CHAMELEON ANTENNAS IN THE ARMY HF LOW POWER COMPETITION (QRPX)

Contesting in the Mojave Desert

Abstract

For QRPX 2021, the NTC Operations Group, Fort Irwin, CA station had the opportunity to deploy several Chameleon Antenna systems to use in the competition. This article is a summary of how each system performed during the contest, and how each could serve a military operator best.

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Intro

Every year in mid-March, Army NETCOM hosts an annual HF Low Power Competition where stations across the globe try their best to establish HF communications with each other over a variety of modes, including USB Voice, ALE, 3rd Generation ALE, and Tactical Chat messaging application.

Participants include:

- Active Duty, Reserve, and National Guard elements of the US Army
- The three Army MARS HF Hubs in Ft. Detrick, MD; Ft. Huachuca, AZ; and Ft. Shafter, HI
- Any other military branches including Air Force, Marines, Navy, Space Force, and Coast Guard
- Canadian military teams
- Army MARS Auxiliarists

As a Signal Coach out here at The National Training Center (NTC), Fort Irwin, CA, I found out about this competition, and competed the last two years. In the 2020 QRPX, I operated my station alone using only an L3Harris AN/PRC-150 with its accompanying antenna, the L3Harris RF-1944 dipole kit. I operated as I was able to, not expecting much, only to find out that my station placed third with 48 points and was only a few contacts shy of the winning score of 53 set by a fully stacked team from Joint Base Lewis-McChord. I was absolutely hooked from there.

I spent the next year refining my antennas, planning my operating site, and spent countless hours listening to the bands training my ears to pull stations out of the noise. I expanded my own portable station. I bought and MARS/CAP modded a Xiegu G90, and also bought the excellent Icom IC-705 to use as a receiver. I acquired unused masts and guying kits, found scrapped feedlines, and even spotted a few antenna kits from manufacturers that I could use. I setup, tested, and tore down my station numerous times. Each time I got better and better at operating the station, but there was still something missing that I needed to ensure I had the best possible chance at contacting as many stations as rapidly as possible. I needed an antenna upgrade.

Receiving

If you can't hear them, you can't complete the contact. Due to how the QRPX flows, hundreds of military and MARS stations will flood the primary and alternate fixed frequencies simultaneously all throughout the event. This adds a level of frustration, difficulty, and challenge similar to attempting to operate in an amateur radio contest as a QRP station while everyone else is pushing full legal limits. While the competitors are limited to only using 20 watts, the participating MARS stations that don't want to compete are not limited. Many of those stations have high gain directional antennas on rotors strong enough to pin your receive meter to the maximum, and likewise blot out transmissions from all other stations. Now that a substantial amount of amateur and MARS stations has an Icom IC-7300 in their shacks, you also have to deal with people who use automatic voice keyers.

I also do not have ample battery power to operate the station at 20W perpetually. This caused me to have to set up near infrastructure where I could extend power from, which unfortunately places me in a high RF interference situation. I needed to be able to null out local RFI and either null out these wattage titans or keep my receiver from being desensitized so that I could hear underlying stations.

Three antennas immediately came to mind: a horizontal loop in air or on ground, a beverage antenna, or an amplified receive loop. Without one of these systems, my 2021 competition would have gone very similar to 2020; with me being overwhelmed with interference, and having my QSOs buried by the MARS stations that dominated the calling frequencies.

Transmitting

If they can't hear you, you can't complete the contact. With my L3Harris RF-1944 terminated dipole kit, I didn't fully grasp the transmit patterns until late in the 2020 QRPX. It exhibited half-rhombic directional characteristics on our day time frequency near 14.8 Mhz. It exhibited omni-directional characteristics on our night time frequency near 6 Mhz. It performed abysmally if hung as a traditional horizontal dipole. It could also be configured as a sloping V, but I still didn't get solidly repeatable results when trying to orient it to a desired direction.

While military stations participating in the QRPX tend to set up in field sites and operate perpetually throughout the 2.5-day exercise, most MARS stations only operate as they are able and only a small amount of them are competing. What this means to a competitor is that when a new station is heard, you have a limited amount of time to reach that station and be heard above all other competing stations trying to reach them simultaneously. The station list is published prior to the event, giving a station ample time to plan their antennas to orient towards intended targets. For me in southern California, the vast majority of my targets only range between directly north and directly east.

Running out to repeatedly reorient my RF-1944 isn't a very difficult task, but doing it alone hundreds of times over two and a half days is absolutely exhausting. It also means while I'm moving the legs of the antenna, I'm not listening and trying to reach other stations that may have been on the frequency for a brief period of time. I needed to have a better plan, and a more diverse set of transmitting antennas. I added in some antennas I already had: A SuperAntenna MP1, a homebrewed EFHW, an acquired folded dipole for NVIS, and my own absolute favorite antenna the Chameleon Antennas MPAS 2.0. This would give me an adequate diversity, but lacked in directionality aside from the MPAS 2.0 or EFHW in some form of inverted V or sloper configuration. Without anything else, I'd still be doomed to run back and forth, re-staking the RF-1944 kit like crazy.

I also needed a combination of resonant antennas and broadbanded antennas. Contacts on ALE and 3G count as substantially more points than a simple USB contact. This meant that I needed an antenna that was reasonably resonant between 4 to 20 Mhz in addition to some resonant on the primary and alternate day and night calling frequencies. With only 20 watts, I needed to be sure that every watt counted.

There were some antennas that came to mind that I wanted to add: a large horizontal loop, a hex beam, a yagi or log periodic, a custom tuned vertical, or a custom tuned dipole variant like a fan dipole. Without these on hand, emplaced specifically in azimuths I knew I needed, my 2021 run would likely have been similar to my few contacts in 2020.

Disclosure

The same day I received my official notification to register for the QRPX, I sent an email to the Chameleon support team asking some refining questions about their Skyloop 2.0, F-Loop, and RXL. My intent was to buy the Skyloop 2.0 and F-Loop, but I wanted to be sure that they would meet my criteria

above. The RXL was still in development, so I knew I wouldn't be able to get one. I also offered to test any antennas they wanted during the competition. The very next morning I got a phone call from Chameleon's Don Sherman who proceeded to absolutely sweep me off my feet in support. He talked details with me about my station, and some event details with me before offering to ship evaluation antennas for the event. Within a week, a Skyloop 2.0, Lightweight End Fed Sloper (LEFS), EMCOMM III, Tactical Delta Loop (TDL), Tactical Dipole 2.0 (TD 2.0), and a very special Receive Loop (RXL) prototype arrived just in time for me to begin testing about a week out from the competition.

I am not being compensated for any evaluation of these antennas, nor was I influenced to provide a biased observation or review of them. I sent the RXL off to another amateur radio reviewer after the event. While they did permit me to retain the others, they will all be used to help train rotational units on HF communications, and hopefully continue being a key part of Fort Irwin's competition station going forward.

The Chameleon team merely asked for me to send photos and video of the antennas, provide candid feedback on each, and provide a military HF operator perspective in regards to potential improvements in each antenna.

Antennas

For each antenna kit, I'll give a brief overview of what it is, what purpose it served in my competition station, notable characteristics of it such as receiving, transmitting, and SWR, potential improvements that can be made, and best use case for a military HF operator.

Skyloop 2.0

The Skyloop 2.0 is a 265' long wire antenna with transformer intended on being hung 20-30' in height in a symmetrical square pattern. When I received the antennas from the Chameleon team, initially there were a total of two boxes, one very large box and one very small box. To my surprise, the smaller box, containing the Skyloop 2.0 kit, felt much heftier than the large box containing every other antenna they sent except the RXL.

The Skyloop 2.0 is very, very broadbanded and does require a tuner.

Installation

Due to extremely high speed sustained winds here in the highlands of the Mojave Desert, I knew that installation of this antenna would take my small team of volunteers and I a day or so to set the appropriate foundation for this massive antenna. I selected an operating area that had two street lamps approximately 30' in height which could operate as two of the four required masts for the corners. I grabbed two L3Harris telescoping heavy grade carbon fiber masts, and staked them into place approximately 100' apart from each other, opposite side to the street lamps.

I used a tent stake as a jig to extend the wire out and measure it in halves approximately 66' in length, marking locations where I would use paracord and tape to secure the included circular plastic insulator so that once I strung it up the dimensions would be as close to symmetrical as possible. I found this far easier than attempting to use a measuring device while it was so windy.

Once the masts were in place, using a combination of a slingshot, a throw weight, 400 feet of paracord, 4x S shaped carabiners, 4x bungee cords, and some strong field tape, I was able to pull each side

alternating as I went until the whole antenna was suspended by the paracord tied to an S carabiner, hooked to a bungee, which hooked to the circular insulator.

We pulled and pulled, using tent stakes and the guying stakes of the mast that were already in place.

At completion, the Skyloop was symmetrical and level at approximately 26' in height. It was taut and looked great. It was at that moment I had realized that while I had affixed the feedline to the transformer, I had completely forgotten to attach my long, braided grounding strap to the grounding post on the bottom of the transformer. This might lead to RF reflection and a less optimal receiving ability on it. Running out of daylight and motivated help, I made the executive decision to leave the loop as is without grounding it to a star ground kit near my intended station location.

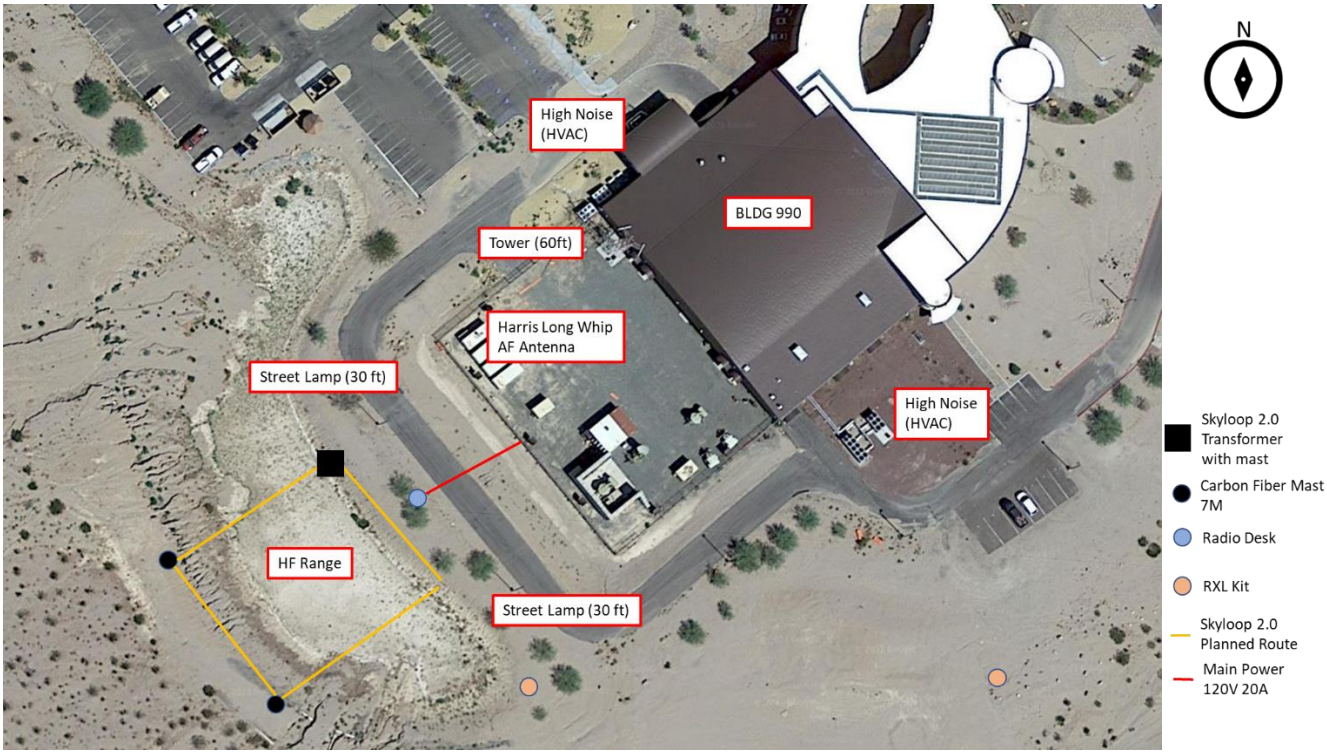

Figure 1 - Competition Station Layout w/ Skyloop 2.0

As installed, the transformer was in one of the four corners versus installing it in-between corners. I had read in other antenna literature that a horizontal loop had a gain bias opposite of the transformer so I contacted the Chameleon team to see what they had observed. They assured me that the antenna would behave omnidirectional and that the transformer location wasn't relevant. After a long day of installing and hanging this beast, honestly that was exactly what I wanted to hear. My entire station was built around this antenna being the cornerstone of both transmitting and receiving operations. It needed to be fully set before I could build the remaining antennas and the rest of the station.

Purpose

As stated in the introduction, I needed an antenna that could both resist the localized RFI, could provide receive discernment so that high powered stations couldn't disrupt my QRP contacts, have a general broadbanded characteristics for use on ALE and 3G, and have a reasonable transmit coverage capable of every type of distance from NVIS range to trans-Pacific.

Receive

Absolutely everything I read about horizontal loops on receiving was true. This antenna has "ears" for days. I was hearing stations from New Jersey like they were sitting next to me at my station desk. I contacted the New Jersey MARS operator on my cell phone and asked him what kind of wattage he was pushing and what his antenna was to make his signal so clear over 3,000+ miles. He was a QRP operator pushing 20 watts that was competing, and his antenna was nothing more than a random wire.

I got exactly what I was chasing after. I heard simultaneous contest QSOs in "layers" so that I was able to actually discern one conversation from the other at varying levels of power. The only time this wasn't the case was when stations in the far north eastern parts of New York had their beams aimed southwest, and were amplified to the full legal limit.

I did experience some local RFI that, unlike smaller receive loops, the Skyloop couldn't null out simply because it was elevated, and wasn't vertically oriented for me to rotate it away into a null zone.

I experienced a quality of un-squelched, un-notched, un-tuned, and non-noise reduction enabled receiving that I have never heard at any point in time on both amateur radio and military radio. The receive on this antenna is absolutely amazing.

Transmit

After my request for information to the Chameleon team was replied to, I learned that this antenna worked mostly omnidirectionally which was a huge relief considering its size alone prohibited me from being able to easily rotate, reorient, or reinstall it in a reasonable time frame.

The team was right on the money. This antenna was the first antenna I used to transmit with on the first day of the competition. With only 20 watts, the Skyloop was pinning receive meters to the maximum limit. I was hitting central California, Arizona, Colorado, Texas, Washington, Missouri, Louisianna, and Kentucky with no issues. It was only the stations on the far east coast that I couldn't reach. This could have been propagation, and it was definitely correlated to the fixed call frequency of 14.8Mhz. Ultimately, not being able to be heard by those stations drove me back to transmitting primarily on dipoles set up directionally like the TD 2.0 and the RF-1944, especially early in the mornings when the east coast stations were the first to return to contest operations.

The SWR on the Skyloop 2.0 with my tuner bypassed ranged between low 1.2:1 and was as high as 3.1:1 on some of my fixed calling frequencies. With the AN/PRC-150's integrated tuner, the G90's integrated tuner, and the IC-705's mAT-705 tuner I was able to make fast 1:1 matches without issue. On ALE and 3G frequencies, the tuner on the AN/PRC-150 was able to tune all of them to 1:1 without issue.

The Skyloop 2.0 is single handedly not only responsible for the greatest number of contacts I made, it was also the antenna which gave my longest eastern (3,100 miles to MD) and western (4,100 miles to HI) contacts.

While it couldn't always hit the same very distant stations as my directional dipoles could, adjusting the dipoles came with a cost of potentially missing contacts while I was out readjusting and staking them.

Potential Improvements

Make no mistake, while contained in a small package, this antenna is huge. If you're not gifted with tall, sturdy trees similar to my operating circumstances, you are going to need some stiff, hefty masts to suspend this miracle of an antenna.

In conversations with the Chameleon team, I drafted up a schematic that was almost entirely comprised of already produced Chameleon products that could be used to create this 4-masted masterpiece (say that three times fast).

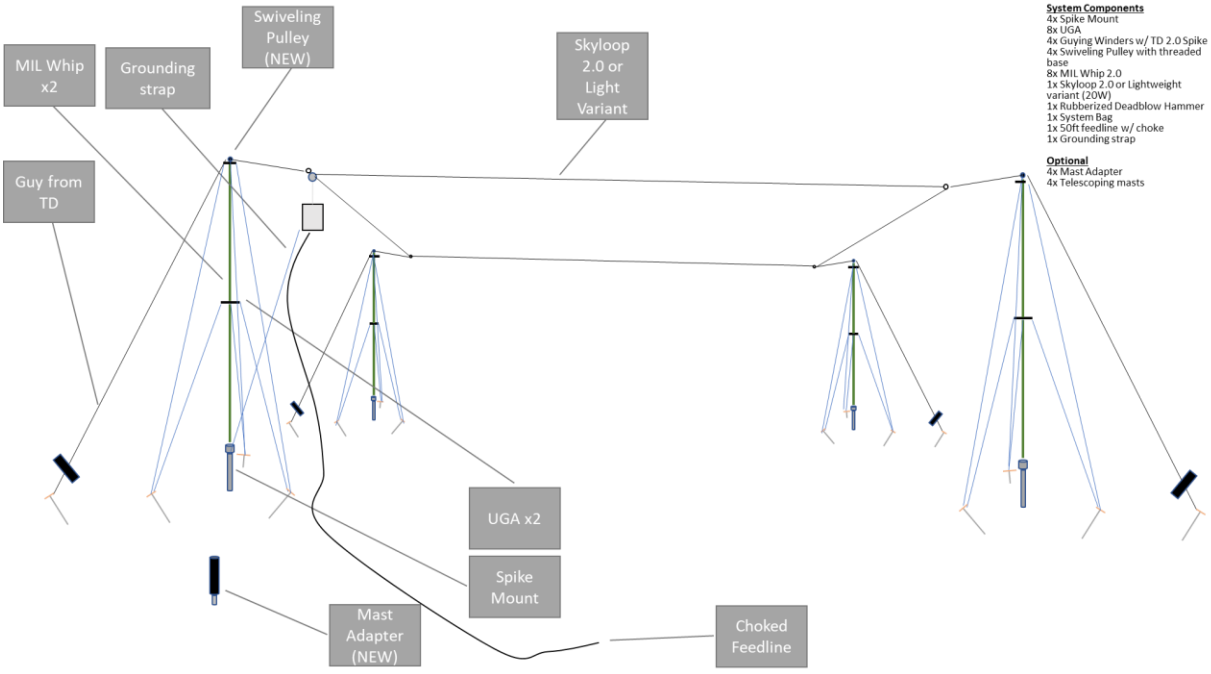

Figure 2 - Concept of Skyloop 2.0 hung with only Chameleon Antennas parts

The wire is the same heavy duty gauge the their almost all of their other antennas are built with. While this is ideal for general uses as most stations use at least 100 watts and many military stations have 125 watt amplifiers, the heft of the wire made it a real bear to elevate and keep stable. A lighter weighted variant could have a lot of use cases, and would have made it ideal for the competition.

Best Use Case

As a military operator, I'm working either manpack portable, vehicle mounted, or stationary at a command post of some kind. Command post operations is where this behemoth would shine brighter than any other military marketed antenna I have ever used in 17 years.

A quick google search of photos of military tents or army tactical operations centers (TOCs) will show you tents surrounded by masted antennas galore for things like VHF, UHF, and satellite communication. What you'll never find is an antenna strung above the tent. This is prime real estate and by hanging the Skyloop 2.0 above these tents. This alone would give units one of the best receiving and transmitting experiences I have ever had, and absolutely dominate the critical HF distances we need in the Army, NVIS close range and mid-range even without power amplification. While there would be some local

noise from generators and fluorescent lights, this antenna would absolutely change the game for stationary command center HF operations.

Final Thoughts

As a receiving antenna, it's the second best I evaluated. As a transmitting antenna, it's the best I evaluated. The only thing I couldn't do with it was snipe contacts with stations across the entire country by applying a bit of directivity.

If you have the hardware or natural surroundings to support this antenna, and plan on operating stationary for an appreciable amount of time, this antenna will change your life.

Tactical Dipole 2.0 (TD 2.0)

This antenna is Chameleon's closest competing product to the L3Harris RF-1944 terminated dipole kit. The largest difference between the two is that at the ends of the main legs of the dipole there are transformers which help bring the SWR down and make the antenna be broadbanded and stable. On the RF-1944, the transformer has grounding line attached to a grounding spike. On the TD 2.0 it uses counterpoise wire that can also be used to extend the length of the antenna out or simply be laid on the ground. It contains lots of subcomponents as shipped to me including a center transformer, two terminating transformers, two main leg wires, two counterpoise wires, two guying ropes, and four guying stakes. Even though this seems like a lot, this antenna was a featherweight compared to the Skyloop 2.0.

The TD 2.0 is very, very broadbanded and on many frequencies I used required no tuner.

Figure 3 - Tactical Dipole 2.0 (TD 2.0) components

Installation

As described earlier, I had the advantage of having two 30' street lamps near my operating station, one to the north and one to the east. I elevated the TD 2.0 on the street lamp to the north using paracord that I had used a slingshot to sling over the top part of the lamp. I simply knotted the pull rope to the antenna, and pulled it until the transformer rested under the light portion of the street lamp. For the legs, I oriented them in various ways. I initially used the counterpoises in the air and staked the legs down farther out. Eventually I installed the legs with the counterpoises on the ground. While I'm sure this does impact the way it transmits, I didn't notice much of a difference. I oriented the legs in standard inverted V fashion, sloping V fashion oriented towards my targeted area, and in half-rhombic fashion aiming the wires directly at my intended targets similar to the RF-1944.

The two major differences I noticed between this and the RF-1944 was the SWR and the guying stakes.

The TD 2.0 maintained less than 2:1 SWR with the tuner bypassed on every single calling frequency for the competition between 4-20 Mhz. I have never seen this before, and was absolutely floored.

The guying stakes were simple and to the point. A large nail shaped stake with a plastic head terminating in either a hole to feed guying cordage through or a downward hooked flat surface to pin cordage to the ground. This is a great design. In contrast, the RF-1944 has a T-shaped metal guying stake which is much thicker and has milled holes for affixing carabiner clips to. After two competitions and repeated poundings from a mini-sledge hammer, the L3Harris stakes are practically folding over. They might be great for traditional soil, but the desert has many rocky surprises below the surface that have rendered the L3Harris stakes unserviceable. The Chameleon guying stakes are slender and sharp. If they hit rock, they split the rock and continued to pierce downward.

Later on in the exercise, I attempted to install the TD 2.0 as a horizontal dipole, a setup not recommended for the RF-1944 and confirmed to be awful by my attempt last year. In doing so, I managed to violate a basic rule of horizontal dipole mounting, don't raise it by the antenna. It was too long to string horizontally between the two street lamps so I pulled the wire of the counterpoises across the lamp posts. This caused cuts to the counterpoises and completely split one open. To the TD's credit, the SWR remained just as flat as before, with or without the exposed wire of the damaged counterpoise.

Figure 4 - Damage done to TD 2.0 counterpoise wire

I also did a hasty job of securing the feedline to the transformer with minimal strain relief in the form of a cheap eBay hook and loop strap, compared to the RF-1944 which has a strain relief fixture point on both the feedline and center transformer. After a day of sustained 30-40 MPH winds, my feedline sheared just below the connector and I had to lower the antenna to replace it. Luckily it occurred during late night hours so I didn't miss any contacts while repairing.

Purpose

I wanted this antenna to serve as the anti-thesis to my L3Harris RF-1944 kit. I intended to have them both oriented in ways there were directional, with the TD 2.0 biased to the north, northeast direction and the RF-1944 to the east, northeast direction. If a station to the north were to be heard on the calling frequencies, I'd use this antenna to snipe it.

Receive

Given that the TD 2.0 was installed about 26' up on a metal street lamp post next to a massive building with tons of RFI, the TD 2.0 was never going to give me the quietest receive experience, but it did bring a receive experience that was noticeably quieter than the RF-1944 antenna it was pitted against.

At night, the street lamp was on. This increased the noise as expected.

The real difference was in the counterpoises. By simply changing my installation technique to laying them on the ground versus suspending them with the main legs, I was able to reduce the noise heard on the TD 2.0 to minimal amounts, even when oriented towards gigantic HVAC air movers and condensers for the building I set up behind.

I heard stations on the TD 2.0 a bit better than the RF-1944, and a bit worse than the previous Skyloop 2.0 which was life-altering on receive.

Transmit

As stated in the varied configuration options in the manual, this antenna behaved as described. When sloped, it provided biased gain towards that direction. When in standard inverted V position on higher frequencies it exhibited half-rhombic characteristics just like the RF-1944. When in any position on lower frequencies it behaved omnidirectional. When hung as a horizontal dipole I damaged my counterpoises, and wasn't able to evaluate it which is regrettable. The damage was in no way the fault of the antenna or its design. Other wires I had on hand would have shredded far worse.

I owe this antenna a horizontal test, as I have done so with the RF-1944 and had terrible results. I can't make that comparison without going back to it, and using common sense to raise it without damaging it more.

Potential Improvements

Any mid to heavy weighted wire antenna with an elevated feed point and transformer deserves some built in strain relief, either on the transformer, the feed line, or better yet both. Not having a decent way to give strain relief to my fairly lightweight feedline that was being whipped by non-stop winds cost me one end of a Chameleon feed line in the middle of the night. Given how many antennas I had set up on my antenna range for the competition, I didn't have a whole lot of excess feedline available so this damage affected me greatly taking one out of the quick-fire rotation of available antennas. Fortunately, my SuperAntenna MP1 only had a brief moment of effectiveness, and I reallocated its feedline without much regret. I am not sure if having a piece of metal jutting out from the side of the center transformer

and a hook on the feedline is a patented L3Harris design, but it works and works well. A competing design is needed here.

This is a large antenna, and while installing it I dragged the transformers across pavement left, right, and anything in-between. At the end of all of the dragging, the transformers were scratched up proper. They are made of sealed plastic transformer housings, and are very light weight. Do I think that this will affect their performance? Absolutely not at all. Am I concerned about repeated dragging given the fact that I intend on using this antenna for a lifetime? You bet I am. This is unique to the fact that I was installing this antenna entirely by myself. With help, or with hindsight, these transformers would have never touched the pavement.

The EMCOMM III that I also received from the team has an integrated transformer and winder (see photo later in the article). This makes it lightning fast deployable and recoverable. A similar design could be used on the terminating transformers for the TD 2.0. Comparably, on the RF-1944 the terminating coils function as an integrated winder for the main wire leg and/or the grounding leg portion.

I damaged my counterpoises by my own fault and lack of experience with traditional horizontal dipole mounting. If these counterpoises are the same as the counterpoises offered with other antennas such as the EMCOMM III, MPAS 2.0, and the counterpoise kit, then this is a massive modularity win for Chameleon Antennas. If they are cut to a length that is specific to the TD 2.0 then I am at a real disadvantage. Fortunately, any counterpoise seems to be better than no counterpoise in my experience, and the Chameleon team's customer service is second to none. Before ordering my next antenna, the F-Loop I'll likely be shooting them a message asking to tack on the cost of repairing/exchanging these two wires. Again, to the TD 2.0 and the amazing wire they use's credit, having exposed wire poking through the insulation in no way affected my SWR and operating. My only concern is that the exposed wire was on the counterpoises and therefore at a height that a person contacting it while transmitting could potentially cause harm.

Best Use Case

This antenna is best used anywhere you'd also use an RF-1944. Need omnidirectional, half rhombic directional, or sloping directional shots? This is the antenna for you. If you have a tree, or at least one mast, and you have some lateral space around your station this antenna won't fail you. I'd strongly recommend this antenna as the second best to the Skyloop 2.0 for stationary command posts. Don't forget to use white engineer tape and/or chemlights to mark the wires though. As installed, it may become a hazard to individuals walking around if not adequately marked.

Final Thoughts

If you use an RF-1944 anywhere, save several thousands of US Dollars and grab a TD 2.0. The bag that comes with it is infinitely better than the messenger style bag of the RF-1944. The efficiency is better on every frequency I needed. The guying stakes are better. It weighs less. It isn't as long, but is more efficient. Not only is it a fraction of the price, but it's also supported by a devoted team and a solid warranty.

EMCOMM III Portable

This antenna is an end fed long wire antenna with counterpoise. The transformer, in the case of the portable version I received, is hard mounted to a wire winder capable of accommodating both the main

wire and the counterpoise wire which are both held in place with an elastic cord. Useable as a sloper, horizontal wire, vertical wire, inverted L, inverted L, etc. this antenna provides a level of flexibility that many others can't.

It is broadbanded and requires a tuner.

Figure 5 - EMCOMM III components

Installation

For this antenna, I installed it on the same paracord I used to hang the TD 2.0 at an approximate height that placed the center of the wire at 25' so that I could run half of the wire straight up and the remaining line sloped towards intended stations to the northeast of my station. The counterpoise was laid on the ground in the opposite direction. I used a guying stake and some tape to affix the transformer/winder assembly to the ground to keep tension on the wire.

Purpose

I didn't ask for this antenna, but I was happy to read through its capabilities and configurations to find a spot for it. Based on what I learned in the manual for it, I wanted to use this antenna to be an additional long wire directional antenna capable of picking off stations on specific azimuths, and be broadbanded enough to do the same using ALE and 3G.

Receive

This antenna gave me a result that I knew would be typical of a standard wire antenna close to a strong source of RFI. I was not able to receive productively from it, which was okay as I had the Skyloop 2.0, the TD 2.0, the RF-1944, and the RXL to receive on reliably.

Tethering the ends of this antenna in inverted V or sloper both towards and perpendicular to the building I was near had a minor influence on the amount of noise I got off of it.

As I was contesting, I didn't have the opportunity to really further develop and adjust this antenna to see if I could improve the receive capabilities. This is in no way, shape, or form an issue with the antenna itself, it was simply attributed to me setting up behind the one building on Fort Irwin that has the most heavy-duty HVAC and generation equipment close by.

This antenna deserves, and will guaranteed get more testing in locations that don't have this extreme use case disadvantage, especially in the horizontal wire configuration.

Transmit

The EMCOMM III had a transmit behavior as documented in its manual. In inverted V and L installations, it effectively resonated towards my planned azimuths and netted me a handful of new contacts before I switched back to my staple transmit antennas: the Skyloop 2.0 and the dipoles. I wasn't able to get out past the Midwest, similar to the Skyloop 2.0's transmit performance, but what I aimed at I did contact.

Similar to the Skyloop 2.0, the resonance of this antenna on my calling frequencies was low enough to still get decent SWR across all fixed calling frequencies in use. The TD 2.0 absolutely dominated it in SWR as expected. None of the tuners in use had any issue bringing it to 1:1 resonance within a second or two. On ALE and 3G each frequency tuned up without issue.

Stations that received me were adamant that my signal was strong enough to quiet the other simultaneously transmitting stations, even with only 20 watts.

With a compass, lots of tethering points, and a high affixing point to make an inverted V or L this antenna transmits with the best of them.

As stated for receive, this antenna deserves more testing than I had time to devote to it during the competition, especially in the horizontal wire configuration.

Potential Improvements

This is a revision to a well-loved, and solidly produced line of end-fed long wire antenna. There is not much to improve here, as it isn't the antenna's fault that I was both site with RFI limited and time limited as a contesting station. If I took this antenna deeper into the desert like my companion station operated from, it would have performed as intended without the noise.

I think the design of this antenna should translate over into the design of the TD 2.0 in that the TD 2.0's terminating transformers be bonded to the winder.

Best Use Case

This antenna is more than suitable for any manpack, vehicle mounted, or stationary command center use given that an appropriate installation technique is used for the desired distance: NVIS, midrange, or long distance.

Even with only an expeditionary telescoping mast, this antenna can be a real jack of all trades which offers the best of any desired use case.

This all assumes that the antenna is distanced enough from RFI sources, which is very difficult to do for stationary command center use.

Final Thoughts

I don't think I adequately put this antenna through all of its paces that highlight either strengths or weaknesses. Given more time and additional setup areas, my experiences with the EMCOMM III would have been dramatically different.

When asked by the Chameleon team what antennas I'd recommend for which use case, I placed this antenna as a strong third option behind the Skyloop 2.0 and TD 2.0 without question. It would assuredly perform well in an environment more realistic than mine as contesting and traditional operating are very far removed from each other.

Lightweight EndFed Sloper (LEFS)

This antenna is an end fed long wire antenna designed to be resonant on amateur bands down the 40M and useable without a tuner. As I was waiting for my mAT-705Plus to arrive, I used it to test and operate digital modes on my Icom IC-705. With a smaller gauged wire and it's lightweight transformer, this antenna exists for the lightweight POTA/SOTA activator and field operator.

This antenna is resonant on all advertised frequencies for amateur use, and doesn't require a tuner.

Figure 6 - Lightweight End-Fed Sloper (LEFS) layout

Installation

I installed this antenna as a sloper oriented towards intended targets. I suspended the transformer from paracord attached to either of my two available 30' tall street lamps and pulled it to approximately 25'. The free end I used paracord to tether it to a chain linked fence surrounding the building that I was operating behind.

I did not install this antenna as a horizontal wire, and further testing would need to be done to evaluate how it behaves in that orientation.

Purpose

I didn't request this antenna, but took advantage of having it by trying to aim the downward slope of the wire towards dead center north east of my position in southern California.

Receive

The receive on this antenna suffered the same as the EMCOMM III. Local RFI really dominated all but the strongest signals to the point that I stopped using it for contesting purposes, and only used it to demonstrate amateur radio digital modes like JS8Call, FT8, and WSPR to people who came to tour my station during the competition.

This is in no way the fault of the antenna; it is merely the result of my choice of operating position.

Transmit

The LEFS was created to be lightweight and resonant across the 40-6M amateur bands. It was never marketed to be perfectly resonant outside of what it was designed for. As expected, I got over 3:1 SWR on some of the fixed frequencies that I needed for the contest. This resulted in me getting no contacts on it for contest scores.

Late in the evenings when the calling frequencies went silent, I used the LEFS to work FT8 on 40 and 30M. With the mAT-705 and my IC-705 pushing 10W and the antenna sloped away from the building I was near, I was able to nab contacts in east Russia, South Korea, Japan, and other Pacific islands without fuss. Later in the exercise I operated on 20M, and even without a tuner I reliably contacted stations in Australia, New Zealand, and Kwajalein Atoll. Impressive for such a little antenna with resonant only design.

Potential Improvements

I wasn't able to really evaluate this antenna for contesting as I failed to get contacts with it enough to dismiss it to amateur use only.

The weight is perfect. The size isn't overbearing. The quality of heat shrinking on the coils, the stiffness of the winder, and the thickness and pliability of the wire were perfect.

For amateur operations, this is a homerun. Not even my MPAS 2.0 in my backyard has reached that far west over the Pacific Ocean, granted the location of it isn't ideal either.

For MARS operations, simply adding length to the wire would bring the resonant points below the ham bands where MARS typically operates. Again, this isn't a fault of the antenna as it was never marketed to be a broadbanded MARS capable antenna.

Best Use Case

I see the form factor, design, and installation recommendation as perfect for a dismounted operator or one in a temporarily stationary vehicular platform.

I don't see the resonant points of it as being useful to a typical military operator who is almost always on ALE or 3G, requiring broadbanded characteristics. I also don't know what modification could make that possible. Using fixed frequencies or harmonics of frequencies isn't typical of military operators.

Final Thoughts

As an amateur operator, specifically a manpack only QRP operator like myself, this antenna is a solid piece of equipment that lets me operate without a tuner, on the go, and on most of my favorite bands. This is the off the shelf commercial antenna I'd grab as a SOTA activator. As a military operator, I'm likely to forgo this antenna in favor of the EMCOMM III and some form of mast, pole, or other tall structure nearby to tether to in this use case.

Tactical Delta Loop (TDL)

The TDL is a newer antenna model built off of components previously seen in the MPAS antenna. With a spike mount, hub adapter, transformer, two telescoping whips, and an alligator clipped line to conjoin the two whips, this antenna speaks portability. Functional as a vertical whip, vertical delta loop, and horizontal delta loop, this kit offers lightning-fast installation and tear down while balancing operation between NVIS capabilities and mid-range capabilities.

This antenna is broadbanded, and requires a tuner

Figure 7 - Tactical Delta Loop ground spike mounted

Installation

With a rubberized deadblow hammer in hand, I pounded in the spike mount in about a minute's time. I screwed the whips into the transformer and hub adapter in about another minute's time. I connected the tips of both whips with the supplied wire in about 30 seconds. I extended both whips to full length, which given their high quality took no more than another minute. The feedline screwed readily into the transformer and there were no radials to fuss with. As a single operator, I deployed the TDL and was on the air in less than 5 minutes. This is absolutely amazing.

Due to the loose, sandy soil near my station, I needed to somehow stabilize the TDL from spinning in the direction of the high winds that I had on site. This was easily done with some excess paracord I had on hand tied to some extra stakes from the TD 2.0 kit the Chameleon team sent me.

Purpose

I didn't request this antenna, but knowing what I know now I would have. This antenna is ideal for fast deployment, some directivity, and solid NVIS or direct wave performance. If needed for longer range, the whips could easily be mounted vertically and given counterpoises off of the spike mount. If needed for longer direct wave range, I could have easily oriented it parallel to the ground.

Receive

As some other antennas discussed before, the TDL was ground mounted near a building that generated RFI to the point that it could interfere with receiving of stations that weren't directional and used the 20 watts for competition stations.

I heard the noise on this antenna and wasn't able to copy weaker stations. By rotating the whips, easily due to the spike mount, I was able to nullify some of the RFI. This is in no way the fault of the antenna; it is entirely due to how close I was to the noisy building.

Transmit

With a bit of directionality and a whole lot of close range omnidirectionality, I was able to use this antenna to get a higher ALE score than I've ever seen outside of a classroom with dummy whips. The ALE score of 100 on one frequency and 98 on another was to a HF DSN hub located in San Diego, CA where I was able to place a call for additional contest points.

Later in the exercise after failing to contact a station in Florida, I swapped to the TDL, aimed it east, and got a S55 signal report from a MARS operator there.

This antenna was the perfect balance of NVIS, direct wave, mid-range, and slightly directional long wave.

After the contest had ended, I came home for lunch and noticed that the Last Man Standing Special Event was underway. I set up the TDL in less than 5 minutes, and with only 10 watts I managed to get in their log. Amazing!

Potential Improvements

In soil like mine, the spike mount will freely rotate if coerced by the wind. Adding two guying stakes and some cordage to the kit would help the operator preserve their desired azimuth on the antenna.

No telescoping whip could endure the sustained high winds I experienced while I was operating my station with this antenna. The quality on the whips is at a level I have never felt before, and can only be

understood by extending them yourself. Eventually after watching them bend in the gusts, I stowed them to prevent permanent damage. This is in no way a fault of the antenna as there are no trees to throttle the wind gusts in the high Mojave Desert.

As with any antenna involving the spike mount, I'd hate to see an operator bash the threaded portion of it to a point that the distorted metal doesn't allow a smooth screw in of attachments. A rubberized deadblow mallet should accompany this kit. I'd gladly pay more for it, and save in future spike mount exchanges or replacements.

Best Use Case

This antenna was by far my #1 choice of antenna for both mounted and dismounted operations. The ease at which an operator can deploy and recover it are bar none the best and most innovative I've ever had the opportunity to evaluate. In the stationary command center use case, I place it below the Skyloop 2.0 by a lot, and the TD 2.0 by just a little when considering its rapid deployment and similar performance.

The Chameleon team also advised me that the antenna could perform well on VHF Low, the same frequency range we use in the military for Frequency Hopping FM capabilities. I'm excited to find interesting ways to install this antenna on my HMMWV and test it out.

Final Thoughts

For anything outside of contesting and stationary command center communications, the TDL is the absolute star of the show. Unparalleled ease of installation, military focused NVIS and mid-range capabilities, and its small footprint make this one of the most memorable and impressive antennas I have ever used as an operator that focuses on portable capabilities. Like the Icom IC-7300 is dominating shacks across the globe, I anticipate this antenna to dominate the stations of portable operators that have tuning capability.

Receive Loop (RXL)

I asked about this antenna, but as it is still in prototype was not expecting it at all. The Chameleon team delivered and sent me this prototype for evaluation in my field conditions.

It consists of a transformer, a solid metal loop that is powder coated, a base plate adapter for mast mounting, a feedline, a bias-T box, and a power adapter.

Figure 8 - Receive Loop (RXL) tripod mounted

Installation

This antenna can be sat on a desktop, tripod mounted, or mast mounted via the included adapter plate.

After reading the manual and part manifest, I noticed that there were some missing washer and lock washer sets. The team shipped this prototype out on little to absolutely no warning and basic hardware could have remediated it. Unfortunately, being isolated at Fort Irwin, I wasn't able to acquire equivalent hardware to compensate in time for the QRPX.

This caused the loop to have a lateral shifting bias to the left or right on the transformer, but only if I manually pushed it. While short mast mounted to a field tripod I had on hand, not even sustained 30 MPH wind with 40+ MPH gusts made the loop shift.

I emplaced this near my truck so that I could rotate it quickly if needed to null out noises, and because I only had a 25-foot feedline with the connectors I needed available.

I was operating at 10-20 watts only, so this near installation was feasible. Had I operated with more than that, I'd have needed to move the loop farther from my antenna range to prevent overloading the receiver.

Purpose

This year's QRPX I set out to confirm one hypothesis of mine as a military HF operator. One antenna can never rule them all. There are some antennas that are innately better at receiving. There are some antennas that are innately better at transmitting. There are some that perform well in both cases, but they will never be the best at both.

I wanted to split receive and transmit operations into multiple antennas so that I could hear stations through pileups, and return calls to them loud and clear.

Receive

It wouldn't be called the Receive Loop if it couldn't receive, and it did beyond my wildest expectations. Similar to the Skyloop 2.0, the RXL was able to be hit with a pileup and deliver a listening experience that can only be described as "layered." I was able to discern strong station QSOs from middle and weak station ones.

There was directionality to the loop, which was huge for me being so close to a noisy building. One perpendicular turn of the RXL nulled out any local noise from that building on every single frequency I needed.

This antenna was so quiet, that I honestly thought it wasn't working and adjusted the scope sensitivity of my IC-705 only to be greeted with the same darkness of nulled noise. This caused me to retrace feedlines, ensure the bias-T was working, and check anything else before realizing that indeed this antenna was the receive system I've been hoping for all of my amateur and military radio career.

There was only one instance that between the RXL and the notches on my IC-705 I couldn't nullify the noise. It was during a live jamming period on the training unit out in the desert which coincided with a Mexican AM station so powerful that I got jammed for several hours off of its harmonics.

While very frustrating, this jamming was in no part due to the design of the RXL. No receiving antenna would have been able to null that out while still bringing in signals on the call frequency I was monitoring.

Transmit

This antenna is a receive only loop. If you transmit with it, you can kiss your bias-T goodbye. As such, I made sure to only connect it to transceivers that could not transmit on MARS frequencies.

Sure enough, my guest operator managed to be so enthralled with my FT8 and WSPR demonstration earlier that day, that they decided to operate my IC-705 and scan to a different frequency. In doing so they accidentally hit my speaker mic's PTT button and triggered a tune up using 5 watts in SSB mode in the lower CW portion of the 20M ham band.

I freaked out. Did I just lose the most sensitive receiving antenna I had at my contest station? I unplugged the bias-T and the receiving went dead. I smelled the transformer for burned circuits and got nothing. I plugged it back in and looked at my scope only to find it was the same as it was before the tuning cycle.

Did the RXL survive the mishap? As far as I can tell it did. Would it do that if it were higher wattage and not a tuning cycle? Likely not.

Potential Improvements

The story from the transmit review highlights the one single most important thing I'd recommend to be changed in the RXL. I would gladly pay more to have an integrated TX/RX switch in the same housing or even an additional housing to the bias-T. When I need a sensitive receiver like this, I don't want to take the chance at blowing the components of the module, and as a military operator I know that unskilled, or unlucky operators will absolutely transmit into this thing. This is an option I'd gladly pay for as for a new antenna I don't anticipate many replacement units to be available.

I also underestimated the length of the power adapter for the bias-T box. While setting the RXL up, I ran short of length to plug it in and had to rearrange the power distribution for my station. A minor inconvenience, but could be easily dealt with by a powerpole compatible accessory cable or a decently lengthened power cable.

Directionality is a huge feature of the RXL. Adding in a motorized rotator device would put gold flakes on the frosting of the cake that is the RXL.

Best Use Case

The RXL provided a better receive experience than its closest competitor, the Skyloop 2.0 bar none.

With a 90 degree turn it easily quashed local RFI from the building I operated near. This is huge for military operators as any antenna will be near a massive generator that is usually poorly grounded, numerous fluorescent lights inside of tents, and numerous devices that have unchoked power cables that scream interference.

With a TX/RX switch, the RXL or and equivalent should be in every HF station inside of a stationary command center and would undoubtedly provide far better LQA scores for ALE and 3G outstations.

Final Thoughts

Even though I lacked some depicted hardware, even though a tuning cycle got sent into the bias-T, even though I had no TX/RX switch, and even though I had zero receive only experience with antennas like this, the RXL dominated the receiving ability category and without a doubt lead me to dig outstations out of the noise with little effort. Luckily the AF gain knob on my Icom IC-705 could handle being turned up and down repeatedly while I was operating.

This antenna is an absolute game changer for contesting.

Modular Portable Antenna System 2.0 (MPAS 2.0)

I already owned the MPAS 2.0 system after binge watching so many popular amateur radio Youtubers review and demonstrate the system.

This antenna is a modular vertical or long wire antenna system that is effective at any range depending on how it is installed.

This is a broadbanded antenna that requires a tuner for most frequencies.

Figure 9 - Chameleon MPAS 2.0 with capacity hat in vertical configuration

Installation

I grabbed my deadblow hammer and tube of Noalox and installed this antenna off to the side of my station on some high ground. I also have the capacity hat, guying kit, and additional 4 piece counterpoise kit bringing it up to 5 25' counterpoises.

Later in the exercise I converted it into an inverted V long wire antenna broadside to my targeted direction, only to have my fishing pole snapped and other mast blown over by the sustained high winds.

On the final day I reconverted it into the vertical I originally had it as.

It was a quick, easy, and single person affair. The MPAS 2.0 is second only to the TDL in terms of ease of deployment.

Purpose

I wanted an omnidirectional, low takeoff angle antenna to reach those stations that were too far for the Skyloop 2.0, and without the drama of realigning the TD 2.0 and RF-1944 kits.

This is also the only vertical antenna I have on hand that was broadbanded enough to cover all ALE and 3G frequencies.

Receive

A vertical antenna near local RFI is never going to give a solid receive experience for anything other than a very strong station. In both vertical and inverted V installations, the MPAS 2.0 delivered a receive experience that prevented me from using it alone as a transmit and receive antenna. I used it frequently, but had to use my off hand to turn up and down the volume on my Icom IC-705 connected to either the Skyloop 2.0 or RXL.

This is in no way a flaw of the antenna itself, only that of my operating position.

Transmit

As a vertical, it was installed close to the same metal street lamp that acted as a mast for the TD 2.0 and EMCOMM III antennas. This and using low power contributed to me only getting 5 contacts through it during the contest.

SWR remained low on all frequencies except 10Mhz, but it tuned well. As a wire antenna, SWR was nearly flat on all desired frequencies.

As an inverted V, I still fell short of far east coast stations unless the timing and propagation was just right.

With the wind blowing the mast over, this effectiveness was short lived. This is no fault of the antenna, and is solely the outcome of the weather and me running out of staking and guying materials.

Potential Improvements

A rubberized deadblow hammer included with the kit would prolong the lifespan of the spike mount.

I can't think of another improvement. This antenna alone is responsible for over 99% of my QRZ logged contacts from coast to coast.

Best Use Case

If I could only buy one single antenna, and it had to perform well in dismounted, mounted, and stationary command post operations, the MPAS 2.0 would be the easiest pick.

Solid installation options, easy installation even for those with zero experience, and solid efficiency in mid to high HF ranges.

The vertical mast would be a game changer for direct wave HF communications.

Final Thoughts

This is one of the superstars of Chameleon's lineup of antennas for a reason. If you need operating options that can return decent broadbanded performance, the MPAS 2.0 is for you. It's never going to be the most efficient antenna, and it isn't marketed as one. It will, however, deliver solid all-around results that can be adapted to any use case.

Conclusion

On April 1st, 2021 the final station point scores were released, and Operation Team's station won the military category of the contest with 86 points.

Ultimately this year I learned and/or confirmed three things.

1. Splitting my station into transmitting and receiving paid off big time, especially since I was so close to noise. I view this as critical in both contesting and in normal military operations.

2. Each antenna had a purpose whether it be giving bias to a direction, or being all around good in any direction. Transitioning between them quickly and efficiently was critical.

3. There are a few antenna designs that would be absolutely game changing to a military operator. From the crushing performance of a long wire Skyloop, to the rapid deployment and well-rounded performance of the TDL, it is even more apparent that operators need more options than just a terminated dipole or a crossed, folded dipole.

All of the Chameleon antennas I used during the competition are still in peak working order, from the Skyloop that has been stretched across the desert for over a month now to the TD 2.0 I shredded the counterpoises on. Each system performed outstanding. The Chameleon Team has developed a deep roster of products that not only look fantastic and perform exactly as advertised, they also withstood absolute abuse from my station, the desert, and I. They delivered on a level of quality that I needed for military operations.

While there still are many more tests to be done, as indicated earlier for some antenna systems, I know that these antenna systems will succeed and provide contacts for many years to come.

About Me

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Figure 10 - CW2 Jaber operating the 2021 QRPX station