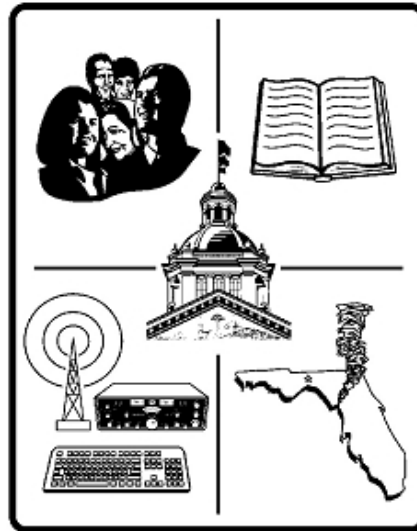


# The Printed Circuit

The Monthly Publication of the  
Tallahassee Amateur Radio Society  
April, 2020



**T**ALLAHASSEE  
**A**MATEUR  
**R**ADIO  
**S**OCIETY



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P.O. Box 37127  
Tallahassee, FL 32315

## May Club Meeting

TARS will be having our May Club Meeting on Thursday, May 7th at 7:00. This will be a new format for us due to the COVID pandemic. We will be conducting the first part of the meeting on the 147.030 repeater starting at 1900, and it will consist of the business portion of the meeting:

Approval of Minutes

Committee Reports

Treasurer's Report – Doug – KD4MOJ

Education – Phil Ashler - N4IPH

Testing Coordinator – Alan Terrell – N4KGT

Repeater Committee – Randy – AG4UU

Old Business

Field Day

## New Business

At 1930 or just after, depending on business portion of the meeting, Tom Brooks, K4TB, will present the program for the month.

He will do so using “Zoom” Teleconferencing “Using Amateur Radio Satellites”, by Tom Brooks, K4TB. Tom will demonstrate the “SatPC32” computer program for working with amateur radio satellites.”

To Connect to the Zoom Meeting:

Phone one-tap:

US: +16465588656,,91435447097# or +13126266799,,91435447097#

Meeting URL:

**<https://fsu.zoom.us/j/91435447097?pwd=UDIWdzcrOXBreXEwOFFzOU1HSkY2UT09>**

Meeting ID: 914 3544 7097

Password:571520

Join by Telephone

For higher quality, dial a number based on your current location.

Dial:

US: +1 646 558 8656 or +1 312 626 6799 or +1 669 900 9128 or +1 253 215 8782  
or +1 301 715 8592 or +1 346 248 7799

Meeting ID: 914 3544 7097

## MINUTES OF THE APRIL 2, 2020 TARS MEETING

Compiled and Submitted by: Tom Brooks (K4TB) – TARS Secretary

(NOTE: The meeting was conducted via radio net due to the Corona Virus

Pandemic.)

Call to Order: Gerry Gross (WA6POZ), as net control for the weekly TARS Information Net, opened the net at 8 PM on the 146.91 MHz repeater at 8:00 PM and turned over the net to Vice-President Todd Clark (KN4FCC) for use with the meeting.

Check-ins: Gerry (WA6POZ), Todd (KN4FCC), Jack (KC4EMS), Norm (K4GFD), Sam (KK4VTC), Clay (W4LCR), Stan (W5RSC), Tom (K4TB), Justin (KQ3O), Tim (KN4UXI), Paul (KN4TRT), Jeff (KN4TDL), Stan (K4SBZ), Ed (KN4WOW), Bob (KN4FCE), Chief (KA5USN), Ryan (KN4SCE), Larry (KN4GLF), Dave (WA4WES), Randy (AG4UU), and Don (KK4SIH)

Program: Due to the change from a face-to-face meeting to a net meeting the program was deferred to a later date. However, Secretary Tom Brooks (K4TB) did mention that the program he will present will be on “Using Amateur Radio Satellites”. He said he would primarily be demonstrating the SatPC32 satellite tracking software available free from the AMSAT Corporation at their website (amsat.org) and recommended that those interested preview the software and manual.

Business Committees:

Minutes: Secretary Tom Brooks (K4TB): Reviewed the highlights of the last meeting minutes, published in Printed Circuit. He asked that approval of the minutes be deferred until the next regular meeting.

Treasury Report: No new report. (Last month’s report was: Checking \$3,548.20, Savings \$3,101.52, Total \$6,649.72.)

Education and Testing, Repeaters: No reports.

Old Business/ New Business:

Antique Radio Donation: Todd said he did contact FSU on behalf of the club and learned they are interested in receiving the radio for FSU’s museum. However, he said he is waiting until after the Covid-19 virus problem eases before taking the radio to the museum.

Future Meetings: Todd asked if there were any suggestions on how to keep in touch during the current crises. Stan (K4SBZ) suggested we might use Zoom (an on-line conferencing program). Paul (KN4TRT) said FSU could officially host us on Zoom and has suggested that to President Don Pace (KK4SIH). Dave

(WA4WES) said he has a Zoom account which is easy to use. He and Tom agreed to get together so Tom could practice how to present his program via Zoom for a future meeting.

Field Day: Ryan (KN4SCE) said he had volunteered to be the captain of the Phone Station for Field Day and asked if we would still be doing Field Day in light of the virus problem. Todd said we would hold to see what the ARRL decides. Chief (KA5USN) said he had given Jerry (N4JL) information on Field Day support but wanted to note that the supplier of soft drinks is now retired so Chief didn't know if the company would still be supporting us.

Open Discussion/Announcements: Gerry (WA6POZ) and Stan (K4SBZ) mentioned various activities on the air that will be happening or are canceled in the near future.

Adjournment – The meeting was adjourned and the net was closed at approximately 8:36 pm.

## TARS Treasurer's Report

Submitted by Doug Ferrell, KD4MOJ, Treasurer

	for period	year-to-date
Beginning Balances:	1-Apr-20	Jan 1, 2020
Cash on hand	\$	\$
Checking Account:	\$3,853.16	\$ 2,688.20
Savings Account:	\$3,101.52	\$ 3,101.52
Total:	\$6,954.68	\$ 5,789.72

### Summary of Month's Activity:

Total Receipts:		\$ 1,380.60
Total Expenditures: -		\$ 499.82
Receipts Derived From:		
Members Dues: -		\$ 680.00
Fifty/Fifty -		\$ 42.00
Donation (KI4NBU & N1HJ)		\$ 630.00
Veteran's Radio Fund	\$	\$
Field Day Radio Fund	\$	\$
Interest (Savings)	\$ 0.39	\$ 0.39

smile.amazon.com -		\$ 28.21
Total	\$0.39	\$ 1,380.60
Expenditures:		
American Red Cross:	\$	\$
Fifty-Fifty	\$	\$
ARRL Insurance	\$	\$
Spaghetti 100 - TARC -	\$	\$
TARS & Feathers Plaque	\$	\$
Storage & Supplies	\$ 284.57	\$ 284.57
Field Day	\$	\$
VE Expenses	\$	\$
Tower Maintenance	\$	\$
Florida Dept of State		\$ 61.25
Post Office Box:		\$ 154.00
Total:	\$284.57	\$ 499.82
Transfer Checking -> Savings:		
Ending Balances - Apr 22, 2020:		
Cash on hand	\$	\$
Checking Account	\$3,568.59	\$ 3,568.59
Savings Account	\$3,101.91	\$ 3,101.91
Total	\$6,670.50	\$ 6,670.50
*Veteran's Radio Fund		\$ 500.00
*Field Day Radio Fund		\$ 697.00

## Ham Happenings

May 2020 DX

It is possible that some of the listing stations canceled their plans due to the Corvis-19

STAYHOME, NHS, THANKS and other stations are special due to CORVIS-19 and the orders to 'STAY HOME' will be on as long as CORVIS-19 is around

From To Prefix Call, () is the IOTA designation  
 01-May ??? 4K 4J0STAYHOME, 4K0STAYHOME  
 01-May ??? 5B 5B4STAYHOME

01-May ??? 5H 5H3DX  
 01-May ??? 6O 6O1OO  
 01-May ??? 8P 8P6DR  
 01-May ??? 9K 9K9STAYHOME  
 01-May ??? A6 A60SH/1, A60SH/10, A60SH/11  
 01-May ??? A6 A60SH/12, A60SH/13, A60SH/14  
 01-May ??? A6 A60SH/2, A60SH/3, A60SH/4  
 01-May ??? A6 A60SH/5, A60SH/6, A60SH/7  
 01-May ??? A6 A60SH/8, A60SH/9  
 01-May ??? CE9 RI1ANM  
 01-May ??? CT CT1STAYHOME  
 01-May ??? CU CR2STAYHOME  
 01-May ??? DU DX0STAYHOME  
 01-May ??? G GB0NHS, GB9CLD  
 01-May ??? GI GB4NHS, GB5NHS, GB8NHS  
 01-May ??? H4 H44MS (OC-047)  
 01-May ??? HA HG20AY, HG20HO  
 01-May ??? HA HG20ME, HG20ST  
 01-May ??? HS E2STAYHOME  
 01-May ??? HZ HZ1STAYHOME  
 01-May ??? KH2 KH2/KC4VBE  
 01-May ??? OH OH#PYSYKOTONA, OH#STAYHOME  
 01-May ??? ON ON4HEROES, OP2STAYHOME  
 01-May ??? ON OQ4ANGELS, OR2STAYHOME  
 01-May ??? ON OR4STAYHOME, OS0STAYHOME  
 01-May ??? ON OT20LIFE, OT2STAYHOME  
 01-May ??? P2 P29ZL  
 01-May ??? PA PC6STAYHOME  
 01-May ??? PY ZW5STAYHOME, ZW8THANKS  
 01-May ??? UA R3STAYHOME, UE20DS  
 01-May ??? VE XM2STAYHOM  
 01-May ??? VK VI2020STAYHOME  
 01-May ??? VK9/N VK9NK  
 01-May ??? YB 8A1HOME, 8C2WFH  
 01-May ??? YB YD6MCE/9 (OC-151)  
 01-May ??? YS YS1STAYHOM#  
 01-May ??? YV 4MSTAYHOME  
 01-May ??? Z3 Z30STAYHOME

01-May ??? Z6 Z60STAYHOME  
01-May 01-Jun HR HR5/F2JD  
01-May 03-May PA PD2020GP  
01-May 04-May KG4 KG4NE  
01-May 06-May VE VC2STAYHOM  
01-May 07-May PA PA75ASN  
01-May 10-May VE VE9HOME  
01-May 11-May G GB9WYH  
01-May 11-May GI GB1SOS  
01-May 11-May ON OT7STAYS SAFE  
01-May 12-May G GB9NHS  
01-May 14-Jun XU XU7AMG  
01-May 15-May 9G 9G5GS  
01-May 15-May ON OR20STAYHOME  
01-May 15-Sep YO YO19STAYHOME  
01-May 18-May UR EM65LR  
01-May 22-May G GB6NHS  
01-May 25-May TA TC1STAYHOME, TC1STAYHOME  
01-May 26-Jul XE 4A60 stations  
01-May 31-May 9J 9J2MYT  
01-May 31-May E7 E7STAYHOME  
01-May 31-May PY ZW75FEB  
01-May 31-May SP SN0KURP, SN100KW  
01-May 31-May UR EM30UCC

DX sources - The Daily DX, 425 DX News, or DX Zone

## **Contest University USA 2020 Online**

(For more information <https://www.contestuniversity.com/>)

K3LR, Tim, Contest University Chairman (aka University President) and the CTU professors are presenting their classes free of charge on Zoom Thursday, May 14. Connection details will be posted on the university's website a week ahead of time, and it will be recorded for later viewing. Here is the current lineup:

CTU will begin at 8:45 US Eastern Time (1245Z) with the welcome by W8CI, K3LR and N9JA.

9:00 – W3LPL on “Effective Low Band Receiving Antennas.”

10:00 – W2NAF, “2020 Solar Cycle Update and the HF Response to Ionospheric Storms and Traveling Ionospheric Disturbances.”

11:00 – N6TV – “Everything You Need to Know about USB and Serial Interfaces”

12:00 – lunch on your own

12:25 – K1AR – memorial reading of the Silent Keys for 2020.

12:30 – NN1C – “Exuberance and Youth Contesting – Update on what is going on.”

1:00 – W0YK – “Digital Contesting Hints & Kinks.”

2:00 – K1DG – “Optimizing Your Station for Contest Operations.”:

3:00 - N0AX – “Grounding & Bonding”

4:00 - NC0B – “Contest & DX Performance A Complex Subject Today Great RX Performance – TX Limitations”

5:00 - W3LPL – “60 Years of Competitive Contesting — the W3LPL Story”

6:00 - K3ZJ – Presentation of CQ Contest Hall Of Fame 2020

## **Contesting**

### **May RadioSport Highlights**

With the current stay at home restrictions, many radio amateurs are finding more time to devote to their hobby. There are many ways to enjoy amateur radio, but RadioSport (contesting) is the most competitive. You may compete against other testers or against yourself. Although the bands may be crowded, you can enjoy RadioSport from the privacy of your own radio shack.

May is a busy month for contesting with at least one activity every weekend. There



is only one Major contest this month, but the State QSO Parties and DX contests make up for it. WA7BNM Contest Calendar lists 81 RadioSport activities for May worldwide, more than enough to keep you busy depending on your interest – phone, CW or digital. The more significant ones are described below.

## **Preview of May Weekends**

### **May 2-3**

May starts off with a bang with four state QSO Parties and a DX contest all during the first weekend. The 7<sup>th</sup> Area QSO Party and the Deleware QSO Party both include CW, SSB and all modes of digital, whereas the Indiana and New England QSO Parties are only CW and SSB. As with all SQPs, the object for out-of-state participants is to work as many counties as possible, plus any bonus stations. The 16 states included in these four SQPs have a total of 377 counties.

There is also one DX contest this weekend. The ARI International DX Contest is a world-works-DX contest using CW, SSB and RTTY. You get no points for working your own country, 1-3 points for another country and 10 points for each Itallian.

### **May 9-10**

There are two DX contests this weekend. The CQ-M Internrnational DX Contest is a Russian contest focusing on “peace to the World.” It’s a anyone-works-anyone with higher points given to working Russian stations and maritime mobile (/MM).

The Volta RTTY DX Contest is organized to increase interest in RTTY mode and to honor the Italian discoverer of electricity, ALESSANDRO VOLTA.

There is also a State QSO Party this weekend. The Arkansas QSO Party is for CW, SSB and RTTY.

### **May 16-17**

There are four European DX contests this weekend. The UN DX Contest is a world-works-world DX contest for CW and SSB. Contacts with stations in Kazakhstan count at least double of other DX contacts.

The Baltic Contest is also a CW and SSB world-works-world DX contest. Each QSO with the Baltic countries of Estonia, Latvia, or Lithuania (ES, LY, YL) counts 10 points, each QSO with another participant counts 1 point.

The His Majesty King of Spain Contest, CW, is another world-works-world contest but this one gives you extra points for working Spanish stations. Multipliers are Spanish provinces.

For RTTY ops, there is the Aegean RTTY Contest. QSOs on 40 and 80 meters are worth 3 times those on 10, 15 or 20 meters. Everyone works everyone.

### May 30-31

The only major contest in May is on the last weekend of the month. The CQ Worldwide WPX Contest, CW, is a contest where everyone can be sought after because prefixes are multipliers. Even Little Pistols can succeed running (calling CQ), if they can find an open frequency. This is especially true the second day of the contest.

### Summary

Contest	Type	Date	Time	CW	SSB	RTTY Y	Other Digital
<b>ARI International DX Contest</b>	<b>DX</b>	<b>2-May</b>	<b>1200Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	
<b>7th Call Area QSO Party</b>	<b>QSO</b>	<b>2-May</b>	<b>1300Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	<b>D</b>
<b>Indiana QSO Party</b>	<b>QSO</b>	<b>2-May</b>	<b>1600Z</b>	<b>C</b>	<b>S</b>		
<b>Delaware QSO Party</b>	<b>QSO</b>	<b>2-May</b>	<b>1700Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	<b>D</b>
<b>New England QSO Party</b>	<b>QSO</b>	<b>2-May</b>	<b>2000Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	<b>D</b>
<b>CQ-M International DX Contest</b>	<b>DX</b>	<b>9-May</b>	<b>1200Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	
<b>VOLTA WW RTTY Contest</b>	<b>DX</b>	<b>9-May</b>	<b>1200Z</b>			<b>R</b>	
<b>Arkansas QSO Party</b>	<b>QSO</b>	<b>9-May</b>	<b>1400Z</b>	<b>C</b>	<b>S</b>	<b>R</b>	
<b>UN DX Contest</b>	<b>DX</b>	<b>16-May</b>	<b>0600Z</b>	<b>C</b>	<b>S</b>		
<b>Aegean RTTY Contest</b>	<b>DX</b>	<b>16-May</b>	<b>1200Z</b>			<b>R</b>	
<b>His Maj. King of Spain Contest, CW</b>	<b>DX</b>	<b>16-May</b>	<b>1200Z</b>	<b>C</b>			
<b>Baltic Contest</b>	<b>DX</b>	<b>16-May</b>	<b>2100Z</b>	<b>C</b>	<b>S</b>		

As you can see, this month has something for any taste, major contest or small, CW, SSB, RTTY or other digital. If you have never contested, everyone has a first time. Give one of them a try.

Before participating in any of these contests or events, please familiarize yourself with the times, frequencies, exchanges, rules, etc. associated with the event. The WA7BNM Contest Calendar (<http://www.contestcalendar.com//index.html>) can provide most of the information, as well as a link to the contest's home page, which will have the rules, give you a "flavor" for the contest and let you know about any bonus stations or plaques awarded. Alternatively, you can Google the name of the contest or event and go directly to their home page.

RadioSport (Amateur Radio contesting) is a diverse and somewhat complex subject area. If you have any questions about contesting or any suggestions or comments about this column, please address them directly to Stan Zawrotny, K4SBZ, at [K4SBZ.Stan@gmail.com](mailto:K4SBZ.Stan@gmail.com).

If you find that you are interested in contesting, consider joining a contesting club in your area. The Florida Contest Group (FCG) <https://floridacontestgroup.org/> has over 300 members throughout the state, the US and several foreign countries.

## **ARES Annual pre Hurricane Season Exercise**

The annual ARES Hurricane season exercise will be held on Saturday May 16, 2020 for 0900-1200 hours. This year will be different and will focus on the weather side of the season. That is, the scenario will have a category 3 or 4 storm hit the Florida panhandle a bit west of Panama City. It will move north and then turn east about Dothan. From there it will go to Albany where it will "park," dumping several inches of rain on that part of southern Georgia. As a result there will be widespread flooding with the Flint River reaching and surpassing flood stage.

Stations from the Big Bend, including the Capital District, will make weather reports to the National Weather Service station, WX4TAE. It will be

especially interested in the following: wind speed; rain totals; damage to include downed power lines, fallen trees, flooding, to include roads and creeks and rivers.

The exercise net will open at 0830 on the 147.03 repeater and on 3.955 MHz. The SAR net will also be used. Every hour the NWS will make weather reports.

All stations are encouraged to participate. Instructions on what to do and what to report and when will be give at the start of the exercise at 0900 on the 147.03 repeater.

## **The History of Radio-The invention of the Transistor.**

With the development of the regenerative radio, and later superheterodyne receivers in the 1910s and 20s, radio in general and amateur radio specifically made significant leaps into the 20<sup>th</sup> century. The AM radio spread throughout the United States and commercial networks, such as the American Broadcasting Corporation (ABC) and the Columbia Broadcasting System (CBS) were created and soon radio had a nationwide span. In 1924 Calvin Coolidge, the President of the United States, became the first president to use radio. Others would follow, and during the depression, Franklin D. Roosevelt would extensively use this new medium to rally the country in the depths of the depression with his regular fireside chats.

The vacuum tube remained at the center of this explosion of radios, and just as Henry Ford wanted every working man to have a car and preferably a Model T, the radio soon became ubiquitous throughout homes in the country. Families regularly would gather around the big brown box and after turning it on and letting the tubes warm up, would listen to their favorite programs such as “Amos and Andy,” “Dimension X,” or “Our Miss Brooks.” The 1930s and 40s were a golden age of radio, the high point being the night Orson Welles scared the nation with his radio rendition of H.G. Wells “War of the Worlds” in which Martians invaded the earth. The radio play was done so well and realistic that many people believed the little green men had actually landed in a farm in New Jersey. It was a simpler, more naive age.

Amateur Radio had been suspended during World War I, and after the war,

there was a movement to eliminate it altogether. Fortunately that failed to materialize, and shortly hams were back on the air. They also made the transition from spark gap transmitters and cat whisker receivers to the regenerative and later the superheterodyne radios. They also took advantage of other developments, such as the Yagi antennas (1926), the invention of coaxial cable(1929), and the discovery of the ionosphere(1923), the latter occurring after the US government limited amateur radio operators to the frequencies above 1.5 MHz. New types of oscillators were developed, such as the Colpitts and Hartely oscillators. The Federal Radio Commission was renamed the Federal Communications Commission in 1934 and assumed licensing authority over amateur radio.

In 1951, the FCC developed a four tier licensing system. The entry level or Novice class license consisted of a simple test of radio electronics and rules and regulations governing radio. It also required the prospective ham to send and receive Morse Code at 5 words per minutes. Once licensed, the new ham had specific, narrow portions of the HF spectrum(80, 40, and 15 meters) to use, and then the transmitter had to be controlled by a crystal. This limited the operator to one frequency, and many Novices had a box of crystals they used when then wanted to change the frequencies. The Novice class call sign also had an “N” after the W or K, so that everyone knew an operator was a novice with that “N.” For example, I was licensed in 1965, and my first callsign was WN6PCA. Significantly, the license was good for one year and was non renewable.

Above that entry level license was the Technician class license, The exam was more difficult than the Novice one, and it also required a 5 wpm code test. Technician class licensee were limited to the frequencies above 30 MHz.

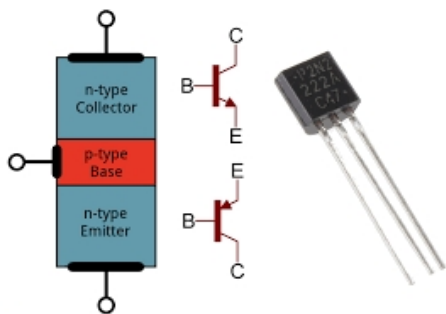
The General Class license was the “gold star” license. General class hams could send and receive Morse Code at 13 wpm, and had passed a comprehensive exam of radio theory and the rules and regulations that covered amateur radio. The license gave them the right to use any of the frequencies allocated to the Amateur Radio Service. That license was good for five years and was renewable. Hams who had been a novice got a new callsign. Mine, for example, now was WB6PCA, the embarrassing “N” having been replaced by the “B.” One of the highlights of my teenage years happened the day I opened the letter from the FCC with my new general class license and callsign.

Above that license class was the Amateur Extra. Hams who held that license

could send and receive Morse Code at 20 wpm, which was, and is, blazingly fast. They also had passed a very difficult written examination. Oddly, getting that license conferred no additional rights or privileges. That would change in 1968.

The vacuum tube had a singular problem: It got hot, and sometimes unbearably hot. It also had problems arising from its structure of wires and plates, particularly when radios were put in cars, trucks, and ships which would shake, shimmy, and vibrate. Something more reliable and which did not generate so much heat was needed.

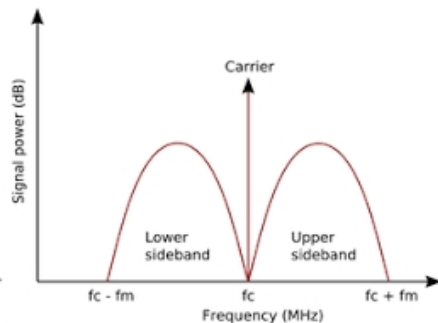
In the late 1940s, William Shockley led a research effort at the Bell Labs that would develop the transistor, a “solid state” device that would solve both problems. Initially, his team wanted to build a device in which a current would flow through a material such as Germanium, and its flow would be controlled by a field that could vary depended on the voltage applied to it. This was the “Field Effect Transistor.” Unfortunately, the materials technology did not exist at the time to realize that idea. Instead, Shockley sandwiched a negatively charged material between two positively charged wafers. As a positive voltage was applied to one of the positive wafers, the collector of this “PNP” transistor, electrons would move towards the negative side of the transistor, the emitter. To get there, they would have to flow through the thin negative slice, the base. If a voltage was applied to this slice, it acted like a grid in a vacuum tube. Hence, the transistor could serve as an amplifier because the small base voltage could control the much larger voltage at the collector.



By the 1950s the transistor began moving into electrical circuits and was replacing the vacuum tube. Amateur radios also began making the switch.

The 50s also saw the introduction of single sideband although a few hams had used it as early as 1933. Until then amateur radio operators had largely used CW and AM as their means of communication. The problem voice communications had was its tremendous inefficiency. That is the AM signal consists of a carrier and two sidebands with each sideband carrying the same voice signal. The problem arises that two thirds of the signal's power is in the carrier, which does nothing. It is simply a carrier. Each sideband has one sixth of the power.

If that problem was obvious so was the solution. Eliminate the carrier and one of the sidebands. Getting rid of the carrier was easy to do, but eliminating the upper or lower sideband had some technology problems that required expensive crystal filters. But it happened, and by the late 1960s and certainly into the 70s, the switch away from AM radio was made, so that today, it is the oddity on the airwaves, and SSB dominates the voice part of the spectrum.



Well, there are other developments. Digital radio begins in the years before the second world war with modes such as Radio Teletype, or RTTY, or RATT if you were in the military. I can remember using this mode when I was in Vietnam in the early 70s. The machines, which looked like large typewriters, would hum or clack along nicely at 45 or 50 baud. If we tried to get them to go at 75 baud parts would fly off and repairs were almost always required. In another room was a digital piece of equipment which went at the blazing speed of 1200 baud.

So, times have changed and so has the amateur radio world. Single sideband is still here, but other modulation techniques have emerged as the world switches from the analog modes of the past, such as AM, to more esoteric techniques, such as PSK, MFSK, THOR, THROB, and Contestia. The

frequencies hams use have also expanded. No longer are we primarily focused on the HF or 3-30 MHz part of the radio spectrum. With the development of the integrated circuit, radio repeaters began dotting the landscape, particularly around cities. Hams now used Walkie Talkies, or HTs. The VHF or 30-300 MHz range, which in the years before 1970, was largely a curiosity for hams to experiment with, now command most amateur interest, and the higher parts of the spectrum have become more attractive as we push beyond the limits of the ionosphere into space, and even the moon.





## TARS Officers

<b>Don Pace</b>	<b>Todd Clark</b>	<b>Tom Brooks</b>	<b>Doug Ferrell</b>	<b>Bob Clark</b>
<b>KK4SIH</b>	<b>KN4FCC</b>	<b>K4TB</b>	<b>KD4MOJ</b>	<b>K9HVVW</b>
<b>President</b>	<b>Vice President</b>	<b>Secretary</b>	<b>Treasurer</b>	<b>Board Member at large</b>
<b>dgpacer</b>			<b>KD4MOJ@</b>	
<b>@yahoo.com</b>	<b>KN4FDCC</b>	<b>K4TB</b>	<b>KD4MOJ.org</b>	<b>K9HVVW@ARRL.net</b>
<b>@hotmail.com</b>	<b>@ARRL.net</b>	<b>@earthlink.net</b>		

## **TARS COMMITTEES/COORDINATORS**

**Repeater Trustee: Randy Pierce AG4UU**

**Assistant: Doug Ferrell KD4MOJ**

**K4TLH Callsign Trustee: Dave Miner W4SKG**

**Equipment Manager: Vacant**

**Education: Phil Ashler N4IPH**

**Testing Coordinator: Norm Scholer K4GFD**