the order of 150 degrees. An hour of baking is sufficient and the added benefit is a truly hard, durable surface.

If you follow these steps, a high quality aerosol paint job can be yours…one that makes your project look first class, professional and the envy of your neighborhood’s do-it-yourself crowd. Yes, there are many steps and a zillion pitfalls to avoid, but once you get the hang of it the whole process quickly becomes second nature.
As the United States Congress continues to play political football with the 700MHz D-Block allocation for an interoperable broadband network for the nation’s public safety first responders, the Mexican drug cartel apparently solved its own interoperable communications problems of sorts. Just this week, it was reported by the Associated Press that the Mexican drug cartel known as the Zetas successfully constructed a radio communications system throughout most of Mexico’s 31 states and parts of northern Guatemala.

The cartel radio network was designed by Jose Luis Del Toro Estrada, a communications expert in his own right and coincidentally a cocaine distributor tried in a Houston federal court two years ago. The amazing thing is that the network was largely constructed in 2006 and apparently went undetected for many years.

Now, bear in mind, we aren’t talking about a collection of CB radios. We’re talking hundreds of repeater systems, towers, solar powered repeater sites, thousands of user radios and, get this: encrypted voice communications. (You think they had problems with co-channel interference?…if so, not for too very long!) The radio network allowed the cartel to steer clear of traditional cellular telephony, which should have been a pretty obvious clue something was up.

According to the AP story, the drug boss in each drug smuggling area was responsible for deploying the necessary towers and radios to support local operations. Perhaps the one valuable take away from this sad tale is that their radio system…one that truly met user needs…was quickly and efficiently deployed not from the top down but on a local level. Maybe we should take a step back and reconsider how to best field a nationwide radio network, on time and on budget.

RESURGENCE OF AMATEUR RADIO

It seems every ten years for the past seventy, people are quick to predict the demise of amateur (ham) radio and they continue to be 100% wrong. Just last month, it was announced that amateur radio in the United States had grown to 700,000 members…the largest number in our history. Worldwide, that number is in the millions and continues to grow. Why is that? How can these dire predictions fall flat every time?

The reason, I believe, is because ham radio has never been a static one-dimensional hobby. It evolves with the advances in electronics and communications technology. Often, its hobbyists have developed and refined technologies the World takes for granted. To most of the non-ham public, all an amateur does is stay camped out in front of a microphone or telegraph key and talk about nothing to strangers. Yes, the purpose of ham radio is wireless communications, but it has gradually morphed into a wide range of communications technologies involving voice, data and image transactions.

And, these modes are accomplished through a host of new and emerging methods and that are key to the hobby’s success: a continuously growing landscape for communicating wirelessly with others.

Need examples? Packet data…the mainstay of public safety’s mobile data computing…was perfected by amateur radio operators in the 1970s and 80s. The ability to transmit video on narrow voice channels was likewise perfected by amateurs in the late 1950s.

Parents should encourage their children to think, and ham radio is a thinking person’s hobby. There is always something new to learn and the radio spectrum available to licensed amateurs is a tinker’s paradise. Sure, it takes a bit of study to become an amateur radio operator and to earn an FCC license. But, people from all walks of life and every age group from 8 to 80+ have earned the right to become a ham.

Why not you??
The die is cast and the deadline set: January 1st, 2013. By then all VHF High Band and UHF radio systems governed by FCC Part 90 must have been converted to 12.5KHz bandwidth equivalency. The penalty for non-compliance is onerous: Fines of $16,000 per day, per frequency and potential revocation of license.

The FCC recognizes that unforeseen circumstances could affect the completion of a licensee’s narrowbanding efforts and has recently established a process for securing a waiver to extend a project’s completion time window. Each licensee’s situation is uniquely different and specific criteria must be met to become waiver-eligible, therefore the application’s approach must be individually crafted to one’s set of circumstances.

If you envision difficulty in complying with the FCC’s Order, you’re invited to contact us at waiver@tusaconsulting.com and one of our radio consultants will be pleased to offer advice and assistance.

The initial consultation is free, so contact us today for more information.

TCS HALL OF SHAME. BATTERY BACKUP, SECOND TO NONE

Every remote transmitter site will eventually lose electrical power. In a thunderstorm with high winds, tree branches are most likely to fall onto utility lines and there is no place more remote than some narrow gravel road leading to a radio tower site. In order to ensure reliable radio service, battery backup is often employed. Sadly, there are battery backups and then there is this:

That poor battery plant looks like it was installed in the 1960s! When given the TCS acid test (pulling the AC plug), it dutifully kept its repeater station on line approximately one-millisecond.

By comparison, here is what a real battery backup system looks like:

On another note, we continue to find new and inventive ways in the field for supporting 7/8” Heliax transmission lines – the Frigidaire air-conditioner!