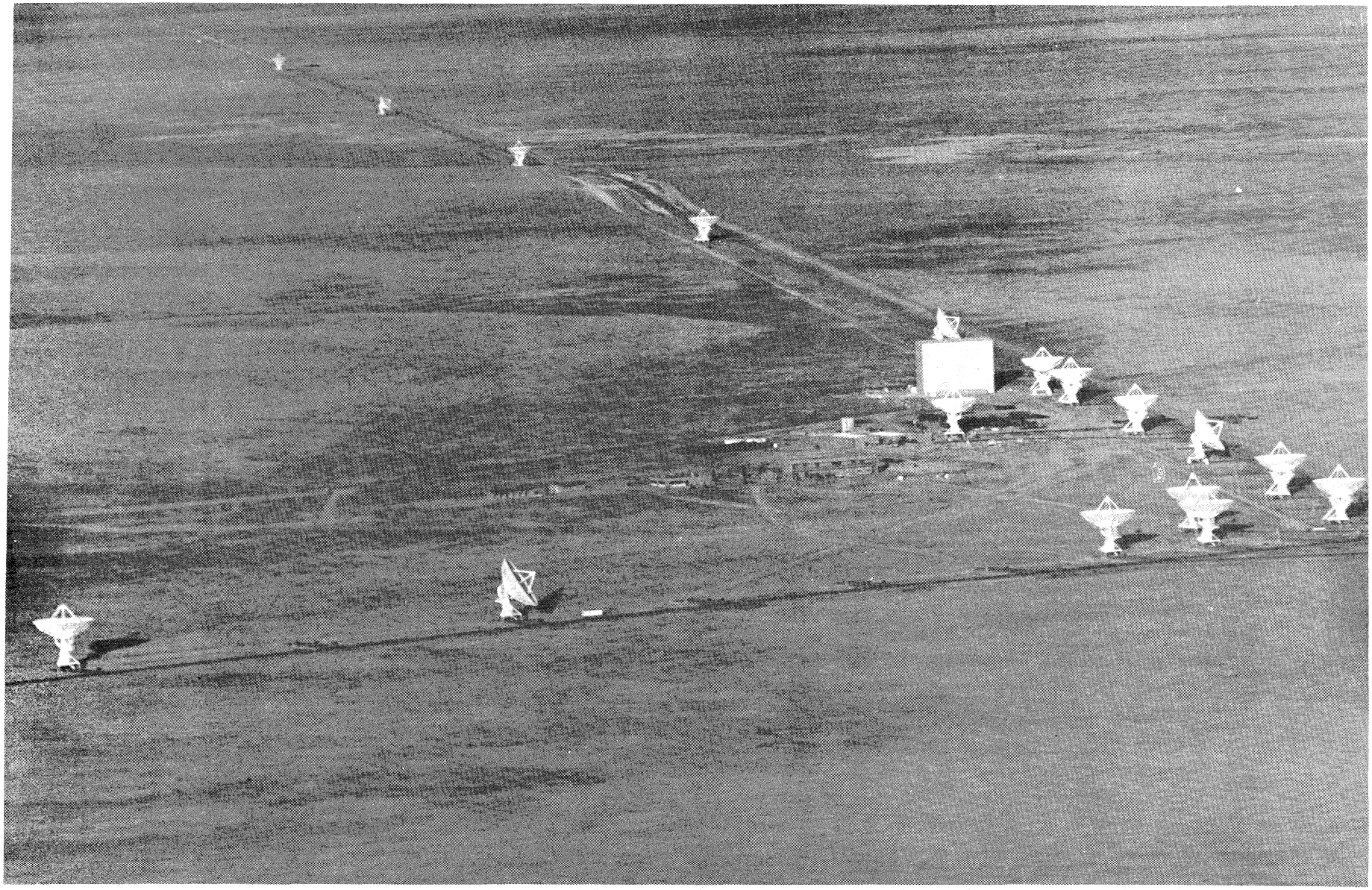
THE OBSERVER Vol.19, No.2 June'78 Page 1



"VLA STRETCHES OUT OVER THE PLAINS OF SAN AUGUSTIN"

The cover aerial photograph was taken by Dave Rosenbush during the second week of June 1978. Seventeen of eighteen telescopes can be seen in this photo with the closest spacing of telescopes at the center of the wye (middle, extreme right). The arm running diagonally from middle extreme right to the left corner past the tall building (antenna assembly building) is the west arm. The other, nearly horizontal arm, is the east arm.

The last telescope on the west arm is about 10 kilometers (a little over 6 miles) away from the center of the wye and the last one on the east arm is about 700 meters (about ½ mile) from the center.

For a panoramic view of the VLA see the photos on pages 35, 36, and 37.

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GB BOWLING

Bowlers are needed for the fall bowling season. Anyone interested may contact Dick Hiner, GB Ext. 309.

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SOME THOUGHTS ON SOLAR ENERGY

Jim Dolan

One of the current topics of conversation over coffee and other important gatherings is the escalating cost of energy, and that is understandable since practically everybody is faced with those ever increasing monthly heating, lighting and gasoline costs. It seems that every time an Arab wants a new pair of Foster Grants, up goes the price of energy, and we collectively sweat out every meeting of the oil cartel. Even the US foreign policy is strongly influenced by petroleum diplomacy. By any standard we are on the horns of a dilemma.

Although I have been interested in alternate energy sources for some time now, it wasn't until I came to the southwest that I became fascinated with the subject of solar energy. (Which, incidentally, includes wind power.) For the past year or so I have read everything I could on the subject, and in New Mexico that is a lot. The Land of Enchantment, with less than 1% of the nation's population has about 10% of all the solar installations. A large part of this activity can be attributed to the generally high percentage of useful sunlight hours but some of the credit must go to the large group of activists both in and out of state government. For instance, there is a state law requiring solar energy to be considered for all new state structures. Another law makes it illegal to take away your neighbors' sunlight. Albuquerque even has a solar heated dog kennel along with many other solar tempered structures.

In any discussion of solar energy the number to start with is the solar constant, the quantity of energy available. We are, of course, talking about direct use of sun power. It is true that all our fossil fuels are a result of sun energy stored over billions of years. The solar constant is by definition the energy incident on a unit area located outside the earth's atmosphere and normal (at right angles to) to the sun's rays. To an accuracy of ±1.5% it is 1353 Watts per square meter (MKS units). In the awkward English system it is 429.2 BTUh per square foot. (Yes, we still use the BTU in this country in heating and air conditioning work.) 1353 Watts per square meter (one square meter is almost 11 square feet) sounds like quite a bit of energy but wait a minute, we haven't got it yet. After coming through the atmosphere the available energy is down to about 1000 Watts (1kW) per square meter, but don't get excited, we still haven't got it. Remember this is measured on a plane normal to the sun's rays. For a fixed flat collector, the kind most often used, this condition can exist for only two short periods per year. For heating purposes in the cold months the collector should be oriented south ±20 degrees or so, and inclined from the horizontal about your latitude +15 degrees. Neither angle is particularly critical, vertical collectors work very well, but the efficiency curve will decrease as the angle deviates from optimum.

The two classes of solar systems usually considered are active and passive, and there are many variations of each class. The active system uses fans or pumps to move the heat transfer fluid, usually air or water, thus requiring power input. Passive systems use natural convection currents to transport the fluid. The biggest advantage of solar heat is that it is free and clean. The big disadvantage is it isn't always there and the density is relatively low. These disadvantages make it necessary to construct large collecting areas and to provide some sort of energy storage systems to get through nights and cloudy periods. Presently, rocks or water are the most cost effective storage mediums. Some other interesting possibilities are being studied, such as compounds with fusion temperatures near room temperature allowing storage of large amounts of heat per unit volume.

Personally I prefer the concept of passive systems, mostly because they are beautiful in their simplicity. In an area where firewood is readily available, a passive solar system, wood heater assisted, should be all a well-built structure needs. Just think, no more heating fuel bills!

For the sake of discussion let's take a

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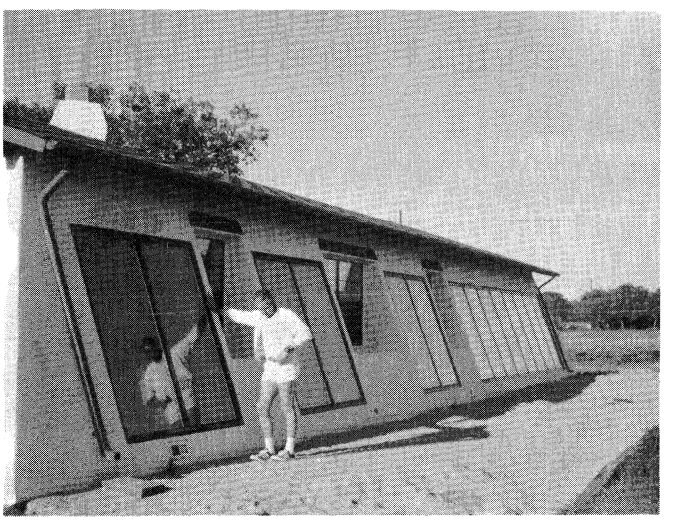
hypothetical example. After all the losses, the useful energy will average about 600 to 700 Watts per square meter (W/m^2) for the 7 or 8 hours centered on solar noon. It follows that the power available per square meter per sunny day is about 4 kilowatt hours. Now the average 1500 square foot home will normally have 15 to 20 kilowatts of heating energy available in one form or another. If 15 kW is used for 24 hours, the input power is 360 kWh. (If you want BTU, you'll have to do it yourself. The conversion factor is about 3400 BTU/kWh.) The cost of electric power varies, but a good average is about $0.04 dollars per kWh. Then the cost of the 24 hours of heat is $14.40 exclusive of lights or hot water and appliances. Any wonder some people are paying 200 or 300 dollars per month for power during cold months?

Free solar heat looks better and better, but let's take a closer look: to collect this much solar power in one day will require 90 square meters of collector, or about 970 square feet, and a large enough storage system to hold over for a day or two at least. But don't despair yet, all is not lost. In a dwelling constructed with energy conservation a prime factor, such techniques as underground or partial underground walls, small windows, or none at all on the north side, small glass area on the east and west, good insulation, weather stripping, etc., the heating power required can be reduced by at least 1/3, reducing the size of the collector to about 60 square meters.

If we do not try to go 100% solar, say about 75%, we can reduce the collector to about 40 or 50 square meters and add some kind of auxiliary heater. 45 square meters is less than 500 square feet, so a south wall measuring about 8 by 60 feet would provide an appreciable portion of the heat for our imaginary house. Keep in mind that this is a hypothetical situation and many other factors must be considered for a given case, e.g., number of degree days for the location (how cold it gets) latitude, useful hours of sunlight, etc.

Like most everything else, some compromises are called for. First, economics: how much are you willing to spend? For a given case it is possible to get as much energy as you want if you build a large enough collector. The most economically attractive systems appear to be those designed to supply about 75% solar energy (including hot water). With the other 25% supplied by an auxiliary system. What if you already own a home? Then retrofitting may be of interest. Several alternatives are available for fixed and mobile homes. The main requirement is access to an unobstructed southern exposure. Several firms are marketing solar furnaces that can be mounted alongside or on existing structures. One interesting idea is the portable green house that can be installed on the south side of the home or trailer and dismantled when not needed.

The accompanying photographs show a couple of solar homes recently constructed in Socorro. The house in photograph number 1 belongs to Mr. and Mrs. Dave Gibson, a sometimes visitor to Green Bank, now on the staff of New Mexico Institute of Mining and Technology. This is an active commercial system provided by Solaron, Inc. Storage is provided by a rock bin located near the center of the house. Dave expects 60-75% of his energy needs to be supplied by this system.



Home of Mr. & Mrs. Dave Gibson, Socorro, New Mexico.

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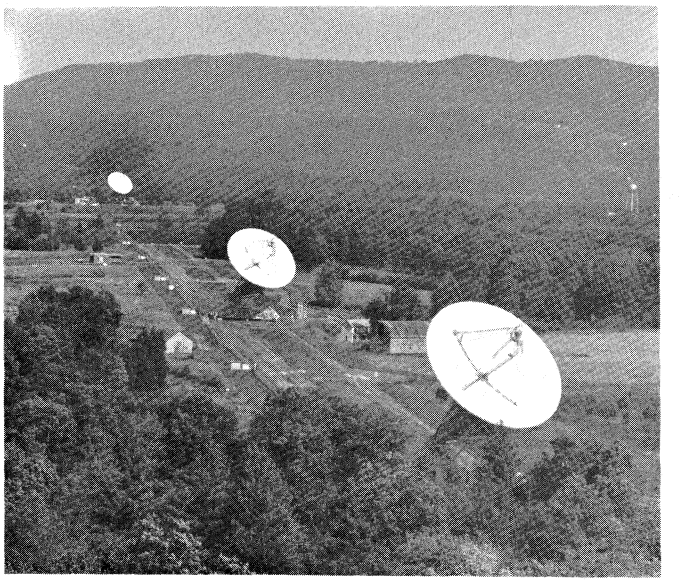
Home of Mr. & Mrs. Dave Winn, Socorro, New Mexico.

Photograph number 2 is of a home belonging to Mr. and Mrs. Dave Winn. Mr. Winn is also on the staff of NMIMT. The rock storage bin for this system is below the floor. This is mostly a do-it-yourself system designed by the owners. No numbers are available, except that Mr. Winn said his heating bills are low.

If you are interested in more information on solar energy I suggest you look into the "New Mexico Solar Energy Association (NMSEA)", P. O. Box 2004, Santa Fe, New Mexico 87501. Cost is $10.00 per year and in addition to a good monthly bulletin packed with information they will assist individuals with solar home evaluations. Another source of practical information is "The Mother Earth News", Hendersonville, NC, although some of the ideas are technically questionable. Several other popular magazines publish experimental designs, but you can also design your own inexpensive system.

Solar power is not on the way, it is already here. Try it -- you'll like it.

GB INTERFEROMETER TO CLOSE DOWN



GB 3-Element Interferometer

D. S. Heeschen, NRAO director, announced on May 9, 1978 that the Green Bank Interferometer telescope is being phased out of operation, with a final shutdown scheduled for October 1, 1978. The interferometer is becoming obsolete as a research instrument as the NRAO's Very Large Array telescope nears completion in New Mexico. Therefore, the National Science Foundation has notified the Observatory that financial support for operating the Interferometer will end October 1. Research programs currently conducted at the Interferometer will be carried out at the Very Large Array telescope.

Employment at Green Bank will be reduced by some 13 to 16 positions (about 10% of the permanent Green Bank staff) as a result of the shutdown. The Observatory hopes to minimize the impact that reduction in force will have by not filling existing vacant positions and through normal attrition, i.e., any retirements and resignations that might occur over the next five to six months. Those employees affected by this reduction were notified on June 1, 1978 of their status so that they could have as much time as possible to make other arrangements.

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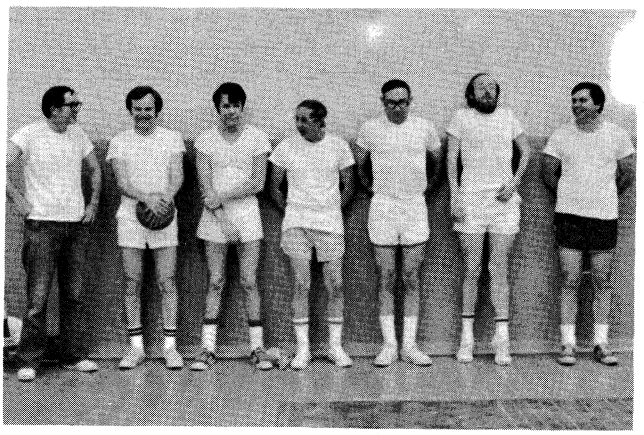
FIRST - SECOND ANNUAL MALE VS FEMALE BASKETBALL GAME AT CHARLOTTESVILLE

(ONE MAN'S OPINION)

Bill Meredith

We milled around while warming up, casting occasional glances at the girls at the other end of the gym. They were much better organized than we, looking almost professional as they practiced lay-ups, foul shots, set shots, and passing. Would this be their year? Would we have to suffer the humiliation of a defeat by girls?

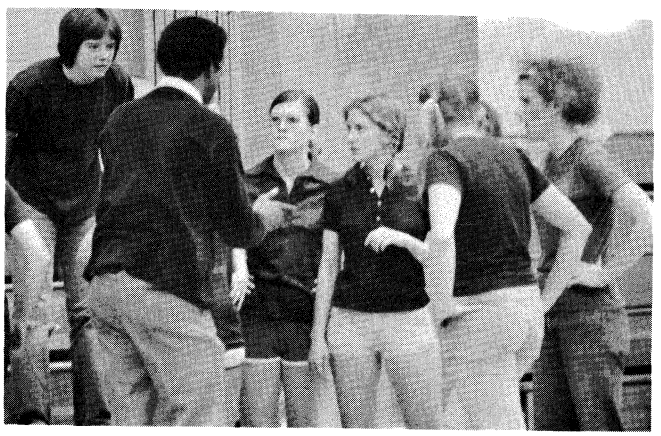


We're ready; bring on the girls.

The date was April 28, 1978; the time, 7:30 PM; the place, Jack Jouette Junior High Gym; the occasion, the Annual Male vs Female Basketball Game. This contest began, almost as a joke, last year. In the spring of 1977, some of the male employees and spouses of female employees rented a junior high gym one night per week for basketball. The NRAO girls apparently were envious of our svelte figures and youthful demeanor, due to superb physical condition, and decided to organize their own basketball play.

Shortly thereafter, we had to listen to snide remarks in the halls and canteen about how good they were. I don't know who actually dropped the gauntlet in front of whom, but someone issued a serious challenge and we accepted. The rules were simple - only the older men could play. Al Marscher, to our later dismay, played for the men and scored about half our points. For the next year all we heard was, "If Al hadn't played, we would have won."

Well, this year we were determined not to give them any excuse. The minimum age for the men was 30 and only employees were permitted to play on either team. It took about a month of negotiations before a set of rules was adopted. No throwing the ball across the center line - it had to be dribbled across. No full court pressing. Play would be half court. Four active players per team. No hand checking on either side. Proper garments must be worn at all times.



Don't forget which basket is ours.

The girls were coached by Ernie Allen. Had they won, we would have attributed the victory to male coaching, assuming of course that Ernie is male. There are some doubts. Mort Roberts was the time keeper. He had been a bit miffed due to criticism about his last year's performance and promised to do a good job this year. He is not above bribery, however. Hein Hvatum volunteered to be towel man for the girls, but his offer was politely refused. Betty Davis (Wade's wife) and Gary Pasternak were referees. The game was delayed 15 minutes waiting for Gary to arrive. He can't referee well, either.

The game finally got underway. Bob Burns, Dave Hogg, Stan Hansen, and I

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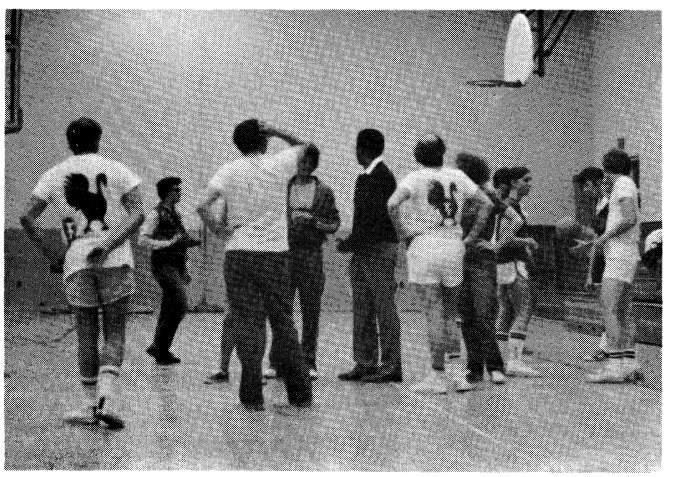
Our scorekeep - Would you buy a used car from this man?

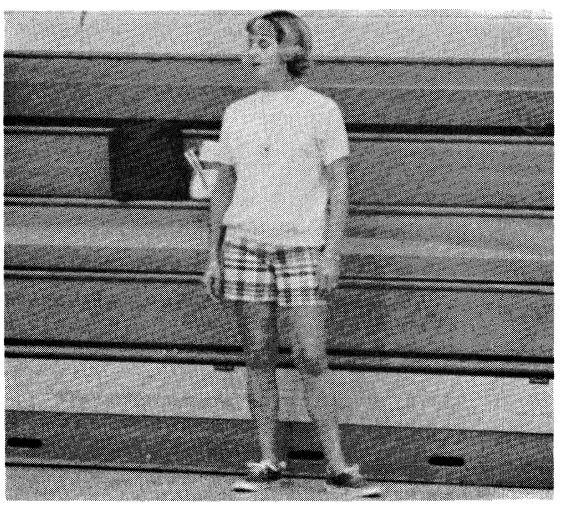
started (for the men, of course). We substituted every half quarter. Monroe Petty (player-coach), Bob Fromm, and Bill Wireman rounded out the men's team. The girls' starting line-up was Gail Browning, Betty Stobie (chief organizer for everything), Martha Haynes, Jean Eilek, Carole Black, and Linda Dressel. Linda could not play due to an injury suffered in practice. However, in a typical case of female temper tantrum, she did try to bodily throw me off the playing floor. No foul was called.

The girls jumped to a 4-0 lead and we were incredulous. Our worst fears were being realized. Maybe it was because we were nervous, or overly concerned about being gentle, or maybe they were just better. They were making good shots and playing their positions well. Nevertheless, we settled down and with judicious substitutions and superior performance took the lead and led at the end of the first quarter 14-8. At the half we led 22-13 and were feeling quite proud. We were showing those uppity females. Now let's really turn the screws.

At the end of the third quarter the girls were leading 30-28. It should be mentioned here that the girls tried every conceivable trick to win. They wore too short shorts, too tight tee shirts, and even managed to smell good, in order to distract us. They underestimated our determination. We were worried about the time and score keeping, remembering last year's fiasco and Mort Roberts. Furthermore, Marilyn Cram, a notorious female and suspected of being sympathetic to the female cause, was keeping the official score sheet.



What do you mean, I can't be the goalie?



Betty - always with her eye on the action.

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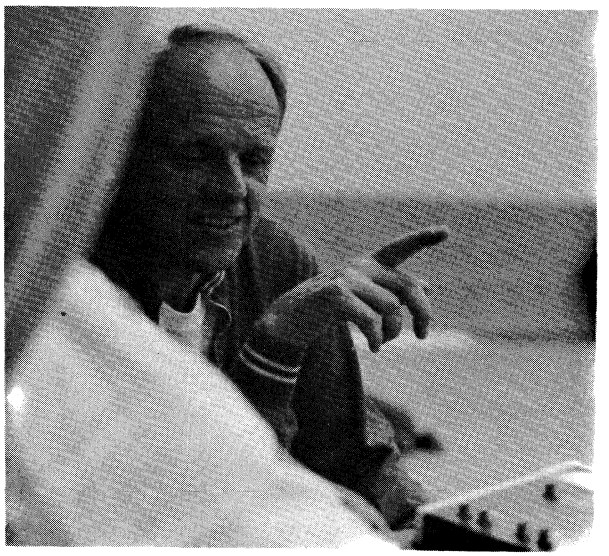
The referees, Betty and Gary, had 100% cooperation from the girls' team. Each girl considered herself a referee as well as a player and continually called what they claimed were fouls. Who can play a basketball game without a few hand checks? When caught up in the spirit of the game, what is a pat here and a pinch there? They were poor sports.

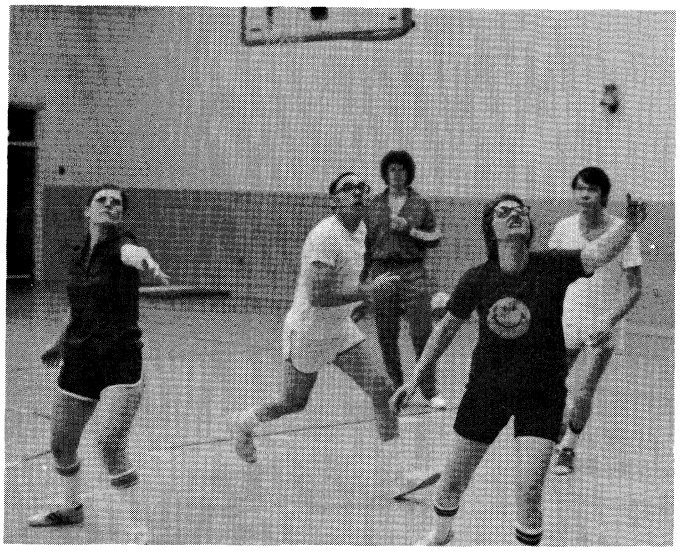
With four seconds to go, we were behind 40-38. We asked for time out. Monroe called for some strategy. Since we couldn't pass the ball across the center line, we would station Bob Burns one step before the line, the ball would be thrown in-bounds to him, he would dribble one time, taking him across the line, then



Now in Norway, we dribble the ball with one finger.

throw to Bill Wireman under the basket. Bill had been playing superb ball and it would be trivial for him to tie the game with an easy lay-up. Everything worked well except Bill Wireman was too closely guarded to receive the ball. It was thrown to Monroe who sank a one handed jumper at the buzzer.

Pandemonium! Ecstasy! We had been given a chance to redeem ourselves. No more being nice guys. No mercy. We would see just how large a lead we could acquire before the end of overtime. At



The sky is falling, the sky is falling!

the buzzer signifying the end, the score was 46-46. Double overtime. We were tired now. After all, we were all over 30.

Martha made a field goal and Jean scored a foul shot, but Monroe, incensed at the way the game was going, made two field goals and Bill Wireman one. We then went into our famous four corners offense. The girls had not been coached in a defense for this, so the score remained 52-49 in favor of the men as the clock ran out for the last time.

There was a post game party after the game (what better time for a post game party?) at the Stobies'. There the game was replayed many times as we ate, imbibed, and enjoyed the camaraderie which is all too often missing at the NRAO. The girls kept repeating, "Wait till next year", but we don't know. After all, it has been two years in a row now, and our natural superiority has been proven. This year's game was a little close, we admit, but we won. This may be a good time to issue a challenge to any females at any other NRAO sites. If you would like to schedule a game with men of impeccable character who have never been defeated on the basketball floor, let us know. We are very accomodating individuals and love sports.

At the party, several of the opposing team invited me outside to look for Mizar and Alcor, but how could I go when some-

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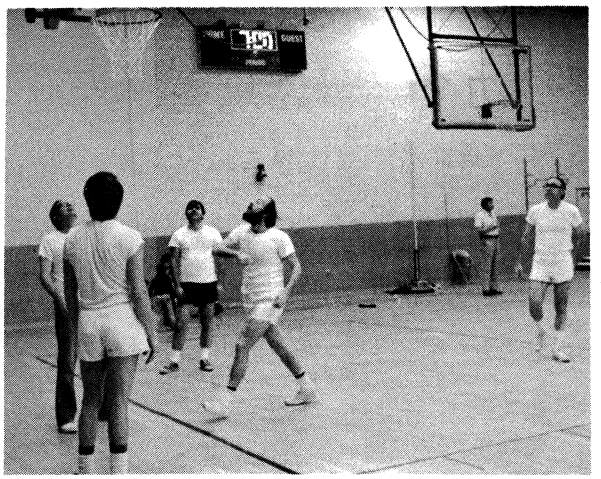
one had tied my shoe strings together? Besides, they may have had ulterior motives.

(ONE FEMALE'S OPINION)

Martha Haynes

Let's face it: the previous account of the Turkeys - Angels basketball game was rather biased. What we need is a little objectivity in journalism.



You mean we have to get that big ball into that little hole?

From the opening buzzer, it was perfectly clear that, though Turner's Turkeys had scoffed at them, they surely had not scouted their opposition. The Angels roared off the bench, somewhat like the front row in the first instants at Indianapolis, and before the dust had settled, the Turkeys found themselves down by four big points. During the ensuing time-out, called by a panicked Turkey coach, representatives of the poultry industry lobbied with the Angels to relax their game a bit so as not to demoralize totally the men. Being the sweet things that they are, the Angels responded by allowing their opponents to build up a sizeable lead during the first quarter as a handicap. After that, however, the vision of Turkey dinner with all the trimmings loomed in the minds of the sharp-shooting Angels.

Ernie's Angels - always prepared.

Coached by Ernie Allen in the tradition of Bobby Knight, the Angels were aided by a strong recruiting season, undoubtedly made successful by their fine performance last year. Returning veterans "Up-Front" Browning, "Jump-Shot" Nance, "Slam-Dunk" Stobie, and "Hondo" Haynes, provided the experience to complement the vigor of the new recruits, "Midnight Kid" Black, "Cornbread" Dressel, "Dr. J." Eilek, and Susan "The Stilt" Neff. The Turkeys may have forgotten that "Hondo" and "The Stilt" had recently played out their options with the Hurryin' Hoosiers before signing with the Angels. The Turkeys simply didn't take the game seriously. Until perhaps the last quarter

There went my balloons!

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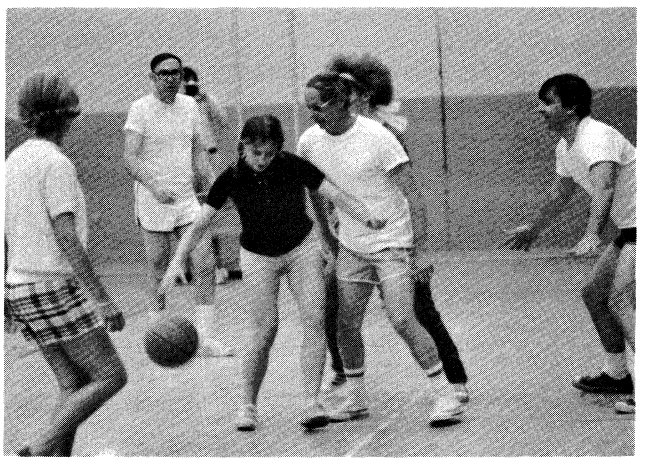
of regulation time. The Angels had worked long and hard to develop not only a strong offense, but also a solid defense which totally confounded the attacking Turkeys who managed to develop only a case of ruffled feathers.

Yes, in the end, time played in the favor of the Turkeys and they walked away with a fortunate victory in the second mini-overtime. Turkey Bill has implied that too many fouls were called against the Turkeys, but who ever thought of calling an angel a fowl. One cannot deny



Note the elbow in the stomach. Note the referee right on top of the action. No fondling foul was called.

after all, that the Turkeys had a distinct height advantage with those long legs and long necks. The Angels had the problem that their haloes kept getting in the way. Despite the inferences of the previous reporter, the Angels had no need to ask for the favors of the referees. The Turkeys brought on those key violation calls all by themselves. The Angels have even kindly offered to tutor the Turkeys in the art of setting up a play before the game next year.

Clearly, the Turkeys were outclassed by the razzle dazzle play of the Angels, and hence the moral victory belongs to the Angels. For next year, we predict that an Angel victory will be simply duck - or turkey - soup.

*****

BUCKY--OF THE 140-FOOT

Seeing a deer on the Green Bank site certainly isn't unusual. Not when you can see them anytime during the day or count a hundred in an evening. However, Bucky wasn't just one of the site deer; he was tame. People, not knowing this, were always surprised and delighted to see him grazing peacefully near the 140-foot or resting on the cocoa mat in front of the double doors.

Scuttlebutt around the shops implied that Bucky was born in royalty on a large estate in the Wesley Chapel area. Afraid that he might be shot, he was brought to the Green Bank site. When he adopted the 140-foot telescope, Bucky was a little over a year old. Generally you could find him grazing around the 140-foot pedestal but as he became accustomed to the site and people, he wandered as far as the 300-foot. His favorite resting places were the cocoa mat on the front stoop and the Cassegrain subreflector shed near the pedestal.

Employees and tourists (from the tour buses) fed him an assortment of goodies (maybe not so goodies for a deer) of sugar, cake, biscuits, candy, Vitamin C, salt tablets, and occasionally a cigarette butt. He got so spoiled for human food that he came to nudging visitors if they failed to give him a tidbit.

Not long after Bucky came to the 140-foot his antlers started to grow. Mere nubs when he arrived on site (that's how we knew he was a he) they grew into handsome antlers by summer's end. When they were covered with velvet they were hard to resist stroking (see photo on following page). For most people, Bucky's horns were the first horns they ever stroked that were on a live deer.

Since he was getting bigger and his antlers became better developed, it was feared that in his playfulness he might hurt someone. Nor was it known how aggressive he might become during the "rutting" season. For these reasons a conservation officer removed Bucky to the French Creek Game Farm near Buckhannon, West Virginia.

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Anne Michele Brundage strokes Bucky's horns.
(photo courtesy of Bill Brundage)

If you visit French Creek, Look for Bucky and say hello.

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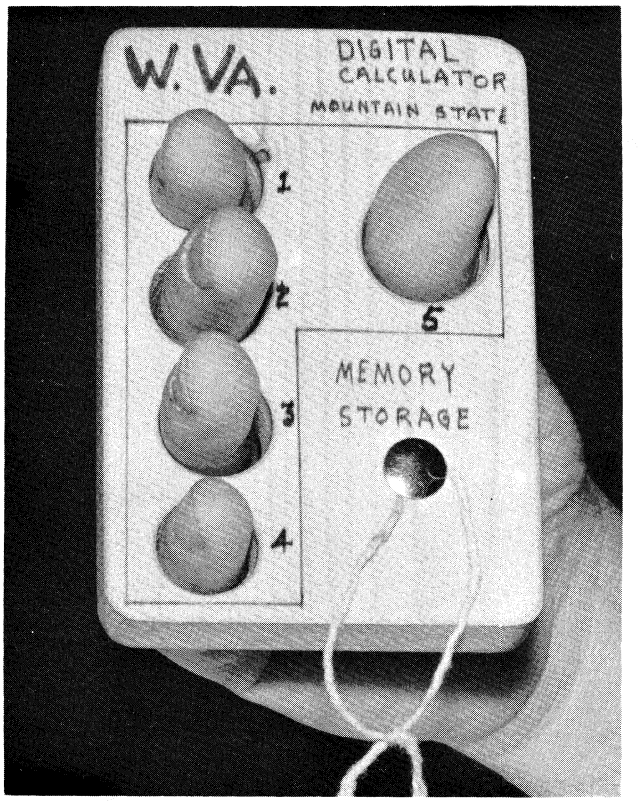
NEW 300-FOOT CALCULATOR

The latest in calculating equipment is now available to visiting observers at the 300-foot telescope, according to Bob Viers, chief telescope operator. "It was a good buy for the Observatory", says Viers. "We got it at a low price, it's easy to operate, calculates quickly, and has storage memory. Not only that, it's durable and should outlast the 300-foot."

Viers tells us the new calculator is made by West Virginians right in his hometown (local pork barrel project) out of recycled materials, and comes in patriotic red, white, and blue, with the Lord's Prayer printed on the back side for observers who need help with their programs.

As we were going out the door, Viers shouted out over the roar of the Crews/Weimer Symphony, "This calculator will put the electronic pocket calculators out of business. You better buy some stock while it's still cheap."



300-foot's new whiz-bang calculator.
(photo by Monk, Cassell, Sparks, Miano, and Oref)

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THE HOMESTEAD

In the early days good, mineralized water springs were a gathering place for people who felt their waters afforded therapeutic cures or temporary relief for an assortment of ailments. Generally, after the discovery of a good flowing mineralized spring, a resort of sorts followed and eventually a town built around it. One needs only to look at a map of Virginia or West Virginia to see that many towns have "spring" in their names. While in most cases the resorts were short lived, a few prospered and became famous. The Homestead, in nearby Hot Springs, Virginia, is one of the famous ones.

Legend says the hot springs that attracted the early settlers were the focal point for several small resorts preceding the present Homestead, and were discovered about 1630 by an Indian brave who wandered into what is now known as Warm Springs Valley. Thereafter the springs became so popular with the Indians that some of the northeast tribes declared it neutral ground and used it for rest and recuperation for over a hundred years before the whites learned of its existence.

Perhaps colonists heard of these hot springs before 1750, but the first written record of their use by colonists wasn't until 1750 when a doctor on his way to and from Kentucky noted in his journal the use of the springs for therapeutic purposes. The springs, however, enjoyed only a limited use until they were acquired by one Dr. Thomas Goode. A sharp entrepeneur, Dr. Goode saw in the springs the makings of a profitable resort. By 1832 he had a modest resort in operation and during his twenty-five years of ownership he advertised in leading magazines and newspapers, claiming his resort was equal to or even, perhaps, better than the leading European spas.

After Dr. Goode's death in 1858, the ownership of the resort passed through the hands of several absentee owners whose neglect and ineptness almost brought about the demise of the resort. M. E. Ingalls came along in time to save the resort. Like Dr. Goode he saw the potential of the resort. With a syndicate of three wealthy northeastern men he began active development of the property in 1890.

Ingall's active development of the resort, starting in 1890, marks the opening chapter in the contemporary history of the Homestead. Three years later, under his direction, the Bath House, branch railroad, and the handsome frame Homestead were completed. Eight years later a fire (starting in the bake shop) burned it to the ground. However, rebuilding began immediately. In 1908 the West Wing was completed, the East Wing in 1913, and the Tower Section in 1928. The completion of the Tower Section brought into being the elegant Georgian-brick Homestead. In 1973 a $9,000,000 modernistic South Wing of 200 guest rooms and a conference center was added. Today the Homestead has 700 rooms and parlors with a capacity of 1,100. The spacious Conference Hall can accomodate 1,500 persons for meetings and 1,000 for banquet functions.

Before, during, and after the main building activity, all those facilities necessary for making a resort of international repute were actively pursued. As one would guess, the pools at Warm Springs and the bath house at Hot Springs were the first facilities built. The men's pool, a 40-foot octagon, 120 feet in circumference, dates from 1761. The ladies' pool, 50 feet in diameter and 150 feet in circumference, was completed in 1826. Both fill continuously with natural, 98° colorless - and sometimes effervescent (from carbon dioxide bubbles) - mineralized spring water. The bath house, mentioned earlier, was built in 1892 and is supplied with 106° water.

Golf has been popular at the Homestead for a long time. The first tee of a six-hole course was laid out in 1892 and is still in use as the first tee of the 18-hole Homestead Course. The original 6-hole course was upgraded to 9, later to 15, and eventually to 19 holes. Nineteen holes is no mistake. They turned the practice green into a 19th hole and golfers use it to decide who pays for refreshments and caddies. In the early 1920s an 18-hole course was completed at Cascades, and in 1963 a Robert Trent Jones designed 18-hole Lower Cascades

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The Homestead, Hot Springs, Virginia, showing the main building and historic tower.

course was opened for play.

Tennis was as popular as golf and in the same year the first tee was laid out (1882), the Homestead built its first tennis court. Two years later 3 clay courts were added and 5 all-weather courts in the early 1930s. So popular has tennis become that seven more courts have been added in recent years. Of the 15 tennis courts, 3 are En-tant-Cas, 4 Teniko Royal, 7 Har-Tru, and 1 all-weather.

The Homestead became a year-round resort when it brought skiing to the South in the late 1950s. The idea of skiing, however, was toyed with long before that, but snow cover in the area was so unpredictable as to make skiing a financial gamble. For that reason skiing in the South had to wait for Larchmount Engineering of New England to invent the artificial snow-making machine in the early '50s. Three years in the making and $1 million later, the Homestead, in the winter of 1959, launched the

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"Come South to Ski" movement which featured a 3,200-foot main slope with trestle lift, a 2,000-foot subsidiary trail, and smaller courses of 1,000 and 600 yards.

Golf and tennis in the summer and skiing in the winter are probably the "in" sports at the Homestead. But a well-rounded resort has to offer more recreational activities than the "in" sports. The Homestead does. Riding is one. Good horses (walk-trot-canter road hacks) and 100 miles of trail or anywhere on the Homestead's 16,000 acres make riding at the Homestead a unique experience. Other sports include skeet and trap shooting, swimming, ten pin, lawn bowling, ice skating, and trout fishing in a well-stocked nine-mile trout stream.

It all started, of course, with natural, free-flowing mineral springs. The springs brought people to Warm Springs Valley in the first place. In the old days, mineralized springs were highly touted for relief of many human miseries; however, the Spa at the Homestead ascribes no magical powers to its hot springs. Yet it feels a spa offering a pleasant environment, a good living regime and the proper use of hot baths is conducive to health building. The activities of the Spa at the Homestead, modern in every respect, are centered in the Bath House. Located here are medical activities, the medical director, hydrotherapy (use of water) equipment, 104° F baths, Zander Room (houses special exercising equipment), a glass-enclosed swimming pool and adjoining sun deck, and an outdoor pool and sand beach.

How about the Homestead for your next division dinner? You can choose from a menu that is basically "continental cusine" with any number of dishes from various countries, including the U.S. Your food is prepared under the watchful eye of executive chef, Albert Schnarwyler, a native of Lucerne, Switzerland. To lend him a helping hand, in case you have a large division, he has 65 cooks, bakers, pastry men, etc., and 165 persons working in the dining room. Food, the best available - and fresh, is shuttled in twice a week from Washington, D. C. by refrigerated van (meats and seafoods are shipped to D. C. from New York City). In season, vegetables and fruits are purchased locally.

See you at the Homestead?

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[1] Information for this article was supplied by John M. Gazzola, Jr. of the Homestead through the efforts of Tony Miano.

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WHY LIBRARIANS DRINK AND/OR ENGAGE IN PRIMAL SCREAM THERAPY

Sarah Martin

Comments by a librarian colleague in a recent newsletter I saw indicate that, despite their beliefs to the contrary, NRAO library users are far from unique. The writer was pointing out the similarities between users in the large university library from which she had come and those in the small special library in which she is currently employed. Some of her examples, with NRAO applications:

1. "Few people read signs or instructions posted in a library." Ahhhh - it brings to mind the many times I have had someone stand in front of the sign that says "ApJ" in bright, bold letters and ask in a thunderous voice "Where have you hidden the AaaaPeeJay?" Seriously, folks, if I wanted to hide the Astrophysical Journal, I'd be much more subtle than that.

2. "The 'I want my cake and eat it too' syndrome" is exemplified at the NRAO by the user who wants to know why staff member B has been allowed to keep a certain book for 2 years. The user then retrieves the book from B and keeps it in his office for the next 4 years.

3. "People are often surprised to learn that someone else is interested in the same subject, especially if that subject is highly specialized." Examples of this phenomenon range from the scientist who doesn't bother to check out the volume he wants of a particular journal ("because I'm the only one interested in this stuff") to

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the administrator who says "I'm the only one who needs these data" and then proceeds to request that others be cognizant of said data, which of course they have some difficulty in doing, because the aforementioned administrator has the book/journal squirreled away in his office.

As if living daily with such illogic weren't enough, librarians must spend a lot of time figuring out how to save money/space/time/resources while at the same time trying to anticipate the needs of a user community that, at best, can articulate 25% of what they want and yet still expects one to know exactly what it is and to have it on hand at the precise moment it is required. This juggling/mind-reading game gets a little difficult because not only has the inflationary spiral hit libraries, but it has sucker-punched many of them into the position of having to choose between two or more equally needed items when there is only money and room in the library for one of them. The price of technology books has risen 57% in the past 10 years and science books 89%. The real villain, however, is journal prices, though I wasn't aware of how much a villain they were until I found recently a list of prices we paid for journals approximately 20 years ago. Subscription price differences on journals we bought then and continue to get average a whopping 739% higher today. It's mind-boggling to consider that a journal we paid $15.50 for back then now costs us $320.00 a year (Monthly Notices) or that convenient abstracting service we bought for $44.80 in 1958 now costs us $1210.00 to just get it into the library, which doesn't include the cost of checking in, binding, and shelving the little devils.

In July of each year, we receive the major invoice for most of our journals. That explains the primal screams coming from the library around that time, closely followed by the primal screams from down the hall and the ensuing flurry of activity to determine which journals can be surreptitiously dropped without eliciting primal screams from the staff. This year, to try to lower the decibel level on summer screaming, we will shortly be circulating a list of candidate journals for dropping. Staff members are cautioned to keep in mind example #3, above, when reviewing the drop list. If you <u>really</u> are the only person interested in a particular $500/year journal, it's going to take some fast talking to convince me to keep it instead of 10 journals costing $50.00 each that many people use. Not that we'd <u>ever</u> try to put a price tag on the value of a particular staff member's research, but in these inflationary times, a journal that is used once every three years is hardly worth the cost of acquiring and maintaining, when a photocopy of a needed article can be gotten cheaply and quickly. One should also keep in mind that all of the NRAO libraries are rapidly running out of space. That means we either have to get rid of something or start appropriating offices for storage space (and <u>we</u> would determine what was stored in your office.... Do you really want to face 20 years of old, dusty Comptes Rendus each morning?). Suggestions for droppables will be gratefully accepted at any time, but particularly between now and the first of August, for acting on your suggestions to drop something allows us to pass the blame when three years hence you come roaring in to discover that the library no longer maintains a complete run of the Irish Philosophical Society Proceedings. Librarians learn early in their training that it is always wise to have a scapegoat at the ready when a user approaches....

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GREEN BANK SCHOOL

Ernestine Clarkson[1]

Ageless as time itself, the new replaces the old, yet the nostalgia of the old remains in memories of days gone by: so it is for Green Bank Elementary School. The students of Green Bank Elementary School will attend classes in a new building this fall, constructed on a site near the old building. However, the Green Bank Middle School (grades 6-8) will have to remain in the old building until phase two of the building program is completed. Completion

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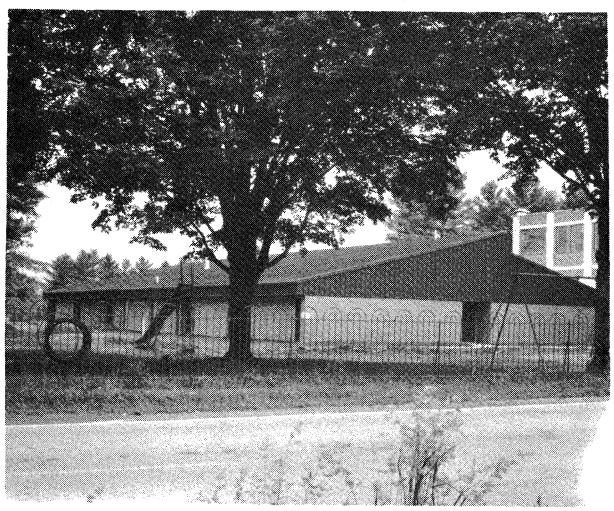
of phase two will result in a whole new structure replacing the sixty year old school building.

The Green Bank School, built in 1916 with grades one through twelve, was chosen because it was centrally located and could best serve high school students from surrounding communities. This was the first time since one-room schools that upper Pocahontas County students were offered an education above the 8th grade level. One-room schools with grades 1-8 and only one teacher were in every small community.

Unless you were within walking distance, getting to school in the early days of the high school was pretty rough. Transportation was an old truck with benches and a canvas top to keep out rain and snow. Often times the driver was one of the students who was determined to get an education. Road conditions were terrible and clearing the roads of snow in the winter was unheard of. Eventually, as roads and transportation got better, the small one-room schools closed and students were bused to three larger graded schools at Cass, Durbin, and Green Bank, and high school attendance increased.

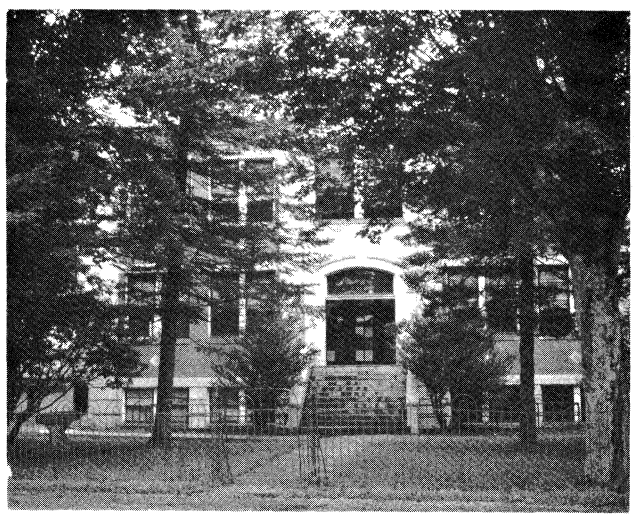


The new 10-room grade school addition. Part of the old Green Bank School can be seen at middle right.

As the years passed, students and parents demanded still better schools, and in 1970 the voters of Pocahontas County voted a bond issue and Pocahontas County High School was built. The new high school, built on 80 acres adjoining Seneca State Forest, replaced the three old high schools at Marlinton, Green Bank, and Hillsboro. At this time, Green Bank became solely an Elementary School. Cass Graded School was closed and those students were bused to Green Bank. Later, in 1977, Durbin Graded School consolidated with Green Bank. In June of 1977 the 10-room new elementary school was started and completion date set at April 1978. Money came from the passage of the Better School Amendment.

The new school has approximately 11,000 square feet and ten 24' x 30' classrooms. In addition, there is office and storage space and restrooms. It is constructed of brick veneer over block with 12" insulation, and 2" styrofoam between block and brick. The floor is a concrete slab covered with vinyl tile and the windows are the thermal insulated type. The building has a metal roof and is heated with a fuel oil furnace.

The consolidation of Green Bank and Durbin students crowded the old school building and every available space was used



A view of the former main entrance of the sixty-one year old Green Bank School.

to house the five hundred students now attending Green Bank School. Although space

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was important, the need for a safer, fireproof building was of much greater importance. The new school building will meet all fire safety specifications of the State Fire Marshall.

So in closing, we welcome the new, remember the old, and look forward to the future when Green Bank Middle School will move into a new and safer building upon completion of phase two of a two-phase plan for the Green Bank Schools.

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[1] *Secretary, Green Bank Elementary School*

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AUI TRUSTEE SCHOLARSHIP WINNERS

D. S. Heeschen

It is my pleasure to announce the following winners of this year's AUI Trustee Scholarship competition at NRAO:

Mr. Joseph J. Mathieu - Mr. Mathieu is a senior at Socorro High School, Socorro, New Mexico. He plans to attend New Mexico State University this fall where he will major in Electrical Engineering.

Mr. Mathieu has been active in the following school activities: German Club, Varsity Club, Student Council, Delegate to New Mexico Boys State, National Honor Society. In addition, Mr. Mathieu has participated in football, basketball, and track. He has received All-District honors in football and basketball.

Mr. Mathieu is the son of Mr. and Mrs. David L. Mathieu. Mrs. Mathieu is assigned to the VLA Fiscal Group.

Mr. Michael S. Hjellming - Mr. Hjellming has been a student at Socorro High School, Socorro, New Mexico for the past two years. He transferred there from Albemarle High School in Charlottesville, Virginia. Mr. Hjellming plans to major in Physics at the University of Chicago.

Mr. Hjellming has participated in the following activities at Socorro High: Science Club - President, Drama Club, French Club, Student Council, Delegate to New Mexico Boys State. Mr. Hjellming is also active in band and has played with the NMIT Chamber Orchestra.

Mr. Hjellming is the son of Dr. and Mrs. Robert M. Hjellming. Dr. Hjellming is a Scientist at the VLA.

I'd like to offer congratulations on behalf of the entire Observatory to Jimmy and Mike and to their parents!

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THE INCONSTANT MOON

Lee J Rickard

The waxing and waning of the moon is the ancient symbol of time passing, of fulfillment and reversal, of the inevitable change of fortune. But in the centuries since Galileo first turned his telescope toward it, the moon has come to be more a symbol of time passed. Its ruined surface gives the impression of great age. We know that most of its features were made within the first two billion years of its formation. Not suffering active erosion by air or water, they remain substantially unchanged to this day. Unchanged, petrified, dead.

But changes on the moon have been reported from time to time. These changes, called lunar transient phenomena (or LTPs) involve temporary glows or brightness changes, obscurations of detail (as if by fog), or color changes (red spots, violet glares, etc.). The average duration is about 15 minutes. Reports are known from as far back as 1540, and have been made by such distinguished observers as William Herschel, J. D. Cassini, E. E. Barnard, and the crew of Apollo 11. And, until recently, they were generally dismissed as spurious effects arising from the unusual ways in which the sun can illuminate the lunar surface and from the fallibility of visual observations. They are thus part of that class of anomalous phenomena (ball lightning, auroral noises, noncosmological redshifts, UFOs) that pass through a period of ambiguity before being resolved into either the

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frontiers of science, or the fringes of pseudoscience.

Long after photographic techniques were introduced into astronomy, visual observations were still preferred for the moon and planets because they were less susceptible to atmospheric seeing. Photographs average over the fluctuating distortions of the atmosphere. But visual observers can wait for those brief instants when the seeing is clear, revealing surface features at the limits of the telescope's resolution. Thus, until the Lunar Orbiter missions, most of our knowledge of the fine details of the lunar surface came from visual observations. Because the work was boring, it was done mainly by nonprofessionals, who are not considered unimpeachable in matters of anomalous phenomena.

Lunar observers tend to concentrate on features near the terminator, the boundary between the dark and sunlit parts of the moon, where the surface structure is seen in strong relief. (The good observers return to features thus discovered, examining them in a variety of illuminations.) But the surface of the moon is a jumble of light and dark material, distributed over varying unknown slopes and elevations, and can easily create optical illusions. For example, at local sunrise, the floor of the crater Alphonsus often gives the impression of being a luminous cloud, hovering above the surface.

In addition to being explainable in terms of the effects of illumination and psychology, LTPs also suffered from being theoretically unpopular. As soon as Galileo observed the lunar craters (in 1610), it was recognized that they could have been formed either by volcanic eruptions or by meteoric impacts. Robert Hooke discussed both theories in 1665 and was unable to decide between them - a remarkable thing, considering that the existence of one side of the argument (the meteors) was not accepted for another 150 years. But by the mid-twentieth century, the impact theory was so favored that the occasional sign of volcanism (such as LTPs, which had been identified with eruptions since Herschel's time) was viewed with considerable skepticism.

Augmenting the LTP disrepute were the spectacularly bad experiences of some professional astronomers. For example, at the turn of the century, W. H. Pickering was sent to Harvard's newest outpost, in Jamaica, with a special long focal length telescope that turned out to be good for nothing but lunar observations. After several years, Pickering found color changes in various craters, notably Eratosthenes and Plato, and suggested that they represented seasonal changes in frost cover. He became fascinated by the subject, to the eventual detriment of his career, since other astronomers did not confirm his results.

The eventual course of Pickering's lunar studies may have been affected by his collaboration with Percival Lowell on maps of the Martian canals. In a letter to his brother in 1912, he commented: "Whatever reputation as an astronomer I lost when I published my former observations, will be nothing to the destruction produced when these get into print..." He had identified the color changes in Eratosthenes as seasonal vegetation, akin to that lining the Martian canals. (Because of the speed of the variations, though, he later revised the interpretation to migrating swarms of insects.) As in Lowell's maps of the Martian canals, Pickering's observations were overwhelmed by his expectations.

We may judge their fallibility by the canal maps. Not only have the recent Mars probes found no evidence of canals, they have found no features that could even be misinterpreted as canals.

On the other hand, a statistical examination of LTP reports, as made by Barbara Middlehurst in the 1960s and by Winifred Cameron more recently, suggests a real phenomenon occurring at specific times and places. LTP sites are not distributed randomly over the face of the moon: 80% are linked to only 12 sites, and 33% to the single crater Aristarchus. They also have a tendency to cluster at the edges of the maria. Reports have a tendency to occur when the moon is at perigee, suggesting a tidal connection (although with the latest data, the correlation is not as strong as

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when first discovered). As if that weren't enough, amateur astronomers participating in project Moon Blink have contributed several independent reports of color events. (Moon Blink involved observing the moon in rapid alternation through red and blue filters. The surface appears as a pattern of flickering spots in which one new flicker is quite noticeable.)

It was hard evidence, though, that certified LTPs. The first such evidence was obtained by N. Kozyrev, at the Crimean Astrophysical Observatory. In 1958, Kozyrev was taking spectra of the crater Alphonsus, known to be a frequent site of LTPs, when he noticed that the central peak had become blurred. During a second spectrum, the peak became abnormally bright; and Kozyrev took a third when the peak returned to normal. The spectra record the appearance of a dust cloud in the crater, followed by the emission of carbon molecules, excited by solar radiation, which dissipated within half an hour. Within several years, Kozyrev obtained spectra of other similar degassing events, and his results stimulated further research.

The Apollo missions gave substantial support to the identification of LTPs as isolated emissions of internal gases. A month after Apollo 14 returned to Earth, one of the experiments it left behind reported a series of bursts of water vapor ions, apparently vented from the interior. LTPs have been reported near the Fra Mauro site. The Apollo 15 and 16 orbiters recorded alpha-particles produced in the decay of radioactive radon, which must have been released shortly beforehand. The radon emission correlated strongly with the edges of the maria and with specific craters, such as Aristarchus - all sites of LTPs. So modern opinion on LTPs is strongly on the side of their interpretation as real degassing events.

This accounts for the brightening and color change events, the majority of LTP reports. But there have also been a few reports of physical changes on the moon. These are much more disreputable, and in fact are still considered largely spurious. The best example is the case of the feature Linné, in the Mare Serenitatis. Linné was described as a deep crater by observers in the 1840s, and as a small whitish patch by observers in the 1860s. Many thought that the crater had disappeared in the interim. The present opinion is that it never existed in the first place, but was rather due to peculiar lighting conditions. Indeed, modern observers have reproduced this error.

Of course, the moon does change. The surface is eroded by micrometeorites, crater walls creep and slump, and as we have seen, occasional degassing events stir up the dust. But these changes are generally not visible to ground-based observers. The only surface change that one might hope to see is the formation of a new impact crater; but here the statistics are not encouraging. The smallest crater one can see from the earth is about one kilometer across, and there are some 300,000 craters this size or larger. Even if they were formed at a uniform rate (and they weren't - they were formed much faster in the early days), that would mean a new observable feature would be formed every 15,000 years. A long time to wait.

Despite this unfavorable number, J. B. Hartung has suggested that a major impact event, the formation of the crater Giordano Bruno, actually did occur in recent times, and was recorded by English monks. Hartung refers to the Chronica of Gervase of Canterbury, one of the important sources of information about England during the reigns of Kings Richard I (the Lion-Heart) and John. Gervase was sacristan of the Christ Church monastery in the 1190s. In his Chronica, he included a description of a lunar event on the 18th of June, 1178 (Julian calendar), in which a "flaming torch sprang up" from the crescent moon, spewing out fire and coals and slicing the crescent in two. From this account, Hartung derived a rough position for the event, and found that it could be identified with Giordano Bruno. Bruno is a 20-km-diameter crater just beyond the visible limb of the moon, and is known from the structure of its ray system (the debris blasted out by its formation) to be very

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young.

The idea is startling, even heretical (the real Bruno would have been pleased), especially in view of the long history of failure of modern searches for lunar meteors. (The occasional reports, such as that of L. H. Stuart in 1956, have never left any craters as hard evidence.) Hartung was immediately challenged by the great meteorite specialist H. H. Nininger, who suggested (in collaboration with G. I. Huss) that the monks had merely seen a meteor that coincidentally passed in front of the moon. But recently, Odile Calame and J. D. Mulholland have come to Hartung's aid, arguing that the effects of the Bruno event can still be seen in the motion of the whole moon.

While the lunar day is, on the average, one month long (so that we always see the same face), its actual rotation is more complex. It wobbles. (In polite society, it librates.) The moon's asymmetrical mass distribution is tugged in various ways by the gravitational pulls of the earth and sun, and is kicked about by perpetual meteoric bombardment. The motions thus induced are fairly well understood - after all, the theory of the lunar motion is the oldest subject in celestial mechanics. In particular, one can calculate that after accounting for all other effects, the east-west wobble due to the past history of impacts should have been damped out (by internal friction) to less than one arc-second. But laser ranging experiments have shown that the present east-west wobble is about 1.8 arc-seconds, suggesting that there must have been a recent impact producing oscillations as yet undamped. Calame and Mulholland show that the Bruno event could have done the job.

Of course, this doesn't constitute a proof. (Although, in astronomy we often substitute consistency for confirmation.) But some of the Bruno ejecta appears to have fallen in the area sampled by the Russian automatic probe Luna 24. So, a chemical analysis of the Soviet soil samples might resolve the question of when Bruno was formed.

Beyond natural changes, the lunar surface has now been altered by intelligent forces. The footprints of the Apollo astronauts will remain uneroded for millenia, and the litter of junked space probes will last even longer. Of course, there are some who believe that the moon holds more than terrestrial artifacts. Consider a recent paperback featured in my local supermarket. The author, one George Leonard, claims to have found evidence of extraterrestrial habitations on the moon in NASA photographs. Unfortunately, he has based his claims entirely on the low resolution photos released by the NASA public information officers. The high resolution photos, not yet suppressed by the CIA, give the lie to his cosmic Rorschach test.

But even without extraterrestrials, the moon is an amazing thing. It is ancient, but not dead. Indeed, it is the greatest living fossil that we know of. And still, apparently, full of surprises.

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A SLICE OF THE SOUTHWEST

Doris R. Gill

Mack and Bev Brown, owners and proprietors of the Monte Largo Inn, Magdalena, have incorporated the following explanation as part of their new menus. Some of our observers/visitors will have digested this gem by printing time but thought it might be of interest to our nonvisiting fellow employees.

WELCOME TO MAGDALENA, NEW MEXICO

The Village of Magdalena is located on Highway 60, the scenic route from Chicago to Los Angeles.

Magdalena was founded in 1883 and incorporated in 1916; the population in 1973 was 1315.

As you drive into the village you will see a sign proclaiming that Magdalena is the "end of the trail" and in fact during

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the years of the big cattle drives it truly was the end of the trail. At one period in the history of the old west, more cattle were shipped out of Magdalena than any other place in the United States. The cattle were driven along the trailway, (marked as you drive west out of town by an historic marker) and held in stock pens in Magdalena for shipment on the Santa Fe. The old train depot is now the Magdalena City Hall and Library and has been preserved as intact as possible. IF there were any hangings in Magdalena, in all probability, they took place using the old cottonwood tree near the depot, the oldest tree in town. However, it is considered opinion that most disputes were settled much quicker with the old reliable six shooter. As late as 1916 five men were shot in "discussions" over an election. When the miners from the booming mining town of Kelly, population 3600, came into town and the cowhands had just completed their long drive, there was much activity in Magdalena.

Kelly is now a ghost town approximately 1¼ miles south of Magdalena. Remnants of some of the stores and other buildings can still be found and the little church is preserved for each year there are memorial services held for the miners of Kelly. On your right as you drive up to visit Kelly you can see the profile of Mary Magdalene on the side of Magdalena Mountain. Legend has it that if you could get to Magdalena Mountain where the lady's face was visible you would be safe from Indian attack.

The old ghost town of Riley is located 22 miles north of Magdalena. Riley was settled back in the 1880s by Spanish-American colonists from Socorro and other Rio Grande settlements. The soil was good for farming and many of the old orchards are still struggling to survive. Many old houses are still standing as is the old schoolhouse and the church.

Approximately 18 miles northwest from Magdalena is the beginning of the Alamo Indain Reservation. The trading post is about 31 miles in. These are the Navajo people so well-known for their beautiful silver and turquoise jewelry and their rugs.

West of town 25 miles is the site of the VLA (Very Large Array). This will be the world's largest radio telescope installation. The Plains of San Augustin were chosen for this installation because of their freedom from pollution (noise and smog). It is expected to be completed in 1981.

Besides the blending of three cultures, Magdalena is blending history - past, present, and future. PLEASE, ENJOY YOUR VISIT!

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ARIZONA'S OCEAN

Frank Hart

Being a part of New Mexico's smallest minority is a definite problem. The need to surf becomes so overpowering at times that the irrigation ditches start to look inviting, even though they are totally unsuited for this purpose. If one looks at a map, the closest solution to this dilemma appears to be the Pacific Ocean. HOWEVER, THIS ISN'T SO.

Located about half way between Socorro and the Pacific Ocean is Big Surf, or, as it is advertised, Arizona's Ocean. There, after only a seven hour drive, and $1.50, one can frolic in the sun and surf for the day.

The drive to the beach is through highly unlikely country, past the ranches, across the Continental Divide, more ranches, through Salt River Canyon, out into the desert of Arizona, then finally through Tempe and into Phoenix. A very pleasant trip, but just imagine the strange looks received while driving through cowboy country with a surfboard on the roof of the car and The Beach Boys playing on the tape deck.

This marvel of modern engineering was built during the late 60s and has been operating since. Big Surf is located near Phoenix on the banks of the Salt River, which happens to be dry most of the year.

The basic principle of operation is to pump water into a holding tank located at the top of the wall at the "ocean's" hori-

zon, which appropriately enough is the west end. The water is then released with a thundering flush and after hitting the reef, produces a waist high wave of dubious quality. The waves may not always be of good surfing quality, but they are more than adequate for body surfing and the other forms of non-stand-up wave riding, such as the styrofoam belly boards and air mats.

This ocean comes complete in every way with sand, palm trees, and even a tropical waterfall that can be used as a slide. The surfing line up is a little strange in that only eight people are allowed to try to catch this slow wave. While these eight are waiting for their possible ride, there are four more on each side waiting to paddle into the line up and again four more on each side waiting to jump into the water. With these sixteen people waiting, anyone who misses the wave quickly paddles out, then waits in line for his turn to come again. The locals use this facility with as much enthusiasm as the ocean evokes.

Personally, I don't care to surf there, but will continue to return because of its proximity (?!!?). But, in one respect, it is a typical surfing beach in that the locals will say that you just missed the good waves, "shoulda been here yesterday".

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A TALE OF TWO CAFETERIAS

Barry Geldzahler

This is the wurst country I have ever been in.

Let's face it. By nature, cafeteria food is not the greatest. In fact, many visitors to Green Bank complain about the food (not me...for my money they make a great deluxe cheesburger platter and thick chocolate shake...heart be still.). To those people I can only say, "If you think this is bad, try the cafeteria at MPI."

If you like pork cutlets, you'll love it here. Sometimes, however, they offer a variety: a choice of cutlet or the specialty of the day.

One day while standing in line and not understanding what the woman behind the counter was saying to me (I've gotten pretty good at this), I saw what looked like beef stew. Aha! I thought. A decent meal at last. In fluent English I asked her what it was, and in fluent German she told me "Nieren." Great, I thought. I learned a new word today: Niren = beef stew. So I got a spoonful slopped in my bowl (I think she tried hard to talk me out of it.) and proceeded to eat. Now if I had been clever and realized that the meal cost 3DM (about 1.50 rapidly sinking greenbacks) and that beef is really expensive here and nobody could offer beef stew that cheaply, I'd have known something was screwy. Two bites later, I realized that the stuff tasted awfully strange, and I sort of set it aside. I asked the guy next to me what nieren really is and he replied "kidneys". Well, I was close.

Care packages consisting of deluxe cheeseburger platters may be sent to me care of the MPI.

*****

MARLINTON'S FORGOTTEN WATER WHEEL

Leona G. Brown

Rusting away beneath the Marlinton Water Plant building are the remains of an unusual and perhaps unique method of pumping water for a municipal system. For many years, a large part of the comfort, convenience, and good health of the people of Marlinton depended upon this system, and upon the hard work and reliability of one man, Mr. Cecil Curry.

Mr. Curry retired in 1970, after twenty-eight years of service to the town of Marlinton. The most vivid memories of his career come from a period of about eight years in the 1940's when he, singlehanded, ran the entire water plant, including its ingenious pumping system.

The main element in this system was a

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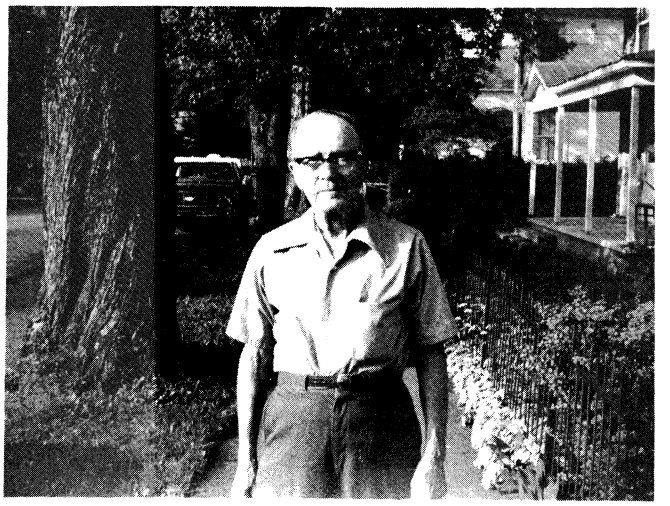

Mr. Cecil Curry, former operator of the Marlinton Water Plant. (photo courtesy of Bill Vrable)

bucket-type overshot water wheel, built by Fitzwater Water Wheel Company in Hanover, Pennsylvania. The wheel, twelve feet long and eight feet high, was turned by water diverted from Knapp Creek through a pipeline thirty-six inches in diameter and over a quarter of a mile long. The water flowed into a large rectangular tank above the wheel. Gates on the tank could be opened or closed to regulate the flow of water over the wheel. The shaft of the wheel, which weighs 1900 pounds, was connected to a set of gears which operated a piston-type pump capable of delivering 250 gallons of water per minute to the plant.

The pipeline which carried the water to run the wheel, and which still supplies the water for the town of Marlinton, begins on the opposite side of a hill near the water plant, where Knapp Creek begins a wide bend before flowing on past the plant itself. Mr. George Hoover, of Stillwell, dug the tunnel for the pipeline in 1939. Mr. Curry remembers children playing inside the huge pipe, before the water was diverted to flow through it. The upper end of the pipe is covered by a grille to keep out debris from the creek.

Then, as now, water coming into the plant was mixed with lime and alum and pumped into a large settling tank at the side of the building. The chemicals caused impurities in the water to coagulate and settle to the bottom of the tank. Then the water passed through three separate filter tanks, where it was filtered through gravel, sand, and a spongy substance called floc, to remove all other impurities. Finally, it was chlorinated and pumped out to the large storage tanks which supply the town's water mains.

All of this process, as well as the complete maintenance of the entire system, became Mr. Curry's responsibility when he went to work in 1942, four years after the town bought the plant from its original owners, Carl Sheets and Frank King. An engineer from the state health department spent two days with Mr. Curry, training him, and then he passed an examination for his license to operate the plant. His starting salary was $90 a month, plus a log house to live in, next door to the water plant. He paid his own water bill.

World War II was in progress, and manpower was in short supply. So Mr. Curry was on duty twenty-four hours a day, seven days a week. Sometimes, in the winter, he would go to bed, leaving everything running smoothly at the plant. "Then," he said, "in the middle of the night, I'd hear that old wheel go chug-a-chug-chug." He would get up, dress, and go around the hill to clear the slush ice, which had formed during the night, away from the grille, so the water could flow to the wheel again and the people of Marlinton would have water for their morning coffee.

Mr. Curry's job became easier in 1950 when Mr. Clarence G. Ware, the present operator of the plant, was hired. The workday was then divided into two twelve-hour shifts. Mr. Curry continued to work for the town until his retirement at age seventy. Mr. and Mrs. Curry still live on Ninth Avenue, in sight of the water plant where he served so faithfully. The log house he lived in was recently torn down.

Bob Viers, a boyhood friend of Mr. Curry's son, Curtis, has many memories connected with the water wheel. He and Curtis often helped Mr. Curry clean out the

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buckets on the wheel, which sometimes collected an interesting assortment of wildlife. Large turtles sometimes slipped through the grille and actually stopped the wheel from turning.

The point where the water returned to the creek was an excellent place to catch bait, Bob recalls, and fishing in Knapp Creek was good then. He and Curtis sometimes used the large open settling tank at the side of the building as a storage tank for the fish they caught. Other boys found out about this, and one night someone slipped in, while he and Curtis slept, and caught twenty-five prize bass---eighteen inches and up---out of their "storage tank".

Mr. Curry points out that the water wheel provided an economical and efficient way to pump water. The only expense was for grease and oil and an occasional repair part. In those early days, the system served about 550 families, who paid six dollars every three months for all the water they could use. Meters were installed in 1955. There are about 600 meters in the town. The price of water service, like everything else, has gone up. The water wheel was retired from service in 1966, and electric pumps are now used.

Mr. Curry believes that the new municipal water system, soon to be built, should use the power of Knapp Creek to run its pumps, perhaps by means of a new turbine-type water wheel. In this day of looking for new sources of energy, and rediscovering old ones, it makes sense.

*****

THAT STEAK PLACE

Ed Fomalont

Incredible! Monstrous! Unbelievable! Beyond comprehension! Sounds like the coming attractions for the newest Sci-fi thriller, doesn't it? In reality these are some of the attributes used to describe the gargantuan steaks at the Eagle Guest Ranch Restaurant, better known as the Datil Steak Place or The Eagle.

Although most of the 100 employees at the VLA commute via the bluebird buses to Magdalena and Socorro, generally there are about six people, mostly astronomers and programmers, who stay later or remain overnight. After a long day of sitting at the computer terminals, trying to reduce data or track down the latest software bug, the dream of a good steak and beer becomes irresistible. The VLA-cafeteria cooks, who serve great food at lunch (the meat sopapillas with green chilies are an experience) must leave on the bus at 4:30 so except for prepared sandwiches, a complete course dinner is not available.

Datil--the name is derived from Spanish for a type of sage--lies at the western edge of the Plains of San Augustin. It is about 15 miles down route 60 from the VLA site (or 2000 miles down route 60 if you start at White Sulphur Springs, WV). The road then continues west through the Datil Mountains across the Continental Divide at an elevation of 7500 feet. The town itself contains about 30 hardy souls; however, the surrounding area of Catron and Socorro Counties contains many ranching families. The most notable landmarks seen when entering Datil from the east are the flashing yellow light at the intersection of state highway 12 and the State of New Mexico Truck border inspection trailer here, even though the Arizona border is 80 miles west or 100 miles south. On the left beyond the intersection stands the Eagle restaurant with the attached Chevron Station and several cabins hidden among the piñons and ponderosa.

As one walks in the door to the restaurant for the first time, one sort of knows what to expect, but the preconceived image is no match for the reality. The view is dominated by an L-shape bar surrounding the cooking and preparing area in the opposite corner. On the left appear a fireplace blazing in the winter, a juke box blaring the latest of Willie Nelson, and a table under the head of an enormous buffalo whose long goatee tickles the head of those seated directly underneath. To

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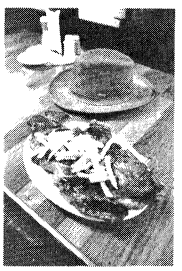
the right there are five more booths above which are Elk trophies and the inevitable Catron County bank calendar with a large picture of unclad, female cows. The mean-looking, two-foot trout above the entrance is only noticed after being seated.



Eagle Ranch Sirloin Steak (center front) (photo courtesy of Bruce Balick)

The $5.95 sirloin steak shown in the picture doesn't fit the 9" x 15" oval plate and the only room for the french fries is on top of the steak. Slightly smaller are the Special T-Bones, the small (HA!) T-Bones, and the Club steaks. For $2.95 you can get a chicken-fried steak, and a great hamburger with green chili costs less than a dollar. The meal is usually downed with Colorado Cool Aid (Coors).

The reaction of first-timers as their steak is placed before them is always interesting. Shock is the usual response; those managing a few words might say, "Did I really order the whole cow?", or "Gee, how interesting, this one steak is for us all, isn't it?", or "Is this some kind of joke?". Lee Coker, the owner of the Eagle for the last 28 years, keeps an eye on his customers, especially those foolish enough to order the sirloin. When you have about a half pound left sitting on your plate, Lee will ask if he should start your next steak, or perhaps he'll tell you that they've no doggie bags so you have got to finish it.

In 1936 when the Eagle was built, it was only a gas station although the restaurant was soon added. It is relatively new compared with the Navaho Lodge across the highway. The lodge was built about 25 years earlier by one of the early ranching families, the Morleys, who came to the area in the late 19th century when the railroads had been established across Colorado and New Mexico. Recently a couple from East Texas have taken over the Navaho Lodge and now serve great Mexican food (after all, how many nights in a row can you eat steak?)!

Lee gets all of his steaks from the Deming, NM Packing Company about 150 miles to the south. A typical carcass weighs about 400 pounds and about 20 a month are consumed by ravenous customers. Except for the six years between 1962 and 1968 when Lee was a representative to the New Mexico State Legislature, he has worked full time at the Eagle. Perhaps he will retire in a few years.

The mix of humanity at the Eagle on a busy night is unbelievable. Rusty-complexioned Chicanos animately discussing and gesticulating while precariously holding their beers; an Indian husband and wife in the corner sullenly drinking their whiskey; ranchers and cow-hands eating steaks and radiating a confidence--this is their land. Add to this two more transient clans--archaeologists drinking and eating away the dust from their daily dig on the southwest arm of the array, and the VLAers soberly discussing the latest computer eccentricity or who will be the new director of NRAO.

An encounter, which I will call the Battle of the Wine, occurred several months ago. In a moment of sophisticated extravagance, we decided to have wine with our steaks. The stunned waitress, after a moment's thought, said "Yeah, I think we have some of that stuff." Surprisingly, the stuff she found under layers of dust wasn't too bad. A minor California red 'infidel' wine. We weren't sure if the 195 on the bottle was the price, proof, or age. But who cares after a few glasses, elegantly served with ice in a plastic glass. Of course, all of this imbibing was noticed by the archaeologists (mostly grad students from NM State) who, after shouting "What is that Stuff?", were sent a glass of infidel to sample.

Several weeks later eight of us went to Datil to celebrate the loss of a bet by the author of this article with some

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steaks and expensive French wine bought in Albuquerque. One bottle doesn't last too long among eight, so when our glasses (plastic) were empty, the archeologists in retaliation to those snobby Easterners (sorry, Doris Gill) who drink wine, ordered us a more suitable local swill. Served in an ice-filled Hunt's tomato catsup can were two bottles of New Mexico Tokay. Unbelievably bad stuff, sort of a combination of Listerine, Cheracol, and a touch of lemon skin. With a brave front we finished the swill and staggered out ignoring the snickers of our brethren scientists.

With the Magdalena mountains crimson, the clouds a fiery orange, we headed back to the VLA, to the terminals, to the data, to the Xerox machine with a contentment from eating too much, drinking too much, and reflecting on the diversity of people in this far corner of New Mexico.

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WHAT'S COOKING?

COCONUT CREAM PIE

from the kitchen of
June Bignell

Mix together: 2 egg yolks
½ cup white sugar
3 tablespoons conrstarch.

Add to 2 cups hot milk - stirring constantly; cook until thickened.

Add: 1 teaspoon vanilla
½ cup coconut
butter, size of a walnut.

Allow to cool before pouring into baked pie shell.

Meringue

Beat 2 egg whites and 1/8 teaspoon cream of tartar until stiff. Add 2 tablespoons white sugar; beat until mixed in. Spread on pie. Brown in 350° oven approximately 10 minutes.

Potato Balls

from the kitchen of
Vimala Bagri

5 medium-size potatoes (boiled, peeled, and mashed into small pieces
1 onion - chopped
2 tablespoons cooking oil
¼ teaspoon turmeric powder
½ teaspoon mustard
½ green chili - chopped
1" x 1" fresh ginger - cut into bits
1½ tablespoons salt - or according to taste
1 tablespoon lemon juice

Heat oil; season with mustard, chili, and ginger. Sauté onion until browned; sprinkle with turmeric and then add mashed potatoes. Add remaining ingredients. Shape this mixture into small balls (approximately 1¼" in diameter).

3/4 cup gram flour or garbanzo flour
½ cup water (quantity of water may vary depending upon coarseness of the flour used)
pinch of salt

Mix these ingredients into paste; paste should be thin enough - but not too thin - to coat potato balls.

Heat 1½ cups of cooking oil in a skillet. Deep fry coated potato balls in the heated oil.

*****

CREF UNIT VALUES - 1978

January	$35.72
February	34.96
March	36.10
April	39.28
May	39.52

*****

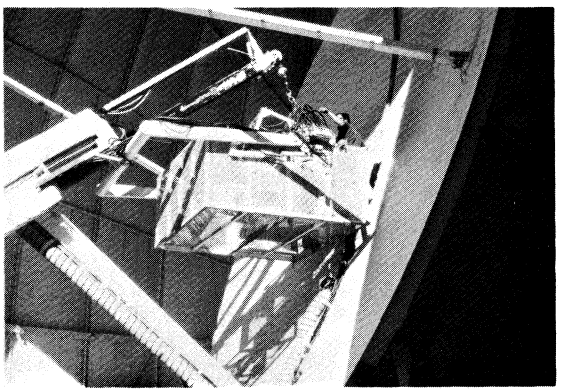
A friend is the first person who comes in when the whole world has gone out.

*****

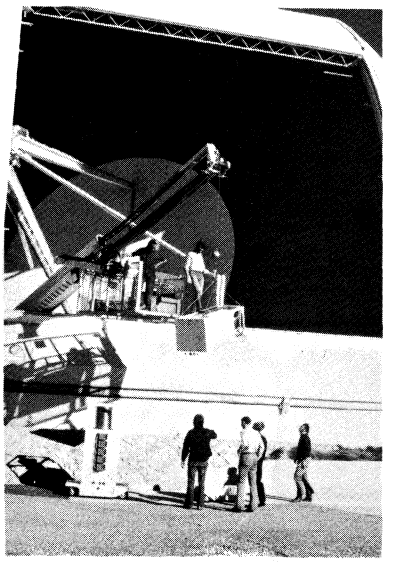
PHOTO POTPOURRI FROM THE 36-FOOT TELESCOPE - DECEMBER 1977

Bill Brundage

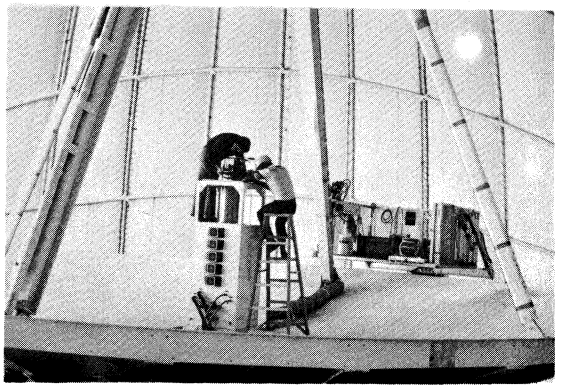
The 36-foot is wearing its teepee, which reduces distortion of the dish surface caused by solar heating. Could the teepee have attracted old Indian spirits who might have brought the unusually heavy and prolonged rains of January?



Marty Tester is unbolting a cassegrain front-end box. There would be no cassegrain receivers without that strange looking cherry-picker (the machine, not Marty, though Marty is necessary too).



Marty, Mike Hollis, and the cherry-picker lower the front-end box to a cart waiting outside the dome. The crowd below seems to be waiting for a great fall. Don't be a lead-foot, Mike.



After the new cassegrain box is bolted onto the disk, Jack Cochran and John Payne very, very carefully install the 150 GHz quasi-optics. Don't let your thumb slip through the wire grid, John. (He didn't.) That bloated boa-constrictor below John's feet carries cool air to the prime-focus front-ends.

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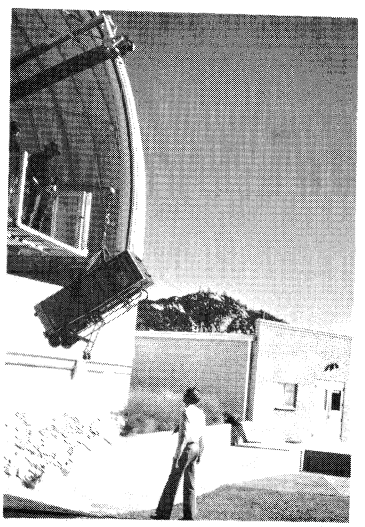

While Jack and John are left with the quasi-optics, Rick Howard and Roy Cardarella abscond with the cherry-picker. They lift the old receiver control rack over the dome to Bob Freund. If Bob isn't squashed, he will wheel it into the electronics building seen behind the dome.

Later (or was it earlier), Rick Howard and others installed the nutating subreflector at the prime-focus. Rick appears to be contemplating a fast downward slide. He didn't.

Here is the interior of the electronics and cryogenics building next to the dome. Bob Freund seems to be rushing to rescue a piece of smoking (?) electronic gear. The rescue was successful.

NRAO ROUNDUP

Reprinted from the NRAO Quarterly Report for January 1, 1978 - March 31, 1978

ELECTRONICS DIVISION

Charlottesville

Development of the Model IV autocorrelator is progressing. The computer has been checked out and programming is underway. The custom made chips have been received and checked out, and the few non-operative chips have been returned to the manufacturer for evaluation.

The VLB Mark III formatter has been completed and one unit has been sent to Haystack for evaluation. The first record terminal is being completed and most parts have been ordered for the second terminal.

The Millimeter Group has been building 2-mm mixers and assembling S. Weinreb's downconverters. A second independently biased harmonically-pumped mixer has been built and is about to be tested.

Green Bank

A Mark II VLB data quality analyzer has been completed and is in operation in Green Bank. This unit will display the number of parity, BOF, frame count and drop-out errors over selectable periods of 1, 10 or 60s. It also decodes the audio track to display the time information. The signal to be analyzed can be either from the read-after-write head on the IVC recorder or from playback on either the IVC or Ampex recorder. The data quality analyzer is described in EDIR No. 185.

The Mark III digital continuum back end has undergone preliminary tests at the 300-foot to test data transfer formats and electronics. For the present an HP 9825A calculator is being used in this unit, and an integration time as short as 0.3 s can be achieved with four channels in the Dicke switch mode with continuous gain calibration.

Six surplus Ampex VR 660 recorders were received from NASA, and we are in the process of repairing as many as can be salvaged for spares and use at other observatories.

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Work on a single sideband mixer for the VLA is nearly completed.

The stability of the 11-cm continuum receiver has been greatly improved by replacing some IF amplifiers, and the spurious front-end switch problems in the 2.8-cm receiver appear to have been isolated. A number of 5 GHz Comtech paramps are being repaired for use as spares in Tucson and Green Bank.

Acceptance tests were performed at AIL on the 8.2 and 10.8 GHz upconverter and delivery is expected in early April. Systems work is proceeding on the 5-16 GHz Cassegrain receiver and upconverters will be added as they arrive. Systems work and upconverter development is also underway on the 0.3 to 1.0 GHz receiver.

The VLA prototype front-end which has been in use on the 140-foot for several years was retired in March to make room for the maser development.

Tucson

During this quarter the computer controlled local oscillator system has been installed at the telescope.

Both the new 80-120 GHz/33-50 GHz and the 130-170 GHz receivers have been used for observing during this quarter. The 130-170 GHz mixers are still not working as well as was hoped, and the receiver has been withdrawn from service in order to permit study of the problem.

The second 1 MHz, 256-channel filter bank is almost completed and will be tested on the telescope during the next quarter.

ENGINEERING DIVISION

Design for a new traveling feed system for the 300-foot telescope continued, with emphasis on the readout and drive system. The study for a measurement system for the surface of the 140-foot telescope moved forward, and work orders were placed with the shop for equipment, tools, and attachments to be used on the telescope. Fabrication and assembly of the activating system for the deformable subreflector was completed and performance and electronics tests were started in preparation for installation on the telescope. Conceptual design and structural analysis was carried forward for a future 25-m millimeter wavelength telescope and astrodome, along with research and study of other factors relative to the telescope, astrodome and site. Routine engineering assistance was provided operations and maintenance in Charlottesville, Green Bank, and Tucson.

COMPUTER DIVISION

Map Processing Development

An interactive, image-oriented map processing system to run principally on the Charlottesville Modcomp computer is being developed. This system will be used initially for VLA post-processing, but will also be available for other kinds of astronomical map processing, including VLBI and single dish observations. The purchasing process has begun for large disks, a television-like display processor, and an array processor. The fundamental routines needed to handle user/computer communication and data movement and management are now working. The program is called NIPS for NRAO Image Processing System.

300-Foot Telescope

Development has continued on the 300-foot quick-look continuum system (CONDARE). Most one-dimensional verbs available in the Charlottesville Condare program are available in the 300-foot Condare program. Also the 300-foot Condare program has been expanded to include multiple data files increasing the number of scans that can be stored on disk from 2400 to 9600.

VLBI

Further work was done on organizing and developing a standard program package for spectral-line VLBI observations. Previously, post-processing on VLBI spectral-line observations made use of private programs not supported by the Computer Division.

360 System

Work has begun on connecting the 360

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system to the Modcomp IV computer to facilitate passing data between the two systems. The Modcomp IV system is being developed especially for map processing.

VERY LARGE ARRAY PROGRAM

The array was scheduled for 908 hours of tests and observations during the first quarter of 1978. By the end of the quarter, the array was operating with eleven antennas on a baseline of 10.5 km. Sixteen antennas have been accepted from E-Systems as of the end of March.

The electronics group pressurized the waveguide for the first time on February 14. The manifold-regulator system for introducing the nitrogen gas into the waveguide performed satisfactorily. The current retrofit program covering most of the required local oscillator modifications has now been completed on all antennas except 2, 4, and 6. Three production run refrigerator-compressor systems were received from Cryogenics Technology, Inc. and will be used on front ends 13, 14, and 15. The first fringes were obtained on Antenna 11 on February 1, 1978 and on Antenna 12 on March 27, 1978.

In the computer area a study group has been set up to formulate configuration and specifications for the spectral-line system sorting system. By the end of the quarter the group has nearly completed their study and will issue a final report in early April. A review of film output devices for map output has begun, with procurement anticipated this spring.

The question of applicable Davis-Bacon wage rates was resolved favorably, and the final wage determination was published by the Department of Labor on March 10, 1978. Preparations are underway to issue the bid package for an amended Phase IV construction of track and foundations, using this determination.

The archaeologists from New Mexico State University commenced their dig on the southwest arm on February 20. The work is proceeding well at the end of the quarter.

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GINSENG

Reprinted from WV Department of Natural Resources NEWS, May 19, 1978

Dan Cantner, chief of the Department of Natural Resources' Wildlife Resources Division, has announced that the DNR is in the process of promulgating rules and regulations for the management and harvest of wild, native ginseng.

Enrolled House Bill 1252, which was signed into law by Governor John D. Rockefeller IV on March 23, 1978, gives the director of the Department of Natural Resources authority to regulate and set the digging season of wild, native ginseng.

According to Cantner, once the ginseng regulations are promulgated, the Department of Natural Resources will submit them to the federal Endangered Species Scientific Authority (ESSA) along with information concerning the abundance, range, distribution and biological characteristics of native ginseng.

Cantner noted that DNR must convince officials of ESSA that the export of native ginseng will not be detrimental to its survival. Failure to do so will prevent ginseng collected in this state from being exported abroad.

Michigan is the only state which has been federally sanctioned to export ginseng internationally.

Cantner states that the draft regulations will be promulgated within the next few weeks. Before these regulations can take effect, they must be reviewed and approved by the Legislative Rule-Making Review Committee, as provided in Chapter 29A-3 of the Code of West Virginia. Until then, anyone can legally buy, sell or collect ginseng.

However, federal law will prohibit this ginseng from being exported out of the country. Cantner added that this is the principal market for domestic ginseng.

Until ESSA approves West Virginia's permit system, Cantner asks that diggers refrain from collecting ginseng plants until they have attained at least three five-leaflet leaves or until their berries have developed.

*****

1978 SUMMER STUDENTS

Name	School	Advisor(s)
	Charlottesville	
Edmund Bertschinger	Caltech	H. S. Liszt
Marlene Buckman	VPI	J. J. Condon
Ralph Fiedler	Minnesota	L. Rudnick
Marian Freuh	Purdue	E. W. Greisen
Robert Hanisch	Maryland	F. N. Owen
Terry Herter	Rochester	W. Jaffe
Michael Jones	Illinois	D. R. Decker
William Keel	Vanderbilt	J. van der Hulst
Guy Miller	Caltech	M. J. Reid
James Sewall	Massachusetts	P. F. Bowers
Susan Terebey	California, Berkeley	W. B. Burton
Annika Tiitus	Chalmers (Sweden)	A. Shalloway
Steven Wallenhorst	Wisconsin	C. Leung
	Green Bank	
Mark Ashby	West Virginia	J. R. Coe
Stephen MacMinn	Lehigh	J. R. Hallman/R. J. Lacasse
Roger Norrod	Tennessee Technological U.	W. B. Brundage
Frances A. Verter	Brooklyn	P. C. Crane
	Socorro	
Gary M. Heiligman	MIT	R. C. Bignell
Douglas Morton	Maine	P. J. Napier/L. R. D'Addario
Robert Newell	New Mexico Tech	R. M. Hjellming
Juan Pimentel	Virginia	M. W. Sinclair/J. L. Dolan
James Ulvestad	Maryland	R. A. Perley
	Tucson	
Andrew Harris	California, Davis	J. M. Payne
Robert MacDowell	Swarthmore	J. M. Hollis

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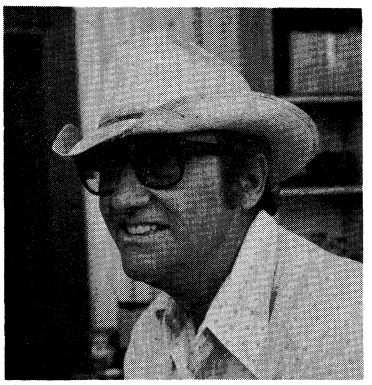
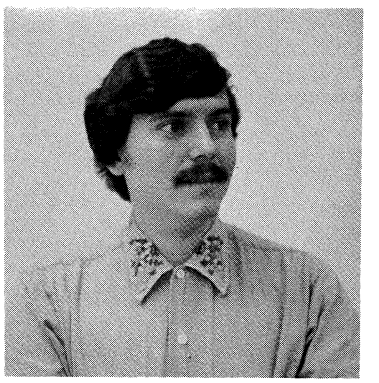
PERSONNEL UPDATE

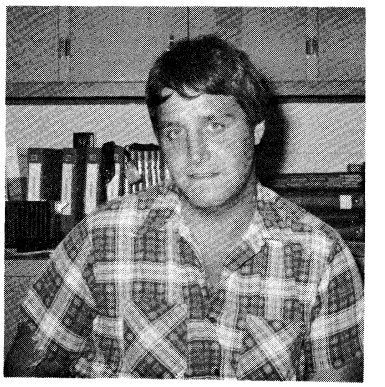
NEW EMPLOYEES



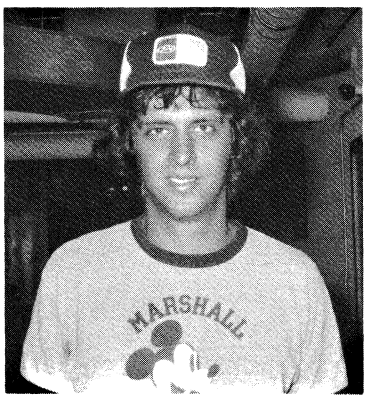
Frank E. Bacon
Waveguide Foreman
VLA - New Mexico



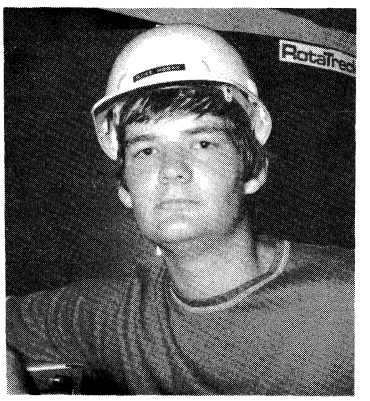
Cameron W. Coates
Technician
Electronics - CV



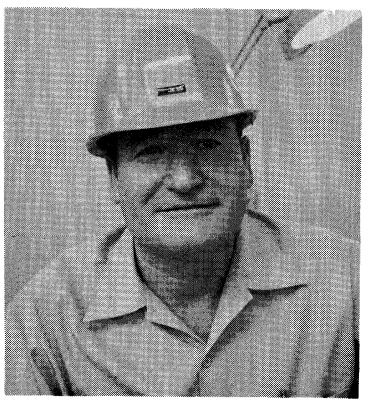
Douglas A. Fedak
Rec Area Attandant
Plant Maintenance - GB



Steven W. Gillispie
Lifeguard/Grounds Keeper
Plant Maintenance - GB

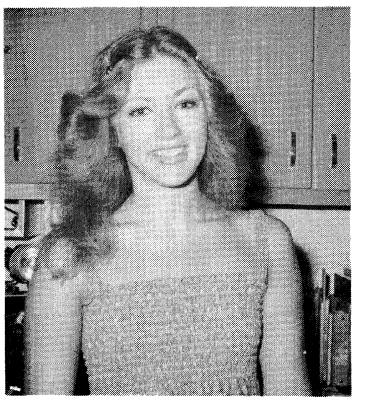


Michael E. Hogan
Laborer
Plant Maintenance - GB

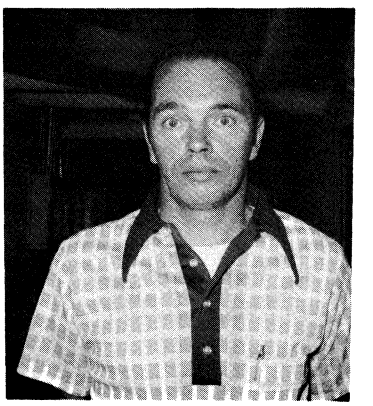


Jess D. Landers
Technician
VLA - New Mexico

David R. Maroney
Computer Operator
Computer Division - CV



Kimberly S. Nottingham
Lifeguard
Plant Maintenance - GB



Edward G. Rockafellow
Bus Driver
Administrative Services - GB

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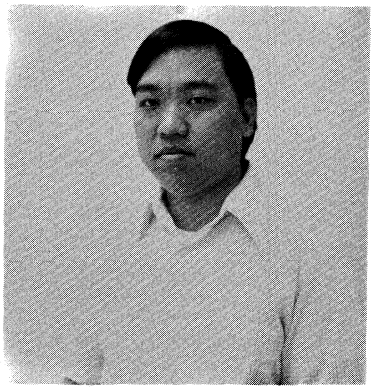
NEW EMPLOYEES (continued)

Greggory T. Sutton
Laborer
Plant Maintenance - GB

Sandra E. Treppa-Richards
Secretary
VLA - New Mexico



Li-Kong Wang
Electronics Engineer
Electronics - CV

OTHER NEW EMPLOYEES - PHOTOS NOT AVAILABLE

Harold J. Bashaw	Maintenance Trainee	VLA - New Mexico
James B. Brunner	Laborer	VLA - New Mexico
Albert Bustamante, Jr.	Draftsman	VLA - New Mexico
Paul T. Ford	Scientific Programmer	VLA - New Mexico
Leo O. Gabaldon	Draftsman	VLA - New Mexico
Michael R. Lawson	Janitor	36-foot - Tucson
Sheila R. Reasner	Secretary	VLA - New Mexico
Patricia D. Sanchez	Accounting Clerk	VLA - New Mexico
Gene R. South	Draftsman	VLA - New Mexico
Anthony G. Willis	Visiting Assistant Scientist	VLA - New Mexico

REHIRES

Gregory A. Brubaker	Laborer	Plant Maintenance - GB
Luis R. Casiano	Technician	VLA - New Mexico
Nathalie K. Dolan	Lifeguard	Plant Maintenance - GB
Samuel J. Goldstein	Electronics Engineer	VLA - New Mexico
James M. Manning	Technician	VLA - New Mexico
Judith F. Moore	Accounting Clerk	Fiscal - GB
Craig L. Sarazin	Visiting Assistant Scientist	Basic Research - CV

TRANSFERS

Howard W. Brown	Larry A. Miller	Steven R. Spangler
VLA - New Mexico	VLA - New Mexico	Basic Research - NM

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LEAVES OF ABSENCE

On Leave: Stanley S. Hansen
Henry A. Taylor

Return From: Thomas A. Cram

RETIREE

Ether J. Tyson	Stores Clerk	Administrative Services - GB

TERMINATIONS

Durgadas S. Bagri
C. Keith Cottom
James L. Dolan
Ray Hallman
Martha P. Haynes
Reva Houston
David C. Hudson
Judith S. Kampf
Donald L. Krieger
John A. Lichtenberger
Kathleen Y. McConnell
Gustave E. Mortenson
Harold S. Morton, III
Gary A. Pasternak
George H. Patton
Lewis E. Somers
Frank Tafoya
John A. Van Tol
Betty L. Warner
Claude Williams

We regret to report the death of Steven C. Ayers, a Technical Trainee in New Mexico, who was fatally injured in an automobile accident on April 23, 1978.

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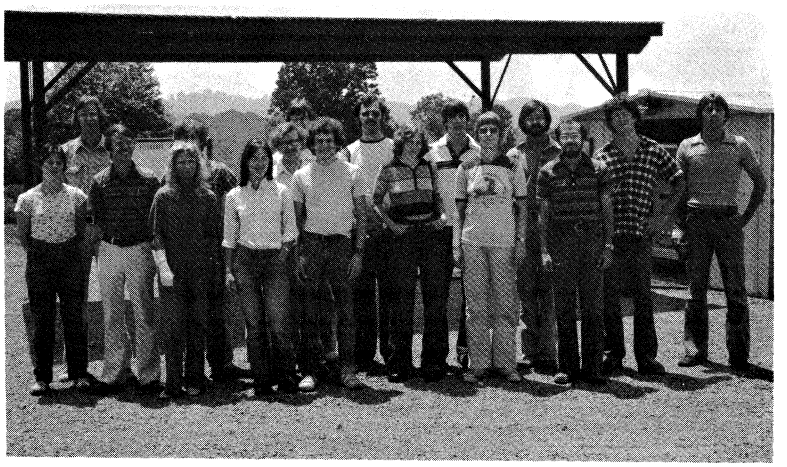
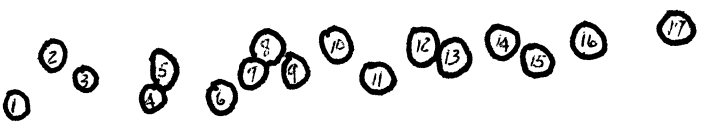
GB - CV SUMMER STUDENTS





1. Fran Verter
2. Stephen MacMinn
3. Roger Norrod
4. Marlene Buckman
5. Mark Ashby
6. Susan Tereby
7. Ralph Fiedler
8. Ed Bertschinger
9. Mike Jones
10. William Keel
11. Annika Tiitus
12. Terry Herter
13. Marian Freuh
14. Bob Hanish
15. Steve Wallenhorst
16. Guy Miller
17. Jim Sewal

* * * * *

VLA STRETCHES OUT OVER THE PLAINS OF SAN AUGUSTIN

photos by Dave Rosenbush