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Harry T. Kelsh*

Memorial Address

I AM PLEASED today to offer this tribute to Harry T. Kelsh as my contribution to the series of Memorial Addresses sponsored by this Society in recent years. These talks are intended to honor the memory of individuals making outstanding contributions to our profession.

I knew Harry Kelsh quite well over a period of 20 years as a friend and a client. To obtain other viewpoints I wrote to many other friends and former associates. I also reread the several papers Harry presented at meetings of this Society and reviewed the many published articles on the plotter by various users.

Both from personal contact and from this research emerges a clear picture of a calm, kindly, straight-forward individual not given to exaggerated claims either for his plotter or for himself. I concluded that it would be most inappropriate for me to present Harry and his capabilities in an exalted manner; therefore, I have tried to be factual while admitting at the same time to a definite bias in his favor. I liked Harry as a person, respected his persistence, his honesty, his optimistic attitude. For many years I have been an enthusiastic proponent of his simple, direct approach to mapping problems as we know them in this country.

Harry Kelsh is noted principally for development of the plotter bearing his name, a feat worthy of our admiration and gratitude. Once he became involved in photogrammetry in 1935, Harry devoted most of his waking hours until he retired to our science, first by advancing the development of the slotted template method of map control, followed by his total devotion to the problem of producing a simplified, economical plotter capable of projecting full-size images at large magnification.

Although Harry received substantial help from others in the later stages, it is my positive opinion that without him this type of inexpensive plotter might never have been built. The European man-

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Harry T. Kelsh
15 November 1889—30 January 1979

ufacturers were consistently oriented to the more complex optical instrumentation which, while appropriate for use in their well-mapped countries, was beyond our needs in 1946. The Geological Survey had little interest in large-scale mapping, its largest publication scale being 1:24,000. The leading USGS photogrammetrists were unanimous in favor of development of a modified Multiplex instrument, using a reduced diapositive rather than a full-sized plate. This program resulted in the successful design of the ER-55 Projector, which became available commercially in 1955 as the Balplex Plotter, approximately seven years after the Kelsh appeared.

Although the Kelsh Plotter became widely used by government agencies, particularly highway departments, Harry was primarily aiming at the commercial sector. He once told me that his idea was to develop a plotter that the average photogrammetrist could afford. The thousands who man the small companies throughout the United States are living proof that he fulfilled this longtime objective.

In this ultrasophisticated age Harry's plotter may seem a simple device, but its development required several years of laborious trials, research, and experimentation by Harry backed by some of the best technical brains at our leading federal mapping agency. He succeeded by sheer persistence and determination, qualities which carried

him through periods of extreme discouragement when, as he stated at our 1948 Annual Meeting, "I was tempted to throw this plotter out the window."

The Society honored Harry with the Fairchild Photogrammetric Award (Figure 1) before electing him president in 1959 (Figure 2) and an Honorary Member in 1970, shortly after he retired to Florida, where he died in January 1979.

I volunteered to write this paper partly out of the friendship and respect I developed for Harry during the 20 years we knew each other, partly because I felt that an account of his struggles against substantial odds and his ultimate success through persistence and determination might encourage future experimenters in similar situations.

More importantly, I felt that Harry's development of this simple compilation plotter had profound effects on both map makers and mapping instrument manufacturers to a degree that has been largely unappreciated. I believe that the immediate acceptance of this instrument awakened European manufacturers for the first time to the real mapping needs of our country. They began to realize that our large unmapped areas needed first-stage mapping rather than updating or polishing, that we required a large number of less complex, simplified plotters turning out preliminary maps on a production basis.

The greatest effect by far, however, was the opening up of opportunities in commercial mapping by making it feasible for the average photogrammetrist of modest means to enter business. Today, instead of a limited number of large, conglomerate-owned mapping firms in the main cities, we have more than a thousand small organizations scattered nationwide. After experience in both types of companies, I am convinced that our



FIG. 1. Harry Kelsh receiving the Fairchild Photogrammetric Award at the ASP Annual Convention in March 1948.



FIG. 2. Harry Kelsh opening the 1959 Annual Convention as incoming President of the American Society of Photogrammetry.

specialized calling is more efficiently conducted by those close to the clients, by local practitioners who know weather, vegetation, control, and other vital data in their regions, knowledge necessarily acquired by years of observation and actual experience.

POSTWAR SITUATION

To set the stage for the appearance of the Kelsh Plotter, let us review briefly the general mapping situation in the United States at the start of the postwar era. In a large sense we lived in an unmapped country, one that had never supplied proper funding for general-purpose maps commensurate with its size and importance. The pre-1929 efforts of the Geological Survey were limited and devoted largely to the needs of Survey geologists. During the Depression these relatively meager efforts were reduced still further; as a result, in 1946 the Survey was just organizing a program to provide 1:24,000 maps to replace the outdated inch-to-the-mile series, which by no means covered the country.

At the state, county, and city level aerial photography and photogrammetric mapping were almost nonexistent. Most cities had no maps or at best schematic diagrams showing street profiles or property lines.

Mapping plotters available for purchase were those designed by Europeans for Europeans with little thought for our needs. The Stereoplanigraph, Aerocartograph, Wild A-5 Autograph, and others were fine, versatile instruments but much too complex and expensive for routine map compilation. The Multiplex, regarded by its German designers as a reconnaissance device, had been greatly improved by the USGS and Bausch & Lomb scientists during World War II. Many smaller commercial firms relied on the Multiplex after the war, but its use for large-scale mapping

was greatly impaired by a low working C-factor, which resulted from the relatively dim lighting and serious loss of detail in the reduction printer.

During the Depression and the war years a tremendous demand was building up for homes and the supporting services such as sewer, water, and electric power. The construction boom starting in 1947 created an immediate and explosive need for preliminary engineering maps.

In 1948, when the Kelsh Plotter became available commercially, it found an immediate market. Photogrammetrists, surveyors, consulting engineers, and outside investors started aerial mapping firms. Many were located in basements, garages, shopping center storefronts, even in caves if we can believe Bill Harman who then traveled the country for the Geological Survey. He claimed that in the Los Angeles area he had to "swing in on a vine" to check out some who had set up Kelshes in the Hollywood hills.

BIOGRAPHICAL DETAILS

Harry Kelsh continued to work for the Geological Survey after his plotter became a commercial success, but undoubtedly his thoughts were often directed towards the commercial world. As a result of Survey efforts to channel his talents into other areas, he published in 1952 a report on the Airborne Profile Recorder. However, the diversion must have been temporary; after receiving somewhat of an ultimatum, Harry took early retirement later that year, and after an unsuccessful stint as a private consultant he entered the manufacturing field in Baltimore.

Meanwhile all this commotion was attracting national attention; I recall articles in *Barron's*, the *Wall Street Journal*, even *Reader's Digest* during this hectic period. Employment offers started flooding the government mapping centers and many of us cut our food bills by free lunches at Washington restaurants, which we paid for by listening to sales pitches designed to entice or shame us into leaving the government.

In postwar Washington numerous opportunities existed in the federal service at the many new or expanding military and intelligence agencies. Nevertheless, photogrammetrists who disliked the city or preferred the more varied life in smaller entities decided to leave the federal service. I doubt if many had visions of great wealth as salaries offered were usually only a bit higher than the government rates. For whatever reason, a small exodus took place, which included such future mapping executives as Louis Woodward, Al Quinn (who detoured via Syracuse University), Carl Alster, Lou Dickerson, Pete Warneck, Bill Seestrom, Marshall Wright, Jr., and many others, including myself.

The new wave of small companies, many with a single Kelsh, were not exactly welcomed with open arms by the established firms, many of whom

had at least one "heavy" plotter which was often displayed and publicized for marketing purposes. Competition became quite fierce, particularly in city mapping. City engineers, who often seemed particularly impressed by the more complex European instruments, sometimes even barred companies with projection-type plotters from competing for their favors.

Harry Kelsh remained aloof from this fray, preferring to let his plotter speak for itself. As expressed at our March 1948 Annual Meeting, he saw a need for many types of plotters, each suited for a specific type of mapping. He never criticized competing manufacturers nor did he attempt to promote his ideas by downgrading others.

Harry was quite wise to stand back. Companies who treated his plotter with respect were pleasantly surprised at the consistently fine results which compared favorably with those attained through use of more complex plotters. Even those who went in for long periods of benign neglect managed to achieve fair results, especially if they secured ample control and avoided competing for the more difficult jobs.

The Kelsh Plotter, like the old DC-3 aircraft, proved to be a sturdy and forgiving beast which, once planted firmly in place by Harry's agent, stayed in adjustment well and required little maintenance. The substantial and undeniable worth of Harry's contribution to mapping in the U.S. is shown by the continuing use of many early instruments as well as the present, much-improved models produced by Danko/Arlington. It is still the workhorse of highway departments, small companies, and even some of the largest who, I'm afraid, tend to hide them in obscure corners.

Harry Kelsh, the author of all this revolutionary activity, had a varied career as surveyor and banker before encountering photogrammetry in 1935. He was not a mechanical genius nor was he highly educated in optics. His chances of success were slim indeed considering that over 200 patents for various mapping and modeling devices had already been registered.

He had an inventive, inquisitive mind, a willingness to learn from others, and a persistent determined nature, qualities which combined to bring success to his efforts.

Harry's biographical sketches carefully avoid any reference to his birthdate but school records indicate he was born in Philadelphia on 15 November 1889. His father, also named Harry T. Kelsh, maintained the family home at 529 South Broad Street, in the "center city" area not far from Independence Hall. Later the family moved west a short distance to 3002 West Girard Avenue.

He was fortunate enough to attend Central High School, a venerable Philadelphia institution known for its high standards and exacting curriculum, factors which caused the State Legisla-

ture to allow this school to award degrees to its graduates. On 18 June 1908 Harry received a Bachelor of Science degree from its modern language school.

That fall he began two years of engineering studies at the University of Pennsylvania which served to qualify him for entrance as a Commissioned Officer in the Coast & Geodetic Survey on 5 April 1911.

ASSOCIATES' COMMENTS

We are indebted to O. S. Reading, a co-founder of the Society and 1937 ASP President, for this glimpse of Harry's life at the Coast Survey, based on their service as fellow officers on a cruise to Southeast Alaska on the survey ship *Patterson*.

"The morale of the ship's officers was quite high about the quality of their survey work. Harry was recognized as the top topographer with a planetable. The sheets he produced were beautiful, precise, with neat delicate drafting. When he checked the first projection I made (with a beam compass and straight edge those days), he criticized the holes I had pricked for the position of triangulation stations as big enough to bury a man in.

"Harry was interested in photography, resurrected a topographic survey plate camera (Vintage 1900) from the ship's survey gear. He made a few plates for use in contouring some hills on the islands in the waters we were surveying, but their woods were so thick and high that he used the plates only experimentally. The chief was interested only in shoreline and top heights, for which the planetable was adequate."

The years from 1911 to 1932 were described by Harry in his biography, written for the ASP 1959 presidential ballot, as follows: "After service in the Air Force during the First World War and a period in private business, he returned to the Coast Survey in 1932." This terse description is wholly in keeping with Harry's lifelong reluctance to discuss his private affairs.

We have factual information that Harry was President of Pacific Finance Company in Seattle during this period, which tends to support the hints he dropped once or twice that he had been in banking and owned other businesses, becoming quite wealthy before losing all in the Crash of '29. He told one friend of borrowing a nickel from a faithful houseboy to buy a newspaper to study the "help wanted" ads.

In 1932 he succeeded in making his way back to Washington where he obtained a position at the Coast & Geodetic Survey, no small feat in itself when one considers his absence from the surveying field for years and the fact that government jobs were *really* frozen in those days.

Why he left the Coast Survey in 1934 is known only to Harry and his superiors, most of whom are long gone. At this point I would like to introduce a letter from Louis Woodward, a charter member

and Past President of the Society, who was kind enough to write at some length:

"In about 1934 when we were setting up the Cartographic Division in SCS (Soil Conservation Service), Harry came in looking for a job. He was down to "skin and bones" and sure looked like he needed a job. His experience with the C&GS was one thing we needed at that time, but I was reluctant to hire him because he had not been active in the Surveying profession for some ten years. He gave Capt. Adams and Commander Bowie, both Officers in the C&GS at that time, as references. They both gave Harry good recommendations and a few days later we hired him. Soon he became head of the Survey Section and did a wonderful job.

"At SCS, Harry never had any official connection with photogrammetric work, i.e., his title, job description, etc., all related to field survey control for mapping. However, Harry was most interested in the Multiplex equipment when it was purchased and installed in Bill Cude's section. Harry just knew it was wrong to reduce the image from 9 by 9 inches down to 'postage stamp' size and then blow it up and get a fuzzy image—but he did not know how to do it differently. He spent a lot of time studying optics and talked to everyone he thought might have an idea. Some of his early attempts used condensing lenses. The SCS bought some of the gadgetry Harry wanted and a lot of it he bought with his own funds. He first concentrated on illuminating the entire 9- by 9-inch image, but this resulted in an instrument entirely too large. Finally, the idea occurred to him to illuminate only the usable portion, which was incorporated in his final design.

"About that time SCS decided Harry should pay more attention to his job of Surveying and would purchase no more equipment for him. This resulted in Harry going to the USGS and convincing Russ Bean and others there that he had a good idea and that they should 'transfer' him and let him go ahead and develop it. From here on I am sure someone at USGS can give you better information."

At this point we are fortunate to have direct word from Jim Lewis, now retired in Livonia, Georgia, who—with Jim Buckmaster—supplied considerable experience and expertise needed to produce a viable and practical plotter.

Excerpts from Jim's letter are as follows:

"I will try to recount some experiences with Mr. Kelsh, as I called him—

About Christmas time of 1946 or maybe 1947 Mr. Davey, Art Frazier, the Chief of our Division of Field Equipment, Buck, and I went to Beltsville, home of SCS to see Harry Kelsh and his first version of the Kelsh Plotter. It was a large projection instrument with plastic condensing lenses to project a 9- by 9-inch diapositive. After seeing this, it was agreed that Harry would come

to the USGS on a half time basis and that the Division of Field Equipment would help to construct a better instrument. I remember asking Art Frazier to let me work on the project as one of the team with Buck.

"Mr. Kelsh and I had my old office in the old Washington Auditorium where he and I designed a swinging light type instrument which we mounted on an A-type frame. Buck, at the same time, designed a swinging-light type instrument which was adapted to rest on a Multiplex X and Y carriage.

"There developed a considerable rivalry about which type to move ahead with. The rivalry was certainly not between Buck and me but mostly between Kelsh and those in the Survey committed to the Multiplex.

"Harry won out and he and I moved to the ground floor of the South Interior Building. Harry had complained that there were too many top officials visiting the moth-eaten office we were occupying.

"I made the drawings of the first commercial model Kelsh Plotter working with Mr. Kelsh as advisor. I have never encountered a man before or since who was more dedicated to *one idea*, namely the development of the Kelsh Plotter. I don't believe he had another thought during the year (maybe 1947-48) except the plotter. Needless to say, I was kept rather busy. Harry did manage to tell me that he once had a fur farm in the Northwest and he had been quite wealthy (I hope my memory is correct about this).

"The first model plotter was built by the Instrument Corp., Baltimore, Maryland, headed at that time by Julian Friez, founder of Friez-Bendix Inst. Co., Baltimore.

"A duplicate of this model was purchased by the Engineer Research & Development Laboratories at Fort Belvoir where tests were begun. The Survey then put one instrument in each Region office for testing. The biggest headache in the early days was designing a cam system to eliminate lens distortion.

"In summary I will say that my work with Mr. Kelsh was rewarding to me, he was always certainly a professional man and easy to get along with. I must also add that those two or three years were the most trying and demanding in my career with the Survey."

Marvin Scher, now retired in Potomac, Maryland, was detailed by the Survey in 1947 to assist in the map compilation aspects, including preparation of quadrangle manuscripts which indicated vertical accuracy attainable. In his letter he cites Harry's optimistic and enthusiastic nature, his unusual receptiveness to new ideas, his tendency to turn any conversation "sooner or later" to some facet of the Kelsh Plotter.

Marvin's letter sheds new light on a controversial area where Harry Kelsh has sometimes been

criticized. I refer to his leaving the government to start a manufacturing business based on an instrument developed and patented "on government time." This feeling still lives, unfortunately; when I mentioned Harry's name recently to a former member of the Eastern mapping establishment, he immediately said "Hell, Harry made a fortune on an invention developed during his government service."

The facts of the matter are wholly consistent with Harry's mild, nonaggressive disposition, his steady devotion to scientific pursuits in preference to the acquisition of wealth.

At the time of Harry's original patent, Federal Regulations allowed the inventor to file for full domestic and foreign rights, with the proviso that the government paid no royalty on its purchases. Harry followed the usual procedure and was granted these rights. Later, these regulations were changed during the Truman Administration to require that the inventor assign domestic rights to the government. This effectively prevented subsequent patentees from receiving outside royalties, including Russell Bean and others who subsequently patented plotting devices, electronic supporting devices, etc. This may partly account for later friction between Harry and Russ as one would expect some resentment, conscious or unconscious, on Bean's part.

Harry's departure from the Geological Survey for the manufacturing field was neither direct nor wholly voluntary. I am sure he would have been entirely content to stay on indefinitely, experimenting and developing new accoutrements for the Kelsh Plotter.

This is shown by an excerpt from Marvin Scher's letter which follows:

"While with the Survey, his relationship with Russ Bean was not always the best. Harry wanted to stay close to the plotter development and Russ wanted him to perform other functions. Eventually this friction, which probably had deeper roots, seemed more than Harry could bear. He was in tears when he talked to Jim Lewis and me about his decision to leave the Survey. . . .

"As you can imagine, it was quite surprising to me to learn several years later that Russ Bean, upon his retirement from the Survey, had joined the Kelsh company. Harry was a most forgiving man."

When Harry left the government, he first tried to establish himself as an individual consultant. The September and December, 1952 issues of *Photogrammetric Engineering* carried an ad in which Harry listed himself as a photogrammetric engineer offering "Consulting Service, Special Assignment Services, Representative to Foreign Purchases in U.S.A." The address listed was that of the Croydon Apartments on 17th Street, N.W. in Washington, D.C., where Harry had lived for many years.

Gently nudged out of the federal service in his early sixties, a lifelong introvert with little flair for promotion or public speaking, Harry was propelled by force of circumstance into the manufacturing business. Fortunately for him, soon after he started the Eisenhower Administration developed plans for the Interstate Highway System which instantly created at least 50 well-heeled clients for plotter manufacturers.

The highway departments either established inhouse capacity or rounded up private firms to assist them; companies were forming so fast in those days, particularly in the Los Angeles area that, whenever two photogrammetrists were seen in deep conversation, it was assumed they were discussing a partnership.

PLOTTER IMPROVEMENTS

The steady improvement of the Kelsh Plotter from the earliest apparatus to the present day may be seen in part by the following slides, which by no means show all of the variations.

At SCS his prototype plotter (Figure 3) showed promise but was hampered by the practical impossibility of condensing the full 9- by 9-inch image through the small aperture to yield a well-lighted model at 30-inch distance. Although Harry reported in March 1947 rather excellent results in reading spot elevations (H/3500), the weak model lighting probably would have made for poor contouring.

The 1946 version (Figure 4) depicts the first use

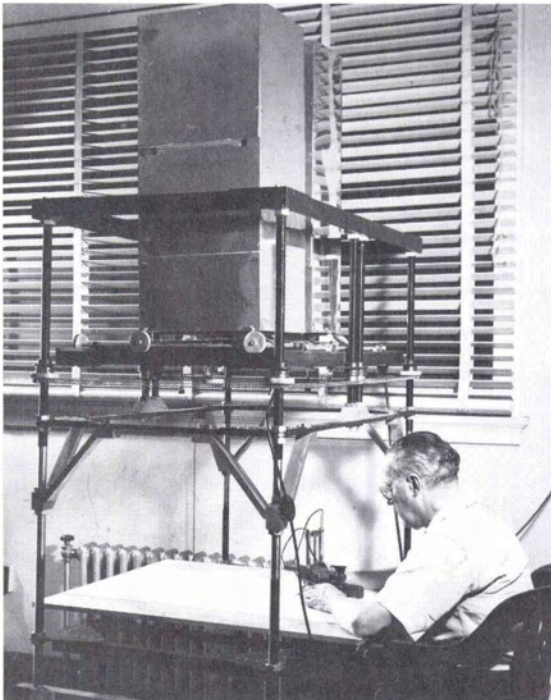


FIG. 3. The prototype plotter, 1945.

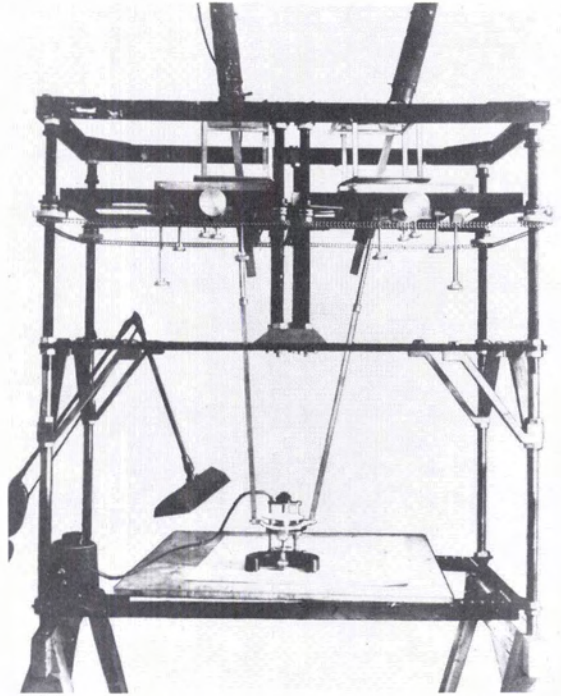


FIG. 4. The 1946 version of the plotter with the swinging light source.

of a swinging light source indicating, as Woodward also stated, that Harry moved to this idea before joining the Geological Survey.

The next model (Figure 5) shows results of the advantageous assistance Harry received from the USGS mechanical experts. Gone are the sawhorses, the chain drives of the prototypes; the instrument is solid, firm.

In 1948 the instrument had been improved by the addition of the ball cam device which permitted 6-inch, wide-angle Metrogon photography to be used.

Space and time limitations have forced me to confine the illustrations to representative samples of Kelsh models rather than trying to catalogue the really vast output. In addition to several American firms, at least three European manufacturers (Williamson, Nistri, and Kern) produced similar plotting devices for sale. And by 1969, when presumably the original Kelsh patents had expired, a search of the Society journals for that year shows six U.S. companies in the field (Kelsh Instrument, Belfort, OGM, Instruments Corporation, Kueffel & Esser, and Dell Foster). Plotters for in-house use were also made by the Geological Survey and by Aero Service Corporation.

Harry's shop itself produced a number of custom-made and prototype plotters never placed on the market. I recall orienting a test model on a 3½-inch plotter in a small garage near the Kelsh

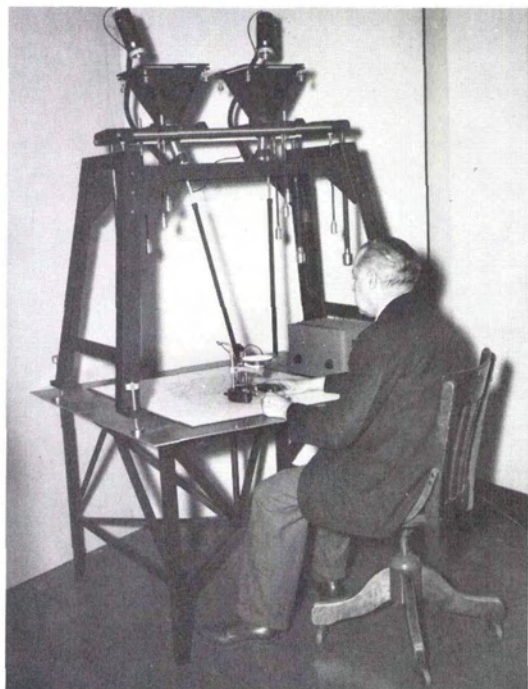


FIG. 5. The 1947-48 model, believed to be the first production model. Harry Kelsh is sitting at the plotter.

plant when the Special Maps Branch of the Geological Survey was experimenting with the PK9-lens German camera (2-inch focal length). On another occasion Harry and John Knapik took me to lunch at the Pimlico Hotel. In a benign state induced by the magnificent food at this famous Baltimore landmark, they gave me an illegal peek at a 12-inch classified version they were putting together, presumably for one of the cloak-and-dagger outfits.

This plotter was a gigantic affair, with outsized projectors that moved majestically along overhead rails something on the order of those huge cranes in a steel mill. They operated this behemoth by means of a control box similar to a TV remote control.

In those days of plentiful highway funds, I have a distinct recollection also of a highway-oriented six- or seven-diameter model which mercifully never came into widespread use. It would have called for a special breed of operators with arms like our primate ancestors.

I believe Harry's operation was cursed by the bane of many small manufacturers headed by technical people, an inability to stop tinkering and freeze the design. Henry Ford offered the public a choice of any color as long as it was black. Harry Kelsh, however, needed to know the type of camera, type of plates (0.06 inch, 0.13 inch, 0.25 inch, or film positives) to be used, whether printed

through the film or contact, whether sandwiched between glass, used with a cover, emulsion up or emulsion down, whether you planned to unhook the cams—the variations were endless and each plotter was strictly a custom order.

Companies that ordered several plotters over a period of time found no two exactly alike, which slowed operations a bit by limiting interchangeability of projects.

An article by George Whitmore (1952) compares the 1946 model (Figure 4) with the 1951 version, stating that "the principle of the two models is exactly the same, but in the short space of five years the instrument has gone through so many stages of refinement that the two models would scarcely be recognized as the same instrument!"

He goes on to mention that both Abrams Instrument Company and Bausch & Lomb had become somewhat involved, the latter having produced a prototype in which the projectors were supported on a standard Multiplex frame.

By 1952 Aero Service Corporation had produced 20 or 25 Kelshes in its own shop, an operation which ultimately may have produced as many as 70 plotters of this type.

In a scholarly article, Heinz Gruner (1954) describes a "double-projection instrument with 2 projectors" which Bausch & Lomb delivered to ERDL, at Fort Belvoir. Careful reading of the article reveals no mention of the Kelsh name although the instruments appear quite similar.

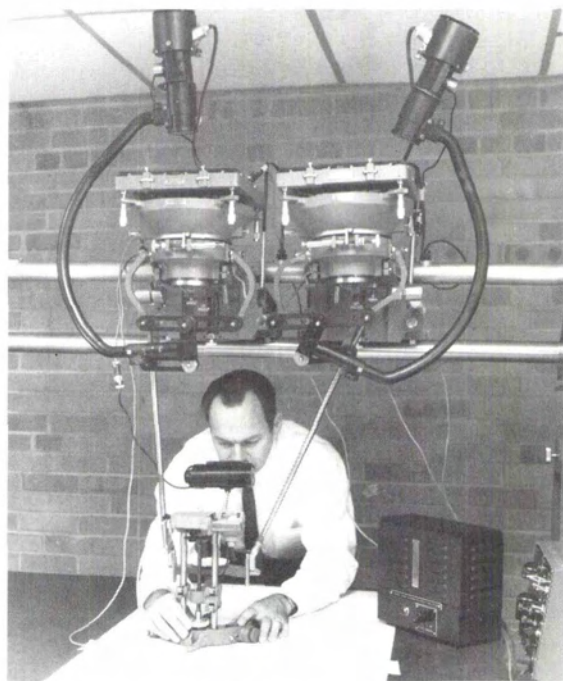


FIG. 6. A USGS Kelsh Plotter equipped with the Stereo Image Alternator.

The article mentions that "the design makes use of a spherical cam as a mechanical means of correcting radial distortion, a method invented and patented in 1933 by Santoni, Italy," and of "partial projection by a mobile light source governed by guide rods linked to a tracing table, a feature used in almost identical form in 1931 by Gallus-Ferber, France, and which is found in varied form in many other plotting instruments."

This, of course, is a very polite but firm way of pointing out that the two principal features of the Kelsh Plotter, the swinging light and ball cam correction device, were not original developments but had been around for years.

While this is undoubtedly true, it should in no way detract from the ingenious and effective use Harry made of these earlier devices in putting together a simple, direct, practical plotter, one totally devoid of handwheels, elaborate motions, or complicated linkages but simply a superb large-scale plotting tool.

PERSONAL CHARACTERISTICS

Until now I have concentrated on Harry's achievements and his determined struggles to develop the plotter while saving my comments on Harry's personal characteristics for the last, as I would like to leave with you a true and lasting impression of the man I admired and thoroughly respected.

I found him always to be a kindly, modest person who rarely, if ever, raised his voice in anger or criticism. I recall one occasion in later years when he asked my help in recovering a substantial sum owed to his company by a mutual friend. My company had paid Mr. X for Kelsh parts and labor but our friend had not paid Harry for the parts. It was quite obvious to me that he would never recover the money, nor did he to my knowledge. Where most of us would have been furious and cursing Mr. X, Harry never criticized him in any way but seemed sadly resigned to it all.

I never had the impression Harry was basically an efficient, cold-blooded businessman or administrator. In the last throes of his participation in the company, Harry and Russ Bean and Carl Huffaker were dispensing conflicting orders to the plant employees. The latter two were imaginative and innovative individuals but not highly respected managers, to put it charitably.

It was told that John Knapik, Harry's very capable, pragmatic, down-to-earth assistant and general manager, gave up at this point and spent the afternoons quieting his nerves in a neighborhood beer parlor.

Realizing that my one-sided view, which saw Harry mainly as a supplier, might be wholly deceptive, I wrote to a number of individuals who knew Harry, but necessarily on a personal friendship basis. Most replied; those closest to

Harry, who worked with him daily, were unanimous in expressing liking and respect for him. The few who clashed with, or disapproved of, him preferred to remain silent or submit a token response.

Harry was never inclined to speak of his early experiences, his family background, or of how he spent his evenings. While he had many friends and was welcomed by clients throughout the world, this preference for privacy tended to discourage intimate friendships; consequently, we have many gaps in our knowledge of his leisure hours.

For most of his years in Washington he maintained bachelor quarters at the Croydon Apartments on 17th Street N.W., commuting daily to Baltimore for fifteen years until he retired. Although reputed to have an "eye for the ladies even into his seventies" as one friend put it, no one as far as I know actually saw him in female company.

He was fond of travel but even then his preoccupation with the Kelsh plotter was such that I'm sure he had the location of his clients in mind when he selected a cruise.

He once spoke to me of visiting our San Juan mapping office but lost interest when I reluctantly admitted we had only Balplex plotters in that location.

Travel was a lifelong interest for Harry. He once made the trip from Moscow to Vladivostok soon after the Trans-Siberian Railway was completed. He also traversed the Alcan Highway from Great Falls, Montana, to Fairbanks, a rugged trip he never cared to repeat.

During World War II he traveled extensively by light aircraft in the Upper Amazon Valley, attempting to devise a method for locating strands of mild rubber trees from the air. His clear, factual account of his unsuccessful mission should be of interest even to non-photogrammetrists.

In addition to his interest in travel, Harry was a long-time investor in the stock market and was reputed to have had some success in this pursuit.

I regret very much not being able to contact John Knapik who worked with Harry daily for many years as General Manager of Kelsh Instruments. John, who also retired to Tampa, could have supplied helpful data but efforts to reach him were not successful.

In closing I acknowledge helpful responses from Morris Thompson, Jane Whitmore (George's daughter), Bob Kingsley, Gerald Fitzgerald, Jim Buckmaster, Bill Harman, Al Quinn, Joe Danko, and others.

I am especially thankful to Jim Lewis, Lou Woodward, Marvin Scher, and Scott Reading for helpful details regarding critical phases of Harry's career.

Harry Tubis, a pioneer photogrammetrist who also graduated from Central High School, was

most helpful in tracking down Harry's early history.

My wife, Gladys, who typed and retyped the paper, now has the dubious distinction of knowing more about Harry Kelsh than any other living female.

Finally, I sincerely hope I have been able to leave you with a recollection of a kindly, devoted person, a dedicated photogrammetrist whose service to the cause of science has been of great benefit to us and to our nation.

TABLE 1. PAPERS BY HARRY T. KELSH IN "PHOTOGRAMMETRIC ENGINEERING"

1939.	Report of Tests of the Slotted Templet System of Radial Triangulation, Vol. V, No. 4.
1943.	Hunting Rubber From The Air, Vol. IX, No. 4.
1946.	Germany's Use of the Slotted Templet System, Vol. XII, No. 3.
1947.	The Kelsh Plotter, Vol. XIII, No. 1.
1948.	The Kelsh Plotter, Vol. XIV, No. 1.
1949.	The Kelsh Plotter, Its Place in Photogrammetry, Vol. XV, No. 3.
1952.	Report on Airborne Profile Recorder, Vol. XVIII, No. 1.

TABLE 2. REFERENCES TO THE KELSH PLOTTER IN "PHOTOGRAMMETRIC ENGINEERING"

Burns, J. P., 1957.	A Comparison of the Kelsh and Balplex Plotters, Vol. XXIV, No. 1.
Gruner, Heinz, 1954.	Photogrammetric Development and Research at the Bausch & Lomb Optical Co., Vol. XX, No. 4.
Rutledge, D. H., 1952.	The Kelsh Plotter, Vol. XVIII, No. 4.
Sparling, R. J., and J. V. Sharp, 1948.	A Functional Comparison of Stereoscopic Plotting Instruments, Vol. XIV, No. 3.
Struck, L. V., 1952.	The Multiplex, Kelsh Plotter and Wild Autograph, Vol. XVIII, No. 1.
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Cutting ribbon for exhibits opening.