

40-FOOT TELESCOPE

The experiment in which the 40-foot telescope (called a 40-foot telescope because of its distance of forty feet from a point on the edge of the reflector to a diametrically opposite point) plays a most important part is to try to determine if the intensity of a certain radio source varies with time. It has long been known that the optical brightness of some stars changes from day to day and it has been suspected that radio sources vary in intensity. The change in intensity is very small and is easily hidden in the uncertainty of the results. Many factors affect the uncertainties and to minimize these effects, as many things as possible must be kept constant, during the entire experiment.

It is not practical to tie up a very expensive instrument for such a long period of time as is needed for this experiment, so the relatively inexpensive 40-foot telescope was built. This telescope will be devoted exclusively to the present experiment for at least 5 years as will the receivers now in operation at the telescope.

Most people today believe that the earth is a sphere. There is a group of people that believes the earth is flat. However, for the purposes of this article it will be assumed that the reader believes in a spherical earth.

This spherical earth rotates about its axis from west to east. One complete rotation requires 24 hours. The center of the axis of rotation in the northern hemisphere is called the north pole and an imaginary extension of this axis would point almost exactly at Polaris, the pole star. There is no visible star in the southern hemisphere marking the south pole.

To understand, better, the geometry of space it sometimes helps to imagine a larger sphere surrounding the earth with its center coincident with the center of the earth. This imaginary sphere is referred to as the celestial sphere and all the stars and other heavenly bodies can be pictured as attached to the inside of this sphere

and facing the earth. This sphere must be fixed -- that is, it does not rotate with the earth.

An imaginary extension of the earth's equator would divide the celestial northern hemisphere from the celestial southern hemisphere. This celestial equator is called, appropriately, the celestial equator.

There are several systems used to define the position of any point on this celestial sphere, but the system used most at the Observatory is the equatorial system. Just as it requires some magnitude of longitude and latitude to define any location on earth, it requires two independent coordinates to define a position in space. These equatorial coordinates are declination and right ascension.

Declination corresponds to latitude on earth and is the angular distance north or south from the celestial equator. A northern declination is denoted + and a southern declination -. Thus, all declinations are between $+90^\circ$ and -90° .

Right ascension may be compared with longitude. Just as longitude on earth is angular distance east or west from a predetermined point, the prime meridian, right ascension is the angular distance eastward from a predetermined point, the first point of Aries, to the celestial object involved.

The positions of all radio sources are given in terms of right ascension and declination. These positions are independent of one's location on earth so the coordinates are universal.

Sidereal time is another term which many observatory people use. This is star time, and once a year sidereal noon occurs at civil midnight. Sidereal time is very useful to astronomers. Just as the ordinary layman thinks of noon as that time when the sun is almost directly overhead,

the astronomer thinks of a given sidereal time as that time when a certain star is almost directly overhead.

Some people may not be aware that although in any year except leap year there are 365 days, the sun rises and sets 365 times, but the earth rotates about its axis only 364 times. Since a day or the time between successive sunrises is caused by the earth rotating about its axis, this may appear to be quite phenomenal. One need only remember, however, that the earth in its travel around the sun makes in effect another complete rotation about its axis. The 365th rotation is accrued throughout the entire year or the revolution around the sun, in the amount of 3^m56^s per day. This is the daily difference between sidereal time and mean solar time.

The celestial meridian is an imaginary circle passing directly overhead and through the north and south poles. Sidereal time is the angular distance westward from this meridian to the first point of Aires. Thus, at any instant the sidereal time is the same for all latitudes on earth at the same longitude, but differs at all different longitudes.

Hour angle is the angular distance, east or west from the celestial meridian. There is a direct relationship between sidereal time, right ascension, and hour angle. The algebraic difference between right ascension and sidereal time is the hour angle. If the sidereal time is greater than the right ascension, the hour angle is west. If the right ascension is larger, the hour angle is east.

The 40-foot telescope, like the 300-foot telescope, moves about one axis only. This movement is north or south or along the celestial meridian. There is no telescope movement east or west so the hour angle of these two telescopes is always zero. These telescopes can point to any declination in the sky (within limits) but must make use of the earth's rotation to change their position in

right ascension. Since the hour angle is the difference between right ascension and sidereal time, and the hour angle is always zero, it is inevitable that the right ascension to which the telescopes are pointing is the same as the sidereal time. In other words, at transit, or when an object is crossing the celestial meridian, the right ascension of the object is equal to the sidereal time at that meridian.

An observation of a radio source, in effect, consists of determining the intensity difference between the radio source and the background radiation beside it. This difference is valid only when the radio source is located in a region of little or no background radiation or when the comparison regions (the near-by places in the so-called empty sky) have the same background radiation as the source itself.

In the case of Cygnus A, the eastern comparison region is rendered useless because of the presence of Cygnus X. The intensity of Cygnus A is determined by using only the western comparison region. In a similar manner, the observation of 3C 358 is complicated by its location on the edge of the galactic plane. Since the radiation from the galactic plane adds somewhat to that of the radio source, and adds still more to the eastern comparison region, but it is not present at all in the western comparison region, the determination of the intensity of 3C 358 is indeed not simple.

Since the 40-foot telescope is a transit instrument, the only practical way of observing, with the present automatic positioning system, is to position the telescope at the proper declination for the object being observed and let the rotation of the earth move the beam of the telescope across the source. The earth, rotating on its axis from west to east, scans the telescope beam across the radio source from west to east. Consequently, the western comparison

region is observed first, then the radio source, then the eastern comparison region.

The actual time that an object remains in the beam of the telescope varies with the declination of the object even though the rotation of the earth is constant. If the 40-foot telescope were pointed at Polaris, it would observe Polaris constantly, since the declination would be $+90^\circ$. The beam of the telescope would be parallel with the earth's axis of rotation and the rotation of the earth could not possibly move the beam away from Polaris. The earth rotates about its axis once in 24 hours. Since there are 360° in a complete circle, the earth makes an angular movement of 15° in one hour. For an object on the celestial equator the relationship between time and angular distance is that 1 hour is equivalent to 15° . For example, if the 40-foot telescope were observing an object whose declination is zero degrees and the observation began 1 hour before transit, the western comparison region would begin 15° away from the radio source.

The minimum time required to obtain an observation with the 40-foot telescope then is limited by the object with the greatest declination, which in this case is Cassiopeia A with a declination of about $+58^\circ$. This time is 104 sidereal minutes.

The width of the beam of a telescope is basically determined by the diameter of the dish and the frequency of the receiver. Therefore, 52 sidereal minutes before the radio source being observed is due to transit, the 40-foot telescope starts its observation. It begins recording the outputs from the two receivers, one at 750 Mc and the other at 1400 Mc. The output is summed or integrated for a period of 117.981 sidereal seconds and then punched on paper tape and also printed on another kind of paper tape to verify the punching. The punching time requires 2.019 sidereal seconds, making a total time of 120 seconds or 2 minutes for each summation. In digital language, these

summations or integrations are called "words" and there are 52 words taken for each source observed by the 40-foot telescope. Forty-eight words are receiver output and the remaining four are the sidereal day number, two declination readings and the sidereal time of the observation.

The 40-foot telescope, then, begins to establish a zero level or the intensity of the western comparison region well before it begins observing the radio source. During this off-source time, however, a calibration is made to minimize the effects of receiver gain changes. A calibration is made before and after transit of the radio source.

Eight natural radio sources are observed each day and two artificial sources. The artificial sources are created for further calibration purposes. The eight natural sources are:

3C 48 This is believed to be a single star since its angular diameter is so small.

3C 144 or Taurus A. This well-known radio source is also called the Carb Nebula. It is the remnant of a supernova and is 4000 light years away and 900 years old.

3C 218 or Hydra A. This extragalactic source is 160×10^6 par secs distant.

3C 274 or Virgo A. This is a galaxy which emits strong radio waves. It has a "jet" off to one side and is 40,000,000 light years distant.

3C 295 The most distant of any known radio source. It is located 24,000,000,000,000,000,000 miles away.

3C 358 Also known as Kepler's super-nova. It exploded 360 years ago and is 1000 par sec distant.

3C 405 or Cygnus A. Originally believed to be a pair of galaxies in collision. It is located 550,000,000 light years away and is the second most powerful radio source outside our solar system.

3C 461 or Cassiopeia A. The remnants of a super-nova or star which exploded about 258 years ago. This is the most intense radio source outside our solar system and is 11,000 light years or 6.5×10^{14} miles away.

Instrumentally, the secular variations described in the first two paragraphs of this article are accomplished with the 40-foot and its associated equipment. A brief description of this system follows.

Because of innovations in manufacturing and assembly techniques, the 40-foot was erected in about two days. The telescope's surface is aluminum mesh similar to the 300-foot, but with smaller openings. The telescope is capable of being moved in wind up to 40 miles per hours, but for safety reasons, it is automatically prevented from moving at considerably less wind velocities.

Not everyone reading this article is aware of the fact that the dish itself is a mirror, which reflects all incoming radio waves parallel to the axis of the telescope and collected on its surface, to a point of focus, some distance above the dish. At this focal point on the 40-foot is placed a concentric feed or antenna, which accepts energy at both 1400 megacycles and 750 megacycles. Immediately behind the feed electronic equipment housed in the so-called "pillbox" amplifies and converts the collected energy into a more useable form. This "useable form" at 30 megacycles is

cabled into the receiver backends some 60 feet away in the control room. The complete receiver is the NRAO version of a modified Dicke system which uses synchronous switching to reduce the effects of instability and gain changes.

The outputs of the 750 megacycle and 1400 megacycle receivers are recorded in three ways. First, an analog record is provided on a Sanborn Recorder, which is used for pinning down interference and is indicative of overall performance. The analog record is not satisfactory for use in data reduction with the computer, so two more outputs that are digital in nature are provided. One of these is printed record much like adding machine tape, and the other is punched tape, which goes into the computer directly.

The method of analog to digital conversion is by use of a voltage to frequency converter and a counter whose time of counting is basically 2 minutes minus recording time, or 117.981 seconds for the 40-foot.

Since the 40-foot is automatic, something must tell it where and when to observe, insuring that the telescope points to the correct place in the sky at the correct time. This is accomplished with the positioner. The positioner has in its memory the various positions and times, and the sequence in which they are followed. The telescope's real position and the real sidereal time must be compared to memory. The telescope position is measured in two ways -- one, a simple dial indication for checking purposes, and two, the method used for measuring the position automatically. The latter is a rather simple system, which totalizes the number of pulses coming from a tachometer located on the telescope, and compares them to a predetermined number of pulses. As the telescope moves from one observing position to the next observing position, it is first slowed down as its position becomes approximate, and is ultimately stopped at the

new observing position. Since this system gives no zero point, a daily checking point is provided so that one can sight through an optical instrument to a scribed stainless steel block in the concrete pad on which the telescope is mounted. This system is cheap and does have its drawbacks, but is satisfactory for this type of program.

Each source is given the same treatment. Two receiver calibrations are put into the system at each source position. The sidereal day of the observations, the time of the observation, and the position of the telescope along with the output data of the two receivers are all recorded on the digital output systems.

At the end of an observation, a code goes onto the punched tape for computation purposes, and the telescope goes to the next position and awaits the next sidereal time of start.

Real sidereal time is taken from a clock in the control room, which is driven from the lab's precision time standard.

Since the instrument is unattended, system reliability is a question of considerable concern. Some of the problems with the system that are considered chronic offenders are being worked on. Mechanical scanners for use with tape punches seem to be the biggest problem.

Since this is a 5-year program, possibly two years from now, certain effects due to meteorological phenomena maybe found to be important -- particularly temperatures. At the 40-foot, the wind velocity, and the temperature of the control room, the pillbox, and the outside ambient are continuously recorded.

The data tapes, which are collected every three to five days, are read directly into the Observatory's IBM 1620 digital computer.

The value of the calibration and the relative value of the source intensity are computed. A ratio of source intensity and calibration factor is then derived and the result punched out on cards, with some other useful information.

At a later date, using certain sources as standards, source to source ratios are calculated and these results are plotted on graph paper. The sources selected as standards are those believed to change very little, if at all, in intensity. If the values plotted remain the same, for a considerable length of time, it means there has been no detectable change in source intensity. If the values decrease, however, it means that either the standard source is increasing or as is far more likely, the source in question has decreased.

The first year's observations are now being analyzed and maybe in a short while some conclusions can be made. It must be emphasized that the anticipated variations are quite small, in the order of one percent per year, and will be very difficult to detect.

Dr. Findlay visited the Rohr Corporation in Chula Vista, California, on April 16, returning through Tucson for a NAS radio astronomy subcommittee meeting, and in New York for the trustees' meeting on April 18 and 19.

Dr. Schatz, Dean of Research, and Dr. Williams, Professor and Head of the Department of Electrical Engineering, at Carnegie Institute of Technology, visited the Observatory on April 22nd.

THE COIN CORNER - L. W. McPhersonWest Virginia Commemorative Medal

The W. Va. Commemorative Medal is the first official commemorative medallion ever to be struck with a proof surface by the U. S. Mint. The medals were authorized by an Act of Congress and are the only official medals to be struck in platinum, silver, and bronze for the centennial celebration.

Quantities have been limited to 20 platinum, 20,000 in silver, and 750,000 in bronze.

The obverse of the medallion shows the seal of our state with the motto *Montani Semper Liberi* (mountaineers are always free.) The reverse shows a large radio telescope.

The price of the platinum medals are \$500 each. The silver ones are \$12.50 each. The bronze are \$2.50 each. These medals went on sale to state residents April 1, 1963, and the rest of the states on May 1.

All orders for silver medallions which are received in time to permit processing before June 20 -- the state's 100th birthday -- will be mailed from Wheeling, W. Va., on that date, in first day covers that carry the centennial commemorative stamp. This constitutes a bonus for collectors who send their order for the silver medallions promptly.

All medals can be ordered from any state building and loan association, and also from the West Virginia Centennial Commission, Department CW, 1608 Kanawha Blvd., East Charleston, West Virginia.

I have never collected medals, but this is one I will be proud to own. How about you?

Proof Coins

I have been asked how do I get proof sets.

Proof coins are struck only at the Philadelphia Mint, and during the calendar year

indicated by the date on the coins. They are sold only in sets. A set contains one each of 50 cents, 25 cents, 10 cents, 5 cents, and 1 cent. Five pieces in all. One set costs \$2.10, two sets \$4.20, etc. You may order as many as 100 sets maximum.

Requests for these sets should be directed to The Superintendent of the United States Mint, Philadelphia 30, Pa., and accompanied by a postal money order or certified check made payable to the Superintendent, U. S. Mint. They will not accept cash, and you cannot order back dates.

These are beautiful coins, and also a good investment for the beginner.

Did you Know

The U. S. Treasury keeps a close tap on \$10,000 - \$5,000 and \$1,000 bills. A recent treasury report stated that, "There are 420 - \$10,000 bills in circulation. Salmon P. Chase is pictured on this bill. 532 - \$5,000 bills are in circulation, which carry the portrait of William McKinley. The common \$1,000 bill shows Grover Cleveland, of which there are 288,169 floating around the universe.

The \$1.00 silver certificate, or as we know it, the one-dollar bill, will soon be replaced by a \$1.00 Federal Reserve note, in order to release 1.3 billion ounces of silver. Silver has reached an all time high of \$1.38 per ounce.

It has been suggested to me that this fall (maybe) we can organize a coin club. Let's think it over this summer.

I hope in some way I have helped someone to become interested in coin collecting. See you again this fall. (Thanks!)

140-FOOT TELESCOPE

Some moving of offices has been done at the 140-foot. Those of us who were on the starboard side are now on the port side and those who were on the port side are now on the starboard. Those with telephone extension 347 are presently on 348 and those who were on 348 are now on 347. Confusing, isn't it?

Max Small arrived at Green Bank on Friday, April 18, and will spend about a week with us before returning to his home at Bellport. It's nice to have him here and also to see that he is getting along so well with the cast, crutches, wheel chair, raised tables, and the rest. As we've said before, you can't keep Max down.

The tent at the 140-foot has been taken down and arrangements are under way to build the small railroad previously mentioned. The Main Ring Truss of the superstructure will be moved within reach of the derricks so that it can be raised and other phases of the work can be done. Several persons breathed sighs of relief when the tent was taken down. As you know, it withstood lots of rough weather during the winter including heavy snow and high winds.

O. Barr and J. Cassell have been working for two weeks cutting stiffeners, braces, etc., out of the two old cantilever arms at the 140-ft. which will later be used as culverts in the road which will be part of the 85-foot Interferometer Project. Unfortunately, J. Cassell became sick with "lead poisoning" and has now been taken off the work and replaced by W. Sheets. We thought "lead poisoning" went out with Marshall Dillon and his crowd. Seriously, we hope John is feeling much better.

They say Barr drinks more....milk.... than John and that is the reason he didn't get so sick. Reckon that's right?

LAB GAB

A prominent lab engineer is quoted as getting buck fever when lining up his sights on his first groundhog this year. Tradition has it that this costs a shirt tail. To prevent any animosity perhaps he should just turn in a well sheared shirt tail.

Carl D. says he is going to carry a large shopping bag with him from now on when he has to fly anywhere. Also when he is invited out to dinner, please omit hot dogs.

Carl Cooper of Lynchburg, Va., and Bernard Pasternak of Clarksburg, W. Va., joined the Electronics Division April 22. Both will work in the R and D lab.

Dewey Ross says -- If I could be reincarnated, I'd like to come back as an octopus.

Once again let us state that only Government vehicles will be parked in the rear of the lab building. People who have had to use Government vehicles have been blocked by private cars. It is very annoying, especially when one has an important errand to do in a hurry. So, please, let's ALL cooperate to keep the back area clear of non-essential vehicles during working hours.

Due to a series of unfortunate circumstances lately, several of the employees' wives have been in and out of the nearby hospitals. Among them have been Mrs. June Zatta, Mrs. Wilhelmina Hensley and Mrs. Rose Kuhlken.

Bill Lowman has gone to his home in Charleston after he became ill at work. We wish Bill a speedy recovery.

Hein Hvatum, Bert Hansson, and Jim Dolan visited Airborne Instruments Lab, Long Island, New York to check on the maser which is just about ready for use.

LAB GAB, continued

Bert Hansson visisted Microwave Physics in Dallas, Texas and then took a little trip to the West Coast.

Anybody still interested in forming a hobby shop? Surely there are those around who have interesting hobbies -- like model air-planes, ham radio, auto modification, knitting or printing money -- something like that? Let's yak it up a little.

(The following articles were contributed by an anonymous employee.)

The question was asked recently by a female employee of the cafeteria to a lab employee as to why he was having dinner at a local restaurant when there was such a good cafeteria on the site. If the quality and quantity of the food is so wonderful at the cafeteria, I wonder why this female employee was having dinner at the local restaurant??

Interested in trading one or two cars for mountain goat or a quarter horse to ride over the road from Cass to Green Bank. Animal must have experience in traveling on extremely rough, narrow trails.

I hear a certain lab employee's work is improving. It's not quite as S--messy as it was.

It is interesting to know the state has "lost" 6.5 million dollars on state parks in the past 7 years. We hope the next 6.5 million will go into road repairs with a small amount towards patching or "bridging" the holes in the Cass road.

After hearing a lot of the conversation around the lab for the past several months I am convinced that I am employed by the National Radio Astronomy Observatory Recreation Association. I wonder why I am still being paid by Associated Universities?

The Modern Bare Foot Boy

Blessings on the Little Man
Bare foot boy with cheeks of tan,
Trudging down life's dusty lane
With no thought of future pain.

You're our one-and-only bet
To absorb the national debt,
So have your pleasures while you can
For soon you'll be a Bare Foot Man.

GREEN BANK RIFLE AND PISTOL CLUB

We now have a gun club affiliated with the National Rifle Association of America. The charter was approved Feb. 14, 1963. The charter officers are as follows: President, T. Zatta; Vice President, J. Dolan; Secretary-Treasurer, J. Rader; and Program Committee, P. Devlin and R. Keener. There were 11 members submitted for charter and now there are 21 members and we hope to acquire more. The club is open to the public and any citizen 17 years of age or older in the community can join.

We hold our meetings the first Tuesday of each month at 7:30 PM in the Arbogast House on the site, at present. And every third Thursday there is an informal meeting at 7:30 PM in the Arbogast House for the gun bugs who like to talk and swap guns.

We are at present trying to build up our treasury to acquire guns which the NRA affiliated clubs are eligible for. When we receive these guns we are planning to have competitive shoots for club and NRA championship awards. The riflers will be 30-06 M1 Garands and .22 cal. rifles and .45 cal. pistols. We will be allotted so many rounds of ammo per member for practice and competitive shooting. These guns are military type and therefore do not shoot as accurate as shooters would

RIFLE AND PISTOL CLUB, continued

want them. The reason that these arms are made possible for the clubs to use is to get as many civilian personnel as possible familiar with our military arms. So, in case of war we will be able to use our military arms, with little or no training on the part of the Army.

We are now raffling off a rod and reel and creel to help build up our treasury. Ticket sales have been very good on this raffle.

If anyone is interested in joining our club, contact either one of the officers or members and we will be glad to have you.

BIG WINNERS

The drawing for the fishing equipment mentioned above was held on April 25.

Everett Arbogast won the rod and reel.
Jack Daniels won the creel.

Del Cassell won the shotgun which Carl Davis raffled off.

BIRTHS -- Born to Mr. and Mrs. Gene Crist a daughter on April 23.

OBSERVATORY WIVES MEETING

The regular meeting will be held on May 8, 1:30 PM to 3:30 PM in the upstairs lounge of the Residence Hall.

CONSERVATION NEWS

The West Virginia trout season is scheduled to open at 6:00 AM, EST, April 27. The stocking of trout is underway and will continue throughout the season. Approximately 640 thousand will be stocked before season and an additional 400 thousand during the season.

As of April 18, the stocking of 154,418 pounds, or approximately 500 thousand trout, has been completed, in 118 streams and impoundments throughout the state. Some are the centennial golden trout.

For those fishermen who will be cooking their fish, rather than bringing them home for the wife to clean and cook, the following tips will be of great value.

Outdoor Fish Fry

Fried: First wipe fish dry. Then cut off head, tail and fins. Heat two tablespoons of butter or substitute until it smokes slightly. Put in fish. Move the pan back and forth occasionally to prevent sticking. Fry one side until golden brown, then turn and fry other side. If fish curl, keep turning. Salt after cooking.

Foiled: Wipe fish but don't clean. Cut off about 2 feet of aluminum foil. Place it on the ground and double it over. Rub butter on the foil, then roll up the fish in the foil. Close both ends of package by crinkling up the foil. Have a shallow layer of glowing coals ready. Place your fish packages on the coals. After about five minutes, turn the packages, and cook five minutes on other side. Salt when serving.

Outdoor Fish Fry, continued

Poached: A famous European dish is blue trout. To get the blue effect you must use freshly caught trout and not wipe off slime - it's the slime that turns a soft blue. Pour into a pan enough water to cover your fish, add one-fourth cup of vinegar and bring to a boil. Slip one trout at a time into the pan without letting the water stop boiling. Fish is poached in 6 to 10 minutes.

Steamed: This is the simplest way of preparing fish. Cut as many sticks as you have fish, about 4 inches longer than fish. Sharpen one end. Tie fish to stick at tail and at gills, head at pointed end. Push sticks into shallow layers of coals until heads are partly covered. Steam for about 10 minutes.

Boiled: Make a tennis-racket type holder from a three-pronged branch and a few cross sticks. Place two or more fish on the holder and keep them in place with several more cross sticks. Support holder over a bed of glowing coals. Broil one side of fish golden brown, turn and broil other side.

Smoked: Chop up twigs and put them in large pot to a height of 2 inches. Clean fish and cut off heads. Stiring fish by tail on pointed sticks and hang them inside pot by resting sticks across top. Cover pot and put it over fire. In about one hour your fish is done.

A few hours before you go fishing, put a few skins from a dried red onion in your minnow bucket. They give the minnows a golden color that makes them more attractive to fish.

To clear fish lures, put a substantial amount of sand and about a cupful of laundry soap in a gallon can. Put in your lures and cover the can. Shake the can vigorously for five or ten minutes.

BASKETBALL

The basketball season came to a successful conclusion with the playing of a tournament during the week of 1-8 April.

The first game of the first night found Carl Davis' Red Raiders hammering out a close 55-51 victory over Ronnie Monk's Green Hornets. The Raiders were led by hot handed Lennie Howell's 32 points followed by John Ralston's 11. The Hornets scoring was paced by Ronnie Monk's 14 followed by Dale Cassell's 11.

The second game of the evening found Davidson's Brown Bombers defeating Tom Carpenter's Blue Devils by a score of 53 to 27. The Blue Devils were led by Chester Cassell's 11 points while B. Lowman and J. Cassell led the Brown Bombers with 16 and 14 points, respectively.

The consolation game Thursday night found the Blue Devils wringing out a close 59 to 52 victory over the Green Hornets. Chester Cassell again led the Blue Devils with 19 points while the Green Hornets were led by R. Monk's 22 points. The championship game failed to live up to its advance billing of a close contest as the Brown Bombers destroyed the Red Raiders 56 to 29. This was due in part to the absence of the Red Raiders star, Brown Cassell, while the Brown Bombers were strengthened by the return from school of Bill Lowman. The Bombers were led by hot shooting John Cassell's 19 points and Bill Lowman's 18. The Red Raiders were again led by Lennie Howell's 11 points.

This game brought to a successful conclusion another year of NRAORA basketball.

SOFTBALL

Notices have been posted on the bulletin boards for all NRAORA members interested in playing softball this summer. Signed up so far is probably enough players to make a maximum of three teams. If so, John Gallagher, Jim Simmons and John Hensley will sign on as captains. We are trying to recruit enough players to make four teams. So if you are in doubt -- sign up.

Teams will be picked soon and play will start early in May.

FOR SALE

20 bags of pellet insulation.

Lumber --

10 ea. 2 in. x 6 in. x 10 ft.
 4 ea. 2 in. x 6 in. x 16 ft.
 2 ea. 2 in. x 6 in. x 14 ft.
 3 ea. 2 in. x 6 in. x 12 ft.

1 ea. 4 ft. x 12 ft. x 3/8 in. gypsum board.

See or call Teo Zatta.

Mr. Pleasants and Dr. Hogg were speakers at the Marlinton High School's "Career Day" on April 23rd.

The beautiful suntan Nigel Keen is wearing, he got at Virginia Beach the weekend of April 17.

MAY BIRTHDAYS

6	E. J. Tyson
7	John Ralston
8	R. E. Grabe
9	John Hensley
10	Brown Cassell
10	Bill Vrable
17	W. W. Pleasants
22	Janice Galford
22	Spencer Greenwood
23	Beaty Sheets
24	Jerry Shears
25	W. Sheets
26	Clifford Barkley

