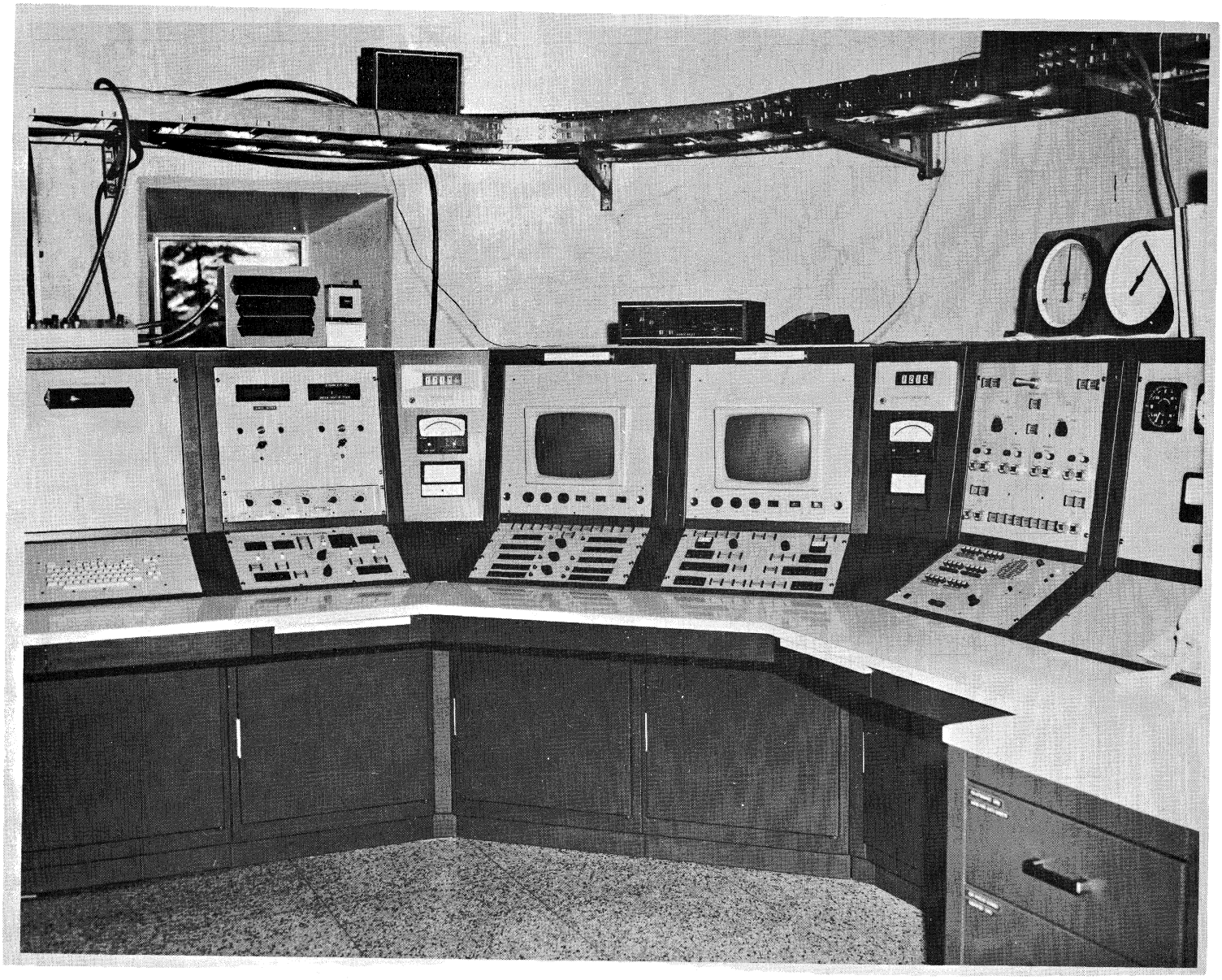
The OBSERVER

Vol. 13, No. 5 October 1972 Page 1



NEW CONSOLE AT THE 140-FT

Story on Page 3

WHICH ONE ARE YOU?

Boy, I've messed around six months and I still don't have an article for the "Observer"

You know, I've never written one article for the "Observer."

I'm too damn busy to write an article for the "Observer."

Editor: - Wally Oref

Editorial Board: - Ed Fomalont
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Jon Spargo

Consultant: - Dave Hogg

Assistant to the Editor: - Berdeen O'Brien

Typist: - Vicki Taylor

Photography and Printing: - Brown Cassell
Gene Crist
Tony Miano
Ron Monk
Peggy Weems

Contributors to this issue: - Bill Brundage
Jane Chestnut
Fred Crews
Richard Fleming
Mark Gordon
Don Hovatter
Elaine Litman
Wally Oref
Mary Ann Starr
Virginia Van Brunt

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A special thanks to all of those who helped assemble the OBSERVER.

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SOMETHING'S HAPPENED DOWN AT THE 140-FT!

M. A. Gordon

The 140-ft telescope has now gone digital! After a number of years of discussions concerning various ways to convert the telescope's dated analogue control system, the faithful but nearly worn-out pilot-drive system has been replaced by a "Buck Rogers" system: mini-computer, cathode ray data displays, digit switches, new console, and--last but not least--new upholstery on the operator's chair, courtesy of Dwayne Schiebel. In addition, we've added a motor-generator set to protect the computers from transients in the line voltage, a new IBM 29 card punch, and sundry other goodies. Even the Stirling mount has been overhauled.

Operationally, there are fundamental differences between the old and new control system. The old control system, shown in Fig. 1, was a velocity-controlled system. Left alone, the telescope followed a given celestial position across the sky. To move the telescope to a new position, the operator accelerated the telescope to some convenient speed which moved the telescope beam toward a new celestial position. As the beam approached the new position, the operator accordingly slowed the telescope down so that, ideally, it stopped with the beam directly upon the new position. In a sense, the telescope was positioned by means of a servo loop involving the judgment of the operator. This process demanded careful attention of the operator during the entire procedure--as well as a great deal of skill. Accompanying adjustments to receivers, etc., could only be done before or after this repositioning.

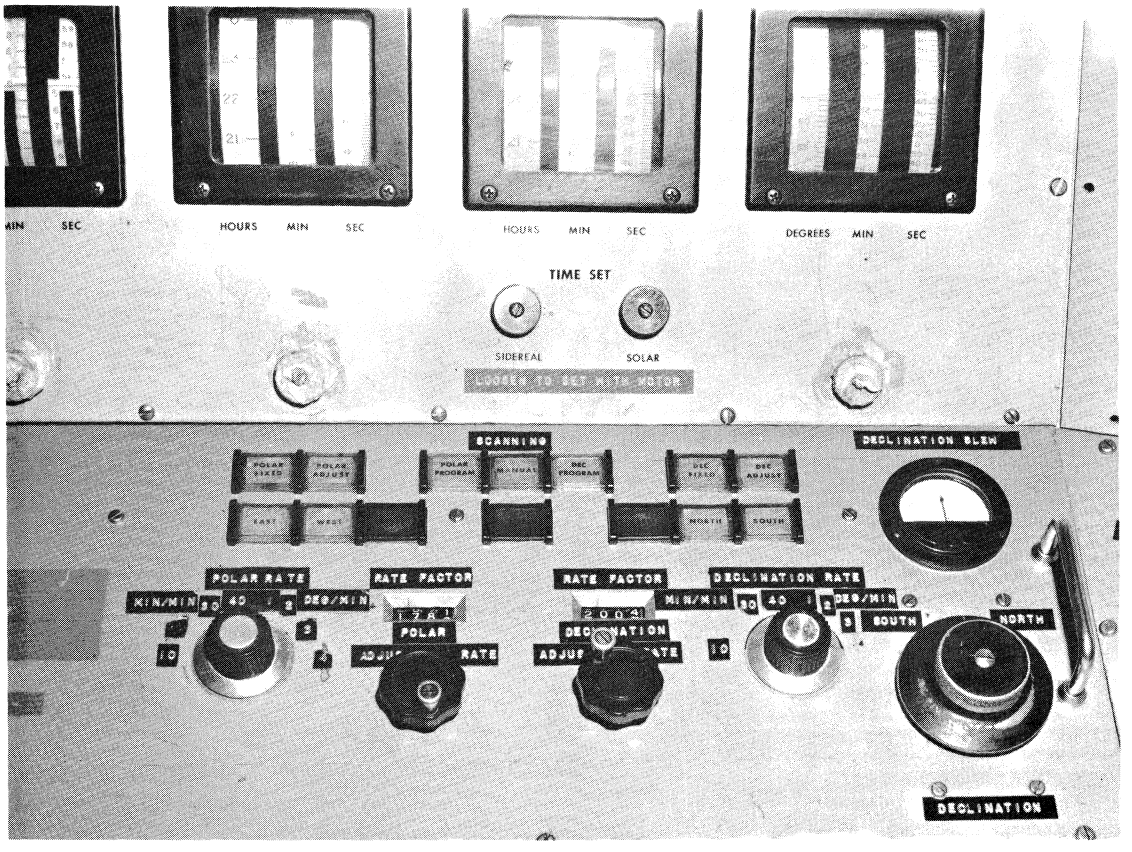

Fig. 1 - The analogue drive, sometimes called pilot drive, of the 140-ft telescope, which served well for many years. The "windows" cover up the drums which indicated the celestial position of the telescope's beam. The sticky substance around the middle knobs is reputed to be Dave Van Horn's gum.

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The new control system, shown in Figures 2, 3, and 4, is a position-controlled system. The Honeywell mini-computer (Fig. 4) assumes the role of the operator by judging the proximity of the new position to the old, and accelerating and de-accelerating the telescope into the new position. The operator can now spend his time tending other matters (such as listening to political discussions between Barry Turner and George Behrens) while the telescope is being moved,

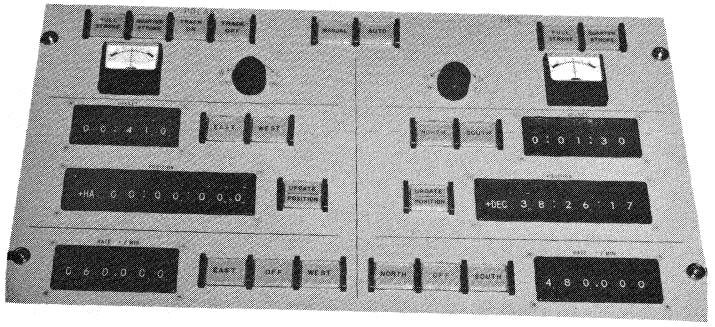

Fig. 2 - The main operating board of the new control system. This panel provides direct digital control of the telescope's axes.

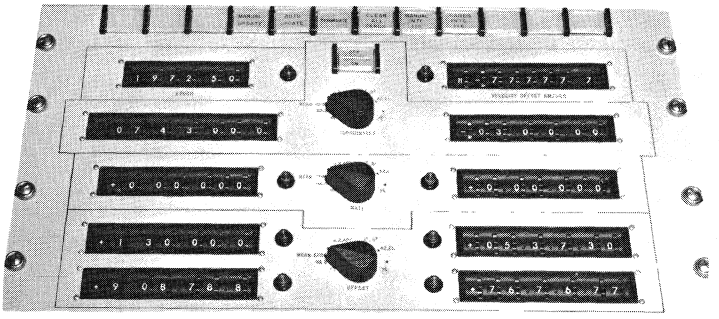

Fig. 3 - The astronomical board of the new control system. It differs from the board shown in Fig. 2 by allowing control in a variety of different coordinate systems. Light-emitting diodes (courtesy of Ron Weimer) are built into the digit switches to mark change of units selected by the central knobs.

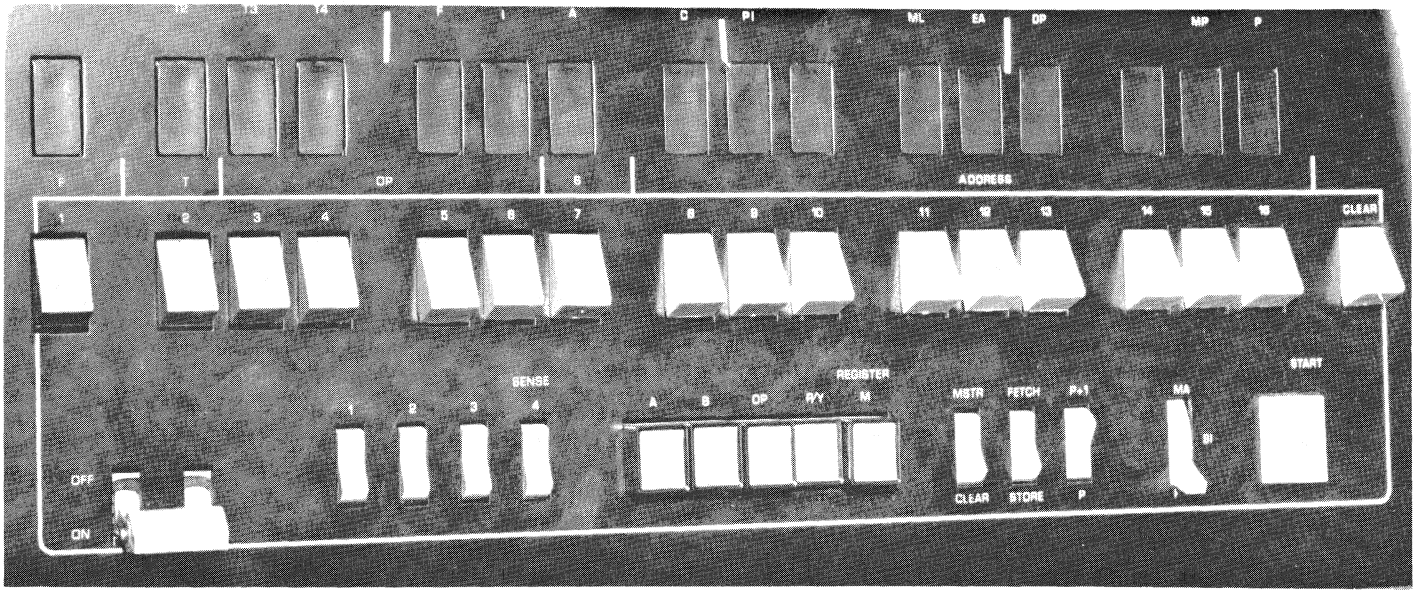

Fig. 4 - The front panel of the Honeywell computer which, along with the panels shown in Figures 2 and 3, replaces electromechanical control system shown in Figure 1.

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and the observing efficiency of the telescope should increase considerably. Figure 5 shows the operator's new position, adapted from the interferometer.

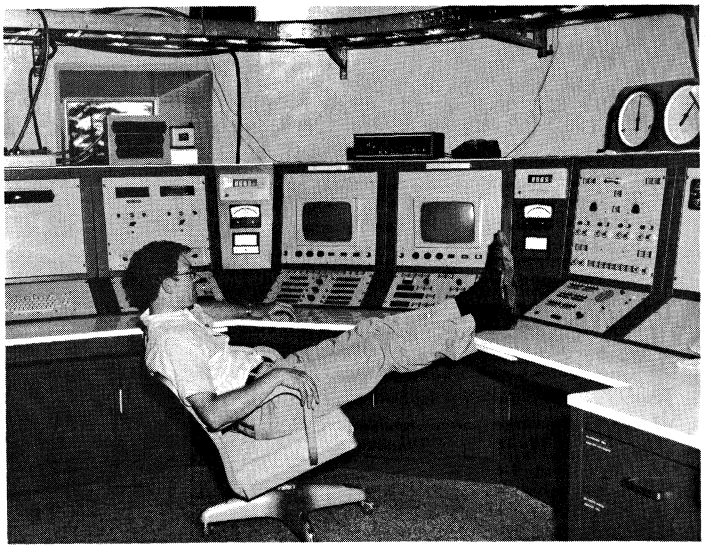

Fig. 5 - A local automotive mechanic demonstrates the new operator's position at the 140-ft, a position brazenly copied from the interferometer. The TV-like devices in the background are cathode-ray-tubes which display the coordinates of the telescope's beam and other information helpful to the operators.

More importantly, position control brings a new degree of flexibility to the 140-ft telescope. Under the old system, the telescope moved in right ascension and in hour angle, with no coupling between these two coordinate systems. In the new system, we will be able to drive the telescope in an infinite variety of patterns on the sky by controlling the rates between the two coordinate systems. For example, the telescope can be commanded in coordinates of latitude and longitude of our Galaxy and in azimuth and elevation. We will also be able to preprogram scan patterns into the system such as a raster-scan for mapping extended sources, or long simple scans at arbitrary angles to the celestial axes. Pointing corrections can be effected automatically. And also, an entire observing program can be accomplished by using previously-prepared punched cards.

The new computer drive permits a variety of new telescope commands without sacrificing any of the older, more familiar observing procedures.

Functionally, the telescope can be controlled by any one of 3 systems: the operating board shown in Figure 2, the astronomy board shown in Figure 3, and punched cards. The first provides direct digital control of both telescope axes and is intended to duplicate the old system as much as possible. The second permits control in a variety of coordinate systems convenient for astronomy. Here, the computer calculates the necessary relationship between the telescope axes to drive the telescope in other coordinate systems. The third is intended as a "set it and forget it" mode for those making large numbers of routine observations. For the 140-ft, the second mode will probably be most popular.

Not all of these functions are ready yet. The amount of programming required to implement such flexibility is large. In spite of the skills of Joe Greenhalgh, Bob Vance, and Tom Cram, these things will take a little more time to put into effect.

The digital telescope control should make it possible to gain insight into the fluctuations in pointing accuracy. Eventually, we hope it will be possible to record not only the necessary pointing correction to place the telescope beam on some point source, but also to record the output of carefully placed thermocouples. Some astute astronomer--like Ken Kellermann--would then be able to assess the telescope behavior as a function of temperature. (Kellermann insists that he wants to personally undertake this kind of a project.)

While the electronics were being modified, the surface was reset. The plan was to fit the entire surface of each panel (rather than just their edges) to a paraboloid. And, the setting was chosen so that the telescope should be most sensitive 30° away from the zenith towards the south. Such a biased "rerigging" of the surface should have benefited both galactic and non-galactic astronomers, who rarely use the telescope at the zenith. However, initial tests at 23 cm show no change in the telescope's performance before and after the rerigging. Because the changes in

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the panel positions were extensive, some change (good or bad) should have been seen. The engineering staff are presently scratching their heads over this unexpected result. (Perhaps it's just not possible to tweak a battleship!) However, the lack of change in performance must be telling us something about the behavior of the structure, which will eventually lead to improved electrical performance of the telescope.

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TEST TUBE PLANTS

If you could combine the hardiness and the growing characteristics of a garden weed with the good of an ordinary vegetable, you would produce an unusual and useful plant. We have joked about such a plant when talking about garden vegetables and garden weeds. Joked about it because, heretofore, it was thought impossible to hybridize a weed and, say, a green bean because these plants are of different species and hybridization by normal sexual and reproductive process (cross pollination) is not possible. However, hybridization of widely devergent species now appears possible.

Scientists at Brookhaven National Laboratory are on the road to hybridizing plants of different species. Recently they took the best characteristics of two parent plants of different species and produced a superior hybrid. They did this by a technique of cell fusion that completely circumvented the normal sexual and reproductive processes. Their success represents the first known case of where an entire organism of any higher order of life has been produced by combining the cells of two different species.

In this technique, cells from Plant A and Plant B having the desired hybrid genetic information were fused by simple chemical manipulation. Then the fused cells were placed into a growing medium which supported only the growth of the fused cells. All other cells (unwanted) died. In this special growing medium the fused cells grew into colonies that were then introduced into another growing medium that contained no hormones. This procedure stopped the growth of all parent tissues but allowed the hybrid to form simple shoots and leaves. The hybrid shoots were then grafted onto freshly cut stems of Plant A and Plant B. These grafts grew into fertile, healthy, mature plants.

This technique opens up a lot of plant possibilities. It represents the potential of developing totally new crop species or improving existing species. For example, a plant with edible parts above ground and edible tubers below could be possible, perhaps a "Cornato"--succulent sweet corn on stalks above ground and Kennebec potatoes below.

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THE POMATO

The preceding article about "Test Tube Plants" reminded us of an unusual plant that was sold to gullible gardeners only a few years ago. Several years ago some magazines carried an ad about a plant called, we believe, a "Pomato". The "Pomato", the ad went on to say, grew beautiful tomatoes on vines above the ground and wonderful eating potatoes below. It sounded like some kind of a spectacular hybrid and several people we know sent for them.

What they got was this: a potato with a hole in it, several tomato seeds and instructions. The instructions said to fill the hole in the potato with a little soil and plant a couple of the tomato seeds. After the tomato seeds were up and growing only the strongest seedling was kept. After the tomato seedling got its first true leaves, potato with tomato seedling were transplanted in the garden. If all went well, by mid-July you would be eating tomatoes and by fall you could dig potatoes.

This combination was no hybrid but it would probably work. We don't know, for we never heard what results people got who tried raising "Pomatoes". Now perhaps, as the article on "Test Tube Plants" indicated, such a hybrid plant is within the realm of possibility.

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WATER POLLUTION AND WATER QUALITY MONITORS

Bill Brundage

Water pollution in Pocahontas County vicinity? No you say? Not in this part of wild and wonderful West Virginia. Whoever says this is partly right and partly wrong.

No rigid definitions of water "pollution" exists in the minds of most people. However most of us object to obviously visible pollution.

Anyone drinking untreated water directly from Deer Creek, North Fork or the Greenbrier River is risking discomfort or disease. Only near the very head of some of these streams, where man has not disturbed the land, is the risk negligible. Water pollution of some degree is inevitable wherever activities of man such as living, farming, grazing, logging, mining, roads and industry are located.

Water pollution occurs in many forms, some of which are not visible. Some of the visible forms are siltation, turbidity, colored or foaming chemicals. Some invisible forms are dissolved solids, salts and chemicals, bacteria, insufficient dissolved oxygen and high acidity or alkalinity. Various forms and degrees of water pollution are harmful to man and livestock and to aquatic life in rivers and streams.

At what degree does water pollution become objectionable and harmful? The presence of coliform bacteria in water indicates it is contaminated with sewage and/or livestock manure; therefore it contains disease producing bacteria. Water containing more than one coliform bacterium per 100 milliliters (about 1/2 pint) is unsafe for drinking according to Federal health standards. A "clean stream" such as the West Fork of the Greenbrier may average up to 100 coliform per 100 milliliters, while badly polluted waters may have 200,000 or more.

Some dangerous pollutants besides bacteria are certain persistent pesticides and heavy metal compounds which can enter the food chain.

Water pollution of varying degrees does occur in rivers and streams near the vicinity of Green Bank. Most have bacteria from farms, septic tank drainage and raw sewage from several communities. Of special concern to sportsmen are oxygen depletion, acidity, alkalinity, siltation, turbidity and toxic chemicals from sewage, agriculture, logging, mining and industrial wastes - as these directly affect aquatic life and fishing.

For example, deep mines, strip mines and logging contribute acidity and turbidity to Shaver's Fork - the river on "top of Cheat Mountain". Shaver's Fork is a wild and scenic river famous throughout the Eastern States for its trout fishing. It is heavily stocked and fished. It contains one of the two "fish-for-fun" areas in West Virginia. Shaver's Fork supplies most of the water for the National Fish Hatchery at Bowden, which in turn produces a large fraction of the state's trout.

Shaver's Fork is a delicately balanced river where only a relatively small amount of additional acid would ruin its fishing and seriously hurt hatchery production. Because of this delicate balance and important uses of the river, the State Department of Natural Resources opposed the opening of some 15 coal mines on Shaver's Fork by Linan Smokeless Coal Co. Currently the DNR is carefully evaluating potential river damage from two coal mines proposed by Mower Lumber Co., before issuing or denying a permit.

A year ago, a tannery waste-water spill into the Greenbrier River caused a huge fish kill along 15 miles of river. The DNR fined the tannery $32,000 for the value of the fish.

The State Regulations for Water Quality Criteria of 1970 established by the Department of Natural Resources under the West Virginia Water Pollution Control Act of 1969 sets forth very general minimum conditions for water quality. It also sets water quality criteria for every major watershed in the state. These include specific levels for dissolved oxygen, pH (acidity-alkalinity), temperature, odor, toxic substances, bacteria, radioactivity, heavy metals and other compounds.

The state regulations further say "Waters whose existing quality is better than the established standards will not be lowered in quality...except in extreme instances." Furthermore, it says "In special cases where the facts warrant, more stringent standards or exceptions thereto may be established..." In other words, water quality cannot be allowed to worsen, legally, except in extreme

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instances.

To assist the Water Resources Division of the Department of Natural Resources in monitoring water quality of all rivers and streams, the Water Pollution Control Act of 1969 authorizes the Division Chief to appoint and train voluntary water quality monitors. "Such monitors are authorized to take water samples of the water of this State at such times and at such places as the chief shall direct and to forward such water samples to the chief for analysis...Upon showing that any water sample...was taken in conformity with standard and recognized procedures, such sample shall be admissible in any court of this State for the purpose of enforcing the provisions of this article." In other words, samples are admissible as evidence in court cases prosecuting polluters.

Late last year, a group of Green Bank area residents became concerned about water quality in the Greenbrier and Shaver's Fork rivers. They wanted to assist the Department of Natural Resources in maintaining and possibly improving their water quality. As voluntary monitors, they could help quickly identify sources of severe transient pollution. With regular sampling they could also help provide a baseline of information for the DNR's surveillance records, and point out problem areas that may warrant further investigation. The value of regular sampling would increase over the long range as data is accumulated and present water quality can be compared with future trends.

In February, Water Resources Division personnel held a training session for the volunteers where they were instructed in the procedures and techniques of taking water samples. Later that day the Division Chief, Edgar Henry, gave a public talk and discussion of the responsibilities and activities of the division to the volunteers and many other interested people.

During spring and early summer the voluntary water monitors took regular samples of numerous points on Shaver's Fork and two of its tributaries. The DNR is using the data as a baseline to help judge potential pollution from coal mining in that area.

Recently the monitors began a monthly sampling at five points on the Greenbrier River and Deer Creek. This general background survey will continue indefinitely.

The voluntary water monitors are: Howard Brown, Bill Brundage, Bill del Giudice, Richard Fleming, Herb Hanes, George Liptak, Craig Moore, Pepper Moore, Dwayne Schiebel, Leroy Webb, and Dave Williams.

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THE INVASION OF NRAO

On Thursday, July 6, the mythical Blue Coats invaded a strategic valley of West Virginia and overran the National Radio Astronomy Observatory (NRAO).

After arising in the early dawn, the invading force prepared hastily and rode to the site in the familiar yellow troop carriers. The planned assault was a complete success, as the overpowering radiations from the ignition systems of the troop carriers completely disrupted observations for the entire morning.

After capturing the base, the Blue Coats' espionage experts busied themselves with excursions into the laboratories of the NRAO. They also infiltrated and photographed the many telescopes, interferometers, and control rooms.

The mission was aborted shortly before noon and the Blue Coats retreated back to their base camp at Five Mile Run.

The above is how the "Rhododendron Record", a publication of the National Youth Science Camp, described the Campers' visit to NRAO this summer.

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Writers seldom write the things they think. They simply write the things they think other folks think they think.

--Elbert Hubbard

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Newspapers are the world's mirrors.

--James Ellis

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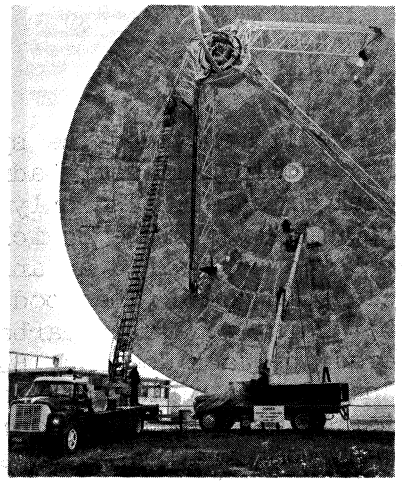
85-1 FACE LIFTING

Fred Crews



Stripping the paint from the surface of 85-1

In July of this year, the 85-1 telescope was given a face lifting by stripping off the old reflector (dish, if you like) paint and recoating it. Reflectors of solid-surfaced radio telescopes are coated with a special paint to minimize the amount of solar energy or reflected heat to the focal point as the telescope points near the sun, and of less importance to minimize the distortion of the reflector panels due to heat. This special paint does not affect the reflection of radio waves to the focal point at frequencies normally observed with radio telescopes.

In 1962, an experiment was conducted with a 30-foot diameter telescope to determine the effectiveness of the special paint. The telescope was instrumented with temperature sensors at the focal point and first pointed at the sun without any protective coating (i.e., bare aluminum). After tracking the sun a short time, the focal point temperature was measured to be 1672° F. It is not clear whether the temperature levelled out, or the experimenters chickened out and ended that phase of the experiment. At any rate, the reflector was next given the special paint coating, and while tracking the sun for two hours at mid-day, the temperature did not exceed 88°F, 17°F above ambient.

Deciding to paint the 85-1 surface was easy. How to remove several old coats of paint and touch up paint from six thousand square feet of reflector surface was a major problem. Additionally, paint removal had to be accomplished without damage to other painted surfaces, to equipment, and, of course, to the panels themselves. Several different methods were tried before one was selected.

One method used the technique of extremely high pressure water (hydrospray), another used abrasive cleaning methods, and a third used chemical cleaning methods. Finally, it was decided that chemical cleaning (paint stripping to most of us), if done properly, was the practical and safest. However, chemical strippers are hazardous to personnel, resulting in burns if they come into contact with the skin. Burns can be avoided if the chemical is immediately flushed off with water. Several episodes of the flushing operation were witnessed, and a few experienced. A representative of the Oakite Company (which specialized in paint stripping) looked the situation over, and together with NRAO people decided how the job should be done.

First, all the cracks between the panels were filled by packing with neoprene rope. This amounted to 2600 feet of cracks. The next problem was how to fill and protect the thousand or so 1/8 inch target holes that were drilled into the panels for surveying purposes. Gene Moyers, one of the Green Bank painters, suggested golf tees - cheap and easy - which explains why we buy golf tees for telescopes. This preliminary work was necessary before stripping began.

Under contract, the McBride Sign Company of Lynchburg, Va. arrived with an 80-foot mechanized aerial ladder, a 30-foot cherry picker, pumps, and spray equipment. All sorts of problems developed. The cherry picker broke down, the aerial ladder broke down, the chemical was too viscous to pump from the ground and also gave off vapors that locked up the pumps. In reality, no one, NASA included, had tried to remove this paint from aluminum before. Although NRAO people and Oakite had run some short tests, this was the real test with a finite limit on the available telescope time to complete the stripping and reapply the paint.

As more and more of the reflector paint was stripped, more attention had to be given to avoiding the sun so that cables and equipment were not damaged. In the photograph

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accompaning this article, the ladder truck was so hot that the contractor had to put on gloves to get into the cab.

Finally, after the reflector surface was all stripped and cleaned, people from plant maintenance, telescope mechanics, and telescope operators pulled out the neoprene rope and golf tees. After this NRAO painters took over and applied the necessary primer and two finish coats. Very hot days coupled with heat reflected from the aluminum made this a very exhaustive job.

And, as scheduled, 85-1 moved off to the demands of the observing program, and the human participants groaned a long sigh of relief.

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ACTIVITIES IN CHARLOTTESVILLE

Elaine Litman

In February of this year a concerned group of NRAO-C'ville employees decided to organize a committee for the purpose of fostering greater social interaction among the employees in C'ville. The committee for this year has been comprised of Tom Cram, Coordinator; Jack Cochran, Bowling League; Bill Meredith, Sports; and Elaine Litman and Bruce Balick, Social Activities. As the bowling league was already an active entity, Jack had an easy job until it came time to reorganize for the fall bowling. This year the bowling league will meet on Thursday nights at 7:30 and we'd like to see as many people as possible joining as regular bowlers.

Bill Meredith organized basketball in the spring, which was played at a local high school gym. Aside from the sore muscles, good times were had by all who participated. Volleyball equipment was purchased and all summer there have been exciting games with anywhere from 15 to 25 people playing. Games were scheduled for the early evening on Tuesday (or Wednesday or Thursday or Monday) evening. As volleyball season nears its end, there is talk of the next basketball season or maybe we can use the U. Va. pool for swimming???

The social activities this year included two trips to the Charlottesville-Albemarle Dinner Theater and a picnic in June. The first trip to the dinner theater, to see CABARET, was quite a success in spite of a postponement due to a freak snow storm. The second trip, to see YOU'RE A GOOD MAN, CHARLIE BROWN, did not bring out as many people; however, all who went had a most enjoyable evening. The picnic in June brought out about 100 people for an afternoon of food, drink, and sport. Bill Meredith provided the sporting equipment with a volleyball set, badminton set, and several frisbees. The only casualty of all this sporting was Bruce Balick who stepped on a rock and sprained an ankle during a rousing volleyball game. The food (hamburgers and hot dogs) were ably barbecued by chefs Bill Meredith, Jack Cochran, Burt Litman, and Ann Jackson. The only souls who ventured east from Green Bank for our picnic were the Ed Fomalonts and the Ed Wilsons; we hope more of you will join us next year.

Most of us have enjoyed having these activities at NRAO-C'ville and hope there is enough interest to keep them going throughout the coming year.

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GREEN BANK BOWLING NEWS

Don Hovatter

The bowling season is with us again! Seems like the past season was completed only yesterday.

Green Bank will again field two teams. However, both teams will participate in the Tuesday night League, whereas last year one team bowled on Monday and the other on Tuesday.

The teams this year will be as follows:

No. 1	No. 2
Don Stone	Jon Spargo
Leroy Webb	Wendell Monk
Bill Vrable	Don Hovatter
John Matheny	Howard Brown
Russ Poling	Bill Radcliff
Dave Williams	Herb Hanes
Harold Crist	Troy Henderson
Ronnie Monk	Bob Vance

The numerical order of teams does not necessarily indicate ability.

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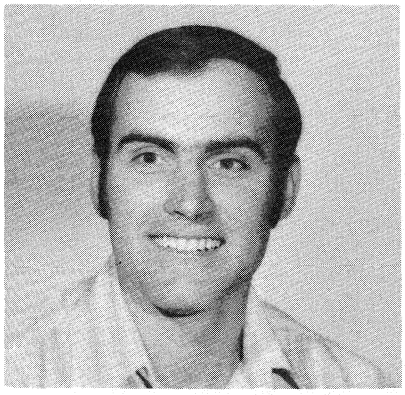
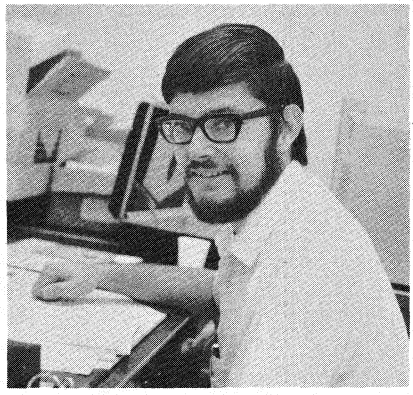
NEW EMPLOYEES

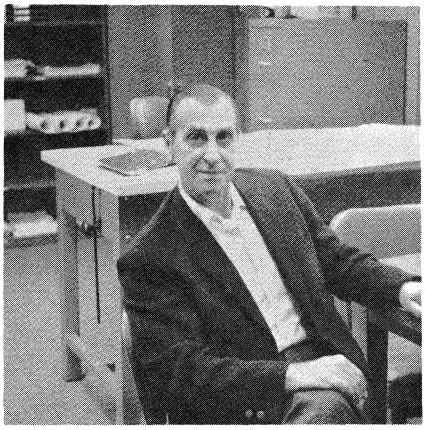
David O. Myers
Technical Specialist
Tucson



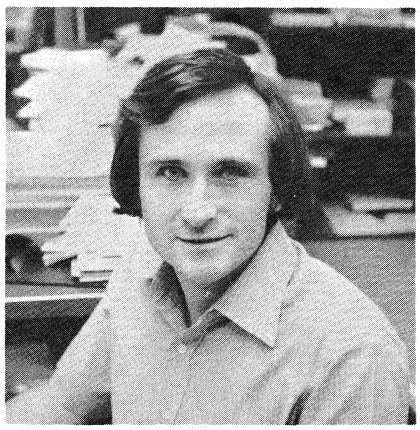
Paul J. Rhodes
Technical Specialist
Tucson



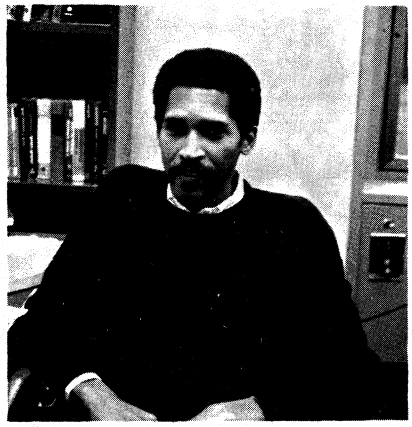
C. Read Predmore
Electronic Engineer
Electronics Division - CV



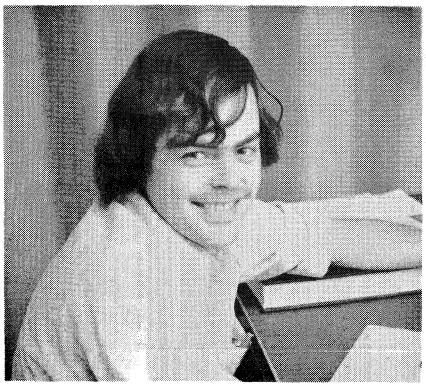
Raymond R. Werner
Design Engineer
Engineering Division - CV



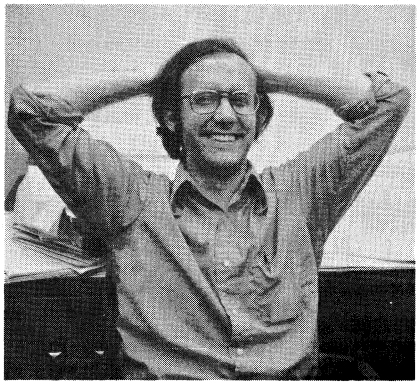
James J. Condon
Research Associate
Basic Research - CV



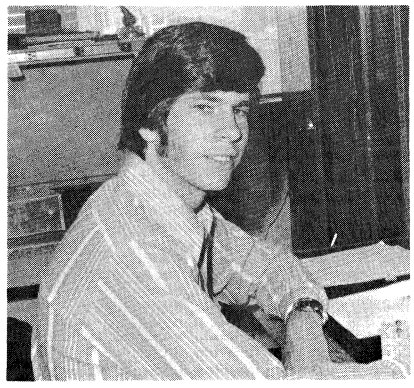
Floyd W. Peterson
Research Associate
Basic Research - CV



Eric W. Greisen
Research Associate
Basic Research - CV



Robert H. Sanders
Assistant Scientist
Basic Research - CV



Michael S. Hersman
Co-op Student
Scientific Services - GB

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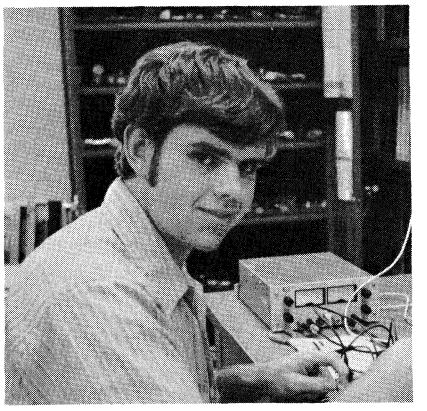
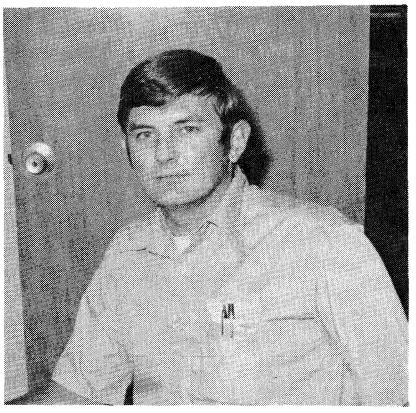
NEW EMPLOYEES - cont.

Patricia J. Smiley
Illustrator Trainee
Scientific Services - CV

Judith F. Moore
Accounting Clerk B
Fiscal Division - GB



Neil Horner, Jr.
Intermediate Technician
Electronics Division - CV



Oscar Cate
Scientific Programming Analyst
Computer Division - GB

Photo Not
Available

Gregory D. Murray
Computer Operator
Electronics Division - CV

Dr. James H. Bartlett
Visiting Scientist - CV
University of Alabama

TERMINATIONS

Margaret A. Hermann	Basic Research
James D. Scarl	Tucson
Joseph P. Greenhalgh	Computer Division
John M. Copper	Computer Division
Victor Herrero	Basic Research
M. Kathryn Campbell	Scientific Services
Melvyn C. H. Wright	Basic Research

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NITE HORSESHOES

Ringo Pegg

The big scene is a group picnic. We've had a "gut stuffer" of a meal and probably a few beers. Someone yells, "Let's have a game of horseshoes." Someone else yells back, "OK, get the shoes." No one notices that it's almost dark. No one doubts that someone has horseshoes in his car. They know that one of the guys carries horseshoes around in his car like some other guys carry golf clubs, fishing rods, or shovels. Out come the shoes and teams of two are made up. First, game participants check shoes for matched sets while challengers move off to one side to kabitz. By now it's hard to see the pegs but they try a few shoes. No dice! The pegs are too hard to see. Time out for a conference to solve the dilema and another beer.

The group gathers around and suggestions begin to fly. Someone suggests putting an empty Duke can over each peg to make to peg easier to see. Duke has more white on the can than some of the others, like Millers or Colt 45. One stalwart forces a Duke can over each pole and the game commences. It is soon apparent that the only attribute of the cans is that they spin madly when hit with a shoe. Off come the cans and another time out to figure out a solution; but first, another beer.

Someone asks if anyone here has any lights. Silence, except for gulps of beer. Finally, a voice shatters the quiet. "Hey, I do." and the voice and its jolly owner disappear into the night. In a few minutes he reappears dragging a 25-foot extension light in one hand and a can of Schmidts in the other. Someone else plugs it into an outlet at the shelter. Ahh, a nice bright light that illuminates the box and peg but only if the light is held high overhead by one of the taller people. "Move it to the center between the two pegs," lisps an anxious voice. "Can!t you, Jackass? The cord only reaches to this peg." "Well, hell, we can't stand here all night holding the light up over our heads." Then a jubilant voice cries out, "Cut a pole and hang the light on the pole." A short, squatty, overweight-type hands the ax along with a burp to one of the bigger fellows who disappears over the bank into the willow thicket.

Shortly he reappears with a pole about six feet long and as crooked as a dog's hind leg. Of course everyone comments about the pole while the poor fellow is trying to stick it in the ground but the pole won't go. The ground is too hard. Several others try to help but it still won't go. Someone suggests digging a hole with the ax, and while the man with the ax is digging the hole the rest go for some refreshments. The ax man is only partially successful. He has been able to make only a small hole and someone sticks the pole in the hole and it stays, but only for a few seconds before it begins to tilt south. The situation is quickly grasped by one of our big-bellied friends (it's only fair to say that he is on a diet) and he grabs several limbs chopped from the pole and props up the pole on three sides. Hurrah! the pole stays put and the light is hung on the pole. Light for the south peg is pretty good but it's not so hot for the north peg (directions were supplied by one nosy fellow who had a smattering of Astrology and was able to locate the Big Dipper).

Nevermind. The game starts again but it is soon obvious that the north peg is too hard to see and something has got to be done about it. Time out! While the rest are going for something to wet their whistles, the coldest man in town (not necessarily his wife's opinion) moves his car down opposite the north peg and turns the lights on. Hurrah, again! The north box is lit up alright, but no one can see the peg. The car's lights have blinded everyone.

Hardly had the car's lights gone out and this drafty little fellow, on slightly wobbly legs, shouts out, "Hold everything! I've got a Coleman lantern in my trunk." "Gitit," says the fellow in shorts from Marlinton as he fondly caresses his paunch. The drafty little fellow leaves and soon appears with his Heck's special: a genuine, two mantle, Coleman lantern. Dangling it up for everyone to see, he says, "Never know when one of these will come in handy." So the lantern is lit and placed on a table opposite the north peg. Success! The peg and box are pretty well lit up and the game resumes. But only for a few minutes because the pole with the light at the south end begins to totter and as it is falling towards the ground a fat

--continued, next page--

little fellow grabs it and says that he could have gotten us a good 4 x 4 post seven feet long for $2.50. He was sure of it because he just sawed some this morning after he had hauled three truck loads of dirt. Time out again!

A decision is made to bring over a garbage can and set the light on top of the garbage. It works OK and there is enough light on the south peg to play. Meanwhile some other soul had put an aluminum covered tray behind the lantern and improved the lighting by about one wooden match worth. The game is almost over when out of the dark bosomy apparitions appear and almost in a chorus they say, "It's late and it's time to go home."

Most of this story is true. Names were omitted to protect the innocent. Beers mentioned in this story do not necessarily reflect an endorsement by the athletes who participated in the horseshoe game.

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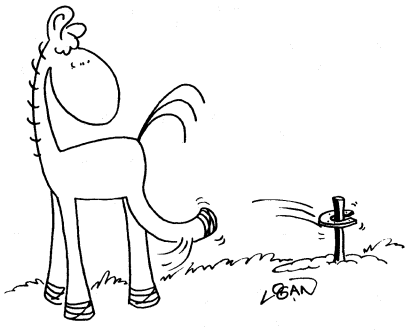

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LETTER TO THE EDITOR

SAFETY/CLEANLINESS/?

I am not a member of the Safety Committee, just a fellow employee. No one asked me to write this but it has been irritating to find conditions and standards so low; either due to lack of personal pride or not educated in proper personal cleanliness, maybe both.

The first gripe is noticing (over the past years) those who come out of the commode closets and away from the urinals (naturally in the little Boys room as the girls will not let me observe in the little Girls room) and DO NOT WASH their HANDS. It is fact, the level of Intelligence, Degrees of Higher Education and Position, in organizational employment, obtained (and visitors as well) seems to verify or nullify those who seem to think they're Verily Divine.

The other gripes are: Coughing in other's faces without covering of mouth, especially when having a cold; sneezing without cover with a handkerchief or tissue, so as to make a spray of whatever can be sprayed, as well as upon anything and anyone; nose picking with the Bare finger and wiping it upon the edge of a piece of furniture (or upon it's own clothing) so as to decorate.

It is not the intention of this writer to fun upon anyone, merely to construct a criticism so to cause self consciousness upon offenders (as glorious as they may deem themselves) that they offend others within the realm of our community. However, these same atrocities can be and are visual elsewhere in the world; so don't assume that anyone is giving priority to only Green Bank residents and employees, etc. Elaboration could continue but the point (only to offenders) is had.

What has this to do with Safety? You will do well to find out.

The only reason for being an anonymous author is my wish not to make this a personal thing.

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Two engineers were out hunting on Cheat Mt. and became lost. After walking around aimlessly for an hour or so, they decided to sit down on a log and think about what they should do. Finally they decided they would shoot up in the air and wait half an hour for rescuers. So they did. A half hour went by and no one came. They shot again and sat down to wait. Fifteen, twenty, thirty minutes went by and still no one came. Anxiously one said to the other, "Shall we shoot again?" "I don't know", replied the other, "I only have one arrow left."

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If you don't know where you're going, you may miss it when you get there.

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MAINTENANCE DIVISION

Jane Chestnut

The Maintenance Division, located in the third building on the right on the main Observatory road, is work place for 35 permanent employees and a half dozen or so part-time employees during the summer. Three assistant plant maintenance supervisors--Glen Grandon (crafts, guards), Bob Elliott (labor, heavy equipment), and Bruce Nottingham (electricians)--plan and supervise the daily work. They, in turn, report to Duane Madron, division head.

Other employees in the division are: office clerk, Dick Hiner; secretary, Jane Chestnut; plumbers, Alfred Collins, Russell Clarkson; electricians, Troy Moore, Beryle McLaughlin; painters, Gene Moyers, Guy Mayes; carpenters, James Carpenter, Herman Coleman; truck drivers, Henry Taylor, Merle Kerr; mechanics, Gail Geiger, Clifford Barkley; heavy equipment operators, Charlie Puffenbarger, Fred Cole; laborers, Neil Horner, Winfred Sheets, Neil McLaughlin, Dharl McLaughlin; janitors, Pat Hall, Jesse Tacy, Charles Cassell, Jim White, Bill Lovelace; guards, Ether Tyson, Roy Pennington, Jim Pennington, Delbert Cassell, Harlan Tallman. All these people can be placed into 11 classes of work--office, plumbing, electrical, painting, carpentry, truck driving, automotive mechanics, heavy equipment, and labor, janitors, and guards. These groups of people perform the maintenance services for NRAO.

It is not the intention here to detail all the work performed by the maintenance division, but we think it might be informative to broadly outline the areas in which these groups of people are responsible.

There are approximately twenty-five miles of paved roads on the site to maintain, mow along, and to remove snow from. During the spring and summer about 200 acres of grass must be mowed around the lab, residence hall, residences, recreation area, and telescopes. Twenty-six houses require painting (inside and outside), plumbing, electrical, and carpentry work. Four large buildings (lab, residence hall, warehouse, works area), must be maintained in the same way as the houses. In addition they are cleaned daily. Six smaller buildings (including four telescope control rooms), need the same services as the large buildings. Some fifty government-licensed vehicles must be kept running. These include trucks and diesel cars, one road scraper, bulldozer, end loader, crane, back hoe, cherry picker, fire truck, ambulance, four farm-type tractors, a number of lawn mowers, generators, water pumps, and air compressors. New and old roads, telescope sites, building additions, sewer systems, cable ditches, all require heavy equipment and trucks. This same equipment is used in the winter to clear Observatory roads. All these buildings, telescopes, houses, and equipment have to be watched over after regular hours. The guard house at the main entrance has to be manned, visitors have to be greeted, and some one has to drive the ambulance and fire truck, and fight fires.

Hopefully, we have briefly outlined who does what in this division. We perform a service in many areas. If we cannot get to your problem immediately---patience---we'll get there as soon as we can.

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October turned my maple's
leaves to gold;
The most are gone now; here
and there one lingers;
Soon these will slip from out
the twig's weak hold,
Like coins between a dying
miser's fingers.

--T. B. Aldrich

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It is easier to suppose that the universe has existed from all eternity than to conceive a Being beyond its limits capable of creating it.

--Shelley

****

Words are the most powerful drug used by mankind.

--Kipling

****

FIND THE CAPITALS OF THE UNITED STATES

Names of 51 of the Capitals of the United States can be found among these letters. Name of the Capital is read forward, backward, up, down, or diagonally. Draw a line around the name of each Capital as you find it.

A B Y T I C E K A L T L A S W Z B L D C L J S
A E N N E Y E H C N I T S U A T L A N T A E E
L R S T P A U L O C C B S P S A C C L C N F N
E R I U T N R D R O F T R A H C P N K A S F I
B E L A S O R P K N N J B E I Q T S S R I E O
P I O E N T L J C C C A E M N D O D W S N R M
M P P N O S A A O O O L S O G N O N E O G S S
Y R A U T E T S R R L I R N T M S O N N I O E
T O N J S L R R E D U Y N N O N A M X C Y N D
I H N S O R E L L S M T M D N R L H I I L C O
C E A L B A N Y T U B C B P I T E C N T C I T
A L E R S H T O T R I N I A I A M I E Y O T N
M E E M R C O P I S A L S K X A N R O O A Y E
O N S O B I N Q L T L O M E Y S D A H L R T M
H A S N B I S M A R K C A P L Q E S P E R V A
A S A T N N M B A T O N R O U G E T V O M I R
L H H G O G N V U L O I C T E F W N F F L L C
K V A O S D O V E R T L K H K P E K F S S I A
O I L M I S P R I N G F I E L D N D D T O P S
B L L E D S Y T I C E S I O B A U G U S T A B
Y L A R A U L U L O N O H I R A L E I G H H L
R E T Y M E L A S A N T A F E S U B M U L O C
M R E I L E P T N O M A L E C N E D I V O R P

Check the names of the capitals as you find them in the puzzle.

Montgomery
Juneau
Phoenix
Little Rock
Sacramento
Denver
Hartford
Dover
Washington
Tallahassee
Atlanta
Honolulu
Boise
Springfield
Indianapolis
Des Moines
Topeka
Frankfort
Baton Rouge
Augusta
Jefferson City
Helena
Lincoln
Carson City
Concord
Trenton
Santa Fe
Albany
Raleigh
Bismark
Columbus
Oklahoma City
Salem
Harrisburg
Providence
Columbia
Pierre
Nashville
Austin
Salt Lake City
Annapolis
Boston
Lansing
St. Paul
Jackson
Cheyenne
Montpelier
Richmond
Olympia
Charleston
Madison

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FACTS FROM FISCAL
SOCIAL SECURITY TAXES

Don Hovatter

On July 1, 1972, Public Law 92-336 became effective. The basic provisions of this law are as follows:

1. Social Security benefits will increase 20%, effective 9/1/72.
2. To fund this increase the following changes will be made in the employee-employer FICA taxes:

a. In 1973, the FICA base will go to $10,800 and the tax rate will be 5.5%. (At present, 1972, the base is $9,000 and the rate 5.2%.)

b. In 1974, the base will be $12,000 and the rate is to remain at 5.5%, at least so far as the current law provides.

The effect of these changes to the individual are as follows:

1973

1. Persons making $10,800 or more will pay $594 (or $126 more) per year in FICA taxes.
2. Those making between $9,000 and $10,800 will pay $27.00 more on the first $9,000 (3/10 of 1%), plus 5.5% of the amount over $9,000.
3. Those making less than $9,000 will pay 3/10 of one percent more per year in Social Security taxes. (This would be $24 on $8,000, $21 on $7,000, etc.)

1974

1. Persons making $12,000 or more will pay $660 or $66 more per year in FICA taxes.
2. Those between $10,800 and $12,000 will pay 5.5%, of the amount over $10,800, in additional Social Security taxes.
3. Those under $10,800, no change.

For those who like to ponder such things--in 1958, the base was $4,200 and the rate was 2.25%. $94.50 per year was the maximum paid by employee or employer.

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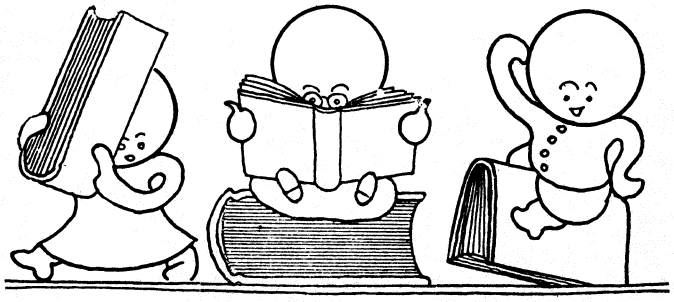
NOT SO NEW NEWS FROM THE LIBRARY

Virginia Van Brunt

In case you haven't been keeping up with what is on the "NEW BOOKS" shelf, here is a capsule summary of a few interesting titles, just waiting for your reading:

In the not-too-distant future, you may be buying your hamburger in kilograms instead of pounds, buying gas in liters instead of gallons, measuring distance in kilometers instead of miles, and measuring yourself in centimeters and millimeters instead of feet and inches. Most other countries are already using or are firmly committed to the metric system. A METRIC AMERICA, A DECISION WHOSE TIME HAS COME, recently published by the National Bureau of Standards, discusses the implications of conversion to the metric system in this country. Better read it and be prepared.



From the publishers of ELECTRONIC DESIGN, comes a not-so-new, although new to us, book entitled MICROELECTRONIC DESIGN. Since the library retains copies of the journal for only a few years, this volume of reprints of articles is particularly welcome.

Finally, the IEEE has published their long awaited and sorely needed IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS. A new dictionary needs no introduction, if you know the alphabet; suffice to say copies are available in Green Bank, Charlottesville and Tucson.

THE UNIVERSE OF THE MIND, by George E. Owen, attempts to trace the history of the concepts of physics and mathematics for the non-scientist who often feels isolated from the scientific concepts on which society is based.

Also, we have just acquired the third edition of Marlow Shapley's book, GALAXIES, originally published in 1943. This edition was revised by Paul Hodge.

Unfortunately, we learned the hard way that Sci Tech Book Service, Inc., had gone out of business. The library had to reorder all books with a new dealer, and finally we are beginning to get some of the titles you requested.

If you are interested in ordering books at a discount for personal use, try OMNIBOOKS DISCOUNT BOOKSELLERS out of East Cleveland, Ohio. Berdeen and I have order forms, and a complete explanation of their discount policy. Book orders still require three weeks or more to be filled, depending on the availability of the title.

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When you reach the end of your rope, tie a knot and hang on.....

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Question: Do you know why the Green Bank golfer had two pairs of pants?

Answer: Because he made a hole in one.

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REMAINING NRAO HOLIDAYS 1972

October 23	*Veterans' Day
November 23	Thanksgiving Day
November 24	*Holiday
December 22	Half Holiday
December 25	Christmas Day
December 26	*Holiday

*Additional Holiday

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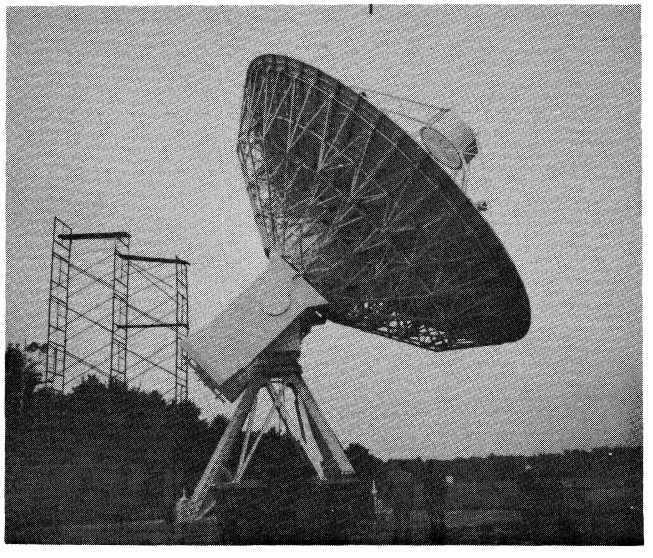
45-FT PORTABLE ANTENNA

John Ralston

A new 45-ft, elevation-over-azimuth, portable antenna will soon be erected on the NRAO site for testing. This new antenna will replace the 42-ft polar mounted antenna which has been an integral part of the long baseline interferometer. The 45-ft antenna is now being erected and tested at Electronic Space Systems Corporation, Concord, Massachusetts, and should be delivered to NRAO by the first part of October.

Foundations for the new antenna have been completed on a site immediately west of the old Arbogast House and at the gas well site on Beaver Lick Mountain near Huntersville. Other sites in addition to these two may be used in the future.

This 77,000 pound antenna is portable in a sense that it can be transported in the assembled or disassembled mode. The transported assembled mode is defined as moving from one station to another (similar to station moves on our existing interferometer) on a specially built trailer over level ground at a maximum speed of five miles per hour.



45-ft Portable Antenna

The trailer for hauling the antenna is unique in that it was specially designed to facillitate both modes of hauling and that, if using a fifth wheel dolly and tow bar, it can be pulled by a bulldozer or it can be pulled by a heavy duty tractor. Besides this special trailer, two other trailers will be used when hauling in the disassembled mode to handle the back-structure components, 72 surface panels, feed supports and ring, pick-up arms, counter weights, and tower components.

Compliance of specifications requires that the complete antenna system be repeatable. Repeatable in the sense that from assembly to disassembly, to assembly again, only minor adjustments might be required for repeatable and acceptable performance. Such compliance will be achieved by using pinned connections in assembling the entire structure, from tower to surface panels, in the fabricator's plant. Each member can only be assembled at its designated location and although many components look similar, they will not fit out of place.

For the next three months other departments such as Electronics, Telescope Operations, and Digital and Computer will be installing and testing their systems. Oh well, that's par-for-the-course.....do the easy jobs during cold weather.

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OVERHEARD AT COFFEE CALL

Say, have you heard that Colonel Sanders has two new chicken dinners? One is the McGovern dinner and has left wings and rear ends (polite version) and the Nixon dinner has right wings and bird brains.

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SHARPENING SERVICE

Circular and hand saws, scissors, and knives sharpened. Don Stone, 456-4746.

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GOLF-NRAORA OPEN

On September 23rd and 24th the first NRAORA golf tournament was held. Everyone had a great time and expressed the desire that more such tournaments would be a regular thing.

Three additional tees were added which made the course much more interesting. It now plays as 3 par 4's, 2 par 3's, and 1 par 5 with a total par of 69.

Pat Coleman did a fine job in preparing the course and everyone agreed that it was in great shape.

Some of the players appeared confused about where to play. One high ranking engineer hit four consecutive balls into the softball parking lot until someone pointed out that the green was some 50-yards to the right.

Another engineer appeared to prefer playing No. 3 out of the swamp. Perhaps his professional training has taught him that a straight line is the shortest route to any objective, which is, of course, true; but, man alive, the lies are sure tough in that swamp. Actually he spent so much time in the high grass, that we are very seriously considering naming that particular section of boon-docks after him.

Another participant had a very good front nine on Saturday but on the back nine his score was some ten strokes higher. When asked the reason for this, he indicated that he was bothered by "boiler makers" on the back nine, which is, I guess, some sort of medical malady affecting the visual and balance functions.

Tournament winners were decided by the "Calloway System" of handicapping. They were as follows:

	Name	36-Hole Score
1st:	Don Hovatter	142
2nd:	Bill Vrable	144
3rd:	Bill Radcliff	*146
4th:	Sid Smith	*146

*Sid and Bill were tied for third and Bill won a 6-hole play-off.

Longest drive on hole No. 4 - Bill Vrable

Closest to pin on No. 1 - Bob Vance

All winners received Titlist balls as prizes.

Handicaps have now been established for all those who participated, and if weather permits, we hope to have one more tournament before the season ends.

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NRAORA REPORT

Richard Fleming

With the summer (what there was of it) behind us and the fall and winter ahead, your Recreation Association is planning some activities you will enjoy. A fall dance is planned for Saturday night, November 4, and will be held in the warehouse auditorium. Another concert is scheduled for sometime in late October or early November. As soon as the group is scheduled, notices will be posted as to time and place.

A nominating committee has been chosen to present to the board of directors--during the general membership meeting at 3:00 p.m. on Tuesday, November 14--names of members to be voted on in November to fill the vacancies that occur in January 1973. The five names presented to the membership during the November meeting plus names added to the list from the floor during the meeting will appear on a ballot to the general membership during the last two weeks of November. Results of the balloting will be posted and the new members will assist the old board in the very active month of December. The new members will take their place on the board in January at which time election of officers will be held.

Big plans are underway for the month of December which include a Christmas party for the children, Christmas dance for the teenagers, and the big New Year's Dance. Much has happened this year and more is to come, so stay tuned.

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CARTOON CONTEST

OK, you funny guys, you doodlers, and you quick quip artists, here's your chance to shine. The OBSERVER wants a good cartoon to publish in the December issue. To that end the editorial board is having a cartoon contest and is offering a mystery prize to the winner. Selection of the best cartoon will be made by the members of the editorial board. The winning cartoon will be selected on a basis of general employee appeal, simplicity, originality, timeliness, and how it relates to NRAO.

The contest is open to all employees and their families with the exception of the members of the editorial board of the OBSERVER.

If you need help with cartoon ideas and gags, the editor's office has a copy of Jack Markow's book, "Cartoonist's and Gag Writer's Handbook". This book may be borrowed overnight from the editor's office.

Cartoons should be submitted by November 20.

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