CHAPTER 14

630M TRANSMIT/RECEIVE (T/R) AND OTHER CONTROLS FOR YOUR STATION

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5/21/16
KEYING A RELAY: DIODE ACROSS BUG TERMINALS SUPPRESSES BACK EMF
John WG2XIQ reports: The combined pair of keyed CW amps did well this morning but I found that the bug needed a bit of adjustment and contact cleaning. Because I am keying a relay whose contacts present simultaneous contact closures for each of the amplifiers, there is a back-EMF generated when the relay coil opens. The spark on the contacts has resulted in residue deposits which resulted in erratic keying during today's sked. After completing the sked I spent an hours making adjustments, cleaning contacts and testing a diode across the bug terminals to suppress the back-EMF. It seems I was successful and only further on-air testing will determine whether further work needs to be done. Keying the relay changed the character of the bug keying that I had grown accustom to so there will be another readjustment period to the new parameters.

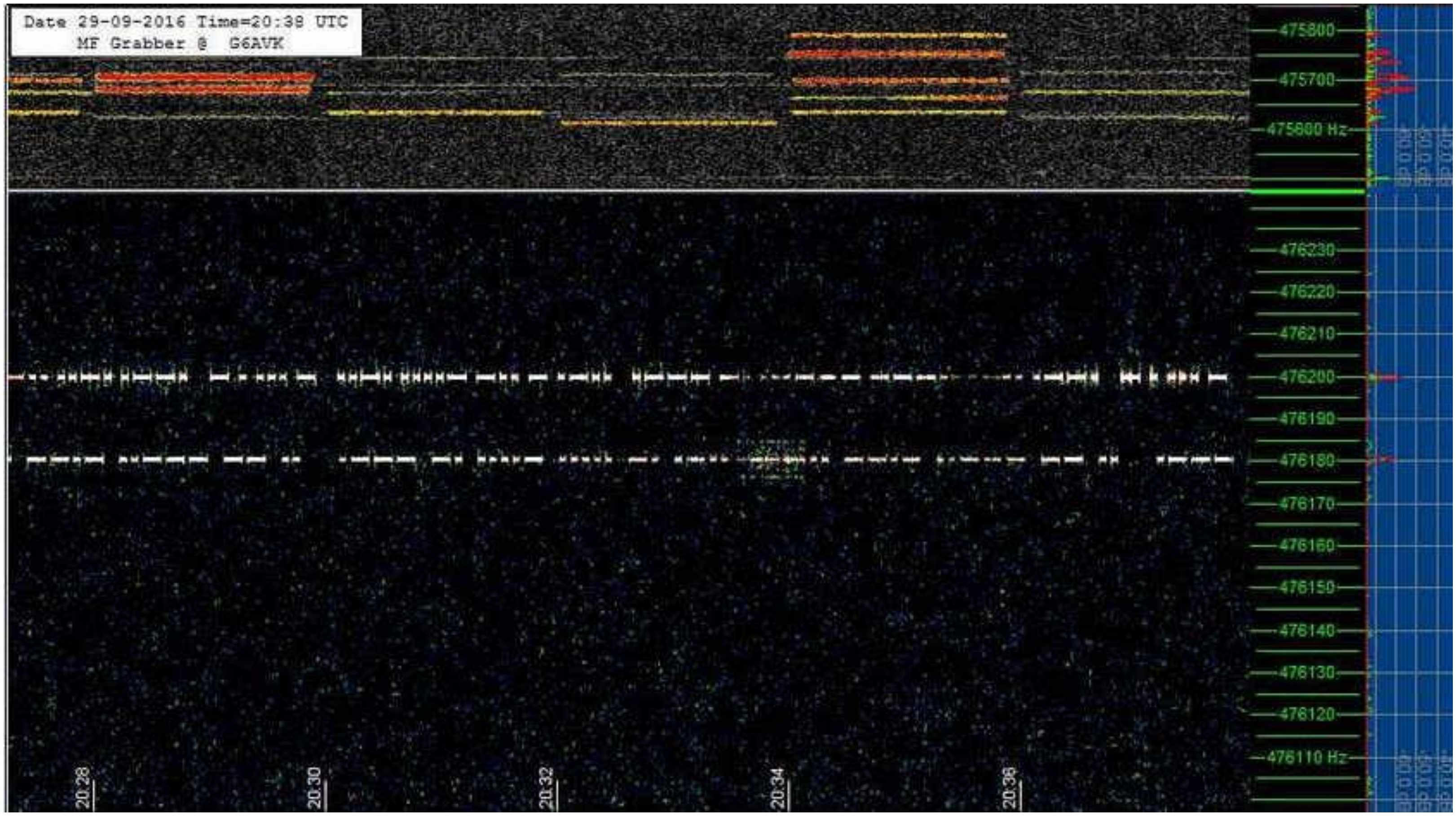
1/30/17 TRANSVERTER: EASILY RX WITH TX ANTENNA
Doug, K4LY / WH2XZO, reported a big night as well with these comments and assessments of his receive system: "Conditions were quite good. I used my TX antenna for RX all night for the first time ever. With my previous transceiver to amplifier set up, I needed a relay in order to use the TX antenna for receive, and I never did that. With the transverter you can easily RX with the TX antenna, but need a relay for an additional RX antenna, if your transceiver exciter doesn't provide for that.

…with all the work I've put into my Delta and Kaz receive antennas, my TX antenna works as well or better on receive! Last night a near record 53 decoded XZO. XZO, however, decoded a record 19, including 3 VE7s. We'll try the TX on RX again tonight."

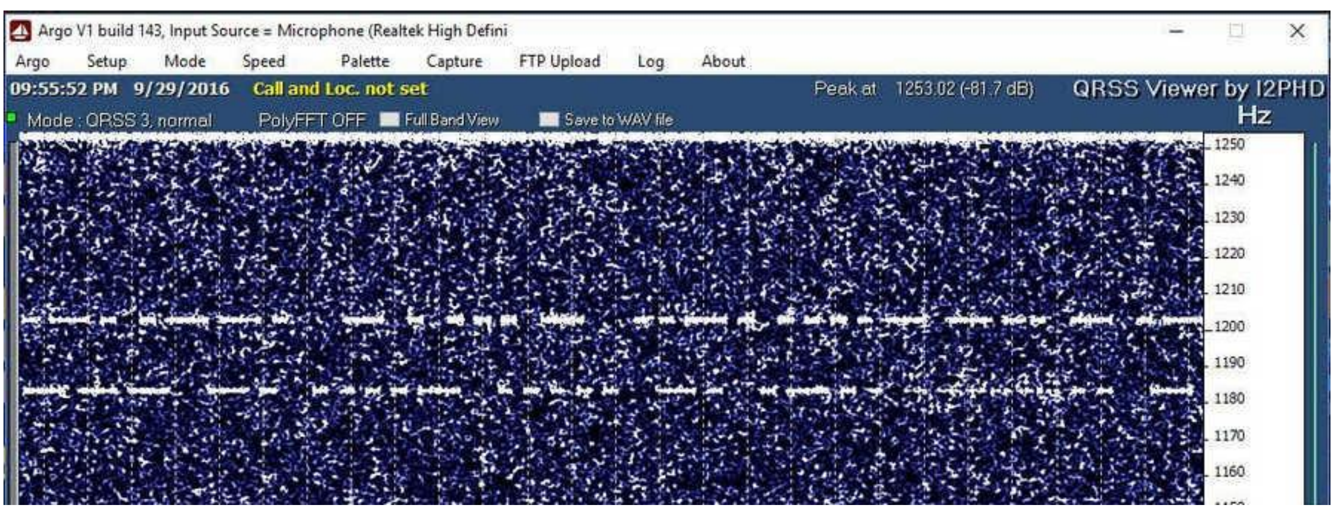
9/30/16 DIRECT DIGITAL SYNTHESIZER AND ARDUINO CONTROLS, NO PC
Nicolas, F4DTL, operated a CW beacon overnight with good success. He offers the following comments on the RSGB-LF reflector:

> "Hello all, I'm testing my new automatic beacon this evening. **476,200 QRSS3 50W** Built in a small size (in a old CB Midland 4001) power by 2x **IRFP450A**. The **frequency and the key are piloted by DDS and Arduino** inside. **No PC** only 24V and my antenna."

He received a few reports and screen captures which follow:



F4DTL, as reported by G6AVK



F4DTL, as reported by G3WCB

Tom, DK1IS, reports “2045 UTC: good audible reception here in JN59WK. **Rig: remote Perseus with active whip,** your signal -113 dBm resp. S4, SNR = 17 dB”

Stephan, DK7FC, had the following comments about the recent activity of RN3AGC on the RSGB-LF reflector:

“**RN3AGC** is now RXing on MF, having very good results. I always thought the path to Moscow is extremely hard to cross on MF but the results look promising for many stations.”

RN3AGC session WSPR activity

2/7/17 HF/160 STATION AT K4RO

http://www.k4ro.net/k4ro/station_tour/k4ro_tour4.html (scroll 2/3)

11/8/16 QSY, T/R, QSK: THREE SPECTRES HAUNTING 630M

At the risk of perhaps overdramatizing-- QSY, T/R, and QSK are indeed three subjects that may make you think of uncomfortable or even frustrating experiences, depending on your 630m station setup.

As we know, WSPR calls for 110 seconds of full transmit power and JT9 runs the TX 50 seconds at a time. CW is perhaps somewhat less intensive, but can still be demanding on the transmitter, and one generally QSYs to do CW and JT9 away from the WSPR band.

Antenna system/ground resistance may consume 20 times as much 630m TX power output compared to a few watts of actual 630m EIRP, given the usual electrically short 630m transmit vertical. So, any departure from perfect 1:1 SWR can be thermally hard on your TX power amplifier PA. Even 1 KHz of QSY on 630m can significantly move SWR away from a perfect match.* To restore the match upon QSY calls for adjustments that can be inconvenient in the middle of the night when you want to concentrate on a potential CW contact.

T/R of course refers to the changeover from transmit to receive. With an HF transceiver connected to a single HF antenna, T/R can be nearly effortless. Depending on your 630m station setup, on the other hand, T/R may involve switching at one or more stages in the transmit chain, antenna direction switching, detuning/undetuning an RX antenna, and perhaps switching a preamplifier and switching in the receive chain too. Configuring WSPR or other mode control software beforehand may also be involved. From a hardware point of view, T/R may involve a bunch of miscellaneous switching, cabling and relay infrastructure at your station.

Full break-in, or QSK, means you can hear another station, or at least the band noise, between your CW dahs and dits. QSK is T/R on steroids: QSK ratchets up all the demands on station design mentioned above.

QSY, T/R, QSK: Tell us what you do to keep those three spectres from haunting your 630m station!

* See illustration and discussion at http://njdtechnologies.net/big-action-in-pacific-we2xpq-jh3xcu-jh1inm-je1jdl-vk3elv-wh2xcr-vk2xgj-jh3xcu-ja1nqi-2-trans-atlantic-path-yields-reports-between-new-england-and-dk7fc-wg2xsv-kl7-as-jt9-beac/

11/09/16 CONVERSATION ON 630M T/R RELAYING…AND FULL POWER 630M QSK?

Jim W5EST: Among the convenience challenges of ham/Part 5 MF, some standouts are T/R, QSY, QSK, and 630/2200m band switching. Lots of station-specific details! Solutions that would be applicable to many very different kinds of stations could enhance the appeal of MF in those countries that permit MF transmissions by their operators.

John WG2XIQ: Even with all of the station differences, the usual HF descriptions of T/R and QSK are based on some commonalities between these types of stations:

1) A **transceiver** with probably internal **pin diode switching** is used and the sequencing is handled there. 2) **Keying of an amplifier** often controls keying the exciter. But sequencing may be poor, damaging amps and exciters. 3) With external RX antennas one might use a **transistor circuit to suck RF from RX antenna line and switch in attenuation** to protect the receiver from RF. If a rig lacks this RX protection, you need a properly **sequenced relay** to open up. Back-to-back diodes produce IMD problems, so avoid them.

Jim W5EST: Phil AD5X in Texas is probably thinking of HF, but might his web site help 630m to use his boat anchor QSK circuit designed for separate vintage 100-200w TX and RX? http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=7&ved=0ahUKEwjvsJO__4fQAhVD5iYKHUUzAwcQFghEMAY&url=http%3A%2F%2Fwww.ad5x.com%2Fimages%2FArticles%2FQSKBArevA.pdf&usg=AFQjCNEIjmc99hw1zuCurvlQgrSQ3ADaiQ&bvm=bv.137132246,d.eWE In his website, two OMRON signal relays are associated with delay circuitry. Would they work for 630m T/R but have to be redesigned for 630m QSK?

John WG2XIQ: Every implementation is different. Low band stations are vastly more complicated because of things like **receive antenna**, **detuning transmit antennas**, and amplifiers. **Active RX arrays** sometimes have their preamp power switched off between transmit cycles. **Rig receive antenna port protection** may be solid state or mechanical...As you can imagine, the sequencing has to be right.

Am I using an active RX antenna array? Does an **RX antenna preamp need to be switched off** between TX cycles? If yes, sequencing is needed.

If I am using separate TX and RX antennas, I need to **detune the TX antenna on receive** to prevent noise coupling and pattern disruption. For QSK I will have to use a very **fast relay** at the antenna feed point to accomplish this switching of the detune circuit. **It has to be right 100%** of the time or I am going to dump X watts into a mismatched load. On 630m, my FET amp would fail immediately--no room for another chance. Big tube amps are more forgiving when running legal limit.

Not many low band CW ops run QSK because of the complications I mentioned. A lot is required to get things right, and it has to be right 100% of time because there is a lot of money potentially at stake. Some guys still do it and they make it look easy. I'm not risk tolerant enough.

That first web site's relay delay idea above is nice IF you are only trying to deal with an interface between a transmitter and a receiver. If you have systems that have keying relays as state changes at the transceiver, that's going to seriously cut into your keying time budget. On 630-meters not many are are simply using a separate TX and RX and listening on their TX antenna where the relay system could work.

I use separate RX and TX on 630m CW but I have **relays and contactors controlling one another along the RF chain**. I use a **foot switch** to get everything to line up.

Jim W5EST: I'm also interested in blogging an uncomplicated solid-state 630m QSK solution. Don Huff W6JL's solution for a 550w station is based on four 1N4007 rectifier diodes. That's the simplest PIN T/R circuit I see on the web so far. T/R isolates the always-on RX by -100dB on transmit. Scroll 30% for the photo and T/R schematic at p.10:
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwjN9szOmojQAhUF8CYKHSUdA6YQFggjMAE&url=http%3A%2F%2Fcbjohn.com%2Faa0zz%2FPPLLUsers%2FW6JL%2FW6JL.pdf&usg=AFQjCNGa7f4Jpm72uoAxtl5Bl1T-Zk8xJg&bvm=bv.137132246,d.eWE

John WG2XIQ: That solution is nice, and the time budget probably gets better with lower time to state change. Just keep in mind 630m may need down-line switching on the RX antenna system and in the transmit chain and to TX antenna. So a T/R isolation solution gives you a piece of the puzzle, and you have more to do to control a whole 630m station.

Jim W5EST: Lastly, another web site tells about click/pop/TVI problems and QSK in message traffic-handling: http://qrqcwnet.ning.com/forum/topics/1993813:Topic:2221 .

John WG2XIQ: The click problem is a BIG issue. Poor makes and breaks get really hard on amps and anything that can receive the signals like TVs, radios, anything... Poorly switched vacuum relays will generate tons of harmonics. A sequencing problem with a detune process can radiate up the band too.

So I guess if you have a simple system with minimal peripherals, you could make many options work. Probably multiple pin diodes along the way can be switched quickly. I've seen microwave pin diode switches in the lab change state 10,000 times a second. That speed is way superior to a mechanical relay. But there is overhead in making pin diode switches work.

If 630m QSK were easy, more guys would do it. Lots of pieces have to work all the time and can be difficult to troubleshoot. Few 630m ops run QSK at full power. We need schematics of station successes at this.

Jim W5EST: Any closing remarks you'd like to give us?

John WG2XIQ: I really love QSK CW but only run it on HF when I don't need the amp. I can't run it on 160m if I am listening on RX antennas because of the detune requirement to prevent noise coupling. But it's ok when listening on the TX antenna--if TX antenna is not useless due to noise and crud as at my QTH on 160m.

My backup MF Solutions board for 630m has the receive pass-through option. So it's solid state switching, and I have run it directly to the TX antenna using QSK. It works fine but it's only 25w TPO, better for talking around the area/ regionally.

We can aspire to 630m QSK so long as we recognize the challenges and deal with them intelligently and economically. It's state of the art to achieve 630m QSK at full power!
To our blog readers: Tell us your experiences and tips on these topics—T/R, MF band switching, QSY, QSK. TU & GL!

11/10/16 PUTTING A MILLISECOND MICROSCOPE ON 630M T/R AND QSK

Today I dig deeper into yesterday's blog dialog about T/R relaying and the question of full power 630m QSK.

Regarding vacuum relay harmonics and radiating up and down a band, it was assumed that the relay is mistimed so that it cuts out a tiny fraction of a second before CW transmit power is truly off. The sudden power-off transition would cause a very hard key click that has a lot of wideband or spurious frequency content.

I think the most basic question at hand is whether 630/2200m CW QSK at full power is important enough in the first place to justify your efforts to achieve it. For **short to medium distance ragchewing and traffic handling, try for QSK--** I think there's a lot to recommend it. Moreover, low-power 630m QSK, while not totally simple, is within many ops' capability.

For long path work, **I think a station without QSK could "surf" 630m QSB by transmitting for 5-10 seconds and listening for 5-10 seconds and capture most long path QSB fade-up wave-swell opportunities for QSOs**.

That said, amateurs and experimenters are nevertheless a hearty and hardy bunch of MF/LF mountain climbers, and full power 630m CW QSK is an interesting and challenging mountain! So let's dig deeper into QSK with a "millisecond microscope."

How long does it take for CW transmit power to turn truly off at a 630m transmit station? Here goes my take. If you have better wisdom, let us know.

The CW transmitter itself may have shaping circuitry to "soften" off-on-off transitions and minimize key clicks. For instance if an on-off transition takes up a fraction **k ~ 1/10, one-tenth** of a dit-length or space, how much is that in milliseconds? Back of envelope, I'd guesstimate about **6 milliseconds at 20 wpm**. (See endnote.*) Since the CW transmitter would be applying power during those 6 milliseconds, one could only do relaying and transitioning to RX sometime after that power had ceased. Even at lower WPM, you'd probably still want that 6 ms amount of transition time.

Besides keying waveform shaping inside the CW transmitter, the TX antenna system involves an RLC network including the antenna tuning unit ATU, vertical antenna inductance and capacitance, and antenna resistance and grounding system resistance. That RLC network has a quality factor Q that tells us the ratio of amount of RF energy in the system divided by the energy dissipation in each cycle.

Unlike HF, a **630/2200m TX antenna system has much higher Q than an HF antenna**. When the transmitter turns off, a 630/2200m TX antenna system "rings" with RF energy for a significant length of time. How long is that? I estimate for purposes here that a **typical 630m TX antenna rings for roughly 2 ms**.** Trying to turn on the receiving system during this time would risk a lot of extraneous QSK popping noises in the receiver. That means you probably need about 8 ms (i.e., 6ms + 2 ms) on 630m not only to get the TX transitioned off but also to get the antenna system energy dissipated.

At this point, T/R circuitry should start detuning the TX antenna, begin undetuning the RX antenna, and commence exposing any preamplifier and the receiver itself to the RX antenna. All those operations can ideally be performed timewise in parallel or nearly so. Suppose that process takes perhaps another 10ms, which is probably over-optimistically brief, but remember I'm looking for a theoretical low amount.

From the instant a dah or dit ceases, it evidently hypothetically takes 18ms (i.e., 6 + 2 + 10ms) to get T/R accomplished on 630m. Presumably one's ear subsequently needs significant time to auditorily sense whether another station is present, which probably takes at least roughly 40 ms. Then to get the next dit or dah started will take still another 18 ms of T/R time reversing all the steps. I'm guessing about 76 ms (i.e., 18+40+18ms) is needed for the CW spaces if a 630m station is doing full-power QSK, full break-in.

Bottom line: I deduce an **upper WPM limit for 630m CW full-power QSK to be about 15 wpm**.*** This result suggests that **630m CW full-power QSK up to 15 wpm is not impossible**, even though it may be difficult to achieve.

On 2200 m the T/R delays would exceed those on 630 m, due to longer-duration of antenna ringing, so I'm guesstimating **10 WPM 2200m CW full power QSK** is probably the maximum achievable QSK code speed on that LF band.

Please **do not rely on these guesstimations** if you are putting your own TX/RX station design on the line with 630m or 2200m QSK. Do your own calculations and test with measurements at greatly reduced power first. Compare your wisdom with the most relevantly experienced operators you know.

What do your experience and knowledge tell you? E-mail us so we can blog the best wisdom!

*Note 1: I worked from a click bandwidth guesstimate in Hertz $\Delta f \sim 1/(k\Delta t_{dit})$. Substitute **k~0.1** and Δt_{dit} (sec) ~ **1.2/WPM** to get $\Delta f \sim WPM/0.12$ Then at 20 wpm, the dits (and spaces) would be **60 milliseconds** in duration, and **soft clicks ~170 Hz wide**. Suppose **on-off transitions 6 ms** (1/10 of 60ms). http://www.rfcafe.com/references/qst/why-key-clicks-october-1966-qst.htm (scroll 40%). http://www.eham.net/ehamforum/smf/index.php?topic=8534.0;wap2 ; and https://en.wikipedia.org/wiki/Morse_code (scroll halfway).

** **Note 2**: Δt_{ring} **(ms) ~** $(Q/2\pi f_{KHz})\ 0.23$**(TPO dBm – RX acceptable dBm).** With antenna/ground system Q ~ 100 at 475KHz, I estimate for example 200 watts TPO (53 dBm TX power output) and guesstimate acceptable RX dBm at -110 dBm by the time the TX antenna ringing decays.

$\Delta t_{ring} \sim 1.2\ ms = (100/2\pi\ 475)\ 0.23(53 + 110)$, which I round up to 2ms.

The above formulas are based on a conversion from dBm to power and use an energy dissipation-per-radian definition of Q: https://en.wikipedia.org/wiki/Q_factor (scroll 25%). See also:
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwiCgfbR5JnQAhXJYyYKHSfVBBEQFggiMAE&url=http%3A%2F%2Fwww.ece.ucsb.edu%2Faculty%2Frodwell%2FClasses%2Fece218b%2Fnotes%2FResonators.pdf&usg=AFQjCNGUfO4C3CIDEmsFBwdTKTIn2lBySg Based on Q, I write a declining energy equation $[1-(2\pi/Q)]^N = [10^{0.1\,(-110dBm)}]\,/\,TPO$**.** Cautiously, the **equation imagines the full TPO dBm of the undetuned TX antenna must dissipate to -110dBm before undetuning the RX antenna that's in the near field.** The equation left side closely tracks an exponential function (e^{-x}) , so I convert the right side to exponential form by using **0.23**. Solve for N, the number of RF ringing cycles needed to dissipate TPO RF from the TX antenna system down to RX acceptable dBm. Period (ms) of one RF cycle is $1/f_{KHz}$. Apply $\Delta t_{ring} = N \times (1/f_{KHz})$ to finally get the formula I stated first.

*** **Note 3**: If Δt_{dit} (sec) ~ **1.2/WPM,** then **WPM ~ 1200ms /** $\Delta t_{dit(ms)}$ **= 1200ms/76ms = 16 wpm**, which I round down to 15 wpm.

11/11/16 630M WSPR T/R AT WG2XKA

John WA3ETD WG2XKA in Vermont has put up a 630m TX vertical and several 630m RX choices. The base RF setup is a Yaesu FT-857ND transceiver,* homebrew RX converter with 5.0 MHz IF,** and a MF Solutions TX converter throttled down to 1.0W out. That 1.0W drives a 2X frequency doubler to the PA directly driving the vertical** with no switching.

The WSPR RTS signal,*** in advance of the tone, actuates a DPDT relay on an RTS board. One set of contacts actuates a large RX/TX relay that switches the Yaesu single RF port between the RX converter and the TX chain in advance of the tone.

The other DPDT contacts remove +12V from the RX preamp on the transition to TX. Finally, the tone from WSPR drives an external soundcard box with built-in PTT (push-to-talk) to the transceiver, which is now configured into the TX chain. No chance of a hot switch using the RTS or DTR*** signalling from the WSPR laptop, which prevents any "hot" switching overlap undesirably feeding TX RF to the RX. This lashup has worked well here with no burnouts, etc.

Since this is WSPR T/R, QSK full break-in is not the goal. Two relays fire in series (RTS relay and then main TR). Probably 25 ms elapses before the main T/R settles and insures the station is completely in TX mode before applying RF.

To our readers: We consider it a privilege to blog your 630m T/R, QSY, 630/2200m band switching, and QSK info. Sends us your info and/or photos!

*See manual at:
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiN-LWMgJrQAhVFZCYKHXL8CSEQFggbMAA&url=http%3A%2F%2Fwww.yaesu.com%2FdownloadFile.cfm%3FFileID%3D6105%26FileCatID%3D158%26FileName%3DFT-857D_OM_ENG_EH007M102_V2.pdf%26FileContentType%3Dapplication%2Fpdf&usg=AFQjCNGA-ob45fcql7MY5wGGkcUphYa9Pw&bvm=bv.138169073,d.eWE

**For converter to 5.0MHz IF: https://wg2xka.wordpress.com/197-2/ (scroll down one-quarter for PA scroll 2/3). See TX converter, scroll 2/3: https://wg2xka.wordpress.com/ See 630m vertical : https://wg2xka.wordpress.com/current-630m-vertical-info/

***See https://en.wikipedia.org/wiki/Data_Terminal_Ready and http://stackoverflow.com/questions/957337/what-is-the-difference-between-dtr-dsr-and-rts-cts-flow-control

11/14/16 GENERALIZED LF/MF STATION BLOCKS & CONTROL

The Nov. 8-11 blogs this last week featured T/R and QSY in station control, and considered the limits of 630m QSK. Also, we know MF/LF station control is diversely station-specific for now and probably will continue that way.

Today's **illustration** attempts to block diagram the high-level features of LF/MF stations generally, with central emphasis on station control. You may see station designs that depart from this block diagram by omitting one or more blocks or functions. But I think you'd agree that most LF/MF **stations mainly differ on several dimensions inside the blocks**: 1) their physical layout spread into or between the shack and outdoors, 2) the electromechanical or electronic way they accomplish their functions, 3) separateness or integration of various station elements, and 4) degree of manual control by operator versus automatic or computerized control.

Starting with the **transmit chain**, today's block diagram includes some means of developing LF/MF transmit drive whether directly or by some pre-existing equipment augmented with a frequency converter. Next comes a **TX power amplifier**, because LF/MF transmit antenna systems* are generally electrically short inefficient radiators that suffer a characteristically high percentage of ohmic losses in the grounding system plus some losses in the antenna tuning unit ATU and antenna itself. LF/MF top-hatted TX single verticals predominate, such as Marconi-T and inverted-L – while vertical arrays, end-fire TX antennas and large TX loops provide further interesting radiative players.

Between the TX power amplifier and the antenna system is situated a complex of shack based and outdoor circuits that I lump together as "**Post-TX**." These include the ATU, some means of detuning the TX antenna to promote effective reception, circuitry for detecting the state of matching of the TX power amplifier to the ATU, protective circuitry such as SWR trip, manual or automatic tuning/QSY control, and band switching between 630m and 2200m, if any. Post-TX also includes lightning protection,** even as simple as a manually connected base-mounted shorting bar to ground to contribute to station protection before and during a thunderstorm.

Turning now to the **receiving signal chain**, we see some kind of receive antenna which might be associated with an always-on grabber RX at considerable distance from TX but generally is not. Generally, folks locate their LF/MF receive antenna(s) in the near field – within one third wavelength from the TX antenna. That means that some not insignificant fraction of the TX antenna power is capacitively coupled between the antennas as illustrated, or inductively coupled (blue arrows), or both. Bidirectional or unidirectional RX magnetic loops are frequently used, thanks to their pattern nulls. Also, BOGs (Beverage on Ground), E-probes, and single or arrayed short verticals show up at stations here and there.

To handle or prevent unhappy TX-to-RX power coupling, a **Pre-RX** section of the station detunes and isolates the receive antenna on transmit, and then on receive efficiently couples or tunes the RX antenna and activates a preamplifier if a preamp is used. Like the Post-TX section of the station, the Pre-RX section may be concentrated indoors or outdoors or distributed between indoors and outdoors. Stations may run separate control lines, or deliver combined RF and control voltages on coax instead, or do wireless controls. Pre-RX noise canceling and control may be included in the system.

The Pre-RX section supplies signals to the main **Receiver**, which may be standalone or transceiver-based instead. The Receiver, in turn, provides audio for the operator to copy CW, and can feed one or more digital mode decoders for automatic reception too. Receiver functions are variously partitioned between hardware and software depending on your hardware receiver setup and any one or more SDR instances. Receiver imaging for waterfalls and curtain displays help us see band activity and follow QRSS.

Decoders can upload to the internet and update a WSPR2/WSPR15 database at a central server. Internet connectivity can screen-share your JT9 decoded information with other MF/LF stations. The Decoders section also includes an interface to permit remote control and protective commands to your station such as from a smart phone. "Meep-meep" heads-up signaling from ON4KST reflector is internet-deliverable. Operator notifications of propagation excursions and/or terrestrial storm conditions can be automatically given via internet.

Now we reach the **Station Control section**. Station Control in the past and primarily even now means the intelligent human operator. You manually control the station by adjusting tuning dials and actuating panel buttons, and by manipulating keyboard and mouse, and operating with a CW key and possibly a station control foot pedal. Voice control may also be used with care. Station control effectiveness and convenience are enhanced with various types of interlocks, relays or equivalent hardware circuits, software features, etc. Antenna rotation, antenna selection and/or antenna pattern control are further included in Pre-RX and Station Control.

In recent years we see increasing amounts of machine-based automation and machine intelligence*** applied in ad hoc modules or more comprehensively for the Station Control. Timing can start up and stop beaconing operations, change transmit percentage TxPct, and support station operations that adapt to band conditions as detected by Receiver and Decoders. Perhaps we will see some form of *automatic* retuning in **QSY Control** in the Post-TX section, if a station isn't already doing it!

At the other end of the automation spectrum, **some station strategies try to get rid of as much complication as possible**: Provide a receive antenna that needs no outdoor RX preamp. For TX and RX, do all their coupling and tuning indoors or as close to indoors as possible.^ Run the antennas at low enough efficiency (or low system Q) so that QSY involves no retuning at Post-TX or Pre-RX.^^ Do almost everything manually.

Tell us your techniques and solutions for various parts of LF/MF station construction and control. Send us schematics – elegant or ugly, sophisticated or modest – if you have them. We look forward to blogging them!

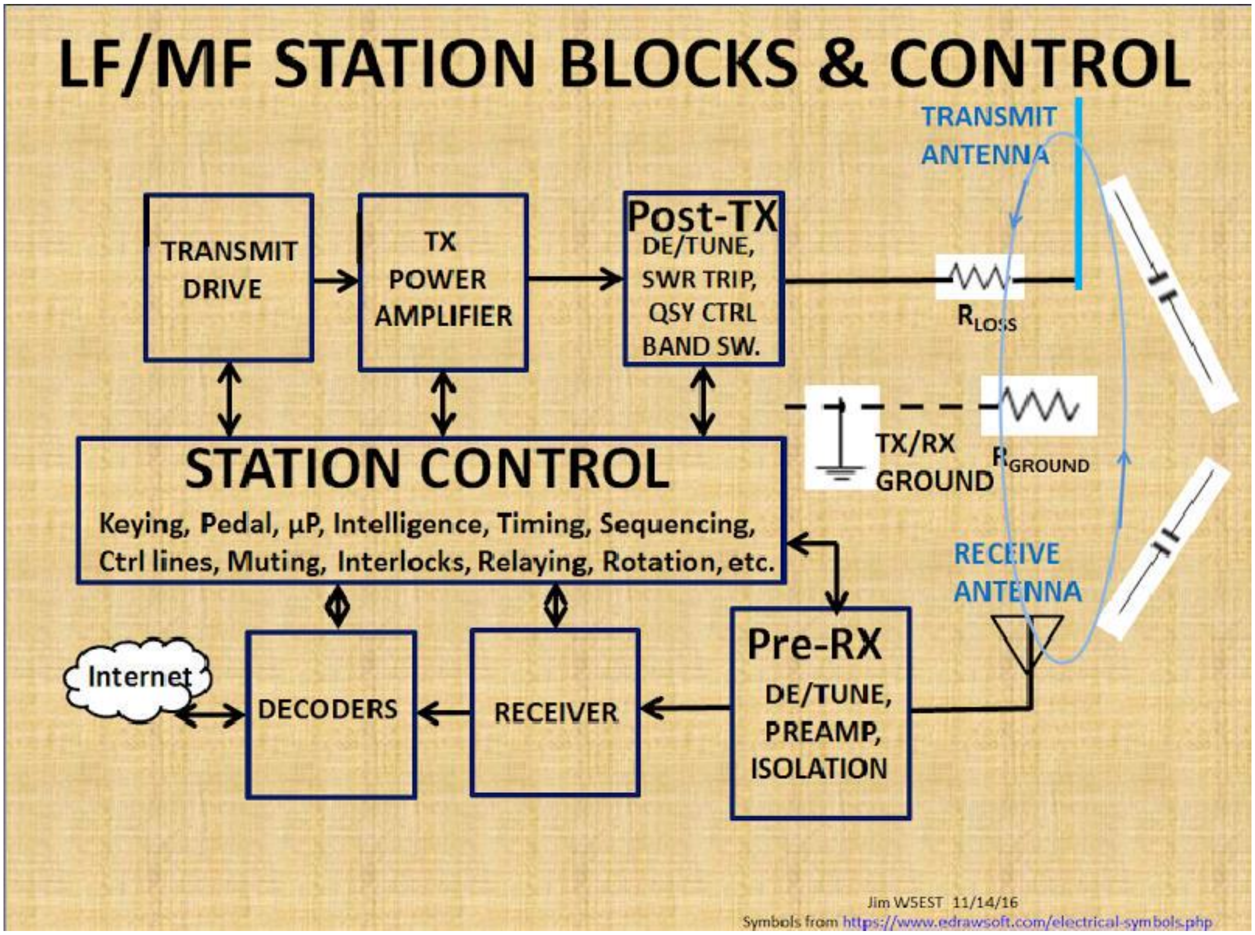
*See blogs on transmit antennas from last season, scroll 30% in http://njdtechnologies.net/a-band-opening-that-spanned-the-globe-vk3elv-kl7l-wh2xcr-vk2xgj-vk3elv-jh3xcu-trans-atlantic-activity-from-europe-to-new-england-that-extends-even-further-south-dk7fc-k4ly-wg2xsv/

**Consider a multi-part lightning series: http://njdtechnologies.net/big-night-for-trans-atlantic-reports-including-g0mrfs-portable-operation-dk7fc-ua0snv-wsq2-action-in-the-pacific-northwest-stormy-night-in-vk-results-in-one-pacific-dx-report-for-wh2xcr/ (scroll 40%)

***See smart controls and machine intelligence; start at minute 6:15 of this video: https://www.youtube.com/watch?v=Bwk-r8AJBR0&feature=youtu.be

^Compare WI2XBQ one-turn shack-tuned active loop blogged Sept. 28: http://njdtechnologies.net/092816/

^^ Compare WG2XSV station: http://njdtechnologies.net/dont-roll-up-those-radials-yet-good-band-condition-continue-around-the-world-first-time-wh2xcr-tasmania-wh2xzo-dl4raj-dk7fc-wd2xsh17-more-qso-party-redux/ (scroll 40%)



11/11/16 U3S REVISIONS WILL BE GAME CHANGER

by John WG2XIQ: **Hans Summers** announced exciting news yesterday that he has completed code changes for the U3S to allow variable dead time prior to signal to allow for receive relays to change state. This will be a game changer for a lot of U3-series users. Hans explains:

> "I have produced firmware v3.11 of the Ultimate3S kit http://qrp-labs.com/ultimate3/u3s which allows the "Key" output to be configured for controlling a T/R relay or keying an external PA, with a configurable delay from 1..999 milliseconds ahead/behind the start/end of the RF envelope.
>
> You can read about it starting on page 17 of the operating manual for v3.11 which you can get here: http://qrp-labs.com/ultimate3/u3firmware.html . Some example 'scope screenshots are shown there, showing the RF envelope and the Keying/PTT/RxTx signal with various delays (relatively long delays e.g. 200ms, for easy viewing). The delay is configurable from 0..999 milliseconds. 73 **Hans G0UPL** http://qrp-labs.com"