LETARC
LONGVIEW / EAST TEXAS AMATEUR RADIO CLUB

Propagation Newsletter

November 2017

ACCURATE SWR MEASUREMENTS
by Jim Ritchie - WA5OKO

The "Standing Wave Ratio" (SWR) is a ratio between the forward RF energy to reflected energy. SWR can be determined by measuring forward to reflected power voltage (VSWR), measuring forward to reflected power current (ISWR) or measuring forward to reflected power watts (PSWR).

Antenna manufacturers always include the antenna's SWR specifications. So it's not unusual that amateur radio operators rely on SWR measurements to adjust their antennas for maximum efficiency. The availability of antenna measuring instruments has grown in past years and most of these devices measure SWR and power (watts). Some of the new antenna measuring instruments can flatten your pocket book, so the inexpensive portable in-line SWR meter is still a very popular instrument.

SWR Myth – High SWR can destroy your transmitter's output stage. The true information is hidden in the "Transmission Line" section of the ARRL handbook. (2001 Handbook, page 19.4) [Now, what actually happens to the energy reflected back down the line? This energy will encounter another impedance discontinuity, this time at the generator. Reflected energy flows back and forth between the mismatches at the source and load. After a few such journeys, the reflected wave diminishes to nothing, partly as a result of finite loses in the line and by absorption at the load.] The transmitter's output stage is never subjected to reflected energy.

Directional Coupler – Resistive Bridges and current transformers can be used to measure forward and reflected RF energy, but the most common method used is the "Directional Coupler". See Figure 1.

The directional coupler is basically a section of transmission line with additional elements located in close proximity to the main line. The RF energy picked up by the sensing elements is rectified to provide a DC voltage that represents forward and reflected. Figure 2 is a directional coupler electrical diagram.
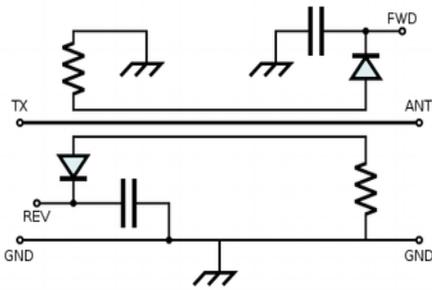

Figure 1

Figure 2

Figure 3

SWR Measurement Accuracy – Making accurate SWR measurements can be challenging because there's a multitude things that can affect accuracy.

- I have found that the manufactures accuracy specifications are not very reliable. If you have more than one instrument that can be used to check SWR, don't be surprised if they provide different reading. Phil Salas (AD5X) wrote an article that shows how to construct precision non-inductive resistors that can be used to check SWR meters. http://www.ad5x.com/images/Articles/PrecisionMismatches.pdf Phil was an electrical engineer for Alcatel who retired before I did.

- To demonstrate how different instruments can provide different reading, I measured my 40m inverted V at 7.125, 7.2 and 7.3 MHz's with a VNA, MFJ-259B and SWR meter shown by Figure 3.
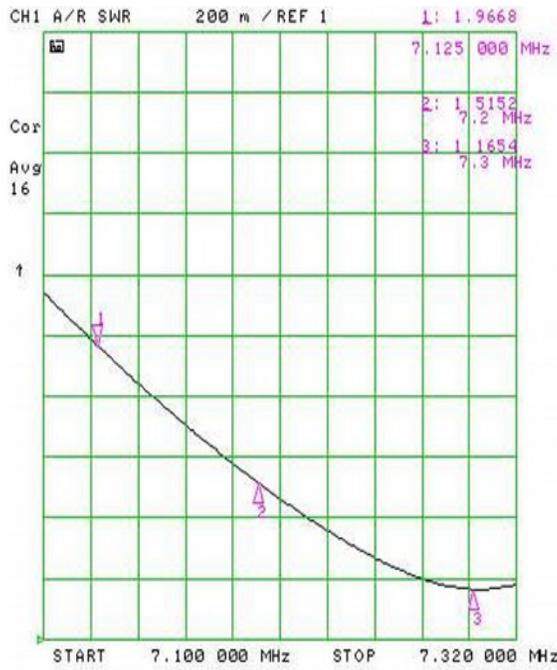

2.5:1 @ 7.12 MHz

1.45:1 @ 7.2 MHz

1.3:1 @ 7.3 MHz

The HP-8753C Network Analyzer was used because it can be calibrated to establish very accurate (5 digit) SWR measurements. VNA SWR results: 1.9668:1 @ 7.125 MHz, 1.5152:1 @ 7.2 MHz and 1.1654:1 @ 7.3 MHz's. The basic SWR meter has an accuracy spec of ± 10%, but my MFJ-259B SWR analyzer manual does not provide any accuracy specifications.
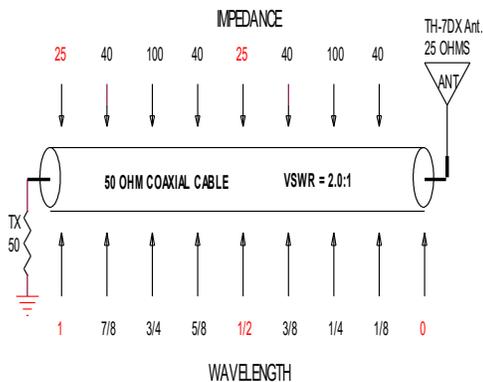
- Manufacturers never provide the instruments "Directivity" specification. This specification is the dB level of isolation between forward sensing element energy and reflected element. When this isolation level is exceeded, the forward power will influence the reflected power reading.

- If the SWR instrument is one that is inserted into the feedline, its accuracy depends how well it handles impedance mismatches. The Hy-Gain TH-7DX Tri-band beam has a maximum SWR specification of 2.0:1. A SWR of 2.0:1 calculates to a maximum impedance of 100 ohms (50X2=100) and minimum is 25 ohms (50÷2=25). See diagram on the next page. This diagram is good example of how the antenna can change the feedline impedance characteristics. If the SWR meter was inserted into this

coax feedline it could see one of these impedance extremes.

IMPEDANCE

| 25 | 40 | 100 | 40 | 25 | 40 | 100 | 40 | TH-7DX Ant. 25 OHMS ANT |

50 OHM COAXIAL CABLE   VSWR = 2.0:1

TX 50

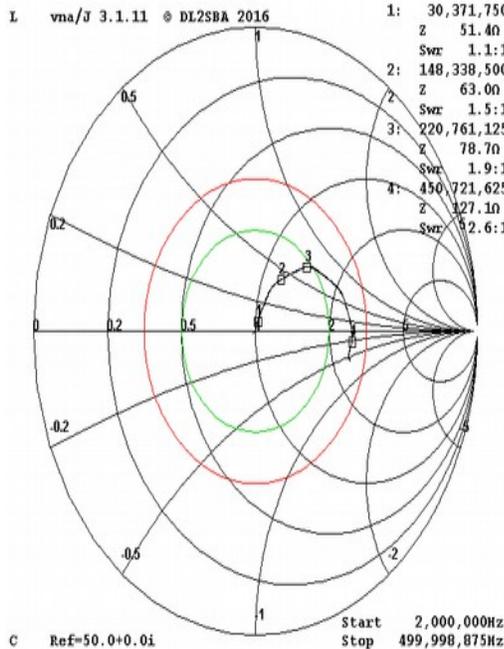| 1 | 7/8 | 3/4 | 5/8 | 1/2 | 3/8 | 1/4 | 1/8 | 0 |

WAVELENGTH

- If you are using an inline SWR meter, the meter must duplicate coaxial cable 50 ohm impedance. If the meter is using standard SO-239 connectors, it will not accurately cover VHF/UHF frequency range. MFJ is using a special SO-239 connector on their VHF/UHF SWR meters which they advertise as being an "Air Dielectric" connector. See photos. The MFJ connector center conductor is supported by Teflon, unlike the standard air dielectric connector. I have tested air dielectric connectors and most have an impedance of 46 ohms at 400 MHz's. I would be surprised if the MFJ connector would provide the performance of a true air dielectric connector. The VNA Smith Chart screen plot shows the impedance (Z) of my SWR meter across the HF band. This meter uses SO-239 connectors.

MFJ

Amphenol


```
L   vna/J 3.1.11  © DL2SBA 2016
```

```
1:  30,371,750H
    Z    51.4Ω
    Swr  1.1:1
2: 148,338,500H
    Z    63.0Ω
    Swr  1.5:1
3: 220,761,125H
    Z    78.7Ω
    Swr  1.9:1
4: 450,721,625H
    Z   127.1Ω
    Swr  2.6:1
```

```
C   Ref=50.0+0.0i         Start   2,000,000Hz
                          Stop  499,998,875Hz
```

- Checking the SWR level of a balanced antenna that is connected to an unbalanced coax cable can result in false reading if a balun was not used. Not using a balun can cause the feedline to act like part of the antenna. To check for this condition, add a few feet of additional coax between the SWR meter and transmitter. If the SWR reading changes, the feedline is acting as part of your antenna.

- I'm sure you have read that SWR measurements should be taken at the antenna. This would eliminate the inaccuracies caused by the feedline attenuation. At HF frequencies the cable attenuation is usually minimal, but at VHF/UHF the attenuation might be 3 dB. In this case, your SWR reading would be only half of the true value.

-

Antenna Tuners - Today you can buy a radio with a built-in antenna tuner or one that connects externally to your rig. Antenna tuners **do not** tune your antenna. They match the feedline impedance to the 50 ohm radio antenna port. Transceivers that incorporate automatic tuners or external units are really an extension of the transmitter's fixed matching circuit. My Kenwood TS-590SG is rated for a SWR of 1.5:1 (33.3 to 75 ohms) without the tuner and 3.0:1 (16.6 to 150 ohms) with the tuner

turned on. Some of the external tuners will handle a SWR level of 8:1. Tuners that are not connected directly to the antenna **do not** eliminate the reflected power caused by antennas impedance mismatch. The reflected power still travels back and forth until the reflected power is radiated by the antenna.

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Summary – The in-line SWR must be popular, I counted 12 meters in the Ham Radio Outlet catalog and 18 in the MFJ catalog. 12 different antenna analyzers were also available. Measuring SWR is a good way to determine the health of your antenna system. It is important that the readings are accurate. I prefer an instrument that measures SWR at the cable end that attaches to the radio. Most of these instruments also measure impedance and the impedance mismatch is what detunes the amplifiers matching circuit. If adding 2 or 3 feet of coax to my feedline moves the impedance closer to 50 ohms, it's a good move. The majority of in-line SWR meters use analog meters, while the antenna analyzers have digital displays. Digital displays play no part in the accuracy of these instruments. It's obvious that I need to do a little work on my 40m antenna!

The W8TEE/K2ZIA Antenna Analyzer

by

Dr. Jack Purdum, W8TEE

Farrukh Zia, K2ZIA

If you read in the November 2017 Article of ARRL's QST magazine, there was a nifty article about building your own antenna analyzer for about $50. This low cost analyzer seems to do much more than some commercially made units that cost hundreds, if

not thousands of dollars more. The only draw back to this analyzer is that you need to build it yourself and is a time consuming project. It is a worthwhile endeavor as a learning experience. The following is the scoop on this analyzer obtained through links contained in the QST article. The following is the user's manual and it should give a good idea of what the antenna analyzer should do.

Introduction

The W8Antenna TEE/K2ZIA Analyzer (AA) is a general purpose antenna analyzer than can measure resonance for a given antenna system. While it is possible to perform measurements on any frequency segment between 1.0 and 30.0 MHz, the AA comes pre-configured for the 160 through 10 meter amateur radio bands. The AA measures the ratio of the forward and reflect wave (or voltage standing-wave ratio, VSWR) across each frequency segment. A perfect (theoretical) match between the transmission line and the antenna impedance would be 1:1, although values under 2.0:1 are often considered acceptable. Because the VSWR of an antenna system varies with respect to frequency, the AA allows you to determine the range for each data scan.

The AA does not require an external PC or laptop for its use. The scan data are temporarily saved in memory and may be subsequently displayed in either tabular or graphic plot format on the built-in TFT color display. If the user desires, they can save the most-recent plot to an onboard SD card. Scan data that are saved to an SD card may be exported via a USB connection to another computer. The exported data is stored and exported in a Comma Separated Variables format (CSV), which can be imported easily into a text editor or spreadsheet for further analysis.

The AA can be powered by a 9V battery or a 120V-to-9V voltage adapter (e.g., "wall wart"). There are only two controls on the AA: 1) an on/off switch, and 2) the *Select* knob, which is actually a rotary encoder with a built-in switch. The on/off switch allows you to toggle between power sources. The single *Select* knob provides all of the functions necessary to control the unit.
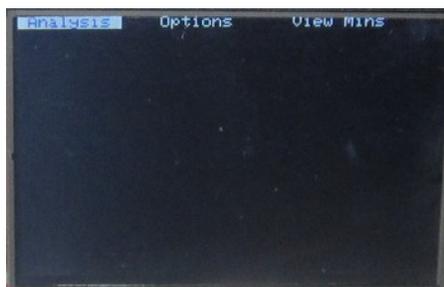
Main Menu

Figure 1

The startup screen for the AA is shown in Figure 1. This first screen shows the main menu options Figure 1. Antenna Analyzer Startup Screen across the top of the display, with the Analysis menu option currently selected on power up. The current selection is always highlighted. Turning the *Select* knob clockwise (CW) advances the highlighted selection to the Results menu option. Another CW move of the *Select* knob highlights the File menu option. Another CW move causes the highlighted option to "wrap around" back to the Analysis menu option. Likewise, if you had the Analysis menu option highlighted and turned the *Select* knob counter clockwise (CCW), the File menu option would be highlighted.

As a general rule, rotating the *Select* knob moves between menu items. In Figure 1, rotation results in movement to the left (CCW rotation) or right (CW rotation), depending upon the direction of rotation. Other menus may be

oriented in an up-down fashion (see Figure 2). In these cases, CW rotation moves the menu option towards the bottom of the display, while a CCW moves the option towards the top of the display. If the end points of a menu is reached but the same direction continued, the menu wraps around to the other end of the menu option list.

Analysis

The *Select* knob has a built-in switch. If you currently have the Analysis menu item shown in Figure 1 selected and push on the *Select* knob, the display screen changes to show you a sub-menu. This sub menu is shown in Figure 2. By default, activating a sub menu always highlights the first item in the new sub menu The first sub menu item in the Analysis sub menu is *New Scan*, followed by other sub menu items.
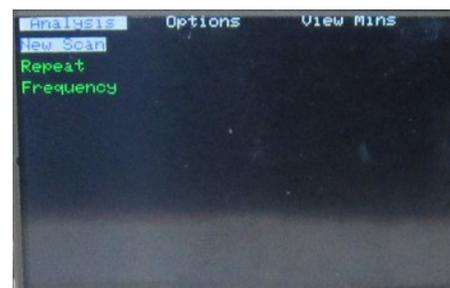

Figure 2.The Analysis sub menu

New Scan

If you press the *Select* knob as shown in Figure 2, you will select the *New Scan sub menu* option The display shows the bands covered by the AA . This is shown in Figure 3. The 40M band is highlighted in the Figure, which means you wish to run a scan on some segment of the 40M band. Once you have selected the band,

press the encoder switch to set the start and end frequencies for the scan.
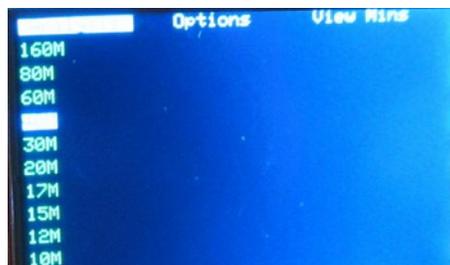

Figure 3. The minimum VSWR for all scanned bands.

Figure 4 shows the input screen for setting the scan parameters. The software knows the upper and lower frequencies for the 160-10M US bands. You can change these if need be. If you are running a scan on a new 40M antenna, you might enter a frequency below the start of the 40M band (e.g., 6500)and an ending value above 7300, just in case the antenna is resonant outside the band. This would allow you to figure out whether the antenna is too long or too short. Press the encoder after the start and end values for the scan are entered. Once the ending frequency is entered, the scan starts immediately.
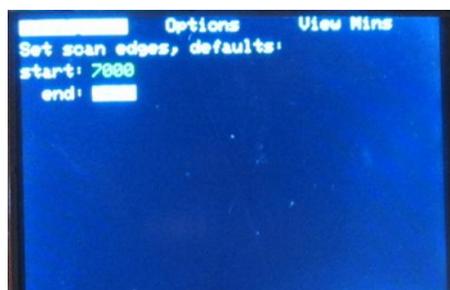

Figure 4. Inputting scan parameters.

There's a lot going on during a scan. The code divides the frequency spread into 100 equal segments. It then sets the DDS oscillator to that starting value and sends a signal to the antenna. The program takes 75 sample readings at each of those 100 frequency intervals; 7500 samples in

all. The resulting plot is based on these samples. An example can be seen in Figure 5.

Figure 5. Sample plot.

In Figure 5, you can see that we started the plot at 6.9MHz and ended it at 7.4MHz. The minimum VSWR is at 7.158333 MHz with a value of 1.15. Note that if the SWR is above 3.0, the value is NOTplotted. It is possible, therefore, that a scan will plot no data for an antenna that has its resonant frequency far outside the parameters used for the scan. Press the encoder switch to return to the main menu.

Also note that, if you want to save this scan, you should go to the *Options* menu and select *Save Scan*. (Saving a scan is explained below.) The reason for saving it now is because the data is held in memory only until the next scan is performed. When a new scan is started, the current scan data is lost. If you are tuning your antenna, you may want to save it so you can overlay this scan data with the data from a new scan after some adjustment to the antenna.

Each time you run a scan for a band, its minimum value (e.g., 7.158333 MHz) is saved in EEPROM so it can be retrieved later even if the unit is turned off. When power is again applied to the AA, the EEPROM data is read and ready for display. Note, however, that this means that previous minimum scan data is lost each time a new scan is run. This shouldn't be a burden, however, since you can save the data from each scan. Depending on the SD card you are using, you can save over 9,000 scans.

Repeat

Once you have viewed the data, press the *Select* knob again, which returns you to the main menu (Figure 1). If you re-select *Analysis* and rotate the *Select* knob CW, the menu selection moves to the next menu item (e.g., *Repeat*). The purpose of the Repeat option is to allow you to run a new scan, but using the same input parameters as the previous scan. That is, you can perform a new scan, but using the same starting and ending frequency. This is useful if you are making small adjustments to an antenna and repeatedly running scans for that antenna. The output, of course, will look similar to that shown in Figure 5.

Frequency

Frequency allows you to adjust the frequency and get a VSWR reading for that frequency. It's similar to a scan, but you enter a single frequency, and the code immediately measures the VSWR at that frequency. You can use the rotary encoder to adjust the frequency up or down and see the impact on the VSWR. This feature could be useful if you are fine tuning an antenna like a magnetic loop.

Options

The *Options* menu item activates a sub menu that, for the most part, applies to actions taken immediately after a scan is performed. These options are presented in Figure 6. The first option in the sub menu is *Save Scan*.
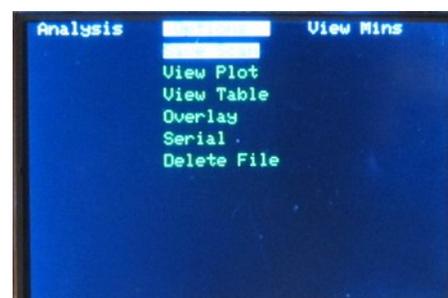

Figure 6.The Options sub menu

Save Scan

This option allows you to save the most recent scan to the micro SD card that is housed on the back of the TFT display. The maximum usable size of the SD card is 2Mb, but that's more than enough for almost everyone. The SD card is read when power is applied to the AA. Part of the startup routine checks for the presence of the SD card and to see if it is initialized. If both conditions are true, the main menu is displayed. If either test fails, a message is given telling you that the SD card either is not in the slot or formatted correctly.

The code automatically names and display the file name and saves the data from the most recent scan (which is being held in memory) to the SD card. When the data are stored on the SD card, a message is displayed telling you the data have been written to disk.

View Plot

This option lets you view a scan that has been previously stored on disk. Selecting this option requires you to select the scan you wish to view. The selection screen looks like Figure 7. You select the file by rotating the encoder switch; CW to move down the list, CCW to move up the list. Once you select the file and press the encoder switch, the plot looks essentially the same as Figure 5. Note that the data is in comma separated variables (CSV) format, which allows the data to be viewed with other programs once exported to a PC via a USB cable.
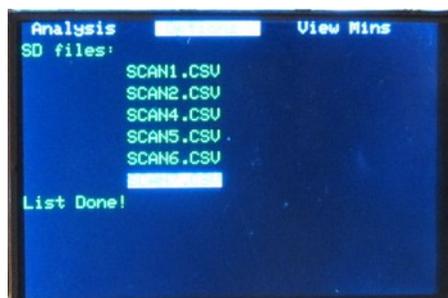

Figure 7. File selection for View Plot.

View Table

The plot data may also be viewed in tabular form. The file selection process is the same as for *View Plot*. When the file has been selected, the data are displayed in tabular format, as shown in Figure 8

Figure 8. Plot data in tabular format.

The displayed data is a compromise forced by the screen size. Fixed point notation is used for the display. For example, the first data point is **3.15 6.900.** This means the VSWR is 3.15 at a frequency of 6.900 MHz. The next sample point is **3.14 6.905**, which illustrates that the data are read across rows and then down columns. Looking closely at the data you can see the sample points are spread evenly across 5KHz increments. You can scroll the display with the encoder.

When you are done reviewing the data, press the encoder switch to return to the main menu.

Overlay

The overlay option allows you to select a previously-stored scan and overlay it onto the current scan that is stored in memory. When this option is activated, you need to select which file stored on the micro SD card you wish to overlay with the current scan. The file selection process is the same as the *View Plot* option discussed earlier. Once selected, the two plots are displayed. An example appears in Figure 9. Overlaying makes it easy to see the impact of whatever changes you made to the antenna between the two scans. Pressing the encoder

switch returns you to the main menu.

Figure 9. Overlay scan plot.

Serial

This option allows you to direct a file to your PC. Perhaps the simplest way to copy the file is to display it on the serial monitor, copy its contents, and save that as a text file. You can also just read the SD card file directly and then import it into a spreadsheet or graphics program as a CSV file. The file selection process is the same as the *View Plot* instructions.

Delete File

This option lets you delete a file from the SD card. Our experience is that we generated about a dozen files in the process of experimenting with an antenna. Once we did that, we removed the SD card and used a card reader and copied the files to our PC in case we wanted to use them at a later date. We then replaced the SD card into its slot on the display and used this option to erase all of the files on the card.

We did this not because we were running out of card space, but rather to "declutter" the SD card. Then the next time we were experimenting with an antenna, we knew that all scans pertained to the current antenna. Of course you can keep the data, but scrolling does get a little boring after a while. Selecting the file to be deleted is the same as selecting a file using *View Plot*. Once selected, you are asked to confirm that you wish to delete the file. Answering yes permanently erases the file from the SD card. Press the encoder switch to return to the main menu.

View Mins

This option allows you to view the minimum VSWRs that have been stored in EEPROM. When you select this option, the sub menu shown in Figure 10 is presented. The *All* option is currently highlighted.
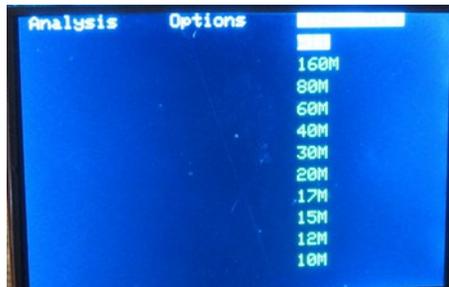

Figure 10.The View Mins sub menu

If you press the encoder switch, the display changes to that shown in Figure 11. Note that only the 80M band has scan data show. All of the rest have N/A on the right side of the display. This shows that no antenna scans have been performed on any band other than 80M. As you experiment with other bands, the minimum VSWR measured for each band is written to EEPROM. By writing it to EEPROM, the data is preserved even when power is removed.

If you had selected the 80M option in Figure 10, the results would be as shown in Figure 12. Pressing the encoder switch returns you to the main menu.

This concludes the Users Manual.

As a final note to this analyzer, the QST article provides a web link where the above user's manual, parts list and building instructions can be found. Do a search for W8TEE and K2ZIA Antenna Analyzer at http//www.qrpguys.com .

LETARC MEETINGS

City of Longview Fire Training Facility, 411 American Legion Blvd, Longview, TX

LETARC's monthly meeting held the third Saturday of each month at 0900 at the Longview Fire Training Facility at 411 American Legion Boulevard.

Talk-in on 147.34 (+136.5).

Presentations, free coffee and donuts and friendship!

Officers / Board Members

ELECTION OF NEW OFFICERS TAKES PLACE IN DECEMBER 2017

The LETARC Officers / Board Members for 2017 are:

President
Jim Quinn AA5CX

Vice President
Joe Gimbert AG5FJ

Secretary/Treasure
Carolyn Morton KF5GLT

Media Director
John Armstrong KG5LWD

Communications Director
Jim Rogers N5VGQ

Events - Ham Fests / Conventions

Source:
http://www.arrl.org/hamfests-and-conventions-calendar

Enid ARC Hamfest

HAMFEST/CONVENTION

11/04/2017

Start Date: 11/04/2017
End Date: 11/04/2017
Location: Hoover Building
305 East Oxford
Enid, OK 73701
Website: http://enidarc.org
Sponsor: Enid Amateur Radio Club
Type: ARRL Hamfest
Talk-In: 145.29+
Public Contact: Lois Fox , KC5ZCK
1831 East Maple Avenue Enid, OK 73701
Phone: 580-242-4800
Email: enidfoxes@gmail.com

Ark-La-Tex Amateur Radio Clubs
TAILGATE SALE

Start Date: 11/11/2017 – 9:00AM
End Date: 11/11/2017 - 5:00 PM
Location: Longview Fair Grounds,
 1123 Jaycee Dr,
 Longview, TX 75604

EVENTS AND CONTESTS

November 2017
 4-5 EME - 50 to 1296 MHz
 4-6 Nov. Sweepstakes – CW
 18-20 Nov. Sweepstakes – Phone

December 2017
1-3 160 Meter
9-10 10 Meter
17 Rookie Roundup–CW

Source:
http://www.arrl.org/contest-calendar

REGIONAL CLUBS

Click on underscored name to visit site.

Tyler http://www.tylerarc.org/
Nacogdoches http://w5nac.com/
Athens http://www.athensarc.org/
Cedar Creek https://k5ccl.wordpress.com/
Marshall http://marclub.net/
Minden http://www.n5rd.org/
Shreveport (ARCOS)
http://www.qsl.net/nwlarn/arcos.htm
Shreveport (SARA) http://www.k5sar.com/
Rusk County (Henderson)
http://www.ruskcountyarc.com/
Four States (Texarkana)
http://www.444sarc.org/
Palestine-Anderson County
http://www.pacarc.org/
Navarro, Freestone, Limestone and Leon County http://www.nflarc.com/
Panola County (no website)
LeTourneau University – LUARC (no website)

Other Ham Clubs

Fond du Lac Amateur Radio Club, Fond du Lac ,WI https://www.fdlhams.com/

Useful & Informative Ham Links

LETARC Web Site
http://www.letarc.org

Radio Tools and Utilities for amateur radio operators
http://www.dxzone.com/catalog/Software/Utilities/

eham.net – Product Reviews
http://www.eham.net/reviews/products/41

Android Apps - Tools
https://play.google.com/store/search?q=ham
%20radio%20tools&c=apps

ARRL
http://www.arrl.org/

Freedom Link Update

As of 7/30/2017 No updates since the
February 2017 LETARC Propagation
Newsletter.

Testing - Get Upgraded

LETARC is working with **LeTourneau University** to help with facilities for VE testing. We would like to extend our sincere appreciation to the University for helping facilitate this endeavor.

Directions to LeTourneau Campus

LeTourneau University is located on 2100 S. Mobberly Avenue in Longview, TX.

Upon entering the main entrance to the campus, turn right at the stop sign and follow the road around past the Solheim Center parking lot on the right to the first intersection. The building across the street and to your right is Glaske Center. Turn right and go to the parking lot at the rear of Glaske Center. Enter Glaske Center rear entrance and go to classroom 103.

Now that you know where the place is, why not study a little and upgrade your license. If you have a Technician's license, you can upgrade to the General. And if you pass the General exam, the VE Volunteers will offer you the opportunity on the day of your exam to test for the Extra at no additional cost.

Where: LeTourneau University Glaske Engineering Center - Classroom C103.

January is membership renewal month. Please complete the form on the following page to renew your membership and mail your check to the address shown at the top of the application. **Application on last page.**

NEW HAMS / LICENSE UPGRADES

Sabrina Pollard - Upgrade to Extra License

Christopher Dahl – Technician's License

The September 2017 Monthly Meeting

Of

The Longview/East Texas Amateur Radio Club

The September 2017 monthly meeting of the Longview/East Texas Amateur Radio Club was called to order at 9:00 am Saturday, September 16 by President Jim Quinn AA5CX. Introductions of members and guests were conducted. The minutes of the last meeting were read and approved after a motion to approve was made by Jim Rogers N5VGQ and seconded by Phillip Mullins AA5KE. The treasurer's report for the current reporting period was read and approved after a motion to accept was made by Joe Gimbert AG5FJ and seconded by John Zenter AA5OY.

Jerry Ritchie WA5OKO then presented a very informative and interesting program on RF Connectors and Impedance for Amateur Radio. Using a Vector Network Analyzer, Jerry tested a PL-259 Connector on RG-8 coax, a PL-259 Connector on RG-58 coax, an N Type Connector on RG-223 coax, a BNC Connector on RG-58 coax, and an SMA Connector on RG-142 coax. Jerry concluded that although the PL-259 presents a workable impedance at HF frequencies, the N Connector, the BNC, and the SMA Connectors are better choices at VHF and UHF frequencies. A copy of Jerry's paper is available from the club on request.

After a short refreshment break, the business portion of the meeting was held. Jim Rogers N5VGQ, the club's Communications Director, announced that work to update the repeater and antenna system at the East Mountain site will be held at a date to be determined. It will have to be done on a weekday and a ground crew of 5 people will be needed. More information will be available at the next meeting.

Information was then provided on the deployment of the EOC Mobile Unit to the Hurricane Harvey affected area. Two local hams, Paul Piccola W5BPP deployed for 1 week to help provide emergency communications and was then relieved by Mary Jane Burnet KG5PZR. This operation evolved into a desire by local authorities to have a team of trained amateur radio operators available who can deploy with the Mobile EOC to provide communications in future emergencies and events. A signup sheet was passed around for those who are interested.

A discussion was then held on the upcoming Tailgate Sale on November 11 alongside the Longview Trade Days. There will be 60 spaces available at no charge for those wishing to set up and sell surplus gear. More information will be available at the next meeting.

The LETARC Board of Directors was asked to participate in a Skype meeting with the Fond du Lac Amateur Radio Club in Oshkosh, Wisconsin to provide them with the procedure for acquiring 501C3 status and the benefits of being a nonprofit.

The need for a committee to solicit funds for needed projects such as a radio room was discussed. Richard Brown K5RRB agreed to head up the committee and anyone available to help should see Richard.

Testing will be held this afternoon at 2:00 pm at LeTourneau University. All available VEs are welcome to assist.

Cracker Barrel was chosen at the site of the next Sunday evening meal, Oct. 1 at 6:00 pm.

The meeting was adjourned at 11:00 am.

LETARC Treasurer's Report Next Page

<u>**Treasurer's Report for**</u>

<u>**September 16, 2017 to October 19, 2017**</u>

Brought forth from the last reporting period: $6,542.05

Income for this period: $65.00

 Membership Dues:

  James Turner $25.00

  Donation from Solar Eclipse Party $40.00

Expenses for this period:

  Donuts for monthly meeting (Shipley's) $27.46

  Storage Unit Fee (Alpine Storage) $135.00

    Total Expenses $162.46

Ending Balance (as of September 16, 2017): $6,444.59

LETARC CALENDAR

NOVEMBER 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5 DINNER		7	8	9	10	11
12	13	14	15	16	17	18 LETARC MEETING VE TESTING
19	20	21	22	23	24	25
26	27	28	29	30		

Calendar Detail

Sunday , November 5, 2017 , 6:00 PM–Posados 110 Triple Creek Cir, Longview, TX 75601

Saturday, November 18, 2017, 9:00 AM – LETARC Monthly Meeting - City of Longview Fire Training Facility, 411 American Legion Blvd, Longview, TX.

Saturday, November 18, 2017, 2:00 PM – VE Testing LeTourneau University , Glaske Science and Engineering Building, Rm 103, 2100 S. Mobberly Avenue in Longview, TX.

LETARC MEMBERSHIP APPLICATION
PO BOX 5613
LONGVIEW, TX 75608-5613

Membership: * New   * Renew   **Calendar Year: 2017**

Date: _____

CALL SIGN: _____   **LICENSE CLASS:** _____

LAST NAME: _____   **FIRST NAME:** _____   **MI:**

_____

ADDRESS: _____

CITY: _____   **ZIP:** _____

TELEPHONE: _____   **CELL PHONE (optional):** _____

E-MAIL ADDRESS: _____   **DATE OF BIRTH:** _____

ARRL MEMBER?   * YES   * NO

==

TYPE OF MEMBERSHIP (check one)

- **Full Membership: $25.00 per year. A full member shall be an FCC licensed Amateur Radio Operator**

- **Family Membership: $35.00 per year. A family membership is available to members of the same family, provided they reside at the same residence. Each member has the same privileges and same membership requirements as a full member.**

Privacy: Member names, addresses, (including e-mail addresses and other personal information shall not be supplied to any third party without expressed consent of the individual.

Signature: _____   Date:_____

===

Please list **all** of your Amateur Radio **Interests**: [Examples: Contesting, CW, 6 meter, 1.2 GHz, Kit building, ISS, AMSAT, Emergency Communications].

_____

_____

_____

_____

_____

Entered master database;__   Confirmation letter sent:__   Entered master email list:___
For use by LETARC