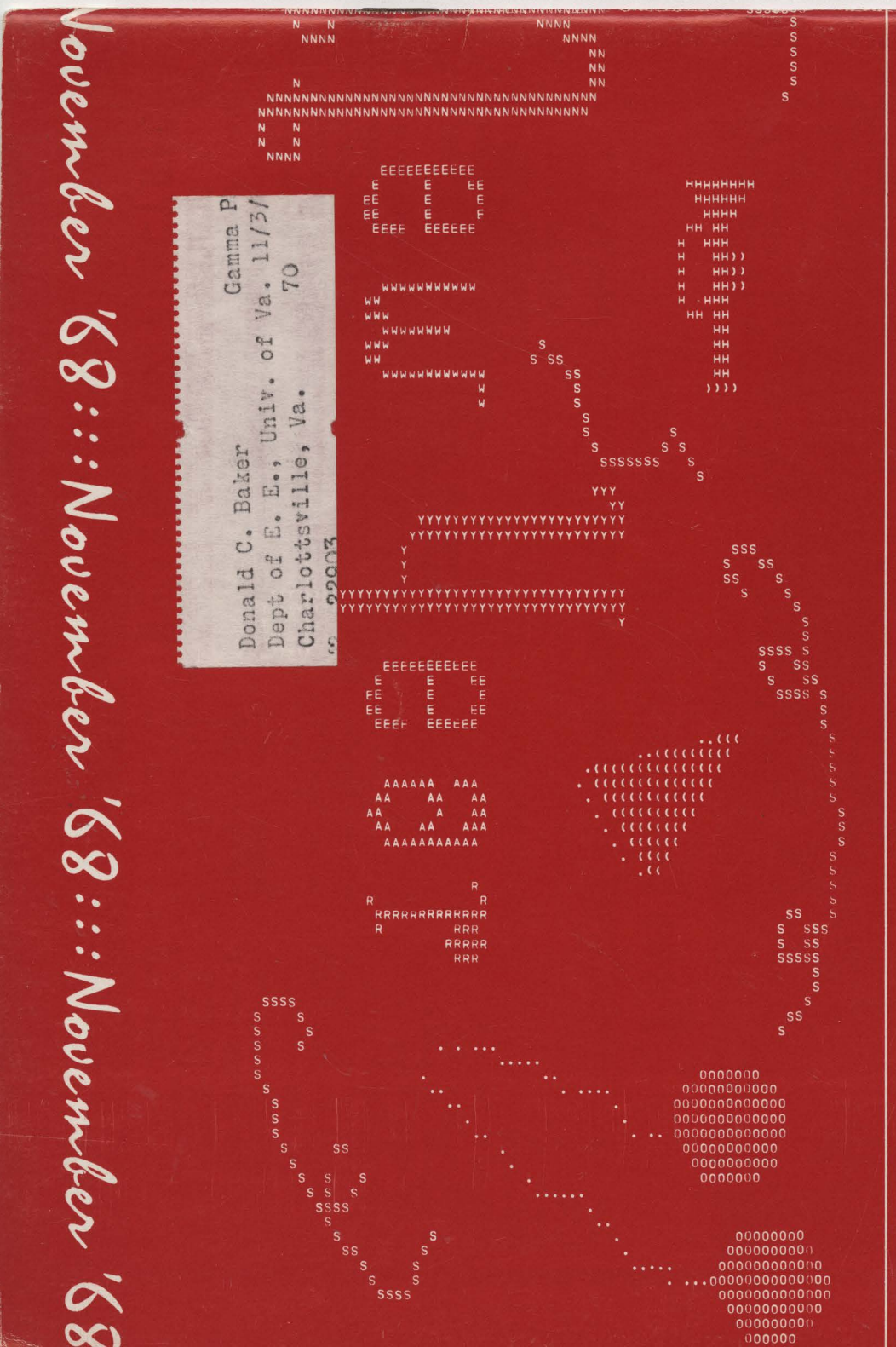

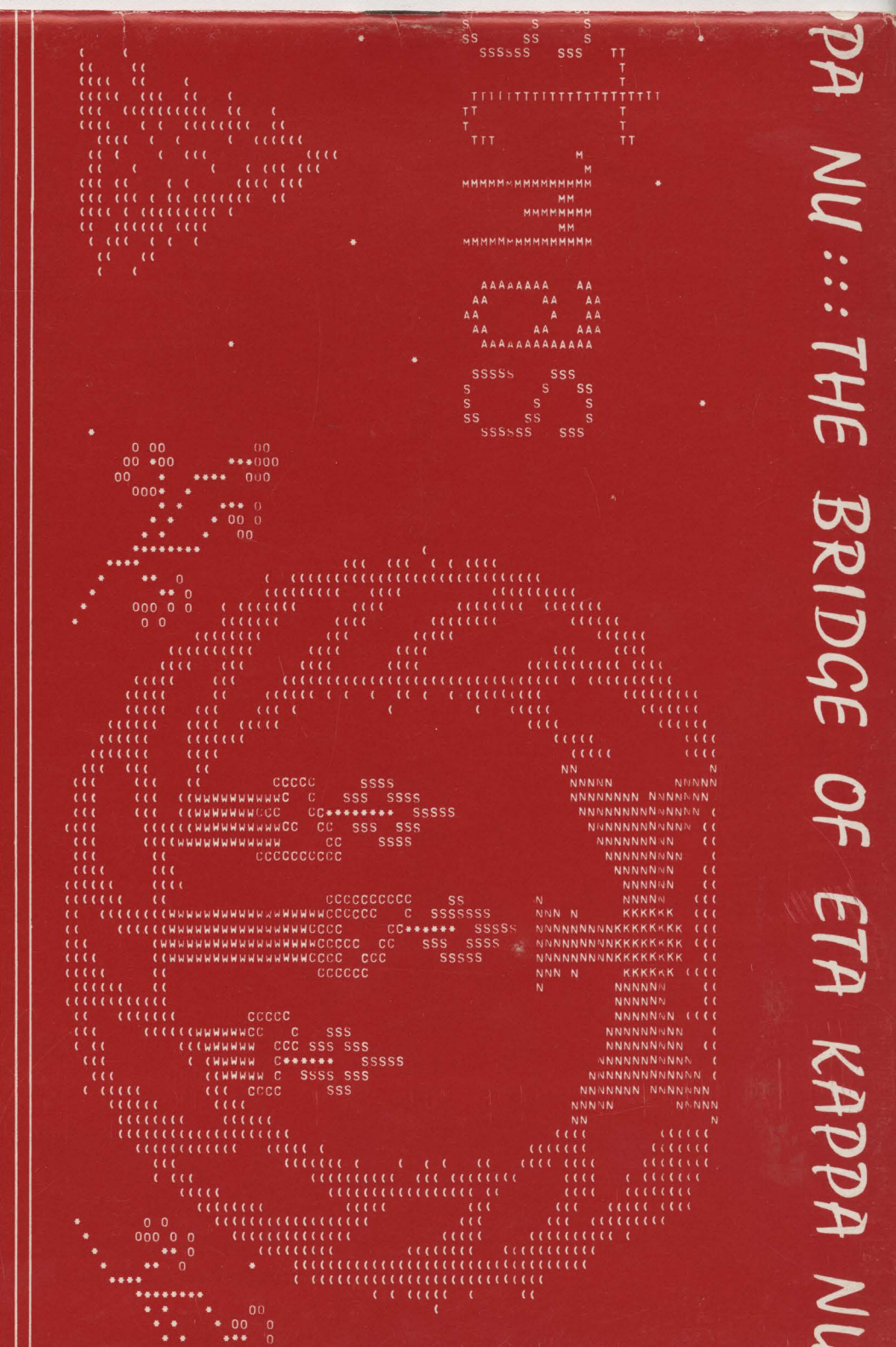

November '68 ::: November '68 ::: November '68

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ETA KAPPA NU

Electrical Engineering Honor Society

NOVEMBER 1968, Vol. 65, No. 1

Editor and Business Manager
Paul K. Hudson

CONTENTS

OUR COVER

Beautiful BRIDGE sends friendly felicitations to a comely company whose energetic engineers build complicated computors which when properly programed will print out Christmas cards like the one on the cover. (IBM 7094)

The BRIDGE is published by the Eta Kappa Nu Association, an electrical engineering honor society. Eta Kappa Nu was founded at the University of Illinois, Urbana, October 28, 1904, that those in the profession of electrical engineering, who, by their attainments in college or in practice, have manifested a deep interest and marked ability in their chosen life work, may be brought into closer union so as to foster a spirit of liberal culture in the engineering colleges and to mark in an outstanding manner those who, as students in electrical engineering, have conferred honor on their Alma Maters by distinguished scholarship activities, leadership and exemplary character and to help these students progress by association with alumni who have attained prominence.

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Real and Imaginary

Eye on the Sparrow

Old Bossy may have worn a cow bell to signal her whereabouts, but soon scientists will be able to keep up with animals and study the complete migratory habits of birds by simply tying tiny transmitters to all types of moving wildlife!

A new satellite system is being developed that will keep its eye on wildlife activities so thoroughly that man will at last find out what a giant sea turtle *really* does with its time.

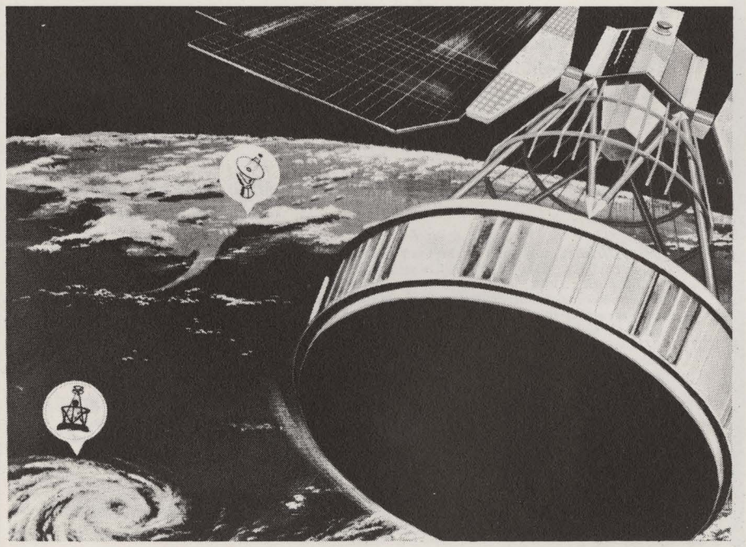
The electronic system developed by engineers at Radiation Incorporated, Melbourne, Florida, a subsidiary of Harris-Intertype Corp., is called the Interrogation, Recording and Location System (IRLS). The initial experimental use begins with the Nimbus-B Satellite launching scheduled for 1968.

This paves the way for the Nimbus-D and the Advanced IRLS, which by 1970 may turn out to be man's best snoop when it comes to discovering precise facts about wildlife activities.

For example, the Advanced IRLS may give scientists exact information about the life cycle and migratory habits of those giant sea turtles found in the area between the West Indies and the Ascension Islands off the coast of Africa. With the transmitter attached, the turtle will "broadcast" its movements and activities. The information would be picked up by the orbiting satellite, then would bounce to a pickup station, so the turtle would be under constant surveillance.

Still later systems — if and when they are developed — wouldn't even need the transmitters to keep up their busy "moving-migrating-flying" charges; their sensors would be able to distinguish between living things on earth by the radiation they give off.

(Continued on Page 8)



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Chicago Regional Visitation

By ROBERT J. MILLER

The second ETA KAPPA NU Central Regional Meeting was held in the Chicago area and organized by the Chicago Alumni Chapter. The meeting took place at the Teletype Corporation in Skokie, Illinois, a suburb of Chicago.

The meeting was attended W. P. Smith, President HKN, J. E. Farley, Vice-President HKN, H. H. Slocum, Member of the Movie Committee, three members of the Chicago Alumni Chapter and twenty students and faculty advisors from nine universities in the East Central Region. The following universities were represented: Bradley University, Illinois Institute of Technology, University of Illinois, Iowa State University, University of Minnesota, Northwestern University, University of Notre Dame, Purdue University, Rose Polytechnic Institute.

Following a 9:00 a. m. registration and welcoming of delegates, the meeting was convened by Mr. John Leary, President of the Chicago Alumni Chapter, who outlined the agenda for the day.

Dean William P. Smith, National President HKN, indicated that with 113 chapters it is simply not feasible to attempt to get together on a national level, and, therefore, regional meetings were established to provide better communication to the college chapters. Relating to expansion activities, it was pointed out that the 113th chapter was just installed in Florida, and it is possible that some thirty to forty additional chapters may be included some time in the future.

Delegates from the nine universities each made a brief presentation of their chapter activities and mentioned problems encountered along with solutions recommended. The points made included the following:

Activities

1. Tutoring undergraduate EE's, with or without participation of other organizations such as TAU BETA PI.
2. Sponsor of "Outstanding" Freshman Project" award.
3. Award to outstanding EE Senior.
4. Preparation of a "Teacher Rating Form" to be completed by the student with appraisal of strong and weak points.
5. Recommendation of award "Outstanding Teacher Of The Year."
6. Parents day demonstration of lab. activities.

The Movie Committee activity was discussed by H. H. Slocum,who outlined events leading to the preparation of the 1954 movie on *Engineering — A Career For Tomorrow* and the desirability of updating the film with a new version incorporating significant technical changes made over the intervening decade. Script preparation is now in progress and the level of financial assistance is improved because of recent co-sponsorship and assistance provided by IEEE.

A very interesting and informative luncheon address was given by Mr. Roger Klich, Vice President, Research and Development of the Teletype Corporation, who described how management views the engineering profession and indicated to the new engineer those attributes and attitudes that he should bring to his new organization.

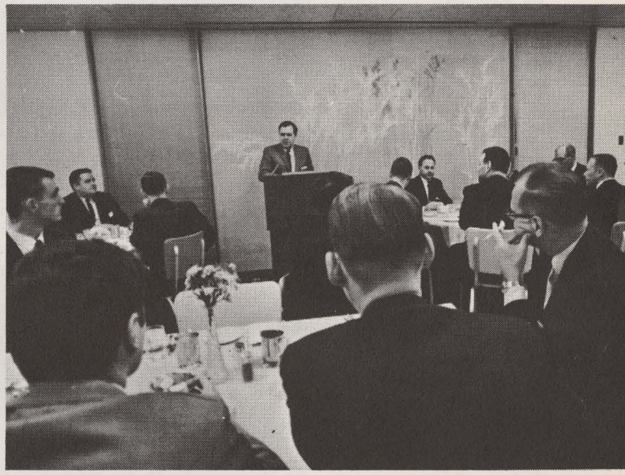
Following a very interesting tour of the Teletype Corporation facilities the meeting adjourned at 3:30 p.m.

Dean William P. Smith, National President of HKN on the left is shaking hands with Mr. Roger Klich, Vice-President of Research and Development at Teletype Corporation. To the left of Dean Smith is Jack Farley, National Vice-President of the HKN. In the front row on the left in order is Mr. L. E. Stauder, Faculty Advisor from University of Notre Dame, Mr. R. J. Miller Treasurer Chicago Alumni Chapter, Mr. E. Glenner, Vice-President Chicago Alumni Chapter and Mr. J. Leary, President Chicago Alumni Chapter. On the right side in the front row the three men from right to left are Mr. C. Rogers, Faculty Advisor from Rose Polytechnic Institute, Mr. H. Slocum, HKN Movie Committee Chairman, and Mr. J. Bellino, Project Director of Development at Teletype Corporation. Other student delegates in the picture are S. Kostoff, C. Totolo, S. Grepan, P. Wester, D. Zell, J. Hammond, J. Gravel, W. Harding, W. Wheeler, C. Butulos and G. Erickson.

Seated on the panel from left to right are, Mr. Jack Farley, Vice-President of National HKN, Dean William P. Smith, President of National HKN, Mr. Bob Miller, Treasurer of Chicago Alumni Chapter HKN, Mr. John Leary, President of Chicago Alumni Chapter HKN.

During the problem and discussion period, the delegates had a chance to discuss various topics pertaining to chapter activities.

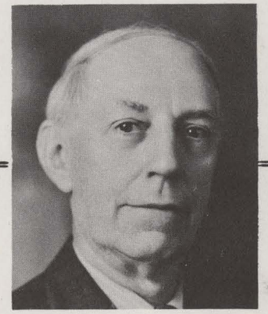
Delegates are shown participating in actual demonstrations of Teletype equipment. Mr. R. A. Neufeldt from Equipment Exhibits Department at Teletype is shown answering questions about the equipment.



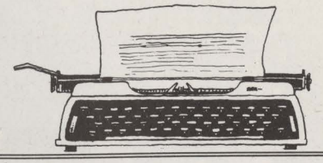
Mr. Roger Klich, Vice-President of Research and Development at Teletype Corporation is shown giving the after dinner speech which pertained to the outlook and relationship of Industry and the new Engineer.

Mr. D. B. Willmott, R & D Engineer at Teletype Corporation, is shown demonstrating MOS thin-film circuitry used at Teletype Corporation. The delegates could see the evolution and steps involved in development and manufacture of thin-film devices.

Mr. Bob Miller, Treasurer of Chicago Alumni Chapter of HKN and Senior Engineer in Test Set Design at Teletype Corporation is shown welcoming the delegates to the meeting hosted by Teletype Corporation.



LETTERS
from Ellery



RAIL TRAVEL IN 1853

Dear Friends,

Knowing how great was my interest in railroads when a boy you will not be surprised to know I was attracted to a book I ran across Saturday morning at the Urbana Library. One incident which shows something about the early railroads is the account written by Horace Greeley for the Tribune regarding his experience on a lecture tour in Indiana in October, 1853.

Greeley had given his lecture on Temperance at Lafayette and was to go by train to LaPorte, Indiana, for the next lecture. He went to the station in the early morning but could get no definite information as to just when the train would leave. After waiting several hours he learned the train he wanted used another station in Lafayette. He got to that station just in time to see the smoke of the departing train. So he had to remain and take the train the next day.

That day he boarded the train which to him seemed quite a combination of rolling stock. It was scheduled to start at 10 but actually did not move until noon. Five cars were packed with hogs, five with wheat, two with lumber, five cars with livestock and incidentals returning from a fair, and three cattle-cars loaded with people. The engine looked old and it had trouble moving the train.

Near Tippecanoe Creek Battlefield the locomotive ran off the rails and it took quite a time to get the wheels back on the rails. Then the supply of wood and water for the locomotive was used up. To get more the engine was detached from the train and was run to the next station where wood and water could be obtained. This took two hours.

But after its return as they were coupling it to the train a part of the boiler blew out making the engine inoperative. The engineer thought there was a locomotive at a place 40 miles ahead. So he got a handcar and proposed going with it to get the locomotive. The conductor decided to use a handcar and return to Lafayette to get an engine that would pull the train back to Lafayette. Greeley didn't want to stay longer in that place so urged the engineer to go on with his plan. And the engineer seeing how anxious Greeley was to get to Laporte offered to let Greeley ride the handcar with him. Some others also wanted to go and 7 men crowded on the little car which Greeley said "was the size of a wheelbarrow and a half." The men took turns pumping the car. The first 5 miles took 25 minutes and the first 10 miles took an hour. It took from 7 PM. until midnight to reach the place where the engine was supposed to be but when they reached that place they found the engine had been moved the other direction to Michigan City.

So what could Greeley do? They still were a long distance from La-Porte. Seeing how anxious Greeley was to get there the engineer offered to let him take the handcar and Greeley hired two men to pump the car because he had awakened the people in every house in that town trying in vain to find a horse that could be hired.

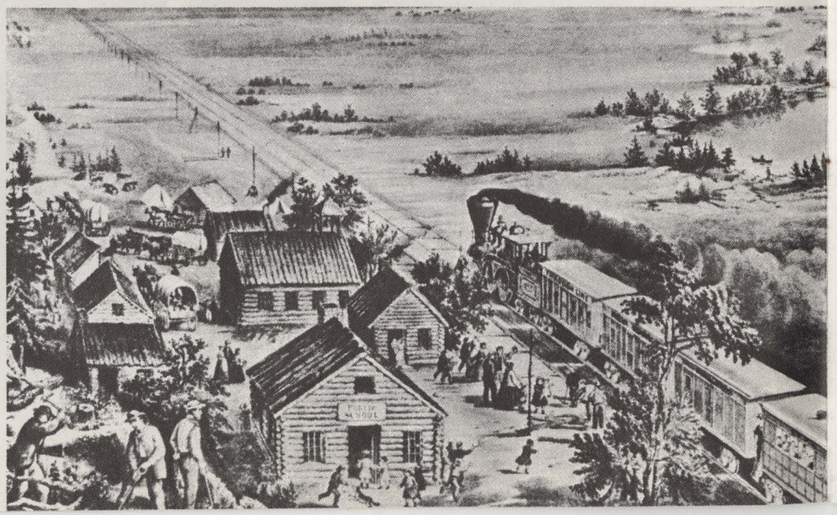
So all the rest of that night the handcar was pumped along and Greeley reached LaPorte at 9 A.M. and gave his lecture that afternoon on the subject of the evils of dram taking.

Such was what might be expected in those days in going by train. Greeley got there however and he tells of the interest he had in seeing wild geese, a great heron, many wild animals scared in the night by the handcar, five prairie fires, etc.

That railroad goes through Crawfordsville where Wallace lived. It is supposed that he wrote some chapters of Ben Hur while on train journeys on that railroad.

Great Love from

ELLERY PAINE
Eminent Member



The flight pattern of birds, the fishy side of a fish's underwater life far from the eyes of man — all could be picked up and studied carefully.

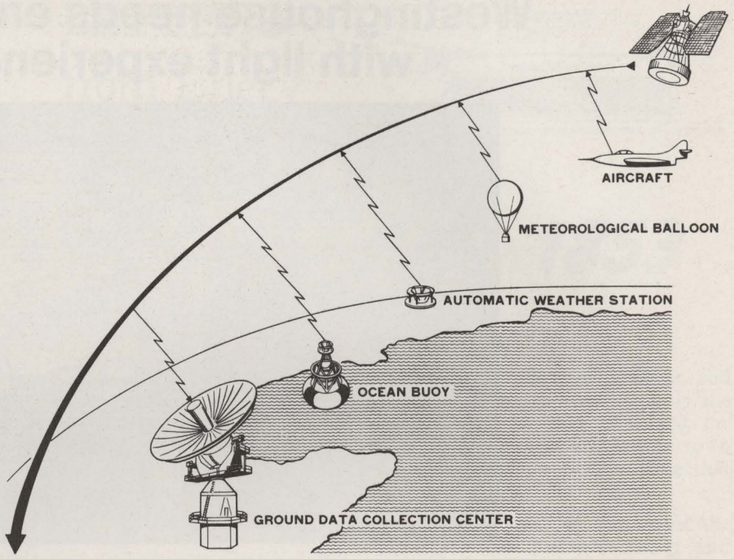
Similar satellite systems, including Eros, will make information readily available on conditions inside live volcanoes. These "eyes" in space will be able to "study" inaccessible deserts, glaciers and dense jungle areas — then report precisely on the conditions in an exact spot over a period of time. Man will no longer have to be there in person, for these advanced data collection systems will be highly useful to any scientist needing extensive information from any area which normally would be remote to humans.

In addition to tracking animals, spotting developing volcanoes and surveying remote areas, it will be possible for the satellite system to detect forest fires, provide iceberg warnings and help maintain inventories of coal, timber, water, mineral and cropland resources. More significantly, the Advanced IRLS will contribute to truly accurate long range weather forecasts.

While both the earlier and advanced systems are capable of collecting vast stores of information, the primary difference according to Radiation Incorporated is the Advanced IRLS's greater capacity and flexibility.

For instance, the IRLS system, which will begin with the launching of the Nimbus-B, can make 20 contacts — or interrogations — during a single polar orbit. But the Advanced IRLS, which will be ready about 1970, will be able to make 270 contacts per orbit — and will be flexible enough to operate with several different types of remote information stations. The Advanced IRLS will be "talking" to drifting ocean buoys, land weather stations, free floating balloons and aircraft.

Platforms for the first generation IRLS generally contain medium-capacity sensors and are attached to ocean buoys. They will also be used with the Advanced IRLS, according to Radiation Incorporated, but there will be smaller lighter platforms for balloon transport and a heavier type. And, of course, the capacity will be much higher.



Each platform for the first IRLS will have a 168-word capacity but the larger platforms for Advanced IRLS will be able to handle up to 840 words — which is pretty gabby for a satellite in anybody's book!

When it begins, the IRLS circuitry on the Nimbus satellite — very much like a hitch-hiker in somebody's car — will be commanded by the Ground Data Collecion Center at the beginning of eacl of its polar orbits to "question" different platforms at specific times. Then when the satellite clock time matches the programmed time, the satellite will send an address code to the platform.

The platform then acknowledges the address and transmits its data to the satellite — data on such environmental factors as water salinity and temperature.

Exact location of each platform is calculated by computer even when the platform is constantly moving. The sensor data is coordinated with the time of questioning and the satellite-to-platform "range" for tracking purposes and is stored in the IRLS satellite Data Memory.

When the satellite again passes over the Ground Data Collection Center, material collected from all the "questioned" platforms is received by the ground center. The information is separated, then forwarded to appropriate users.

The "Sea Turtle" data may go to an eagerly waiting naturalist.."Weather Conditions In Artic Ocean At 4 A.M." to the weather man, safe and warm in his bureau . . . and then all the information goes to help the most curious animal of all: Man.

THE NEXT EIGHT PAGES

Presented here is the sixth in a series of special BRIDGE supplements. This one, involving the dimensions of the human spirit, is in observance of the year-end holiday season. The cup on the first page is a detail from the painting **Still Life** by Zurbaran, courtesy the PRADO, Madrid. The painting on the second page is by Detlefsen,© 1964. The poetry on the third page © 1966 by Tom Jones and Harvey Schmidt, used by permission of Chappell & Co., NYC. The paintings on the third page courtesy the General Electric Co. The painting on the fourth page is Spenser's **Teardrop.**

THE CUP

And He said unto Peter, The cup which my Father hath given me, shall I not drink it?

The Cup Of Life

I, Charles Lounsbury, being of sound mind and disposing memory, do hereby make and publish this, my last will and testament, in order as justly as may be to distribute my interest in the world among succeeding men.

I give to good fathers and mothers, in trust for their children, all good little words of praise and encouragement, and all quaint pet names and endearments, and I charge said parents to use them justly and generously, as the needs of their children may require.

I leave to children inclusively, but only for the term of their childhood, all and every, the flowers of the fields, and the blossoms of the woods, with the right to play among them freely according to the customs of children, warning them at the same time against thistles and thorns. And I devise to children the banks of the brooks, the golden sands beneath the waters thereof, the odors of the willows that dip therein and the white clouds that float high over the giant trees. And I leave to children the long, long days to be merry in, in a thousand ways, and the night and the moon and the train of the milky way to wonder at, but subject nevertheless to the rights hereinafter given to lovers.

I devise to boys jointly all the useful idle fields and commons where ball may be played; all pleasant waters where one may swim; all snow-clad hills where one may coast; and all streams and ponds where one may fish, or where, when grim winter comes, one may skate; to have and hold the same for the period of boyhood. And all meadows with the clover blossoms and butterflies thereof, the woods and their appurtenances, the squirrels and birds, the echoes and strange noises, and all distant places which may be visited, together with the adventures there found. And I give to said boys each his own place at the fireside at night, with all pictures that may be seen in the burning wood, to enjoy without let or hindrance and without any incumbrance or care.

To lovers, I devise their imaginary world, with whatever they may need—as the stars of the sky, the red roses by the wall, the bloom of the hawthorn, the sweet strains of music, and aught else they may desire to figure to each other the lastingness and beauty of their love.

To young men jointly, I devise and bequeath all boisterous, inspiring sports of rivalry, and I give to them the disdain of weakness and undaunted confidence in their own strength. I give to them the power to make lasting friendships, and of possessing companions, and to them exclusively I give all merry songs and brave choruses, to sing with lusty voices.

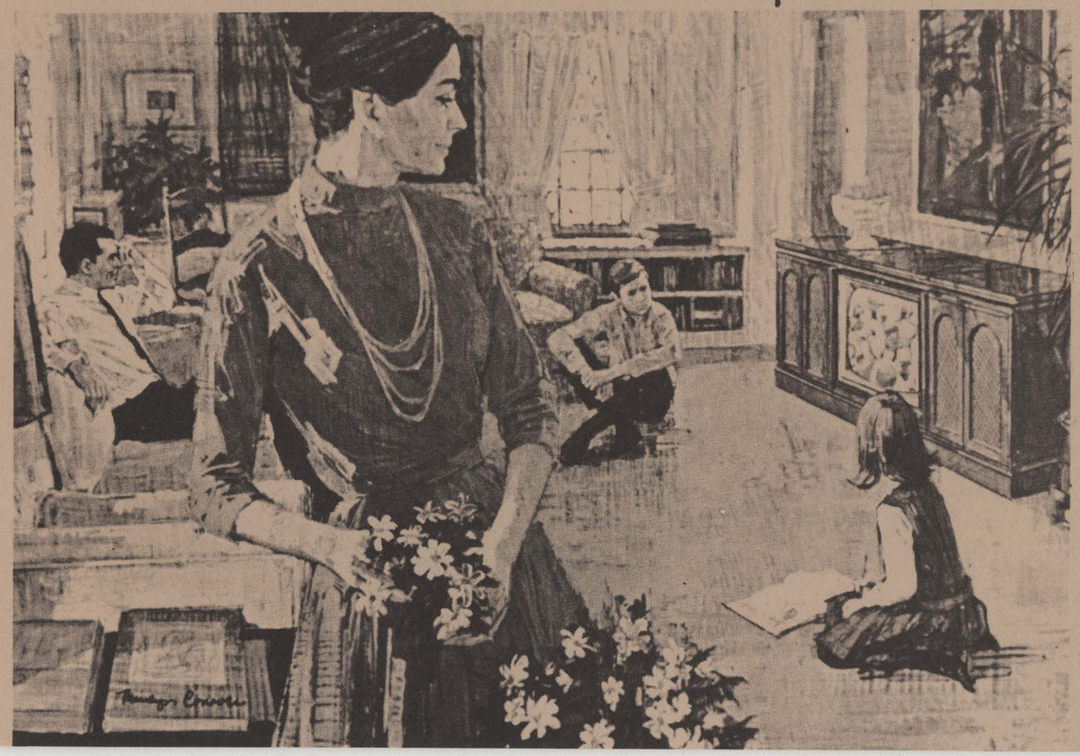
And to those who are no longer children or youths or lovers, I leave memory, and I bequeath to them the volumes of the poems of Burns and Shakespeare and other poets, if there be others, to the end that they may live over the old days again, freely and fully, without tithe or diminution.

To our loved ones with snowy crowns I bequeath the happiness of old age, the love and gratitude of their children until they fall asleep.

In only a moment,
we both will be old;
We won't even notice
the world turning cold.
And so in this moment
with sunshine above:
My cup runneth over
with love.

The Cup Of Love

Sometimes in the evening
when you do not see,
I study the small things
you do constantly.
I memorize moments
that I'm fondest of:
My cup runneth over
with love.



The Cup Of Childhood

by Vernie Larson Swenson

When I was a child, about the turn of the century, I lived on a farm in Minnesota. Closest to the Corner, South, in Kildare Township, their fields just across from our own, lived the John Malms. We didn't often have a close-up of Mr. Malm; he was seldom a church-goer, and whether through diffidence or by nature, not very sociable-seeming. We thought it a sad, sad thing, when Mrs. Malm died, leaving such heavy responsibilities to Selma, the eldest — who couldn't have been more than ten or eleven. Selma and Alma and little Esther were pupils with the rest of us at 40 West. Johnny, the one and only boy, on a farm that needed boys, seemed to us a replica of his father.

Selma and Alma were shy and silent girls, never seeming self-forgetful or secure. We girls felt protective of the Malm children — though Selma was close to my age — thinking they couldn't be happy at home, and seemed so ill at ease at school, with a sort of on-the-defensive attitude.

Selma, as said, was my age, or close to it, and so would walk along with me and my pals, Julia and Ruth, on our way home from school as far as the Corner, from where we went our separate ways. The Malm and the Claus Larson children would then continue southward together, being neighbors. But Ruth and Julia and I, differing only a matter of months in our ages, formed, throughout our adolescent years, an almost inseparable trio. Inseparable that is, except, as happens frequently in such three-way friendships, any two of us would occasionally — perhaps for no better reason than that we craved the excitement or diversion — gang up on the third of us: excluding her from our secrets, making a deliberate show of leaving her out. It was cruel fun when you were one of the two; cruel misery to be the one shut out. Fortunately there would still be Selma to turn to, so that it would not look as if you were reduced to taking up with the younger children for companionship! But with Selma, you never really felt intimate enough to discuss anything very personal; just friendly talk about school and church or whatever polite subject came to mind.

It may not have been during one of these threesome situations at all — Ruth may merely have been out of school for some reason at the time. Anyway Julia and I had both "matured" that season, and — forewarned though we had been by our mothers that this profound experience might come about at any time — this phenomenon of "becoming a woman" (a phrase we had heard) had prompted in us a quite natural curiosity and interest in the whys and wherefors of life.

It was while we were walking along toward the Corner on our way home from school, and lagging a bit behind the rest so as to be free to exchange confidences on new-found topics of profound interest, that the disturbing thought came to us: Selma, Selma — we said — she was close to our age! What if — with no one now to tell her anything — what if, suddenly, she should have this experience, why it would be just awful —— Why she would be scared to death, wouldn't she? Yes, she would! The way we would have been if our mothers hadn't made us "ready" for something like that! And Selma had no mother. Maybe your mother, I suggested, maybe your mother could sort of talk to her — since you're neighbors — She maybe wouldn't want to — Julia thought — not without asking Mr. Malm, should she — And Mr. Malm — well, he wasn't such an easy man to talk to — And, anyway, how could you talk to a man about anything like that!

No, it was obvious that was not the answer. No — but couldn't we —

The road home from a country school

couldn't we kind of talk around the subject — sort of like the three of us having a secret? Because you couldn't just let Selma go on in her ignorance, could we? No, you couldn't. Well, then, wasn't it our duty to tell her how things were for girls? Our Christian duty? We agreed it was! We felt very self-righteous, now that we had reached this virtuous decision.

It was a simple enough matter to maneuver things so that we were walking along with Selma a day or so later. We broached the subject, carefully, obliquely. We felt it our Christian duty, we said, since she had no mother. To tell her a few things about Life, we said. The way our mothers — and older sisters — had told us. We lapsed into Swedish, even, as was our wont, when a subject grew too profound for mere English. We took turns; when one hesitated, the other went valiantly on...

We had been prepared for whatever reaction; we thought. Like Selma going into a sort of nervous giggling over a so embarrassing subject, to cover up her blushes. Or, if we weren't very careful, even being frightened enough to burst into tears. We were not prepared; not for her quiet, dignified silence, as she let us stumble along with our little - girl - trying-to-talk-oh-so-grown-up burst of confidence. Finally, when we were quite done, and were wondering uncomfortably if perhaps she hadn't understood at all — or, still worse, maybe we shouldn't have made it our business to talk about such things after all — then Selma turned toward us and met our eyes quietly, gravely. In that moment, it was she who was a woman; we the awkward adolescents:

"Allt sådant talade Mamma om för mej — förrän hon dog," (All this mamma told me about before she died.)

It took a moment for this to reach us, as we trudged along. That Selma had known so long what we had learned only so recently...

I was strangely moved by this incident. I think Julia was, too. We spoke little of it, later; perhaps only to look wonderingly at each other and say: "She knew. All this time she knew." Our whispering confidences sort of thinned from that time to the merely occasional, off-hand reference; perhaps we sensed, uncomfortably, that our "virtuous" urge to inform had not been prompted solely by Christian concern. For myself, I was to see a quite different Selma from the one I had thought I knew from her awkward, diffident mannerisms. Beneath the surface was a person, miles ahead of us in her reach toward womanhood. Who was already assuming the burdens of womanhood in her care of a household and younger children; while we went our protected, carefree ways. I was to think very solemnly and deeply about a scene I could not banish from my imagination: a mother calling close to her bed — as she must have sensed her own life ebbing — this young daughter barely approaching teens, to lay upon her such hard truths as she must know for the care of the younger ones, and for her own welfare. Thinking about it made an ache come in my throat; it was sadder, sadder — and braver — than anything one could read about in books.... Wasn't it?

Epilogue

Dear Miss Malm:

When you were a little girl you had a friend named Vernie Larson. She passed away recently but before she died she wrote a book about her childhood that contains a charming episode concerning yourself. With your permission we plan to print this and in addition would be pleased if you could tell us your own recollection of the events mentioned.

Sincerely, Paul K. Hudson, Editor

Dear Prof. Hudson:

With regard to the reaction I had at the death of my mother at the age of ten, I will relate as much as I can recall.

My mother died in the night and I was told about it the next morning by my father. It seemed that this had the effect that from being a carefree child I at once became a person with a different outlook on life. Altho I did not at the time realize what the full impact of this would be, I knew that from then on there immediately was a responsibility for my younger sisters and brother who were too young to know the tremendous loss they had suffered.

My aunt, my mother's sister, came for the funeral and stayed on for a while. When she was ready to return home I was informed that she was to take our baby sister, who was then one year old, home with her to keep. This was perhaps as much of a blow to me as the death of my mother for I had helped care for the baby sister a great deal of that time. When the baby was born my mother's aunt who was the midwife of the community, did not arrive in time as she lived several miles away and had to be gotten to our house by horse and buggy. My father stopped in at the next door neighbor and woke the wife there to come to our place as soon as possible. By that time the baby was already born and I was the only one in attendance, having been called upon to remain there while my father was gone.

To make a long story short, my sister lived with my aunt and her husband until she was seventeen when they both died during the flu epidemic and she was told that they were not her parents and that she was not my cousin but instead my sister. Now we have lived together for many years and I can say that in the providence of God, and as I look back over the years of my life, it has been a happy and joyous experience and looking ahead, it holds joy unspeakable and full of glory for all those who trust in the Lord. Sincerely, Selma Malm

At age thirteen

The Cup Of Death

After Socrates had been condemned, but before he took the cup of death (hemlock) in his hands he addressed the people as follows:

I say to you, who have condemned me to death, that immediately after my death a punishment will overtake you, far more severe than that which you have inflicted on me. For you have done this thinking you should be freed from the necessity of giving an account of your life. The very contrary however, as I affirm, will happen to you. Your accusers will be more numerous, and they will be more severe, inasmuch as they are younger and you will be more indignant. For, if you think that by putting men to death you will restrain any one from upbraiding you because you do not live will, you are much mistaken; for this method of escape is neither possible nor honorable.

Moreover, we may conclude that there is great hope that death is a blessing. For to die is one of two things; for either the dead may be annihilated and have no sensation of anything whatever; or, as it is said, there is a certain change and passage of the soul from one place to another. And if it is a privation of all sensation, as it were, a sleep in which the sleeper has no dream, death would be a wonderful gain. For I think that if anyone, having selected a night in which he slept so soundly as not to have had a dream, and having compared this night with all the other nights and days of his life, should be required on consideration to say how many days and nights he had passed better and more pleasantly than this night throughout his life, I think that not only a private person, but even a great king himself would find them easy to number in comparison with other days and nights. If, therefore, death is a thing of this kind, I say it is a gain; for thus all futurity appears to be nothing more than one night.

But, if, on the other hand, death is a removal from hence to another place, and what is said be true, that all the dead are there, what greater blessing can there be than this, my judges? For if, on arriving at Hades, released from these who pretend to be judges, one shall find those who are true judges, and who are said to judge there, Minos and Rhadamanthus, Aeacus and Triptolemus, and such others of the demigods as were just during their own life, would this be a sad removal? At what price would you not estimate a conference with Orpheus and Musaeus, Hesiod and Homer? I indeed should be willing to die often, if this be true. For to me the sojourn there would be admirable, when I should meet with Palamedes, and Ajax, son of Telamon, and any other of the ancients who has died by an unjust sentence. The comparing my sufferings with theirs would, I think, be no unpleasing occupation.

But the greatest pleasure would be to spend my time in questioning and examining the people there as I have done those here, and discovering who among them is wise, and who fancies himself to be so but is not. At what price, my judges, would not any one estimate the opportunity of questioning him who led that mighty army against Troy, or Ulysses, or Sisyphus, or ten thousand others, whom one might mention, both men and women? with whom to converse and associate, and to question them, would be an inconceivable happiness. Surely for that the judges there do not condemn to death; for in other respects those who live there are more happy than those that are here, and are henceforth immortal, if at least what is said be true.

You, therefore, my friends, ought to entertain good hopes with respect to death, and to meditate on this one truth, that to a good man nothing is evil, neither while living nor when dead, nor are his concerns neglected by the gods.

Thus much, however, I beg. Punish my sons, when they grow up, paining them as I have pained you, if they appear to you to care for riches or anything else before virtue, and if they think themselves to be something when they are nothing, reproach them as I have done you, for not attending to what they ought, and for conceiving themselves to be something when they are worth nothing.

But it is now time to depart — for me to die, for you to live. But which of us is going to a better state is unknown to every one but God.

The Cup Of Remembrance

A new theory suggests that the famous Taj Mahal may not be just a memorial to a Mogul's favorite wife — but her actual "portrait" in architecture.

Shah Jahan, who as fifth Mogul of India began building the Taj in 1632, was known as a zealously religious Moslem. One of the tenets of his faith was that no actual person — or even a human figure — be represented in Moslem art, which limits itself to geometric designs.

What was the Shah to do, then, when his "Mumtaz Mahal," his "chosen of the Palace" and lover of 19 years, died.

The Shah, who sat on a solid gold throne flanked by life-size emerald and ruby peacocks, couldn't for religious reasons, allow himself the equivalent of a $1.98 locket with his beloved's picture in it.

Instead, he called in architects from far away Turkey, Persia, Italy, and France, and embarked on a series of conferences. What he said may never be known, but we know the result — the magnificent Taj Mahal which took over 20,000 men 22 years to build.

Two terraces, suggesting two legs, are crowned by a dome (head) which swells to the height of 80 feet and is 175 feet in circumference.

Twin domes (like breasts) rise on the terraces. These are flanked by slender minarets.

And a lace-like screen of white marble, considered one of the world's finest art treasures, stands in front of the tombs of the Shah and his beloved.

Could this screen represent a beautiful Moslem lady's veil?

The great entrance is ornamented in low relief. Directly under the dome in an octagonal chamber are the marble tombs of the Shah and his wife — and a single flower on her tomb is made from three hundred stones!

While we may never know exactly what the Shah told his architects to do, history records this story: Disgraced and broken from a revolt against his expenditures, he was imprisoned for seven years across the river Jumma from the Taj. His dying request was to be taken up in the tower of his prison palace for one last look at the Taj.

Here, just as dawn was breaking across the sky, he took his last look at the Taj across the river, from a window framed in Moslem archways.

One last look — at his beloved wife's "picture"? At a "personal snapshot" which cost 63 million dollars?

Come, fill the cup, and in the fire of Spring
The Winter-garment of Repentance fling;
The Bird of Time has but a little way
To flutter — and lo, the Bird is on the Wing.

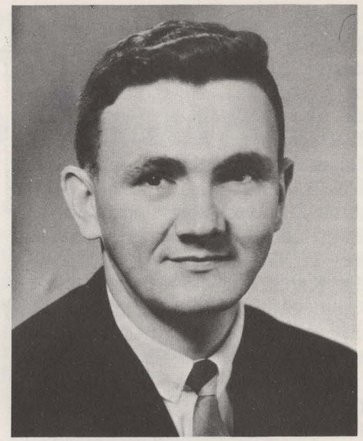
Ah, my Beloved, fill the Cup that clears
To-day of past Regrets and Future Fears:
To-morrow — Why, To-morrow I may be
Myself with Yesterday's Sev'n thousand Years.

Whether at Naishápúr or Babylon,
Whether the Cup with sweet or bitter run,
The Wine of Life keeps oozing drop by drop,
The Leaves of Life keep falling one by one

And when that Angel of the darker Drink
At last shall find you by the river-brink,
And, offering his cup, invite your Soul
Forth to your Lips — you shall not shrink.

OFFICERS AND DIRECTORS

Left — John Farley, National President



Right — John Hancock National Vice-President

Mr. John E. Farley, new National President (top left) is switching supervisor for Illinois Bell Telephone Company; but in his spare time, he has always been a Lake Michigan sailor. He owns a power boat but crews in sailboat races as often as possible.

Jack joined the Engineering Department of Illinois Bell Telephone Company in 1948 and worked with television and mobile radio systems. He has had a rather interesting and extensive career in the Bell system. He was at Bell Telephone Laboratories twice. In 1955 he worked at Bell Laboratories on the development of the first completely transistorized communication receiver in the VHF region.

During the 1958-60 time period, Jack was at Western Electric Company's Defense Project Division heading a group coordinating the solution of computer equipment and program problems connected with the SAGE system of the U.S. Air Force. In 1960 he returned to Illinois Bell in their newly formed Marketing Department as district marketing manager. In 1963 he was appointed special services engineer.

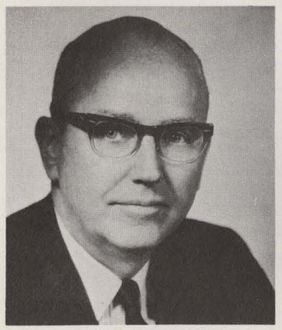
Jack became a member of Alpha Chapter at the University of Illinois, where he received his BSEE in 1948. He received his Master of Science from Northwestern in 1955.

Dr. John Hancock is Head of the School of Electrical Engineering at Purdue University. He received his Ph.D. degree from Purdue in 1957.

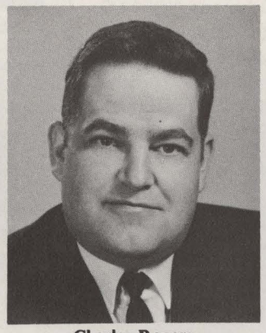
During this period from 1957, he has also acted at different times as electronic scientist and staff consultant at the U. S. Naval Avionics Facility, Indianapolis, Indiana, as a member of the technical staff at Hughes Research Laboratories, Culver City, California, and as a consultant to Ramo-Wooldridge Corporation, Los Angeles, California, Emerson Electric Company, St. Louis, Missouri, ITT Kellogg Space Communication Laboratory, Ft. Wayne, Indiana, Page Communications Systems, Washington, D. C., as well as to General Electronics Laboratory at Cambridge, Massachusetts.

He has credited to him over twenty-five published articles in scientific journals and presentations at national and international conferences.

Walter K. MacAdam, Vice President — Government Communications of the American Telephone and Telegraph Company — is coordinator of Government Communications for the Bell System. He began his telephone career in 1937. Following Engineering and Plant assignments in Atlanta, New York and Denver he was appointed Superintendent of Engineering for the Western Electric Company of the first DEW Line project in the arctic in 1953, and subsequently Area Chief Engineer for Long Lines in White Plains, New York. In 1959 he became Assistant Chief Engineer of A.T. & T. in New York. He was named Vice President in 1960. (Continued Next Page)



Walter MacAdam



Charles Rogers

Lloyd Cherry

William Bonser

Born in New York City, Mr. MacAdam holds a Master of Science degree from Massachusetts Institute of Technology. He is Past President of The Institute of Electrical and Electronics Engineers and is a Director of the United Engineering Trustees. He is a National Director of the Armed Forces Communications and Electronics Association. He is a member of Tau Beta Pi, Sigma Xi, and Eta Kappa Nu, the National Aviation Club, National Space Club, and is a Fellow of the American Association for the Advancement of Science.

Mr. MacAdam is married to the former Rilla M. Reed. He and his family live in Valhalla, New York.

Charles C. Rogers was born January 27, 1931, in Crawfordsville, Indiana. He completed the BSEE degree at Purdue University in 1953 and subsequently served in the US Air Force as an electronics officer on a long range radar. After discharge he became general superintendent of the Crawfordsville Electric Light and Power Company. Returning to Purdue in 1957, he served as an instructor and conducted research in electromagnetic scattering. He completed the doctorate degree in 1960.

After spending six months as a research engineer with the Collins Radio Company, he joined the faculty at Rose Polytechnic Institute where he has conducted extensive course and laboratory development in circuits, electromagnetics, and communication theory. In 1965, he became chairman of the electrical engineering department, the position he now holds. He was also instrumental in establishing the Epsilon Eta Chapter of Eta Kappa Nu at the Institute. Since joining Rose, he has participated in summer programs at Stanford University in plasma physics and at Princeton University in digital computation.

Dr. Rogers has served on the advisory board of the Aerospace Research Applications Center at Indiana University and as vice chairman of the Central Indiana Section of I.E.E.E. He is also a member of Sigma Xi and Tau Beta Pi.

Professor Lloyd B. Cherry is Acting-Dean of Engineering at Lamar State College of Technology, Head of the Department of Electrical Engineering and Director of the Lamar Research Center.

He holds the BA (1936) and MA (1937) degrees in Physics from the University of Texas and the BS in Electrical Engineering (1951) and the Professional Degree of Electrical Engineer (1951) from Oklahoma State University.

In the summer of 1964 he served as an educational consultant for U.S./A.I.D. in India. In this position he taught a course in transistors to nineteen Indian Engineering Professors.

Professor Cherry received the Western Electric Award in 1964 for excellence in Engineering Teaching. This award was made at the Southwest Meeting of the American Society for Engineering Education in Albuquerque, New Mexico. In 1962 he was named a Fellow in the Institute of Electrical and Electronic Engineers, and in 1967 he was named a recipient of the Piper Award for excellence in college teaching.

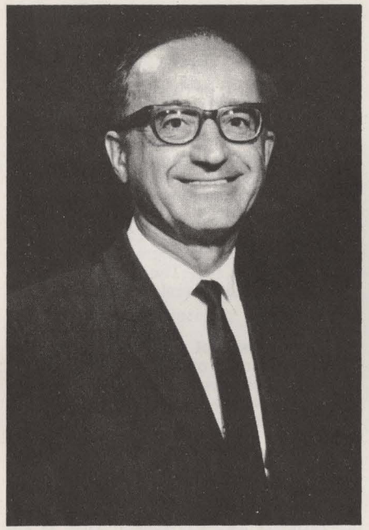
Mr. Cherry is a member of Sigma Xi, Eta Kappa Nu, Sigma Tau, Sigma Pi Sigma, Blue Key, Phi Theta Kappa, and Phi Kappa Phi.

The newly elected Director for the Western Region is William D. Bonser.

Mr. Bonser was born in Beaver City, Nebraska, January 11, 1925, was a participant in the Army Specialized Training Program at the University of Oregon in 1943 and received his B.S.E.E. from the University of Southern California in 1950. He has since worked with the California Electric Construction Company (1950-52) as a designer and estimator of industrial electrical systems, with C. F. Braum & Company (1953) as an electrical designer of petrochemical related sytesms, and with Larsen Hogue Electric Construction Company (1954-65) in design, estimating and management.

Mr. Bonser is presently establishing an engineering department for the Johnson-Peltier Electric Company. He has been a Boy Scout Leader since 1961 and was a Trustee of the Presbyterian Church from 1959 to 1961.

Mr. Bonser was inducted into Eta Kappa Nu as a junior at the University of Southern California, has been active in the Los Angeles Alumni Chapter since 1950 and was President of this Chapter in 1958.



A FIRESIDE CHAT with Cledo Brunetti

The FMC Company, like many others, is employed in a wide variety of defense programs of both chemical and mechanical natures. We have developed a much improved amphibious personnel carrier, the LVTPX12, that can be landed from a ship at sea. It employs water jet propulsion which drives the carrier faster with half the horsepower.

A concept created by our engineers could allow large submarines to transport troops to within a safe distance from shore. It would then transfer troops to a smaller vehicle looking like another submarine with outside tracks on it. This vehicle would crawl along on the bottom or could swim to the top and then land on the beach. We are working on a variety of other vehicles for carrying missles and other fire power. Our hydrofoil built boats ... are also being considered for military application where it is necessary to go from land to water rapidly, and vice versa. Our Northern Ordnance Division in Minneapolis is the principal Navy facility for producing shipborne missile launchers and guns. They are working on new concepts for faster more reliable missiles launched from ships. Our Portland Division is building a new series of high-speed patrol boats for the Navy...

The Defense Department is giving considerable attention to faster nuclear powered aircraft carriers and to helicopter carriers that can move rapidly into an area such as the Mekong Delta. Also being investigated are the air cushion type of vehicles in which the vehicle floats over the land or water by a cushion of air created by a fan blowing downwards...

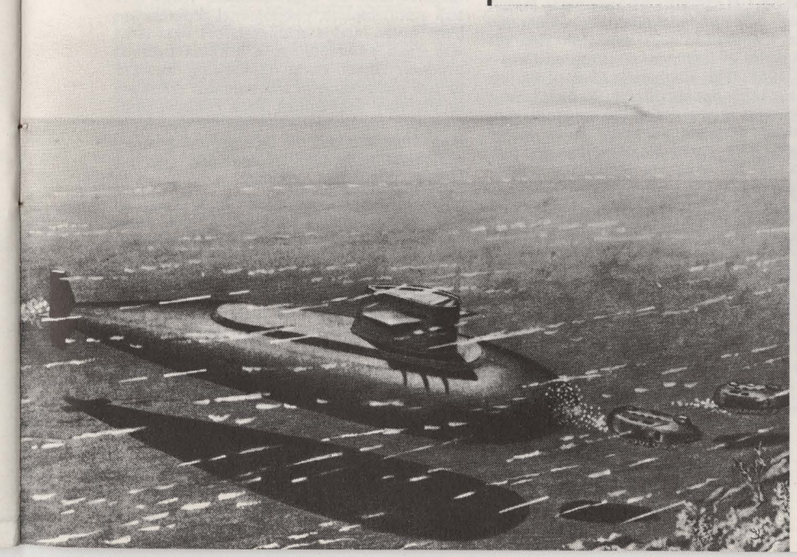
Present defense programs concentrate substantial effort of weapons systems teams in new types of aircraft and air transport systems. New propulsion systems, fuels, and high temperature materials will make it possible to increase the range of the large aircraft by 1975 to 50 percent more than today. The Defense Department seriously is looking at aircraft that can take off vertically from an airport and fly from city to city without the long landing fields (and the long walks required to go from the aircraft to the terminal).

...There is much to be done in the military and commercial aircraft field. Although we have automatic collision avoidance equipment today, it is far from the quality we need. We expect to have the first universal aircraft tracking system in operation by 1975... Much work will... be done on supersonic aircraft to reduce sonic boom and other noises caused by aircraft on takeoff, flying and landing...

We are using new high energy fuels in rockets in the space program. Scientists are now giving attention to the possibility of using fuels of this type in aircraft ...

For space defense, the Air Force is working in a Manned Orbiting Laboratory, a $1.5 billion project, which could be launched within a couple of years. To start with it will use one of the Gemini capsules modified to include a laboratory. This laboratory could be equipped with devices for analyzing unknown satellites to determine whether they carry any military warheads.

A futuristic Ordnance experimental design for "guppy subs," submersible assault amphibian cargo and personnel carriers. The guppies were designed to be stowed inside a submarine and used as assault carriers on land.
(Photo courtesy of FMC Corporation)



CHAPTER NEWS

BETA, Purdue University — Has had a very active year. Forty-five undergraduate members and nineteen professional and graduate members were initiated, and the chapter has carried on several projects.

In conjunction with IEEE, Beta Chapter has opened a lounge in the Electrical Engineering building where students and staff can gather for coffee and informal conversation. A weekly sack-lunch meeting is held between various staff members and interested students, the subject being "whatever comes up."

A staff — HKN picnic is scheduled for late in the spring and promises to be a real success.

The School of Electrical Engineering has accepted an HKN proposal that graduate instructors be given some training in instructional techniques. Action is presently being taken by the administration to insitute this program.

Some other projects carried out this year include a senior elective seminar in which instructors relate the purposes and content of their courses and the institution of a speaker-from-industry program of guest speakers with emphasis on what a graduating engineer needs to know when applying for and accepting a position and what he should expect for the first few years after graduation.

Beta Chapter also participated in the regional meeting at Skokie, Illinois.

DELTA, Illinois Institute of Technology — On March 2, 1968, all of the officers of the spring semester attended the Regional Conference of HKN, which was held at the Teletype Corporation in Skokie, Illinois.

A program of faculty ratings by the students was revived after an absence of several years from our campus. A new rating form was prepared by the Chapter, and was distributed by all the EE instructors. The final results of the survey were made available to the instructors. In conjunction with the rating forms, the Chapter has installed a plaque on which the name of the **Best EE Instructor of the Year** will be inscribed.

On April 28, our school held it's annual Parent's Day and Open House. The Chapter set up and manned displays of various electronic experiments in our EE labs.

Early in May the Chapter initiated eleven new undergraduate members. Our semi-annual Banquet was later held at George Diamond's Steak House. The guest speaker was Dr. L. Greenstein, one of our faculty, who was then given the Best EE Instructor of the Year Award.

IOTA, University of Missouri—The University of Missouri Iota Chapter of Eta Kappa Nu sponsored several activities for the winter semester. As usual initiation of new members was held and twenty new members were initiated including a member of the opposite sex. The annual award of the **Outstanding Sophomore in Electrical Engineering** was made and presented at the Honor Awards Banquet during Engineers' Week. Along with Engineers' Week the Iota Chapter cosponsored a prize for the best Electrical Engineering lab exhibit and sponsored two lab exhibits that helped the Electrical Engineering Department win the lab exhibit award in competition with all of the other departments.

KAPPA, Cornell University — Sunday, March 10 we had our smoker to which we invited juniors and seniors who were at that time eligible for membership. We had informal talks and refreshments were served.

Thursday, March 21 we had a meeting of the newly invited members and held elections for next year's officers.

Our most interesting function of the semester was our initiation banquet, held March 28 and preceded by the initiation. As well as old and new members of HKN, several members of the electrical engineering faculty and their wives were able to attend the banquet, too. After the dinner we were fortunate enough to have Professor Neil Brice give a captivating talk on the "Wildlife of Antartica."

At the end of this semester the Chapter once again distributed course evaluation forms to students in the Electrical Engineering School and combined the responses to give to the individual instructors.

PHILADELPHIA
ALUMNI
LUNCHEONS
on the first Monday
of each month,
OCTOBER to MAY
at the ENGINEER'S CLUB
Everyone Welcome ! !

ALUMNI CHAPTER, Philadelphia, Pennsylvania — The Philadelphia Alumni Chapter of Eta Kappa Nu will hold the first of its fall series of luncheon meetings on October 2, 1968. The Engineer's Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pennsylvania is the site of the meetings. An interesting program of speakers is being arranged. The dates for meetings for the balance of the year are November 6 and December 4.

PHI, Union College — After being inactive for several years the Chapter became active again in the spring of 1967. Since then Phi Chapter's members have been deeply involved in many of the activities associated with the Electrical Engineering Department. Members of Eta Kappa Nu form the nucleus of the Executive Board of IEEE. Phi Chapter members also performed most of the work on a joint project with IEEE which was placed on display as part of Engineer's Week in February. Finally the Chapter is now working on plans to send a brief questionnaire to the alumni. The results of this survey will be used to aid graduating seniors in planning their futures, and to aid the faculty in reviewing the curriculum.

On February 11, 1968 Phi Chapter initiated three new undergraduate members into Eta Kappa Nu. The Chapter also expects to initiate several juniors later this spring.

RHO. University of Colorado — This year we have continued our tradition of awarding the outstanding sophomore an award in recognition of his achievements. This year the award was received by Karf Schaaf. Due to the retirement of one of our electrical engineering professors, Lloyd A. Bingham, our chapter cooperated with the local branch of IEEE and presented a set of high quality fishing rods and reels to the professor who has helped many of our students through the basic circuits. As always the Chapter had a banquet following the initiation of the new members. This year it was held at The Gold Hill Inn and was attended by the professors and active members. It was followed by an informal gathering at the same establishment.

BETA THETA, Massachusetts Institute of Technology — Beta Theta Chapter enjoyed the singular honor of inducting Professor James Bruce as a Professional Member this term. Beta Theta alumni may recall Professor Bruce pioneered the use of computers to manage the ballooning number of functions of the EE Dept. and the Institute.

The pledge program of Beta Theta Chapter was decidedly more structured this term. In the past, there has always been a pledge committee engaged in compiling information on EE graduate schools. However, since this committee competed for man-power with a multitude of other pledge committees, progress of the project was slow and could not keep up with new and updated information. This term, all pledges worked on a single committee dedicated to completing the compilation and to preparing it in a form suitable for reproduction. While it is still not complete, phenomenal progress has been made, and a similar effort next term will most assuredly see a brilliant finished product. Beta Theta is looking forward to the publication of this valuable reference in the very near future. Beta Theta Alumni who can remember when, in the dim past, they, too, worked on this endless project, may take heart that their work was not in vain.

On the social calendar, Beta Theta is cooperating with Tau Beta Pi and other engineering honoraries at M.I.T. in throwing a fall back-to-school social. We lack only the honoraries at nearby girls' schools interested in cooperating, too.

BETA PI, The City College of New York — One of the most important activities of the Beta Pi Chapter this term, was the re-

(Continued Next Page)

vision of its bylaws. Redundant sections were eliminated, others were removed, and new ones added to make the bylaws more workable and effective.

On April 27, nineteen new members were initiated into the Beta Pi Chapter at our induction ceremony and dinner held at the Park Sheraton Hotel.

Gary Fishman has been chosen to represent Beta Pi for the Outstanding Electrical Engineering Student Award sponsored by the Los Angeles Alumni Chapter.

Plans are being made by Beta Pi, together with the other honor societies, for City College's E & A Day to be held this fall in honor of the 50th Anniversary of the School of Engineering and Architecture.

DELTA DELTA, University of Denver — Delta Delta Chapter of the University of Denver held a meeting May 17, 1968 for the purpose of electing new officers for the coming year. Those elected were David T. Crook, president; Richard Warner, vice-president; Harold M. Wenzel, recording secretary; John Greer, treasurer; Richard Warner, correspondence secretary; Steven Bruland, Bridge correspondence; and Henry D'Angelo will remain faculty advisor.

DELTA OMICRON, University of New Mexico — This year our chapter made an extended drive to get members who were juniors so that the chapter would be able to pass on some experience. We had fifteen junior pledges and five senior pledges in the beginning of November. We then had the installation banquet.

This year the pledge class took on as a project, the design, construction and installation of a message board for the new basketball arena. They are now about three-quarter done with the construction.

We also changed the election of officers from the end of the spring semester to the end of the fall semester. Now the incoming officers can get some help before the seniors graduate.

EPSILON ETA, Rose Polytechnological Institute — Epsilon Eta Chapter at Rose Poly has avoided the spring slump that hits many college organizations annually that have been quite active during the third quarter.

April 31st saw the Chapter sponsor "EE Day," during which projects of twelve junior and senior electrical engineering students were displayed for all interested faculty and students. The basic purpose of the program was to interest freshman in Electrical Engineering at Rose.

The Chapter also set aside an afternoon early in the third quarter to prepare the pulse code modulator, last year's pledge project, for use. It is expected that the PCM will be ready by next fall.

At the direction of President John Spear, a committee has been formed to investigate the possibility of purchasing a bronze casting of the Bridge to be displayed on campus. Also, in an effort to keep up with our alumni, President Spear has initiated the creation of an alumni address list. Therefore, he asks that all alumni send to Rose Poly their present address, c/o John Spear, President HKN.

EPSILON NU, California State College at Los Angeles — Epsilon Nu Chapter has initiated an on-campus tutoring program for engineering students. The courses tutored were junior and senior levels of engineering and mathematics. Posters and notices were printed to publicize our program, and engineering professors were asked to recommend this program to all students in need of assistance.

We are glad to report that an enthusiastic response was received from students, and we have therefore decided to continue this service as long as students seek help. This is one way our chapter hopes to serve our school.

EPSILON THETA, California State College at Long Beach — This semester Epsilon Theta has expanded its personal tutoring service to include two more undergraduate EE courses. A voltmeter currently being built by our chapter will be on display soon. Designed so that all of the various parts will be visible it will be used primarily during Engineering Day held every February.

The Spring Smoker was held on March 22, in the Belmont Room in Belmont Shore. The Smoker was held to meet the prospective members and to acquaint them with the requirements, purpose and goals of our society. During the next month pledging activities and a poker party helped to further acquaint the pledges with our chapter. On the Saturday afternoon of April 20, thirteen new members were initiated into Epsilon Theta. The Galaxie Restaurant, located atop the Crocker Citizens National Bank in Santa Ana, provided the perfect setting for a cocktail party and buffet dinner held later in the evening to honor the new initiates.

GAMMA PSI, Lafayette College — This past year has been a very productive, interesting and rewarding year for Gamma Psi Chapter. Productive in the fact that more members took an active part in our activities, interesting since this year marked the first time in our history that evening program students were included actively in the chapter. In fact an evening student held one of the chapter offices which was a first for our Chapter. This proved very helpful in communicating with the other night students. Rewarding to all of us, especially our officers, to see and feel that the chapter finally came of age.

Presently our membership is twenty-two. Of these eleven are day students and eleven are night students. Since there are as many night students it was felt that they should be included in all activities. Their ideas and suggestions proved most worthwhile.

GAMMA PHI, University of Arkansas— Monday, September 25, 1967, the Gamma Phi Chapter of Eta Kappa Nu got underway with the election of faculty advisers. Professor Bryan Webb was re-elected for the position, and Dr. J. R. Yeargan was chosen to replace Professor Tacker, who had left the University.

Sunday afternoon, December 3rd, officers, members, and pledges met in the Student Union Building for the fall initiation of seventeen new members.

During the latter part of the spring semester, the membership continued to grow with the addition of twenty more members.

It was decided that the Gamma Phi Chapter would have its annual outing at Lake Weddington the Saturday of May 11, but due to persistent rain, Dr. Yeargan, newly elected faculty adviser, offered his home as "picnic" grounds for the celebration that was to close a most successful year.

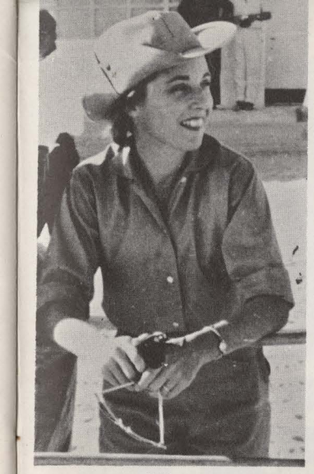
GAMMA XI, University of Maryland — The brothers of the Gamma Xi Chapter of HKN began the semester with their registration program. Members took turns assisting at registration, thus relieving the advisors of many routine matters. This project also offered an excellent opportunity to prepare a preliminary eligibility list from the records available during registration. This was done in order to get an early start on the pledge program and to avoid the frantic pace that begins in the last month of school. Plans are under way to continue this program during the fall.

To aid the Electrical Engineering Department in the preparation and scheduling of classes for the fall, a special survey was undertaken. The survey contained questions aimed at determining the most favored time for courses to be given and at determining which classes should be prerequisites or the semester in which courses should be taught in order to help the student in other courses.

DELTA BETA, Lamar State College of Technology — Earlier this year the Delta Beta Chapter conducted a slide rule course in conjunction with Chi Epsilon, civil engineering honor society. The course offered to anyone who was interested, but was especially designed for freshman engineering majors. The course seemed to be very successful.

Soon we will mail our annual Newsletter to all Lamar Tech Alumni of Eta Kappa Nu. I t will contain interesting information such as the name of our new department head, Dr. W. C. Bean, and our new engineering building. We hope that this Newsletter will be of interest to ou EE grads.

As required by the Post Office, the BRIDGE mailing list is now set up numerically by Zip Codes which is not the same thing as alphabetically by states and cities. Therefore, when you send an address change to national headquarters you must send the old address and old Zip Code number as well as the new address and new Zip Code number.



Miggs

The Great Sahara Mousehunt

Catherine Collins and Miggs Pomeroy

27TH MARCH

THREE GUNS WENT out early this morning and came back with two gazelle bagged by John and Frank. Hank went to work, skinning and cleaning with wonderful dexterity, put the hide and skulls to dry for his collections and gave me the meat for dinner. I have marinated it in olive oil, lemon juice, onions, garlic (bless Randolph for insisting on our bringing garlic along) and salt. The skin and skulls are hanging in No. 2 car. Catherine has taken me tactfully aside to whiff the interior.

'Do you smell anything sort of mortuary?' she whispers unhappily.

I try to be comforting. 'Hank says there is no bacterial action in this dry desert air,' I say. If anyone says a thing definitely enough I am inclined to believe it. Catherine is not convinced.

'I'm not worried about bacteria,' she says crossly. 'I just don't like the smell.'

Today is laundry day with plenty of water, cold though it be, and a brisk wind for drying. Catherine pounds her things and Winston's against a convenient rock, periodically sluicing them with water. It is a far cry from that pink washing-machine with its chromium-plated buttons. Winston holds up his end of the labour detail by supplying her with water and orangeade, and even hangs up a few pieces. The lighter pieces dry between the tub and the line. When she is through I do my lot, and in the meantime the men are all scrubbing and bathing here and there among the rocks. Liv spends the day whittling away at an old whisky-crate which he is converting into fox-traps. He is going to bait them with gazelle meat, unmarinated, and put them among the rocks and, by special permission, in Abubaker's house. Abubaker has told him that the foxes raid the house whenever there is food around. In the midst of laundry, hair-washing and general clean-up Abubaker comes to call. We give him Winston's pink orange drink and he talks of foxes and other problems. Some of the people at his settlement have not been away for thirteen years. They or their parents fled here from Kufra at the time of the Italian conquest of that oasis more than thirty years ago. Most of the original settlers died of thirst, for there were too many then and not enough water to go round. It is hard to imagine such a bleak life. They play cards, produce children and drive their camels to pastures as far as sixty-five kilometres away on the other side of the mountain. They do not appear to grow anything except one or two tired tomatoes. They have one radio, which they have begged Jack Thompson to fix. He needs a part which Abubaker says may take six months or a year to get, and we can't wait! Abubaker himself is from Kufra. He has been here seven months and he would like to take his wives, his children and his camels and settle in the Chad.

In the afternoon Abubaker will take us to see the rock-paintings. There are many of them but we haven't the time to explore. When we arrive to pick him up at Ain Zwaia Catherine makes such a hit with her Polaroid that he invites her into his cave to photograph his family. I tag along with my less dramatic camera and the men sit in the cars simmering with envy. The children all have their heads shaved with appealing little tufts of hair left, by which to yank them into paradise should occasion demand. A giggly young wife with a baby at her breast lets us photograph her without demur. She wears red flowered trousers, a crimson striped barrakan and a black head-shawl. We both think her pretty and sweet, but the second wife is rather a beauty, black and statuesque and resentful. She pulls her shawl across her face until Catherine peels off the first picture and presents it to the first wife. In a moment the second girl has dropped her shawl, and pulled it well aside to show a breast covered with gold jewelry, heavy ear-rings flashing as she throws up her head. We were both sick at not having colour film, and worried because the entrance to the cave is so dark. Catherine parts sadly with the best of her pictures but still manages to keep a couple.

To reach the cave-paintings requires a fair percentage of mountain-goat blood. Catherine gives Charlie her camera to carry, somebody else her films and somebody else her hand. She screws her eyes tight and leaps in the most petrifying fashion. Heights are not one of my fears, but I am too small to scale some of these boulders, and I keep Liv close. Catherine says for the first time she is glad Alan is not here. She says his head for heights is even worse than hers, which is only to say that he has none at all.

The paintings are more than worth the risk. They are no rough primitives, but delicately painted in terracotta, clay blue and white; cattle, men, one with a bow, women and children. The cattle are long-horned. How many thousand years since this country has been able to support any sort of cattle? Was this sand really covered with true grass, these skeletal mountains with the flesh of earth, grass and trees? Have a thousand or more years of drought and wind blown it all away? We would all like more time to explore Uweinat. But we've lost too much time on clutch-plates and such, and we must go on.

28TH MARCH

LAST NIGHT THE wind blew from the south, strong and hot. It roared in from the plain, with the thundering of an express train, turning our boulder village into a funnel of rushing air. Sand in eyes, ears and beds, cups tinkling away across the plain. A camp-bed, unoccupied for a moment, jumps the rocks and rushes away in a frenzied dance, a stumbling body and strange Gaelic curses hurtling after it. The moonlight makes these boulders menacing and ghostly, and even more gigantic than they are by day. Who pushed them off the top of the mountain? Is whatever-it-was still up there? We talk ghosts and ghouls over our charcoal fire, and when Catherine goes off to her bed behind a distant rock, which she thinks a better windbreak than anyone else's, she goes reluctantly. Liv and I make our beds close to the car, knowing that there is no such thing as a break for such a wind. As we snuggle down we hear a yelp.

'Fox!' Liv cries with satisfaction, tugging at his zipper. Everyone has said he would not get anything with his home-made traps. Before he can disentangle himself from his sleeping-roll the cry is repeated with increased and panicky volume from the direction of Catherine's windbreak. He finds her sitting up in bed, tangled in a cardboard ration-box and a roll of film which had rushed at her through the darkness with far-from-inanimate venom. She pulls her head down into her sleeping-bag, confining wind and rocks and ghouls alike to outer space, but obviously expecting anything to happen.

This morning everything is still and hot. We refill on water and pack up. We have ahead of us the longest lap without water, Uweinat to Tekro in Chad, three hundred and twenty miles. About twenty-five kilometres south on the plain we cross the first of the big camel pastures. Water would certainly make a great grazing land of these plains. As it is the pasture is yellow and thin. We see fifteen or twenty camels neither hobbled nor attended. I don't suppose there is any temptation for these animals to stray from the pasture until either it or they are dried up, at which point they would surely head back to the only water. Now the dunes are on our left, pyramid-shaped, every sharp sand-blasted edge in place. We have seen step pyramids cut out of the sand as though by a human hand, and now these. Catherine says nobody could have thought Egyptian geometry up without an object-lesson and here it is, where it has been for millions of years, and all the while the Egyptians have pretended to be so original. In 1932 Ralph Bagnold, a British Army officer with an adventurous spirit, made this journey with some model A Fords. He named some of the little hills we are now passing, Mud Lion, Sandara, Giant Flat Tops (there are a lot of these), Dune Gateway, Lone Tree (no tree, or perhaps we are not where we think we are). I try to draw silhouettes of these, or what I suppose to be these—but photography would be better. Drawing while one bumps over the sand is not much help to anyone. The going is good for the most part. We have not had to use the out-walker technique and have only had five boggings. It is really hot now, too hot to eat. We mix a variety of tinned fruit and have that for lunch. We have no bread and fortunately don't want it. The bread we started with from Benghazi was stale within a day, hard as a rock within two days. A fresh supply, baked in Kufra, lasted longer, as the Kufrans bake their bread with oil. But now even that is gone.

In the afternoon No. 5 has fuel-pump trouble and has to have the pump replaced. While John and Taffy work on that Winston makes us all tea and we have a party with tea, hard tack and marmalade. It is late enough for the cars to cast shadows and we crowd into this relative coolness, gratefully. Winston and Liv discover that they have gone to the same school, though years apart, and they talk of the rough old days and the professor who used to twist their arms when sufficiently exasperated.

The pump takes an hour to fix and we are back on our way again. While Winston was tea-making I found a cache of ostrich-egg shells. Hank says they are easily a thousand years old. The children will like that. Twice we have seen old car-tracks; Francis says that these will be Leclerc's. Apart from Bagnold and Leclerc and the L.R.D.G., probably no one has been this way before us. It has a splendid solitary beauty, and if, like Tennyson's Ulysses, 'I am a part of all that I have met,' it surely belongs, a little, to me.

We are late making camp. We have travelled one hundred and forty-five miles and we settle at last at the base of a rocky castle where rules a falcon. His kingdom is a turbulent ocean of dunes to the west, a stretch of rolling sand and a line of crested dunes to the north, marching in well-spaced fashion southward. We think that this is Bagnold's Dune Gateway. The radio aerial is up; we are roasting the remaining gazelle on charcoal, and Benghazi is cross because we are late making contact. Jack taps off our news, how the cars and we are faring and where we think we are. He takes a long time, and we suspect that our report takes all of ten seconds while the rest of the time Jack devotes to exchanges of gossip with his chum, the Benghazi operator.

A couple of the boys have been ill. We have had good water, not once having to use the water purifiers we brought along. Frank solves the mystery by saying that he saw the boys drinking from the camel trough at Uweinat instead of the tap. As he turns the gazelle-meat over the embers he assures us that Charlie will give them each twenty-five pills and they will be all right. He then launches an argument as to how and whether you can really get a greatcoat into a mess-cup. It is an army regulation which Francis hasn't heard of yet and he explores the possibilities warily. The British mess-cup is a huge comforting thing which we have learned to our sorrow, for when water is low and tea rationed to one cup apiece the soldiers have it all over the rest of us. But a greatcoat is an even huger and more comforting thing, and Francis decides that it is mathematically impossible to pack the one in the other. There is a glitter in Frank's eye. He is leg-pulling again. At last he confesses. In the Army this is a ritual as old as army-issue. A new recruit or a green young officer is put to the test and watched with poker faces as he folds and prods and stamps upon his coat and cup. One intent young soldier was found by his sergeant undergoing this torment. 'Hoot, mon,' roared the sergeant, 'ye'll never get it in that way. Ye maun cut the bottons off.'—Which the poor man did, to everyone's delight. If there is a gripe in the Army, or a joke, Frank has heard it. He has a devilish look as he pokes at the charcoal embers. His curly reddish-yellow hair and beard seem to have got out of control, and his humorous eyes are reddened by the wind and sand. He is twenty and comes from Midlothian in Scotland, where his father and grandfather were coal miners. He says that he joined the Army for adventure but it is mostly polishing buttons. He and Liv have decided, on the strength of Frank's tea-making skill, to open a tea-room in the middle of the Sahara. But perhaps it would suit Frank's convivial temperament more to run a pub; it is easy to imagine him regaling customers from behind a bar —and 'bouncing' the troublesome as well.

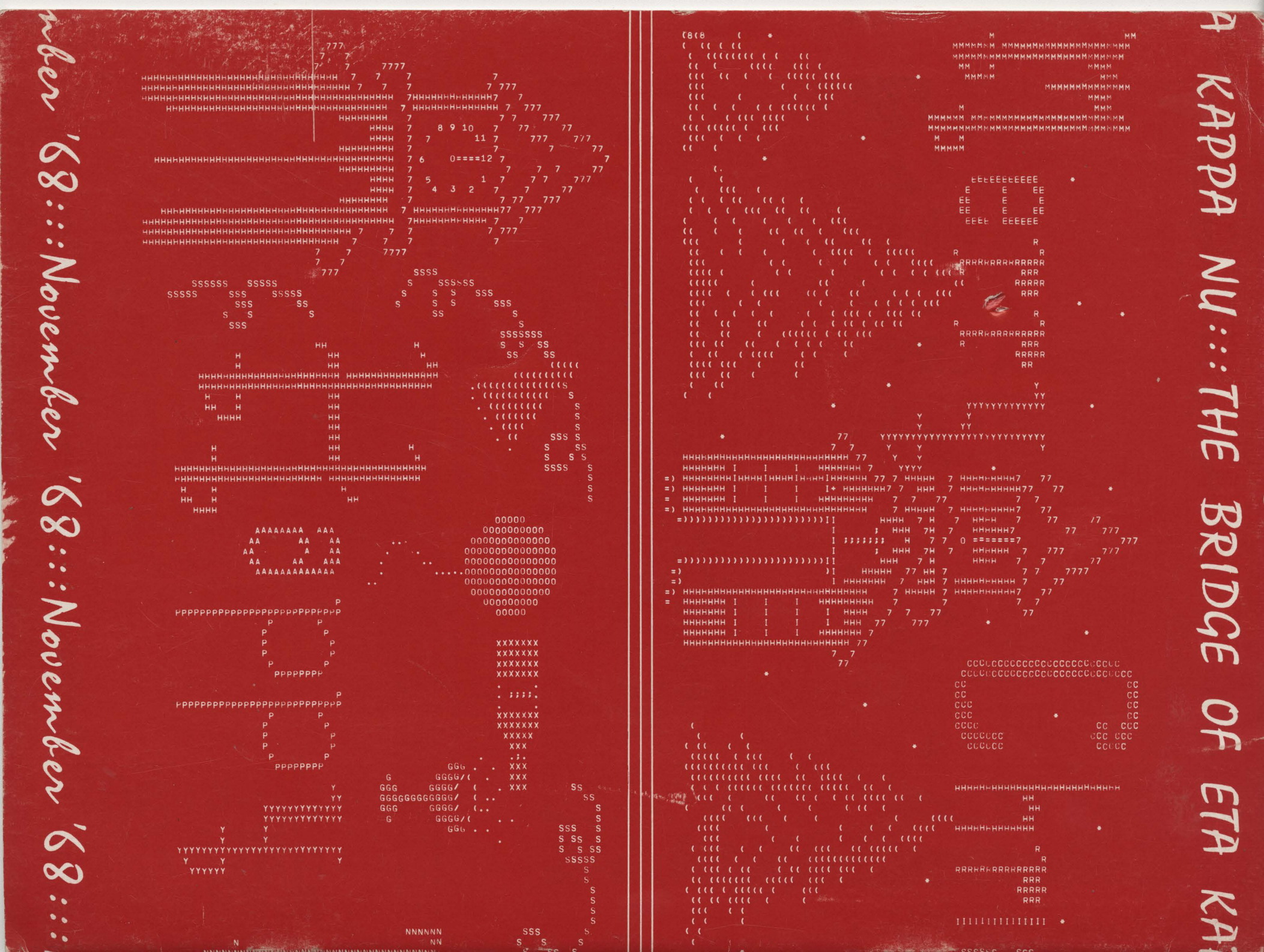
As we sand-wash our dishes, Francis takes a census on who wants to be home, and when. Liv and I don't care much, though Charles and Ginnie Humfrey, who have adopted our children, might. Winston has to be back at Oxford by the twentieth of April. Francis says: 'Not a hope—but you could make it by the twenty-fifth. I've a regimental party I must be back for by then.'

Catherine says that if Alan will fly to Faya she'd like to stay on indefinitely. The men think it would be a fine idea not to go back until July, when some of them are due for home leave anyway.

Francis takes a fix on the stars. There are no adequate maps for the area we are in now. It is up to him to get us to Tekro safely.

Francis is the product of two rigid institutions; Loretto School, in Scotland, and Sandhurst, England's West Point, but neither would care to own him now; he has sidewhiskers and shaggy hair, a wispy fur round his chin and his shorts are held up—or almost —by a safety-pin. His shoelaces have broken to random lengths. He likes schedules to be laid out and orders to be given, and as a military man has had a hard time adapting to Liv's frequent change of plans and abhorrence of trying to organize anybody. He is very dour and cross with us sometimes, and then in a moment is gay and charming and full of enthusiasm, particularly when he talks about his three favourite sports—drinking, rugger and girls.

(Continued)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