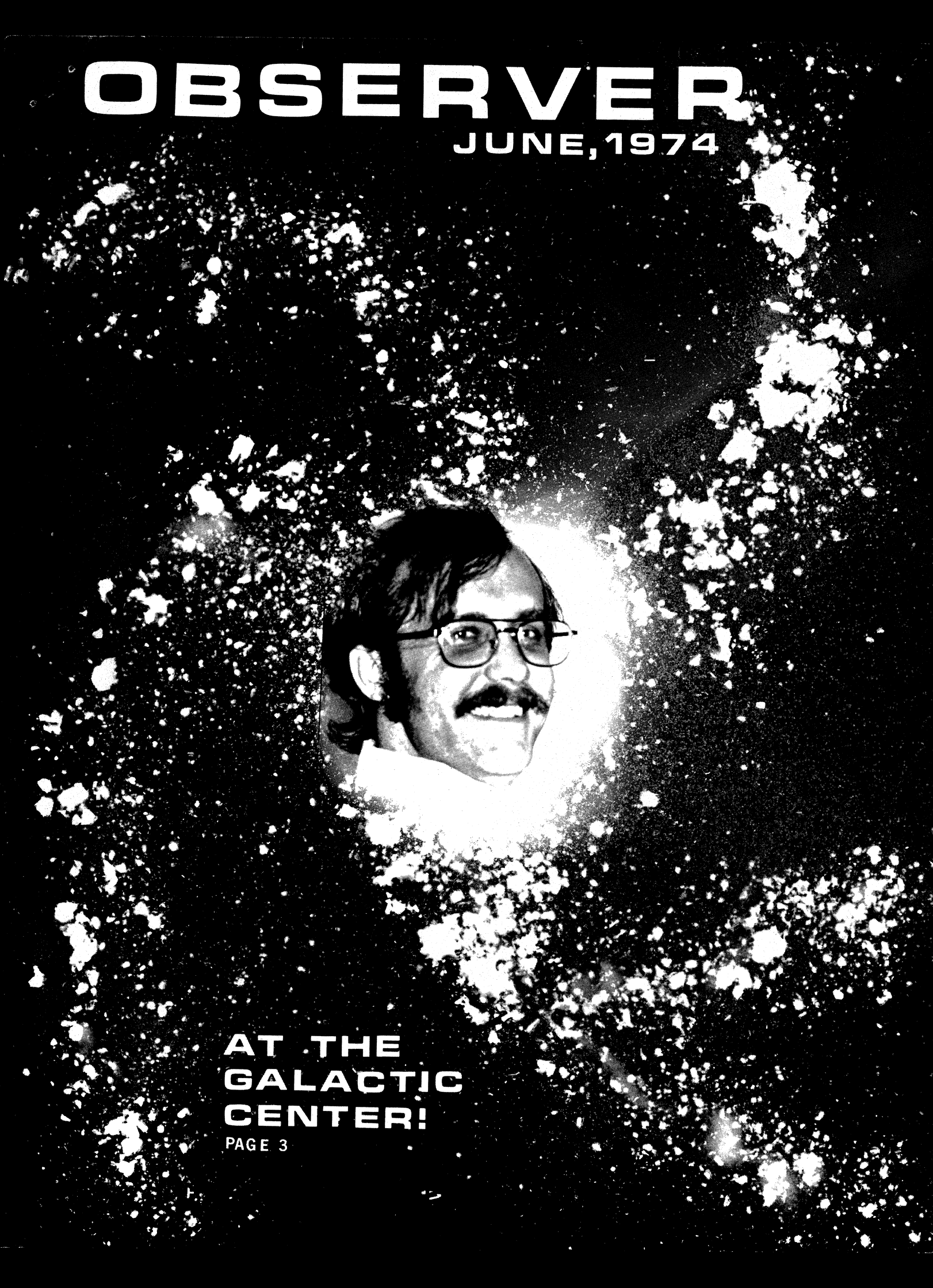
OBSERVER

JUNE, 1974



AT THE GALACTIC CENTER!

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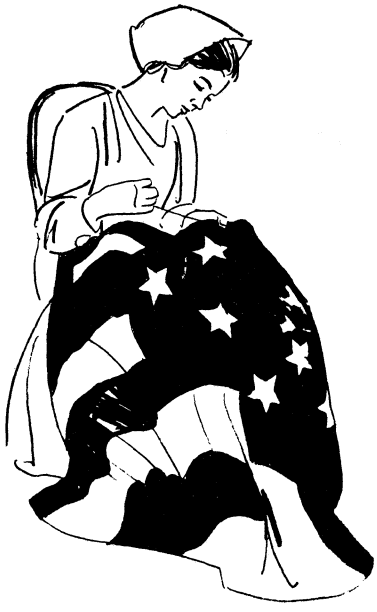

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THIS MONTH'S COVER: Bob Sanders, always where the action is, takes us on a trans-stellar journey to the center of our galaxy beginning on page 3. According to Bob, having all those arms is a distinct advantage for molesting the waitresses at the Mousetrap.

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

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THE CENTER OF THE GALAXY: BAR OR QUASAR?

Bob Sanders

About 15 years ago Dutch radio astronomers made a most perplexing discovery: a large amount of gas in the form of neutral hydrogen is apparently flowing out of the central region of our Galaxy with high velocity. This was surprising because we would expect that the gas near the center would be moving about the center in circular orbits just like the gas in the vicinity of the sun; or at least, the deviations from pure circular motion should be small.

The outflowing gas seems to be distributed in two arm or partial ring-like structures. These two arms or partial rings are (see Figure I) moving away from the center with velocities of 53 km/s and 135 km/s respectively. They are between 2000 and 4000 kiloparsecs from the center and have a total neutral hydrogen mass of more than 10 million solar masses. The kinetic energy of the outflow is between 10^{53} and 10^{54} ergs - 100 times larger than the total energy released by supernovae explosions (i.e., exploding stars).

The discovery of numerous molecular lines in the direction of the center has led to the conclusion that there are also large deviations from circular motions in the inner few hundred parsecs of the galaxy. Formaldehyde absorption maps indicate the presence of an expanding ring-like feature of dense gas clouds 300 parsecs from the center. The non-circular or expansion velocities in this ring are as high as 130 km/s. Recently, carbon monoxide observations of the galactic center made with the 36' at Kitt Peak have revealed molecular clouds with non-circular velocities as high as 170 km/s.

These observations of non-circular gas motions in the direction of the center are highly significant. Similar deviations from pure circular motion have been observed in the nuclei of other normal spiral galaxies - in fact, it seems to be a general property of the nuclear regions of galaxies. In more extraordinary galaxies, such as Seyfert gal-

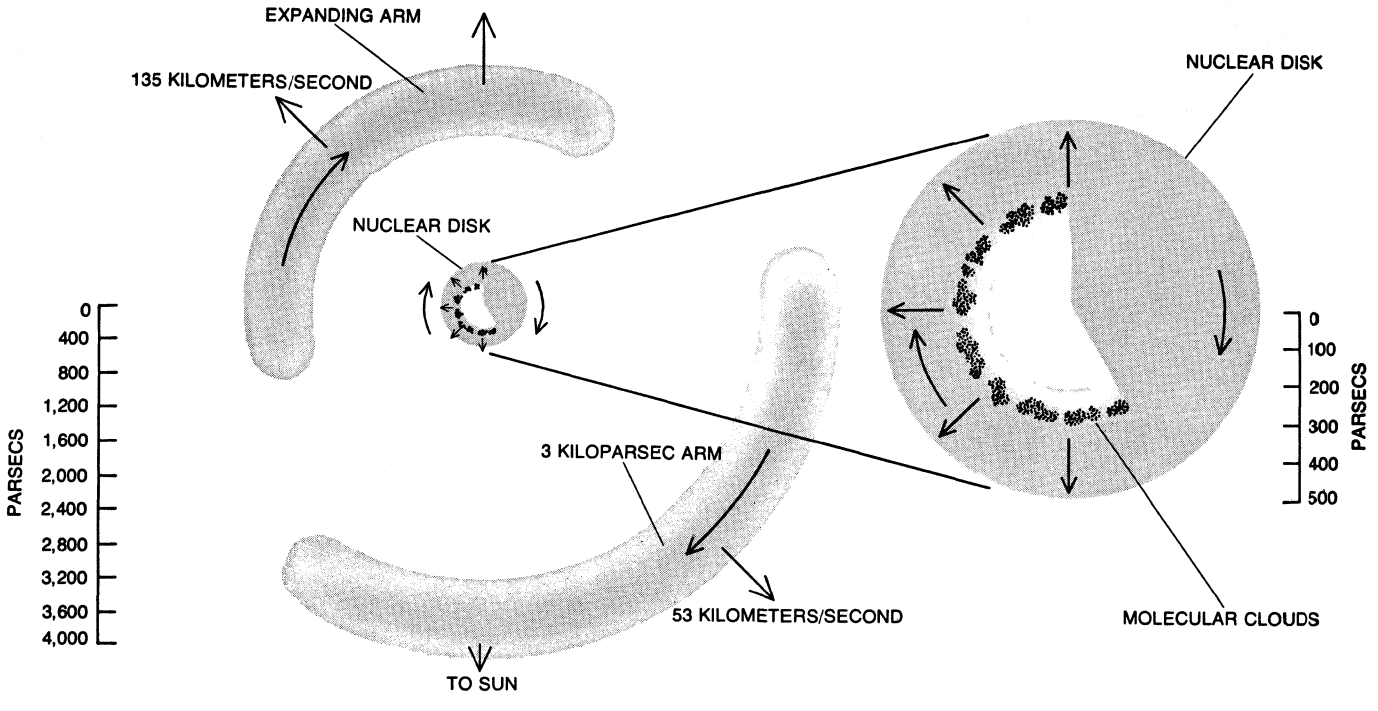

Figure I. Current Picture of Galactic Center

axies, the non-circular velocities may be very large (thousands of kilometers per second) and are probably due to energetic events or explo-

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sive events, qualitatively similar to those occurring in Seyfert galaxy nuclei. The non-circular gas motions in the so-called normal galaxies are less violent either because the activity in normal galactic nuclei is less energetic - or the explosions occurred sometime in the past and we are now just observing the remnants of that previous nuclear activity, i.e., the gas near the center is still sloshing around from earlier explosions.

Numerical hydrodynamical calculations have shown that the large expanding neutral hydrogen features 2-4 kiloparsecs from the galactic center could have been caused by a very energetic explosion at the center (with an energy in excess of 10^{58} ergs) which occurred 100 million years ago. The energy of this event is so large one would conclude that 100 million years ago our galaxy would appear to be a Seyfert galaxy. This interpretation of the gas motions in the nucleus of our galaxy implies that our nucleus, like those of Seyfert galaxies, may periodically contain a mini-quasar.

However, there is an alternative interpretation of high non-circular gas motions in the nuclei of our own and other normal galaxies. The mass in most spiral galaxies (i.e., the stars and gas) is distributed in a thin axisymmetric disk. However, in some galaxies the stars and gas are distributed in a bar-like, or cigar-like structure rather than a disk. In those cases where the bar is conspicuous, the galaxy is called a "barred spiral". A dynamical consequency of a bar-like distribution of mass is that the stars and gas in the bar do not move in circular orbits - but elliptical orbits which rotate with the bar, i.e., we would expect to see significant non-circular velocities of gas in the bar.

Some theorists have suggested that there might be a bar-like distribution of mass in the nuclear region of nearly all normal spiral galaxies including our own. This bar might be inconspicuous or only a small perturbation on the axisymmetric distribution of mass, but would, nonetheless, have a dynamical effect. Looking toward the center we would observe possibly high non-circular motions of gas.

This interpretation of non-circular gas motions asserts that the nature of gas-motions in our own and other normal spiral galaxies is not only quantitatively but also qualitatively different from gas motions in the nuclei of explosive galaxies. It suggests that there is not a continuum of energetic activity from mild events in normal galactic nuclei to extremely energetic events in active nuclei, and therefore implies a fundamentally different picture of galactic evolution.

Which of these two processes, explosive events or bars, contributes most significantly to the non-circular gas motions in the nuclei of normal galaxies is thus a very important question. The resolution of this question requires much more work, both theoretical and observational. On the theoretical side, we need to construct physically realistic models of gas motions due both to explosions and to bar-like distributions of mass. Then we have to make detailed comparisons of theoretical models to the observations of gas kinematics in the nuclei of normal galaxies. We can obtain the most detailed information on nuclear gas kinematics in the direction of our own galactic center, and the tools for deriving this information are the numerous radio lines which have been observed in this direction. One of the most promising observational opportunities is provided by the 2.6 mm line of carbon monoxide - due to the high spacial resolution which can be achieved with the 36' telescope (1' arc) and to the general distribution of this molecule. The development of the cooled millimeter-wave receiver and a stable wide bandpass back-end will bring us much closer to understanding the dynamics and evolution of galactic nuclei in general.

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HEESCHEN GETS HONORARY DEGREE

David S. Heeschen was the principal speaker at West Virginia Tech's seventy-fifth annual commencement held on May 11, 1974. He was awarded an honorary Doctor of Science degree.

Tech graduated its one thousandth engineer this year. There were 550 candidates for graduation.

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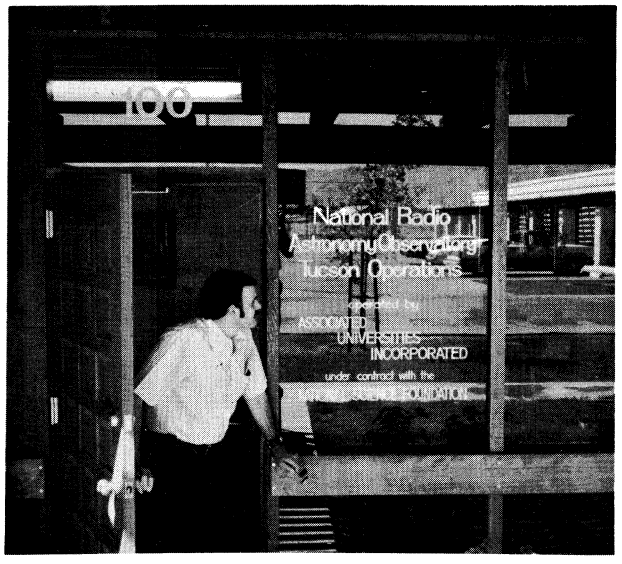
NEW OFFICES FOR TUCSON OPERATIONS

M. A. Gordon

We've moved! On May 8, Tucson Operations gathered their furniture, papers, integrated circuits, and coffee pots and moved out of the Kitt Peak National Observatory building to new offices elsewhere in Tucson. In the eight years the NRAO has been in Tucson, we've grown from a one-man, do-it-yourself operation to a full-fledged major division of the Observatory, having approximately 20 employees. The NRAO's venture into the



Paul Rhodes checks spelling on window of new NRAO - Tucson office

millimeter-wave range anticipated and made possible great advancements in radio astronomy.

The 36-ft telescope began in Green Bank in the early 60's. Two NRAO astronomers were interested in exploring the mm-wave range: Peter Mezger, in coherent detection; Frank Low, in optical-bolometer work near 1 mm. To satisfy both men, the design called for a dish of focal ratio 0.8, rather than the 0.4 more usually used for coherent-wave receivers. The telescope design was worked out by John Findlay and the Rohr Corporation. Later, Hein Hvatum supervised construction while John was in Puerto Rico.

Because this telescope was to be used in the millimeter-wave range, it could not be located at Green Bank. At these wavelengths, oxygen (60 GHz) and water vapor (120 GHz) in the atmosphere absorb radio waves heavily. What was needed was a high altitude site in the Southwest. Because of his belief that optical and radio astronomers should work more closely together, Nick Mayall--then director of Kitt Peak National Observatory--invited us to locate the telescope on Kitt Peak, where we could use their support facilities for visiting astronomers.

Perhaps the first NRAO employee to move to Tucson was Bill Terrell, who came in 1966 to help with the initial construction. Later, Ralph Burhans was hired to look after NRAO's interests during construction. At that time, the offices and lab were shared with KPNO's Space Sciences Division in the Campbell Shopping Plaza. The east wing of the KPNO building was completed in November 1967, and NRAO moved into the 1200 sq ft which it had purchased in that building.

The telescope went into operation in 1968, with George Grove as the NRAO caretaker, guide and general fixer, and Don Cardarella as telescope operator. In 1969, Johann Schraml moved in to solve problems with the telescope pointing, becoming one of the first Bavarians equipped with a bolo tie, blue jeans, rough-out boots, and a Stetson hat. Also in 1969, Ned Conklin arrived from graduate school at Stanford to become site manager. Dewey Ross arrived in 1970. From this point, the operation grew steadily, year by year.

As receiver technology improved and as a few molecules were detected with other telescopes, astronomers found that NRAO's new telescope, was an unique tool to search for molecules in the interstellar medium. A large number of molecules were soon detected with the telescope, and observer demand escalated with each detection. By 1973, Bill Howard noted that there were more than a year's backlog of observing requests for the 36-ft telescope--much more than for any other NRAO instrument.

By the end of 1973, many in the support group at Tucson had been transferred out of Technical Services (Electronics, Computer and Engineering) and organized in a way completely parallel to Green Bank Operations. By the time you read this, our new Business Manager will be settling into his Tucson office and weaning us from the considerable administrative and

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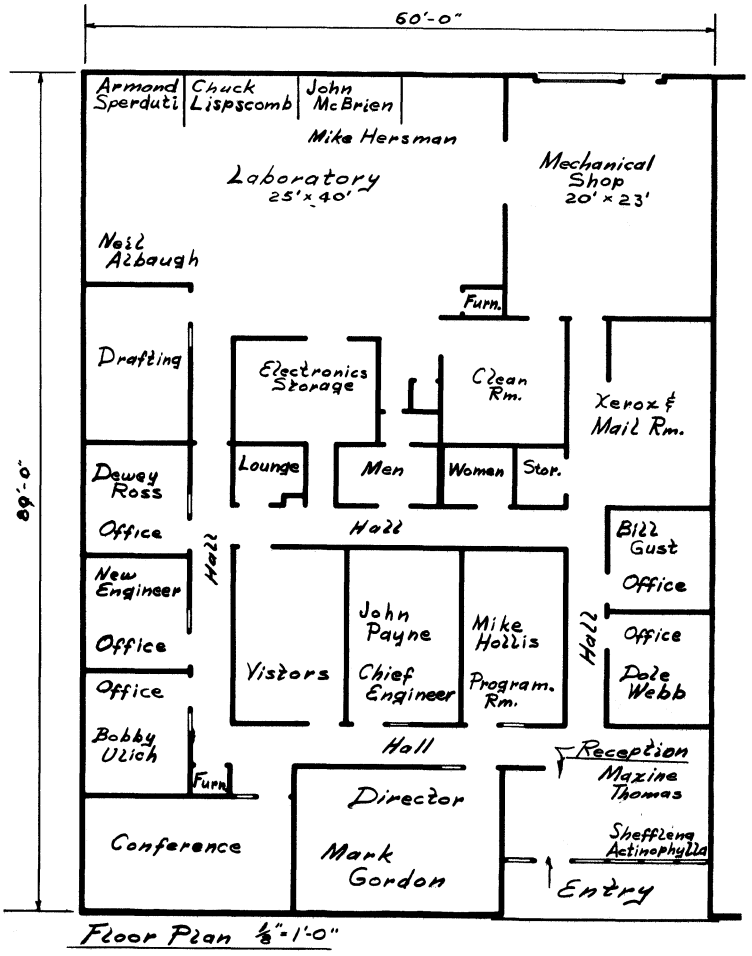
business support we've been getting from Kitt Peak National Observatory over the years. Bobby Ulich will be supervising Telescope Operations, and John Payne--as Assistant Head of the Electronics Division--will look after Tucson electronics for Sandy Weinreb. As Site Manager, I'll continue to hunt for loose NRAO money and to keep an ear pealed for disgruntled observers.

Prior to moving, we owned approximately 1200 sq ft of space within the Kitt Peak building, leased an office trailer, and borrowed two additional offices from KPNO. Now, we have 4800 sq ft. In addition, we will keep one office in KPNO to serve visitors and staff having temporary business there. And so when you come to Tucson, we may even be able to assign you a desk!



RIGHT: Floor plan of new NRAO - Tucson office.

BELOW: Almost completed building. NRAO has end section nearest camera.

RADIO ASTROLOGY

Gerrit L. Verschuur

For the last 30 to 40 years astronomers have known about, and studied, radio signals reaching the earth from outer space. It seems about time for some of this information to be passed on to the astrologers of the world. After all, if we are going to seriously consider the astronomical influences affecting us at birth which might play a role in determining the potential personality development of us all, isn't it time that we also use the latest scientific information which will help us to clarify the pictures we see in our horoscopes.

In order to take the first step in the direction of updating and supplementing classical astrology we should seriously consider the radio waves that are even now permeating all of space around us. We know a lot about where these radio signals come from and we also know that these radio signals carry a great deal of energy. These radio energies are greater than the light energy reaching us from space. We cannot go forward in astrology any longer and regard its predictions of character analysis seriously without a careful consideration of the new field of radio astrology.

Those of the readers who regard the old-fashioned astrology seriously would do well to take the following just as seriously. Those of you who enjoy astrology as a pleasant break from harsh reality can hopefully enjoy the following equally well.

It is the radio radiations from the sun and the planets, from radio stars, galaxies and quasars that should be considered in the new astrology. It is the newly discovered radio constellations that should be considered. These constellations need first to be identified and then labelled, and then the personality traits that go along with them should be codified. What better time to start these considerations than now. So here we go!

Firstly, the sun. Sometimes the sun undergoes giant explosions on its surface. These are called flares and produce enormous bursts of light and radio signals and they also spew clouds of matter into space. These clouds can travel all the way to the earth and they generate the aurorae. Surely, when we are born it is important to our future development to be aware of whether a giant flare was occurring or not. Explosive personalities are cradled beneath these giant eruptions on the sun that send particles hurtling toward us and filling our bodies. X-rays, too, stream toward the earth and cause the highest reaches of our atmosphere to undergo considerable changes. The astrologer should bear this in mind or he is ignoring some of the most damaging influences around us.

Well, you might say, we would be safe if born at night, for then the earth shields us from all these radiations from the sun. Then all is well, and you return to your horoscope. But no, for up there in the night sky lurks Jupiter. Jupiter is known to be one of the strongest emitters of radio radiation near to us. Every 9 hours and 55 minutes Jupiter's radio signals increase and decrease. The radio signals are in the form of intense bursts of radio radiation which are apparently directly related to the position of one of Jupiter's moons (Io) with respect to the Jupiter-earth line. A clear connection with the earth is obvious here. Horoscopes should never be cast without careful reference to where Io is at the moment of birth. And then, when Jupiter is far from earth on the other side of the sun its influence will obviously be less than when it is closer, since the radio signals are more attenuated by their passage through space.

What about the other planets? Well, while hardly so chaotic as Jupiter at radio wavelengths, they are nevertheless very important. Venus, the morning or evening star, appears to be very hot to radio astronomers. It is because the lower atmosphere of Venus is heated up by the greenhouse effect produced by its clouds of carbon dioxide. Venus at radio wavelengths has no phases, so it is always shining with the same steady glow. Only its distance from the earth produces any changes. This too should be considered from now on. Mars looks about the same to radio astronomers as it does to the optical types (only it doesn't look red!)

The other planets do not compare in drama to Jupiter either, so let us reiterate that woe betide those who neglect Jupiter and Io in our skies when they pretend to forecast our futures or describe our past. And even our day-to-day forecasts should bear in mind the

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vagaries of solar flares, radio bursts and Jupiter's nearly 10 hour cycle.

Now we come to the biggest breakthrough of modern astrology--the recognition of the radio constellations. This task has long been ignored by astronomers, but here these constellations are revealed for the first time.

In order to prepare the map of the sky shown in Figure I, (unfortunately, because of the medium used, it was not possible to reproduce Figure I) I had to gather together all the radio observations made at one wavelength, 20 cm in this case, and plot the position of the brightest radio sources in terms of the intensity of their emissions. Since radio astronomers like to measure their radio signals received from outer space in the incredible set of units known as flux units (a flux unit is no less than 10^{-26} watts per square meter per cycle per second), I have had to convert them into the more readily recognizable, if just as hard to understand, units of the optical astronomer.

The optical astronomer uses magnitudes to indicate the brightness of stars. So the brightest star, Sirius, has a magnitude of -2 and the fainter stars have brightnesses of--you guessed it--more positive numbers! The faintest stars we can see with the naked eye are of magnitude +6. Accepting this crazy system then, I called the brightest radio object outside the solar system, magnitude -2 and then indicated on the map the positions of all the radio sources down to magnitude 6. But what is a radio source?

Radio sources are the names given to those objects out in the universe which emit radio signals by whatever means. Some of these radio sources are the remains of exploded stars called supernovae. These are hot clouds of gas called emission nebulae by our optical friends. Yet others are distant galaxies and the most famous category of all are the quasars. Some of the weakest radio sources in the sky are the stars we see at night. Indeed, hardly any of the stars we see at night emit any radio signals at all which we can pick up on earth. None of the objects marked in Figure I is a normal star. This clearly has alarming consequences for the serious astrologer. You see, the point here is that these radio sources emit much more energy in the radio band than they do in the visible part of the spectrum. So when horoscopes are cast it matters not whether the sun was in Gemini, but whether it was in the "Small Snail" or the "Jolly Giant"! What are these latter two, you may ask. Well I am coming to that if you will just have a little more patience. The world has gone for thousands of years without knowing about the radio constellations, so that another few minutes won't harm you. The "Cosmic Kite" will be there forever.

The important point I need to make first is that in Figure I we can all see a long string of large bright radio sources strung out in a band across the sky. These are objects in the Milky Way. Just as the Milky Way is striking to the eye as a broad band of diffuse light on a clear night, so the radio sources in the Milky Way are the brightest objects in the sky. These are the supernova remnants and the emission nebulae. They overwhelm the picture. In addition, the gases between the stars in the Milky Way also radiate radio signals, but I have not sketched in this emission on the map since it would merely look like a faint glow underlying the sources. The radio signals from the sources out there are reaching us day and night. The presence of the sun in the sky does not prevent us from seeing the radio signals from these cosmic objects.

Unfortunately, since I have used the magnitudes for the brightest objects to correspond to the optical system and since most of the bright radio emitters lie in the Milky Way itself, we find relatively few bright sources over the rest of the sky. Indeed, all the sources away from the Milky Way are down at magnitudes 4 to 6. Constellations are more difficult to pick out since all these sources are very distant quasars and galaxies. Some radio sources are actually invisible to the best telescopes on earth so we don't even know what they are. Clearly they are important--all of them--since they outshine the normal stars completely. Our astrology must therefore move out into the universe and can no longer afford to be Galacto-centric! Who cares where Castor and Pollux are when we are born? We must concern ourselves with whether the quasar 3C273 is in the ascendant or whether Centaurus-A is dominant with Jupiter quiet.

Not only that, but those stars which ex-

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plode suddenly and produce the remnants that are now such strong sources of radio waves, have a habit of doing so rather suddenly, without any warning. Ask the Chinese, who saw the Crab nebula explode in 1054 AD. That radio source is known in the trade as Taurus-A, a hang-over from the days when the optical constellations were dominant. Now it can be known by the radio constellation in which it is found. Radio astronomers no longer need to use the ancient constellations of aeons ago. Our science has come of age! The supernova of 1054 can now be referred to as "Batmobile-A".

Other historical figures you might ask about sudden stellar explosions are Tycho Brahe, and Kepler himself, both of who observed the actual onset of supernovae, one in 1572 and the other in 1605. But, I bet that Kepler, who made a few rupees on the side casting horoscopes, missed out when it came to taking into account the effect of the star that exploded for him to see. Here was a message to him. He ignored it, mainly because radio had not been invented yet. However, that did not stop the radio radiations from that stellar explosion from filling our environment and fouling his horoscopes.

Now we come to the serious matter of naming the new constellations. We do not want to offend anybody, so no presidents or other famous people have been used as a guideline to the search. Only inoffensive names have been chosen for the inoffensive new source grouping identified. We have even tried to avoid reference to the obvious 1 hour and 38 minute gap that exists in the Milky Way around 7 hours and 30 minutes of right ascension. Other smaller gaps exist in the Milky Way, but these are thought to be due to a true lack of radio sources rather than an erasure by some sinister influence.

The constellations in the sky at 20 centimeter wavelengths are dominated by the happy influence of "The Jolly Giant". He lies at the left-hand end of Figure II. His chin lies in the zodiac and the sun in early March moves through his chin. Here is the first example of the effects from space that will certainly influence all those born between February 15 and March 14. The Jolly Giant type is recognized by the frequency with which they smile and stroke their chins!

Moving to the right we come to the next sign of the zodiac known as the "Boot", not to be confused with the ancient Bootes. This one is a straight-forward boot. Those born between January 10 and February 15 have a penchant for boots, leather and assorted other fetishes not realized by conventional astrologers. To be born in "The Boot" with the sun in one of her strong phases and Io well placed in her orbit about Jupiter so that the maximum emission takes place toward the earth, is a fate many can only wish for.

Travelling backward even further along the zodiac, and, being good astronomers and astrologers what can be more reasonable than travelling backwards, we come to not so much a constellation as a "Gap". Between December 24 and January 9 the sun lies in this gap. Again, no explanations as to the cause of this gap are easily come by and we should not try to judge the reasons for it until more observations are available. One can only state that the personalities of those born with the sun in this somewhat empty region of the sky are not exactly filled with high points, but in the style of all good horoscopes one can find good things to say by referring once again to the state of the sun and to Io in its path about Jupiter. Failing this, solace can be sought in Mars, Mercury and last and least, Pluto.

As a concession to those fundamentalists who won't accept all of this, I offer the constellation of Sagittarius in the Milky Way itself. Those select few born between December 15 and 23 are best advised to turn to the ancient astrological scriptures for their readings. (Bear in mind that the sun is in Sagittarius in late December in the 20th century.)

However, when we proceed ever westward (to the right is west on astronomical maps--you might have guessed it!) we come to the most delightful of the constellations to loom over one's birth, that of the "Magic Lamp". This stretched from November 15 to December 14 and, although we want to get as many people into this one as possible, that is the best I could do. As a compromise, the next constellation, the "Little Dipper" was kept small so as to include as few as possible, since few would want to be born then. But that is getting ahead of ourselves again. The Magic Lamp lies just below the popular constellation known simply as "The Jay". Wishes, blackmagic,

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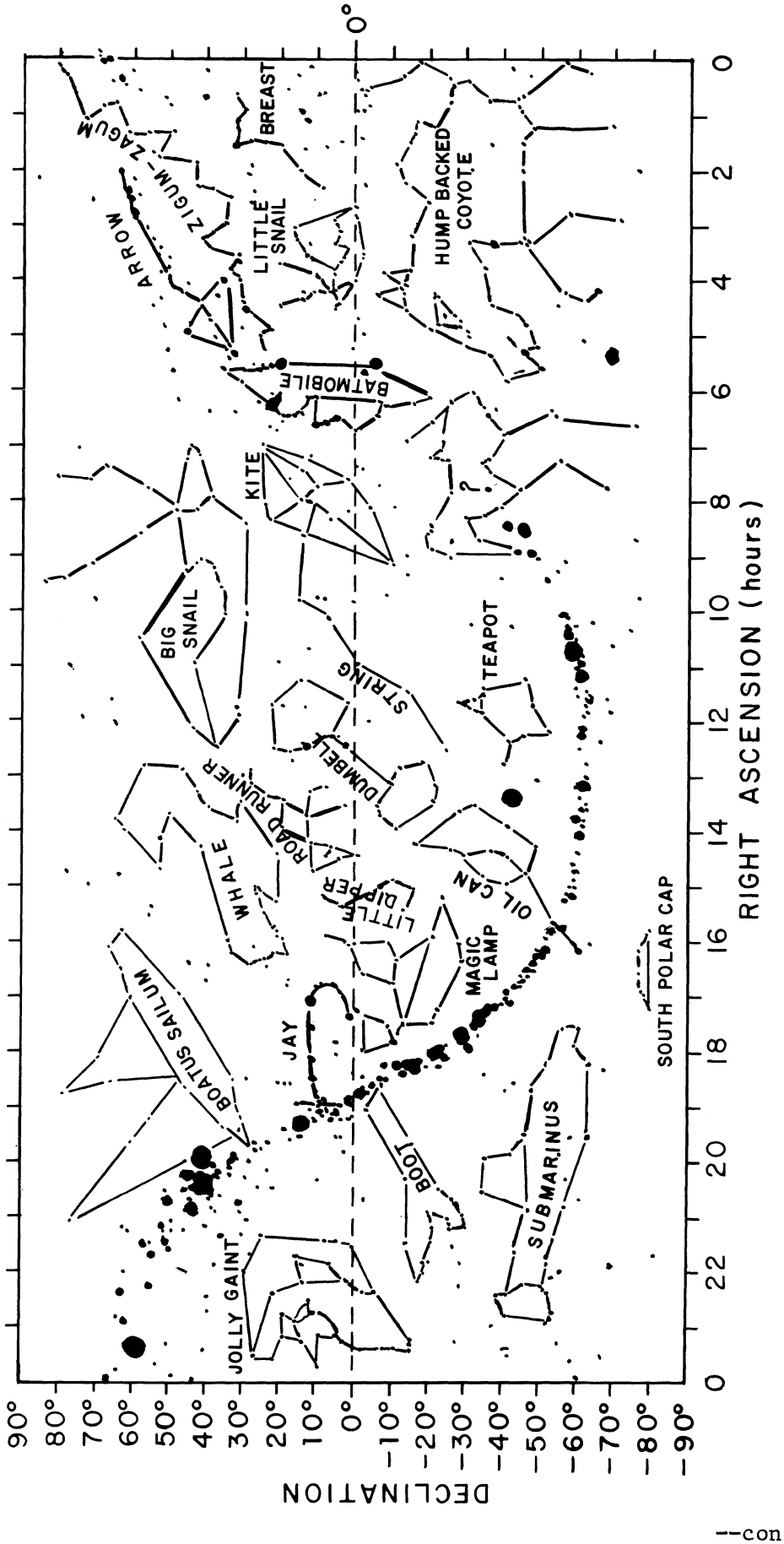

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sorcery, hallucinations and income tax expertise are the forte of those born in "The Lamp", or "Lampus Magicus" (Lux Mirabilis) as this constellation is often named. No matter what combination or permutation of the sun in "The Lamp", and Jupiter or the sun in any state of activities one tries, the vibes are always good for Lampees.

It should be noted that these are only the most cursory outlines of what your true personalities are like and more detailed work can be done for $126 a hit, sent directly to me. If your birthday is after 1953 then the details offered can be most rewarding because regular solar patrols enable us to check back on actual solar activity at the time of birth. Since the radio signals from Jupiter were only found in 1955, we are a little weak on that side of things before that time. Sorry, but more observations are needed!

And then to the Little Dipper. For those few unfortunates born between November 12 and 14, the Little Dipper is your bane. Bad luck!

The next grouping of galaxies, quasars and unidentified objects for the sign of "The Dumbbell". Anytime between September 15 and November 11 the sun is in this sign. This is why there are so many dum. . ., (well, need we even say it) in this world. Again, it is of little use to turn to the planets or the sun for help. Almost the only thing that can help here is if the radio galaxy called M87, or Virgo-A for short, was in an active state. Since radio astronomers have not found any variations in Virgo-A so far, this is also unlikely to be a help. Some solace can be gained from the fact that M87, at a distance of 36 million light years from us (it is the large bright object in the upper bell of the dumbbell), is one of the strongest extra-galactic radio sources around. It did explode some time ago and if you were born during the initial phases of that explosion, about a hundred million years ago, then it would have had a profound effect on your life. Ask the dinosaurs!

Those born between August 10 and September 14 were born in the sign of "The String", regarded by some as the least interesting of the new constellations. The String stretches a long way across the sky and its main function is to hold onto the "Kite". Those born in these two constellations are very supportive of one another. A String will tend to hold onto a Kite for life. Kites are those born between July 1 and August 9. The observant reader will, by now, have realized that the new signs are not neatly spread out in twelve monthly intervals. That is because we are moving with the times together and we have to take things as they come. And from space they don't come too regularly, except the radio pulses from pulsars.

To get back to our subject, those born in the Kite are--you guessed it again-- high all the time. They tend to blow with the breeze, having little say in their own destinies. They can be pulled down to earth at the tug of a String. Kites, watch those Strings!

The "Batmobile" is next. It is seen on its side in Figure II. It is more popularly known "Mobilum Batticus Est.". Those born between June 4 and June 30 are all going places in the world of astrology and whatever else ails them. Some of you might recognize that Batmobile-A, formerly known as Taurus-A or the Crab Nebula, makes up the back wheel of the Batmobile, while the front wheel is none other than the famous Orion nebula, an emission nebula known by the inventive radio astronomers as Orion-A. It will henceforth be known as Batmobile-B, even though it is the front wheel.

We have come through hard times here as well as through ten new signs. We will end up with thirteen, you'll see. Those born on June 3 are fated to have their destinies haunted by "Zigum-Zagum", one of the wierdest of all our signs. It meanders way up there to the right (west) and ever upward. The same can be said for its adherents.

The sun then skirts "The Little Snail". It never quite gets into the Little Snail and only skirts it, so to speak. It traverses its tentacles (or whatever those long spikes on its head are called) and passes close over its back. The domain of The Little Snail is bounded by April 26 and June 2. Those born under this sign are sluggish at best.

Then we come to the sign that all American men have been waiting for--the sign of "The Breast". The map should be rotated almost upside down so as to see the likeness, and then it is a somewhat classical breast at best, and as seen from the right. The radio source known affectionately as "The

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Nipple" amongst afficionados, was previously known as quasar 3C48, one of the first quasars discovered, and now we know why. A careful reader will see that in order to bring the Breast into the zodiac at all one had to work at it and the sun doesn't so much pass through the Breast itself as the upper part of the chest. Those born between March 15 and April 25 are definately Breast types, irrespective of sex.

And so our tour through the new constellations of the zodiac has reached an end. It goes without saying that the naming of each of these has a fascinating tale attached to it which can best be told in a planetarium. Tales involving such legendary characters as Hubble, Hoyle, Nixon, Mao, and a multitude of others, form the hard-core of these stories. Tales involving how these constellations were grouped to start with, how they accounted for the events of the times and how one legendary figure after another raced across the skies to leave in his wake the arrangements of the radio sources, are too numerous to chronicle at this point. Suffice it to say that the other constellations marked in, bearing such neo-classical names as "Oilcan", "Teapot", "The Big Snail", "Whale", "Arrow", not to mention "The South Polar Cap", all have their own fascinating story associated with them. The imagination boggles at the thought of the "Giant Jay" dangling from the lips of the Milky Way. And who knows how the "Hump-Backed Coyote" got its name or where the strange "?" has its home planet?

And last, but not least, the imagination can hardly bear the thought that radio sources do not appear equally bright at all radio wavelengths. They emit differing amounts of radio energy, depending on the precise nature of the object, at different wavelengths. This means that at another wavelength the sky would look somewhat different, then we would be able to draw in new constellations and then our horoscopes would have to be fine-tuned to take these other, admittedly small, changes into consideration.

Remember, the next time you go to a gypsy or look at the sky, that there is more to it than meets the eye. It's the radio waves that really count, the radio band is where it's at.

A D D E N D U M

Radio Constellations *a la* Verschuur*

Gigas Lascivus.....The Jolly Giant

Navicula Vela.....Sailboat

Navicula Submarina.....Submarine

Calceus.....Boot

Cetus.....Whale (NTBCWTO† Cetus!)

Lucerna Magica.....Magic Lantern

Cyathus Minor.....Little Dipper (not the optical asterism)

Cursor Orbiter.....Road Runner

Urceus Olearius.....Oil Can (would you believe oil jug?)

Tintinnaubulum Mutum.....Dumbbell

Cochlea Major.....Greater Snail

Cochlea Minor.....Lesser Snail

Urceus "Tius".....Teapot (sorry; no tea in Rome!)

"Caetum" et Linum.....Kite and String (no kites either!)

Avis Major.....Big Bird (formerly "?")

Sagitta Impotens.....Arrow (NTBCWTP† Sagitta)

Zigum-Zagum.....Translation unavailable

Mamma Inverta.....Breast

Graculus.....Jackdraw (as close as I could come to jay)

Lupus Gibbus.....Hunch-backed Wolf††

Vehiculum Vespertilium....Batmobile

Pileus Cardo Australis....South Polar Cap

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* Dubiously translated by the obscure Medieval Latan Scholar J. H. Acutus

† "not to be confused with the optical"

†† erroneously called Coyote in USA

*****

MEDICAL INSURANCE PROVIDES DIAGNOSTIC TEST COVERAGE

Monroe Petty

One of the lesser understood features of the NRAO medical insurance plan is the outpatient diagnostic, X-ray, and laboratory test benefit. If you are confined to a hospital all X-ray or laboratory tests you undergo are fully covered by our medical insurance as part of your hospital expense. But more and more doctors are turning to extensive outpatient testing in order to diagnose illnesses or injuries, and our plan also provides coverage for these expenses.

Each insured member of your family is allowed up to $150 over any 12 consecutive month period for diagnostic tests conducted in a doctor's office or outpatient clinic of a hospital. These benefits are applicable whenever your doctor suspects an illness; as a rule, pregnancy tests, dental X-rays, or tests administered as part of a routine physical examination are not covered. The one exception to the above is pap tests, which are covered under any circumstance.

If you or any of your family members are sent by your doctor to the outpatient clinic of a hospital for a diagnostic test, you will receive a bill for the test directly from the hospital. However, many diagnostic tests are administered in the doctor's office -- for example -- blood tests, culture for strep throat, etc., and the cost of these tests are not always separated from the doctor's charge for the office call. It, therefore, is important that you always ask for a separate bill for the diagnostic tests so that you can claim reimbursement under your medical insurance policy. This bill should include the name of the patient, the date of service, the charge, the type of test performed, and the suspected illness. With this information, it isn't necessary to have your doctor complete an insurance claim form.

You should remember that the diagnostic test benefits cover only the actual laboratory charge for the diagnostic test. It does not cover any charges by your doctor or by a specialist for reading or interpreting the test results. Such charges are covered only under the major medical portion of our plan.

*****

BOWLING

Dick Hiner

The NRAO bowling team at Green Bank completed another season with 78 wins and 66 losses. The season started 4 September 1973 and ended 21 May 1974, with the team bowling for thirty-six weeks. Bowlers left Green Bank at 5 PM and arrived at the bowling alley at 6:15 PM in time to start bowling at 6:30 PM and returned to Green Bank at 10:00 PM. The fee for bowling in the league for one night is or was $2.50 per league night.

High series was 625 by Jon Spargo (4/16/74). High game was 256 by Jon Spargo (12/15/73).

The season for 1974-75 will start about Labor Day to continue for 36 weeks. Any male employee interested in playing next season should contact Richard Hiner at Ext. 309.

The following employees bowled this past season:

Bill Radcliff	Richard Hiner
Jon Spargo	Russ Poling
Jim Gibb	Wendell Monk
Herb Hanes	Bob Vance
Don Hovatter	Howard Brown

Sorry girls, but they do have a mixed couple league that starts at 9:00 PM on Tuesday nights.

*****

PAPER CLIP PUZZLE

Ever wonder where all your paper clips go to? A firm in Munich, Germany wondered, so it sent out "undercover" men to trace a shipment of 100,000.

The results, though not entirely unexpected, were a little alarming when put on paper: only 20,000 were used to clip papers together; 19,413 turned up as chips in various card games; 15,842 were used as typewriter-key cleaners; 14,163 were bent into abstract sculptures during phone conversations; 7,212 held nylon stockings up; 5,434 became toothpicks; 5,309 cleaned fingernails; 3,196 ended up as pipe reamers; 2,431 were used as screwdrivers; 7,000 disappeared.

*****

DIN-DIN IN CH'VILLE

Cookie Mufson and Bud Taste

About a year ago an article appeared in this rag concerning the selection of luncheon establishments with proven low mortality rates. The response to that article was so minimal we've been inspired to follow-up with this unamusing review of some of Ch'ville's better-known dinner spots. Once again, to provide a capsule summary of our findings (and also aid any illiterates who might be perusing this publication) we've provided a table rating restaurants on paunch peril and wallet damage. Following the table, we review individual bistros in somewhat greater detail.

cut out and save

RESTAURANT	THE GRUB	THE STUB
Schnitzel House	gut and unusual	$5 - $6
That Steak Place	gratifying	$6 - $8
Expresso Internat. #1	hardy, man-sized	$3 - $5
Expresso Internat. #2	elegant, tasty	$6 - $8
Ivy Inn	disappointing	$7
Aberdeen Barn	treats your buds	$6 - $7
Gaslite	well prepared, but skimpy	$6 - $8
University Cafeteria	stout, organic	$3
Villa Capri	unremarkable	$5
Peking Tea House	inscrutable	$4 - $6
Orange Derby	urrrrrp	$4 - $6
Japanese Steak House	good, not great	$7

The prices listed include a typical entree and a beer. If your taste runs to before-dinner cocktails, appetizers and desserts, bring more bread. Also, add 15% for tips unless you're prepared to be roughed-up behind the restaurant after dinner.

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COMMENTS ON THE EATING EMPORIA

REFUGEE SCHNITZEL HOUSE -- Put on your leiderhosen, hop in your Mercedes and drive on over to Central Virginia's best known German restaurant (aren't you proud!) Prim and proper young waitresses (specially selected for their dumplings) will efficiently take your order (and maybe issue a few) and then leave you to read the placemat and listen to an endless tape of beer-hall melodies. The menu, while invariant, is sufficiently diverse for small parties, and the food is carefully prepared. One of our "regular" dining spots in pre-inflation days, the Schnitzel House is now reserved for special treats. A free beer to anyone who can tell us how they got that giant breakfront into the dining room.

THAT STEAK PLACE -- A predictably enjoyable meal can be had here, a favorite place for snowing dates. The salad bar, although it may not be a legend in its own time as the advertisement proclaims, is well-stocked and varied, and if you order a dinner, is unlimited. The steaks are tender, done to your specifications, and the portions are adequate. The service is good, especially if you sit in a booth. In addition, the University's Cavalier Daily occasionally runs Student Special coupons which give $2.50 off with the purchase of two or more dinners. If you are hesitant to eat here because of high prices, the coupon makes it worth your while to treat yourself to a good meal. Be sure to ask that they wheel over the meat wagon before ordering --- the attendant ritual is one of the most intriquing since the demise of the Aztec Empire. By the way, reservations are a must.

EXPRESSO INTERNATIONAL #1 (across from Sears) -- Doesn't look like much on the outside, but on the other hand, that's commensurate with the way it looks on the inside. Nonetheless, the food is tasty and the portions massive. The menu lists an extraordinary assortment of American and Italian fare. Curiously, despite the fact that the E. I. is run by a Greek (as are Archie's Pizza, the Sheraton, Denis's Italian and the Aberdeen Barn), virtually no Greek dishes can be had. Fine for informal dates and dinner with the guys; a real stomach-stuffer.

EXPRESSO INTERNATIONAL #2 (Route 29 North) -- Ch'ville's newest post eatery. The rather uninspired exterior, fabricated from over twelve million used saxophone reeds, conceals a huge, cushy dining room. Here, in traditional restaurant-red surroundings, you can select in hushed tones from a nice assortment of seafood and steaks. The meat is good, though the sauces tend to be a little spicy; undoubtedly a holdover from the practices of E. I. #1. The chef personally wheels out your dinner while a member of the staff stands by with an extinguisher to douse your flaming shishkabob.

THE IVY INN -- The Ivy Inn bills itself as a classy establishment with intimate dining in a candlelit atmosphere. While some of the courses, such as the soup and salad and cheese tray, are good, the main course is a true disappointment. For $7 or so you have the privilege of gnawing on a rather tasteless steak and picking at overcooked, frozen vegetables. In addition, you get to play the ever-popular waitress-waiting game.

Under these conditions, the atmosphere wears thin and is not much enhanced by the resident guitarist-in-training, who has a passing knowledge of five melodies. This is the place for you if you have time to spare, money to burn, the patience of Job, and your own teeth.

ÆBERDEEN BARN -- One of Virginia's Official Steak Houses, which means that the steers have been sanctified by the State Legislature before slaughter. With red tablecloths and heavy, black furniture, the ambience is romantic, and the dining memorable. The operation here is more precise than Bill Howard's accutron; consequently the service and food preparation are invariably first-rate. Wear a tie and you'll be almost half as well-dressed as the Maitre D. who checks your reservation.

GASLITE -- Fight your way through the litter of plaster horse grooms, giant thermometers and paper mache frogs and behold the state's "second most interesting restaurant". The Gaslite is small, and so are the portions: I once discovered my London broil hidden under a mushroom cap. But the menu is imaginative and the help is personable. The surroundings and general atmosphere at the Gaslite are the nicest in town, despite the fact that the walls are laden with paraphernalia salvaged from a Smithsonian time capsule. Bring your date here for dessert and coffee late in the

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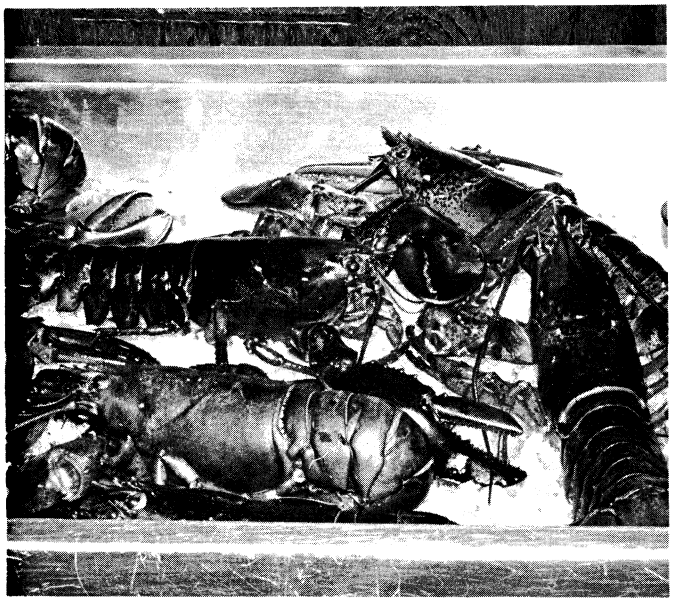
evening and be spellbound by pianists who can actually play on the black keys.

UNIVERSITY CAFETERIA -- If you really are what you eat, then Bob Sanders is 96% Unicaf, a fact which explains his uncontrolled salivation at the words "serve you?". Despite its lack of atmosphere (or at any rate, good atmosphere), the Unicaf remains ever-popular with people who make a habit of dining out. Principally this is due to its history of dishing out life-sustaining substances at very reasonable prices, although the opportunity to share a Formica table with luscious coeds is certainly an attraction. The menu hardly ever changes, although occasionally lima beans will be substituted for the stewed grommets.



Lobsters on death row at the Villa Capri

VILLA CAPRI -- Another Italian restaurant with the de rigeur checked tablecoths and Leaning Tower placemats. The special here is the lobster dinner (see photos) at $4.95. The lobster was fine, although neophytes would probably appreciate an anatomical chart explaining what is edible. Certainly a good meal to order if you're planning a career in sugery, but we've never been much impressed with any other items on the Capri's menu. Service at this establishment is laughable, and you can make easy money by betting the patrons at the next table that the waiter won't remember what they ordered.

Enigmatic smile on Ms. Mufson's face is due to claw in her maw. Not that lobster is now belly-up.

PEKING TEA HOUSE -- Here, the fare is somewhat overpriced and the food is unpredictable. The egg drop soup was good, but the wanton soup was watery. Egg rolls were nothing special. Main course dishes which we sampled varied sharply in acceptability. To our taste, the lo mein was the best of these. The sub gum shrimp chow mein was next, but the portion was small. The sweet and pungent shrimp, however, was immersed in a sauce which smacked of monosodium glutamate, and the chicken egg foo young had the consistency of stir-fried cardboard.

If you do choose to dine here, be prepared to announce yourself as you enter or you may be ignored. And once seated, you can pass the time at the table by pretending you are on a hunger strike. This eatery is all right for a sometime dinner, but it won't satisfy the Chinese-food afficionado's yen for a feast from the Far East.

ORANGE DERBY -- This place just can't make up its mind. On the one hand the menu lists items ranging as high as $15, and yet the decor is truly rinky-dink, with plastic tablecloths and an orange-and-blue "Cavalier Room". Don't order an expensive meal here, you'll only be disappointed. The service is minimal, and it's the only place in town where you have

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to get your own vegetables. Much though we hate to say it, the Orange Derby is really just a shabby chapeau.

JAPANESE STEAK HOUSE -- Tiptoe past the Ah So Lounge and across a babbling brook -- suddenly you're in Osaka! Sure you are. Well, despite the drawback of a very limited menu, the J. S. H. is still a good place to have an occasional dining experience. One part of the experience is the opportunity of sharing your table (actually the grill on which your food is cooked) with an unpredictable assortment of other diners. Our eating companions comprised a couple visiting the "big city" from Short Pump, VA and Hirohito's pet Akida. Such company can be advantageous if your date doesn't enjoy talking to you. About all you can order is shrimp à la Sony and kamikaze steak, and the former, sad to say, is generally frozen. Don't be gauche and put your elbows up on the table -- they'll only be fried if you do.

Needless to say, this listing, while exhausting, is hardly exhaustive. Patrons with limited cash might do well to consult the earlier article on luncheon dining (reprints available from Wally Oref) as many of the establishments reviewed there serve passable dinners. We also wish to caution our readers that the opinions expressed here are those of the authors, and may therefore not bear much relation to the truth. One thing we may safely say, however: dining in Ch'ville, unlike lesser cities such as San Francisco, New Orleans or New York, is always an experience. And if you eat too well, demand Di-Gel.

*****

THAT SEATBELT IGNITION/INTERLOCK SYSTEM

contributed by T. Miano

A safety system designed to reduce injuries and save lives. Mandatory on all 1974 cars. (Unless air bag equipped.)

1. Get in your car.
2. Fasten your lap/shoulder harness.

A. If you have a front seat passenger, his seatbelts must be fastened also, or the car will not start.

B. If you have a package, handbag, briefcase, etc., weighing 25 lbs. or more, and have space only in the front seat, place the object on the front seat, and *then* buckle the passenger-side belt.

C. If you have a dog weighing 25 lbs. or more occupying the passenger seat, buckle the passenger-side belt *before* attempting to start car.

D. If the passenger-side belt is already buckled when you add the package, dog, or passenger, unbuckle, then rebuckle the belt before attempting to start car.

3. Start your car.

A. If your car won't start, try unbuckling and rebuckling your belt (and your passenger's) to be sure the buckle was fully fastened.

B. If that fails, turn the ignition key to "ON", then get out of your car and raise the hood. Press the bypass switch mounted on the fire wall to "START". Close the hood, get back in your car, buckle up, and turn your ignition all the way as in normal starting.

C. If your car stalls, *do not turn the ignition to "OFF" position*. That way you can keep trying to start your car as often as necessary without leaving the car.

D. If you accidentally turn the ignition key to "OFF", turn it back to "ON", unbuckle, get out of the car, open the hood, press the bypass switch again for another "free" start. (Incidentally, if the bypass switch is taped down, the action will be detected in the switch and canceled.)

4. Drive your car.

A. If your dog is on the floor when you begin driving the car, and then jumps on the seat and the passenger-side belt is unbuckled, a buzzer will sound. Stop the car and buckle the belt.

B. In a somewhat rare situation when driving over a very rough road, you may be bounced about in your seat. Should your engine be stopped, remain buckled in your seat and restart your car. A "bounce-time" delay (designed primarily to allow you to straighten your clothing after buckling up) also allows a restart in this situation.

(Exerpted from *SEAT BELT SYSTEM OWNER'S GUIDE*)

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AUI SCHOLARSHIP WINNERS

On April 9, 1974, D. S. Heeschen, Director of NRAO, announced the following two winners of this year's AUI Trustee Scholarship:

Mr. Phillip R. Becker

Mr. Becker has been active in the following clubs at Pocahontas County High School:

Chess Club	Freshman
Nature Club	Freshman and Sophomore
Bible Club	Sophomore
National Honor Society	Junior and Senior
Track	Junior
Band	Freshman
Know-Your-State-Government Representative	Junior

Phillip is the son of Mr. and Mrs. Ralph L. Becker of Arbovale, West Virginia. Mr. Becker is an Advanced Technician in the Electronics Laboratory of the NRAO in Green Bank.

Miss Joyce A. Gum

Miss Gum has been active in the following clubs at Pocahontas County High School:

Band	Freshman, Sophomore, Junior and Senior
Chorus	Sophomore, Junior, Senior
National Honor Society	Junior and Senior
Nature Club	Freshman
Conservation Club	Junior and Senior
Music Club	Sophomore

Joyce is the daughter of Mr. and Mrs. Basil M. Gum of Green Bank, West Virginia. Mr. Gum is a Welder in the Machine Shop of the NRAO in Green Bank.

The alternate winner selected by the Scholarship Committee is:

Mr. Gary A. Pasternak, son of Mr. and Mrs. Bernard Pasternak of Crozet, Virginia. Mr. Pasternak is Technical Specialist II in the Electronics Laboratory of the NRAO in Charlottesville

CONGRATULATIONS!

*****

STONY BOTTOM DEFEATS FROST
FROST PLAYS NEWPORT NEWS (VA STATE CHAMPS)

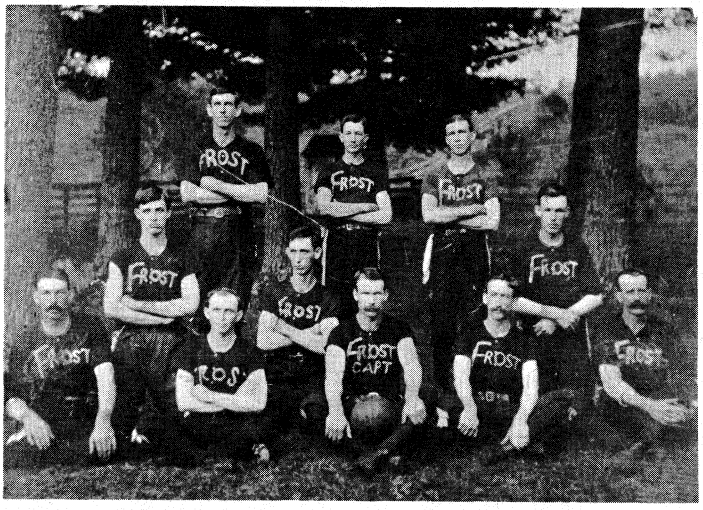
Charles E. Sutton
(Reprinted in part from *WV HILLS AND STREAMS*)

Yancy Meeks kicked the winning goal, and the Stony Bottom Soccer Football Team won once again. In one of the most exciting soccer games ever played in the area the score was Stony Bottom 1 - Frost 0, played at the Pocahontas County Fair some thirty-five or forty years ago. The soccer games and the Pocahontas County Fair were big, big events back then. It seems almost every little town and hamlet around and in Pocahontas County had a soccer team. To name a few: Frost, Arbovale, Stony Bottom, Durbin, Marlinton, Hillsboro, Dunmore, and even some obscure little place called Buckeye. Later there was a collective group of the area called the West Virginia Mountaineers who were considered the state champions.

The extreme interest and intensity of feeling surrounding soccer in Pocahontas County between 1890 and 1938 is a fact even the natives now find difficult to believe. But the oldtimers know and remember. They even remember particular plays of particular games, as when Jesse Reed got his jaw broken, and when Cliff Sharp got his nose broken. They may not

remember the dates, but they remember details, big games, the teams, even the players, attesting to the enthusiasm surrounding soccer in Pocahontas County.

The beginning, the era, the fading and dying of soccer in Pocahontas County is a fascinating story almost forgotten and indeed overlooked. Overlooked? Why? Because today it just doesn't seem believable. If you were to tell somebody today in their thirties, even a Pocahontas native, that Frost once had a championship soccer team he may very well laugh in your face. But there was a time when soccer was the leading sport of the county, and Frost did have a championship team.



Left to right - *1st row:* Aaron Sharp, Melvin Sharp, Cliff Sharp, Ernest Sharp, Upton Sharp. *2nd row:* Pete Shrader, Austin Sharp, John Kelley. *3rd row:* Chris Dilley, Mitchell Sharp, Merve Sharp.

It all started back in the late 1880's when a group of Englishmen settled in Mingo, a small hamlet in Randolph County on the Pocahontas border. Englishmen always introduce soccer into the community when they settle, and this was no exception. It spread to the towns in Pocahontas, mostly because the times, the location, and the people were right for it. Soccer is a rough, tough game. The people then and there were hardy. They were loggers, saw mill workers, mountain people. These were the players and these were the watchers. The cool mountain air in summer was also a contributing factor.

When Stony Bottom defeated Frost at the County Fair playoffs, quite an accomplishment because Frost was the best team in the area,

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the Stony Bottom goalie was John Quinn Geiger. Now a minister in Wellsburg, WV, Mr. Geiger says: "A fearsome sight for a goalie was to see the Frost front five bearing down on him, with Ernest Sharp in the center, dribbling the ball with both feet while he talked constantly to his brothers or sons, 'Here you are Letch, shoot Mitch, now Rexie, allow for the wind', while all the time he was driving with the ball."

Talking to the old timers of soccer playing, one quickly learns that while all games were not regulation games, the sport was well organized. It was no sandlot thing. The towns all had soccer fields, many of which the old fellows can still point to with pride.

Through the teens and twenties soccer continued to grow in Pocahontas County until in August 1929, the *POCAHONTAS TIMES* could report that on Saturday August 24th at the fair, the Virginia championship team of Newport News would play the Frost team for the championship of the two Virginias. Unfortunately for the West Virginians, Newport News won 4 - 0, a crushing defeat in low scoring soccer.

During the Great Depression of the early thirties there was a lag in the game. Drought, depression, transportation problems, and above all the lagging interest in the County Fair where the playoffs were held caused interest to waver.

In the middle thirties interest again revived, culminating in the big game at the Fair (once again prospering) between the outstanding team of Cumberland, Maryland and Frost. This was played in August 1935. The game Friday was a tie, the first game Saturday a tie, the second game Saturday won by Cumberland after going into extra periods.

Soccer continued to be the leading county sport until August 1937, when the Pocahontas County collective team (now known as the West Virginia Mountaineers) played the champions of Washington, D. C. It was somehow the turning point. Soccer declined, faded, died in Pocahontas County.

What caused the demise of a so great and popular sport in West Virginia's eastern mountain region? There is no single or profound reason, but rather many reasons, all adding up. First and probably foremost is that although uncluttered and uncomplicated with meaningless trivia, soccer is a rough game. The hardy, tough guys were growing older and scattering. The area no longer produced these types. Radio made baseball and softball popular. Regular football in schools became popular. There was a general decline in participation sports and rise in spectator sports. World War II was approaching. Perhaps soccer was too dangerous, too exhausting for the upcoming generation to become wedded to the game. The County Fair, where soccer interest centered, started to dwindle and was to become a thing of the past.

Team picture of Frost taken in the early 1920's Shown left to right - *1st row:* Austin Sharp, Letch Sharp, Ernest Sharp, Jess Reed, Merve Sharp. *2nd row:* Luther Shrader, Emmons Moore, Cliff Sharp, Meade Curry. *3rd row:* Mitch Sharp, Clyde Buzzard, Henderson Sharp, Park McNeil - umpire.

What a shame soccer passed! We think the towns of Pocahontas County during that era were ahead of other parts of America sportswise because the greatest spectator sport in the world today is soccer--and until recently retired the worlds highest paid athelete, Pele, was a soccer player.

Will it, or could it, ever come back to Frost? To Stony Bottom? The little towns? We think not. Perhaps to Pocahontas County? Who really knows?

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SNOWSHOE

Jack McMahon

On horseshoe-shaped Cheat Mountain a project is underway that taxes the imaginations of even the most fertile-minded West Virginians.

The project, of course, is Snowshoe, the $90-million ski-and-year-round resort complex which was announced last September. In just nine months, Snowshoe has set up offices in Elkins and Slatyfork, has cleared slopes and trails, planned and located major building sites, is in the working drawings stage of its principal buildings, and even opened its (at the present, nonexisting) doors to its first skiers last winter with a weekend program of cross-country skiing.

The first stage of Snowshoe will take five years to complete, and in the plans are 1,200 condominium apartments and 400 single family dwelling units.

Ski facilities will include a ski center building, 12 lifts and at least one gondola, and over 200 acres of slopes, all covered by one of the most sophisticated snowmaking systems in the world. Contributing to the skiing excellence will be the 1,500-ft vertical drop, highest in Mid-America, and the climatology statistics which project an annual snowfall of over 160 inches and temperatures to hold it.

Other recreation facilities in the first stage will include 20 outdoor and four indoor tennis courts; an ice skating rink; an 18-hole championship golf course; a mile-long lake; indoor and outdoor swimming pools; exercise rooms, health club, and saunas; jogging, bicycle and cross-country ski trails; horse stables and riding ring; and a plush members' clubhouse situated on the lake. Members will reach the club by gondola from the hotel.

The first year of construction (which includes facilities planned for a winter '74-'75 opening) will see a 324-room luxury, condominium hotel with three-story wings and central building which will feature a sunken indoor-heated pool. Layered above the sky-lighted pool area will be a dining room and lounge which will command a 180-degree view from east to west and overlook the pool, interior bowl ski slopes and the ice skating rink.

The hotel rooms will face east or west and will be connected by a central corridor. Each 500-sq ft room will have its own balcony and a separate dressing room and kitchenette area. Connected at the north end of the complex will be the Ski Center, itself a 35,000-sq ft building which will house a general cafeteria and common room for skiers, ski equipment rental shop, ski shops, ski school offices and some administrative offices for the first few years of operation. Many of the rooms within the Ski Center will be convertible to convention facilities in other seasons.

The first year's ski slopes will include over a hundred acres of slopes, from novice to expert, served by four double chairlifts and a snow system with ten miles of underground pipe.

Cup Run, says Dr. Brigham, President and Chief Executive Officer, will be the most challenging slope in Mid-America. To equal the 1,500-ft vertical drop and the unusual pitch and length of the slope (7,000 feet), you would have to look to New England or Colorado.

Five miles of cross-country ski trails have already been cut and prepared and are in use for a weekend program of cross-country ski touring. Gary Horvath, Snowshoe's Cross-Country Ski Touring Director and a former Hungarian national champion in the sport, said Snowshoe intends to keep cross-country skiing in its ski program in years to come and will even expand it. Cross-country skiing, which is rapidly growing in popularity among winter sports enthusiasts, does not require lifts.

Jean-Claude Killy, the famous French Olympic gold medalist and now top professional skier who is acting as consultant to Snowshoe, said of the skiing possibilities there, "I think it is going to be extremely good skiing. The expert will be able to find anything he wants."

Describing his impression of the complex, Killy remarked, "It is extremely unusual to find a ski resort built on top of a mountain... The closest I can compare it to is Kitzbuel, Austria. It's physically shaped like Snowshoe. And, too, there is a train coming into Kitzbuel near the lift station at the base of the mountain."

Killy, who visited the area earlier this year, was referring to the C & O spur which comes all the way to Cass and connects with the C & O tracks to the south at White Sulphur Springs.

Dr. Brigham feels the tracks may eventuall

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prove to be Snowshoe's best answer to the energy crisis. While some have forecasted hard times ahead for those in the recreation business, Dr. Brigham feels the challenge may prove to be a bonus in the long run.

"Snowshoe is a destination resort", Dr. Brigham explained. "Most of our customers will come to spend several days.

"I personally think the gasoline shortage may be a long term consideration. People will have to stop wandering idly about in their automobiles and seek instead a destination resort which offers them a complete package of transportation and recreation.

"I have every idea the leaders in the recreation industry will find themselves in the train or bus business", he said.

"Recreation, after all, comes from the verb to recreate which means to re-create. It is very essential to the well-rounded individual to relax and regenerate his spirit. I believe more and more people will seek such places as Snowshoe to enjoy the amenities as well as the mountain's natural beauty which we intend to retain."

Dr. Brigham stated the Snowshoe board, headed by John Grenier, a Birmingham attorney, is in accord that Snowshoe will be planned and structured with the ecology of the area in mind.

"It is one of the reasons we are going to primarily build condominiums", he said. "By concentrating the housing units in a relatively small area, you can leave other vast areas untouched. In fact, we have planned to leave most of the basin untouched. Over 3,500 of the 7,000 acres in the resort will be left in a natural state".

Brigham went on to say that in locating and preparing recreation sites such as ski slopes and golf courses, Snowshoe would adapt or bend the plans to retain special existing features. He cited the parking lots and the hotel are located on a "blowdown" area where several acres of tall spruce were toppled by a wind storm two years ago.

"We're very interested in the conservation of our spruce forests. So far we've gone around them except for a very few areas. Those trees which have been cut are being sawed and cured for siding on the hotel", he said.

"We've received very little criticism from environmentalists. Those who have shown interest have been happy after seeing that we're building with expert ecological advice with 1983 standards in mind.

"We're going to treat the land gently and simply make its beauty available to more people to enjoy", he commented. "This is really a beautiful and hospitable state. We hope to share some of its attributes with our guests and return to the people of the area economic growth through our industry and through the many support industries which will be involved.

*****

SAFETY COMMITTEE REORGANIZED

Bill del Giudice

All Green Bank employees have received a copy of "Safety at Green Bank" but may not have noticed the new composition of the Safety Committee. D. Madron is the chairman and Bill del Giudice represents Engineering; Brown Cassell, Administrative Services; Russ Clarkson, Works Area; George Liptak, Telescope Operations; Lake Sipe, Central Shops; and Carl Wooddell, Electronics. We hope that anyone noticing a practice or condition which you consider unsafe will point it out to one of the committee.

In future issues of the *OBSERVER* we will keep you informed on the activities of the committee and our efforts to make our good safety record even better. We will try to show you that safety is not something "tacked on" but is a regular part of the job that will benifit all of us. We hope that safety habits learned on the job will be carried home and will not only be to your advantage, but your family's as well.

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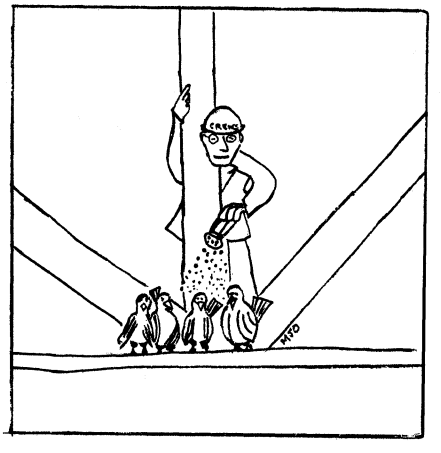

ON TOMATOES

Wally Oref

DETERMINATE AND INDETERMINATE TOMATOES -- Did you know that tomatoes have two different growth habits? The growth habit of the variety is indicated by the words, "determinate" or "indeterminate". The "determinate" (commonly called Bush tomato) varieties set fruit on the terminal bud and stop stem growth. The varieties are self-topping and generally grow three feet or less in height. They seldom need staking and are ideally suited for growing in pots. Popular varieties include Tiny Tim, Pixie, Small Fry, and Patio Hybrid.

The "indeterminate" are the type of tomatoes we generally raise in our gardens for the main season crop. The terminal bud does not set fruit and, therefore, the vine will grow indefinitely until killed by frost. Most of these types require staking. Rutgers, Marglobe, and Big Boy are examples of "indeterminate" tomatoes.

AIR TEMPERATURE AND TOMATOES -- The tomato is rather particular about night temperatures. You get maximum fruit set when night temperatures are in the 55° - 70° range. In particular they don't like cool nights (lucky us in Green Bank). Day temperatures can be pleasantly warm but if the night temperatures fall below 55° even for a portion of the night, many tomato varieties will not set fruit. It takes 50 hours or more for the pollen grains to germinate and send pollen tubes down the pistil to the ovary. At night temperatures below 55°, the germination is so slow the blossoms drop off before they are fertilized. Most of the early varieties (e.g., Burpee Big Early) set fruit at lower temperatures than the main season varieties (e.g., Rutgers).

If in addition to cool nights you have too much water or prolonged humid conditions, the situation worsens. Growers have found that under such conditions fruit set can be increased by shaking the plant or vibrating with a battery powered tooth brush. Best time to shake the plants is in midday when it's warm and the humidity is low. English growers who have many of these conditions set their fruit with chemicals. Blossom Set is one such chemical used for this purpose.

At the other extreme in temperature you can expect blossom drop when day temperatures go over 90° and night temperatures are above 75° (they might have this problem in Charlottesville). Too little water will also cause blossom drop.

*****

RETIREE MEDICAL INSURANCE NOW AVAILABLE AT AGE 55

Monroe Petty

As of June 1, 1974, employees with three or more years of service are now able to retire as early as age 55 and continue their NRAO medical insurance coverage. Previously, retiring employees had to wait until their 60th birthday in order to continue their medical insurance.

Under this policy improvement, an employee between age 55 and 58 may continue coverage for himself and his eligible dependents by paying to NRAO the premium charged to NRAO by our insurance company. Currently, this premium is $18.29 per month for single employees, and $63.26 per month for married employees.

An employee who elects to retire between ages 55 and 58 will be required to pay these premiums only until the first of the calendar year in which he attains age 58. From that point until his 65th birthday, medical insurance coverage will be provided for him and his dependents at no cost. From age 65 on, medical insurance coverage is provided by Medicare and a special supplemental medical insurance provided at no cost by NRAO.

This change eliminates a major obstacle in the paths of employees who have been considering earlier than normal retirement. The TIAA/CREF retirement annuity, of course, can be commenced at any time, but without adequate medical insurance -- which is expensive and difficult to obtain by older persons -- many employees have not been able to consider early retirement.

If you would like additional details on this policy change, please contact the Personnel Office, Ext. 234-CV.

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Discretion in speech is more than eloquence.

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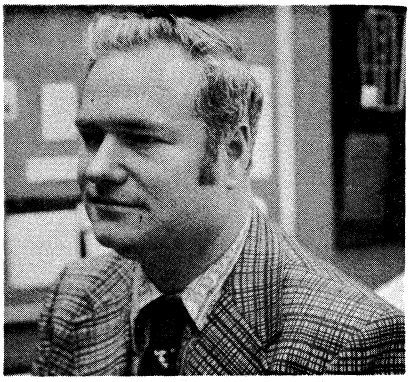
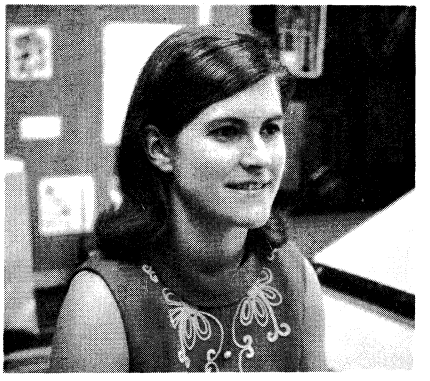
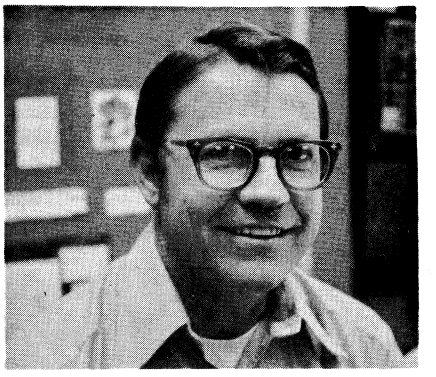
NEW EMPLOYEES



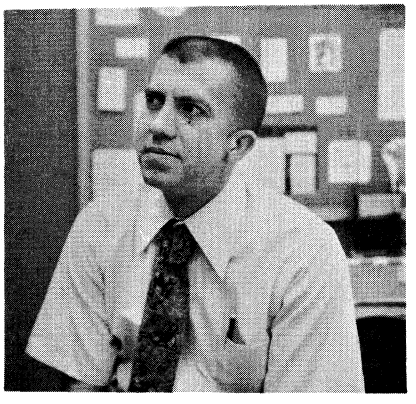
David W. Weber
Electronic Engineer
VLA Project - CV



Elizabeth B. Stobie
Scientific Programmer
Computer Division - CV

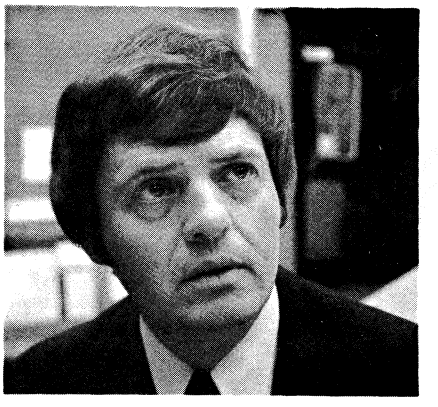


Joseph O. Lee
Purchasing Officer
VLA Project - CV

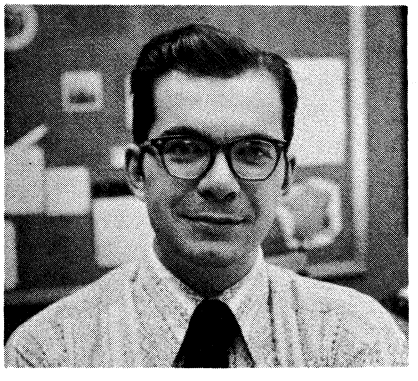


H. William Sutton, Jr.
Purchasing Engineer
VLA Project - CV

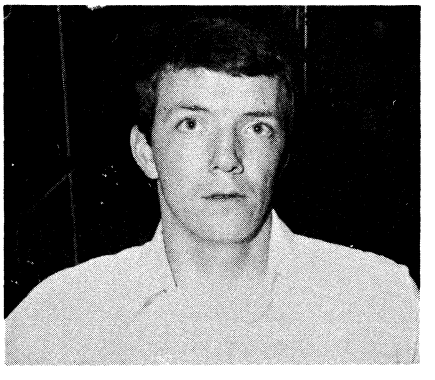
Kristine B. Rye
Jr. Computer Operator
Electronics Div. - CV



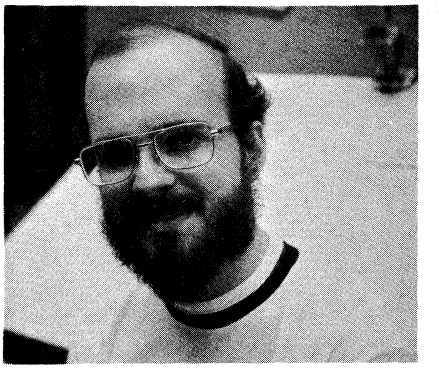
Philipp E. Hartline
Sr. Designer
VLA Project - CV



Alan D. Wilcox
Electronic Engineer
VLA Project - CV



Richard D. Trent
Accountant
Fiscal Div. - GB



Stephen A. Maas
Electronic Engineer
VLA Project - CV

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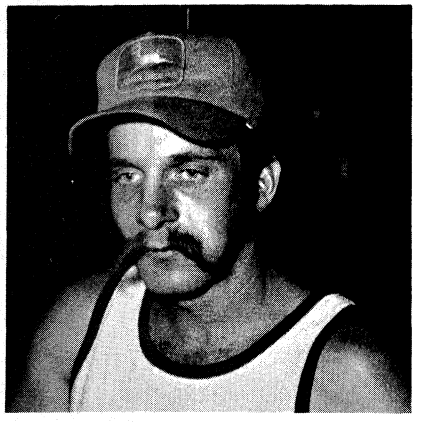
New Employees (Cont.)

David W. Stoner
Admin. Assistant
VLA Project - CV

Ellen Z. Mufson
Secretary
VLA Project - CV

Harold W. Ward
Draftsman
VLA Project - CV



Benjamin B. Campbell
Laborer
Plant Maintenance - GB

June E. Rowe
Secretary
VLA Project - CV

Dale A. Webb
Business Manager
Tucson Operations

Photo Not Available

Isidro Lopez
Laborer
VLA Project - NM

Photo Not Available

Isidro M. Lopez
Laborer
VLA Project - NM

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REHIRES

Stephen D. Burgan	Scientific Services - CV
David G. Steigerwald	Scientific Services - CV
Michael S. Hersman	Scientific Services - Tucson
Paul D. Kuhlken	Plant Maintenance - GB
Robert L. Beverage	Plant Maintenance - GB
Michael L. Anderson	Plant Maintenance - GB
Christopher J. Staud	Plant Maintenance - GB

TRANSFERS

Raymond B. Guthrie, III	Computer Division - CV

LEAVE OF ABSENCE

Jean P. Ray	VLA Project - CV
Shirley L. Huang	Computer Division - CV

TERMINATIONS

Langford G. Brod, Jr.	Tucson Operations
Wayne K. Shuman	Central Shops - GB
Frances B. Hamilton	VLA Project - CV
Joseph H. Greenberg	Scientific Services - CV

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Most radio astronomers have only seen three or four pictures of the founder of our science, Karl Jansky. Recently Bill Howard was able to add one more to our memory file. It shows Jansky in an informal, relaxed mood in a family photograph that was probably taken in the mid-to-late 1940's.

Bill obtained this picture from Karl's nephew, Don Jansky, who works in the Office of Telecommunication Policy in Washington, D. C. Bill first met Don in 1970 during a series of conferences leading up to a World Administrative Radio Conference held in Geneva in 1971 at which allocations of radio frequencies to the radio conference were reviewed and updated, and their contacts have been frequent since then.

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1974 SUMMER STUDENTS

Name		Affiliation		Advisor
Thomas J. Balonek	U	Cornell	CV	Condon
John M. Benson	G	U. Iowa	GB	Fisher
Jack O. Burns	U	U. Massachusetts	CV	Owen
Luiz A. N. Da Costa	U	Brandeis	CV	Sanders
Jesus Gomez-Gonzales	G	U. Paris	CV	Brown
Bengt Hakansson	G	Chalmers Inst. of Tech.	CV	Weinreb
Steven A. Hawley	G	U. California, Santa Cruz	GB	Fomalont
Martha P. Haynes	G	Indiana	CV	Sramek
Stephen J. Hirsch	U	Drexel	CV	Burns
David A. Holm	G	U. California, Santa Cruz	CV	Mufson
James C. Ja Folla	U	Drexel	CV	Shalloway
Dayton L. Jones	U	Carleton	GB	Kellermann
Robert S. Pariseau	U	Princeton	CV	Hjellming
Anthony R. Rothman	U	Swathmore	GB	Findlay
Jouni K. Simila	U	Harvard	CV	Burns
Dan R. Stinebring	U	Williams	CV	Greisen
John R. Thorstensen	U	Haverford	GB	Fisher
Carol A. T. Veenhuyzen	U	Pamona	CV	Burton
Jeffrey S. Waldhuter	U	Columbia	GB	Brundage/Dolan
Edward Witten	G	Princeton	CV	Peterson

*****

1974 MID-SUMMER-EVENING LECTURES

This summer a series of evening lectures will be given in both Green Bank and Charlottesville. The lectures will be on a popular level, will cover a wide range of topics, and should be of general interest. All members of the NRAO community and their guests are invited to attend. The lectures will begin at 8:00 p.m.

Charlottesville on Mondays		Green Bank on Wednesdays
July 8	W. E. Howard: "Growth of Radio Astronomy Here and Abroad"	July 17
15	J. W. Findlay: "The Beginnings of NRAO"	10
22	R. Brown: "Radio Astronomy and the Atom"	24
29	S. von Hoerner: "Cosmology: Why Do We Know So Little About the Universe?"	31
August 5	G. L. Verschuur: "Life In Space" (tentative)	August 7

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THIS AND THAT

NEW APPOINTMENTS

On 20 May 1974, D. S. Heeschen, Director, announced the appointment of Dr. D. E. Hogg as Associate Director of the NRAO. In this capacity he will be responsible to the director for NRAO operations, and will work closely with the Assistant Directors for Business, Green Bank Operations and Tucson Operations in these areas. Dr. Hogg will take up his new position 1 July 1974. Dr. H. Hvatum will continue as Associate Director with responsibility for Technical Services and the VLA.

Replacing Dr. Hogg as Assistant Director for Green Bank Operations will be Dr. W. E. Howard. Dr. Howard's appointment will be effective 1 July 1974, and he and his family will take up residence in Green Bank in July.

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If you wonder how Congress can conceivably spend so much money, here are a few samples of its handiwork in recent years. Study of Polish bisexual frogs - $6,000. Chasing wild boars in Pakistan - $35,000. A potato chip machine for Morocco - $37,314. Payment to the Queen of England for not growing cotton on her Mississippi plantation - $68,000. A carpet for House Speaker Carl Albert - $31,650. A yacht for Marshal Tito - $2 million. Study of Australian aborigines' sweat - $70,000. Carl Albert's draperies - $21,000. Study of the cultural, economic, and social impact of rural road construction in Poland - $85,000. Analysis of violin varnish - $5,000. Carl Albert's chandeliers - $44,000. Budget of the Interdepartmental Screw Thread Committee, a WW I emergency bureau - $250,000. Carl Albert's furniture - $65,000. Traveler's aid to migrants lost on the Los Angeles freeways - $203,979. Study of Frisbees - $375,000.

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CREF UNIT VALUES - 1974

January	$40.75
February	40.83
March	39.32
April	37.58

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$40 REWARD

For information leading to the return of a canoe taken from in front of the Residence Hall on 5 May 1974. The canoe was a 15-ft Grumman Aluminum Canoe - Serial No. 1018-GP-SK-15.
Contact: Dick Sramek, Ext. 235 - CV or
Ed Fomalont, Ext. 215 - GB.

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OBSERVATORY TOURS - 1974

Daily Tours: June 15 to September 2
9:00 a.m. to 4:00 p.m.

Daily tours start from Green Bank School.

Weekend Tours: September 7 to October 27
9:00 a.m. to 4:00 p.m.

Weekend tours start from warehouse auditorium.

Tour Program: 15-minute movie on radio astronomy. Narrated bus tour of site with stops at all major telescopes. Demonstration of how a radio telescope works using a working 2-foot telescope (not operated after September 2). Tours start on the hour and take about one hour.

Tours are free; cameras are permitted.

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SPRING FAIR

Pat Cottrell

The Green Bank PTA held a Spring Fair on 3 May 1974 at the Green Bank School. The proceeds from the fair will be used toward purchasing playground equipment, musical instruments, and text books for the next school term.

Special drawings were held for a cake, a Snow Queen Doll, and Raggedy Ann and Raggedy Andy dolls. Beryl McLaughlin was the winner of the cake; Sis Michael won the Snow Queen Doll; Dr. Aga was the winner of the Raggedy Ann and Raggedy Andy dolls.

Many people worked long and hard to make the fair an outstanding success. Our special thanks to these people. We also wish to extend our appreciation to the many people who attended the fair.

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