A PREVIEW OF YOUR CAREER AT GENERAL ELECTRIC

DEFENSE—G.E. engineers designed and produced six J83 engines to push USAF XB-70 to Mach 3.

CONSUMER—Nickel-cadmium batteries for cordless products were created by G.E. for new business demands.

INDUSTRIAL—G.E. knowledge and skills contributed to automation of new Bethlehem Steel mill.

ELECTRIC UTILITY—Built by G.E., the Dresden Station produces commercial electric power from the atom.

Commonwealth Edison

Only G.E. offers you three routes to four business areas

ENGINEERING, MANUFACTURING AND TECHNICAL MARKETING—these are the career routes open to you at General Electric. G.E.'s activities in the defense, electric utility, industrial and consumer business areas demand experts skilled in these three fields. At G.E., you'll be part of a uniquely decentralized organization with more than one hundred departments that design, manufacture and sell thousands of products. Whether it's automating a complete steel mill, achieving thrust for Mach 3, producing power from the atom, or creating new growth businesses, this is the fast-paced challenge you'll find at General Electric. To define your career interest with G.E. see your placement officer or write: General Electric Company, Section 699-17, Schenectady, N. Y. 12305.

Progress Is Our Most Important Product

GENERAL ELECTRIC
An equal opportunity employer

Bridge

of ETA KAPPA NU

Electrical Engineering Honor Society
AUGUST, 1966, Vol. 62, No. 4

Editor and Business Manager
Paul K. Hudson

CONTENTS

Holography
Epsilon Lambda Installed at Vanderbilt
The Great Sahara Mousehunt
The New York Award Dinner
Letters From Ellery
Chapter Activities
Real and Imaginary
National Directory

3
7
8
12
18
22
2
2


Address editorial and subscription correspondence and changes of address to BRIDGE of Eta Kappa Nu, P.O. Box 2320, Sterling A, Champaign, Illinois.
SPECTACULAR new use for the versatile laser is producing true three-dimensional scenes which can be viewed from any angle as if looking through a picture window.

HOLOGRAPHY

Technical Staff
Hughes Aircraft Company

Although photography is more than 100 years old, its basic technique remains unchanged. It consists of the art or process of forming an image of a subject, by means of a lens, on light-sensitive material, which is then developed and made permanent. For the past 50 or more years, dry plates (which had superseded wet plates) have themselves been superseded by roll or cut film, as the light-sensitive material. The lens and film are both inside a picture-taking device—the camera.

To describe the operation a little more technically, it is a process for recording on film the intensity distribution of a focused image of the scene being photographed. To make a conventional photograph, we have a scene, a lens system for creating the focused image and a recording medium—the film. The most noteworthy element in the system is the film; the most noteworthy aspect of the film is that it is only sensitive to the intensity (the light strength or amplitude squared) of the incident radiation.

One thing film cannot record directly is the phase information associated with the light wave that falls upon the film. As a result, it has been necessary to use a lens to focus an image of the subject on the film if we are to obtain a recognizable reproduction.

Since film records only the intensity of the light from the scene much information about the original scene is lost. The conventional photograph cannot re-

(Continued on Next Page)
Holography (from page 3) produce the three-dimensional character of the original scene, since the film records its projection onto only two dimensions. Specifically, the conventional photog-raph cannot reproduce the parallax (the difference in apparent direction of an object as seen from two different points) between near and far object inherent in the original scene. By changing position with respect to the scene, the relative position of the objects that compose the scene changes. However, no amount of moving about with respect to the photograph will change the relative position of the objects in the recorded image whatsoever.

An additional limitation is that the viewer no longer has the ability to focus his eyes selectively on the various objects in the scene. What is in focus on the photograph remains in focus and what is out of focus remains out of focus regardless of how he focuses his eyes.

Now, all of these limitations could be eliminated if it were possible to photograph the scene in such a way that not only the intensity but also the distribution of the phase of the light emanating from the scene could be recorded. If this could be done, then it would be possible to re-create the original distribution of light from the scene. The viewer looking into this light would see the scene exactly as it would have appeared had he looked directly at the original.

This is the goal—and the achievement—of holography, or the process of photography by wavefront reconstruction. In this process there is no attempt whatever to record a focused image of the subject scene. Instead, by means of an ingenious technique it is possible to record or actually Photograph the radiation field itself. This provides a "master" made in such a way that the original object can be faithfully recreated on "playback." The viewer of the result sees the photographic image in three dimensions, with parallax, and with selective focus.

Holography was conceived by Dennis Gabor in 1949 in connection with work he was doing in electron microscopy. The name was coined by Gabor because of the fact that the process records the whole field—amplitude and phase—in an exact reproduction of the original scene. Early attempts were handicapped by difficulties arising from certain limitations peculiar to electron microscopy, chiefly the fact that the holographic process involves the splitting of a light beam, an impossibility for the beam employed in the electron microscope. Thus the progress of the process was necessarily slow, and it was not until 1962 that two scientists at the University of Michigan (Emmett N. Leith and Juris Upatnieks) solved the difficulties and paved the way for recent develop-ments.

As to how the process is carried out, Figure 1 is a schematic representation of the "taking" portion of the operation. The subject being holographed is illuminated by a monochromatic source, a highly coherent CW laser beam. This illumination, shown as falling upon the subject from the left, is really part of an initial laser beam that has been split into two components. The light falls upon the subject being holographed, in this case a still life, a pitcher with flowers, which reflects light toward a nearby photographic emulsion, as shown. No lens is used to focus the light from the subject onto the film; the reflected light strikes the film directly. For this reason, holography may truly be called "lensless photog-raphy."

The second component of the laser beam is introduced simultane-ously as a plane wave of light, a collimated reference beam, also falling upon the film, from the same side as the light reflected from the subject. This beam is placed so that it makes an angle (A) with respect to the light that arrives at the film from the sub-ject.

Thus, there are two light beams falling on the film, and the film records the interference pattern between them. To record an interference pattern on the film, it is essential that the radiation be spatially coherent. If it were not, then the relative phase between the reference beam and the subject beam at the various points on the film would fluctuate and degrade the quality of the interference pattern. For the same reason the subject must remain still during the exposure.

After exposure, the film is processed in the usual way, and the resulting transparency is called a "hologram." The hologram has a completely different appearance from a conventional photograph. Because it is a re-cording of the interference pattern it bears no resemblance whatever to the original scene. A perfect hologram would have a rather uniform gray appearance, though in practice there is a gross fringe pattern caused by diffraction from dust particles, non-uniformities in the film, or flaws in the collimating optics. The gross fringes pattern plays no part in the reconstruction or play back process; the information contained exclusively in a modu-lated fringe pattern whose scale is so small that the naked eye cannot resolve it.

The viewing or playback sys-tem consists simply of a laser and the hologram. The laser light is collimated and passed through the transparency, as shown in Figure 2, thus reconstructing the wave fronts, and re-creating in space a three-dimensional image of the original subject. The view-er looks into the transmitted light. There are two images: A virtual image and a real image. To see the virtual image the viewer looks up at the same angle with respect to the direct beam that the reference beam made with the subject. He sees the virtual image at the same distance behind the hologram as the subject was in front of it in the taking process. He sees the image in three dimensions, with parallax and with selective focus, exactly as it would have appeared had he looked directly into the subject beam during the picture taking. The real image comes to a focus in front of the hologram and can be seen by looking down on the hologram at the same angle that existed between object and refer-ence beam.

Hughes scientists are actively engaged in studies of holography, using the method depicted in Figures 1 and 2. The film cannot be a conventional type, that used in the current studies is Kodak 649F, black-and-white, spectroscopic, extremely high resolution emulsion. Exposures have run from 10 seconds to 10 minutes, though use of pulsed laser source has provided exposures as brief as 50 nanoseconds (30 billions of a second). Experiments are being extended to color photog-raphy.

The potential of holography, or lensless photography, in the optical world cannot be overstated. It is particularly suitable for application to coherent optical data processing because it permits modulation of the spatial distri-bution of the light beam's phase;
there has been no practical means to do this up to this time. It provides a means for lensless microscopy, and it may make possible microscope systems at wavelengths where lenses are not now available (X-rays or gamma rays) or for systems where even the best lenses present significant limitations. Holography furnishes a basic technique for all three-dimensional displays, for radar, television and motion pictures, though because of the higher resolving power required by the hologram, technical advances in both electronic and photographic recording media will have to be made before the process can be used outside the laboratory.

The standard dictionary definition of photography, "the art or process of producing images on sensitized surfaces by the action of light," omitting as it does all reference to lenses or "focused images," was, thus, unwittingly prophetic in predicting the hologram decades before the advent of the laser!

REAL & IMAGINARY (from page 2)

Members of the International Graphoanalysis Society—the Chicago-based organization which serves as the international voice of the profession, research division and the educational "arm" of Graphoanalysis—are becoming increasingly enthusiastic as their day by day experiences substantiate their findings.

The International Graphoanalysis Society offers a few basic ideas that you can try out in analyzing your own handwriting or that of friends.

Take a look at something you wrote a day ago and compare it to your grocery list, an unmarked letter to a friend—something written

with a regular fountain pen is best. Take a ruler or straight edge, follow and extend all of the "upstrokes" which you can find in a line or two of your writing. This will show you the "slant" of your writing. The slant will probably vary, but you should be able to tell if it is mostly vertical, extremely to the right, or somewhere in between. The farther to the right, the greater the degree of emotional responsiveness, say handwriting analysts. If your writing slants to the left, you probably have repressed emotions and may be an introvert. If your slant is vertical, it's a sign that you will be moved by judgment rather than strong emotions.

Now look at your m's and n's. If you make them with high needle-point tops, you probably grasp an idea quickly and are a

jump ahead of the person who makes his m's and n's with round or flat-looking tops. However, this type of person is generally more thorough and methodical in garnering facts and has more of an engineering-type mind.

The way you cross your t's and dot your i's can also tell a handwriting expert a lot about you. If your t's resembles a tent, for example, you have a tendency toward stubbornness. If you cross it high, you're a person with high-placed goals. Dot your i with a circle? You're an individualist with a desire to be different.

Graphoanalysis is being used in a fascinating variety of ways. Among its enthusiastic practitioners are a hospital administrator who uses it to make decisions (Continued on Page 17).
DEDICATION

To our husbands, without whose unfailing impatience and churlish behavior this book would never have been written.

twenty pairs of socks, Hans has brought scientific equipment, such as mousetraps, scalpels, ammunition and cotton batting. A bottle of formaldehyde has broken, and Catherine, sniffing worriedly at her underwear, prefers Arpege. In the meantime Liv has been called to Tripoli by the deities who run headquarters there. I have seized this opportunity to give him a last-minute shopping list four pages long. The Army's yellow-fever shots have not arrived nor their permits to enter Chad. Only the Churchills are in order.

This morning I go to help the Churchills with their list of supplies, in case they have forgotten something or need help with their shopping. At 9:30 a.m. Randolph is in a shirt without trousers or shoes. He shows me his neat packages of clothes and equipment, and insists that Winston put out a camp-bed so that I can be zipped up in one of their new mummy-style sleeping-bags. He is proud of his cooker—his Magical Box, as he calls it—where he says will be kept perpetually full of ice to chill his pâté de foie gras. In mid-Sahara is a novel idea, but Randolph, if anyone can be said to "franchise" it. Over breakfast, which Winston ate but Randolph drank, we discuss supplies and Winston decides that all he needs is deodorant. Father explains that he's been seeing too much television, but Winston and I go shopping and buy two jars. We also buy ten kilos of charcoal for campfires.

"We shall," Randolph says, "sit around a jolly camp-fire and talk." As he is a great conservationist, we shall more likely sit around a camp-fire and listen. The first contreforts has reared its ugly head. Randolph insists that the 'other ranks' will have their own little cook-fire elsewhere. When Catherine and I protest at both the unfriendliness and inefficiency of this system Randolph's voice rises two full octaves of irritation, authority.

"Don't you women go mucking up the British Army," he cries. "We've got a jolly good army and we don't want any American women interfering with it."

The tense moment passes as Randolph cajoles us. "The soldiers won't understand our jokes, you know, and we shan't enjoy their language. Let them have their own camp-fire. Every now and then we'll send them jolly little presents and converse."

Suspicious are solidified. Everyone else is disorganized. At our house there is a marshalling of children and pets to be left with various kind friends. Catherine is sorting the four pages of shopping which Liv did in Tripoli. My arm, broken a month ago while watching a polo game, is still in a cast. It was broken outgrowing a waring horse, but everyone thinks it was gamesmanship. X-rays are not satisfactory and I will have to wear the cast for another two weeks. A pest! There is so much to be done and I am getting very lopsided. The halls are stacked with packing-cases; the children, multiplied by hordes of friends, run in and out pilfering casually from cases of chocolate or biscuits and scattering anything left in their path. The men are busy checking the cars, spare parts, sand-tracks and jerry-cans. Threading their way through the halls at meal-times, they complain loudly that there is no room in the cars for all of the stuff we are bringing. Catherine reluctantly eliminates a case of fruit juice and one of minute rice. Everyone is to regret this bit of austerily. Winston is tinkering with the Churchill Land Rover, installing a radio.

"The boy can take one of these cars apart," his father says proudly. He ambles between cases occasionally picking up something he feels he might need. 'Just get yourself another,' he says grandly, and then, putting his arm around one of us, he coaxes, 'Come into a quieter room, dear child, and let us have a little conversation,' or, 'I must read you the jolliest little poem by Hilaire Belloc, marvellous chap.' He reads from The Modern Traveller, Amusing, and we think a delightful parallel to our trip. He reads beautifully. Altogether a gifted man who should have been spanked more frequently in childhood.

We cannot possibly get off tomorrow and have set Monday the thirteenth. Randolph is wild. 'We limesy, he thunder, are steady on parade; but you bloody Americans ...' He says (a) he is going back to England to (Continued on Next Page)
March 11th, 1961

To whom it may concern

Departing this week, group of Mr. and Mrs. Alan C. Collins from the United States of America, Dr. Henry W. Setzer of the National Institute of Mental Health, Mr. R. S. Churchill and his son, Winston, R. Churchill is the son of ex-British Prime Min- ister, Sir Winston Churchill, who is regarded as one of the most influential journalistic figures of our time. Mr. and Mrs. Robert L. Pomeroy, the Director of the American Museum of Natural History, and six others from the British Army.

The group with their six cars are leaving this week for touring through Gialo and Cofra from there to Chad. The purpose of the trip is visiting, studying and adventure.

It is requested from the departments concerned that to give all the assistance needed by the above mentioned and also any facilities which they may require during their trip to the Sahara.

(Signed) Mahmoud Abu Shraida, Nazir of Interior.

March 11th, 1961

To whom it may concern

Departing this week, group of Mr. and Mrs. Alan C. Collins from the United States of America, Dr. Henry W. Setzer of the National Institute of Mental Health, Mr. R. S. Churchill and his son, Winston, R. Churchill is the son of ex-British Prime Min- ister, Sir Winston Churchill, who is regarded as one of the most influential journalistic figures of our time. Mr. and Mrs. Robert L. Pomeroy, the Director of the American Museum of Natural History, and six others from the British Army.

The group with their six cars are leaving this week for touring through Gialo and Cofra from there to Chad. The purpose of the trip is visiting, studying and adventure.

It is requested from the departments concerned that to give all the assistance needed by the above mentioned and also any facilities which they may require during their trip to the Sahara.

(Signed) Mahmoud Abu Shraida, Nazir of Interior.

March 11th, 1961

To whom it may concern

Departing this week, group of Mr. and Mrs. Alan C. Collins from the United States of America, Dr. Henry W. Setzer of the National Institute of Mental Health, Mr. R. S. Churchill and his son, Winston, R. Churchill is the son of ex-British Prime Min- ister, Sir Winston Churchill, who is regarded as one of the most influential journalistic figures of our time. Mr. and Mrs. Robert L. Pomeroy, the Director of the American Museum of Natural History, and six others from the British Army.

The group with their six cars are leaving this week for touring through Gialo and Cofra from there to Chad. The purpose of the trip is visiting, studying and adventure.

It is requested from the departments concerned that to give all the assistance needed by the above mentioned and also any facilities which they may require during their trip to the Sahara.

(Signed) Mahmoud Abu Shraida, Nazir of Interior.

March 11th, 1961

To whom it may concern

Departing this week, group of Mr. and Mrs. Alan C. Collins from the United States of America, Dr. Henry W. Setzer of the National Institute of Mental Health, Mr. R. S. Churchill and his son, Winston, R. Churchill is the son of ex-British Prime Min- ister, Sir Winston Churchill, who is regarded as one of the most influential journalistic figures of our time. Mr. and Mrs. Robert L. Pomeroy, the Director of the American Museum of Natural History, and six others from the British Army.

The group with their six cars are leaving this week for touring through Gialo and Cofra from there to Chad. The purpose of the trip is visiting, studying and adventure.

It is requested from the departments concerned that to give all the assistance needed by the above mentioned and also any facilities which they may require during their trip to the Sahara.

(Signed) Mahmoud Abu Shraida, Nazir of Interior.
In this day of great scientific achievement even the most learned audience might be impressed by the deserts of the world. It will be the day when we can find out all about them. We have been studying them and trying to understand them for years. But there is still so much we do not know.

The Royal Scots will be allowed to win the war, but what about the question of the outcome of the war? The war will go on until the end of the year. The Royal Scots will be the victors. They will be the ones who will be able to say they have won the war.

The Royal Scots have been fighting bravely and they will continue to fight bravely. They will not give up. They will continue to fight until they are victorious. They will not be defeated. They will not be defeated by the enemy.

The Royal Scots have been fighting bravely and they will continue to fight bravely. They will not give up. They will continue to fight until they are victorious. They will not be defeated. They will not be defeated by the enemy.

The Royal Scots have been fighting bravely and they will continue to fight bravely. They will not give up. They will continue to fight until they are victorious. They will not be defeated. They will not be defeated by the enemy.

The Royal Scots have been fighting bravely and they will continue to fight bravely. They will not give up. They will continue to fight until they are victorious. They will not be defeated. They will not be defeated by the enemy.

The Royal Scots have been fighting bravely and they will continue to fight bravely. They will not give up. They will continue to fight until they are victorious. They will not be defeated. They will not be defeated by the enemy.
the Fezzan and some coastal areas of Tripolitania and Cyrena-
ic. The desert is vast and empty, and there are no human settlements. The yellow sands reach out as far as the eye can see. The Sahara is the largest desert in the world, and it is home to a variety of wildlife, including camels, birds, and reptiles. The desert is a harsh and unforgiving place, and the people who live there must adapt to the extreme conditions in order to survive.

The desert is also home to a rich culture and history. The Berbers, who are the indigenous people of the Sahara, have lived in the region for thousands of years. They are known for their nomadic way of life, and they rely on the nomadic way of life, and they rely on the sand dunes and the oases for their survival. The desert is also home to a variety of cultures, including the Tuareg, who are known for their unique way of life and their love of the desert. The desert is a place of great beauty and mystery, and it continues to inspire artists, writers, and photographers to this day.
LETTERS from Ellery

THE PORTABLE SAWMILL

"I no believe, I no believe."

The boy hears these words shouted as one morning he hurries with his father to the portable sawmill which was set in operation a few weeks earlier on the top of the hill back of the barn. The boy recognizes the voice of the man from Quebec who tends the engine that drives the circular saw of that mill.

Coming in sight of the mill the boy sees that man surrounded by about a dozen others as the man throws on the ground the witch-hazel branch he has been holding in his hands. Shouts and laughter come from the group as the man walks away toward the engine.

One of the group calls out "The witch stick you held turned down when you were over the spot where it turned down when I held it. It proves for you, as it proved for me, that water is down in the ground there."

The engine-man cuts more wood slabs and throws them in the boiler furnace. With a disgusted expression on his face he again repeats "I no believe."

During the winter of 1887 the boy's father served as representative in the legislature in Hartford. On week-ends at home the men of the neighborhood whom he engaged to work as lumbermen reported to him on the progress made in cutting lumber to be sawed the following spring. One day the boy went with his father and the owner of the mill as they determined the best place for location of the mill. They decided it should be near the center of the woodland close to a small pool that would provide the necessary water for the boiler.

All his life the boy enjoyed visits to the many mills near his home farm to saw shingles, boards, planks and timbers as well as to grind grain. The motive power for these mills were water wheels. The older wheels were built of wood but the more modern ones were made from iron.

The more ancient mills for sawing were of the type called the "Up and Down." The saw for such a mill was of steel, long and straight. The large saw was held in a wooden frame in the vertical position. The frame was moved up and down by means of a wooden rod with one end connected to a crank on the horizontal shaft of the water wheel.

The log being sawed was mounted on a movable carriage which was advanced a short distance after the downward stroke of the saw, by a hinged ratchet connected with the mechanism. When the log had completely passed the saw the man operating the saw opened a gate which let a stream of water strike the wooden vanes of a second water wheel that was called the "Flutter Wheel." This wheel turned a metal gear which quickly brought the carriage back so the log might be adjusted for the next cut.

The action of the old type of saw was much slower than that of the newer circular type. The boy had heard his father tell how it was his habit, when operating the old form of mill, to start the mill and then go to the house for breakfast with expectation that when he returned to the mill the cut would have been completed.

A disadvantage of the circular saw was that with it the oaken planks for making drags could not be sawed. But by use of the old type of saw the thick, broad planks with upturned front like the front of the sled, could easily be sawed. Hence those wanting drags to haul stones or other heavy objects must take logs to the ancient form of mill.

In the early days of rural New England it was highly important to have a mill near every farm to saw materials for erection or repair of buildings and to grind grain for food for humans and animals. After he became an adult the boy was interested to learn that the first man of his family to live in the new town of Woodstock was induced to leave Boston in 1687 and, in the Indian country, to build and operate the mill which was so essential for the setting up of that new town.

The inducement was the gift of land near a stream of water which made available the power to run the mill. But the boy was greatly bored to hear talk about his ancestors. And he found no interest at all in the story that a century after Woodstock had been established surveys were made and it was found that Woodstock actually was in Connecticut not in Massachusetts. The troubles that error brought did not interest the boy at all.

But the boy did have the keenest interest in the portable sawmill which in 1887 had been developed. It had the advantage of doing the sawing near the place where the lumber grew. It avoided the hauling of waste parts such as sawdust and slabs. Only the finished products needed distant transportation. But its chief attraction to him was that it gave him the opportunity to watch the operation of the new source of power, the steam engine.

During the winter months of that year groups of men who lived in the neighborhood worked with crosscut saws and axes to prepare the logs for sawing. The most valuable came from trees of oak and pine which yielded logs two or more feet in diameter and twenty or more feet in length, free of branches. Such logs were sawed into square edged boards or planks. Pine and hemlock trees not yielding logs free of knots were sawed into boards used to make boxes. Such boards had bark remaining on the edges and sold at a lower price. Tall slender hardwood trees were cut for telegraph poles. They were cut in lengths as long as possible and were stripped of bark but not sawed.

Hardwood trees too small for telegraph poles were trimmed of branches, cut in lengths of about 20 feet and taken to the farm woodshed and there formed into strips to be used as hoops for casks to hold molasses and other liquid products of the West Indies. Chestnut trees too large or not straight enough for telegraph poles were cut in proper length to serve as railroad ties and sawed on two sides with the correct thickness. Another product the lumber workers watched for were knees to be sold to builders of wooden sailing vessels. The knee (Continued on Next Page)
was the part of an oak tree where a branch grew from the trunk at an angle which made it possible to shape a piece to form a strong support where certain ship timbers joined. Branches of trees too small for lumber were cut into four-foot lengths to be used for fuel.

The lumbermen were paid at a daily rate. A good worker was supposed to be worth one dollar a day. When cutting firewood the worker was paid one dollar per cord. Such wood was piled in stacks eight feet long and four feet high. In school the boy had learned that amount of wood formed a cord. The chief market for such wood was a nearby brick yard.

During the winter the hired man, using a yoke of oxen and a long iron chain, snaked the logs from where the lumbermen left them to a great pile near the site of the sawmill. With snow on the ground the logs could be dragged with no need of loading them on a sled.

One day in March the boy saw long lines of oxen and horses hauling the heavy parts of the mill along the highway and into the pastures. It was too late in the day for the parts to be taken to the woodland so the men detached the animals and left for their homes.

The boy at once began to examine the steam engine which to him was the most attractive of the machine devices, which were mounted on large wheels for transportation. The engine was built on the top of the boiler and the boy climbed up on it. He could not understand how the steam could make the shaft rotate.

The first boards sawed after the mill was erected, were used to build the shelter for the mill and the shanty in which the four men who operated the mill might eat and sleep. Around the mill a chief topic of conversation was the daily output of the mill. The interest in output became great as the output per day began to approach ten thousand board feet.

As the sawing progressed a period of drought set in. The dead leaves and small tree branches on the ground became so dry that the burning cinders ejected from the boiler stack began to kindle fires. So when the eight-week spring term of school ended the boy was given the task of watching for such fires and extinguish them with water which he carried in a pail. This was welcome work for it gave him the chance to remain near the mill he so liked to watch operate.

The period of drought brought another serious problem. Due to the dryness the pool of water diminished in size. There was danger of its failure to yield the necessary water for the boiler. This was the reason the man with the witch stick came to the mill the morning the boy heard the cry “I no believe.” The man was sure he could, with his stick, show the exact spot where water might be obtained by digging in the ground. The responsibility of what action to take rested on the boy’s father, who did not join in the discussion, that morning, of the reliability of the witch stick. His father decided it was better to bring water from a nearby pond in barrels carried in the two-wheeled ox cart than to dig a hole in the snowy place pointed out by the stick.

So the hired man with oxen named Tim and Curley, went for water. The oxen Dan and David which once were so attractive to the boy, were no longer living. They had been sold for beef. That was proof that his father was correct in his idea that oxen were better for farm work than were horses. The ox had value as food when he could no longer pull, but the horse had no value when it could no longer work.

Before that morning the boy had never heard of the use of the witch stick to find where water was in the earth. Later he cut a forked hazel branch and by himself watched its action as he held it in his hands and walked about. But he was puzzled for it did not always go down at the same place. Later in school he studied about many forces in nature but he never found reference in books to a force which water in the earth exerted on a hazel rod. He learned that divining rods had been discussed by church authorities and others for many centuries. And after he became a great-grandfather in 1964 the topic again came to his attention as he read of a college professor who offered a cash award to determine the veracity or falsity of the method. After long deliberation the offer was turned down by the American Society of Dowsers on the ground that “The Society has nothing to gain but everything to lose.”

Soon after the boy and his father joined the men at the mill that morning in 1887 the man from Quebec, who had expressed disbelief in the witch stick with the words “I no believe,” motions to the sawyer that the boiler pressure has risen to the point of running. The sawyer calls to the boy “Blow the whistle,” a thing the boy greatly likes to do. So he jumps on the belt that extends from engine to saw so he can reach the cord. He pulls the cord

(Continued on Page 24)
CHAPTER ACTIVITIES

This year a library of graduate school catalogues and other information about our programmes was started by the Chapter. Over 100 schools were contacted in this effort.

ROBERT S. WAGERS
NAMED RHODES SCHOLAR

Robert S. Wagers, electrical engineering student at the University of Maryland, was named a Rhodes Scholar. Wagers is one of the nation’s top scholars selected for this honor.

OMEGA, Oklahoma State University—The following is an activities report of the fall semester of 1965 at Omega chapter.

The active membership consisted of 36 active members. There were 13 new undergraduates and 23 continuing members. A new building was dedicated by the Electrical Engineering Department.

The chapter officers are: President, Eta Kappa Nu, is assigned to prepare for the formal initiation of the new freshman class. The formal initiation will be held on December 22 in the campus auditorium.

The chapter had an active program of events, including a banquet at the beginning of the semester, a technical seminar on the applications of computers in electrical engineering, and a social event at a local restaurant.

A successful project has been the production of educational videos on EE students at a nominal fee. These videos are available for loan to EE students at a nominal fee. In addition, the chapter has organized a scholarship program for outstanding EE seniors. This scholarship program is administered by the Engineering Foundation.

The annual Engineers’ Day and Parents’ Day are the major events of the year. The Engineers’ Day is celebrated on the last Friday of the month, and the Parents’ Day is celebrated on the last Sunday of the month.

The Rhodes Scholarships were established by Cecil John Rhodes, a British statesman and philanthropist, in 1902. Each scholarship carries a stipend of 100 pounds (about $2200) per year for the two years of study at Oxford.
DELTA OMEGA, University of Hawaii—Following are some of the activities of Delta Omega chapter: Orientation for freshmen engineering students. Participation in orientation along with other student organizations. President of Chapter spoke to students about HKN. Lunches given for prospective candidates for pledging at East-West Center. Pledge projects: made brass plaques of the HKN symbols; interviewed by chapter advisor; presented demonstrations at local high schools.

Delta Mu's First Good Member in VERONICA WYRWA

Miss Veronica J. Wyrm was the first woman ever to be initiated into the Delta Mu Chapter of Eta Kappa Nu. She is the only female member of the Junior Class at Villanova University's nearly all male Electrical Engineering School and is a student member of the IEEE.

Veronica said, "When my guidance counselor told me during my Junior year in high school that results pointed toward my becoming an engineer, I thought it was a joke. I had never given it a thought, but I find it fascinating. It has enabled me to see things from a different viewpoint."

She apparently is seeing things pretty well, since she's been on the Dean's list as long as she has been at Villanova and received special recognition for her volunteer tutoring efforts.

She has a wide range of interests in both the technical and non-technical fields as indicated by her minor course being French and her ability to play the piano and violin.

Being a girl in a man's world has its moments. Not long ago, Veronica and some of her classmates went on a skiing trip. When the group arrived at the ski lodge, the nonplussed Manager didn't want to let them in at first. It seems he expected all males.

So how does she like being the only girl in the classroom? "Boys are great," she answers.

ELLERY (from page 20)

and the whistle emits the long loud warning of the mill will again begin to operate, and jumps to safety from the belt. The man from Quebec opens the throttle valve and the engine begins to turn. The tail sawyer begins to roll a log on the carriage by use of his cant hook. The marker takes his position back of the saw. He holds a large black crayon in the fingers of the hand holding the marker rod and with the other hand removes the wooden pegs from the holes in the vertical board on which the board feet sawed yesterday is recorded. The man whose job is to take the sawed parts away to the proper stacks for piling drives up his team. The boy with pail of water goes to watch for fires. Great clouds of smoke and steam rise from the stack accompanied by the sound of engine puffs. As the rate of puffs increases the sound from the rotating saw rises until at full speed it emits a high pitched singing sound.

Another day of sawing has begun. Will a new record of board feet output be made. Only time can tell.

Love to all,

ELLERY

The picture tube doesn't stare back at you. And there's no wait for warm-up because it's Instant-On television. Turned on, Jet Set delivers a soft, clear, easy-on-the-eyes picture. New Memory Fine Tuning lets you pre-tune each channel for best picture and sound. Set it once—and forget it.

You can be sure if it's Westinghouse

For information on a career at Westinghouse, an equal opportunity employer, write L. H. Hogg, Westinghouse Educational Center, Pittsburgh, Pa. 15251.
Official HKN Price List

OFFICIAL MEMBER EMBLEMS:

<table>
<thead>
<tr>
<th></th>
<th>10K Yellow Gold</th>
<th>14K White Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain (Unjeweled) Key</td>
<td>$ 5.50</td>
<td>$ 7.50</td>
</tr>
<tr>
<td>Plain (Unjeweled) Pin</td>
<td>5.50</td>
<td>7.50</td>
</tr>
</tbody>
</table>

SISTER OR SWEETHEART PINS:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crown Set Pearls</td>
<td>16.50</td>
<td>19.50</td>
</tr>
<tr>
<td>Plain (Unjeweled)</td>
<td>5.50</td>
<td>7.50</td>
</tr>
</tbody>
</table>

PLEDGE BUTTONS: $12.00 per dozen

<table>
<thead>
<tr>
<th></th>
<th>Single Letter</th>
<th>Double Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain, 10K Yellow Gold</td>
<td>$ 2.75</td>
<td>$ 4.25</td>
</tr>
<tr>
<td>Plain, 14K White Gold</td>
<td>3.75</td>
<td>5.25</td>
</tr>
<tr>
<td>Crown Set Pearl, 10K Yellow Gold</td>
<td>7.75</td>
<td>14.00</td>
</tr>
<tr>
<td>Crown Set Pearl, 14K White Gold</td>
<td>9.75</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Tie Clasps

(illustrations actual size)

<table>
<thead>
<tr>
<th>Type</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Type, Yellow Gold-filled, mounted with 10K Yellow Gold Official Plain Pin</td>
<td>8.25</td>
<td></td>
</tr>
<tr>
<td>Sterling Silver, mounted with 14K White Gold Official Plain Pin</td>
<td>10.25</td>
<td></td>
</tr>
<tr>
<td>Chain Type, Yellow Gold-filled, with 10K Yellow Gold Official Key attached</td>
<td>7.50</td>
<td></td>
</tr>
<tr>
<td>Sterling Silver, with 14K White Gold Official Key attached</td>
<td>9.50</td>
<td></td>
</tr>
</tbody>
</table>

*To all prices listed must be added the Federal Excise Tax of 10%, and any State Sales or Use Tax, and City Tax where applicable. If in doubt order C.O.D. A deposit of at least 20% must accompany all C.O.D. orders.

Your Official Jewelers

BURR, PATTERSON & AULD COMPANY

2301 Sixteenth Street  Detroit 16, Michigan

SEND FOR YOUR FREE COPY OF THE GIFT PARADE