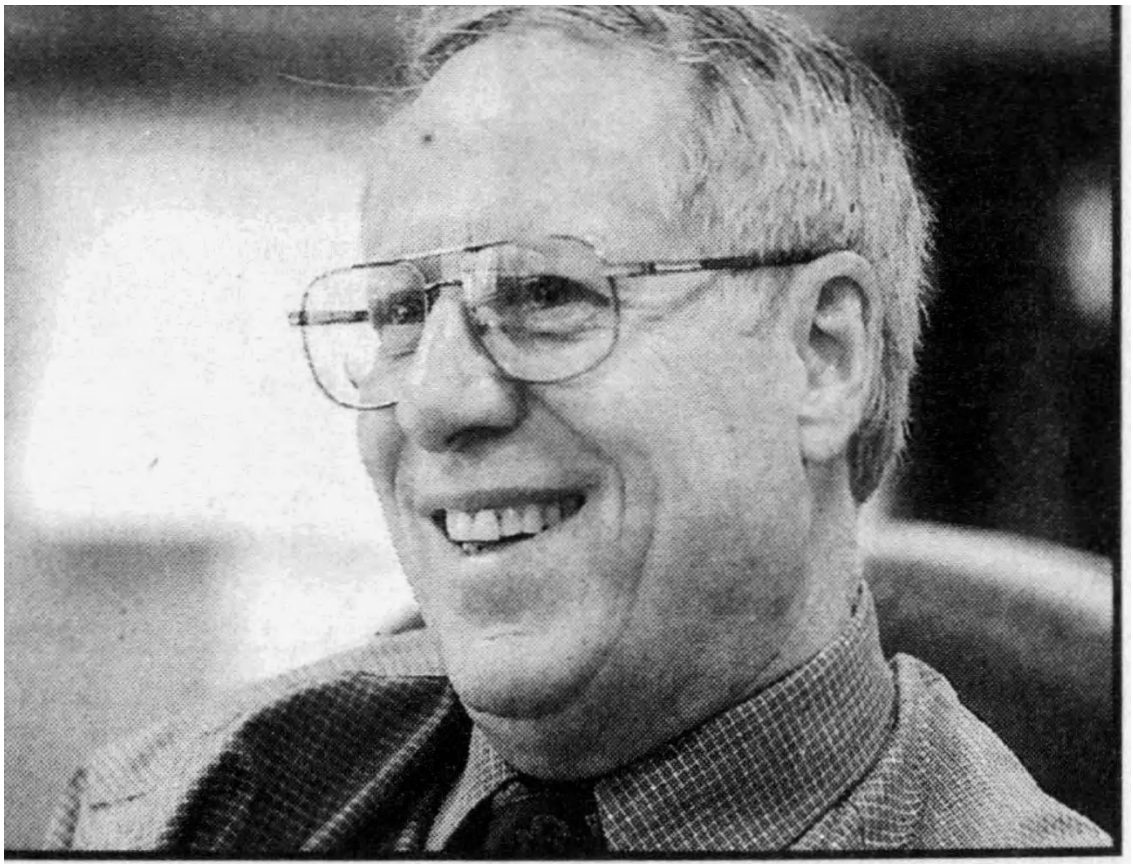
From Wikipedia, the free encyclopedia

Donald B. Keck (born January 2, 1941) is an American research physicist and engineer most noted for his involvement in developing low-loss optical fiber. Keck grew up in Lansing [*Okemos*], Michigan and attended Michigan State University, after which he joined Corning Incorporated's research department. As a senior research scientist for



The Ithaca Journal March 8, 2002

Corning, Keck, along with Robert D. Maurer and Peter C. Schultz, designed the first optical fiber with optical losses low enough for wide use in telecommunications.

Keck spent his professional career at Corning, where he eventually held the position of Vice President and Technology Director of Optical Physics, during which time he guided the company into the field of photonics. For his work with optical fiber, he was inducted into the National Inventors Hall

of Fame in 1993 and received the prestigious National Medal of Technology in 2000.

Early life

Keck was born and raised in Lansing, Michigan. He entered Michigan State University in 1958 with the intention of becoming an electrical engineer. During his undergraduate years, he was persuaded by his father to switch disciplines and study physics. As a result, he received his B.S. in physics in 1962 and his M.S. in physics in 1964, both from Michigan State. He subsequently continued his studies, writing his doctorate thesis on infrared spectroscopy, and ultimately received his Ph.D. in physics from Michigan State in 1967.

2 CGW scientists honored

CORNING — Two Corning Glass Works sc
entists, have received international recogniti
for their research and development of fiber o
fics.

Dr. Donald B. Keck and Dr. Peter C. Schul
have been given the International Society f
Optical Engineering's 1981 Technology Achiev
ment Award.

Keck is manager of appli
physics and Schultz manag
of exploratory research
Corning's research and dev
opment laboratories.

They share the award wi
Dr. Tatsuo Izawa of Nipp
Telephone and Telegrap
and Dr. John B. MacChesn
of Bell Laboratories.

The award recognzes co
tributions toward developi
a manufacturing process f
fiber optic waveguides — hair-thin strands
glass designed to carry voice, video and da
light signals.

Keck

The award was presented at ceremonies h
during the society's annual international tech
cal symposium recently.

Keck joined Corning's Research and Dev
opment Division in 1968. An authority on
theoretical and experimental aspects of li
propagation in optical waveguides, he holds
U.S. patents and has published numerous te
nical articles in scientific journals.

In 1971, he was elected a fellow of the Opti
Society of America, recognizing his dist
guished service in the advancement of optics.
He holds bachelor's, master's and doctora
degrees from Michigan State University.

Star Gazette Sept 3, 1981

Career

Instead of trying to improve upon existing fibers by using better raw materials, Corning's Optical WaveGuide Project team sought to explore the capabilities of new materials, including pure silica.

They started work on the project as soon as Keck arrived at the beginning of 1968. They experimented with different glass compositions and methods of heating the glass. In August 1970, Keck took measurements of the newest batch of fibers he had heat-treated. When Keck noticed the light passed through the 65 foot fiber seemingly without any loss, he exclaimed "Good grief, what do I have here?" Keck

took more measurements of the fiber, and discovered it had an attenuation of 16 db/km, exceeding the goal of 20 db/km. Upon this discovery, Keck wrote in his laboratory notebook, "Attenuation equals 16 db it says. **Eureka**," followed by an exclamatory "**Whoopee!**". **Keck and his team had invented the first low-loss optical fiber**; it was composed of heat-treated titanium-doped silica. Papers were written and patents were filed.

In the meantime, Keck continued to improve upon the fiber he had invented. He replaced the titanium oxide glass of 1970 with germanium oxide doped glass, and eventually achieved a consistent 4 db/km attenuation in June 1972. By the end of the 1970s, Keck had four critical inventions which secured Corning's place as frontrunner in the optical fiber revolution: fused silica doped with titanium; fused silica doped with germanium; the inside vapor deposition, or IV process, for making fiber; and the outside vapor deposition, or OV process, for making fiber, which would ultimately become the leading manufacturing method.

By 1979, Corning was mass-producing the refined optical fiber invented by Keck in Wilmington, North Carolina.

He was elected Editor-in-Chief of Journal of Lightwave Technology in 1989, a position he held until 1994. After beginning as a senior research scientist in 1968, almost 30 years later, in April 1997, Corning appointed Keck the Division Vice President of Core Technology, Optics and Photonics – Science and Technology.

Keck retired from Corning in 2002. At the time of his retirement he held the position of Vice President and Director of Research. Immediately after his retirement, Keck helped establish the Infotonics Technology Center in Canandaigua (town), New York, a collaborative organization between private industry and government focused on photonics and nanotechnology innovation. Due to his expertise in both photonics and research management, he was elected the first Chief Technology Officer of Infotonics, a position he held briefly.

Personal

Keck and his wife Ruth currently reside in Big Flats, New York, outside of Corning. He has two adult children, both of whom are also involved in technological fields: Lynne Vaia, a civil engineer, and Brian Keck, a software expert. He is involved in local philanthropy in Corning, holding board membership for the American Red Cross, the Community Foundation, and the Science Center. In addition to still consulting for Infotonics, Keck remains active in the science community, serving on the oversight board for the National Institute of Standards and Technology, the IPO Education Foundation Board of Directors, as well as holding the position of Vice-Chair of the National Inventors Hall of Fame Board of Directors. Furthermore, Keck is a benefactor of his alma mater, Michigan State University, where he also currently sits on the Advisory Board for the university's College of Natural Science, of which he was a graduate.

Awards and honors

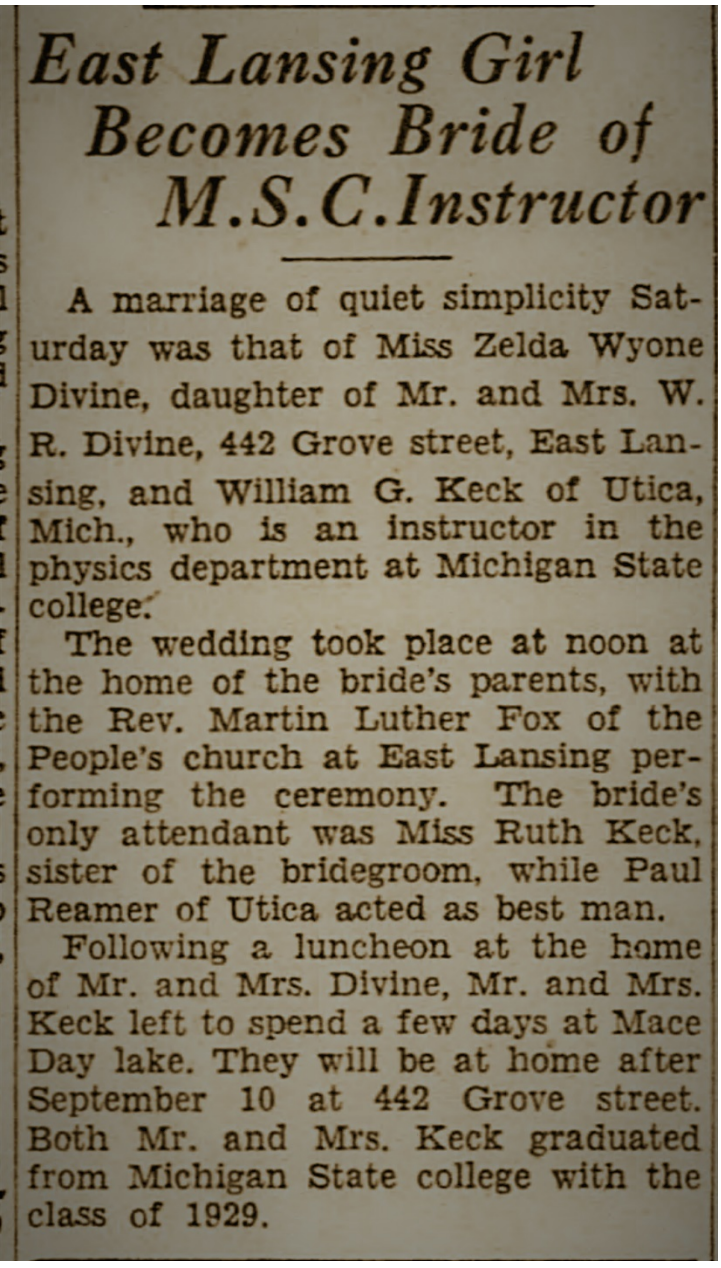
Keck's alma mater, Michigan State University, named him a Distinguished Alumnus, and Rensselaer Polytechnic Institute granted him an honorary degree in 2004. For his discovery of low-loss optical fiber in particular, Keck was inducted into the National Inventors Hall of Fame in 1993, after which he served as President of the National Inventors Hall of Fame Foundation. He is also a recipient of the Department of Commerce American Innovator Award and the SPIE Technology Achievement Award. For his work with photonics, Keck was honored with Laurin Publishing's Distinction in Photonics Award in 2002.

In 2000, U.S. President Bill Clinton awarded Keck, along with his fellow Corning researchers Maurer and Schultz, the nation's highest honor for innovators, the National Medal of Technology. Their award citation read: "Their invention has enabled the telecommunications revolution, rapidly transformed our society, the way we work, learn and live – and our expectations for the future. It is the basis for one of the largest, most dynamic industries in the world today."

Patents

Keck acquired 36 U.S. patents and authored more than 150 papers in the areas of optical fibers and fiber components. Selected patents are listed below:

- U.S. Patent 3,659,915 (1972-05) Maurer, et al., "*Fused Silica Optical Waveguide.*"
- U.S. Patent 3,711,262 (1973-01) Keck, et al., "*IV Method of producing optical waveguide fibers.*"



East Lansing Girl Becomes Bride of M.S.C. Instructor

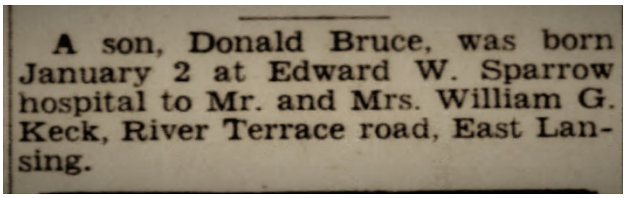
A marriage of quiet simplicity Saturday was that of Miss Zelda Wyone Divine, daughter of Mr. and Mrs. W. R. Divine, 442 Grove street, East Lansing, and William G. Keck of Utica, Mich., who is an instructor in the physics department at Michigan State college.

The wedding took place at noon at the home of the bride's parents, with the Rev. Martin Luther Fox of the People's church at East Lansing performing the ceremony. The bride's only attendant was Miss Ruth Keck, sister of the bridegroom, while Paul Reamer of Utica acted as best man.

Following a luncheon at the home of Mr. and Mrs. Divine, Mr. and Mrs. Keck left to spend a few days at Mace Day lake. They will be at home after September 10 at 442 Grove street. Both Mr. and Mrs. Keck graduated from Michigan State college with the class of 1929.

Lansing State Journal Sept 7, 1932

Donald Bruce Keck, son of William G. (1905-2002) and Zelda Wyone (Divine) (1908-1988) Keck, was born 2 January 1941, Sparrow Hospital, Lansing, Ingham County, Michigan.



A son, Donald Bruce, was born January 2 at Edward W. Sparrow hospital to Mr. and Mrs. William G. Keck, River Terrace road, East Lansing.

Lansing State Journal Jan 8, 1941

Donald graduated in 1958 from Okemos High School and went on to receive his Ph. D. in physics from Michigan State University. Donald married Ruth Ann Mailanen 10 July 1965 in Ewen, Ontonagon County, Michigan.

Donald was employed by Corning Glass as a research physicist in 1968. Later he rose to become vice president and executive director of research until retirement in 2002. Donald and Ruth raised two children and have lived for many years in New York state.

2004 INTERVIEW

Editor note: The following interview is cut and pasted from over 100 pages of a typed dialog done in 2004 with Dr. Keck. A small bit of editing, within parentheses, has been done to help the reader with flow.

This is Tom Lassman here with Dr. Donald Keck, in Corning, New York, on November 2, Election Day, 2004, for an autobiographical interview. Thank you for taking the time to participate in the interview.

And, one of my dad's favorite sayings was, "count that day as lost whose low descending sun, sees not from your hand some useful labor done." So, that was a kind of a mantra that I grew up with.

OKEMOS HIGH SCHOOL YEARS

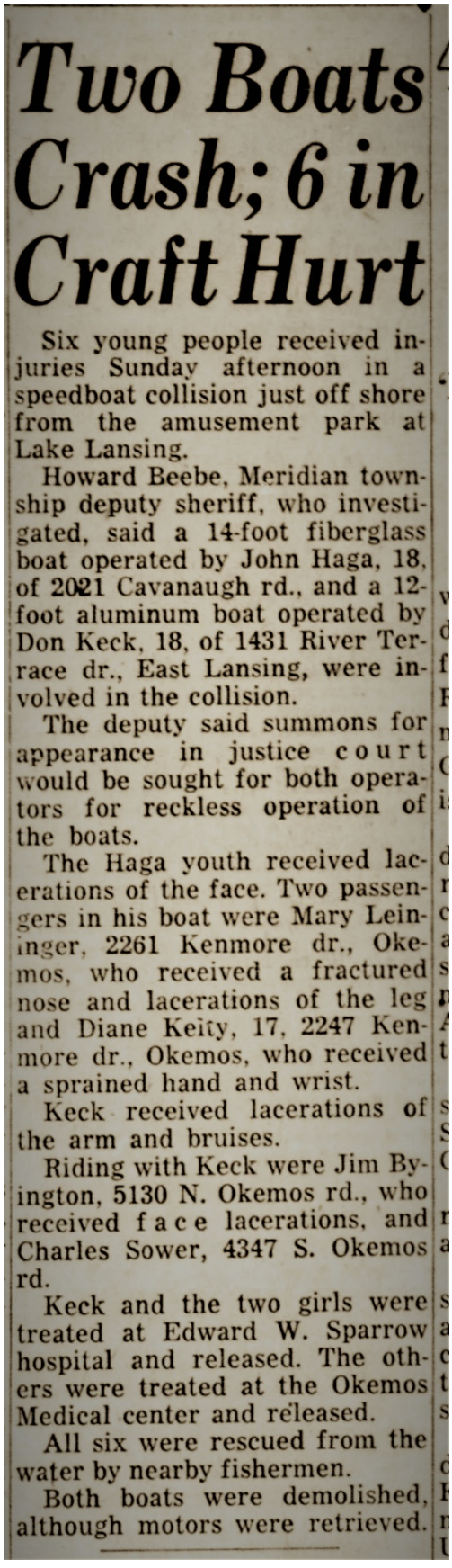
Our graduating class was fifty-eight, in 1958. I did not distinguish myself in high school. I graduated in the middle of the class. I enjoyed things, extracurricular activities. We did the normal things of dividing into boys and girls. But there was the group from, well the agricultural side, the rural part, and then there was the group that were growing up in the brand new subdivisions that Oldsmobile executives populated. They were the professional haves versus the have-nots. I recall that I had friends across the spectrum. One of my best friends later became best man in our wedding, Roger Shaw. He was scientifically inclined; engineering eventually was what he gravitated into. No I can't really say that — there were

scientifically minded folks in both camps. I was going to say that more of the rural folks were destined to become the scientists and the engineers, compared to the professionals, but I can't really make that generalization in my high school. There were some in both camps. But, in my high school so much of it had come easy for me up through the seventh grade anyway. The eighth grade was probably the spot where I started thinking I had it made and sloughed off. I didn't particularly pay attention to the schoolwork. But Mrs. Kelly had an impact. And then, it may have been my freshman year, a new science, physics and chemistry teacher came to the high school, to High School [repeated phrase], Mr. Walbridge. He had a significant impact on me.

I can't remember the substitute's name, but he was an old fellow, balding, short, and he was an excellent substitute teacher. He collared us boys and captivated us, when Mrs. Kelly was out sick for something. I remember one of the first views of physics I had was from this guy. We must have been sophomores, I guess. Somebody was goading him. I don't know the context now in which he said it, but he had the kid come up to the front of the class, and he said, "I bet I can push as hard as you can," or something to that effect. He put his hand up, and encouraged the kid to put his hand out. And he said, now push. And he pulled his hand back, and the kid went down. And somehow, he wove it into Newton's law. The reaction doesn't equal the opposite reaction. For some reason that stuck in my brain too. But there are two more stories I wanted to get in. Mr. Walbridge...

This is the physics,[and] chemistry teacher. The normal regimen was you took chemistry in your junior year and physics in your senior year. I'd had him for chemistry, and enjoyed it. But gosh. We were cutups. I remember in one chemistry class — oh gosh, what was it? Well, there was one kid in class that just, well he was very naive, and we were always playing pranks on the poor kid — Jerry Largent. He was all there, but he just wasn't swift. And so, in chemistry class we had it rigged up. We told him before class that when we give him the signal he was to turn on the water. And, we had a hose hooked up that was going to go into somebody's lap down the way. When he turned on the water, of course, the hose was stacked [Laugh] in his lap. Anyway, so this happened in Mr. Walbridge's class. He knew something was going on. He didn't know exactly what we'd done, but

he eventually found out and let us get away with it. I always liked Mr. Walbridge.



Two Boats Crash; 6 in Craft Hurt

Six young people received injuries Sunday afternoon in a speedboat collision just off shore from the amusement park at Lake Lansing.

Howard Beebe, Meridian township deputy sheriff, who investigated, said a 14-foot fiberglass boat operated by John Haga, 18, of 2021 Cavanaugh rd., and a 12-foot aluminum boat operated by Don Keck, 18, of 1431 River Terrace dr., East Lansing, were involved in the collision.

The deputy said summons for appearance in justice court would be sought for both operators for reckless operation of the boats.

The Haga youth received lacerations of the face. Two passengers in his boat were Mary Leininger, 2261 Kenmore dr., Okemos, who received a fractured nose and lacerations of the leg and Diane Keity, 17, 2247 Kenmore dr., Okemos, who received a sprained hand and wrist.

Keck received lacerations of the arm and bruises.

Riding with Keck were Jim Byington, 5130 N. Okemos rd., who received face lacerations, and Charles Sower, 4347 S. Okemos rd.

Keck and the two girls were treated at Edward W. Sparrow hospital and released. The others were treated at the Okemos Medical center and released.

All six were rescued from the water by nearby fishermen.

Both boats were demolished, although motors were retrieved.

1959 May 18, Lansing State Journal

Well, in high school we had a guidance counselor, Mrs. Lamb, Thelma Lamb. Had all the seniors go through a career course where we looked at all sorts of different careers, and the term paper was you had to pick the career and explain why you wanted to go into it, and things like that. And, we didn't get too specific. Engineering was the one that I think I wrote on, as I recall. As [, and] I sort of had in mind that engineering was the direction that I was going to go, as opposed to straight science in physics.

The reason I was laughing at Thelma Lamb; because I was not doing particularly a stellar job of my high school career, and as I say graduated in the middle of my high school class of only fifty-eight, I remember my folks later on telling me that during one of the parent-guidance teacher conferences, Thelma Lamb had told them that Don had better start looking at a vocational education, that he wasn't going to be a professional, that he just didn't look like he could make it in any professional occupation.

No. I had taken two years of Latin in high school. For the most part, I don't remember a thing about Latin. It was supposed to have helped me greatly in grammar, but in high school, I really wasn't paying a whole lot of attention, frankly. Now I do lament that, that whole, well, period. I did not cover myself with any kind of glory in high school and wished, in retrospect, that I'd studied more. For some reason or another, in college, that notion got out of my system. I don't know what it was that caused me to change my

outlook, but I realized I had to do better. And, I remember vividly the middle of the term of your freshman year, the principal of the high school came over to school, to college, and got a number of the school graduates, the Okemos high school graduates that were at Michigan State, together, and just was asking us questions about how we were prepared. At the time, we had our midterm grades. My grades were higher than any of my high school colleagues. And, the principal of the high school was absolutely flabbergasted, Mr. Harrison. At any rate, so from almost day one in college I changed my way of thinking, and began to study harder and do better.

MRS. DONALD B. KECK

Newly Married Couple Living On MSU Campus

The new Mr. and Mrs. Donald Bruce Keck, who were married in the First Lutheran Church of Ewen, are now at home in University Village, Michigan State University, where the bridegroom is a doctoral candidate.

The marriage between the former Ruth Ann Moilanen, 1252 Haslett Road, East Lansing, and the son of Mr. and Mrs. William G. Keck, 1531 River Terrace Drive, East Lansing, is announced by her parents, Mr. and Mrs. K. J. Moilanen of Ewen.

MEETING RUTH, HIS FUTURE WIFE

I think it was my first year as a graduate student. And, it was about this time of year. And, my boat was still in the water up at a lake, in Lake Michigan. And, Roger Shawl, my high school buddy, must have been going on for his masters at Michigan State. So, he went on. Ted Warner eventually went on and got an advanced degree, and those are the only ones of my high school class that I know of that went on to graduate school besides myself. And Roger had this girl in whom he was intently interested and wanted an excuse to meet with her, because she was about to marry somebody else, and had been asked. And so, Roger said, “Could we double date, and go up?” I told him maybe this weekend I had to go up and get the boat. He said, “Oh fine. I know a, we’ll get a date for you and we’ll go up and get your boat.” And, I didn’t know anybody at that time that I thought of to date. And, Rog had met Ruth at some college gathering, I think associated, well I’m sure

associated with the Lutheran Church in East Lansing. And somehow, Roger had gotten associated with — I don't think Jeannie was part of that. But at any rate, so Jeannie Niedermeier and Rog, and Ruth and I went up to pick up my boat. And that was my first date with Ruth, a blind date. And then we just kept dating from that point on, and eventually married in '65. This would have been '63.

She (Ruth) came from, comes from the upper peninsula of Michigan. Her family is Finnish, one hundred percent. Maternal grandparents, I believe, came over from Finland. I'm sorry, paternal grandparents. Maternal grandparents were here. Grew up in a very, very small town of Ewen, Michigan in the Upper Peninsula. We often kid her that there are fifty people in town, if you count the dogs and the cats. And, she came down to Michigan State, and obviously, we met there.

Lansing State Journal July 27, 1965

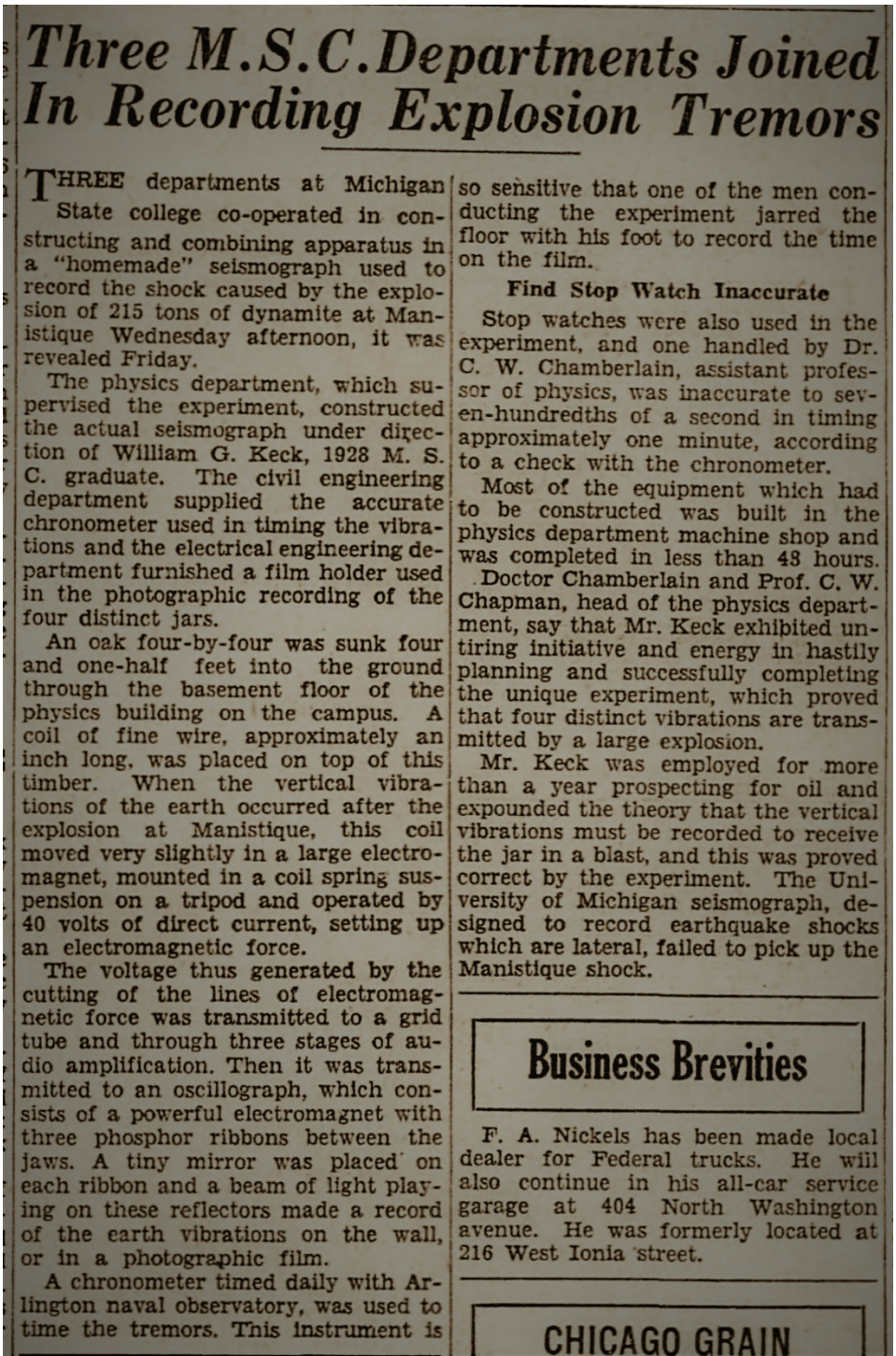
She was studying what they now call human ecology. Home economics was what it was called at the time. Her dad was a county extension agent who had graduated from Michigan State and liked the upper peninsula; had grown up there, and returned. And, basically was helping the farmers in that area make a living. Bringing the latest agricultural, and ways of running farm businesses to the people in that area. He did that until he retired. I can't tell you the year now. You'll have to ask Ruth.

So, at any rate, Rog asked Jean to marry him on the way home in the back of our car. And, eventually she said yes, and they've been happily married ever since. And, Ruth and I eventually got married two and a half years later.

VIETNAM WAR YEARS

As long as I was a student I had a student deferment. When I left then, and came to Corning, I was married already and, but I believe Corning had to send some sort of request for continued deferment, after my employment with Corning. I'm pretty sure Bob Maurer, a couple of years running had asked for a continual deferment. And then the war was — when did it finish, '70?

So, it was three years that Maurer had to submit. At the time, I was probably on the hawk side of things. If my nation was believing, or leaders of the nation were believing that this was a war that we should be fighting we should be in there and so on, but I guess my feeling was that I could contribute more to the effort by being a scientist and doing good technological work that might feed into the military activity. But that was certainly my rationale for wanting and maintaining the student deferment, and so on, as opposed to going into the draft. I don't recall whether my draft — they had draft numbers, and mine was, I'm pretty sure, well down the list. I don't remember whether that was before I got married, but I remember having a 2-S draft card. Well, I didn't worry a lot about it. I didn't pay a whole lot of attention to it. As I say, I figured I could do a better job for the country by learning physics and doing a good job of that. And yes, I had a deferment, and continued.



Three M.S.C. Departments Joined In Recording Explosion Tremors

THREE departments at Michigan State college co-operated in constructing and combining apparatus in a "homemade" seismograph used to record the shock caused by the explosion of 215 tons of dynamite at Manistique Wednesday afternoon, it was revealed Friday.

The physics department, which supervised the experiment, constructed the actual seismograph under direction of William G. Keck, 1928 M. S. C. graduate. The civil engineering department supplied the accurate chronometer used in timing the vibrations and the electrical engineering department furnished a film holder used in the photographic recording of the four distinct jars.

An oak four-by-four was sunk four and one-half feet into the ground through the basement floor of the physics building on the campus. A coil of fine wire, approximately an inch long, was placed on top of this timber. When the vertical vibrations of the earth occurred after the explosion at Manistique, this coil moved very slightly in a large electromagnet, mounted in a coil spring suspension on a tripod and operated by 40 volts of direct current, setting up an electromagnetic force.

The voltage thus generated by the cutting of the lines of electromagnetic force was transmitted to a grid tube and through three stages of audio amplification. Then it was transmitted to an oscillograph, which consists of a powerful electromagnet with three phosphor ribbons between the jaws. A tiny mirror was placed on each ribbon and a beam of light playing on these reflectors made a record of the earth vibrations on the wall, or in a photographic film.

A chronometer timed daily with Arlington naval observatory, was used to time the tremors. This instrument is so sensitive that one of the men conducting the experiment jarred the floor with his foot to record the time on the film.

Find Stop Watch Inaccurate

Stop watches were also used in the experiment, and one handled by Dr. C. W. Chamberlain, assistant professor of physics, was inaccurate to seven-hundredths of a second in timing approximately one minute, according to a check with the chronometer.

Most of the equipment which had to be constructed was built in the physics department machine shop and was completed in less than 48 hours.

Doctor Chamberlain and Prof. C. W. Chapman, head of the physics department, say that Mr. Keck exhibited untiring initiative and energy in hastily planning and successfully completing the unique experiment, which proved that four distinct vibrations are transmitted by a large explosion.

Mr. Keck was employed for more than a year prospecting for oil and expounded the theory that the vertical vibrations must be recorded to receive the jar in a blast, and this was proved correct by the experiment. The University of Michigan seismograph, designed to record earthquake shocks which are lateral, failed to pick up the Manistique shock.

Business Brevities

F. A. Nickels has been made local dealer for Federal trucks. He will also continue in his all-car service garage at 404 North Washington avenue. He was formerly located at 216 West Ionia street.

CHICAGO GRAIN

OSA Optical Society: OSA Awards Won [John Tyndall Award]

Fellow

Donald B. Keck

Donald Keck was born in Lansing, Michigan in 1941. **As Keck grew up, his father, a physicist, and his mother, a**

teacher, created an environment that encouraged creativity and learning. During high school, Keck began working for his father's company, where he helped build a number of instruments used to monitor wells and groundwater. After graduating, he enrolled at Michigan State University (MSU) and was going to study electrical engineering. However, a conversation with his father regarding the narrow nature of electrical engineering caused Keck to change his major to physics. He graduated from MSU with a B.S. and an M.S. in physics in 1962 and 1964, respectively.

For his doctoral research, Keck studied molecular spectroscopy with C. D. Hawes and received a Ph.D. in physics in 1967 from MSU. A strong economy meant bright job prospects for the graduate. After visiting several companies and government labs, Keck took a position at Corning Inc. in 1968 working with Robert Maurer. Within a year, the collaborative work of Keck, Maurer and Peter Schultz would make important contributions to fiber optics.

In a series of experiments, the researchers found that adding titanium to fused silica strengthened the glass fiber and enhanced its optical properties. They later doped the glass with germanium. This step reduced the amount of light lost as a signal traveled through the fiber. Their work helped establish optical fiber, rather than copper, as the key conduit to transmit information.

Keck became vice president and executive director of research at Corning where he worked until his retirement in 2002. For their discovery, Keck, Maurer, and Schultz received the National Medal of Technology in 2000. Keck holds 36 patents and has authored more than 150 papers on optical fibers and related topics.

During his career, Keck received an honorary degree from Rensselaer Polytechnic Institute and was inducted into the National Inventors Hall of Fall. He received the John Tyndall award from OSA and the IEEE/Photonics Society, the U.S. Department of Commerce American Innovator Award, the SPIE Technology Achievement Award, and Laurin Publishing's Distinction in Photonics Award.

Keck served as editor-in-chief of the Journal of Lightwave Technology and generously donated his time to the OSA community. Most notable among his contributions: Keck chaired both the Finance Committee and the Executive Committee of OSA's Science and Engineering Council. He also served on the Board of Directors, the Board of Editors, a number of awards committees, and was on the OFC/NFOEC Steering Committee.

After retirement, Keck helped established the Infotonics Technology Center in Canandaigua, New York. In 2010 the center merged with the Center of Excellence in Nanoelectronics and Nanotechnology. The new entity is known as the Smart System Technology and Commercialization Center.

April

■ Donald B. Keck, 61, retires April 1 from Corning Inc. He and two co-workers invented optical fiber, a product that revolutionized not only the company itself but the global communications system.

KECK

Star Gazette, Dec 31, 2002

Play explores birth of fiber optics

For the Twin Tiers, it's a hometown success story. And now, there's a play about it. "The Quest to Talk with Light" will be offered three times on Wednesday in the Corning Museum of Glass — at 9 a.m., 10:30 a.m. and 12:30 p.m. The play is commissioned by the Science & Discovery Center in Big Flats and was written by Marysue Moses and Alfred Harrison from Theater at Work Inc. of St. Paul, Minn., which produces live theater issue-oriented programs for corporate America.

"The Quest to Talk with Light" is a comedy about the

BRIEFLY

invention of fiber optics by three Corning Incorporated scientists, Donald B. Keck, Robert D. Maurer and Peter C. Schultz. It was written based on material from Corning Incorporated Sullivan Park scientists, marketing personnel and Science Center staff. Each of the three presentations will be followed by a simulcast of the museum's fiber optics exhibit.

Patricia Dann, Science Center executive director, said students in upper elementary through high school are the target audience, but adults are welcome to attend as space permits. Admission is $4 for students and $8 for adults. Teachers get in free, and the Science Center is paying for school bus transportation.

Star Gazette Oct 15, 2009

Editor note: I have freely plagiarized, from numerous sources, in this biographical sketch on Donald Keck. Dr. Keck's renown work has been and continues to be written about. I have tried to document my sources but may have over looked, in my enthusiasm, some.

Respectfully,
Sherrie Paty Barber, Class of '66