

# The O B S E R V E R



GOLF BALL PICK-UP



SACK RACE



FROM CV



SOME OF THE WINNERS



CHOW LINE



AFTER CHOW

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See story on next page.

NRAORA PICNIC
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Ray Hallman

The NRAORA picnic was an enjoyable outing for the approximate 250 people who attended the annual event on August 8. Our cover shows the many people in action at sports, eating, and resting.

The usual contests were held. In addition this year pool contests were added. As usual, most people enjoyed the egg throwing contest. We had one casualty. Bob Beverage fell and dislocated his shoulder while participating in the 3-legged race.

Jon Spargo spearheaded the picnic activities after Carl Davis was stricken with gall stones. (Carl is in good shape now.) Bill McLaughlin and the girls at the cafeteria supplied the food. Ken Anderson set up the P. A. system. Herb Hanes and Jon Spargo bought the prizes.

One of the highlights of the picnic was a radio controlled model airplane demonstration given by Jim Forman. Jim put his plane through a series of landings, take-offs, and acrobatic stunts.

The picnic was a success. There was plenty of good food to eat and many activities to watch and take part in. Everyone who attended seemed to have a good time.

\*\*\*\*

Many people who were asked to report on their sections were too busy to write an article for this issue. Consequently, the following regular articles are not included in this issue.

Electronics	Fiscal
Computer	Shop
140-Foot	Engineering
Maintenance	News in general

\*\*\*\*\*

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Virginia Van Brunt  
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Tom Williams

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

The OBSERVER is a bimonthly publication of the National Radio Astronomy Observatory, P. O. Box 2, Green Bank, West Virginia, 24944.

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FROM THE DIRECTOR'S OFFICE

Hein Hvatum

The more or less permanent reporter from the Director's office, Bill Howard, is presently touring Europe, presumably gathering material for forthcoming Observer articles. In the meantime, it has occurred to us that for many of you the Director's office is a nebulous abstraction located somewhere in Charlottesville. Actually, the Director's office is a genuine piece of hardware, which looks like this.



The Director's Office

\*\*\*\*

LETTER TO THE EDITOR

William del Giudice

The column by the Conservation Committee of the Green Arbor Garden Club on eutrophication was timely and should be of vital interest to us all. I would like to add, however, that it is not soaps that kill but detergents.

Detergents, as noted in the table contain large amounts of phosphates which, along with nitrates, accelerate eutrophication of ponds, lakes, and estuarine waters. Soaps contain little or no phosphates and are therefore not nearly so dangerous. Soap, when

used in conjunction with washing soda, is a cleaning agent almost as powerful as the best detergent and those of us interested in the ecology of our environment should feel obliged to switch from detergents.

\*\*\*\*

MEASURING ACCURATE RADIO SOURCE POSITIONS WITH THE NRAO INTERFEROMETER

C. M. Wade

An observer must know the position of a radio source on the sky (its right ascension and declination) before he can point his telescope at it. It is not enough to know that "it will be high over Bald Knob at midnight". Far higher precision, to the order of a minute of arc in each coordinate, is generally needed. This kind of accuracy is commonly achieved in modern radio source surveys and catalogues.

Many important problems require positional accuracies of a yet higher order. A familiar one for telescope operators is the chore of determining the antenna pointing correction curves, which calls for positions accurate to 10 arc seconds or better. It is of vital importance to astronomy to identify radio sources with their optical counterparts; this can usually be done with confidence only if positions good to a few seconds of arc are available. Very Long Baseline (VLB) interferometry is greatly expedited if the source positions are known initially to one or two arc seconds. The list could go on and on - the point is that there are many reasons for measuring radio positions with the highest attainable accuracy.

It would be well at this point to recall what is meant by an angle of a second arc. There are 360 degrees in a full circle; 60 arc minutes make a degree; and 60 arc seconds make a minute. Hence there are  $360 \times 60 \times 60$  arc seconds in a circle, so that in measuring a position to a second, one is fixing its direction to better than a millionth of a circle. By way of contrast, the smallest angle that can be resolved by the

(continued on next page)

unaided human eye is about 2 arc minutes, or 120 seconds. The following are examples of some things which would subtend approximately one arc second:

A six-foot man seen from a distance of 240 miles (about the airline distance from Green Bank to Philadelphia);

The Washington Monument as seen from 21,600 miles, or about one tenth of the distance to the moon;

An ordinary dinner plate seen from 40 miles away.

Although an arc second is a very small angle, it is typical of the accuracy to which we work regularly with the NRAO interferometer. We can even do somewhat better when we really try. Several methods can be used to determine accurate source positions with this instrument. The particular method used for a given source depends on certain characteristics of the source and the accuracy that is demanded. Consider, for example, how one might find a precise position for an unresolved source (one so small in angular size that the interferometer cannot distinguish it from a geometrical point). The discussion is necessarily very much simplified, but it should give the general idea. Anyone who has watched the interferometer at work has seen the "fringes" being drawn by the pens which monitor the correlation products of the various pairs of antennas. The pens swing back and forth monotonously at a rate of anywhere from 5 times a second up to once in many seconds (this is the "fringe rate"). The actual rate depends on many things; the most important are the radio frequency at which the observations are being made (2695 MHz and/or 8085 MHz at present), the precise length and orientation of the lines joining the various pairs of antennas, and the position of the radio source on the sky. We always know the frequency very precisely. The length and directions of the lines joining the antennas must be found by calibration to an accuracy far higher than any ground survey could give. This calibration can be performed by careful fringe rate measurements on radio sources whose positions are known very exactly to start with (say, from optical measurements of the coordinates of identified sources). This is the procedure which is most often used in practice. The job can be done without reference to such "calibration sources", but the techniques are far more complicated; the advantage, of course, is that the cali-

bration is not degraded by the errors which are likely to be present in the adopted positions of the calibration sources. The latter approach is justified when results of the highest accuracy are wanted. Either way, once the calibration is done, and certain small corrections have been made for various instrumental and atmospheric effects, one can derive the precise position of any point source from the behavior of the fringe rate as the interferometer tracks the source across the sky.

The best accuracy we have achieved to date is about half a second of arc. We hope to improve this by at least a factor or two. The ultimate limit to the accuracy will be set by the Earth's atmosphere, which is never quite steady. It always introduces a certain amount of "jitter" in the fringe rate, and we can't beat it.

\*\*\*\*

#### THE NEW TOURIST TELESCOPE

Kevin Bromberg

The two foot radio telescope, the marvelous new instrument you've heard so much about, really does exist. Directly across from the lab, you can find a small Sears and Roebuck building. Inside this little shack you will find one, two, or perhaps three radio telescope observers (if you are extremely lucky). These three hardy souls monitor the sun on a grueling 10 to 5 schedule every single day of the week, unnoticed by the scientific community.

They are frequently interrupted by the appearance of two large blue and white buses that have an annoying tendency to stop near the telescope. These buses invariably unload hordes of unwanted visitors who haven't the foggiest notion of the reason they are there. All they know is that if the fool standing by the 2-foot doesn't talk faster, they will be late for the next journey on the Cass Railroad.

My educated guess is that if we substituted a train for the buses, the volume of tourism would easily double each summer. Also, the sale of "NRAO is a Gas!" sweat-shirts would help defray the cost of supporting the three tourist guides.

## 36-FOOT TELESCOPE

Dewey Ross

The rainy season has arrived in Tucson and as a result observing came to a screeching halt on July 8. However, observations from April until July produced many interesting results.

Visitors during this period included: Penzias, Wilson, and Jefferts of Bell Labs who observed CO and CN molecules as well as  $C_{12}O_{16}$ ,  $C_{13}O_{16}$ , and  $C_{12}O_{18}$  isotopes using the 2.6 mm line receiver; H. Schmidt of Sacramento Peak who attempted the detection of CN in Comet Bennett (1970); Kellermann and Pauliny-Toth of NRAO observed various sources at 20 mm to establish a standard flux-density scale; Conklin of NRAO observed sources having unusually flat spectra at 9.5 and 3.5 mm; Terzian and Parrish of Cornell investigated the Cygnus X region at 9.5 mm and 3.5 mm; Gorgolewski of Cal Tech observed the Galilean satellites of Jupiter at 3.5 mm; Buhl of NRAO and Snyder of the Un. of Va. observed HCN,  $HC_{12}N$ , and  $HC_{13}N$  using the 3.5 mm line receiver; Gottlieb of Harvard and Dickenson of the Smithsonian Astrophysical Observatory attempted the detection of SiO in various sources at 3.5 mm; Knowles of NRL, Papadopolous of MIT and Welch of Berkeley observed galactic  $H_2O$  sources during three VLB runs at 13.5 mm. These VLB runs utilized the 36-foot, Haystack 210-foot, and the Green Bank 140-foot telescopes.

Activity during April and May was rather routine, however, June offered a more diversified schedule. D. Buhl and L. Snyder were hosts to the NRAO-Tucson employees for a swimming party. Jerry Middleton moved into his new home. Temperatures reached a high of  $113^\circ$  and tempers reached an all time high. Mr. Jim Finks of NRAO Charlottesville spent the week of June 15 in Tucson (working). An electrical storm on June 26 was responsible for igniting a fire which burned over several acres (300 to 3000 acres, depending on which newspaper you read) of the KPNO. Contrary to some news media reports, the fire was contained and brought under control on June 26, approximately one and a half miles from the observatory. So ended June.

To date the month of July has been other than routine. We are in the process of rear-

ranging our control room and preparing for our new lab which will be completed before the observing schedule begins in September.

We have two new employees, Chung Woo Nam, who is writing an assembler for the DDP-116 to be run on the CDC 6400 computer, and Gene Wetmore, our new telescope operator (see photos on page 11).

Chung and his wife Sung came from Seoul, Korea, in August of 1968 and he has been doing graduate work at the Un. of Cal. at Berkeley where he received a M.S. degree in EECS. He hopes to continue his studies toward a Ph. d.

Gene, his wife Charlene, and daughter Christy came to Tucson from California via Chicago. Gene was employed by Motorola after the completion of his military obligation and will be a telescope operator here at Tucson.

Our secretary, Fei (Janne) Jen Lim will be leaving this month. Janne has worked part time for NRAO since 1968. During this time she has also been employed part time by the Lunar and Planetary Lab., Un. of Arizona, as a research assistant. Janne plans to relocate in the San Francisco area and we wish her the best in her new endeavors.



Fei (Janne) Jen Lim

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INTERFEROMETRIC UNIVERSAL SAFETY

C. Sutton\*

Abstract

Abstract details will be left to a later paper.

Introduction

We have very little knowledge of safety practices in the Universe, other than some information from relatively unknown papers (Z. Gray, Light of the Western Stars, 1914) and verbal quotes (B. Crosby, Blue Skies, 1936). We will therefore confine our discussion of safety to the Interferometer environs.

Description

Our safety record here has been excellent. There is very little to say about it. For this reason we will turn our attention to a safety suggestion submitted by one of our operators last year. We think it has particular merit and should have won an award. In order to enlist public support for the views expressed in that safety suggestion, we are taking this opportunity for a wider circulation of its contents. Perhaps public opinion will force the Safety Committee to recognize its merit, and to correct their error.

Observations

With unquestionable and documented proof that the beneficial effect would be enormous, it was suggested that the Safety Award be raised to \$100 from \$25. The advantage of this is the hundredfold increase in safety suggestions which the greater award would bring.

Proof of this is obvious by examination of the formula of Prof. Ytefas Noitseggus (1941, British Honduras Jr. College of Cybernetics). Prof. Noitseggus's formula:

$$A = \frac{A^2}{10} + \frac{375}{10} \quad (B)$$

Where X = Additional Suggestions

A = Present Award

B = Previous amount of suggestions

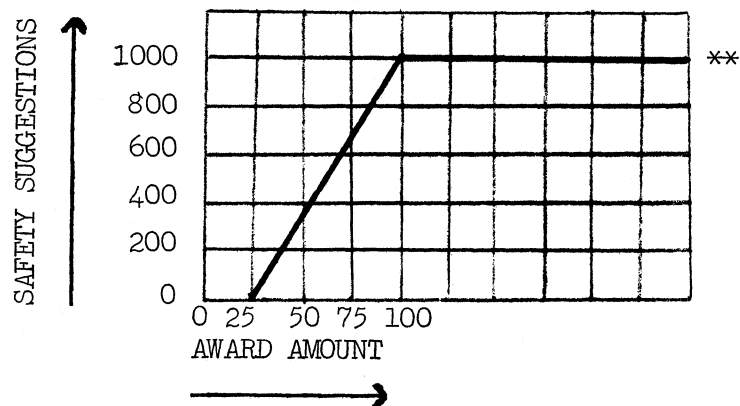
Therefore, assuming the previous amount of suggestions was 10 per month:

$$X = \frac{25^2}{10} + \frac{375}{10} \quad (10) = 1000 \text{ suggestions/month.}$$

It is readily seen that an increase of the Safety Award to \$100 will increase the amount of suggestions a hundredfold, with all the accompanying beneficial results.

Experimental

By experiment, we have found that Prof. Noitseggus's formula will work only when used in conjunction with the following graph:

Future

Our next paper will deal with the edible wild greens around the Interferometer runway. We will use as research the publication "Edible Wild Greens Around the Interferometer Runway".\*\*\*

\* Center for Advanced Studies of Oil Deposits, Dunmore, W. Va. 24934

\*\* This shows that after the award amount is increased 4 times, the added suggestions are negligible.

\*\*\* Elbide Sneerg, of the Green Sulphur Springs Culinary Institute.

\*\*\*\*

## 300-FOOT TELESCOPE

Ken Cottrell

The resurfacing work is going along quite smoothly. All of the old mesh surface has been removed. Progress on installation of the mounting saddles for the surface panels has been remarkable. Each saddle must be aligned and measured into place before it is welded to the structure. Something like 2600 saddles will be required before the job is done. Over two thirds of this number have thusfar been installed. The first truckload of new surface panels arrived from RSI's McLean, Va., plant on Monday, July 27th.

We are told that observing requests for use of the new surface are already coming in.

It should be emphasized that, while the resurfacing work is going on, all personnel visiting the 300-foot are to exercise every precaution for their personal safety when passing under the scope structure. Hardhats are a must.

Plans for constructing an addition to the control building have been postponed.

The telescope operators are making good use of the present down period. A large number of new cables have been made up. A remote drive control station and intercom station have been located at the feed-through pad. Work is now in progress on a drive and control system test monitoring set-up to expedite drive system troubleshooting. Further plans call for the construction of a digital clock and the addition of a winch control arrangement at the scope's north lip position.

Al Hogan transferred to the 140-foot. Roy Sharp has been on extended sick leave due to complications arising from a tonsillectomy.

\*\*\*\*

Know why the cute little bee was flying with her legs crossed?

She was heading for a BP station.

\*\*\*\*

## VISITORS

Frances Copper

The following are scheduled on the 140-foot for September. The October schedule is not made up yet for the 140-foot, the 300-foot is still being worked on, and the interferometer schedule into September only lists NRAO people (beyond September, the interferometer schedule has not yet been made up).

From:

Aerospace Corp., Los Angeles	- William Wilson
Arecibo Observatory	Carl Heiles
Un. of Cal., Berkeley	C. H. Townes
Cal Tech	M. Cohen
Harvard College Observatory	J. Ball
	C. Gottlieb
	A. E. Lilley
	H. Penfield
	H. Radford
Un. of Maryland	F. Kerr
	J. Knapp
	W. Sullivan
	B. Zuckerman
M.I.T.	A. H. Barrett

\*\*\*\*

## WANT TO HELP A BUDDING YOUNG SCIENTIST?

A letter was received last month from a youngster living in the Dominican Republic. The letter was translated by Victor Herrero, basic research, and this is what the youngster wrote:

"I am a young amateur astronomer. I am very poor and I don't have any money to buy a telescope. I would like you to send me a telescope if at all possible so that I can observe the night sky. I am sure that you will not let me down.

My sincerest greetings to you all that work at the Observatory."

If anyone is interested in helping this youngster get a small telescope, see Wally Oref, room 213, Jansky Lab or call ext. 270.

SAFETY
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## Safety Committee

Following Fred Crews' article on safety in the last Observer, it was thought desirable to review available accident reports and to classify them into several general categories.

The period for which accident reports were available was from July, 1964, to June, 1970, inclusive (6 fiscal years).

The results of this review for the entire period show the following number of accident reports for the categories selected:

Involving hand tools -----	10
Power machinery or tools -----	14
Objects in eye -----	21
Dropped or other moving objects -----	14
Slips, trips, falls -----	13
Carrying, lifting or moving objects -	18
Moving heavy equipment -----	2
Burns -----	3
Vehicular -----	2
Miscellaneous -----	18

TOTAL 115

An attempt to separate these 115 accidents between "lost time" and "no lost time" categories resulted in the necessity to add a third unknown group largely because many of the reports were made out on the day of the accident and whether or not the accident belonged in the "lost time" or "no lost time" group was unknown. There was no follow-up information recorded on such accidents. However, twenty-three were definitely in the "lost time" group, and thirty-nine were in the unknown group. Fifty-three lost no time.

The number of accidents by months were: January - 8, February - 8, March - 8, April - 9, May - 12, June - 10, July - 14, August - 13, September - 6, October - 6, November - 11, and December - 10.

Of the twenty-one\* "object in eye" category, one employee (no longer employed) suffered this accident four times, two employees each twice, and thirteen individuals once each. Of the "carrying, lifting, or moving an object" group, one employee suffered "back" injury three times, one employee suffered two such injuries, and thirteen employees suffered one each.

Of the eighteen accidents put in the miscellaneous category it is interesting to note that six of these involved "walking into or bumping" stationary objects. Two accidents in this miscellaneous category involved opening or closing a door. Perhaps the most unusual was a bee sting on the hand of a painter while working.

As for conclusions, we shall permit you to draw your own. A few facetious ones might be:

1. Would it pay you to stay in bed during July?
2. Should you work with your eyes closed to avoid "object in the eye"?
3. Do too many work with their eyes closed when 33% of the miscellaneous accidents involved walking into or bumping stationary objects?

\* 18% of our accidents were eye injuries. In 1969 The National Safety Council reported that its figures showed that eye injuries made up only 4% of total injuries reported.

\*\*\*\*

N.R.A.O.R.A. STATISTICS
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(as of August 10, 1970)

Charlottesville

Family members under 18..	94
Family members 18 & over.	67
Total family members.....	161
Employees.....	109
Total members.....	270

Green Bank

Family members under 18..	255
Family members 18 & over.	197
Total family members.....	451
Employees.....	210*
Total members.....	662

Grand Total Members..... 932

\* Includes 2 retired employees and 9 contractors

\*\*\*\*



TOUR CENTER
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Claudia, Susan, and June

So far the tours have been running fairly smoothly this year. As of August 14, 1970, 12,585 people have taken the NRAO tour with all 50 states, the District of Columbia, and 13 foreign countries represented.

The most frequent suggestions by the tourists have been: have more about the Calibration Horn; to tour the electronics lab; and to have more advertisements about the tours and NRAO.

The most outstanding statements given so far have been:

(After seeing the movie but before taking the bus trip) "Will we be able to look through one of the telescopes?"

"Are the movies segregated?" (in reference to the signs directing to the restrooms which are over the door to the auditorium)

In answer to what state a couple was from - "I'm from California and she is from Kansas -- but we live together."

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SWITCHBOARD STATISTICS
------------------------

Bev. and Irene

As of May 1, 1970, a meter on top of the switchboard at Green Bank has been ticking away statistics that make you wonder why the switchboard operator still has any hair left. Look at the results after three months and tell yourself to be a little more patient the next time you get disgusted because your call doesn't go through as fast as you think it should.

MAY

# of FTS calls placed	894
# of FTS calls completed	294
# of calls on tie lines	3990

JUNE

# of FTS calls placed	1548
# of FTS calls completed	356
# of calls on tie lines	5110

JULY

# of FTS calls placed	1112
# of FTS calls completed	433
# of calls on tie lines	4621

Of the total number of calls that were placed on FTS, only about 28% were completed. This doesn't mean that the call was just forgotten about; it means that for every call you ask the NRAO switchboard operator to make for you, it takes her an average of 4 or 5 attempts before she is successful with the call.

Why does she have to try so many times? Here are just a few of the main reasons why your calls don't go through as fast as they should.

1. Noisy lines
2. Cut off
3. Can't hear
4. Doesn't ring
5. Can't get dial tone
6. Wrong numbers

All the above and many more are troubles that are beyond the operator's control. Some of the problems are local, some are within the state, and some are troubles out of state. No matter where the problem is, your NRAO operator can only report these troubles; she is not a repairman.

So if you keep getting cut off or you can't hear or so on and so on, have a little patience. She has to put up with many more calls than just yours.

\*\*\*\*

WANTED: Double barrel shot gun - 30" barrel or less - cheap. Call Jesse Davis.

\*\*\*\*

TEACHER'S COMMENT
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Mary Bridle

The people of N.R.A.O.  
Have plenty of "get up and go".  
They decided one day  
To play in the clay,  
After which they got up and went!

\*\*\*\*

KEEPING IN TOUCH WITH UNCLE SAM
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Virginia Van Brunt

Did you know that the printing presses of the U.S. Government are among the busiest in the nation? There are over 25,000 different publications currently available for sale by the Superintendent of Documents. Catalogs, price lists, and indexes to the publications enable you as a citizen and taxpayer to retrieve some of your contribution to the cost of their production. Government prices are based on cost and therefore are considerably cheaper than comparable items from commercial publishers.

The comprehensive index to publications of the Government Printing Office is the MONTHLY CATALOG, listing recent publications of the various departments of the government. This journal is available in the CV library.

However, there is a free publication entitled SELECTED UNITED STATES GOVERNMENT PUBLICATIONS which anyone may receive simply by writing to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. This biweekly publication covers a broad spectrum of subjects as demonstrated by the following items from recent issues:

Controlling the Japanese beetle. 1970. 16 pages. Al.77:159 25 cents.

Duck stamp data (a history of duck stamps since 1934) 1969. 48 pages. I49.4:111/5 30 cents.

Family food buying, a guide for calculating amounts to buy and comparing costs, 1969. 60 pages. Al.87:37 35 cents.

Folklore of the North American Indians. 125 pages. LC2.2:In25 \$2.25.

Growing ground covers. 1970. 16 pages. Al.77:175 15 cents.

Seafood moods from Alaska, Washington, Oregon. (A cookbook of delightful ways with fish and shellfish) 1969. 30 pages. I49.42/2:14 60 cents.

A survey of federal government publications of interest to small businesses. 1969. 51 pages. SBA1.18/2:G74/969 45 cents.

It is important to remember that the Government Printing Office requires payment in advance of mailing publications. However, this problem is easily overcome. Coupons can be purchased in 5 cent denominations (or 20

for \$1.00) which are good until used. Or one can prepay by check or money order made payable to the Superintendent of Documents. With so many of the publications priced at less than a dollar, a \$5.00 investment in coupons will go a long way.

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The farther South we went, while on a week-end tour of a few of Virginia's historical sites, the more prevalent the "southern draw" became. We not only found that people talked slower but their actions were in slow motion also.

About mid-morning Sunday we stopped at a discount gas station in Collinsville. Very casually the attendant strolled out to the car and, resting his elbow on the top, asked, "How much?"

He filled the tank then sauntered around and looked at the bug-covered windshield and asked if we wanted it cleaned. After answering him twice he slowly proceeded to delicately wipe the bugs and dirt off.

As he was cleaning the remains of a big "June Bug" with tender strokes, so as not to hurt the poor thing, he looked in the window and said, "Y'all must be avregin 60 or 65 miles pur hour." My husband, with a questioning look, told him that was about right.

With a triumphant look of intelligence the attendant responded, "I kin tell by tha way tha bugs are splattered!"

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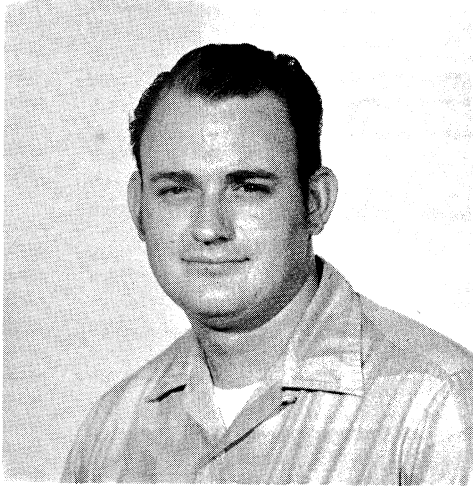
"Not only will men of science have to grapple with the sciences that deal with man, but - and this is a far more difficult matter - they will have to persuade the world to listen to what they have discovered. If they cannot succeed in this difficult enterprise, man will destroy himself by his half-way cleverness."

Bertrand Russell

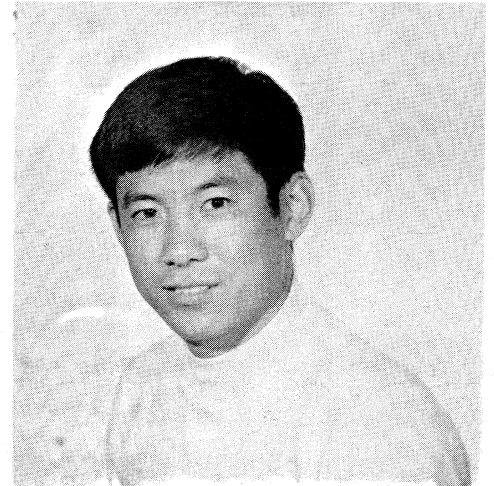
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NEW EMPLOYEES

Beaty Sheets & Mary Ann Starr



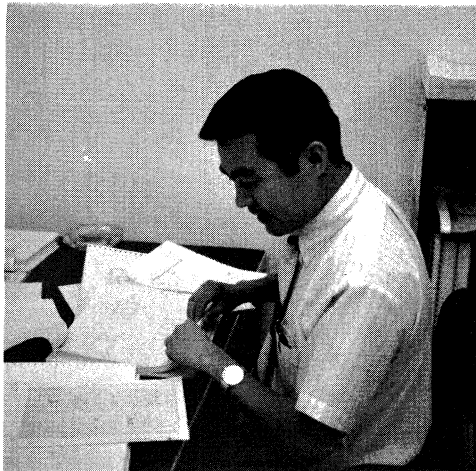
Gene



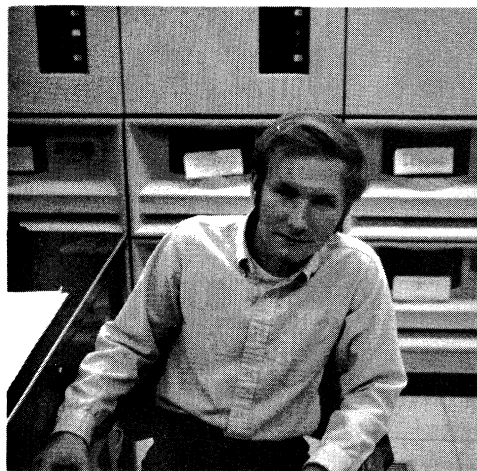
Chung

TUCSON

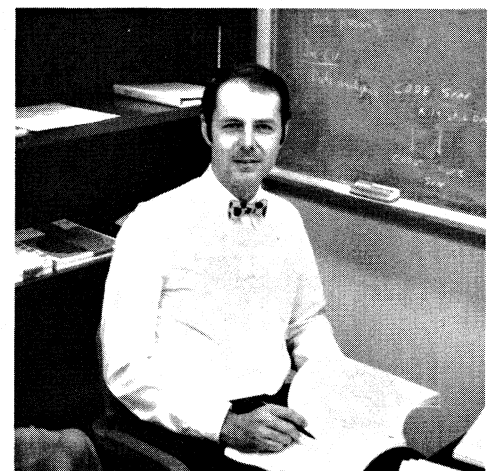
- \*\*\* Eugene E. Wetmore
- \*\*\* Chung Woo Nam
- \*\*\* Charles E. Lipscomb  
(sorry, no photo)



Collins



Greg

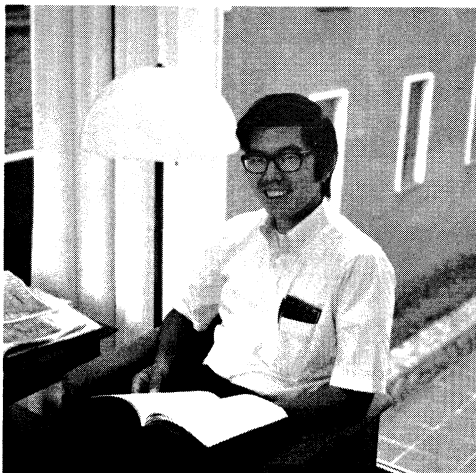


Charlie

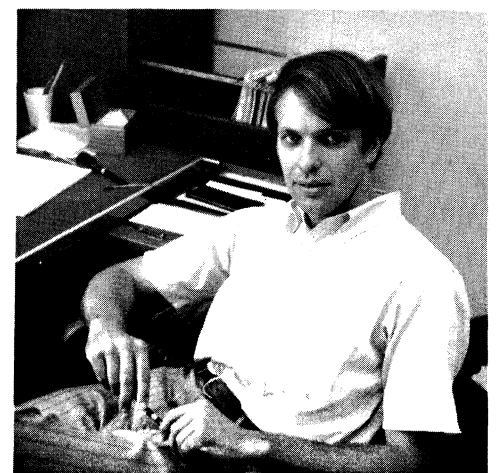
CHARLOTTESVILLE

- Engineering
- \*\*\* Collins Yang
- Computer
- \* Gregory A. Shoemaker
- \*\*\* Charles H. Moore, Jr.
- \*\* John W. Johnson (no photo)
- Basic Research
- \*\*\* Dr. Eugene H. Tademaru
- \*\*\* Dr. Richard Sramek

(cont. on next page)



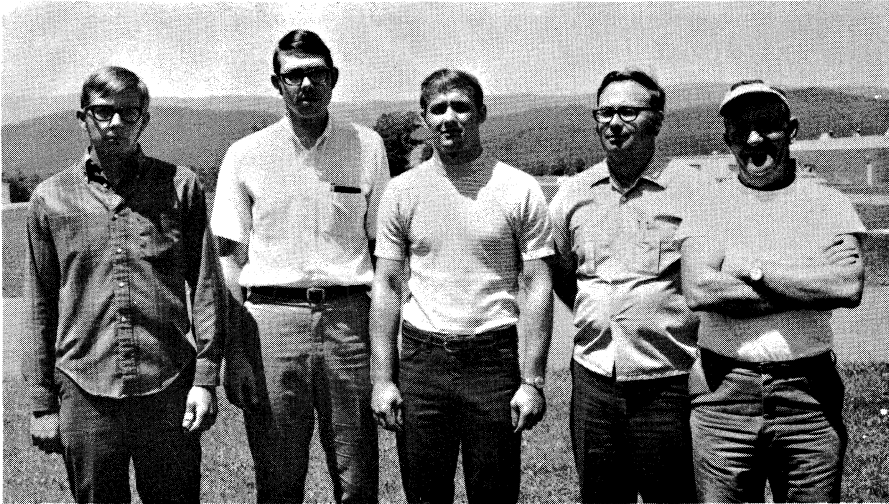
Dr. Tademaru



Dr. Sramek

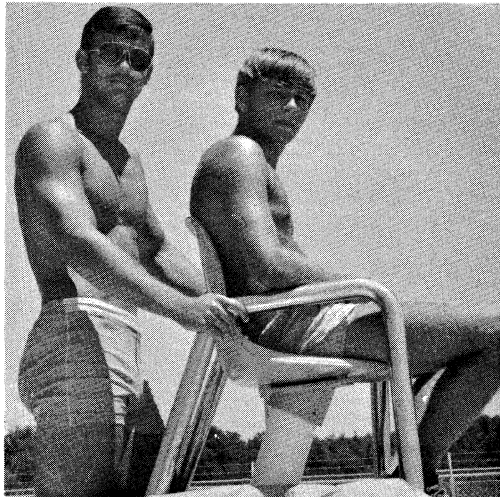
NEW EMPLOYEES  
cont.

GREEN BANK



(left to right)

- \* Charlie L. Montgomery - Maintenance
- \*\* Dr. Stanley D. Shawhan - Basic Res.
- \*\* Robert A. Crist - Electronics
- \*\*\* William F. del Giudice - Engineering
- \*\*\* Leroy Gene Moyers - Maintenance



- \*\* Larry G. Wooddell - Adm. Services
- \*\* Michael L. Anderson - Adm. Services

- \* Part-time Employees
- \*\* Temporary Employees
- \*\*\* Permanent Employees

TERMINATIONS

- Richard W. Bloomingdale
- Harold W. Brooks
- Edward B. Churchwell
- Robert A. Crist
- Christopher T. Day
- John S. Gallagher
- Juan C. Gonzalez
- Fred R. Green, Jr.
- Melvin G. Honaker
- W. Bruce McAdam

- Peter G. Mezger
- Jesse L. Peck
- Bengt A. Pettersson
- Arnoldus H. Rots
- James W. Simmons, Jr.
- Betty S. Smith
- Lewis C. Snyder
- Alan E. Sonnanstine
- Jorn Wink
- Cary A. Young

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PLANETARIUM DIRECTORS VISIT

Wally Oref

On August 8 a group of thirty planetarium directors were given a special tour of the National Radio Astronomy Observatory. They were from the University of Maryland where they were participating in the Cooperative College Program for Planetarium Directors sponsored by the National Science Foundation.

Part of their training in this program included designing planetarium curricula and student workshops. For the most part this training has been optical oriented and very little in the way of radio astronomy was included in any planetarium curricula or student workshops. Hoping to bring more radio astronomy into their planetarium programs, the planetarium directors came to the National Radio Astronomy Observatory with the purpose of learning first hand about radio astronomy, radio telescopes, and the Observatory.

The special tour included the introductory radio astronomy movie, "The Observatory", a tour through the electronics lab, and a site tour with visits to the 2-foot, 140-foot, and interferometer radio telescopes. After the site tour the planetarium directors and visiting and staff people met in the cafeteria for a "coffee and rolls" half-hour. During this time questions on radio astronomy were answered and discussed. The highlight of the "coffee and rolls" half-hour was the discussion about developing a radio astronomy planetarium. Surprisingly, there was a lot of interest shown among planetarium directors to look into possibilities of such a planetarium.

Gart Westerhout arranged the special tour for the University of Maryland. Bill Brundage, the principle tour guide, did an excellent job explaining the National Radio Astronomy Observatory, radio astronomy, and the telescopes. He was ably assisted in the lab tour by Richard Fleming and Craig Moore. Dick and Craig also went on the tour and helped answer questions. During the "coffee and rolls" half-hour, Messrs. Westerhout, Hvatum, Weinreb, Fleming, Brundage, Moore, and Oref made themselves available to answer

questions on radio astronomy and to present ideas about how to develop and build a radio astronomy planetarium.

After the enthusiasm shown on August 8, we are hoping for a radio astronomy planetarium seminar to be held at the National Radio Astronomy Observatory.

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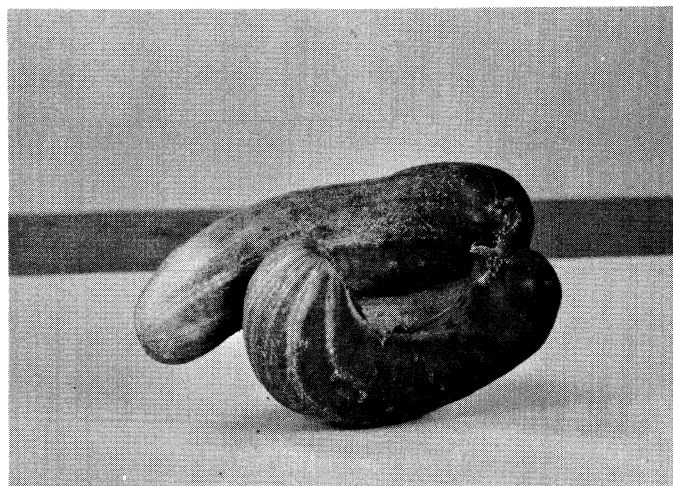
FOR SALE

1968 VW 1500 - Excellent condition -  
Sun roof and removable  
headrests -  
Reasonably priced

Contact: Jorn Wink CV Ext. 340  
or  
Neil Albaugh CV Ext. 325  
or  
Jon Spargo GB Ext. 294

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FACTS FROM FISCAL\*



Siamese Cucumber

\* Researched and grown by the NRAO Fiscal Division

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## REFLECTIONS &amp; COMMENTS - NRAORA

Jon Spargo

For the three years that I have been employed by N.R.A.O., my concept of our Recreation Association has gradually changed from one of pure complacency to one of cautious activism. My initial contacts with it were of the nature of attending some events and passing others by. But, as time wore on, I began to discover the potential of this organization. Now as I enter my fourth year at N.R.A.O. I find myself as the president of it. As the many activities of the R.A. became known to me I began to indulge in the pastime of keeping my eyes and ears open to matters concerning it, which has had some startling results. So, at this point, I would like to pass along to you some personal observations about what I heard, saw, and learned about its operation, along with some comments on its future.

As we all know, the idea of a recreation association or similarly named activity is not a unique one, as it is an almost standard practice throughout industry. What sets ours apart from many others is the conditions under which we have to operate. This is due, of course, to the relatively small size of our place of employ and the fact of our relative isolation, which sets it up as one of the few sources of organized recreation. This last statement also serves the purpose of setting limits within which it must operate. On one hand it tells us that we most definitely need some sort of organized recreation and on the other it says that because of our size we will, of course, have limits to what we can do financially. At first glance this seems to put considerable restrictions on what we can and cannot do. However, I maintain that in spite of this seeming restriction, and that within reason, we should be able to accomplish just about anything we want to do. Right away several questions will pop up. How can we do it? Does this mean that the R.A. has been dragging its feet in the past? Or, will the "I don't give a darn" disease keep us from ever doing anything worth while? To answer these and many more questions that are bound to arise, I think it will be instructive if

we review some of the past happenings and attitudes concerning the R. A.

If you were to ask the average employee at N.R.A.O. the question, "What has the R.A. accomplished in the past few years?", I think you would be amazed by his answer. That answer would probably sound like, "Oh, not very much; they have a few dances and I guess they help with the picnic each year and I guess that's about all.". Sounds familiar doesn't it? Well, what has the R.A. accomplished? Let's list a few things, shall we? We now have facilities for swimming, tennis, basketball, handball, volleyball, badminton, softball, miniature golf, golf driving, regular golf, skiing, ice skating, picnicing, playground equipment, horseshoes, rifle range, croquet, archery, pottery, pocket billiards, ammunition reloading, and a nice place to just plain loaf. In addition, we provide swimming lessons, 3 to 5 dances each year, between five hundred to one thousand dollars worth of gifts and prizes to members each year, a picnic for all members, a Christmas party for the children, pool parties, soda, candy and cigarette machines around the site, fuel oil for the library in Green Bank, sell post cards and brochures to the tourists, intramural softball and basketball, and probably some other things that don't come to mind at the moment. Now, in return what do you suppose we receive the most of? Well, I'm sorry to say, it's complaints, and from all sections of the local totem pole. The one interesting thing you discover about most of them is that the majority of them are unfounded because someone was misinformed because some special interest wasn't served and so on. The prevalent attitude seems to be that the things that are provided for members are part of some hard and fast obligation, sort of the "Well, here I am, now provide me with some recreation." attitude. When things don't magically appear out of thin air the buck gets passed to the management, or the R.A., and then back to the employees for not giving a darn about the facilities already provided on the "You don't use what you have now so why should you get more?" basis. Of course the natural battleground for all this is the R.A. Board of Directors. And so, just as whatever it was that didn't magically appear out of thin air, a controversy surely does. This then has several effects, very few of

(cont. on next page)

which are beneficial. One: The R.A. loses support because of the feeling that we can't accomplish things or from the attitude that whatever we as employees want, management will do what it wants to anyway. Now the "I don't give a darn" disease has really set in. The next step is that we can't get anybody to run for the Board of Directors and that those that do usually back out after a year, no longer wanting to put up with it all. Second: If enough of a noise is heard maybe something will get done. Unfortunately when this happens and gets some results there is always the temptation to use the same method again, which is a habit I'm afraid we've begun to acquire. Thirdly: Many of these things could be resolved easily, if not prevented outright, if we stopped to think about the limits of what we can do and take the trouble to inform each other of these limits.

Well, inspite of all this, things do get done and those that make use of the facilities available do usually manage to have a good time. So why all the fuss? Well, principally because there is such a large potential for the R.A. that I think it unfair to let it pass unmentioned. A giant step was taken in this direction when you as members voted to do away with our old dues-paying system and let the Observatory handle the lions share of the financial burden. Contrary to the grumbling I've heard, this does not automatically make the R.A. ineffective neither does it give management free reign to do what it wants in the sense that it can ignore what the employee wants in the way of recreation on the theory that management always knows what's best. What it does do is this. It shows that management is more than just casually interested in employee welfare in that it is willing to absorb the major portion of the cost for recreation. It also provides for greater flexibility in that we will be able to plan further ahead with the assurance of backing. The question is, "Can it work this way?". The answer is no if we continue with present attitudes; if we fail to communicate; if we fail to recognize each others responsibilities and needs; if we sit back and let the "I don't give a darn" disease take over. If you want the answer to be yes then I submit that the following things must be done by both management and employee in order that things are accom-

plished in an orderly and mutually satisfying manner.

1. The employee must realize that work comes before play in that things we want accomplished take second priority.

2. A giant stride in mutual understanding could be taken if there was a wider representation on the Board of Directors. This should include some of the scientific staff as well as perhaps someone from the management side of the fence to contribute ideas to the pot. This also means that these people must step forward and be available if asked.

3. In addition, it would help if members were willing to show up at meetings to contribute constructive ideas. This is something which has rarely happened in the past.

4. It would also help if, for matters concerning recreation, we adopt a method of planning for our needs instead of reacting only to whatever happens to be pressing at the moment. We wouldn't think of building something like a telescope without detailed planning. Why can't we apply the same to a long range and yet very realistic plan for the Rec. Area, for example?

5. When things are installed for use by members we should pursue an active plan of maintenance in that we should see that things not be allowed to fall into a complete state of disrepair before we notice it and try to fix it.

6. When things have to be done on a moments notice we should take pains to inform others and explain why it was done.

7. When rules are made we should all abide by them instead of trying to find the easiest way around them or to ignore them, thus setting a bad example. In addition, if rules are questionable, the Board of Directors meetings should be the place to bring these questions up.

8. When restrictions are placed on the R.A. by management as a matter of policy, management should present this policy at the earliest possible date and in the most unambi-

(cont. on next page)

guous, complete form possible so that one and all have a clear understanding of what can and cannot be done.

9. All things concerning recreation should, before being acted upon by anyone, be funneled through the R.A. Board of Directors, to become a matter of record, so that none can complain of behind the back dealings or corridor politics.

In conclusion, I would like to say that it is obvious, to me at least, that all the elements are certainly available for a very workable and active program. All that needs to be done is for each of us to bury whatever hatchet we are carrying now, roll up our sleeves, step forward, and make the program work.

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HAVE A BALL WITH THE BOWLERS

Robert Eskanazy

The NRAO Bowling League will start the new season on September 15 and we are anticipating another great year of fun and bowling excitement. There will be six teams with three or four bowlers on each team and this year we are trying to establish a better balance in average on each team. The league representatives for this year will be:

President - Bernie Pasternak  
Vice President - Art Shalloway  
Secretary-Treasurer - Bob Eskanazy

As in the past we will have people participating who have never bowled before. It is most rewarding to see these people learn the game and come to enjoy the competitive team spirit of one of America's most popular family sports.

Last year was the year of the underdog in the world of sports, as was evident with the New York Mets winning the World Series. This was again proven when the team headed by the Taco Kid (Neil Albaugh) and his Mescaleros (Shelton Reid and Jorn Wink) moved from last place to first and finished with a fantastic three game set. I am sorry that Jorn, who played a great part in winning the

Mescaleros' first place, will not be here this year to bowl with us. Good luck to the Winks!

The League ended on a grand note with a bowling banquet to honor the winners and the players showing outstanding improvement throughout the year.

There is still plenty of time before the League starts for all those reluctant to bowl to add to the fun. If you are interested in bowling with us, please contact me. Any Green Bank employees who are in Charlottesville Tuesday nights are most welcome to join us--we welcome both participants and spectators.

Again I want to add my thanks to all our members, both regular and substitute, who have made the NRAO Bowling League a complete success for the past two years.

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IAU MEETING

Beaty Sheets

Astronomers from Green Bank attending the International Astronomical Union meetings in Brighton, England, and the IAU Symposium on Galaxies and Quasars in Uppsala, Sweden, during August are: Drs. Morton S. Roberts, K. K. Kellermann, M. M. Davis, and S. von Hoerner. Two of our recent visitors, Drs. Alan Bridle and Gert Westerhout are also attending the meetings.

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Overheard at a high level astronomical meeting:

Astronomer Orion: Do you know what moonlight is?

Astronomer Nebula: Sure, that's the sun's other job.

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"WAIT UNTIL NEXT YEAR"

Joanne Nance (A Fan)

Again this summer NRAO fielded a slow-pitch softball team in the University of Virginia Intramural Summer League. This league consisted of two divisions with teams representing various departments throughout the University.

By finishing with an overall record of 3-5 and placing 5th in a field of 13 teams, NRAO experienced a more successful season this year. During the regular season our team posted a 2-4 won-lost record with wins over the History and Psychology Departments. Three of the four losses were by close scores: 2-1 (against the second place team), 1-0 (against the first place team), and 7-6 (in extra innings). Following the regular season a single elimination play-off was held in which the NRAO boys scored a decisive 10-0 victory over the U. Va. Medical School before losing out to "the Cadavers" (another Medical School team).

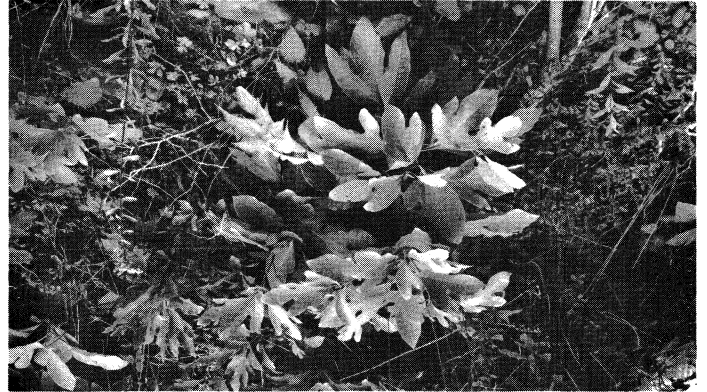
This year's team was organized by summer student Ken Braly, who served as player-captain. The team was composed of the following pictured left to right: Front row - Fred Green, Fred Rosenberg, Gary Born, Paul Hemenway, Dan D'Ippolito. Second row - Bill Peters, Bob Schommer, Ed Churchwell, Dave Neuffer, Ken Braly. Third row - Fred Showalter, Charlie Pace, Russ Bosserman, Bob Eskanazy, Al Sonnanstine, Ted Williams. Not pictured - Jack Cochran, Bernie Pasternak, Bill Meredith, and Bruce Balick.



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WILD MOUNTAIN SASSAFRAS TEA

"The Old Dirt Dobber"



Tea from mountain sassafras root has long been a favorite drink of mountain folk. Many old timers say its good for thinning the blood in the spring. Others say that it helps calm frayed nerves, perks up a tired body, and is good for keeping one lean and mean. I am making no claims for such powers, but I do say that wild, sassafras root tea properly prepared does make a delightful drink.

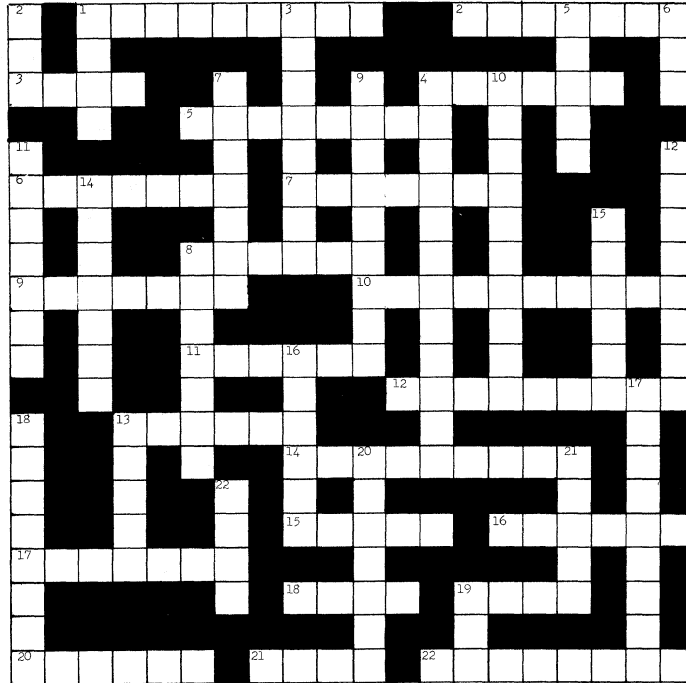
Experience a new drink! Have someone show you sassafras growing in the wild. It grows everywhere in Pocahontas County and is easily identified. (See photo) If you are really interested, come see me, "The Old Dirt Dobber", and I'll show you a plant or two. A "matic" or pick is good for digging roots.

How to make sassafras tea the mountain way: Place six or seven, four-inch pieces of sassafras roots into a pan containing seven to eight cups of water. Bring to a boil and boil for 20 - 25 minutes. Discard this brew but save roots. This first brewed tea is strong and has a woody taste which is removed with the first boiling. Add the same amount of water as before to the pan with the roots. Boil until water takes on a pleasing reddish color -- about 20 - 30 minutes. Serve as you would ordinary teas.

Don't throw the sassafras roots away! Sassafras gives up its flavor very slowly and the same roots can be used many times. Mountain people have a pot of sassafras tea brewing all day long. Once the first batch is made they continually add water as they remove tea for drinking, and keep the pot simmering. Oh yes, it makes a good cold drink, too.

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## EMPLOYEE CROSSWORD



The above crossword puzzle is composed of the last names of employees or scientists working closely with NRAO at Green Bank, Charlottesville, and Kitt Peak. Remember, this is the work of an amateur, so think simply. The clue may refer to the first or last name but always insert the last name. (Answers on page 23)

## ACROSS

1. "Buster Boy"
2. migrated North
3. one is tall and blond; the other is short and dark
4. red and white truck
5. their first names rhyme
6. Tucson employee
7. You do this for apples.
8. The eighth for the widow next door.
9. "A drop of golden sun"
10. husband and wife
11. intoxicated male
12. "I came back!"
13. weatherman
14. a male deer
15. one of England's kings
16. Pepperel, Cannon, Dan River
17. misspelled scavenger
18. deteriorates
19. something you do before an exam
20. D. W.'s brother-in-law
21. She really isn't one.
22. liquid for drinking

## DOWN

1. If something isn't wight, it's \_\_\_\_.
2. secretary
3. happy water hole
4. flowering valley
5. PHD from MIT
6. retired
7. He used to be a Boyscout Master.
8. six-shooter
9. He can't keep up with the "time".
10. profile of Scrooge McDuck
11. visiting scientist
12. male cat
13. has the same first name as a female singer
14. "I'll meet you half way."
15. small W. Va. town
16. telescope operator
17. brand of floor covering
18. "Uum good"
19. soft spoken electronics engineer
20. another name for an "outhouse"
21. good looking co-op
22. His first name is part of a car.

CLAY DAY

Perryn Fleming & Jean Davis

(A) On July 22, 1970 - henceforth known as "Clay Day" - Mary Bridle conducted a free pottery workshop for kids and adults under the auspices of the NRAORA. Mary is a potter by avocation (an occupational therapist by profession) who was in Green Bank with her husband, Alan, a visiting astronomer from Kingston, Ontario.

(A)



(B)



(B) The kids came first. Working diligently and noisily they made thumb pots and coil pots and objects d'art of their own design. The "Clay Day" clay came from a clay bank on Johnnie Hill's Farm in Hillsboro, W. Va. It is a warm brown color and has very fine texture.

(C)

(C) Enthusiastically the kids returned for "Glaze Day" July 28. By then their pots had been bisque fired and were ready for glazing. They applied coats of brushing glaze and the pots were again ready for firing. The kiln, the potter's wheel, and all the other equipment used for the "Clay Day" cycle are the property of the NRAORA and are housed in the Arbogast House on the site where all this activity took place.

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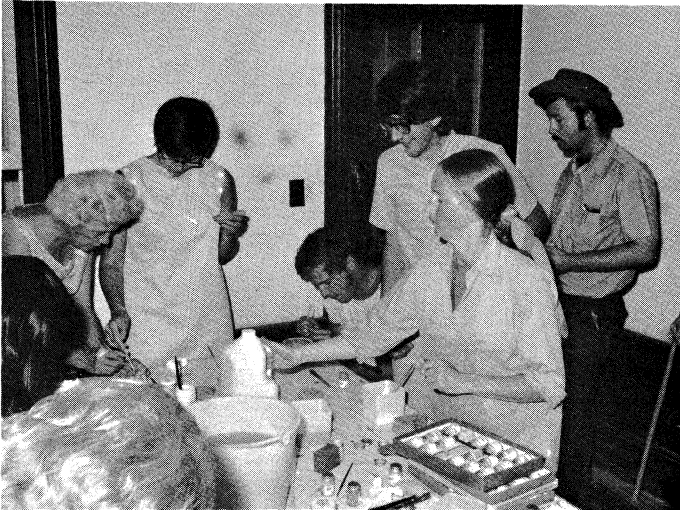


(D) The adults assembled on the evenings of July 22 and 28 and followed much the same procedure as the youngsters. Near the end of the first evening, Mary demonstrated how to "throw" a pot on the potter's wheel. Under her tutelage Mike Allen, a summer student, succeeded in producing quite an acceptable artifact on his first try.

(D)



(E)



(E) When it came to glazing their pots, for the most part, the adults used underglaze for design and color, followed by transparent glaze. This allowed the very agreeable natural color of the clay to show through after the final firing.

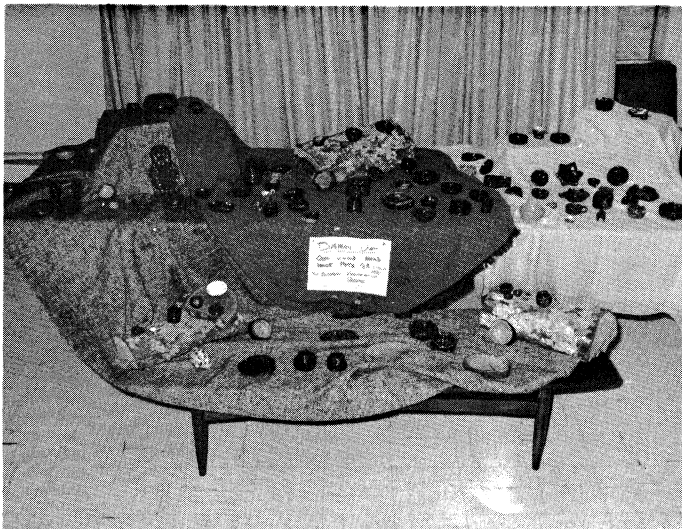
(F) After "Clay Day" the pots were bisque fired, after "Glaze Day" they were glazed and then when the kiln cooled down it was "Display Day" - July 30. The display was set up in the Residence Hall foyer. The accompanying sign read -

(F)

GEN-U-INE HAND MADE POTS  
G.B. (CIRCA 1970)  
By authentic Appalachian Potters



(G)



(G) Some of the older, more morose among the "Authentic Appalachian Potters" wondered if shards of their "authentic Appalachian Pots" might not be discovered long after their last scientific discoveries had faded into oblivion. Generally, however, people took a simpler view and were well pleased with what they had created step by step from the clay dug by Johnnie Hill two weeks before.

WHITE PINE BLISTER RUST CONTROL

Delbert Gillispie

If you've driven or walked through the woods of Pocahontas County you probably have seen or come upon long lengths of white, kite string draped over bush limbs and around tree trunks. Closer examination leads one to suspect these lines of kite string are outlining or marking something. Delbert Gillispie, Project Leader of the White Pine Blister Rust Program, tells us that the kite string is outlining areas within which ribes have been eradicated in the Blister Rust Control Program. Read on as Delbert tells us something about his program.

In Europe about 1865 it was discovered by foresters that a certain ailment of the 5-needled pines was found only when ribes bushes (currants and gooseberries) were growing near the pines. Studies were set up, but no concentrated effort was made at that time to do anything to control the disease.

About 1900 the disease was found in upper New York and had by that time spread to other locations throughout the country.

Blister Rust is a fungus disease that requires two host plants - white pine and ribes. It spreads from white pine to ribe bushes and then from the bush back to the pine. The life cycle of the disease can be broken though, by removing the alternate host plant which is the ribe.

Until five years ago, the White Pine Blister Rust Control project was administered by the Division of Insect and Disease Control, a division of the United States Forest Service. West Virginia allocated a portion of the funds to operate the program on state and private land, with the Forest Service paying in full for the work performed on Federal land. On January 1, 1966, the whole project was transferred to the State Department of Agriculture, which allocates on a matching fund basis with the Forest Service for the operation of the program.

The project is still operated by the guidelines established by the Division of Insect and Disease Control, and reports have to be submitted periodically.

Records are carefully kept of all acreage worked, examined, and mapped, with the

man hours spent charged to each separate pine area. Separate records are maintained for the work performed on land owned by the Forest Service, for the state is reimbursed 100% for that work.

Since the early days of the project, the pine areas of the state have been located by aerial photos, field checking, reconnaissance reports from other agencies, etc. The pine areas were then cruised or sampled to determine the amount of white pine in each area. Plantations were also checked. All white pine that met the set standards became a part of the Status of Control records.

After the pine area is located on the map, a protective control boundary is established, thus giving us the pine acreage and control acreage. A control zone of at least 300 feet is established around the pine. In some places a wider control boundary is needed, depending on several factors.

A new evaluation system has lately been instituted that takes into consideration site, age of stand, cost of control versus value of the volume saved, and the amount of recent infection. If this system had been used previously, areas in some counties that were not reproducing would never have been set up for work.

In determining those areas where ribes should be removed, priority is given to plantations, stands with esthetic value, and young pine growing on good sites.

In the early days of the Blister Rust program, ribes were removed by hand by large crews which moved over areas in close formation. Today, chemical spraying is performed by smaller crews. This work is performed during the spring and summer months. Since eradication cannot be performed during winter months, this time is spent mapping new pine areas, bringing control records up to date, and checking all proposed planting sites.

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NOTICE: NRAORA is trying to form a bowling league and would play games at the Elkins bowling alley. If anyone is interested in bowling, please contact Ken Anderson, ext. 340. It is understood that there will be transportation available from Green Bank to Elkins.

SIXTEEN TONS AND WHAT DO YOU GET?
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Wally R. Oref

Let's jump back a few years to August, 1956. A consulting geologist's report reads in part: "Deer Creek Valley, proposed site of the National Radio Astronomy Observatory, is underlain by Monongahela Series of the Pennsylvanian period. Flat lying sedimentary formations consist essentially of sandstone, shale, limestone, and one thin bed of coal at an average depth of 75 feet. Coal does not appear to be of commercial quantity or quality but may be stratigraphically related to Pittsburgh Vein. Test borings at telescope sites show alluvium to 15 feet and bedrock at 20 feet. Average depth of test holes, 36 feet." And the report closes with this sentence: "Subsurface mineral rights are owned and retained by the Fast Buck Realty Company, Minneapolis, New York.

1957 - 2700 acres of Deer Creek Valley is acquired by the Corp of Engineers on behalf of the National Science Foundation and U. S. Government for site of the National Radio Astronomy Observatory. All land deeds seem standard and include this provision: Subsurface mineral rights are owned and retained by the Fast Buck Realty Company of Minneapolis, New York.

1971 - Business periodicals report economic outlook is bleak because of critical shortage of coal for power and steel. Search for coal reserves at the highest level in country's history.

Same time - a young coal geologist is studying over one of his companies' maps. The geological map he is studying shows an outcropping of coal in Deer Creek Valley, Pocahontas County, West Virginia. Checking through the files he finds a copy of a geological report on Deer Creek Valley area. The report he reads says that the coal formation was less than three feet thick. Perhaps, he thinks, this was an average thickness over an area where the coal was thinning. Possibly the vein might thicken considerably to the west and be of commercial quantity and quality.

Our young coal geologist convinces top brass of Fast Buck Realty to go into Deer Creek Valley and core drill 25 holes to 100-foot depths to see if coal formation thickens and is of commercial potential. Rigs move into the valley and find that coal seam does

thicken to the west - in the direction and vicinity of the National Radio Astronomy Observatory. Furthermore, correlation of well logs show that a gentle anticline brings the coal formation to within 40 feet of the surface just west of the old Green Bank High School and additional drilling in a line parallel to the 5000 foot interferometer base line reveal coal formation 6 feet thick and of metallurgical grade. Estimated value of coal underlying N.R.A.O. and Deer Creek Valley is about 10,000,000 dollars.

1972 - Head lines in Pocahontas Times: "Stripping Operations by Fast Buck Realty Co. begin in Deer Creek Valley. NRAO Site and Telescopes in Path. NSF and U. S. Government Powerless to Stop Mining." Reading the text of the story reveals why stripping couldn't be stopped. The standard deed read in part: "There is excepted and reserved all coal and other minerals, together with the right to enter upon and under said lands and to mine, excavate and remove all of said coal and other minerals from and under adjacent and neighboring lands, and also the right to enter upon and under said granted lands and make and construct all necessary structures, railroads, roads, ways, excavations, air shafts, drains, and openings necessary or convenient for mining and removal of the said coal and other minerals from adjacent and neighboring lands without being liable for any injury or damage done thereby to the overlying surface or to anything therein or thereon, or to any water course therein or thereon. There is also in like manner excepted and reserved the right to take and use so much of the surface at and around each mine or opening, or at convenient places, which said companies may need for the mining of coal and other minerals as may be necessary or convenient for such purposes, including land upon which to construct tipples, tracks, coke ovens, miners' houses and all other structures necessary for the mining and removal of said coal and minerals."

The above is fiction, of course, but for real such mining clauses are permitting large corporations to rape our national and state forests and farm lands in the East. The Mining Law of 1872 permits the same thing to be done in the West. Is it fiction what is happening to the Cheat Mountain area in our Monongahela National Forest today?

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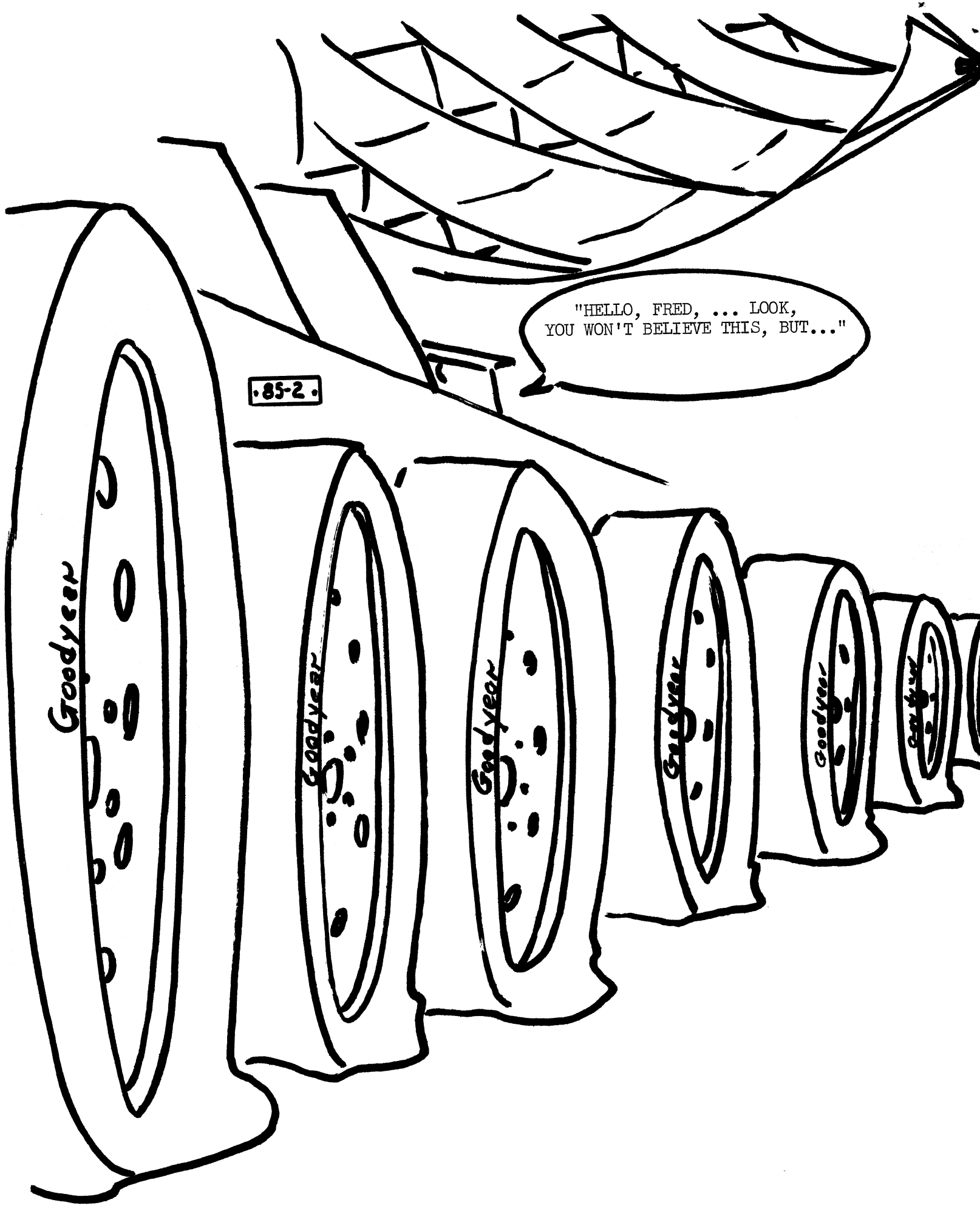
## ANSWERS - EMPLOYEE CROSSWORD

ACROSS

1. William "Buster" WAYBRIGHT
2. Richard FLEMING
3. Ron and Wendell MONK
4. Omar BOWYER
5. Harry and Larry WOODDELL
6. Robert ELLIOTT
7. Bob ELLIOTT
8. Henry TAYLOR
9. Ray HALLMAN
10. Barbara and Richard MANCHESTER
11. Elaine LITMAN
12. Bernie PASTERNAK
13. John WEAVER
14. "Buck" CARPENTER
15. George MILEY
16. Beaty and Jamie SHEETS
17. Russ BUSSARD
18. Arnold ROTS
19. Thomas CRAM
20. George LIPTAK
21. Toby MANN
22. French BEVERAGE

DOWN

1. Woon Yin WONG
2. Janne LIM
3. Tilden GLADWELL
4. Richard BLOOMINGDALE
5. Dr. Littleton MEEKS
6. Merritt GUM
7. Jack COCHRAN
8. Harlan "Pistol" TALLMAN
9. Ken KELLERMANN
10. Gart WESTERHOUT
11. Stanley SHAWHAN
12. Tom DUNBRACK
13. Peggy WEEMS
14. James GARLAND
15. John SUTTON
16. Eugene MARCUM
17. Pat ARMSTRONG
18. William CAMPBELL
19. Jim COE
20. John RALSTON
21. John RIEHM
22. "Cam" WADE



.85-2.

"HELLO, FRED, ... LOOK,  
YOU WON'T BELIEVE THIS, BUT..."

Goodyear

Goodyear

Goodyear

Goodyear

Goodyear

Goodyear