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Let's talk about low band receive antennas...

By John Langridge September 3, 2014 – Posted in: 630 Meter Instructional Topics, 630 Meters

UPDATE: Looking for a comprehensive discussion or MF and LF receive antennas? Check out the talk given by Eric, NO₃M / WG₂XJM, at Hamcom 2016. The slides can be downloaded <u>here</u>.

When I gave my first talk on using separate receive (RX) antennas years ago, it was very interesting to see the large number of people who had no idea that separate antennas were being used by quite a few stations. The reason for that probably comes from the fact that only a handful of high-end rigs at the time (early 2000's) had separate ports to connect a RX antenna. The compact rigs of the day, which were huge compared to the sub-compact rigs seen on the market today, were doing well to have a spare SO-239 and built in antenna A/B switch and even that was rare. A few years ago QST published an article on building an outboard RX antenna switch that allowed the user the switch an RX antenna automatically on the same port that connected the transmit (TX) antenna. This switching process utilized the rig's PTT relay typically used to key an amplifier. It was at this point that that idea of separate RX antennas became mainstream, so much so that many manufacturers added separate RX ports to accommodate these antennas.

So what's to be gained by using separate RX antennas? The biggest gain is improved signal-to-noise (S/N) ratio which involves how deeply into the noise a signal resides. The best way to improve S/N is by diminishing noise sources and that is typically accomplished using directional antennas. A lot of guys put entirely too much value on the idea of antenna gain, looking for the largest gain figures available in their antenna specifications. The most important values in an antenna specification should be frontto-back (F/B) followed by front-to-side (F/S). You can run an amplifier and/or preamp if you need more gain on TX and RX, respectively. The fact is most RX antennas have negative gain values, some in the -20 to -30 db range, while a good RX antenna has very good F/B (30 db is really good) and at least decent F/S (12-15 db is common). A lot of guys comment that they could never possibly hear a signal that low but in reality, good listening skills and a good pair of headphones dictate that the antenna level only need to exceed the receiver's noise floor. One can test this concept by listening to a receiver without an antenna connected and then hooking up the antenna while listening. If there is an increase in the noise floor, the levels are probably fine. If one feels the need for more signal, a low noise preamp can be employed.

With any system that improves overall performance, there are always draw backs and there is never, ever a free lunch. For example, I mentioned that improved S/N is accomplished typically using external RX antennas. That suggests that these RX antennas exhibit a pattern which is used to null an offending signal. In the presence of a TX antenna, typically a vertical on the low bands, the RX antenna pattern can become skewed, in some cases losing all of its directivity. This is often characterized by an

630 Meter Articles

Decent domestic propagation, particularly later in the evening, including many transcontinental openings but active QSB and high QRN reported in the East as a storm system continues its march across North American; Trans-Atlantic openings return for EloCF; Pacific paths were healthy including numerous trans-Pacific openings for VK4YB plus great Pacific Rim paths to JR1IZM, JE1JDL, JA1PKG, JH1INM, JA0HXV, JA8SCD5, 7L1RLL4, JH3XCU, JA5AEA and JA3TVF // VK5FQ -> JA1PKG, JA5AEA // K9FD -> VK7TW, ZF1EJ, K3MF, VK4YB, WA3TTS, ZL2IT, ZL2AFP, WA9CGZ, JA1PKG, JH3XCU, WoJW, JR1IZM, KL7L; WB4JWM presents "MOSFET devices used as DC switches in amplifiers"

MOSFET devices used as DC switches in amplifiers by Tom, WB4JWM

Not a very good night as activity in the West was down considerably and activity in the East was challenging due to storm noise but a handful of stations fought the poor domestic band conditions, completing a few QSO's early in the evening; Quality of propagation depends on who you ask or when you were QRV; Pacific paths were pretty good including openings between Oceania, Hawaii, Alaska and Japan and a nice WSPR report for ZF1EJ at ZL2AFP; W5EST presents: "Viewpoint: Single Terminated Loop RX Antenna Connects Both Ends to Multiple 630M Receivers"

Many of the usual cast of operators in North America put up a valiant, early on-air effort as seasonal noise and storms impact much of North America; Trans-Atlantic openings center around EloCF activity; VK4YB reports that ANZAC day begins at midnight as well as the presence of a 'Mackerel Sky'; Unsettled geomagnetic conditions possible in the coming session; WA3TTS and W5EST present: "EWE RX Antenna Pattern Consequences of Adding 630m Antenna Signals"

Poor band conditions for North America due to very high noise levels from storms in the central US and Midwest but propagation was actually quite good including trans-Atlantic and transcontinental openings for WA3U, receiving reports from KR7O, PAoO and GoLUJ; Good Pacific and trans-Pacific openings including VK4YB -> KL7L, K9FD, JA9MAT, JR1IZM, JA1PKG, JA0HXV, 7L1RLL4, JH3XCU, JA5AEA, JA3TVF // K9FD -> VK7TW, VK2XGJ, VK4YB, WA3TTS, ZL2IT, ZL2AFP, JE1JDL, JA1PKG, JH3XCU, 7L1RLL4, JR1IZM

Relatively poor domestic session for North America in spite of a few highlights early in the session as many report elevated to high noise from central US overall increase in noise and a lack of directivity when listening to known signals. I first experienced this problem using KgAY loops on 160-meters in the presence of my short, base loaded vertical. I was stubborn and it took my inability to hear the 3B9RF DXpedition before I fixed the problem by simply detuning the TX antenna while receiving. This concept of detuning can be daunting to a lot of people and RF switching, particularly at high power, is not for the faint of heart. A simple relay at the *TX* antenna feed point can switch in a network that resonates the antenna out of band. In some cases, depending on the physical length of the TX antenna, simply opening up the feed point or shorting it to ground can be all that is necessary. Relay control is accomplished using the rig's PTT relay or a breakout box that is driven by the PTT relay. The relay should be scaled depending on the amount of power applied to the antenna, SWR, and voltages that are present on the TX antenna. My very first attempt at detuning resulted in a relay that was too small and I welded the relay contacts shut. Yes, it looked like an arc welder. I learned my lesson and began using the Gigavac G2-HAM vacuum relay, which is listed on the Gigavac ham discount program. No more problems and I started hearing well for the first time. I have observed in a few instances that some individuals try to cut corners by doing the detuning from inside the shack in order to avoid running control cables. More often than not this approach fails. For those who say that this approach works, its either denial or dumb luck due to some other aspect of their installation. Detune at the base of the TX antenna!

The need to detune the TX antenna can be minimized by giving a wide berth between TX and RX antennas. W8JI goes into a very extensive discussion of this concept on his website so I will forego the details. For most of us, we are limited to small chunks of property and detuning the TX antenna is the only option.

While some RX antennas might benefit from good ground conditions, like the grounddependent K9AY loop, other antennas rely on poor ground conditions to achieve the necessary wave tilt to become sensitive to vertically-polarized signals. Most notable is the beverage antenna. The beverage antenna in its simplest form is just a straight, long wire, horizontally oriented and spaced several feet above the ground into the direction of interest. Typically the far end of the beverage is terminated through a resistor to a good ground rod and in some cases, more than one. The resistor value is determined experimentally and is dependent on the environmental conditions. Signals arriving from the far end of the antenna tend to have their wave front slowed due to lossy dielectric under the length of the antenna. This slowing results in a tilting of the wave which explains how a horizontal wire can be sensitive to a vertical-incidence wave. As the tilted wave front moves down the length of the antenna wire, the signal adds inphase, resulting in a building voltage which is coupled to the receiver through an impedance matching transformer, typically a 9:1 transformation. Signal arriving from the feed point end of the antenna add similarly but are shunted to ground through the terminating resistor at the far end of the antenna. The result can be a very nice F/B, depending on the length of the antenna and care in termination as well as a tightening of the pattern which is analogous to a narrowing of the beam width. While beverages that are multiple wavelengths in physical length are often desired, portions of wavelengths can be useful, although the pattern tends to become more omnidirectional as the wire gets shorter. All of these factors contribute to S/N. As in the previous section where the importance of detuning the TX antenna was emphasized, locating a beverage over a radial field for a TX vertical, detuned or otherwise, can have devastating effects on the wave tilt and subsequently the storms; Pacific and trans-Pacific openings look pretty good including K5DNL, NU6O -> ZL2IT // VK4YB -> K5DNL, KR7O, JR1IZM, JE1JDL, JA1PKG, JA0HXV, JA8SCD5, 7L1RLL4, JA3TVF, K9FD // K9FD -> VK7TW, VK3LM, VK3WRE, VK3ZYC, VK4YB, JA1PKG, 7L1RLL4, JR1IZM; Outbound JA openings also present including JA3TVF -> K9FD

Quiet band conditions return for North America and operators take advantage, completing numerous QSO's on JT9 and CW; AI8Z completes his first QSO's this week from new QTH in Cortez, CO; Pacific and Pacific Rim paths continue to perform reasonably well including VK4YB -> KL7L, K9FD, JE1JDL, JA1PKG, JA0HXV, JA8SCD5, 7L1RLL4, JH3XCU, JA5AEA, JA3TVF

Noisy but decent night for the most part, particularly later in the evening as transcontinental openings make an appearance for a few stations; Strong night for the Pacific including VK5FQ -> K9FD, JR1IZM, JA1PKG, 7L1RLL4, JH3XCU, JA5AEA // VK4YB -> KL7L, K9FD, JR1IZM, JA1PKG, 7L1RLL4, JH3XCU, JA5AEA, JA3TVF // NU6O -> ZL2IT; W5EST presents: "Antenna Concepts for Canceling 63om Storm Noise and Clear Weather Sferics"

Seasonal storms continue to complicate operating but a few QSO's were completed in the early evening; Decent night in the Pacific while longer trans-Pacific signals seemed to run out of steam by the time they reached western North America

Strong storms kept most of the eastern half of North America under watches or warnings with very high noise levels impacting much of the continent; Propagation seemed to under perform in quieter areas as well in spite of favorable DST values suggesting some other mechanism is in play; W5EST presents: "Storm-free Night Sferics on 630m: Modeling Results"

High points of the previous session retreat leaving deep QSB and weaker signals; Increased noise reported in the West as the next storm system moves across North America; Pacific paths were average but there were a few highlights including VK4YB -> KL7L and VK5FQ -> JA1PKG

Band conditions turn around in a big way allowing good propagation to shine on very high levels of operator activity and allowing numerous JT9, FT8 and CW QSO's to be completed; Trans-Atlantic openings favored one-way paths like EloCF -> K3MF, WA3TTS; Good night in the Pacific including JA1PKG -> KL7L, K9FD // VK5FQ -> K9FD, JR1IZM, JA1PKG, 7L1RLL4, JH3XCU, JA5AEA // VK4YB -> KL7L, WoYSE, JR1IZM, JA1PKG, JA0HXV, 7L1RLL4, JH3XCU, JA5AEA // K9FD -> VK7TW, VK5AZL/2, ZF1EJ, VK4YB, JA0HXV, JE1JDL, JA1PKG, JH3XCU, 7L1RLL4, JA8SCD5, JR1IZM

Big storms continue to wreak havoc on parts of the eastern US but it was actually a decent session as many stations were active as they the situation allowed; Propagation was pretty good but was masked by high noise in many cases; Another good night in the Pacific including VK4YB -> KL7L, K9FD, JR1IZM, JA1PKG, 7L1RLL4, JA5AEA, JA3TVF // K9FD -> JA3TVF, JA0HXV, JA1PKG, JH3XCU, 7L1RLL4, sensitivity and pattern. It is recommended that interested readers carefully study W8JI's website in addition to the ON4UN low band DX book, which are both considered important references for the low band operator.



Beverages come in a number of forms. At KB5NJD / WG2XIQ, beverages have been used on 80 and 160-meters in the past, both in the air and on the ground (commonly known as BOG's, or "beverage on ground"). In fact, beverage antennas are responsible in the completion of 160-meter DXCC. In recent years, however, trees that supported and concealed beverage antennas 8-10 feet above the ground were damaged by ice storms and in most cases had to be removed. While many have reported good performance with BOG's, relatively good ground conditions at this location tend to result in a significant loss of sensitivity and directivity. BOG users often find that due to the proximity to the ground, the dielectric effect allows the short wire to "look" much longer than it really is which is more or less a function of a decreased surge impedance, typically around 200 ohms for an average wire sitting on the ground. Running beverages down the sides of the street along the curb has been done by many and may be considered again here. Its easy enough to roll the wires up using a spool mounted on a drill motor. Of course, very low frequencies dictate very long wires in order to achieve a useful pattern so this concept bares more experimentation.

For low band amateur radio activities, the K9AY loop has historically been the most reliable, compact workhorse at KB5NJD. Sadly, that was not the case on 630-meters. Even making modifications to the termination resistance in order to improve the null depth in addition to changing the transformer material from type-43 to type-77, the performance seen on the ham bands was never achieved on 630-meters. Its difficult to achieve a good pattern with such small spacing on such a low frequency. Jay, W1VD, published an improvement to the K9AY loop on his website which includes increased element length, spacing and a variable termination resistance. Results from those using this design have been been very positive and I believe that this approach is what Jay uses on a regular basis to hear Europeans. The takeaway message here should be that the K9AY loop is a good choice for MF and LF reception if realistic physical size is considered and scaled accordingly. The very nature of the design has made it quite scalable.

JR1IZM; W5EST presents: "Storm-free Nighttime Noise: Sferics Patterns on 630m"

Weather in the eastern half of the US seriously impacted operators and activity during the evening, moderating slightly in some areas by morning; Numerous operators report the return of AI8Z's signal using WSPR; Trans-Atlantic paths were down considerably but EloCF -> K3MF was a bright spot; Decent night of trans-Pacific and Pacific Rim openings including VK4YB -> VE6JY, KM5SW JR1IZM, JE1JDL, JA1PKG, JA0HXV, JA8SCD5, JH3XCU, JA5AEA JA3TVF // NU6O, VE7CA -> ZL2IT; W5EST presents: "Storm-free Atmospherics: Estimating Daytime Noise Patterns on 630m"

Relatively quiet start to the evening in North America was accentuated by deep QSB reports from several stations but good activity resulted in a number of regional QSO's; Trans-Atlantic reports return, including K₃MF -> DK₇FC/P, GoLUJ; Trans-Pacific openings only favored western regions of North America and overall openings were down, mostly limited to Pacific regions

Great domestic band conditions reported for North America including low noise and strong propagation which brought uncharacteristically high evening activity for April; Trans-Atlantic paths retreated considerably while trans-Pacific paths were average for this time of year including K9FD -> JAOHXV, JA1PKG, 7L1RLL4, JR1IZM; Pacific Rim paths were decent including VK5FQ -> JR1IZM, 7L1RLL4 // VK4YB -> JR1IZM, JA1PKG, JAOHXV, 7L1RLL4; KL7L returns to transmitting from Alaska and experiences a decent session

High winds impacted activity in several parts of North America but a few stations were active during the evening, successfully completing QSO's or receiving reports; High noise returned during the evening for parts of North America but some areas reported quiet conditions this morning; Trans-Pacific paths seemed down but VK4YB -> KL7L and other western North American stations; K9FD (/KH6) reaching eastern portions of North America and Caribbean; Trans-Atlantic openings also down but K3MF reporting openings to F59706; Unsettled geomagnetic conditions possible in coming sessions

Noise levels remain high for some stations in North America while others report significant improvements that led to completed QSO's; Trans-Atlantic openings included K3MF -> F6GEX, GoLUJ; Pacific and trans-Pacific paths favored longer haul openings including first time reports for N1HO at K9FD (/KH6) and K5DNL -> VK4YB

Some transcontinental openings reported as elevated noise continued during the evening but significant improvements for many were observed by morning; More unsettled geomagnetic conditions observed this morning; Reasonable trans-Atlantic openings reported including K3MF -> DL4RAJ, GoLUJ // G3KEV -> W1LE, VE3CIQ; Trans-Pacific paths limited to western regions of North America but K9FD reaching NO3M and ZF1EJ on Pacific and transcontinental paths; W5EST presents: "What Storms' Night Sky Wave Arrival Angles Can Mean for You on 630m"



Most recently at KB5NJD / WG2XIQ, the VE7SL multiturn resonant loop has been employed with very good results. This loop replaced the K9AY loops in the summer of 2014 and while this station has historically demanded a switchable cardioid pattern from the receive arrays, the performance of this antenna has been very good during late summer tests (Note I still have a K9AY loop in 2017 and it works quite well at 630m). Noise conditions remain largely unchanged in the East but it wasn't a total washout; Unsettled geomagnetic conditions return this morning; Nice trans-Atlantic reports on both sides of the pond, including K3MF -> DL4RAJ, PAoO, F59706, GoLUJ // EloCF -> WA3TTS; Pacific and trans-Pacific openings were similar to the previous session but probably down just a bit; W5EST presents: "Distant Storms' Night Sky Wave Arrival Angles on 630m"

Decreased signal levels reported by many stations well after dark as storm noise continues to ravage the band but in spite of challenges, numerous QSO's were completed; ZF1EJ transmitting again, receiving reports from GoLUJ; Another reasonable night for trans-Pacific openings including VK4YB -> KL7L, K9FD + others on the western mainland of North America; Pacific openings to Japan were also nominal including K9FD -> JE1JDL, JA1PKG, 7L1RLL4, JH3XCU, JR1IZM and VK4YB -> JR1IZM, JA1PKG, JA0HXV, 7L1RLL4, JA5AEA

Noisy but productive night for many stations in North America as good activity results in many QSO's completed; ON7YD reports trans-Atlantic JT9 transmissions from NO3M; Pacific and trans-Pacific paths were probably about average but there were a few bright spots including VK3HP, VK5FQ, VK4YB -> KL7L, K9FD

Extremely noisy evening for much of North America but some improvements by morning including reports from W7XU that path to VK4YB was best in several sessions; Solid trans-Atlantic openings continue for K3MF, receiving reports from DL4RAJ/2, DL4RAJ, PAoO and GoLUJ; Pacific and trans-Pacific openings include VK4YB -> JR1IZM, JE1JDL, JA1PKG, JA0HXV, JA8SCD5, 7L1RLL4, JH3XCU and K9FD -> VK2XGJ, VK4YB, JA0HXV, JA1PKG, JH3XCU, 7L1RLL4, JR1IZM

Very noise band conditions for much of North America as storms in the south central US signal the presence of Spring and Summer; Trans-Atlantic paths remain open including K₃MF -> DH₅RAE, DL4RAJ/2, DL4RAJ, F₅9706, F6GEX, EloCF and N1HO -> EloCF; Pacific paths are down a bit but VK4YB -> JA1PKG, JR1IZM, JA0HXV, JA8SCD5, 7L1RLL4, JH3XCU, JA3TVF and K9FD -> JA3TVF, JA1PKG, JH3XCU, JR1IZM

Great trans-Atlantic openings continue including numerous reports for K3MF, K5DNL and IW4DXW on their respective opposite sides of the pond; Band conditions seemed decent but QSO activity was down from previous sessions; Kp spiked early this morning sending DST values to moderately disturbed levels; Strong session on Pacific and trans-Pacific paths including VK -> JA, eastern US and KL7 -> JA, ZL; W5EST presents: "Storm Sky Wave Arrival Angles on 630m, plus LOS"

Average session with mostly uncharacteristic quiet band conditions for April and a number of QSO's completed, particularly in the East; Decent transcontinental openings reported by KR7O; Solid trans-Atlantic openings as the geomagnetic field calms including K3MF -> DL4RAJ/2, DL4RAJ, PAOO, F59706, F1AFJ, F6GEX, GoLUJ and K5DNL -> F6GEX, F59706; Good night for Pacific-rim and trans-Pacific openings including VK5FQ -> JA1PKG, JR1IZM; KL7L



A rotator allows the antenna's azimuth to be changed and even with the bidirectional response, performance has been really great. The loop itself is a parallel resonant circuit at a very high Q and uses an isolated feed which is accomplished with a single turn pick-up loop about 6 inches from the main loop turns. a 30 pF variable cap is used in parallel with about 250 pF silver mica padder caps and is adjusted with my MFJ antenna analyzer until the value of X is equal to zero, which occurs around 475 kHz. A W1VD preamp, based on the original design by W7IUV, utilizes a 2n5109 and offers very little noise insertion. Having built a number of poor-performing, noisy preamps, this preamp is very quiet. At zero level input (no antenna attached), there is no discernible difference in output level when the preamp is coupled to the receiver. This means the internal noise is very low. In fact, the noise figure specification is 2.5 db.

-> ZL2AFP, JAoHXV, 7L1RLL4, JA1PKG, JR1IZM; W5EST presents: "Nighttime Storm 'Images' in Your 63om Sky, Beyond LOS Distances"

Wild QSB and black outs reported during the evening but by morning, excellent propagation and big signals were observed as geomagnetic conditions destabilize a bit bringing a few enhancements; Good trans-Atlantic openings continue including W3TS -> PAoO, EloCF -> WA3TTS and K3MF -> PAoA, F59706, F1AFJ, F6GEX, G1VWC, GoLUJ, TF4M; Pacific storms impacted stations in KH6 but K5DNL reported by VK4YB and VK4YB -> several eastern US stations

Strong night for trans-Atlantic openings including K₃MF -> DH₅RAE, DL₄RAJ, DLoAO, DK₇FC/P, PAoO, F6GEX, GoLUJ and K₅DNL -> DL₄RAJ, F₅GEX; Domestic openings were about average with a fairly typical night of two-way QSO's reported in North America; Good night for trans-Pacific openings including KR6LA, K₅DNL -> VK₄YB but the presence of the 'diode effect' was apparent; Pacific Rim openings were solid including VK₄YB -> JR₁IZM, JE₁JDL, JA₁PKG, JAOHXV, JA8SCD₅, 7L₁RLL₄, JH₃XCU

Domestic openings and activity were hopeful at the start of the session but seemed to deteriorate as the evening progressed; High noise reported by a number of stations but its presence moved around from evening to morning; Good trans-Atlantic openings, including K₃MF -> DL4RAJ, PAoA, TF4M, EloCF, GoLUJ; Pacific openings were reasonable but trans-Pacific paths were down from recent sessions

Geomagnetic conditions were a bit more active but the session turned out to be relatively average once again; Trans-Atlantic openings were decent including K₃MF -> DL4RAJ, DLoAO, PAoO, GoLUJ; ZF1EJ provides reports for a number of stations overnight

Another relatively average session for late March but trans-Atlantic openings take a big hit compared to recent sessions; Noise was a major factor in North America resulting in numerous regional QSO's but a few longer openings were observed; Pacific and trans-Pacific openings were average with a couple of reports of VK4YB at NO3M; Early JA openings were reasonable; Wildly changing morning openings observed

Good propagation brings significant improvements for trans-Atlantic openings that reached as far as the central US; Pretty good night for domestic openings and transcontinental reports and QSO's; Pacific and trans-Pacific openings were plentiful with a few openings extending to the eastern US; KL7L/KH6 reports strong signals from K5DNL in spite of path obstructions

Average propagation for late March but elevated noise and lower activity impacted the session; QSB was a major player, as usual, and probably a bit more prolific on domestic openings during the evening; Early morning JT9 QSO attempt between VK4YB and W7IUV that 'ran out of string'; Decent transcontinental openings this morning including QSO for W3TS and W7IUV; K3MF enjoys trans-Atlantic reports from PAoA and GoLUJ



Because the loop is located in the near field of the transmit antenna, I used a 12-v relay to short across the resonating capacitor when I a transmitting. Doing so accomplishes two things: First, it prevents the high-Q loop from developing dangerous, damaging voltages which could not only destroy the capacitors but could also back feed the protection relay in the shack and ultimately damage the receiver. Secondly, a high-Q resonant circuit in the near field of the antenna would serve to sap power away from the antenna that should otherwise be radiated to distant locations. This problem is often seen in the broadcast service when resonant or near-resonant structures are erected in the vicinity of a transmitter site. The result is skewed pattern in directional arrays and a decrease in field strength overall. This problem is often corrected by "skirting" and detuning the structure, resulting it is disappearing electrically.

The most impressive system that I am aware of is the 630-meter 8-circle array at NO3M / WG2XJM located in western PA. Eric's system encompasses 30 acres and is often reported to perform better than his long, phased beverage arrays that are also used on 630-meters. Still other space-conscious options that work well include the W7IUV rotatable flag, which is related to the family of terminated loops, much like the K9AY loop, while offering a significant improvement in performance and the EWE antenna which has been very well optimized by Mike, WA3TTS in west central PA.

While so much has been said about the use of directivity to improve S/N, it is important to mention that one should periodically listen with the transmit antenna because there is certainly benefit when the noise level is low. Because of generally poor performance with the K9AY loops in the winter on 2013/2014, the TX vertical was used almost exclusively during that time frame at WG2XIQ. When the band is quiet, which is often the case from mid- November into early January when the weather is generally stable here in North Texas, the noise floor on 630-meters can sound like 10 or 15 meters. These conditions are perfect for listening with the omnidirectional vertical. This arrangement is also useful living in the central US as it is very easy to be listening in the wrong direction when a signal may be arriving from another. Be aware of propagation and be an active participant in the operation of your station and you won't miss much.

Very poor evening session with high noise and slightly unstable geomagnetic conditions as a weak CME finally arrives, but morning Pacific and trans-Pacific openings offer some hope with nice openings including VK4YB -> WA3TTS, NO3M and VK5FQ -> JA1PKG, JR1IZM; In spite of poor domestic conditions in North America, K5DNL, N1HO and K3MF report that trans-Atlantic openings were alive and well

Very quiet geomagnetic conditions continue as storm and elevated solar wind fails to manifest so far resulting in a very good session with lots of QSO's and reports including first time trans-Atlantic reports for N1HO by EloCF; Strong session for transcontinental openings including numerous JT9 decodes of N1VF at NO3M; Trans-Pacific openings were also good, with VK4YB reaching the Midwest and eastern US; KL7L/KH6 receives several mainland stations in the shadow of a volcano that blocks the path

Very favorable and quiet geomagnetic conditions overnight but evening openings in North America favored eastern long haul paths over domestic; Nice 'bump' in trans-Atlantic openings including numerous reports for WA₃U, DL₄RAJ and K₃MF; Some decent trans-Pacific openings reported including VK₄YB -> NO₃M, W₇IUV, WoYSE, all of which have been under performing paths in recent sessions; Uncharacteristically unstable band conditions reported in North America to western destinations

In spite of several stations reporting elevated noise and bizarre fading, numerous domestic QSO's were completed; Much improved trans-Atlantic openings including W8BYA, K3MF -> EloCF; Pacific and trans-Pacific paths were also improved including K9FD -> JAoHXV, JA1PKG, JH3XCU, 7L1RLL4, and numerous eastern stations; VK4YB openings only extended to central US, however; Much improved Pacific rim opening including VK4YB -> JR1IZM, JA1PKG, JAoHXV, JA8SCD5, 7L1RLL4, JA3TVF

Slight evening improvements reported by some North American stations but otherwise very similar to the previous session as Spring begins; K5DNL and K3MF report trans-Atlantic openings as the path continues to hang on; Reasonable trans-Pacific openings, reaching to the eastern US but like other paths, was down slightly over recent highs; Pacific and Pacific Rim opening also experiencing some challenges as JA reports are down; G1 storms conditions could be on the horizon and flare potential may increase daytime absorption

Propagation retreated from previous session highs leaving a mostly average to below average night in North America where regional openings dominated; K₃MF indicates that trans-Atlantic openings are holding on; Pacific paths were mostly typical while trans-Pacific opening were much less robust than the previous session

Strong propagation, quiet band conditions and great activity in North America start the week for one of the best sessions in a month; W8BYA completes his first QSO with NO₃M using JT₉ with many others following; Good night for trans-Pacific openings with near CW-level reports of VK₄YB at NO₃M but