

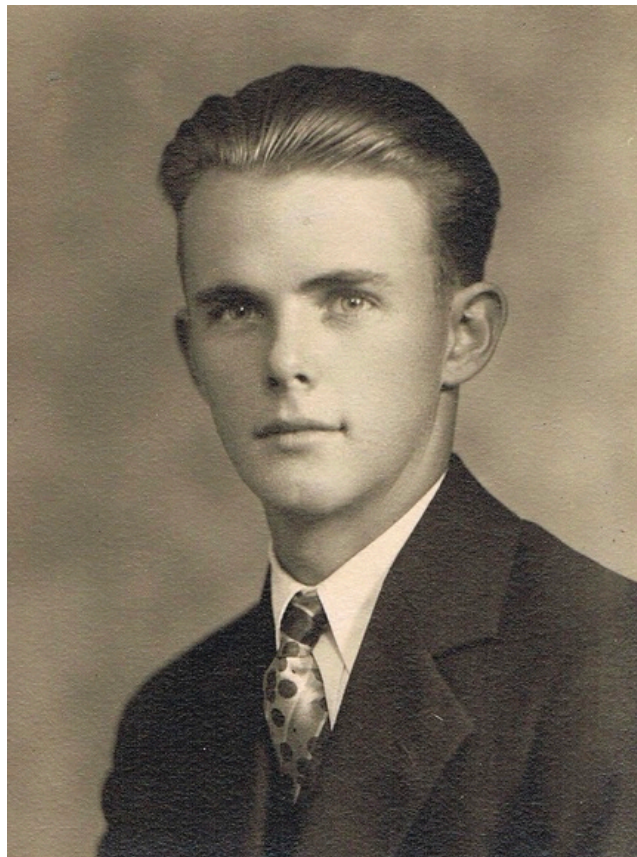
John W. Hawthorne, PLS #1009 (1974), PE #12,553 (1984) BSCE (1969)

My Experiences surveying with my Dad (1958 - 1968), Jean Wm Hawthorne, PLS #454 (1958)

My Dad, Jean Wm Hawthorne, earned his Professional Land Surveyor (PLS) license in October 1958, at the age of 46. At that time he was working under forester Hans Milius in the Forestry Department at Brooks-Scanlon Lumber Company in Bend, Oregon. Sometime in late 1959, he quit his job there and started his full-time surveying practice in Central Oregon as the only full-time surveyor that I know of at that time. To study for the PLS exam, he turned the milk parlor in our failed dairy into his study room and disappeared each evening. His hard work paid off. He got the highest score that year on the exam!

Some background history prior to my Dad's getting his license:

Dad was born in Ainsworth, Nebraska, on October 16, 1912. His father was a farmer. His family moved 100 miles north to Kimball, South Dakota a few years later by wagon. He rode a horse to a one-room schoolhouse that included Native Americans. School Census shows him from ages 6 to 11 in South Dakota. The family later moved to Kansas, where he graduated from



Salina High School on June 4, 1929, a year early for his age - see graduation picture above. That was the beginning of the Great Depression (1929-1939). His father lost the farm and they moved to California. From 1932 to 1936, he attended Fresno State College. He initially majored in geology, but switched to mineralogy after finding that he could get work in the mining industry. Dad left college before graduating in order to go to work. Work was precious during the Great Depression.

Dad worked as an assayer and in general mining operations in mines in Nevada from 1936 to 1938, then in Alaska, ranging from Juneau to Fairbanks, until WWII. He first learned how to survey in hard-rock gold mines at the Alaska Juneau Gold Mine in Juneau, Alaska, where surveyor's reference points are in the top of the tunnel! https://en.wikipedia.org/wiki/Alaska-Juneau_Gold_Mining_Company

WWII began in 1941, Dad began working for the Army Corps of Engineers at Fort Richardson in Anchorage, Alaska, where he gained surveying experience in railroad construction (he later used the railroad experience at Brooks-Scanlon in laying out a new spur line at the lumber mill) and general base construction. He had an order to report for induction on April 30, 1942, but was classified 4F due to a hernia and was frozen on his job with the Corps. Dad later went to Seattle and had the hernia repaired. On August 31, 1942, he enrolled in the Alaska Territorial Guard and was discharged on September 30, 1944, after moving to Oregon. Many Americans may not be aware of the importance of Alaska during WWII. The United States spent \$1.25 billion fighting the Japanese in the Aleutian Islands. Air bases were critical, including the air base at Fort Richardson. My parents said that they saw planes that were shot up after coming back.

Dad met my Mother during WWII. She also was a civilian working for the Army Corps of Engineers, as a secretary. She was from Queens, New York and had been to Alaska prior to the war on a vacation in 1940. For a woman from Queens, the wide-open spaces of Alaska were a wonder. That experience led her to decide to fly to Seattle in September of 1942 and volunteer to go to Alaska. She was shipped to Alaska on a ship convoy. My parents met on the job while my Mother was collecting time sheets. Dad won out over all the officers in courting my Mother. They married in late December 1943, and moved to Eugene, Oregon, in early 1944 to start their family. WW II ended in 1945. My sister was born on November 12, 1944, and I was born on November 9, 1946.

In 1948 my parents moved to Central Oregon and bought a 1,000 acre ranch on Deschutes Market Road, which included 110 acres of cultivated land with water rights. Specifically, the ranch comprised the east half of Section 35 and Section 36, Township 16 South, Range 12 East, Willamette Meridian; it was pretty much surrounded by Bureau of Land Management

(BLM) property to the east, north, and south of Section 36. Our ranch house was a half mile off Deschutes Market Road. Photo - July 1948 at original house on county road before moving half



mile in on ranch to the original ranch house where there was no power or running water at first until they had a cistern built and power line installed. All water came from the irrigation ditches.

That ranch house is now a vacation rental called The Bend Country Cabin (<https://www.vrbo.com/407766>). The old milk parlor, where my Dad studied for his PLS exam, is now one of the rentals, and I have rented the ranch house numerous times with family and friends. My Dad was never successful at farming and ranching, and had to “work out” to support our family and the ranch. The weather, market timing, and health issues were always working against him. During that time he gained more surveying experience with the Soil Conservation Service (now the Natural Resources Conservation Service) between 1949 and 1953 in Redmond, and later with Brooks-Scanlon Lumber Company in Bend between 1956 and 1959. He gained valuable skills recovering lost government corners when surveying lands owned by Brooks-Scanlon prior to its logging operations.

While going through family letters, photos, etc., I found an employment record for Jean Wm. Hawthorne covering the time prior to his earning his PLS license. There was a handwritten copy, and a copy that my Mother had typed since she had the typing skills in the family. I have included a retyped copy at the end. This document gives more detailed background of

Dad's early surveying experience and varied work experiences. His surveying experience started during the summer when he was going to college at Fresno State College in California. He had held a job with the US Geological Survey in southeast Alaska as a topographical engineer's helper. He had told me stories of living on a boat while doing topographic surveying of the inside passage. It sounded like he had a great time.

My surveying experience began in the eighth grade.

I remember first helping Dad soon after he got his PLS license when I was in the eighth grade at Tumalo Grade School, and he was still working at Brooks-Scanlon shortly before he quit. I am pretty sure that the job I helped with was off of Cline Falls Highway, just out of Tumalo, close to the Deschutes River. That is where he taught me to use a plumb bob, and hold the end of the 100' chain with the right tension, and to give him a sight while holding the plumb bob, if needed.

Our ranch was in the Redmond School District, even though we lived closer to Bend (nine miles to Bend but eleven miles to Redmond). Dad finally sold the ranch in the summer of 1963 and we moved into Bend, at 659 East Franklin Street, which was within walking distance of Bend Senior High School. I graduated from Bend Senior High School in 1964.

Surveying with Dad was primarily during summers in high school and college. I was always working on the ranch with him, and got used to not being paid but always being provided for; that's the way of a family farm. In exchange for my helping Dad survey in the summers, he paid for my college education. He believed that a college degree was important, because he never completed his degree and he thought it had held him back. One time I calculated that my higher education cost my Dad the equivalent of paying me a minimum wage for my work for him.

My higher education has been worth every penny to me. The experience and support that I received was outstanding. I went to Central Oregon Community College my first year, taking pre-engineering classes; then I transferred to Oregon State University (OSU) and majored in civil engineering, primarily to get a surveying education. I essentially minored in surveying, with a class in surveying every term for three years. Professors Shultz and Seaders were my instructors. I soon found out that Professor Shultz knew Dad. I was hooked on surveying.

This was Vietnam War time, and I was facing the draft. I was fortunate because I was able to use my education in the military. I applied and took a competitive exam for the Navy Civil Engineering Corps, and was accepted. OSU was in the top ten engineering schools nationally and my education there paid off in my seeking this assignment. Several of my classmates were also accepted. I went to NAVOC in Newport, Rhode Island, on January 3, 1969, and upon

graduation on May 9, 1969, I was assigned to Seabee Battalion Three, stationed at Port Hueneme, California. My first 8-month deployment was Okinawa as Engineering Officer. I was in charge of 20 Engineering Aides. A second deployment took me to Da Nang, Vietnam, as Charlie Company Commander, overseeing about 60 men who did general concrete, steel, and timber construction. I was released from active duty on May 10, 1971, moved to Gresham, Oregon, and started my surveying career.



Okinawa 1969-70. John Wearing Marine Greens; Seabees support the Marines.

Surveying with Dad during my summer months produced some memorable experiences:

OUR EQUIPMENT

To start his surveying business, Dad needed survey equipment, and since he didn't have much money, he bought a used transit that he had found in central Oregon. It was a Gurley with a 30-minute vernier. I inherited it and, based on the serial number, it was manufactured in 1931; it was 27 years old when he bought it. The leveling screws had seen plenty of use, and they were on their way out. I have used this transit since my retirement for leveling projects around my house, and it's a challenge to get it leveled. The tripod must have been worn out, so Dad bought a new tripod. He also got a new 100' steel tape for measuring distances. He bought a couple of Hudson Bay axes for clearing line and driving stakes. I still have one of his axes. Dad occasionally would break an axe handle, and he would just buy a new axe. When he retired, he replaced all the broken handles, that I had inherited. I kept one axe and gave away about four

axes to friends. I love that axe. Here is a link to the history and background of the Hudson Bay axe: <https://www.awesomeaxes.com/what-is-a-hudson-bay-axe/>



John by Chevy Carryall

Our first survey vehicle was our family ranch vehicle, a Chevy Carryall with a four-speed shift on the floor with compound low. We could go amazing places in compound low. I had learned to drive our Case tractor as soon as I could reach the clutch, and got my drivers license when I was a sophomore in high school. I did most of the driving while working for my Dad. (I was also the primary family driver to keep the domestic peace: neither of my parents liked the other's driving.) When Dad sold the ranch and moved into Bend after being in business for three to four years, he upgraded his Gurley to a Wild T2 one-second theodolite! He also traded the Chevy Carryall for a used Jeep Wagoneer with a straight six, and purchased a new American Rambler for a family car. That Rambler was a great car to take a girl out on a date! Later still, after my Dad started making more money while I was in college, he purchased a new Jeep Wagoneer with a V-8 for the family car. Dad told me that when it was time to put the Jeep into four-wheel drive, it was time to turn around. We mostly used the four-wheel drive on snow when skiing at Mt. Bachelor. Near the end of my college years, Dad switched to a Kern DKM2 theodolite, which he used for the remainder of his surveying years. Dad had followed the problems Heinrich Wild had with the Wild Company, and joined Kern Aarau, where he designed

an even better competing theodolite with a unique tripod for quick centering over the survey point, which allowed using a cam system for leveling instead of traditional leveling screws.



John sitting on Jeep Wagoneer tail gate

Now to begin with some actual surveying experiences.

ROUTE SURVEYING

Dad got a contract with the U.S. Forest Service to survey a road in the Ochoco National Forest north of Prineville. You can find the road on the National Forest Service map. It's just west of Mill Creek Wilderness, Road 3320 between Primary FS Roads 27 and 33. From the map it looks to be about 4.5 miles long, climbing 1,440', from 4,080' to 5,520' for an overall grade of 6 percent.

I note here that my civil engineering education still works. I got the elevations from my handheld Garmin GPS/Base Camp, and scaled the distance off the Forest Service map. I calculated the slope with my HP 35s handheld calculator. Reverse Polish Notation is the only way to go.

Our survey site was about a fifty-mile drive from our ranch. We always got an early start and stopped in Prineville for coffee and pastry before continuing up McKay Creek Road/FS27. So it took about about two hours to get to the job site. What a drive up McKay Creek along those ranches, with pastures along the creek! Early in the morning there were always herds of deer grazing. About midway along the route that we surveyed is Hawthorne Spring. Any connection to our family? I do not know.

This job was my first experience at route surveying. Dad used techniques he had learned at Brooks-Scanlon Lumber Company. We used very rudimentary survey equipment: an Abney level, a staff compass, a 100' cloth tape, hand level and a survey rod. One of the first things I learned was how to test the Abney level to make sure the bubble was accurate, and, if it wasn't accurate, how to adjust it with an adjusting pin. It's a basic technique used for most survey instruments.



Gurley Staff Compass w/ Jacobs Staff

We had a starting point on one road and an ending point on the next. Dad set the Abney at a 6% grade and we ran in a grade line, putting up ribbon to mark the route. Next we used the staff compass, an old Gurley that Dad had bought used in central Oregon. (In April 2023 I gave that staff compass to the Deschutes Country Surveyor, Kevin Samuel, who encouraged me to write this narrative.) With the staff compass, we staked a series of tangents, measuring the bearings on each tangent to calculate the delta angles for the curves to be laid in. I learned all the basic elements of a simple curve. I was in high school at this time, and had or was taking

geometry, trigonometry, and algebra, so I had the basic math skills to understand what we were doing.

Once we had a radius, which was determined by the road speed, and how sharp or gentle the alignment was, we could calculate the curve elements (tangent, external, long chord, middle ordinate, degree of curve) from which we could stake the alignment along the curve. I learned all the terminology for the Point of Curvature (PC), Point of Intersection (PI), and Point of Tangency (PT). Then we could station (100' = 1+00, etc.) the route along the final route with the curves. Next we set clearing limits based on the road cross-section template. I learned how to estimate and then, through an iteration process, set the slope stakes (where the cut or fill slope intersects the ground) to mark the clearing limits. We used a hand level to determine the cut and fill catch points.

By the time I took a class in route surveying at OSU, I already had the basic knowledge. I still have my route surveying textbook by Carl Meyer, a classic. I used all this knowledge later in my career while running a survey crew for Marx and Chase Surveyors (Gresham, Oregon) on a Mt. Hood National Forest Service contract for a road, again about five miles long, near Estacada, Oregon. By this point, however, we were using an engineers transit, 200' steel tape and a roads arch.

I also used this work experience later in my career, designing roads in subdivisions for civil engineering consulting firms in Portland, Oregon, and ultimately teaching route surveying at Mt. Hood Community College, where I taught civil engineering technology from 1980 to 1984. Later still, I used this knowledge when I worked at the City of Oregon City as their Civil Engineer, and finally at the Portland Bureau of Transportation, designing street improvement projects and reviewing private development projects until I retired in 2006.

SURVEYING NEAR SMITH ROCK STATE PARK

One summer when I was still a student at Redmond High School, we were doing a boundary survey off of Lambert Road, just west of the entrance to Smith Rock State Park near Terrebonne, Oregon. We were running a traverse across a farmer's field when he came over to us with a desperate look in his face. He needed help delivering a calf. He had a heifer that was bred too early. The calf was just coming out, but was stuck since the heifer had not grown large enough yet to deliver by herself. We ended up getting in our Chevy Carryall and driving across the pasture to the heifer while the farmer stayed with the heifer. We eventually ended up pulling the calf out with the Carryall. That granny gear (compound low) came in handy! And both the calf and the mom survived. All ended well, but not exactly what we anticipated that day! You

do what you have to do. Growing up on our ranch, we had to help my 4-H sheep (Hampshire) deliver at times, until I got a breed (Cheviot) with smaller heads.

THE DAYS BEFORE MONUMENT BOXES

Country roads are frequently built along section lines, with section and quarter corners hidden under the asphalt. Dad had just the tool to get at those monuments, a 6', 1" diameter hex steel pry bar that weighed about 20 pounds. One end was pointed and the other flattened to the shape of a beveled shovel. We were always careful to pull from reference points to get close to covered corners, so we did not disturb very much asphalt. Sometimes we had to dig over a foot through the asphalt and base rock to find a monument. We always tried to refill the hole as best we could, but I am sure that the county road department was not happy. That was the days before metal detectors. Later, while working for Marx and Chase Surveyors (1971-1976), I found out about dip needles, basically a compass turned on its side reacting to the inducted magnetic field for an iron pipe or rebar that is perpendicular to the earth's magnetic field. It's a simple device, but it worked. I still have my Aqua Surveying and Instrument Co. dip needle. They were popular in the 1970s and 1980s. You can find vintage ones on eBay for \$30 to \$60. A dip needle is a lot cheaper than a metal detector, and I think it worked better for our purposes because it responds only to a vertical iron rod or pipe in the ground.

OTHER USES FOR THE PRY BAR!

A pry bar is useful for saving lives, or trying to! Later in my college years, I was running a crew for Dad. I drove out to Bend, heading north on Highway 97, headed for our job for the day. We were a couple of miles north of Highway 20 when we came upon an automobile accident that had just happened. A car driving south had run off the highway and into a vertical basalt rock cut on the passenger side. We were among the first to arrive and stop; no emergency vehicles had arrived yet. My survey crew and I used the pry bar to open the car doors. The driver had fallen asleep, while driving from Portland through the night to ski at Mt. Bachelor. His passenger was dead. Once the driver discovered that his friend had died, and that it was his fault because he had fallen asleep at the wheel, he was an emotional wreck because he had just killed his buddy. I experienced the same emotional situation in Viet Nam when a Marine troop carrier ran off Highway 1 where we were doing shoulder repair. The driver was avoiding our work but drove too far over and rolled the truck into the adjacent rice paddy, pinning another marine in the rice paddy where he drowned. The driver had an emotional breakdown. That pry bar is an amazing lever tool when needed in an emergency! I still have that bar.



Seabees repairing shoulder on Highway 1, Vietnam 1970-71

WALKING IN A CIRCLE AND USING A BASELINE TO FIND THE JEEP WAGONEER

Dad and I were searching for a section corner south of Bend in a flat lodgepole pine forest near La Pine, Oregon. We started from a known location on a north-south gravel road, used a Leupold & Stevens cruiser compass (made in Portland, Oregon, later in 1968 Beaverton, OR) This compass was very popular from the 1960s to the 1980s. : <https://www.leupold.com/a-living-history>

We used the compass and headed west, ruff measuring (without plumb bobs) with a 100' tape for a mile to look for the section corner. We found the corner, and then decided not to use the compass on the way back to the car —just to see how close we could come. We were in flat country with no significant topography in a sea of lodgepole pines. We missed the car by a half mile! Fortunately, we figured out which direction the car was and walked back to it. Instead of a two-mile walk, it was 2.5 miles that day.

Dad taught me how to properly use a compass, how to properly hold it, sight and pick something to walk to, and do it again and again. Because you are part of the instrument, it is important how you hold the compass and sight. If you do not hold your compass properly, you can be way off! That compass was very sensitive because it had a floating needle. Silva/Suunto Type are the best now, with a dampened needle; however, they are easier to misuse if not held properly. The Cruiser compass had township with the section numbers on the lid, so when you

opened the lid you had a reference if needed. I still have my Cruiser compass, along with my Silva Ranger. I was a climb leader for the Mazamas and used a compass occasionally on my mountain climbs. My favorite climb was Middle Sister from the east and west routes. I summited that peak over 20 times! I later used what I learned to teach Map and Compass for the Mazama Intermediate Climbing School in Portland, Oregon.

My best real life experience with a compass was backpacking through the Pueblo Mountains on a 24 mile High Desert Route in SE Oregon from Fields, OR to Denio, NV. This is the mountain range just south of the more famous Steens Mountains. I did it in the mid 1990's with three of my best friends. It took three days, camping at springs along the route. A guide for the route was published by The Desert Trail Association, Burns, OR in cooperation with State of Oregon Parks and Recreation and BLM. There are 48 cairns marking the route with a topographic description, azimuth, and distance in yards published between each cairn. We found all with no problem, and I had the best time of my life navigating.

I just re-read the guide. The guide indicated the declination (difference between true and magnetic north) was 20 degrees East, but used magnetic azimuths and they warned of local attractions that could attract your needle and give a false sense of direction. (see Finding a Truly Lost Section Corner East of Millican) The map was published in 1981. It was a mistake in my mind to use magnetic. The declination changes by a small amount every year, and adds up enough in Oregon to be a whole degree in ten years. I just checked NOAA. It is currently 13 degrees and 15 minutes East with an annual change of 5 minutes West. In Portland it is currently 15 degrees East. Public Land Surveys use True North, not magnetic for that very reason. All professionals use true north, and compasses that can easily compensate for setting the declination.

I used my orienteering skills at Spring Break to twice cross country ski from the locked gate at Page Springs Campground/Frenchglen to the head of Kiger Gorge (9,000') in the Steen Mountains, a 50 mile round trip with 5,000' gain. We snow camped near Fish Lake. Once we got to the snow line, generally about 8 miles up, we put on our skis.

CHAIRLIFT SURVEYING AT BACHELOR BUTTE (NOW MT. BACHELOR)

Skiing became part of my life after we sold the ranch and moved into town. We were no longer married to the ranch, and our life changed dramatically! Dad had learned to ski in Alaska while working at the Lucky Shot Gold Mine, Willow Creek Mining District, 47 miles northeast of

Anchorage. He paid for his ski gear from his winnings at gambling (twenty-one / blackjack) at the mine. He had some wild adventures skiing in Alaska!

Dad took me and my Sister to Skjersaa's Ski Haus, the original ski shop in Bend. That ski shop was established in 1958, the same year that Bachelor Butte opened for skiing, and is still in business. Olaf Skjersaa helped us pick out our skis. Dad bought us entry-level downhill gear, got a season family pass (not much more than \$100) for Bachelor Butte, and we skied every weekend of my senior year in high school. It was only 22.5 miles and a 30- minute drive from our house to go skiing! Why not go every weekend? By the end of the season we had our ski legs. Later in my 40's, I learned and preferred cross-country/back-country skiing, and in my 60's and early 70's telemark lift-skiing at Mt. Hood, as climate change affected the snow quality and quantity at the 4,000' pass level.

Bachelor Butte, which changed its name to Mt. Bachelor in 1983, had one lift (the Black Lift), and business was growing. Dad knew Bill Healy, the founder, and managed to get the surveying contract for the next lift. Mt. Bachelor was his biggest client until he retired around 1977. I never meet Bill Healy, but did meet and work with his onsite operations manager, Cliff Bland, a real character and legend at Bachelor Butte.

In April 2023 I finally met Jeff Kern, the surveyor who took over Dad's work at Mt. Bachelor and wrote his memorial for *The Oregon Surveyor*, a publication for the Professional Land Surveyors of Oregon. Dad died on September 27, 1998. Jeff and I talked about our surveying experiences and Dad. Jeff wrote in the memorial: "The Mt. Bachelor Ski Resort is another institution which stands as a monument to the man who established its control network, laid out its parking lots, helped build its lodges, and mark the locations of its ski lifts. The story of Mt. Bachelor would be incomplete without devoting an entire chapter to Jean's survey work."

The surveying for a chairlift is a two-year project. The first year in the summer, the alignment is cleared. That gives access to set alignment control and do a centerline ground profile. We then referenced our control so we could return in the winter to do a snow-depth profile in order for Riblet Chairlift Company to design the lift-tower locations, foundations, tower height, etc. plus the terminals. Detailed site surveys were done for the terminals. The average snow-base depth was around 16 feet with a range of 10 to 25 feet depending on the snow drift.

The fun part involved the snow profile. This job is a little more adventurous, and it involved skiing. Fortunately I had mastered skiing by that time, and Dad had regained that skill. Plus, we had new and better ski gear. At the end of my first season skiing, I was feeling pretty hot. I came down the hill too fast, caught an edge and crashed, sticking the tip of my wooden skis with metal edges into a snow bank. I broke a foot off the ski tip! Dad took us back to

Skjersaa's, and this time we all got some top ski gear, Head Master's metal skis with Look Nevada release bindings, and buckle boots!

We rode the Black Lift up and skied over to the top of the proposed lift, found our reference markers, and established the alignment on the snow. With a cloth tape, we measured our way down to establish stationing on the snow, periodically checking into reference markers on the way down to update the stationing along the alignment. Next we skied down with the snow probe and measured the snow depth at the stations.



Jean at Mt Bachelor

How did we measure the snow depth? Snow depth is an unusual survey measurement, and Dad came up with a method. He invented a snow probe. We needed something light in weight and portable that could measure up to 25 feet of snow. The main part of my Dad's measuring

tool was an electrical conduit, which is light yet still rigid. He used five-foot sections, with a total of six sections. He took the conduit sections to a shop and had a nut and bolt brazed on the ends for connecting the sections, and a pointed, hard, steel tip for penetrating the snow on the first section. Then he marked off each section in one-foot intervals. We learned how to distinguish an ice layer from the ground so we knew when we were at the ground level. We developed a feel for that requirement. When I talked to Jeff Kerns in 2023, he mentioned that when he bought Dad's surveying equipment, etc. he got the snow probe and continued using it for the chairs he surveyed until he retired.

How do you do all this on skis? Well, by using a lot of survival skiing skills. The technique known as side-slipping, and controlling your edges is required — all while carrying the snow probe sections to the next station to probe.

After our snow-surveying work, Riblet designed the lift, and construction began the following summer. Alignment was critical! There is only so much adjustment on the tower arm to get the rollers lined up. We built large targets out of 4' x 4' sheets of plywood and constructed a 2'x 4' frame to support each target. We put those targets at the top and bottom at locations suited for maximum visibility. We ran a straight transit line up, double centering, to take out any instrument error as we went. After checking in at the top and having assured ourselves we had a good alignment, we then staked the tower locations. Next we set the batter boards for the foundation crew to dig their holes. Holes were dug by hand using pick, shovel, and bucket to lift the material out of the hole. Skid roads were built to pour the concrete foundations and bring the towers up, typically on the side of a caterpillar, and a track crane to position the tower as it was bolted in place. We needed to be there to check the alignment of the top of the towers as they were bolted down. Our job was then finished!

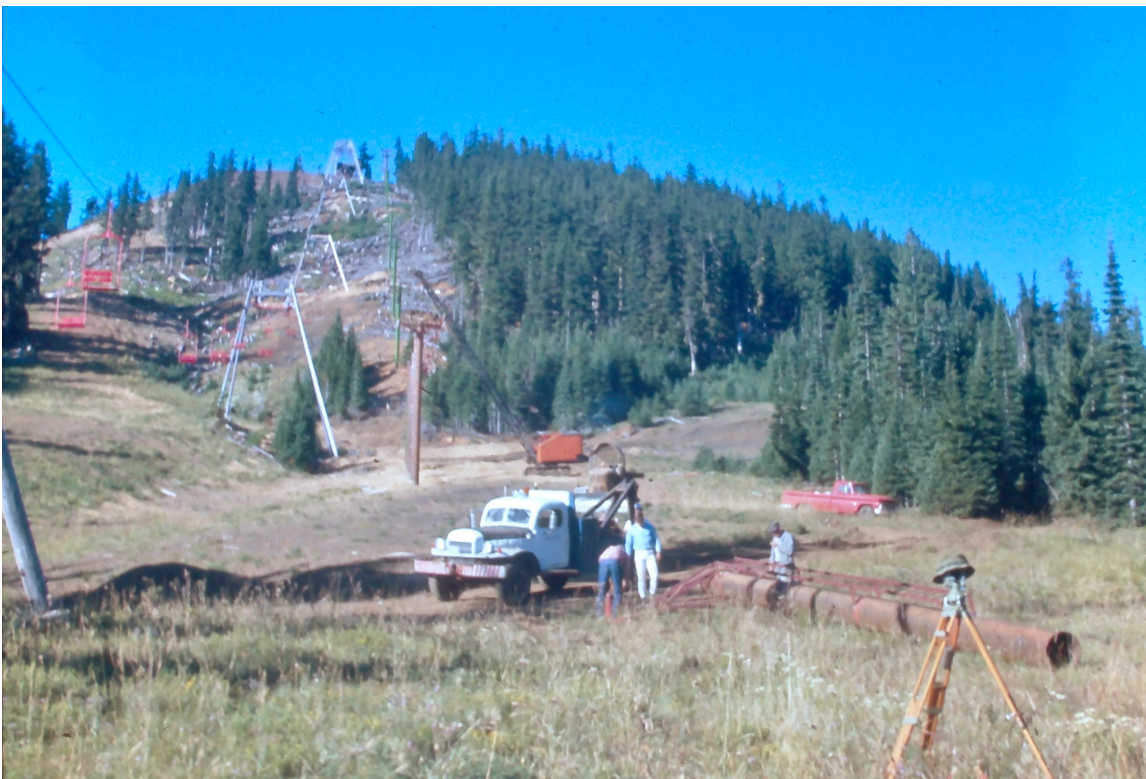
I ended up helping Dad with two lifts at Bachelor Butte. We also worked on some general infrastructure surveying and design for parkings lots, a new day lodge, and a waterline from Dutchman Flats. Also one summer, we did a rope-tow project on a permanent snow field way above timberline for training Olympic skiers. For that project and any of the lift projects, they would always start up an existing lift to give us a ride so we did not have to hike up with all our gear and stakes! But we did have to get that gear over to the project site.

CHAIRLIFT SURVEYING AT HOODOO SKI BOWL

Hoodoo Ski Bowl on Highway 20 at the Santiam Pass is the oldest ski area in the Oregon Central Cascades. It was established in 1938, and development really started after WWII. Its main lift used wooden tower structures. The ski area was purchased in the early 1960s by Hoodoo Ski Bowl Developers. They decided to replace the existing wooden-based lift with a

modern steel tower, a Riblet Double Chair. They hired my Dad because of his experience at Bachelor Butte, and it was an off-year from our Bachelor Butte work.

The alignment at Hoodoo was easier than at Bachelor Butte because we could pretty much see the entire alignment from top to bottom. One unique surveying issue that we had was the fact that Hoodoo was a cinder cone, and the ground was not stable enough to hold the Wild T-2 theodolite for any length of time. It would keep settling if we had to leave it set up in the same spot all day, for example when we had to stick around to give tower alignment. Solution: we drove 2x4s in the ground to set the tripod legs on. But we first had to put points on the ends of the 2x4s (a giant hub), and use a hefty sledge hammer.



Hoodoo Ski Bowl (Note: Old Wooden Towers, Crane w/ Tower, & Wild T2)

Our other problem was the mosquitoes. Near the base of the lift were wetlands and meadows, which were perfect mosquito-breeding grounds. I have never experienced mosquitoes that bad, other than in southeast Alaska. Hoodoo even did spraying. We ended up using DEET. There still would be a cloud of mosquitoes hovering about a foot from our faces, but after awhile we got used to it.

Our work at Hoodoo opened my eyes for the first time regarding heavy-construction safety issues. Hoodoo decided to be its own general contractor, so there was a learning curve along the way. First lesson: Get a level spot for the crane at the tower site before lifting the tower in

place. There was a good caterpillar trail from the bottom to the top, but they had to build new skid roads to each tower site. To place the first set of towers below the top terminal, they had to build a steep track down from the top and build a platform for the crane. They did not get that platform level enough. As the crane operator was swinging the boom around from the uphill side to the downhill side to place the tower, he felt the back of the track starting to lift off the pad. He immediately released the tower from the boom and dropped it into the trees below. The tower was OK; however, the fall bent up the tower arms, which had to be replaced. After regrading the crane platform, it worked the second time! I watched all this happen.

Second lesson: Watch out for turning heavy construction equipment. The accident that really got my attention could have been lethal. They transported the tower up on the side of a caterpillar, supported by the blade in front and a horizontal bar at the back. Track vehicles turn by braking one track, so they can swing around very quickly. Add to that the length of the tower strapped to the side, and the end of the tower can move pretty fast. I was standing near the Wild T-2, next to a parked pickup truck along the skid road, watching the construction. The caterpillar came alongside the pickup and made a 90-degree turn to go up the mountain. A construction worker was standing on the passenger side of the pickup hood and I was standing next to the cab on the opposite side from him. When the caterpillar turned, the tower swung quickly, caught the worker in his chest, and dragged him across the hood of the pickup. The clearance between the tower and the pickup hood was slightly less than the torso of his body. He landed at my feet with the hood bent in. He got up, told me he was fine, walked around to the back of the pickup, and went into shock! They took him to the hospital and determined that he was only severely bruised, no broken bones. A lucky man!

SURVEYING "HOLE IN THE GROUND" FOR U of O GEOLOGY DEPARTMENT

Hole in the Ground is located at the west edge of the Fort Rock Basin, eight miles northwest of Fort Rock and north of OR 31, and 22 miles south of Newberry Caldera, now part of the Newberry National Volcanic Monument. The question had been: Was Hole in the Ground formed by a meteor or was it the result of volcanic activity? It has the same physical dimension and shape as Meteorite Crater in Arizona. I just found a report dated October 1961 by the Oregon Department of Geology and Minerals Industries regarding that issue. They determined it was volcanic.

Dad got a contract from the University of Oregon Geology Department to do a survey so they could do further studies of the origin of Hole in the Ground. We did this job sometime after I graduated from high school (1964) because we were living in Bend and had the Wild T2. Hole in the Ground is just under 60 miles from our Bend house and a little over an hour's drive. Our survey was done in the middle of the summer —HOT. We were to do a profile N-S and E-W

extending beyond the rim to get the original ground. In addition we did a profile of the rim itself. The hole is about one mile in diameter and 500' deep from the top of the rim. The rim is 100' to 200' above the surround ground.



Hole in the Ground, Looking North

Dad choose to do trig leveling because of the depth of the crater. With the one-second theodolite, we could get the best accuracy for the trig leveling. We ended up getting a 200' steel ribbon tape to measure the slope distances. Due to the heat, there could be differential expansion of the leveling bubbles if the instrument was not evenly exposed to the sun. That would negate our one-second readings, so my Dad purchased a surveying umbrella to shade the Wild T2. I remember trying out the umbrella before heading to the survey site. We set up the Wild T2 and the umbrella in the alley behind our house, with my Mother standing by. It was fun to do such a unique survey and figure out how to do it with my Dad.

This survey could have been done using photogrammetry which I later had two classes in at OSU (Photogrammetry and Photo Interpretation) and made use of later in my career. Dad was also knowledgable about the use of photogrammetry, and stayed current with the technology as member of the American Society of Photogrammetry.

A TRULY LOST SECTION CORNER EAST OF MILLICAN

One of Dad's well-known skills was his diligence and ethics in finding lost government corners (section and quarter corners). He left no stone unturned (literally)! He always began with the original government surveyors' recorded notes with narrative descriptions, typically from the 1860s. Not only did those notes describe the monument set (typically a stone with its dimensions and any marking they put on the stone) and all bearing-tree references with their details, they also included what they encountered as they ran the section lines. He told me once when he was Jefferson County Surveyor that no one could find a particular section corner. He eventually found it by re-running the line per the original notes with a compass as used at that time, and found it because there was a local magnetic attraction that threw off the compass.



Jean holding Hudson Bay Axe by Bearing Tree

Most boundary descriptions start with a reference to the US Public Land Survey System (PLSS), originally developed by Thomas Jefferson for westward expansion of the US. The PLSS is a far superior system to the metes and bounds English system used in the Thirteen

American Colonies. A key element is that the original monument controls, regardless if the distances between the monuments are not correct. Another element is that there are no junior or senior rights as in metes and bounds. Equal rights prevail because, like a subdivision, the parcels were created at the same time when the official plat is recorded. So the local surveyor finds the government corners and proportions any subsequent breakdown of the sections; equal rights! The government surveyor sets the monuments for the townships (six square miles) and sections (one square mile) based on a local origin as development proceeds westward. For Oregon and Washington, it is the Willamette Meridian located in the West Hills of Portland. Then the local surveyors do the subsequent breakdown of the sections as land title is transferred.



John holding original stone w/ Bearing Tree in background

We were doing a survey about 30 miles east of Bend, and east of Millican on Hwy 20 that goes to Burns, Oregon. Kind of out there in undeveloped land! Millican had one small general store with a gas pump. The owner was later killed in 1988 by a parolee from Oregon State Penitentiary whom he had hired. The store was finally closed in 2005, and Millican is now

considered a ghost town. When I was in grade school, I bought a can of jackrabbit milk there. It was for the tourists, actually: a can of evaporated milk with a label for jackrabbit milk.

https://en.wikipedia.org/wiki/Millican,_Oregon

The only reference available to start from was the State Highway map for US 20, which was not accurate regarding the adjoining Public Land Surveys. But we started with what was available. The highway runs generally east and west. The section corner was about a mile north. We did our usual. We ran a compass line north and rough-measured the distance to get in the ball park, generally within 50-100', to start looking for the section corner. Nothing fit, and no trees nearby to check for Bearing Trees. We noticed a lone juniper tree about 500' NW on a small knoll. We walked over to the tree and noticed a vertical scar on the trunk, an obvious sign that was not natural. We then took our Hudson Bay axe and cut out the scar that had over grown the original blaze. Once we had the blaze fully exposed we could read the original scribing with reference to the section corner. From the original survey notes, we found the bearing and distance, measured out, and found the original stone also matching the description in the original survey notes! A good feeling! From there we ran out the section lines and found the other corners needed.

SURVEYING A MURDER SCENE FOR THE JEFFERSON COUNTY SHERIFF

After describing the Millican murder, I might as well tell you about surveying a murder scene.

The three principal Central Oregon counties Dad worked in were Deschutes, Crook, and Jefferson, but he also occasionally got into Lake, Klamath, and Wasco. So he was in every county on the east side of the Cascades from Washington to California. He was the Deschutes County surveyor from 1972 to 1976. He was also the Jefferson County surveyor from 1967 to 1980. He ultimately retired in Jefferson County. Bend became too crowded/developed for my parents. The population was 11,000 in 1948, and Deschutes County was 22,000 when they moved to Central Oregon. Bend is currently 102,000, and the County is 205,000. In 1974 he moved to Metolius (population 800+/-) in Jefferson County. He designed and had a house built at 775 Wilson, Metolius, OR., and lived there until his health started to seriously fail in 1997. He died a year later at Powell Valley Assisted Living, Portland, Oregon.

There had been a murder in a homeless encampment west of Madras on the north side of Willow Creek, which drains into the Deschutes River about six miles away. The Confederated Tribes of the Warm Springs Reservation lies on the west side of the Deschutes River. It had been determined the victim was Native American.

The Jefferson County sheriff contacted Dad to survey the crime scene. The body had already been removed and was sent to Portland for evaluation. We surveyed the body location with respect to the encampment. I thought this should be interesting. However, I almost threw up. Even though the body was gone, the ground was stained dark brown from the decomposition. It was the middle of the summer (hot) and apparently the body had been there for awhile. The victim's hair had fallen out and was still on the ground, and there were maggots still crawling around. Having grown up on the ranch, I had seen dead animals before, in various stages of decay, but this scene got to me. Mostly it was the odor; it was so bad I almost threw up. I really had to persevere and not just walk away.

SURVEYING USING TANGENT OFFSETS (OLD SCHOOL)

In the days before computers using COGO, running a random traverse and tying the monuments to the traverse with side shots would have been a laborious task. A simple technique for surveying a section was to start at a section corner and run a straight transit line to the next corner, which is generally a quarter corner a half-mile away.

At the quarter corner, the surveyor puts in a station as perpendicular as possible, and measures the angle and distance to the corner.

This creates a simple triangle from which the surveyor can calculate a tangent offset anywhere along the transit line, measure over, and set a point on the true line such as a 1/16 corner for a 40 acre tract. Basic trigonometry. The only problem is running into an obstacle, such as a tree. If the tree is small enough, it gets cut down; if not, the surveyor makes an offset in the transit line, in which case the surveyor then either offsets back to the original alignment or keeps track of all the offsets and moves back when possible. Very simple.

Dad used this method to set the center of a section, which is the intersection of straight lines from the quarter corners. Once we finished running those lines north to south and east to west, where they cross we would set a hub on both sides, generally within the length of the plumb bob string. We stretched the plumb bob strings out between the hubs and where the strings crossed we drove in an iron pipe or whatever monument we had where the strings crossed.

This method can be surprisingly accurate, remembering that the definition is where the lines intersect. The measured distances may be a little off but the actual point of intersection is very close.

Compared to running a random traverse at 1 to 5,000 for local surveying in the rural areas, you may not be as close to the true position. Precision always goes up in more developed areas as the property values go up correspondingly. The original government surveys done in the 1860s were 1 to 600. What those ratios represent is how far you went before you could be off one

foot. So 1 to 5000 is about one foot in a mile, 1 to 600 would be about 10 feet in a mile. Another reason the monument controls, not the distance.

HOW TO AVOID STARTING A FOREST FIRE

We were doing a survey south of Bend near La Pine in the lodgepole pine country. As described above in the Tangent Offset (Old School), we ran into a lodgepole pine under six inches in diameter, just right for chopping down with the Hudson Bay axe. I got pretty good at falling a lodgepole pine. However, I misjudged the alignment of the cut to fall the tree in the direction I wanted, which was away from a power line. When it started to fall, I immediately saw my mistake as the top of the tree leaned over onto the power line. "Oh shit," I am sure I said! Sparks were flying, and it was the middle of the summer. I did not want to be responsible for starting a forest fire. How to get that tree off the power line? Not enough time to go for help. I finished chopping the tree and got the butt on the ground off the stump. I did not want to touch a green tree for fear of an electrical shock. (When I was in my early grade-school years, one of our neighbors was fatally struck by lightning while loading pumice on the railroad cars at Deschutes Junction. He left a family with two kids I went to school with.) Our solution was to use the dry wooden handle of the axe as an insulator. I rammed the axe into the butt of the tree and kept pulling and dragging until it came off the power line. My adrenaline was running high!

SKINNY-DIPPING ON THE JOB AND GETTING CAUGHT!

One hot summer day I was running a crew for Dad with a couple of other college students. We were south of Bend along the Little Deschutes River, probably near La Pine. We had just finished lunch sometime after 1:00 pm, and in a weak moment the other guys on the crew talked me into taking a dip in the river. Not long after we were experiencing the pleasant relief from the heat, the property owner (a woman) appeared on the bluff above us. It was clear she saw us. She wasn't close enough to talk to us, and she never came down to the river. But I figured the best thing to do was get out of the water, get dressed, and go back to work. An embarrassing moment. I never mentioned it to Dad, not wanting to get in trouble.

However, many years later, around 1990, I told Dad. He told me that the woman had mentioned the incident to him. He said: "Well you know, I never got another job from her." But he had no problem with our going for a short swim on a hot day.

SURVEYING IN MANZANITA BUSH, OR HOW TO AVOID IT

Our worst fear was surveying through manzanita because it was so hard to clear. Manzanita is an evergreen bush with extremely hard branches with red bark. It grows in poor soil with little

moisture. Sometimes one can encounter rather large solid patches that are up to an acre or more. The only way to cut manzanita with the axe was to get right down next the base and chop it out. Otherwise the axe would just bounce off the branches. One or two bushes is not bad but a patch would be hell.

Again we were using the tangent offset method and running straight lines. We ran into a large patch of manzanita. I ended up setting the transit on a mound or large stump to get high enough for a line of sight above the manzanita patch to extend the line. Somehow we also managed to get the steel tape over the patch and continue measuring. The problem was that the mound or large stump was large enough to hold the transit but not me, too. It was all I could do to keep from falling while looking through the telescope of the transit, and holding the tape next to the transit with enough tension to make the measurement. The alternative—the axe—was my incentive, and I managed to do it.

Encountering a patch of manzanita would not be a problem today by running a random traverse.

HUDSON BAY AXE SKILLS—ENTERTAINMENT DURING LUNCH

Having watched westerns on television growing up, I saw many scenes of a tomahawk being thrown. While surveying, a thought came to mind: The Hudson Bay axe kind of looks like a tomahawk, so during our lunch breaks I started practicing axe-throwing, along with my crew of college students. After awhile we got pretty good. We could throw the axe with a flip so it went end-over-end, and have it land in a tree trunk with the handle pointing straight down! What fun!

SUN SHOTS, AND A STAR SHOT FOR KICKS

Surveyors use sun shots to determine true north. As a basis of bearings for the final survey, a sun shot is the best because when retracing a survey one could take another sun shot if needed. The other accepted alternative is just to assume a bearing, which is the easiest, but the bearings on your final map will only give you the angles between lines, and not true north.

Dad was particularly skilled at taking sun shots, and doing the subsequent calculations. A sun shot requires accurate time and a solar ephemeris, which is a table giving the sun's location at specific times during a given period. I never was taught how to do a sun shot at OSU, and Dad did not teach me how to do the necessary calculations using spherical trigonometry vs plane trigonometry. I only helped take the measurements and the notes, which he took to the office to do the necessary calculations. Now I wish I had had the training. One thing I learned is not to look directly at the sun through the telescope on the transit while measuring the angles to the sun. The surveyor uses a piece of white paper as a projection screen in front of the eyepiece. On the paper is projected the cross hairs and the sun. The surveyor then takes a

series of angle measurements with the times to look up in the ephemeris. The measurements are taken to one side of the sun and then the other, averaging in the calculation process to get the true center of the sun.

One can also use the North Star to determine true north. However, the North Star actually is not always right at true north. It is close but it goes through a small elliptical pattern which cannot be seen by the naked eye. To overcome that problem, the surveyor measures the angle to the North Star at its elongation on the elliptical pattern, and then looks up in the ephemeris the time for elongation and the angular measurement to get back to the center where true north is. No complicated calculations. You look up the time and angle adjustment from a table, and you are good to go! So Dad and I decided to give it a try just for kicks. The only problem is that the North Star elongation is not going to happen during normal working hours, like a sun shot. We ended up getting up at midnight to drive to the job site near Sisters and waited for the correct time. At some point, the North Star stops moving in one direction, and starts moving back on that elliptical pattern; then we took our measurement, basically a horizontal angle back to our survey line. Mostly likely we did a sun shot for comparison. Redundancy is best to use in measurement procedures to catch errors. One of the best surveying classes I had at OSU was engineering measurements. It was all about how to design a procedure to come up with the accuracy desired. It also covered error theory, and how to deal with and catch errors. That class was my introduction to statistics. I later took a statistics class at OSU. At David Evans I designed a unique survey procedure with that knowledge.

MORTGAGE SURVEYS

When property sells, the bank and/or title company wants to be assured that the house is actually on the property so there are no potential claims. A mortgage survey does not require a full boundary survey. The surveyor obtains any records of surveys done, and most of the time the property is a lot in a subdivision. The surveyor visits the sight to find a corner, if possible, and roughly where the lot line is. Then the surveyor takes measurements from the lot line to the house and/or improvements. Generally it takes about an hour of field time, some time for research, and drawing up a map of the findings.

For commercial property and other high-value property, the procedure gets more involved and is called an ALTA survey (for American Land Title Association). More time and effort are required to assure that there are no problems.

MINING CLAIM SURVEYING

<https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/locatable-minerals/mining-claims/staking-a-claim>

Dad was uniquely experienced at surveying mining claims because of his gold and silver mining experience in Nevada and Alaska. He was asked to do the survey to mine obsidian near Newberry Crater, which is known for its obsidian flows. There are a number of volcanic buttes north and east of Newberry Crater, most of which are cinder cones. Someone found a butte that was primarily obsidian. Normal obsidian is black. This butte was mottled black and brownish red obsidian. The client wanted this obsidian for decorative rock to be used on the face of prefabricated, standup concrete slabs.

We staked the claim by setting a wooden monument post at all four corners. We did some measurements. Dad filled out the required paper work, and placed it in a 1.5 oz. Prince Albert tobacco can on one of the corners. We nailed the can to the post. Dad was a smoker - cigarettes and a pipe. He smoked Prince Albert tobacco in his pipe. It is in a very distinctive red can and hard to miss on the post. It was also pretty much water-tight, but in the dry Eastern Oregon environment water isn't much of a problem.



Jean with Mike and Jim Weston, at Mercury Mine, Steens Mts.

Dad also helped our neighbors and close friends, Mike and Jim Weston, who lived on Deschutes Market Road, with their mercury mining claim in the Steens Mountains above the Alvord Desert on Indian Creek. The Westons eventually sold their property on Deschutes

Market Road and moved to a homestead claim next to the mining claim to operate their mine. Dad advised them on their claim and the smelting process, which can be very dangerous and even deadly. The Westons worked a vein to get the ore, called cinnabar, which is mercury oxide. To process the ore, they heated the ore, from which the pure mercury came off as a vapor, which was condensed to a liquid state. They worked the mining claim only enough to keep their homestead claim valid. The Westons appeared in a 1982 National Geographic book, "America's Spectacular Northwest," on pages 96, and 100-101. I visited their claim when I was in college, and later around 1990. When the Westons could no longer work the claim and care for themselves, they moved to a retirement home in Burns. They, too, have since passed away. The BLM has totally dismantled their homestead and mining claim.

USING CURTA AND MONROE HAND-CRANK CALCULATORS

At OSU, engineers were still using slide rules when I was going to college. Most engineering problems required only three significant figures, which works well with a slide rule and engineering notation, but not surveying. A surveyor needs at least eight significant figures if the distance is in the two-mile range. Most calculations for surveying use trig functions. We had trig tables with eight and more significant figures, down to seconds of arc. We were only doing the basic math operations of addition, multiplication, and division. A mechanical calculator did the job. We used hand-crank versions, no electricity needed, so we could also do field computations where electricity was not available.

In the office Dad used a small Monroe LN160X hand-crank calculator; it was easier to punch in the numbers. In the field, he used a Curta, which would fit in one hand while he cranked in the numbers. Also, the Curta would easily fit in our Filson Cruiser vests that we used for our Surveyors vest. The Curta calculator concept was born in a German concentration camp. They were made in Liechtenstein, the smallest country in Europe from 1948 to 1972. I learned how to use both kinds of calculators. See <https://en.wikipedia.org/wiki/Curta>

WHAT MY SURVEYING EXPERIENCES ULTIMATELY DID FOR ME

- Brought me closer to Dad
- Gave me an appreciation for Dad's surveying and geology knowledge from real-life experiences and his self-education, and formal education.
- Cemented my love of surveying, enough to want to make it my career, which I combined with my civil engineering
- Provided more real-life experiences, beyond ranch life

- Taught me work ethics and professional ethics
- Contributed to my sense of civic duty
- Gave me broader outdoor nature experiences, beyond the ranch
- Afforded a better understanding of geology from my Dad explaining the morphology of Central Oregon as we surveyed.
- Presented opportunities to develop problem-solving skills, leadership skills, and orienteering skills
- Taught me about the Public Land Surveying System
- Gave me a deeper appreciation of measurement errors, and the consequences of those errors
- Provided a deep knowledge of the broader Central Oregon region
- Equipped me with axe-throwing skills
- Supplied me with a broad range of surveying techniques and a historical perspective of surveying methods
- Presented the beginning of my boundary-law knowledge

SOME HIGHLIGHTS OF MY SURVEYING CAREER

- Marx & Chase Surveyors, Gresham, OR: Hired as temporary summer party chief. Job lasted five years. Learned to use a machete for cleaning line.
- Marx & Chase: Party chief on USFS road survey - summer project.
- Marx & Chase: Control party chief using electronic distance meter on BPA survey for transmission line across Cascades. Participated in all phases of the BPA survey. Late summer/fall project. Learned to run a chainsaw! All measurements during fire watch.
- Marx & Chase: Summer party chief on special projects and boundaries; otherwise in office computing and resolving boundaries.
- 1974 took and passed LSIT and PLS tests. First year for LSIT. Took tests back to back Friday-Saturday.
- 1975 took EIT, That I could not take at OSU. Finished at end of Winter Term, and was already in the Navy when EIT is given in the spring.
- Carter Bringle and Associates, Portland, OR: Began my subdivision platting experience, and civil design experience (1976-1978).

- David Evans and Associates, Portland, OR: Survey Manager, managed 5 survey crews, established field crew procedures to eliminate errors and standardize field work. Resolved boundaries for subdivisions, including Forest Heights the largest subdivision in the West Hills spanning several sections and two counties. Recommended boundary adjustments where needed to avoid legal disputes (1978-1980).
- 1978 Took and passed PLS test for Washington State.
- Mt Hood Community College, Gresham, OR: Civil Engineering Technology Full Time Instructor. Taught all the surveying classes, developed Route Surveying Class to incorporate real life experiences, and developed a new COGO class to reflect the current use of computers in civil and surveying practice (1980-1984).
- 1984 took and passed PE in Oregon and obtained reciprocity in Texas, and later Washington.
- ARP Consulting Engineers, Dallas, TX: (1984-1986) Got my PE in 1984 and focussed on civil design.
- Alpha Engineering, Portland, OR: Back to Oregon after the Savings and Loan crash in TX. Combination surveying and civil design (1985-1987).
- City of Oregon City: Back to the public sector for retirement benefits. Civil Engineer. Oversaw development standards and review. Established survey control, and required all subdivisions to tie plats to control using State Plane, Coordinates, wrote legal descriptions when needed. After sewer treatment became available Oregon City development went from 10 lots per year to over 500 lots, and the engineering staff grew from two to five (1988-1993).
- City of Portland, Transportation: Project Engineer for street design, and review. (1994-2006) (Peter Principal - after burn out at Oregon City)
- Expert Witness in two civil trials regarding boundary disputes.
- Stamped over 100 subdivisions in Multnomah, Clackamas, and Washington Counties while working for Carter Bringle, David Evans, and Alpha Engineering.
- Retired 2006 on PERS and savings.
- I helped several of my friends after retiring locate their property corners and their property lines on the ground. I always told them they were giving me some recreation time, and thanked them for the opportunity. I loved it! Below is a 2011 picture of me helping my best friend, neighbor and climbing partner, Neal at his coast property to insure adjoining logging did not encroach on his property.



John w/ Jean's 1931 Gurley Transit helping friend at coast property (4-23-2011)

EMPLOYMENT RECORD FOR JEAN WM. HAWTHORNE

PRIOR 1936

- Banking Experience as bookkeeper, 2 years.
- U.S. Geological Survey, Alaska. Topographical Engineer's Helper.
- Prospecting, Alaskan Fishing Experience, Small Boat Handling & Tug Boat Experience.
- Worked as Naturalist in Boy Scout Camp and at General Grant National Park (now part of Kings Canyon N.P.), Nature Walks, General knowledge of trees, flowering plants, birds and mammals. Engaged in Nature Photography. Experience in collecting birds for Scientific Study. Held Federal License for collecting.

1936-1937

- General Metals Recovery Corp., Tonopah, Nevada
Cyanidation - Gold and Silver Ores.
Assayer - Fire & Wet, Bullion & Cyanide Precipitate Assays, Custom research on Cyanidation processes and obtaining necessary data for flow sheets and plant design.

1937

- Desert Silver Inc., Silver Peak, Nevada
Load Mining and Cyanidation of Silver Ores.
Installation and putting into operation of assaying equipment.

1937-1938

- Mill Canyon Mining Company, Beowae, Nevada
Gold Lode Mining and Cyanidation.
Shift Boss Cyanide Plant
Bullion Melting
Geology of ore deposits and sampling same for assay maps.
Drafting. Acting as mine foreman for developing mining plan and directing development of new headings. Some mine surveying. Also acted as Postmaster and Licensed Radio Operator.

1938-1939

- Alaska Juneau Gold Mining Co., Inc., Juneau, Alaska
Mr. Walter Scott, Mill Supt.
Millman
Flotation, mixing reagents
Mill reports: Daily Milled Tonnage, Head, Tails, Regrinds, Concentrates, Showing break down on mill operations.
Flotation: Ore testing, Operational Control of Flotation, Fluid Pulp measurements
- Tonnages, Sizing - Screen Analysis
Handling Bullion: Melting - Weighing, Retorting Amalgam

1939-1940

- Willow Creek Mines, Inc., Lucky Shot, Alaska
Assayer, Fire and Wet Analysis: Bullion (Amalgam to Bars), Mine Surveying and Sampling, Instrument work, traverses, drifts, haulage ways. Mine workings and computations. Geology and assay maps.
Acting Mill Supt.: Controlling milling operations - crushing, grinding, treatment. Ordering Mill Supplies. Metallurgical Testing, Step Extraction - Tailings.

1940

- Gold Plaser, Inc., Fairbanks, Alaska
Plaser Mining, Gold
Panner for churn drilling operation. Prospecting for placer gold. Background on methods for computing yardages, values and plotting location of drilling operations.

1941-1943

- U.S. Army Engineers, Fort Richardson, Anchorage, Alaska
Surveying, Chief of Party for Field Work on Railroad Construction: Route Survey, Sidings, Switches, Frogs, Railroad Construction and track alignment, Detail and Design of Railroad.

Surveying:

Streets, Monument System, Establishing Street system, curves, park areas, Buildings, Location for construction, Foundations for Large Hangers, Frame Buildings and reinforced Concrete Buildings.

Sewers, Sanitary, Storm and Outfall, Knowledge of sewer practice and construction.

Gasoline Storage Farm, Grade Control and Construction stakes, Cooperation and direction of earth moving equipment.

Miscellaneous:

Work on Concrete as required on construction for control of grades, alignment, Runways, Underground Steam and Communication lines, Compass Swinging Base, Ammunition Storage, Concentration Areas, Land Surveying and Topographic work. Coordinate Mapping. Use of Aerial Maps. Instrument adjusting.

- U.S Army Engineers, at Steward, Alaska
 - Sewer and Water Lines
 - Hydrographic Survey for present Army Dock
 - Triangulation Coastal Islands

1943

- Civil Aeronautics Administration, Anchorage, Alaska
 - Assistant Airways Engineer
 - Chief of Party (Construction): Runways, Radio Towers, Street checking before erection. Painting Inspection on houses. Earthwork, Grading, filling, yardage, Computations for monthly estimate of progress and payment for contractor.

1943-1944

- The Alaska Railroad, Anchorage, Alaska
 - Transitman: Transit and Level work
 - Drafting and some structural experience
 - Supply clerk and Bridge Gangs.
- Also Engaged in Local and Civic Activities.
 - Member of Jr. Chamber of Commerce. Active in Anchorage Ski Club.

1944-1948

- Eugene, Oregon - Mostly self-employed
 - 1 year Real Estate Selling, Working with such companies as Safeway, Oil Firms, Coca Cola, Oregon Truck R.R., Ranches and Home Sales.

1949-1953 (Intermittently)

- Soil Conservation Service, Redmond, Oregon
 - Started as Rodman and held Field Engineer's Rating at end.
 - Land Leveling, Soil Conservation Practices.
 - Range and soil survey experience.
 - Pipeline construction and design for irrigation purposes.
 - Water loss studies.
 - Drainage Survey.
 - Farmers Meetings and engaged in Farm Planning based on soil capabilities.

1953

- Production and Marketing Administration
 - Secretary for Deschutes County
 - Federal Farm Programs
 - Soil and Water Conservation Payment Programs
 - Support Prices and Loans
 - Grain Storage Loans
 - Selective Service Reports
 - Local and State Program Meetings
 - Federal Crop Insurance Program started in Deschutes County.
 - Office Manager with Secretary
 - Engaged in Civic and Club Activities in Redmond.

1954

- Engaged in Grade A Dairying for Self.

1955

- One year Real Estate Selling, Bend, Oregon,
 - Member Realty Board, Real Estate License still available.

1956-1959

- Brooks Scanlon Lumber Co., Bend, Oregon
 - Forestry Department: Timber cruising, Land Surveying research and field work prior to logging operations, logging road surveying, design and construction staking, railroad spur design and construction staking.
 - License for Professional Land Surveying obtained October 1958.