Lewisville Amateur Radio Association

"THE ARRAY"

MARCH 2020

From the President's Shack, Ron Ford, KF5OMH:

Roger, AE5EZ, gave a great presentation entitled CW On A Dime – Iambic Keyer at the February meeting. Check it out on the W5LVC.org web site at this link -- https://w5lvc.org/presentations. Thanks to Roger for filling in with this presentation when our original presenter was not able to attend.

Speaking of presentations – Do you have a favorite subject you would like to share with your fellow members? The presentation does not need to be fancy with a lot of animated slides; in fact, you don't need any slides, a simple "show and tell" will work just fine. Or, have you seen or heard a presentation at another club or ham fest that you think our members would enjoy? In either case contact Roger, AE5EZ at ae5ez.radio@gmail.com and he will work out the scheduling.

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Web Site: W5LVC.org

Check us out
facebook.com/w5lvc/

Lewisville Amateur Radio Association
Is a 501(c)(3) organization

LARA Upcoming Events

Business Meeting

8:00 AM Saturday
March 21, 2020
Lewisville Central Fire Station
188 North Valley Parkway
Lewisville, TX

Weekly Nets

"Information and Help Net"

Wednesday, 7:00 PM on 145.170
PL 110.9, -.600 repeater

Saturday Breakfast

(except 3rd Saturday)

Main Street Cafe
208 E. Main Street
Lewisville, TX 75057

Association Contact Information

Email: W5LVC.Club@gmail.com

Mailing Address:

LARA, P.O. Box 292282
Lewisville, TX 75029

Welcome New Members

Robert Myers, AD5KI

Barbara Myers, AD5OC

2019-2020 Officers

President
Ron Ford, KF5OMH
rfavcon@verizon.net, 972-742-7839

Vice President
Roger Carver, AE5EZ
Ae5ez.radio@gmail.com, 817-966-3412

Secretary
Ron Swain, KG5VIV
Lronswain@gmail.com, 210-410-2008

Treasurer
Clark Highsmith, K5LGX
alacrity@bennoah.net

Technical Director
Jim Horton, WB8YWA
wb8ywa@arrl.net, 972-523-8467

Operations Director
Mike Reitz, W5EVT
w5evt@sbcglobal.net, 214-535-1368

VE Coordinator
Steve Kline, W5JK
skline4@verizon.net, 972-679-6288

Public Information Officer
Mike Weston, KI5DLF
meweston55@gmail.com, 460-781-5803

Youth Education Coordinator
Perry Abernathy, NE5ET
desertyachter@gmail.com, 505-221-3993

Newsletter Editor
David Jackson, W5YS
w5ys@aol.com, 940-345-0060

"THE ARRAY"

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Association membership is open to all persons interested in amateur radio. Join at any meeting, by mail or on-line through our web site. Annual dues are $25 individual, $30 family.

Technical Director

Jim Horton, WB8YWA

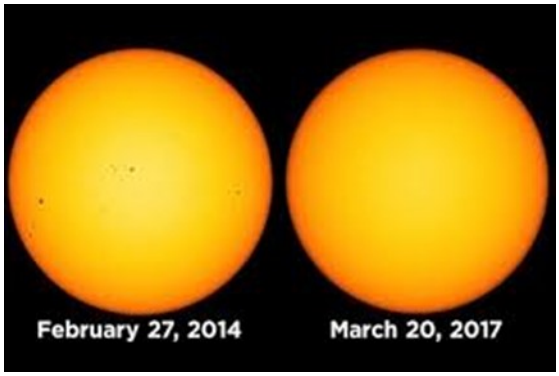
Are you ready for the next Sunspot Cycle?

By Jim Horton WB8YWA

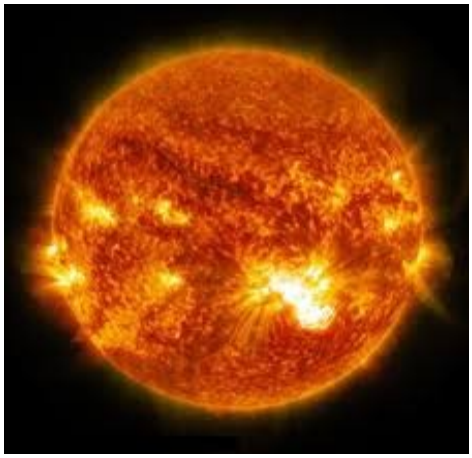
In our communications world we rely on the sun to provide paths for us to communicate through the HF frequencies including the beginning of VHF, 50 MHz or 6 Meters.

There is a known pattern that happens at our Sun known as Sun Spots that help create the Ionosphere condition to reflect our signals. On top of that the amount of Sun Spots happens in an 11 year cycle. No one really knows why. Right now we are at the lowest activity of Sun Spot Cycle 24 and most feel the beginning of Cycle 25 has started. Each cycle has different levels and it is not always exactly 11 years.

Here are images of the sun with no sun spots.



Here is images with huge sun spots, date unknown.



Now a total understanding of the sun solar flux and activity is beyond the scope of this article but it will shed some interest and understanding on the subject. It will also show you where you can go and learn this fascinating science. Here are a few of the numbers and items that are being measured.

SFI – Solar Flux Index – range from 62.5 to 300. This is measured at 2800 MHz – good indicator of F layer which gives us most of our HF DX. Greater the number the higher the frequency of DX. Value today is 70.

SN – Sunspot Number – range from 0-250 – loosely follows correlated SFI. SN today is 0 zero

A Index – provides a daily average level of geomagnetic activity. Range is from 0-400 – Today the A Index was 3. When used with K Index high, both high numbers indicate the geomagnetic field is unstable and HF signals are prone to sudden fades and some paths may close while others open up abruptly with little warning.

K Index – measures disturbance in the horizontal component of earth's magnetic field. Range is from 0 to 9. As said above used with A Index. Value for today is 1.

So what are the bands like when we are in the low sun Spot time of the cycle to what are they like when we are in the high time of cycle.

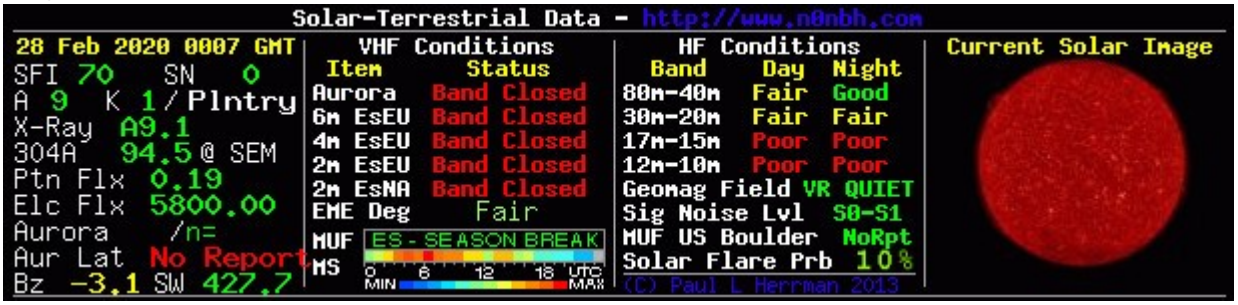
Low Sunspot activity – The lowest frequency (160, 80 & 40) are less affected whereas the higher frequency are greatly affected. Almost every day during the day light hours and right after dark 20 meters is open and offers DX. The higher bands are open for a very short time and you need both stations on the air to know they are open. FT4 & 8 are open for communicating, and there is no activity on CW or voice. Good reason to call CQ.

High sunspot activity – The lowest frequency (160, 80 & 40) are more stable, less fading and maintain the same from day to day. 20 meters up through six meters is open almost every day and 20 will stay open long into the night time hours.

So where do you go to find these numbers and our conditions?

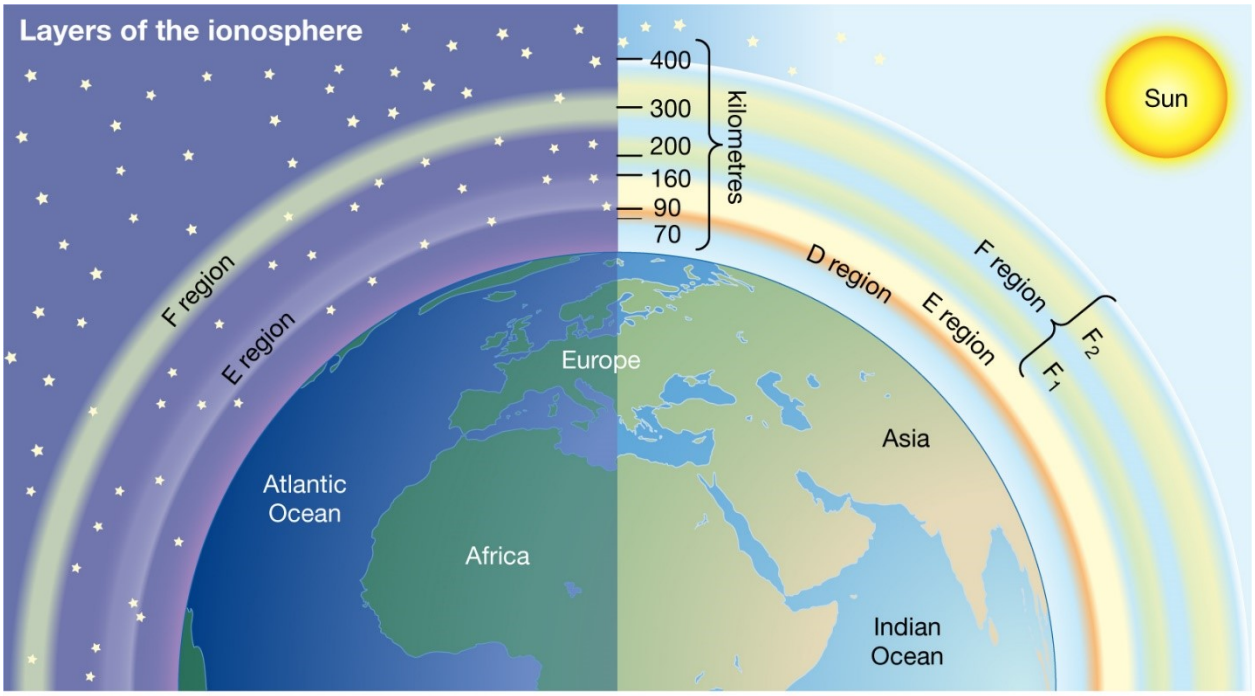
One good place is the front page of QRZ.com. Third column over is 'Solar – Terrestrial Data provided by NONBH. You will find all of the above data and more. Also on QRZ.com you will find a Solar report from the Space Weather Women or just search for the Space Weather Women for detail reports on the sun's activity.

Image of the NONBH taken off QRZ.COM 2/23/2020.



Notice the SFI of 70, SN of 0, A=9 & K=1. There is also a section for HF Conditions.

Here is an image of the Ionospheres D-F Layers. Notice the change from daylight to dark. This is the reason for longer paths during the night time for our lower frequency bands (160-40 meters).



So the question was, are you ready? It is now the time to get your antennas tuned to the higher frequency, maybe for the technicians get on 10 and 6 meters and get ready for worldwide communications. Another 11 years and we will be right back to where we are today. Isn't ham radio a fascinating hobby?

The President's greeting, from page 1

Do you like our newsletter? – How about contributing to it? Do you have a ham radio related story you would like to share? Maybe a technical piece of some kind? Have you introduced a new piece of equipment to your shack? Tell us about it. You certainly do not have to be a polished journalist to submit articles; just write it up and send it to David, W5YS, at W5YS@aol.com.
Have you sent in your officer nominations? The nomination period will close on March 31 at 1700 (5:00 PM) with ballots being distributed shortly thereafter and voting will close April 17 at 1200 (12:00 PM). Self-nomination is acceptable or you can nominate another willing individual. Use of the automated nomination form is preferred but, if you mis-placed it, contact Steve, W5JK, the Election Coordinator. If you would like to see what an officer's meeting is like, the next one is March 17, 5:30 PM at the Main Street Café in Old Town Lewisville. Come on out and join in.
Summer Field Day – we're in need of an individual to coordinate our Summer Field Day event. Conner Pavilion at Lake Park has been secured for the occasion but we're in need of an individual or two or three to coordinate the details. This is a great opportunity for someone to get some experience at leading one of our popular events. Don't think you have what it takes? Sure, you do! Several of the officers are more than willing to help you work through it and be successful.
By-law revision – At the February meeting the following revision to the LARA By-laws was proposed:
Article V, currently reads:

> **"G) No individual member may hold more than one (1) elected office concurrently."**

The proposed revision, incorporating comments from the membership, reads:

> **"G) One individual member may hold no more than two (2) elected offices and will have only one vote when voting on matters of question. The offices of President and Vice President cannot be held by the same member."**

A vote for approval of the membership will be taken at the March 21 Membership Meeting.
Looking forward to seeing everyone at the meeting on March 21. Dale, KB5NFT, will present Rig/PI. Come out and bring a guest.

73, Ron KF5OMH

Treasurer's Report

Clark Highsmith, K5LGX

Greetings friends and members of LARA. Spring is just around the corner and activity is picking up on the bands. In coming weeks and months there will be many major contests including the CQ World Wide Contest, many QSO parties, and an increasing number of park activations including the Texas State Parks on the Air event sponsored by LAARK.

February was a good month for revenue. We had several members renew in addition to gaining several new members. At last count, our active full memberships stand at 49. In addition to dues, we received a modest Amazon Smiles donation, a deposit refund from our Winter Field Day event, and proceeds from the sale of a donated radio.

I look forward to seeing you at the March meeting.

Clark Highsmith
LARA Treasurer, K5LGX

LARA Treasurer's Report--February 29, 2020

Checking Account				
Beginning Balance				$2,718.91
Income				
	Dues		$160.00	
	Donations		$8.18	
	Events		$50.00	
	Miscellaneous		$75.00	
		Total Income	$293.18	
Expenses				
	Paypal Fees		$6.46	
	Events		$0.00	
	Club Equipment		$0.00	
		Total Expenses	$6.46	
Ending Balance				$3,005.63
Petty Cash (Included in balance)				$0.00
Club Assets				
	For Sale	$0.00		
	Stock (Not for Sale)	$3,009.34		
	Loaner Equipment	$375.00		
			$3,384.34	
LARA NET VALUE				$6,389.97

Support LARA with AmazonSmile

AmazonSmile is a simple and automatic way for you to support your favorite charitable organization every time you shop, at no cost to you. When you shop at smile.amazon.com, you'll find the exact same low prices, vast selection and convenient shopping experience as Amazon.com, with the added bonus that Amazon will donate a portion of the purchase price to LARA. To shop at AmazonSmile simply go to smile.amazon.com from the web browser on your computer or mobile device. You may also want to add a bookmark to smile.amazon.com to make it even easier to return and start your shopping at AmazonSmile. The AmazonSmile Foundation will donate 0.5% o the purchase price from your eligible AmazonSmile purchases. On your first visit to AmazonSmile (smile.amazon.com), you need to select Lewisville Amateur Radio Association as the charitable organization to receive donations from eligible purchases before you begin shopping. AmazonSmile will remember your selection, and then every eligible purchase you make at smile.amazon.com will result in a donation to LARA.

Kroger Rewards

If you shop at Kroger and are a member of their Rewards Program you can also support LARA by selecting Lewisville Amateur Radio Association as your charitable organization of choice. Simply sign in to your account and select us and Kroger will donate 0.5% of your eligible purchases to LARA.

Matching Funds

Many employers will match hours that employees spend supporting a non-profit with donations to that non-profit. If your employer has such a program LARA may qualify to receive these types of funds as we are an approved 501 (C)(3) organization. So, you're retired? Some companies even support a program of this nature for their retirees. Check with your current, or former, employer to see if they have a program of this nature.If 501 (C)(3) details are needed contact the club treasurer.










Area Repeaters

FREQ	SHIFT	PL	CALL	NAME	ALLSTAR
144.9100	none	none	W5NGU-4	DCARA DIGIPEATER DENTON	
144.9900	none	none	KC5GOI	DCARA DIGIPEATER ROSSTON	
144.9900	none	none	KD5EOC-10	DCARA WL GATEWAY	
145.1700	-0.600	110.9	W5FKN	DCARA DENTON COUNTY EOC	
145.2100	-0.600	110.9	N5MJQ	METROCREST ARA CARROLLTON	
145.4000	-0.600	110.9	NETARC	GRAPEVINE	
145.4900	-0.600	85.4	WD5U	ROSSTON TOWER	41089
146.6200	0.600	110.9	N5ERS	GRAPEVINE	
146.7800	0.600	131.8	WQ5A	WISE COUNTY SKYWARN	
146.9200	-0.600	110.9	W5NGU	DCARA DENTON	41087
146.9400	-0.600	110.9	K5FTW	FT. WORTH SKYWARN	
147.3800	0.600	110.9	K5LRK	LAARK THE COLONY	47668
147.4500	-1.000	none	W5NGU-C	DCARA EOC D*STAR "C"	
147.4900	-1.000	none	KE5YAP-C	DCARA ROSSTON D*STAR "C"	
147.9700	none	none	K5YX-10	WINLINK GATEWAY	
224.0000	-1.600	110.9	K5LRK	LAARK THE COLONY	
224.2000	-1.600	110.9	KE5GDB	DCARA DENTON	43409
224.9200	-1.600	110.9	AF5RS	AF5RS	43784
440.6625	5.000	none	N5LS	DMR MARC CC1	
440.6875	5.000	none	W5NGU	ROSSTON DMR MARC CC1	
440.7125	5.000	none	KE5YAP-B	DCARA ROSSTON D*STAR "B"	
441.3250	5.000	88.5	W5NGU	PORTABLE DCARA REPEATER	
442.1750	5.000	110.9	NETARC	SOUTHLAKE	
442.6000	5.000	131.8	WQ5A	WISE COUNTY SKYWARN	
442.6500	5.000	110.9	N5MJQ	METROCREST ARA CARROLLTON	
442.7500	5.000	110.9	KA5R	TROPHY CLUB	
442.9250	5.000	none	W5NGU-B	DCARA EOC D*STAR "B"	
443.2250	5.000	110.9	N5ERS	DECATUR	
443.3000	5.000	110.9	K5LRK	LAARK C4FM ONLY	
443.5250	5.000	118.8	WA5LIE	DCARA DENTON	
443.7375	5.000	141.3	N6LXX	ROSSTON TOWER	
443.8250	5.000	103.5	KC5BY	COPPELL HIGH SCHOOL	40666, 50187
443.8750	5.000	110.9	NETARC	DFW AIRPORT	
444.0500	5.000	110.9	W5NGU	DCARA DENTON COUNTY EOC	
444.2250	5.000	110.9	K5CFD	COPPELL	
444.5125	5.000	123.0	KE5UT	CELINA	
444.7000	5.000	110.9	NETARC	SOUTHLAKE	
444.8500	5.000	110.9	N5ERS	GRAPEVINE	
927.0500	-25.000	110.9	W5FKN	DECATUR	
927.4125	-25.000	432.0	N5LS	DENTON	
927.6125	-25.000	110.9	W5NGU	DCARA DENTON COUNTY EOC	
927.6625	25.000	none	N5LS	DMR MARC CC1	
1253.6000	none	none	W5NGU-G	DCARA EOC D*STAR "G"	
1259.2000	none	none	KE5YAP-G	DCARA ROSSTON D*STAR "G"	
1293.2000	-20.000	none	KE5YAP-A	DCARA ROSSTON D*STAR "A"	
1293.4000	-20.000	none	W5NGU-A	DCARA EOC D*STAR "A"	

Antenna Fundamentals

ARRL

Where does the word “antenna” come from? As related by Dr. Ulrich Rohde, N1UL, the term originated with Guglielmo Marconi during early radio tests in 1895 during which he used wire “aerials” attached to a vertical tent pole. The aerial wire then ran down the pole to the transmitter. In Italian, a tent pole is known as “l’antenna central” and so the pole with the wire became simply, “l’antenna.” In the beginning of radio, antennas were attached directly to generators and transmitters and were considered part of a common assembly. It wasn’t until after 1900 that antennas began to be regarded as separate elements of the system, independent of the transmitter or receiver. While there are an enormous variety of antennas, they share basic characteristics and all are designed to radiate and receive electromagnetic waves.

In 1820 Hans Oerstad discovered that a current flowing in a wire would deflect the needle of a nearby compass. We attribute this effect to a magnetic or H-field, which at any given location is denoted by the letter H. The magnetic field’s amplitude is expressed in A/m (Amperes/meter) along with a direction. (Direction can also be expressed as some value of phase with respect to a reference.) Because a magnetic field has *both* amplitude and direction, it is a *vector*. A compass needle (a small magnet itself) will try to align itself parallel to H. As the compass is moved around the conductor, the orientation of the needle changes accordingly. The orientation of the needle gives the direction of H. If you attempt to turn the needle away from alignment you will discover a torque trying to restore the needle to its original position. The torque is proportional to the strength of the magnetic field at that point. This strength is called the *field intensity* or amplitude of H at that point. If a larger current flows in the conductor the amplitude of H will increase in proportion. Currents flowing in an antenna also generate an H-field. An antenna will also have an electric or E-field. The magnitude of vector E is expressed in V/m (volts per meter), so for a potential of V volts and a spacing of d meters, E = V/d V/m. The amplitude of E will increase with voltage and/or a smaller separation distance (d). In an antenna, there will be ac potential differences between different parts of the antenna and from the antenna to ground. These ac potential differences establish the electric field associated with the antenna.

An electromagnetic wave, as the name implies, is composed of both an electric field and a magnetic field that vary with time. Electric and magnetic fields that do not change with time, such as those created by a dc current or voltage, are called *electrostatic fields*. The fields of a radio wave are created by an ac current in an antenna, usually having the form of a sine wave. As a result, the fields in a radio wave vary in the same sinusoidal pattern, increasing and decreasing in strength and reversing direction with the same frequency, f, as the ac current. It is the movement of electrons — specifically the acceleration and deceleration as the ac current moves back and forth — that creates the electromagnetic wave. The two fields of the electromagnetic wave are oriented at right angles to each other. The term “lines of force” means the direction in which a force would be felt by an electron (from the electric field) or by a magnet (from the magnetic field). The direction of the right angle from the electric field to the magnetic field, clockwise or counterclockwise, determines the direction the wave travels. This is called a *propagating wave*. To an observer staying in one place, such as a stationary receiving antenna, the electric and magnetic fields of the wave appear to oscillate as the wave passes. That is, the fields create forces on electrons in the antenna that increase and decrease in a sine wave pattern. Some of the energy in the propagating wave is transferred to the electrons as the forces from the changing fields cause them to move. This creates a sine wave current in the antenna with a frequency determined by the rate at which the field strength changes as the wave passes.

If the observer is moving in the same direction as the wave and at the same speed, however, the strength of the fields will not change. To that observer, the electric and magnetic field strengths are fixed, as in a photograph. This is a *wavefront* of the electromagnetic wave; a flat surface or plane moving through space on which the electric and magnetic fields have a constant value. Just as an ac voltage is made up of an infinite sequence of instantaneous voltages, each slightly larger or smaller than the next, an infinite number of wavefronts make up a propagating electromagnetic wave, one behind another like a deck of cards. The direction of the wave is the direction in which the wavefronts move. The fields on each successive wavefront have a slightly different strength so as they pass a fixed location, the detected field strength changes as well. The fixed observer “sees” fields with strengths that vary as a sine wave.

“Information and Help Net”

Wednesday, 7:00 PM on 145.170
PL 110.9, -.600 repeater

ARRL, from page 9

Because the velocity of wave propagation is so great, we tend to ignore it. Only 1⁄7 of a second is needed for a radio wave to travel around the world — but in working with antennas the time factor is extremely important. The wave concept
evolved because an alternating current flowing in a wire (antenna) creates propagating electric and magnetic fields. We can hardly discuss antenna theory or performance at all without involving travel time, consciously or otherwise. Electromagnetic waves propagate at the speed of light for the medium through which they travel. The speed of light is highest in the vacuum of free space, approximately 300 million or 3×10^8 meters per second. It is often more convenient to remember the speed as 300 m/ms. (A more exact value is 299.7925 m/μs). This is called the wave's *velocity of propagation* and is represented by the familiar "speed of light" symbol, c. It is also useful to know a radio wave's *wavelength* — the distance traveled during one complete cycle of a wave. Since one complete cycle takes 1/f the velocity of a wave is the speed of light, c, the wavelength, λ, is thus: $\lambda = c / f$ (1) In free-space $\lambda = 299.7925 \times 10^6 / f$ where λ is the free-space wavelength in meters. More convenient approximate formulas for use at radio frequencies are: λ in meters = 300 / f in MHz, and (2a) λ in feet = 983.6 / f in MHz (2b) The ratio between the wave's velocity in a specific Medium and that of free space is called the medium's *velocity factor* (VF) and is a value between 0 and 1. If the medium is air, the reduction in velocity of propagation can be ignored in most discussions of propagation at frequencies below 30 MHz. In the VHF range and higher, temperature and moisture content of the medium have increasing effects on the communication range. In materials such as glass or plastic the wave's velocity can be quite a bit lower than that of free space. For example, in polyethylene (commonly used as a center insulator in coaxial cable), the velocity of propagation is about 2⁄3 that in free space. In distilled water (a good insulator) the speed is about 1⁄9 that of free space.

A wave is said to be *polarized* in the direction of the electric lines of force. Polarization is vertical if the electric lines are perpendicular to the surface of the Earth. If the electric lines of force are horizontal, the wave is said to be horizontally polarized. Horizontally and vertically polarized waves may be classified generally under *linear polarization*. Linear polarization can be anything between horizontal and vertical. In free space, "horizontal" and "vertical" have no meaning, since the reference of the seemingly horizontal surface of the Earth has been lost. In many cases the polarization of waves is not fixed, but rotates continually, sometimes at random. When this occurs the wave is said to be *elliptically polarized*. A gradual shift in polarization in a medium is known as *Faraday rotation*. For space communication, *circular polarization* is commonly used to overcome the effects of Faraday rotation. A circularly polarized wave rotates its polarization through 360° as it travels a distance of one wavelength in the propagation medium. The direction of rotation as viewed from the transmitting antenna defines the direction of circularity — righthand
(clockwise) or left-hand (counterclockwise). Linear and circular polarization may be considered as special cases of elliptical polarization.

The energy from a propagated wave decreases with distance from the source. This decrease in strength is caused by the spreading of the wave energy over ever-larger spherical surfaces as the distance from the source increases. A measurement of the strength of the wave at a distance from the transmitting antenna is its *field intensity*, which is synonymous with *field strength*. The strength of a wave is measured as the voltage between two points lying on an electric line of force in the plane of the wave front. The standard of measure for field intensity is the voltage developed in a wire that is 1 meter long, expressed as volts per meter. (If the wire were 2 meters long, the voltage developed would
be divided by two to determine the field strength in volts per meter.) The voltage in a wave is usually low so the measurement is made in millivolts or microvolts per meter. The voltage goes through time variations like those of the current that caused the wave. It is measured like any other ac voltage — in terms of the RMS value or, sometimes, the peak value. It is fortunate that in amateur work it is not necessary to measure actual field strength as the equipment required is elaborate. We need to know only if an adjustment has been beneficial, so relative measurements are satisfactory. These can be made easily with home-built equipment.

In free space, the field intensity of the wave varies inversely with the distance from the source, once in the radiating far field of the antenna. If the field strength at 1 mile from the source is 100 millivolts per meter, it will be 50 millivolts per meter at 2 miles, and so on. The relationship between field intensity and power density is similar to that for voltage and power in ordinary circuits. They are related by the impedance of free space, which is approximately 377 Ω. A field intensity of 1 volt per meter is therefore equivalent to a power density of $P = E^2/Z = 1 \text{ (volt / m)}^2/377\Omega = 2.65\text{mW/ m2}$ Because of the relationship between voltage and power, the power density varies with the square of the field intensity, or inversely with the *square* of the distance. If the power density at 1 mile is 4 mW per square meter, then at a distance of 2 miles it will be 1 mW per square meter. It is important to remember this so-called *spreading loss* when antenna performance is being considered. Gain can come only from narrowing the radiation pattern of an antenna, which concentrates the radiated energy in the desired direction. There is no "antenna magic" by which the total energy radiated can be increased. In practice, attenuation of the wave energy may be much greater than the inverse-distance law would indicate. The wave does not travel in a vacuum and the receiving antenna seldom is situated so there is a clear line of sight. The Earth is spherical and the waves do not penetrate its surface appreciably, so communication beyond visual distances must be by some means that will bend the waves around the curvature of the Earth. These means involve additional energy losses that increase the path attenuation with distance, above that for the theoretical spreading loss in a vacuum.