The LongPath

April 2023 — Volume 47 Issue 4 A North Alabama DX Club Publication

Contents:

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From the President

By Bruce Smith, AC4G

As I write this article, the weather outside is in the low-80's. I must have spring-fever. It is so nice outside, that I cannot wait until I get a chance to do some antenna work that Old Man winter left me to do this Spring and Summer. I have some tower sections that I need to assemble and install to get my 30m Yagi off the ground after a couple of years being on a short mast on the ground. I also want to assemble my Earth-Moon-Earth (EME) 2m station after purchasing an ICOM 9700 VHF/UHF transceiver a couple of years ago that has been powered up for only three (3) minutes. I do know Fred Kepner (K3FRK) is a happy camper after having removed some antennas and a tower recently that belonged to Tom Duncan (Silent Key - KG4CUY) and Janet Duncan (KI4WLX). Fred will be working to prepare a location for his new tower and install his new HF antennas. Steve Werner (AG4W) has indicated his plans to upgrade his EME station to also include not only VHF (144 MHz) capability, but adding UHF (432 MHz) capability. I am sure all of us have some antenna work to do over the next several months to prepare us for this year's ham radio DX operating and contesting activities. I am bad and tend to procrastinate while time slips by me, so my advice is to take advantage of the warm weather while you can to complete your outside antenna projects sooner than later.

We continue to receive NADXC club dues. I thank each of you for paying your dues. If you have not paid, please try to take time to do so. The NADXC Web Page has a link to PayPal to make paying your dues much easier than paying by cash or check in person at the club meetings. If PayPal is not your choice of payment, you can always send a check to Barry Barton (WA4HR) our club Secretary/Treasurer or pay with cash at our next meeting.

Our NADXC budget is on track for us to meet our goals this year. Since Barry Barton is having health issues, Bob DePierre (K8KI) is helping me track the budget and will let us know how we are doing at our next meeting.

It is great to see hams attending hamfests around the country. I attended the Tullahoma Hamfest in March and it was great to see old and new faces trolling around rag chewing, looking at equipment, bartering, and making purchases from vendors and other hams in the "boneyard" flea markets. I ran into NADXC member Jim Spike (N4KH) selling some of the extra ham radio equipment he no longer needed

From the President (continued)

in Tullahoma. Some NADXC members will be making long distance trips to hamfests such as the Dayton Hamvention in May. I trust each NADXC member is planning to make the trek to the Huntsville Hamfest and NADXC DX Banquet in August. Please be safe as each of you travel to some of your favorite Hamfest spots this summer.

I encourage each NADXC member to be "radio-active" by getting on the air. All of the HF bands seems to be quite active although we recently have seen short-lived solar activity that created a Coronal Hole (as of writing this article) and other solar activity affecting the bands. However, I have noticed even with the high A and K indices affecting the HF bands, 10m is still open early in the morning throughout the day through early evening allowing world-wide propagation to all regions on Earth. Even 6m has been open to all regions of the world depending on where you live. I have seen openings on 6m from my QTH in southern Tennessee from South America and the South Atlantic and to the west to VK/ZL and some of the Pacific Islands in the South Pacific. Also, I want to remind the membership that the NADXC provided support to the CY0S Sable Island DXpedition. I hope each member made QSOs with Sable Island to knock this DXCC entity off your DXCC "Needs" List.

I want to send my thanks to Tom Harrell (N4XP) and Nathan Wood (K4NHW) for last month's (March) presentation on their DXpedition to Svalbard (JW0A) late-2022. I recently received my QSL card from this DXpedition. I am looking forward to our next club meeting and our presentation this month. Our very own NADXC Member Kevin Hibbs (KG4TEI) will speak to us about 3D printing and how he relates 3D printing to ham radio. If you are able, please come out and listen to Kevin in person on Tuesday, April 11 at 6:30 p.m. at the Museum of Information Exchange (MIE) at 1806 University Drive for our meeting, then on to our presentation which will follow.

Every Job Needs the Right Tool

By Steve Werner, AG4W

With experience I have learned the importance of the title of this article "Every Job Needs the Right Tool". This quote is at the top of the RigExpert Stick Pro manual. It certainly is the Swiss Army knife of antenna analyzers. I have owned a Stick 230 for 9 months to do several antenna projects. The Stick Pro was out of stock at the Dayton Hamvention last year. I was pleased to do a trade-in with GigaParts for the Stick Pro last month. My initial impression is outstanding.

It is useful for antenna analysis including SWR, return loss, R, X, Z, L, C, Magnitude and Phase Angle at a single frequency, SWR Chart for a single band and multi band antennas. It can also measure cable velocity factor (not directly), cable length using the TDR, be a stub tuner, and provide a cable loss chart and impedance chart. The TDR is a very useful tool for finding cable problems.

Figure 1 is an SWR graph of my 2-meter EME antenna on the Stick Pro. Figure 2 shows the same antenna impedance

Figure 1 — SWR graph of AG4W's 2m EME antenna

Every Job Needs the Right Tool (continued)

Figure 2 — SWR of AG4W's 2m EME antenna at 144.07 MHz

Figure 3 — TDR measurement from AG4W's 80m loop antenna

measurement at a single frequency. Figure 3 is a TDR measurement of one of my 80-meter loops.

It can store 24 antenna measurements and interface with Android or Apple phones with their AntScope App or be used with a PC with the AntScope2 program. This is done with Bluetooth for the phone and a cable for the PC. These obviously have the advantage of a larger display and include Smith chart capability. Figure 4 is an SWR measurement of a dummy load from 100 to 600MHz on the iPhone.

Although the normal default for system impedance is 50 ohms it can be set to 12.5, 25, 28, 37, 50 ,75, 100, 150, 200, 300, 450 and 600 ohms. This is good where you are measuring an antenna without the impedance matching transformer such as a short 160-meter vertical.

Although the 1-page quick start guide is not that great, the manual is easy to download and print and helps you utilize all the different functions.

The analyzer runs on a Li-Ion 18650 battery that takes 3 hours to recharge after 16 hours

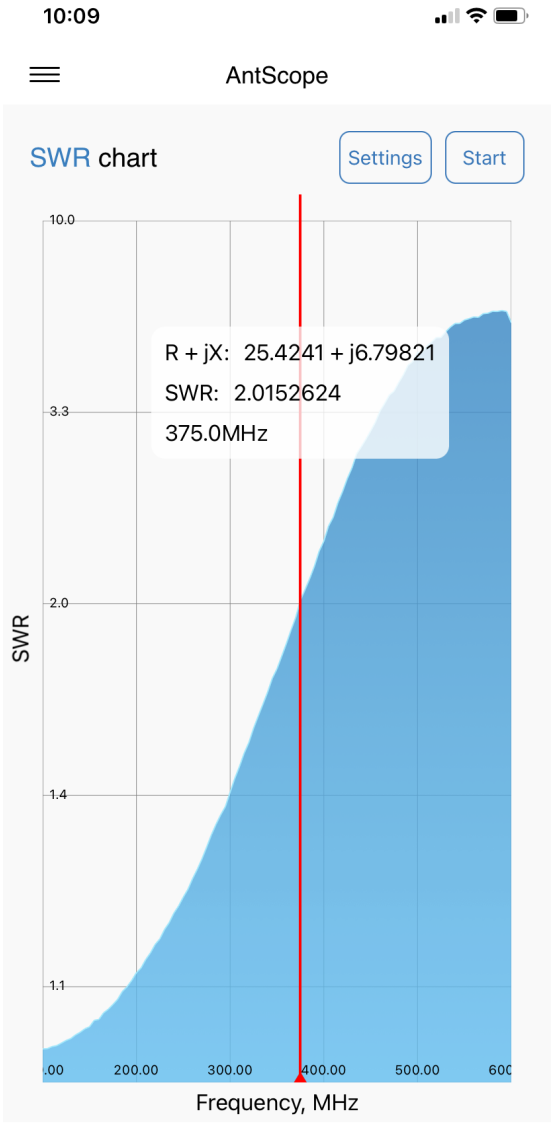


Figure 4 — SWR plot of a dummy load from 100 to 600 MHz

of operation using the provided USB cable. The color TFT 220X220 pixel display is more than adequate for most functions. The analyzer interface is an N connector but comes with a N to UHF connector adapter.

It was interesting that it came with a "Be Brave" Ukrainian flag refrigerator magnet. RigExpert is a Ukraine company that was founded in 2003 and has about 30 employees. I am amazed that they are shipping products and coming out with new models.

A 555 Timer Refresher

By Bruce Smith, AC4G

Introduction: When I first became interested in building electronic projects years ago, I designed one of my first designs using the 555 Timer (Reference Picture 1). This integrated circuit (IC) is one of the most versatile and popular integrated circuits available for the electronic hobbyist to use. The 555 Timer IC was introduced over 40 years ago. Due to its relative simplicity, ease of use, and low cost, it has been used in many applications throughout the years and is still widely available. Many ham radio applications (HF Transceivers, amplifiers, antenna tuners, and other amateur radio applications) use the 555 Timer today. You may ask me, what prompted me to write about 555 Timers? To be frank, when Bob DePierre (K8KI) and I began to study and analyze the schematic of my HF amplifier, there were so many IC's serving specific applications on any of several circuit boards, that I wanted to share one device with the reader that I used in the past for a different purpose.

Picture 1: The 555 Timer Integrated Circuit

Two Primary modes of operation for the 555 Timer: The 555 has two primary operating modes. The first is Monostable mode as a timer and the other is ASTABLE mode as a square wave oscillator.

a. In Monostable mode, the 555 functions as a one-shot device. Applications include not only use as a timer, but missing pulse detection, bounce-free switches, touch switches, etc. For amateur radio use, when we make or break a switch, we sure do not need the switch to oscillate on and off; hence, the necessity of a bounce-free circuit.

b. In ASTABLE mode, the 555 can operate as an oscillator. Other uses include LED and lamp flashers, pulse generation, logic clocks, security alarms, tone generation, and other general uses in amateur radio applications to name only a few examples. One example might be triggering a timer for a designated amount of time, once per cycle and continuously running until powered down.

The 555 Timer allows the ham operator to build circuits to operate a relay for a certain amount of time; cascading timers; looking for a missing pulse allowing a timing cycle to be completed, changing an output state; and the list goes on. The devices are very handy in ham applications as well as commercial and military applications as I have already alluded.

Internal Block Diagram of the 555 Timer Chip: The 555 Timer is made up of 23 transistors, two diodes, and sixteen resistors on a silicon chip making up an 8-Pin, Mini Dual In-line Package (DIP). A 14-Pin DIP combining two 555 Timers on a single chip is available as the 556 Timer chip. These packages are also available in the low power version packages. Figure 1 on the next page shows the PIN-Out of the 555 Timer and internal block diagram.

Parameters for Consideration: The standard 555 has a few characteristics that are undesirable for battery powered circuits. It requires a minimum operating voltage of 5V and relatively high quiescent supply current. As the 555 produces output transitions, it produces current spikes of up to 100 mA. Additionally, its input bias and threshold current requirements impose a limit on

A 555 Timer Refresher (continued)

the maximum timing resistor value, which limits the maximum time interval and ASTABLE frequency.

Low Power 555 Versions Available: Low power CMOS versions of the 555 timers (such as the 7555, TLC555 and the programmable CSS555) were developed to provide improved performance, especially in battery powered applications. They are pin compatible with the standard 555 device, have a wider supply voltage range (for example 2V to 16V for the TLC555) and require significantly lower operating current. These ICs are also capable of producing higher output frequencies in ASTABLE mode (1-2 MHz depending on the device) and significantly longer timing intervals in Monostable mode.

These devices have low output current capability compared to the standard 555. For loads greater than 10 – 50 mA, one may need to add a current boost circuit between the 555 output and the load.

555 Signals Discussed: The left side of Figure 1 shows the internal block diagram of the 555 Timer IC, while the right side shows the input and output signals of the 555 Timer as they are arranged around a standard 8-Pin DIP typically in a plastic package. The following discusses the 555 signals for each pin on the IC.

Pin 1: Ground (GND) - This pin is connect ed to circuit ground.

Pin 2: Trigger (TRI) - A low voltage (less than 1/3 the supply voltage) applied momentarily to the Trigger input causes the output (pin 3) to go high. The output will remain high until a high voltage is applied to the Threshold input (pin 6).

Pin 3: Output (OUT) - In output low state the voltage will be close to 0V. In output high state the voltage will be 1.7V lower than the supply voltage. For example, if the supply voltage is 5V output high voltage will be 3.3 volts. The output can source or sink up to 200 mA (maximum depends on supply voltage).

Pin 4: Reset (RES) - A low voltage (less than 0.7V) applied to the reset pin will cause the output (pin 3) to go low. This in put should remain connected to VCC (supply voltage) when not used.

Pin 5: Control voltage (CON) - You can con trol the threshold voltage (pin 6) through the control input (which is internally set to 2/3 the supply voltage). You can vary it

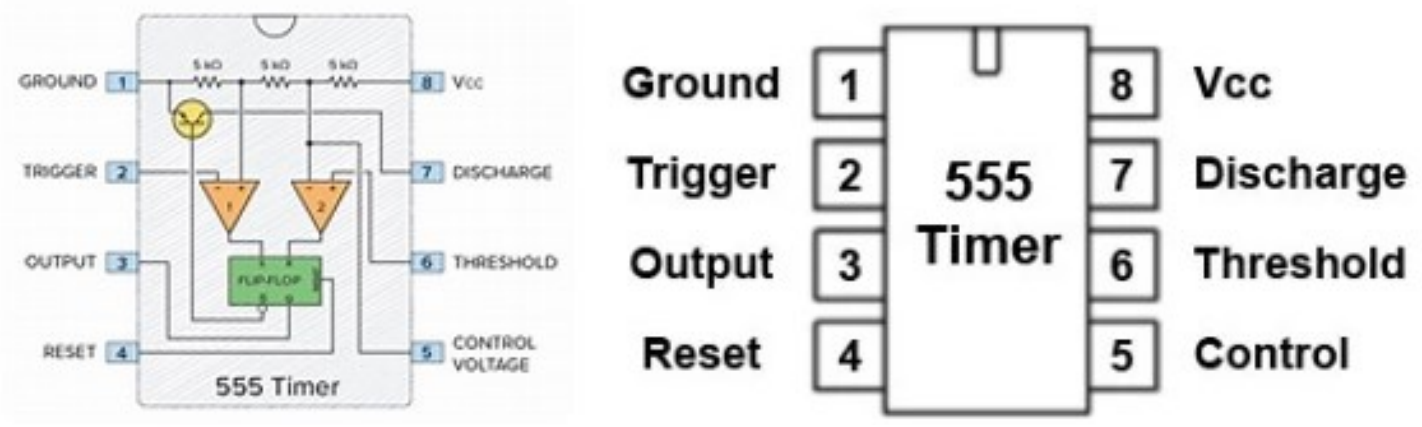


Figure 1: 555 Timer Internal Block Diagram and PIN-Out

A 555 Timer Refresher (continued)

from 45% to 90% of the supply voltage. This enables you to vary the length of the output pulse in Monostable mode or the output frequency in ASTABLE mode. When not in use it is recommended that this in put be connected to circuit ground via a 0.01uF capacitor.

Pin 6: Threshold (TRE) - In both ASTABLE and Monostable mode the voltage across the timing capacitor is monitored through the Threshold input. When the voltage at this input rises above the threshold value the output will go from high to low.

Pin 7: Discharge (DIS) - When the voltage across the timing capacitor exceeds the threshold value, the timing capacitor is discharged through this input.

Pin 8: Supply voltage (VCC) - This is the positive supply voltage terminal. The supply voltage range is usually between +5V and +15V. The RC timing interval will not vary much over the supply voltage range (approximately 0.1%) in either ASTABLE or Monostable mode.

The 555 Operating Ranges that follow apply to the NE555 (8-PIN mini-DIP). Other chip specific ranges can be found in various component supply books or online from various 555 Timer vendors.

Supply Voltage (VCC): 4.5V to 15V
Supply Current (VCC @ +5V): 3mA to 6 mA
Supply Current (VCC @ +15V): 10mA to 15 mA
Output Current: 200mA (Maximum)
Power Dissipation: 600mW
Operating Temperature: 0 to 70 Degrees C

Monostable Circuit Timing Interval Calculations: When calculating the timing interval, one uses the following formula to calculate the timing interval for a Monostable circuit:

$$t = R1 * C1$$

R1 is the resistance in ohms, C1 is the capacitance in micro-Farads, and t is the time interval. For example, if you use a 1M ohm resistor with a 1 micro-Farad (.000001 F) capacitor the timing interval will be 1 second:

$$t = 1000000 * 0.000001 \quad = 1.0$$

RC Components Selection for Monostable Operations: When choosing RC components for Monostable circuits, first choose a value for C1. Note: The available range of capacitor values is small compared to resistor values. It's easier to find a matching resistor value for a given capacitor. Next, calculate the value for R1 that, in combination with C1, will produce the desired timing interval.

$$R1 = t/C1$$

Avoid using electrolytic capacitors. Their actual capacitance value can vary significantly from their rated value. Also, they leak charge which can result in inaccurate timing values. Instead, use a lower value capacitor and a higher value resistor. Note: For standard 555 timers, use timing resistor values between 1K ohms and 1M ohms.

When I began utilizing the 555 ICs, I always breadboarded my designs before soldering components on a circuit board. The reason I did this is because in Monostable circuits where false triggering might cause problems, I tied Pin 5

A 555 Timer Refresher (continued)

(Control Voltage) to Ground via a 0.1 micro-Farad (uF) capacitor to prevent false triggering. Sometimes if my power line leads were very long, I would place a 0.1uF capacitor across Pin 8 (VCC) and Pin 1 (Ground). It makes it much easier to breadboard your design rather than soldering components on a circuit board, then trying to troubleshoot and remove and add components of different values. For myself, this usually results in a mess with the solder pads.

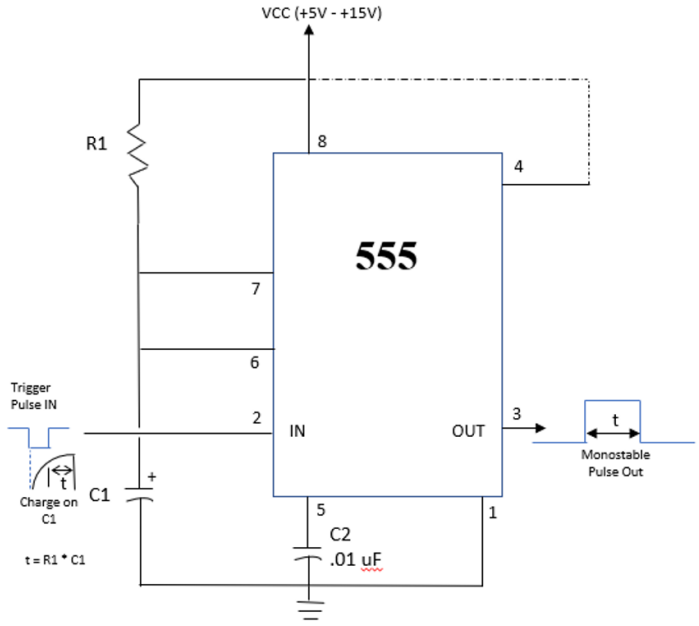


Figure 2: Basic Monostable Circuit

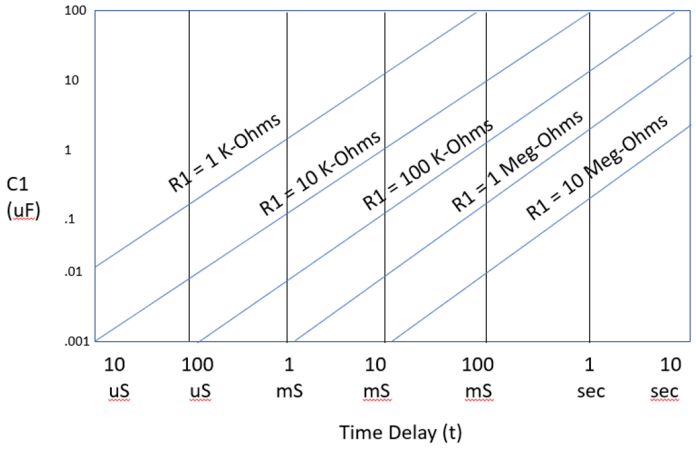


Figure 3: Basic Monostable Time Delay (t) Calculations [t=R1*C1]

Basic Monostable Circuit: The circuit for the basic Monostable circuit (better known as a "one-shot") is shown in Figure 2. A negative trigger pulse at Pin 2 (Trigger) turns off a transistor that otherwise shorts C1 to Ground. Afterwards, the output goes "HIGH" as C1 charges through R1. When the charge on C1 is 2/3 VCC, the 555 discharges C1 to Ground. The output then goes "LOW". It is best to make the "RESET (Pin 4)" and "Trigger (Pin 2)" input momentarily "LOW" to rest the timing cycle; otherwise keep "RESET (Pin 4)" at VCC. Figure 3 illustrates approximate resistance values for R1 and C1 that sets the time delay (t) of the circuit.

Basic ASTABLE Circuit: The circuit for the basic ASTABLE circuit (also known as a multivibrator) is shown in Figure 4. Pin 2 and Pin 6 are connected, so that the circuit will self-trigger itself each timing cycle. This functions as an oscillator. C1 charges through R1 and R2, but discharges through R2. The charge on C1 ranges from 1/3 VCC to 2/3 VCC. The oscillation frequency is independent of VCC.

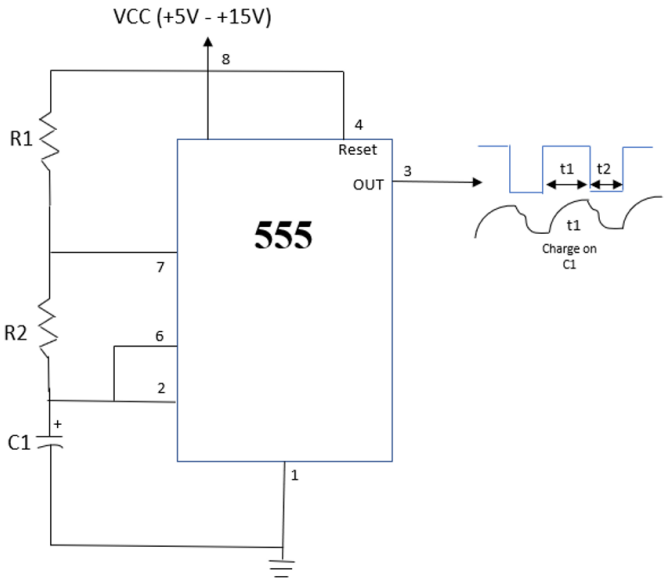


Figure 4: Basic ASTABLE Circuit

A 555 Timer Refresher (continued)

ASTABLE Frequency, Period, and Duty Cycle Oscillation Calculations: For the ASTABLE circuit, there is a time (t1) representing the time to charge capacitor C1 and time constant (t2), which is the time required for C1 to discharge. Calculating the period, frequency, and duty cycle completes the cycle of a square wave generated by a 555 ASTABLE circuit. The period (time to complete one cycle) of the square wave is the sum of the output high (t1) and low (t2) times. See Figure 5. T (total duty cycle) = t1 + t2, where T is the period, in seconds.

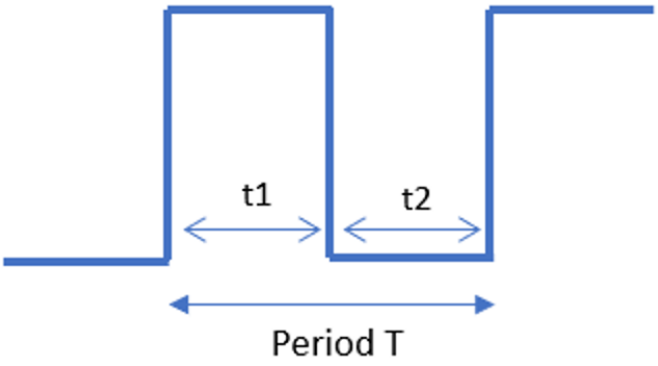


Figure 5: Square Wave Generated by ASTABLE Circuit

The output logic "high" and logic "low" times can be calculated (in seconds) using the following formulas:

$$t1 = 0.7 * (R1 + R2) * C1 \text{ [Logic "high"]}$$
$$t2 = 0.7 * R2 * C1 \text{ [Logic "low"]}$$

or, using the formula below to calculate the period directly.

$$T = 0.7 * (R1 + 2*R2) * C1$$

To find the frequency, just take the reciprocal of the period or use the following formula:

$$f = 1/T = 1.44 / (R1 + 2* R2) * C1$$

Frequency (f) is measured in cycles per second or hertz (Hz)

For example, in the ASTABLE circuit in figure 4, if R1 is 58K ohms, R2 is 580K Ohms, and C1 is 1 micro-Farad, the frequency is approximately 1 Hz:

$$f = 1.44 / (58{,}000 + 2 * 580{,}000) * 0.000001$$
$$f = 1.18 \text{ Hz}$$

The duty cycle is the percentage of time that the output is "high" during one complete cycle. For example, if the output is a "high" for t1 seconds and "low" for t2 seconds then the duty cycle (D) is:

$$D = 100 * (t1/t1 + t2)$$

The values of R1 and R2 need to be known in order to calculate the duty cycle.

$$D = 100 \, [R1 + R2/ \, R1 + 2 * R2]$$

C1 charges through R1 and R2, but discharges through R2 alone so duty cycle will be greater than 50 percent. However, you can obtain a duty cycle very close to 50% by choosing a resistor combination for the desired frequency such that R1 is much smaller than R2.

For example if R1 is 58,0000 ohms and R2 is 580,000 ohms the duty cycle will be approximately 52.38 percent:

$$D = 100 * [(58{,}000 + 580{,}000) / 58{,}000 + 2 * 580{,}000] = 52.38 \%$$

The smaller R1 is compared to R2, the closer the duty cycle will be to 50 percent. To obtain a duty cycle that is less than 50% connect a diode in parallel with R2.

Choosing RC components for ASTABLE operation include the following steps:

A 555 Timer Refresher (continued)

(Step 1) Choose C1 first

(Step 2) Calculate the total value of the resistor combination (R1 + 2*R2) that will produce the desired frequency.

$$(R1 + 2 * R2) = 1.44 / f + C1$$

(Step 3) Select a value for R1 or R2 and calculate the other value. For example, say (R1 + 2 * R2) = 25K and you select a 5K resistor for R1. Then R2 must be a 10K ohm resistor.

For a duty cycle close to 50%, select a value for R2 that is significantly higher than R1. If R2 is large relative to R1 you can initially ignore R1 in your calculations. For example, assume the value of R2 will be 10 times R1. Use this modified version of the above formula to calculate the value of R2:

$$R2 = 0.7 / f * C1$$

Then divide the result by 10 or greater to find the value for R1. It is recommended for standard 555 Timer applications, use timing resistor values between 1K ohms and 1M ohms. Figure 6 will provide a quick glance in selecting resistance values for a given frequency.

Summary: As I remember, my particular application years ago used a 555 Timer as a one-shot to trigger an SCR which allowed a television (TV) connected to an AC outlet to "power-up" the TV. This was part of a design to turn my TV "ON" and "OFF", before remote controls were around. I had to tweak the timing resistors and capacitors, to get the exact on-time I desired for my one-shot. After some experimentation, my design worked to fit my special application at the time. I trust this refresher will help each ham to better understand and/or act as a refresher to allow every ham to realize that a simple, basic IC that is part of most ham radio equipment is simple in function, but plays a significant role in every electronic circuit and application it was designed for. I am almost sure that any piece of ham gear that we all own uses the 555 timers, perhaps packaged in differing styles. This makes me appreciate this simple device that much more. By the way, in case you are interested, I reviewed the schematic of my HF amplifier and it did not use any 555 Timer IC. Timing is achieved with other components and circuitry.

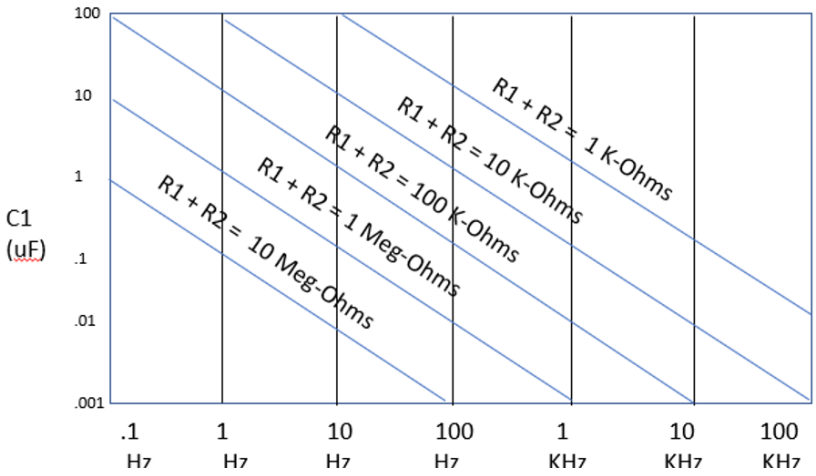


Figure 6: Basic ASTABLE Frequency Selection Guide

Upcoming NADXC meeting:

Tuesday, April 11th, 2023

5:45 PM Doors Open / 6:30 PM Meeting

Location: Museum of Information Explosion, 1806 University Drive NW, Huntsville, AL 35801 and via Zoom

New Tower Installation - Part 1

By Fred Kepner, K3FRK

Photos by Brayden Gold

I have slowly built and grown my station since I was bitten by the DX bug a few years back. I am now on my 3rd transceiver and my 2nd amplifier. I've made improvements in my coax, my tuner, microphones, and many of my station accessories along the way. As a new ham, I started off with a G5RV Jr on a pole, which allowed me to work limited DX. I eventually upgraded to a 6-band hex beam on a 22 ft mast as my primary antenna and was very happy with the ability to work DX that I couldn't before. After a couple of years, I upgraded again, this time going to a SteppIR DB11 beam. I again saw a noticeable increase in the DX I could work. I've been very happy with the SteppIR but I wanted to get it higher in the air.

I'd thought about getting a tower for a long time but knew it would require a lot of work and expense, and I wasn't ready to go down that road. A couple of months ago, I decided that it was finally time to start pursuing a tower. I bought a book on towers and tower installations and began researching the options. I quickly narrowed down what I wanted and what I thought would keep the XYL happy: something at least 40 feet tall, free-standing, collapsible, and which would tilt over to keep me on the ground (or close to it) when repairing or working on antennas. I started searching QRZ, eBay, and other online sources for used towers within driving distance. I was willing to go several hundred miles in any direction to pick one up and get it home. It became apparent that locating what I wanted, even within a couple of hundred miles, wasn't going to be quick and easy. I determined that I would keep monitoring the websites until something came up. At some point it dawned on me that we have a large and robust ham community in Huntsville and that I should reach out and ask for help. Then I remembered Bob DePierre, K8KI. I had talked with Bob about towers a few years ago and he said something to the effect of "I see them all the time, you just have to have your eyes open and be ready to act when one becomes available". It wasn't that I didn't believe Bob, but I was a little skeptical. I shouldn't have been. I sent Bob a note telling him that I was finally ready to get a tower, described what I was looking for, and asked for his help. Less than 24 hours later I got a call from Bob. Bob said he knew of a tower that was exactly what I was looking for and was potentially available. Bob then connected me with Janet Duncan, KI4WLX.

Tom Duncan, KG4CUY (SK) had installed a beautiful tower in his backyard that connected to a very nice station in the house. The 55 ft retractable tower held a Cushcraft X7 log periodic tri-bander, a Cushcraft X740 dipole add-on element for 40m, and a 3-band rotatable dipole for 12, 17, and 30m. I can only imagine the spectacular DX that Tom worked from his station. I was extremely impressed with Tom's design and installation plans as well as his notes.

In the weeks leading up to the tower removal I developed the plan that we would execute. I made many trips to Janet's house to take measurements and determine the needed tools and sizes. I also spent a good bit of time pouring over Tom's records and original installation plans. Once the plan was developed, I needed volunteers. Janet was able to secure the help of some friends with a ¾ ton truck and a heavy-duty trailer and I asked for help at the monthly NADX Club meeting. Together we were able to put together a

New Tower Installation (continued)

crew of experienced volunteers who ultimately made the entire project possible and successful. No matter how much you plan and prepare for a project of this nature, you will need help. I am incredibly thankful to each and every one of the volunteers who donated their Saturday to this project.

The biggest obstacle to taking the tower down was removing the antennas. The beam on top had an 18 foot boom and the longest element was 41 feet long. The tower can be lowered with a winch, but the antenna would not clear the structures on the property. Therefore, the antennas needed to be removed before lowering the tower. An aerial lift with a 51 foot boom (56 foot reach) was secured. The extra length allowed the lift to be located in the driveway and diagonally reach the higher of the two antennas. The reach proved to be just enough. With the boom fully extended, I was positioned below the upper antenna but could reach it with my arms extended above my head.

The 51-ft aerial lift made working on the antennas much more manageable.

We began on the day of the project by meeting and reviewing the overall plan and order of operations for the day. Janet supplied a hardy breakfast to get us going. The first step was to disconnect the coax and rotator cable and remove the cable offset brackets. This was relatively quick and easy from the bucket of the lift. The second step was to remove the Cushcraft X7 and X740 antennas from the tower. These two antennas shared the same beam and were the lower of the two antenna assemblies. I went back up in the bucket along with the tools and supplies that we anticipated needing. Removing these antennas proved to be the most difficult work of the day. Although the antenna assembly weighed only 80 lbs., the 18 ft x 41 ft footprint made handling them very difficult. I secured the antenna assembly's boom to the bucket with straps but was unable to maneuver it securely onto the boom as it had a tendency to roll to the side when I tried to move it. I was able to position it in such a way that Billy, KM4BGF and Dick, W1TV could reach the longest elements from the roof of the house. They worked together to remove the elements they could reach while I removed the elements on the front of the beam. Once most of the elements were removed, maneuvering the beam became more manageable and I was able to better secure it to the bucket. With the beam strapped to the bucket, I lowered it to the ground. The team took it to the off to the side and removed the remaining elements, making it narrow enough to transport on the trailer.

New Tower Installation (continued)

Billy (KM4BGF) and Dick (W1TV) removed elements from the roof, Fred (K3FRK) removed bolts and elements from the bucket.

Upon successfully removing the large beam and after a quick break to let my nerves calm and my legs stop shaking, I went back up in the bucket to work on the 12/17/30m rotatable dipole. I was barely able to reach it with the bucket fully extended so I carefully loosened the u-bolts, but did not remove them. I then slid the antenna down the mast to a better working position. I strapped it to the bucket, detached it from the mast, and lowered the bucket to ground. With both antenna assemblies removed from the tower, it was time to lower the tower.

US Tower designed a very clever winch system to raise and lower the tower (see Figure 1 on the next page). The winch sits on a robust metal extension that bolts onto the rear of the tower base. Two arms then attach between the metal extension and the front of the tower base to provide additional support. The winch cable runs through a pulley on the tower and returns to the extension piece. The winch's gears are designed so that it takes A LOT of turning to slowly raise or lower the tower, but it worked beautifully. After removing the 2 bolts holding the rear of the tower to the base and one set of bolts attaching the tower to the front side of the tower base (leaving one set for the tower to pivot on), we cranked the winch and gave the tower a gentle push. The tower was easily lowered until it rested in a horizontal position on sawhorses. We removed the mast from the rotator, which remained mounted inside the tower. We then removed the last bolts attaching the tower to the base and removed the winch mechanism. The tower base was attached to the cement slab with massive bolts buried in the cement. An impact wrench quickly removed the 3 sets of double nuts, allowing the base to be removed.

Now that the tower was on the ground, it needed to be moved onto the trailer. We hoped to lift it over the wooden fence between the yard and the driveway but we were prepared to remove the fence if necessary. The tower is heavy, probably close to 1,000 pounds. We only needed to lift it a foot or two to clear the fence, but it was a lot of weight for our team to lift on our own. Instead, we utilized lifting straps and the bucket lift to reduce the amount of muscle that we needed to contribute. I maneuvered the bucket lift arm while several of the hams helped lift the tower. Bob, K8KI used a rope to help position the tower over the trailer in the driveway. After lowering the tower to the trailer, the tower and antenna parts were secured and prepared to deliver to my house. After a short drive to my house, we again used the lift to

New Tower Installation (continued)

supplement our muscle and used the rope to steer the tower, removing it from the trailer and positioning it on elevated blocks near where it will be installed.

I am currently working on the logistics and planning to raise the tower. I have secured most of the parts and materials necessary but will need to dig a rather large hole, construct the rebar cage, pour the cement, and wait at least 30 days for the cement to cure. If everything goes as planned, I expect to have the tower up and operational in early summer. Once it is up and I am able to pull myself away from working all of the newly accessibly DX, I will write part two of this article to share my experiences raising the tower.

As I said earlier, a project like this cannot be done without help. I would like to take a moment to thank Billy Gold (KM4BGF), Bob DePierre (K8KI), Brayden Gold, Dick Christiansen (W1TV), Frank Tarpley, John Stensby (N5DF), and Mike Robinson. These hams and non-hams certainly had the ham spirit! In addition to the physical help, I gained a great deal of knowledge shared with me that day. I'd also like to thank Janet Duncan (KI4WLX). Janet was a fantastic host on project day but more than that, I very much enjoyed working with and getting to know her as I planned this project. I now have a new tower and a new friend.

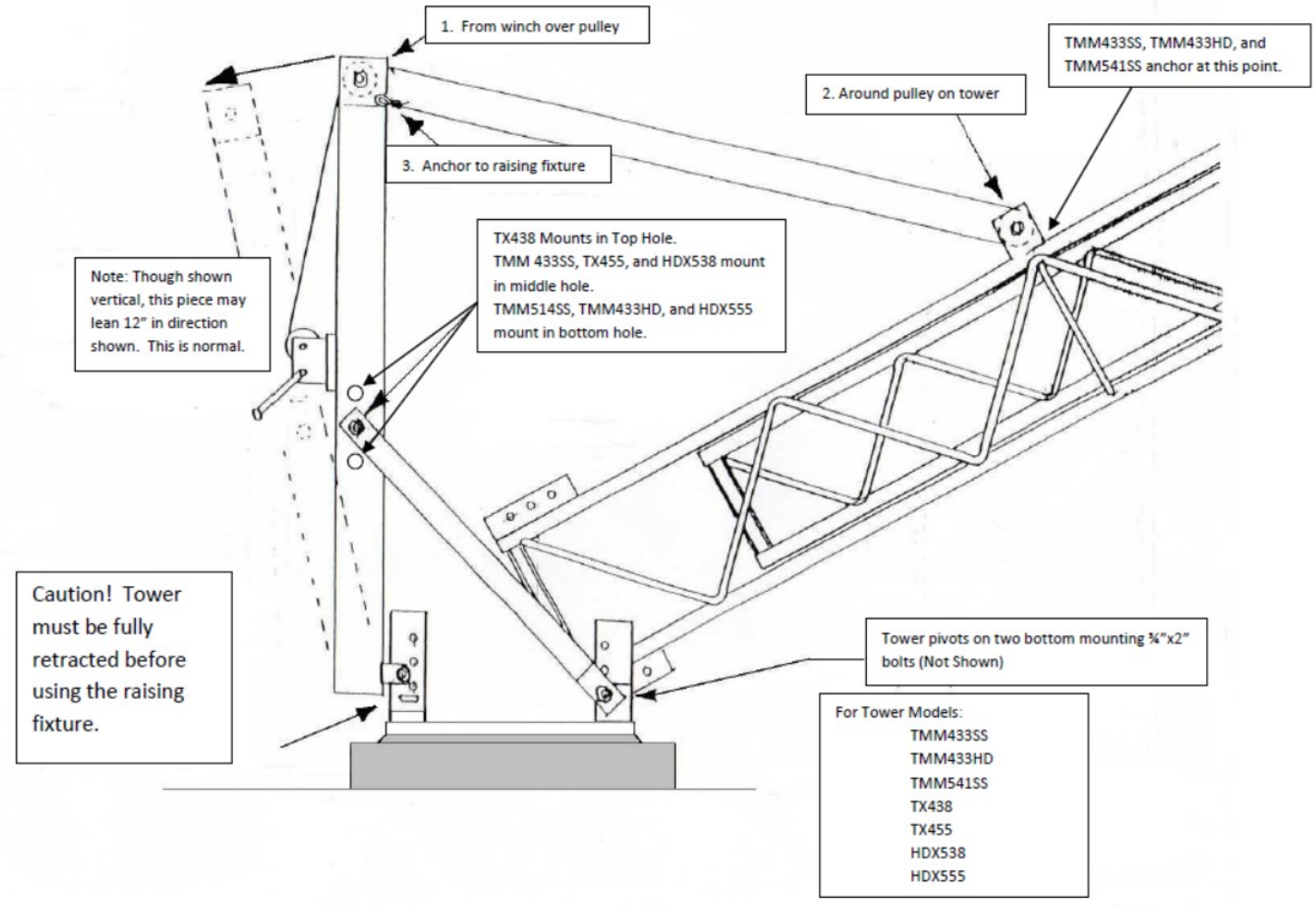
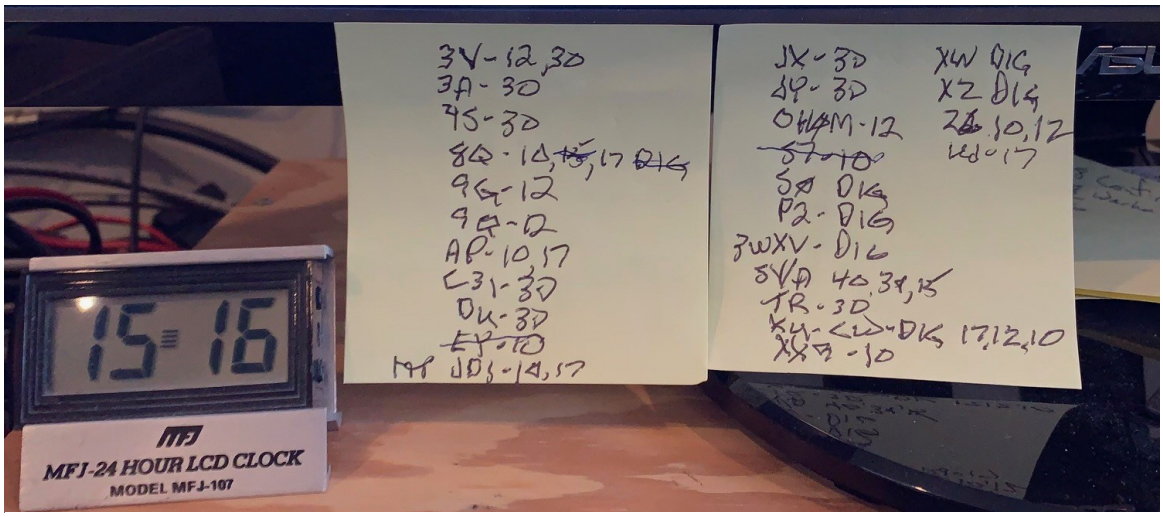


Figure 1: US Tower's winch-driven tilt over mechanism made lowering the tower easy

Need Sheet Post-Its

By Steve Werner, AG4W

Last month I heard Bruce AC4G made a need sheet to not miss some easy band countries that are needed for DXCC Challenge. With the sunspots improving most of us missed a few relatively easy ones the last time we had good propagation on 10 and 12 meters. Another change is that more hams around the world are using FT8, so a digital DXCC Honor Roll is now much more possible than when it had to be done on RTTY. Just reviewing the band countries you need will help you keep an eye out for them. Some use HRD alert to identify needed band countries or grid squares. There is no need to put band countries that require a DXpedition on the list. I decided to put my list on 2 Post-Its below my monitor. Try it and see what a difference it makes even if you have over 2500 band countries.



Steve (AG4W) keeps his needed DX next to his radio and computer

Club Business

March 2023 Meeting Minutes

by Bruce Smith, AC4G

- NADXC President Bruce Smith (AC4G) called the meeting to order at 6:33 P.M. on 14 March 2023. Bruce welcomed all members and asked if there were any guests or potential members in attendance. Bruce recognized Tim Wininger (AB4B) who was in attendance, but no guests were present. Bruce mentioned that WA4HR had received an application for membership from Jacob Sharp (KY4UD) , but that person was not in attendance to introduce themselves. Bruce also received an application for membership from Jim Johnson KC4HW who was applying for membership. Next month we will vote on these members. Bruce also thanked John Stensby (N5DF) for his presentation last month showing his Kenwood TS-890 HF Transceiver.
- Bruce covered the sign-in sheet regarding DX worked and contest participation over the past month. Both AC4G and AG4W briefly discussed the benefits of using the club repeater

March 2023 Meeting Minutes (continued)

to pass along real-time DX spotting to help club members increase their DXCC count and band country count.

- Fred Kepner (K3FRK) made an announcement requesting help from club members to assist Saturday, 18 March with the removal of his new tower and antennas from Janet Duncan's (KI4WLX) residence. Fred asked members that can help to send an RSVP to his email address.
- The NADXC Treasury Report was presented by Bruce Smith in the absence of Barry Barton (WA4HR) NADXC Secretary/Treasurer, who is out for health reasons. Bruce quickly skimmed through the February meeting minutes and proceeded to the bank balance, which is currently $8,704.94 as of 8 March. The club received dues from five members for a total of $101.34. Total expenditures included $100.00 for a donation to the Sable Island DXpedition coming soon, and $22.50 for bank checks. Billy Gold mentioned that internet costs have risen from $100 to $150.00, but the club will continue to meet its commitment to HARC to pay for half of the dues. The 2023 NADXC is on track to meet the budget with the exception of the increasing internet cost.
- For new business, Bruce mentioned that we will need to contact a speaker for the NADXC Banquet in August. He stated that a member of the Bouvet DXpedition is probably in order. Steve Werner (AG4W) stated that if we need a contact to get Adrian Ciuperca (KO8SCA), that he be willing to approach him since Steve knows Adrian and both were on the J28 MD Djibouti DXpedition together recently.
- There was not any old business to discuss.
- It was announced that the next NADXC meeting will be held on 11 April 2023 at the MIE. The speaker for next month will be Kevin Hibbs (KG4TEI) discussing 3D Printing.
- A motion to adjourn the meeting was made by Michael Werner (KF4BOG) and it was seconded by John Stensby (N5DF). The meeting was adjourned at 6:50 P.M.
- After adjournment of the business meeting, NADXC President Bruce Smith read the bios for the speaker of the March program which followed this meeting. Bruce mentioned apologies for Tom Harrell (N4XP) not being able to make it due to personnel reasons; however, after introducing Nathan Wood (K4NHW), the floor was given to Nathan who discussed several different goals that the Dateline DX Group achieved during their DXpedition to Svalbard (JW0A), all the while showing and explaining the culture and ham radio aspects of this DXpedition. After answering a few questions from the audience, Nathan concluded his program by showing us the commercial sponsors who helped financially with this DXpedition.
- The program ended at approximately 7:52 P.M.

Attendees: Rodney Durrett (AK4PR), Fred Kepner (K3FRK), Kevin Hibbs (KG4TEI), Janet Duncan (KI4WLX), John Stensby (N5DF), Steve Werner (AG4W), Bruce Smith (AC4G), Billy Gold (KM4BGF), Jared Cassidy (KQ4VT), Chuck Lewis (N4NM), Tim Wininger (AB4B), Craig Compton (K4XR), Chris Arthur (NV4B), Mic Bell (N8AU), Sandy Bell (KB0DLS), and Michael Werner (KF4BOG).

Via ZOOM: Jim Spikes (N4KH), Walt Miller (AJ6T) and Pat (K0OO), Nathan Wood (K4NHW), and another that was not recorded.

March 2023 Financial Report

by Bob DePierre, K8KI

The spreadsheet below totalizes the results from the bank and PayPal. The Targets column is the budget we voted on in February - we want to keep focus on where we're going throughout the year, so we'll keep showing this as a point of reference. The March subtotals column shows just what happened in March. The right column, Year Totals, shows how far we've gotten so far this year. This will become interesting come July as we prepare for the Hamfest. The bills for all the Recurring Expenses can/should be closed soon.

2023 NADXC Budget

Budget Category	Targets	March Subtotals	Year Totals
Year Start	8,365.65	8,646.10	8,365.65
Dues In	1,000	263.34	683.17
Recurring Exp	-683.00		
repeater elect	-160	-22.5	-22.5
web hosting/domain service	-73		-16.88
repeater maintenance	-100		
to HARC for Zoom	-50		
use of museum	-300		
Misc			-22.5
Donation of equipment to sell			
Dxpeditions	-1,000		-100.00
Picnic	-160		
DX Banquet	380.00		
venue	-600		
food	*-2,350*		
speaker	*-400*		
tickets	*3,800*		
raffle	*700*		
grand prize	*-390*		
beer/wine	*-250*		
insurance	*-130*		
EOY Bank Delta	-463		
Year End Bank Balance	7,903	8886.94	8886.94

Most of our transactions have been for membership dues. We should be finished with that by April, but as you can see, we are not. Dues payments are trickling in. We expected to collect $1,000 in dues this year, but so far we have only gotten in $683. One might argue that we're 30% behind schedule there.

Along those lines, we've gotten some complaints that the membership page of our website doesn't accurately reflect who has paid their dues. And sadly, those complaints are completely valid. The problem is that we haven't found anyone who knows how to program websites to volunteer to update that screen. If you know how, we need you badly. Any volunteers?

April Program

Kevin Hibbs, KG4TEI will discuss 3D printing and how it can be used in ham radio.

Upcoming DX Contests

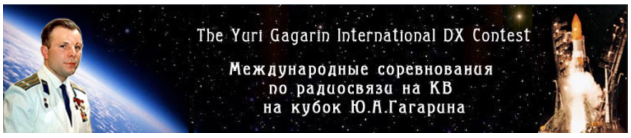
By Chuck Lewis, N4NM

OK/OM DX Contest, (SSB), (160-10M)

Apr. 8, 1200Z to Apr. 9, 1200Z

Exchange: RS plus serial; OK/OM send RS plus county code (3 letters)

See: Page 69 April QST and www.okomdx.crk.cz



Yuri Gagarin International DX Contest, (CW), 160-10M

Apr. 98 2100Z to Apr. 9, 2100Z

Exchange: RST, ITU zone

See Page 69, Apr. QST and gc.qst.ru/en/section/32

Japan Int'l. DX CW Contest (CW), (160-10M)

Apr. 8, 0700Z to Apr. 9, 1300Z

Exchange: RST plus CQ zone; JAs send RST plus prefecture

See page 69, Apr. QST and www.jidx.org

YU DX Contest (CW & SSB), 160-10M

Apr. 15, 0700Z to Apr 16, 0659Z (see website for times)

Exchange: RST plus Serial #; YUs send County or Serial

See page 69, April QST and www.yudx.yu1srs.org.rs

CQMM Contest, (CW), 80-10 meters

Apr. 15, 0900Z to Apr. 16, 2359Z

Exchange: RST, continent abbrev., category

See Page 69, Apr. QST and www.cqmmdx.com

SP DX RTTY Contest, (DIG), 80-10M

Apr. 22, 1200Z to Apr. 2234, 1200Z

Exchange: RST, plus Serial # or SP province

See Page 69, April QST and www.pkrvg.org

Helvetia Contest, (CW, SSB, DIG.), 160-10M

Apr. 29, 1300Z to Apr. 30, 1259Z

Exchange: RS(T) plus Serial # or Swiss canton

See Page 69, Apr. QST and www.uska.ch/contest

Upcoming DX Contests
(continued)

OTHERS:

IG-RY Worldwide RTTY Contest, April 8, 1200Z to April 9, 1800Z

Holyland DX Contest, April 14, 2100Z to Apr. 15, 2100Z

Dutch PACC Digital Contest, April 15, 0700Z to April 15, 1900Z

EA-QRP Contest, April 15, 1700Z to April 16, 1200Z

UKEICC DX Contest, CW, April 29, 1200Z to April 30, 1200Z

ARI International DX Contest 1200Z, May 6 to 1159Z, May 7

Dates & times often change or are misprinted in the journals; beware!

2023 NADXC Officers and Directors

President	Bruce Smith, AC4G
Vice-President	Mick Bell, N8AU
Sec./Treasurer	Barry Barton, WA4HR
Directors:	Fred Kepner, K3FRK
	Bob De Pierre, K8KI
	(Ex-Officio)

How to Join

Come to a club meeting or send in an application by mail (form on www.NADXC.org)

Monthly Meetings

Meetings are held at the Museum of Information Explosion at 6:30pm on the 2nd Tuesday of each month. Participants can also join the meeting virtually via Zoom.

This edition of The LongPath published by:
Fred Kepner, K3FRK

2023 Apr01	2023 Apr09	Mayotte	FH	LoTW	By F4IFF as FH/F4IFF; 80-10m; FT8; 100, 250w; verticals, dipole; QSL via EB7DX
2023 Apr01	2023 Apr30	Monaco	3A8AB	LoTW	By op(s) HF
2023 Apr02	2023 Apr12	Solomon Is	H44MI	LoTW	By DL2GMI; 80 40 20 17 15 12 10m; SSB RTTY, some CW; QSL via DL2GMI (B/d) or Club Log OQRS
2023 Apr03	2023 Apr08	Panama	H31W	Club Log OQRS	By EA3BT EA3WL as H31W and H31B; 40-6m; SSB CW FT8 (f/h)
2023 Apr04	2023 Apr11	Turks & Caicos	VP5	LoTW	By W0UV as VP5/W0UV; 40-10m; FT8; mini Buddipole; QSL via W0UV direct
2023 Apr09	2023 Apr12	Svalbard	JW	LoTW	By DC8TM as JW/DC8TM and DF3TS as JW/DF3TS; HF; SSB FT8
2023 Apr09	2023 Apr23	Reunion	FR	EA5GL	By FY4JI as FR/FY4JI; HF; SSB
2023 Apr10	2023 Apr22	Timor Leste	4W	TBA	By DL6FBL E77DX SP5XVY as TBD fm Dili; 40-10m, perhaps 6m; CW SSB RTTY
2023 Apr10	2023 May12	West Kiribati	T30UN	LoTW	By DX Rebel Group; 160-6m; CW SSB FT8
2023 Apr12	2023 Apr26	Bermuda	VP9KF	See Web	By G4BKI fm Baileys Bay, Hamilton Parish; HF; CW
2023 Apr13	2023 Apr28	South Cook Is	E51	Club Log OQRS	By SP9FIH as E51WEG and SP6CIK as E51CK; 40-10m; CW SSB RTTY FT8
2023 Apr15	2023 Apr16	Guatemala	TG9ADM	EA5GL	By TG9ADM; 80m; QRV for CQMM
2023 Apr15	2023 Apr16	Palau	T88UW	JH7IPR	By T88UW; QRV for CQMM
2023 Apr15	2023 Apr29	Lakshadweep Is	VU7W	TBA	By YL2GM fm Kavaratti I; 160-6m; CW SSB FT8; only FT8 on 6m; 1kw; vertical, Spiderbeam, BoG; see QSL details on Web
2023 Apr17	2023 Apr23	Belize	V31JZ/p	NN7A	By NN7A fm South Water Caye; 80-10m; mainly CW; QSL via Club Log OQRS or NN7A (B/d)
2023 Apr18	2023 Apr22	Br Virgin Is	VP2V	LoTW	By KD9TAW as VP2V/KD9TAW; 40-10m; SSB FT8; 100w; holiday style operation; QSL via Club Log OQRS
2023 Apr19	2023 Apr23	Jamaica	6Y	LoTW	By KC8WVG as KC8WVG/6Y; 40-10m; SSB; 20w; holiday style operation
2023 Apr20	2023 Apr23	Monaco	3A	LoTW	By IW1RBI as 3A/IW1RBI; 80-10m; mainly FT8, also CW SSB; QSL via IW1RBI
2023 Apr24	2023 May10	Uganda	5X2I	LoTW	By HA5AO fm Busbala; 40-10m; CW FT8, some SSB; 400w
2023 Apr27	2023 May07	Maldives	8Q7KB	LoTW	By DL2SBY fm Mushimas I; 80-6m; CW SSB+ digital; QSL via Club Log OQRS or DL2SBY direct
2023 Apr29	2023 Apr30	Andorra	C37RC	LoTW	By MM0NDX EA3NT MM0OKG; HF; CW SSB FT8; QSL via URA (B/d)