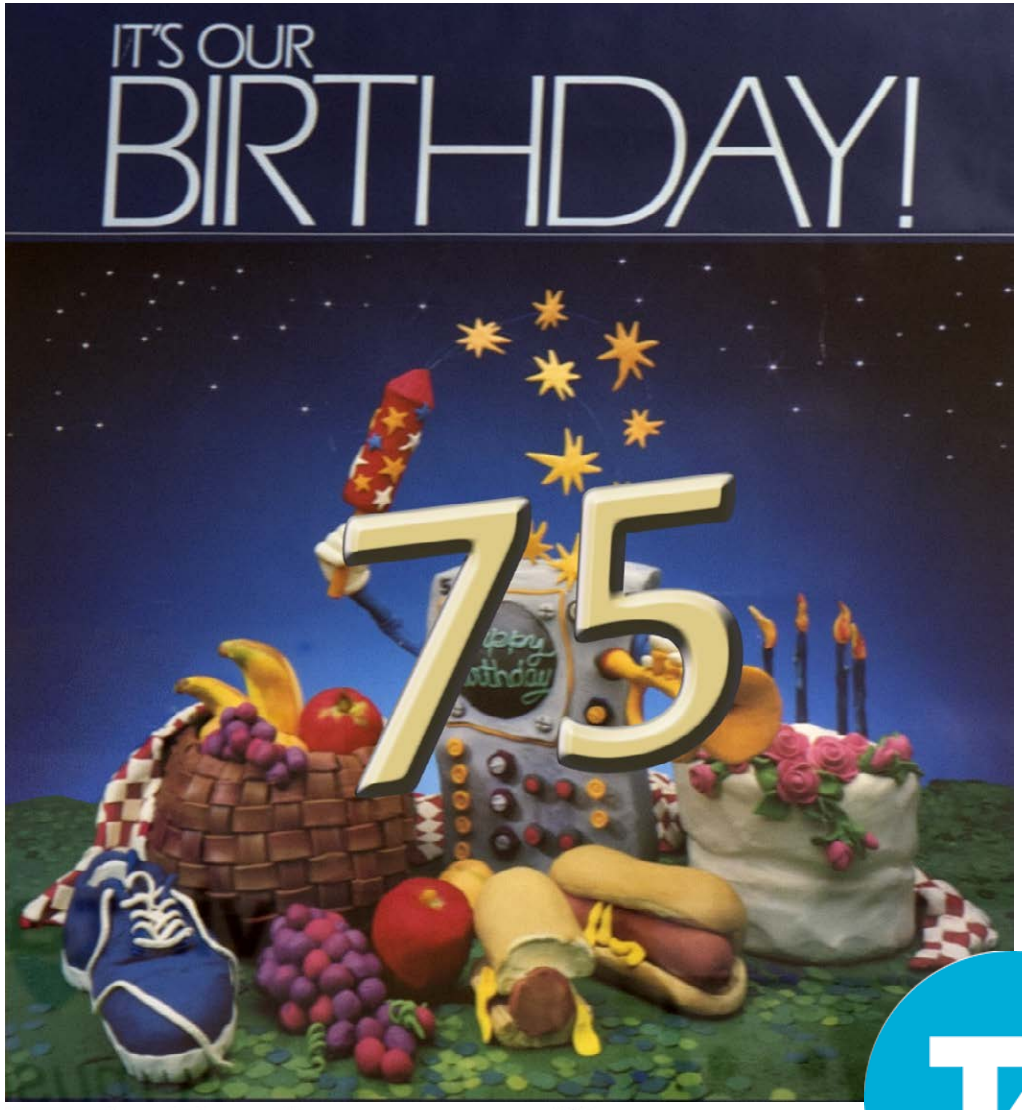


Tektronix®

vintageTEK museum

75 historical images to commemorate the 75th anniversary of Tektronix.

vintageTEK museum

Tektronix' Articles of Incorporation

State of Oregon

CORPORATION DEPARTMENT

STATE OF OREGON 1859

Certificate of Filing Articles of Incorporation

To All to Whom These Presents May Come, Greeting:

Know Ye, *That whereas* MELVIN JACK MURDOCK, CHARLES HOWARD VOLLUM, GLENN LELAND McDOWELL and MILES WILLIAM TIPPERY

having presented Articles for a Corporation organized and formed for profit under and pursuant to the Laws of the State of Oregon, and paid the organization and annual license fees in accordance with the Corporation Laws of the said state, providing for the licensing of Domestic Corporations:

Now, Therefore, I, Maurice Hudson, *Corporation Commissioner of the State of Oregon, DO HEREBY CERTIFY that said Articles of Incorporation have been filed in the office of the Corporation Commissioner; that the name assumed by said corporation is*

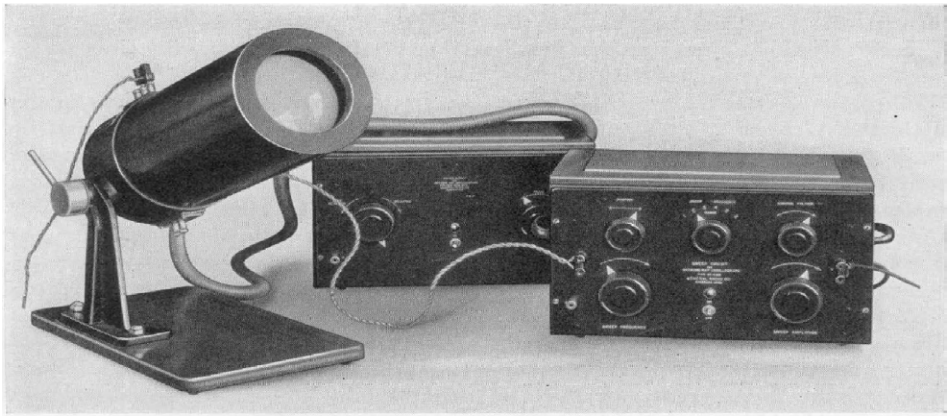
TEKRAD, INC.

On January 2, 1946, the founders of Tektronix filed Articles of Incorporation with the state of Oregon. However, soon the name for the company, "TekRad", was found to be confusingly similar to a trademark already registered by a California company. In an amendment recorded on February 4, 1946 the company was renamed "Tektronix".

Glenn McDowell would take ownership of Hawthorne Electronics, a retail company established to provide revenue in the early days, in exchange for his shares. Miles Tippery left the company in 1953 due to bad health.

Tippery, who was the source for both names, said deciding what to call the company was surprisingly one of the most difficult tasks they faced in getting started. "Tektronix" was unique, copyrightable and unmistakably indicated the nature of their "technical", "electronics" business.

Howard's First Scope



General Radio Type 478-A scope

While taking a break in his college education between his sophomore and junior college years in 1933/34, Howard Vollum designed and built his own oscilloscope. He later recalled he built the instrument "for looking at waveforms", primarily in support of his experimentation with radios. This was one of the first scopes to be found in the Pacific NW. Later at Reed College he built more instruments, one of which was still in use in the physics department well after his graduation in 1936.

Unfortunately, no photo of Howard's scopes survives, but it consisted of a moderately-sized box to house the electronics with a 3-inch diameter cathode ray tube. The CRT was mounted on a stand inside a metal tube.

Howard's instrument was probably inspired by the first commercial oscilloscope sold in the United States by the Boston-based General Radio Corporation in the early 1930s.

Photo Reference: General Radio *Experimenter* June 1932
https://www.ietlabs.com/genrad/experimenter

Jack Murdock's Store

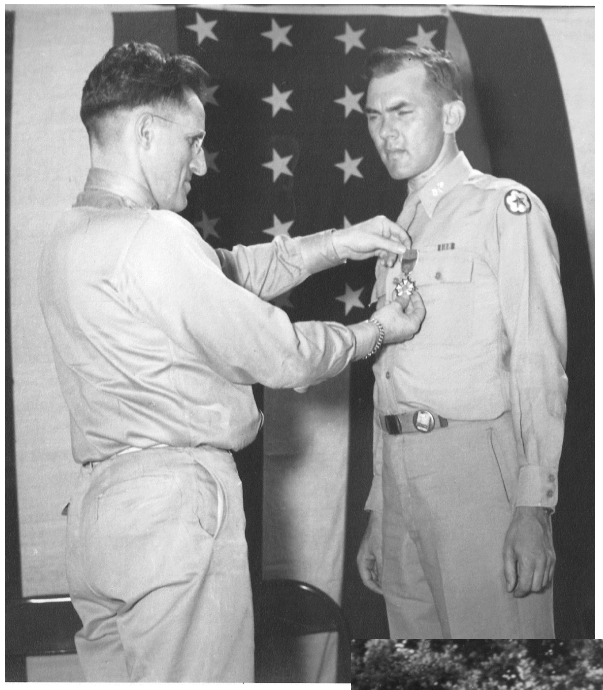
When Jack Murdock graduated from Portland's Franklin High School in 1935, his father offered him two opportunities: he would either fund a college education or provide seed money to open a business. Jack chose the latter, establishing an appliance and radio store on Foster Boulevard in SE Portland. Even though it was during the depths of the Great Depression, he made the business work.

When Jack needed a person to take over the radio repair business so he could devote his full time to sales and management, he hired a Reed College physics graduate named Howard Vollum. This was the start of a more than thirty-five year friendship that laid the foundation for the creation and success of Tektronix.

Photos courtesy of the M.J. Murdock Charitable Trust.

vintageTEK museum

World War Two



During Howard Vollum's time in the US Army in WW2, he was recognized for his skill with electronics and was assigned to an elite radar design group in England. His work there and stateside later earned him two Legion of Merit Medals. The photo at left is from the first award ceremony at Camp Evans, New Jersey in 1944. While working on advanced radar systems with the Army Signal Corps, he became convinced that there was a path to creating better-performing oscilloscopes, in particular, instruments that provided quantitative results, as opposed to the crude, qualitative products of the day.

Jack Murdock served in the Pacific Northwest in the US Coast Guard during the war, directing radio repair, installation and maintenance operations in several locations. After the war he recruited several fellow Coast Guard veterans to work at Tektronix. Many of these people would be instrumental in the company's early success.

Jack Murdock Photo courtesy of the M.J. Murdock Charitable Trust.

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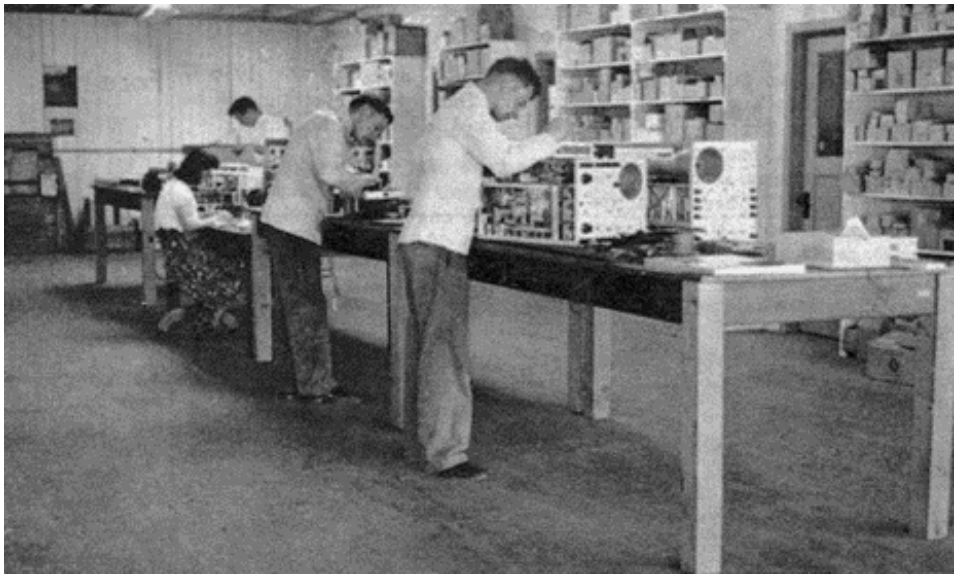
The Hawthorne Plant



Tektronix' first home at SE 7th and Hawthorne in Portland was occupied starting in May, 1947. The building was constructed to Howard Vollum and Jack Murdock's specifications. Tektronix occupied the upper floor and the back half of the lower floor. The rest of the first floor housed the retail part of the early business, Hawthorne Electronics. The building is still in use today.

As demand for Tek products increased and the workforce grew to three production shifts, the building became cramped and parking was a serious problem. The company moved to new quarters on the Sunset Highway in 1951.

The lower photograph shows the manufacturing line for Tek's first oscilloscope product, the 511.

vintageTEK museum

Tek's First Product

Tek's first product was not an oscilloscope. While Howard Vollum was finishing the design of the 511 oscilloscope, in 1946 Tektronix offered a less complicated product in order to gradually ramp up production capability. Howard had designed a square wave generator to calibrate his oscilloscope so the "Type 101 Video Calibrator" was introduced as Tektronix' first product.

They built a total of ten instruments and sold exactly…none. Tek's first product was a complete flop.

Fortunately, that was to change in a big way.

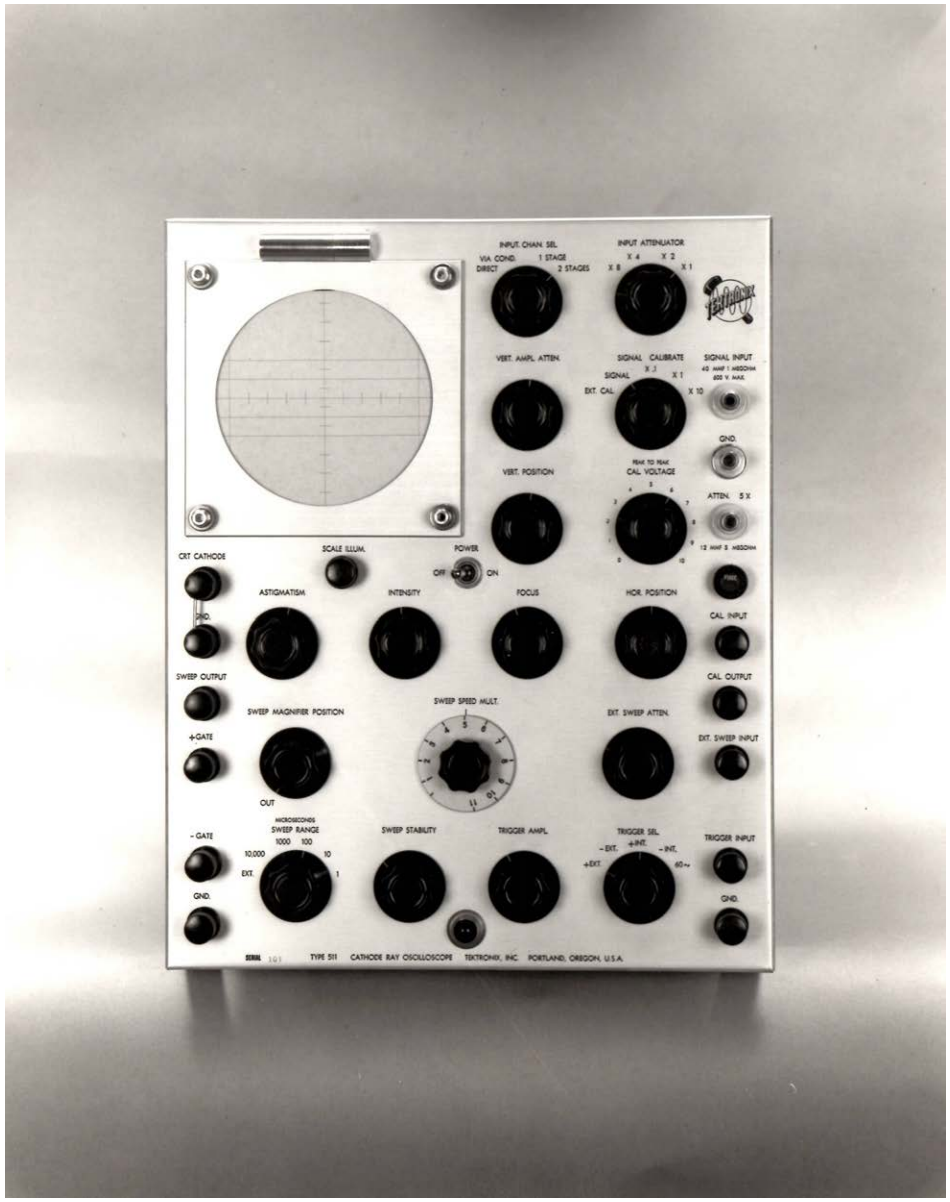
Type 511 Oscilloscope

After being discharged from the Army and co-founding the company, Howard started work on the oscilloscope he had visualized during his time working on radar systems. After a full year, with some assistance with mechanical packaging from a Coast Guard friend of Jack Murdock's named Milt Bave, twenty units were built by the founding Tek team. These were shipped to customers as varied as the University of Oregon Medical School, the US Navy and Army, Yale, Princeton, RCA, Hewlett Packard, Boeing and the Bell Systems Laboratories. Named the 511 because the instrument had a 5-inch CRT, one channel and was the first model, feedback was enthusiastically positive.

Priced initially at $595, and shortly thereafter increased to $795, it was still roughly one-third the price of the closest competing instrument from Du Mont Laboratories. At 65 lbs it was also about one-third the weight of the Du Mont scope.

Featuring a 10 Mhz bandwidth, the 511 was the first oscilloscope to have both a calibrated vertical amplifier and time base. It also incorporated a triggering capability Howard designed using his experience with radar.

The First 511 Oscilloscope



This is a picture of first 511 scope Tek sold – serial number 101. It was shipped to Dr. Archie Tunturi in July of 1947 where it was used to map brain impulses at the University of Oregon Medical School, now called the Oregon Health and Science University.

In 1961 Dr. Tunturi exchanged the 511 for a newer instrument and it was shown in the Building 50 reception area for many years.

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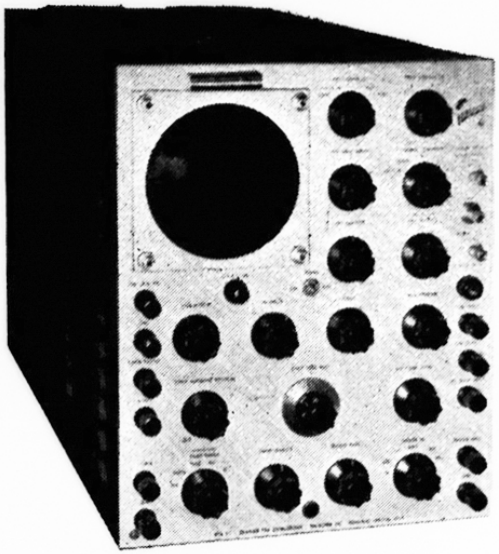
Tektronix' First Advertisement



Tektronix Type 511 Oscilloscope

Versatility...Plus

The Tektronix Type 511 is a portable wide band oscilloscope providing facilities formerly available only in very expensive, cumbersome instruments.

SWEEP CHARACTERISTICS

Continuously variable .1 second to 1 microsecond (10 cm. deflection).
Direct reading sweep speed dial.
Choice of triggered, recurrent or single sweeps at all speeds.
Triggers on sine waves to 10 mc. or pulses over .05 microsecond.
Any 20% of sweep may be expanded 5 times.
DC coupled PP amplifier for external sweep input.

VERTICAL DEFLECTION SYSTEM

Amplifier Bandwidth 10 mc., 1 stage; 8 mc., 2 stages.
Rise Time .04 microsec., 1 stage; .05 microsec., 2 stages.
Maximum Sensitivity .27 V/cm. (Peak to Peak).
Input Impedance Direct 1 meg., 40 mmf.; Probe 10 meg., 11 mmf.

MISCELLANEOUS

Calibrating voltage 0-1, 0-10, 0-100 volts, 60 cycles.
CRT 5CP1A, 5CP7A or 5CP11A operating at 3 kv.
Direct connection to all plates from side panel.
Total weight 65 pounds, self contained.

Price $795.00 f.o.b. Portland

Your inquiry will bring more detailed information and name of the nearest Field Engineering Representative.

TEKTRONIX INC.

Phone, EAst 4885
Cables, TEKTRONIX

712 S. E. Hawthorne Blvd.
Portland 14, Oregon

The first Tektronix advertisement was placed in the September, 1948 issue of *Electronics,* the leading trade magazine of the day.

The $795 price would be the equivalent of $8,450 today.

Note that the cover story for this issue of *Electronics* featured a new device called the "crystal triode", more commonly known later as the transistor.

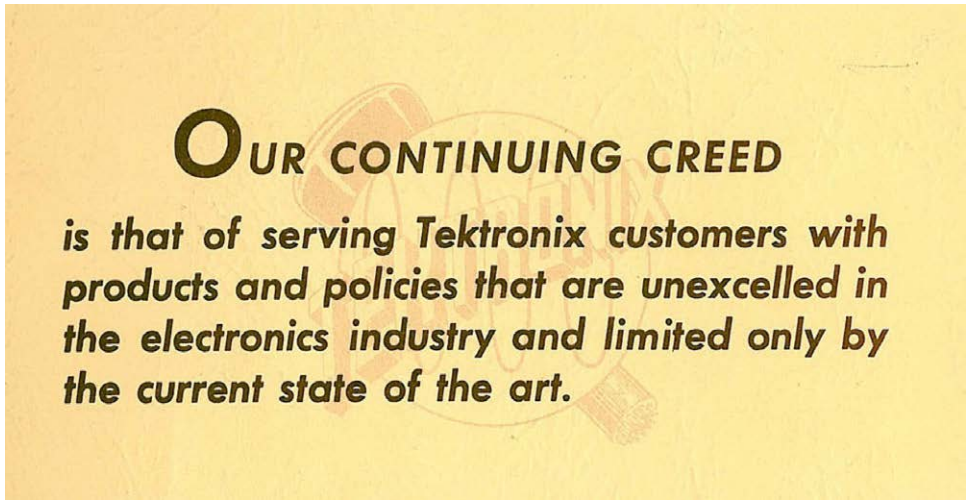
vintageTEK museum

Tek Bug

The first Tektronix logo, called the Tek “Bug”, was reportedly designed by an artist friend of Howard Vollum’s. It was used into the 1970s with minor modifications.

The presence of a cathode ray tube in the background and a round screen displaying a sine wave in the logo underscores the fact scopes at the time were called “Cathode Ray Oscilloscopes”.

Tektronix' Creed and Primary Interest

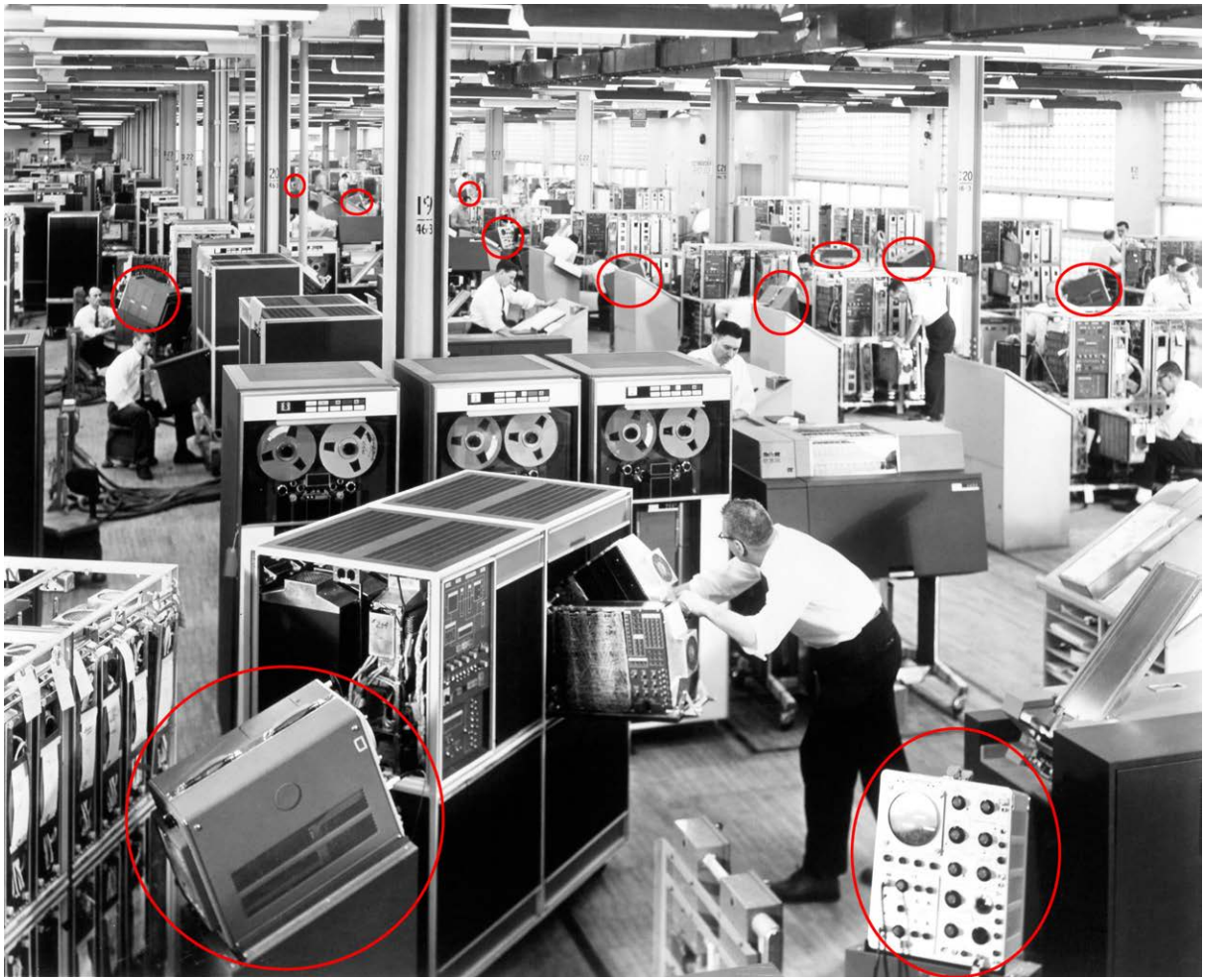


This "Continuing Creed" statement was placed on the first page of Tektronix annual catalogs for ten years starting in 1951.

The "Primary Interest" statement below was also found in catalogs during this time period.

The primary interest of Tektronix is the further development and improvement of the oscilloscope, not only as a "quality observation" device but, increasingly, as an accurate tool capable of precise quantitative measurements of time and amplitude. All present efforts are toward accomplishment of this goal, and all other Tektronix instruments have been developed for the purpose of supplementing and augmenting the operation of the oscilloscope.

Booming Applications for Oscilloscopes



During the 1950's the growing use of electronics in consumer electronics, computers, telecommunications and the military led to a soaring demand for oscilloscopes.

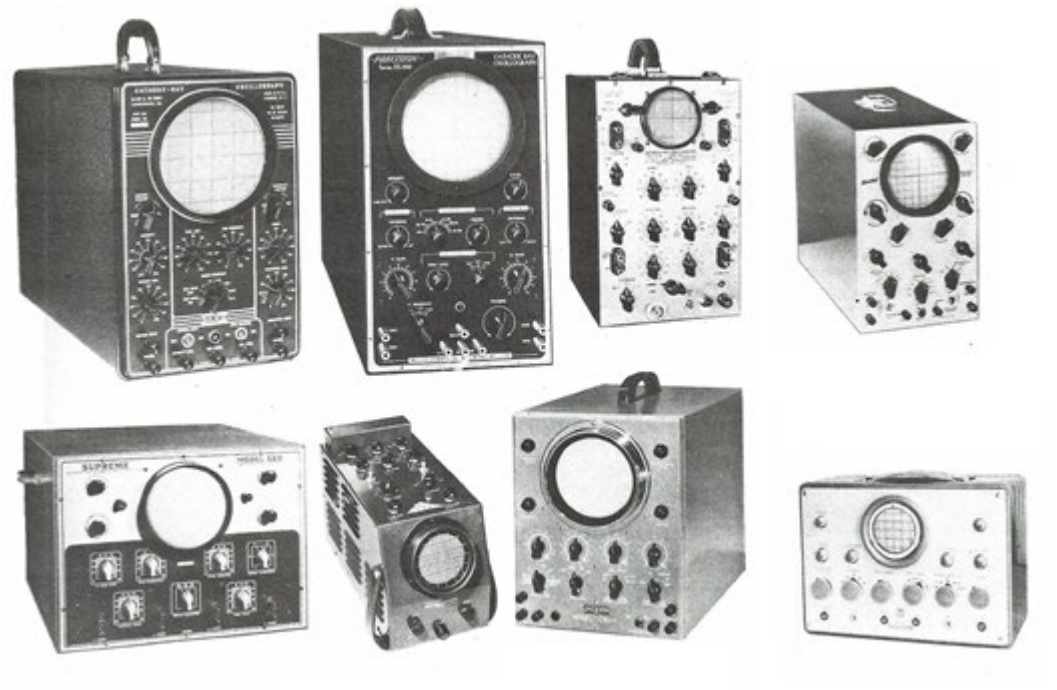
By mid-decade Tek had established itself as the leading scope manufacturer in the United States.

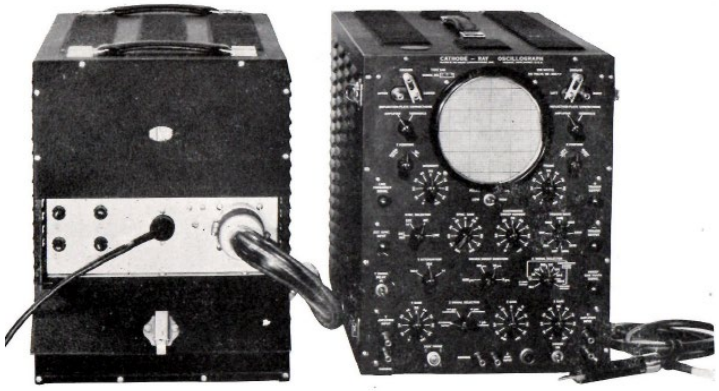
On this manufacturing floor for the IBM 1401 computer, there are twelve Tek scopes, highlighted with red circles.

Photo courtesy of IBM Archives

vintageTEK museum

Initial Oscilloscope Competition





Du Mont Type 248

Tektronix Type 511

In 1950 there were more than forty companies producing oscilloscopes in the United States. The leading manufacturers were Du Mont Laboratories, RCA, Sylvania and General Electric. Hewlett Packard did not have an oscilloscope product at that time.

The collection of scopes at left is from the *Oscilloscope Encyclopedia* by John Rider from 1950. Most of these instruments are limited to sub-1 MHz bandwidth aimed at servicing radios and the like.

At the bottom the Du Mont Type 248, probably the 511's closest competitor, pictured. It had 5 MHz bandwidth, weighed 196 lbs (two enclosures) and was priced at $1860.

Tektronix' 511 was superior in most every way.

Note the 511's unique CRT placement – a signature design feature found in virtually all Tek laboratory scopes to come.

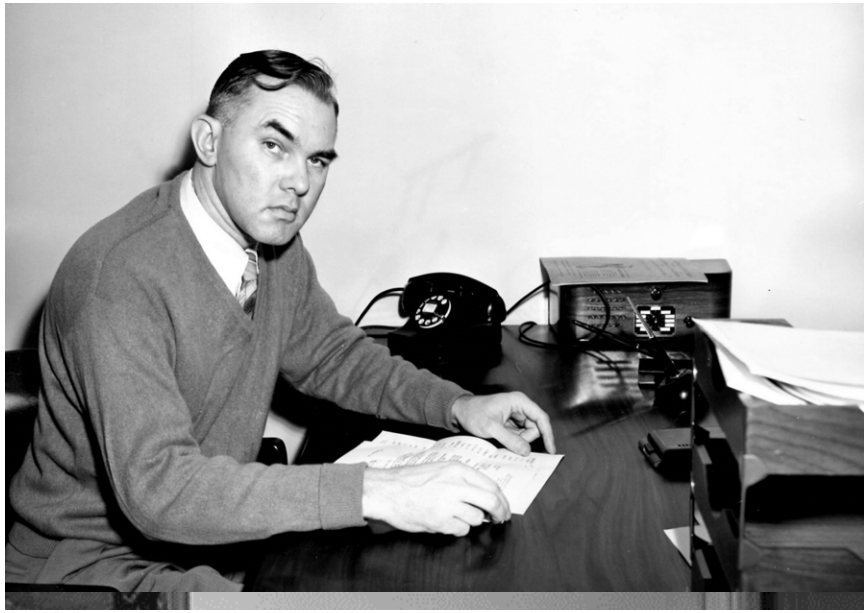
The Sunset Plant

This ad from the November 1951 issue of *Industrial Research* magazine introduces Tek's new home.

The site was chosen for its Portland address, its access to the Sunset Highway and the availability of nearby housing.

The building on the right side of the lower photo is still visible from Highway 26, near the intersection with HW 217, although it's been altered.

Howard and Jack and Tek Spirit

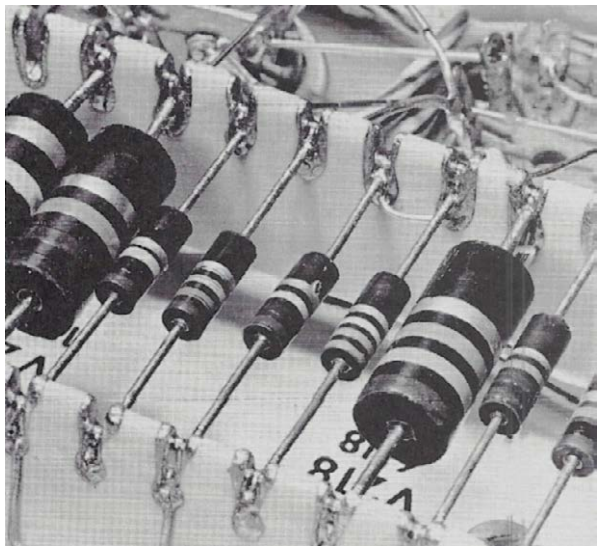


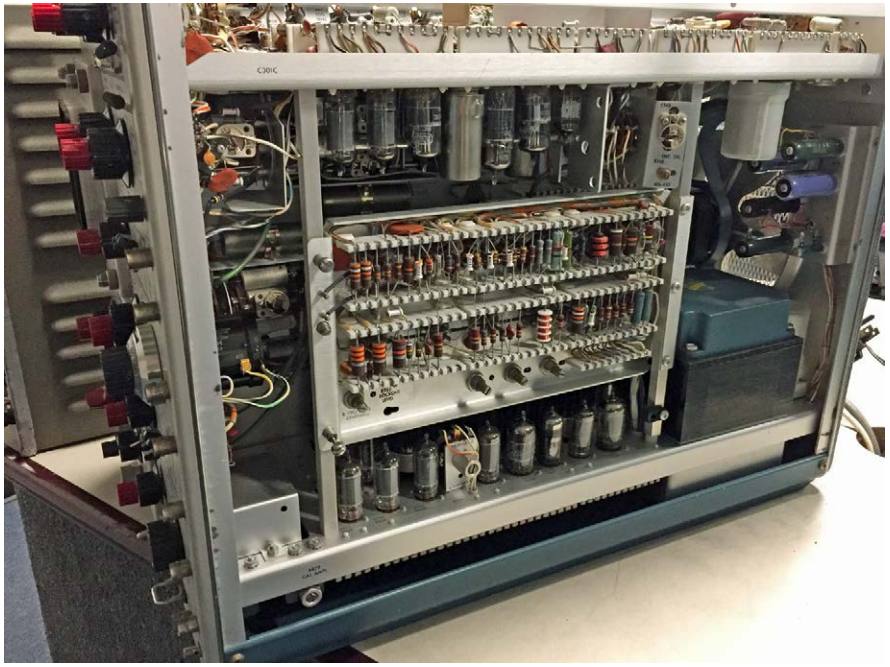
Co-founders Howard Vollum and Jack Murdock in their Sunset Plant offices.

Here are examples of Tek's uniqueness – the "Tek Spirit"– driven by Howard and Jack:

- Everyone was on a first-name basis: If you called him Mr. Vollum, he would tell you his name was Howard.
- Profit share in addition to regular salary: This was established early on at the Hawthorne Plant.
- A progressive education plan: On-campus classes were offered for a wide variety of applications: math, physics, chemistry, programming, electronic design, machine tool instruction and more.
- No time clocks: People were trusted.
- No reserved parking spaces: Howard was seen on many mornings walking in from the far reaches of the Bldg 50 parking lot in Beaverton.
- Celebration of employee longevity at Tek: Howard personally awarded Tek Bug diamond pins to employees with 20 years of service and higher. There were over 1,000 employees with 20 years of service by 1978.

Ceramic Strips





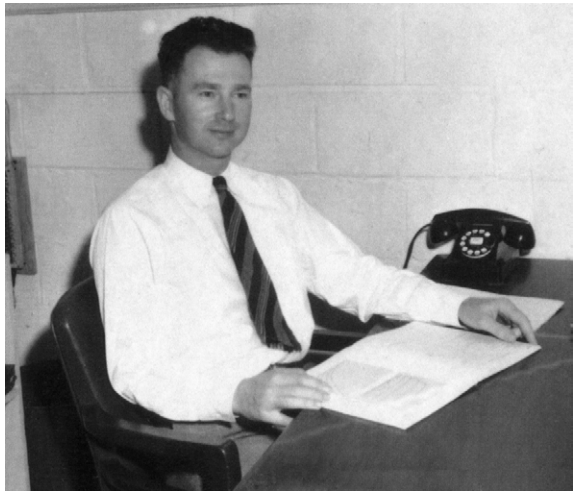
At a time predating printed circuit boards, Ted Goodfellow (at left) made use of his ceramics hobby to design and fabricate mounts for passive electrical components made from ceramic strips. Grooves with a conductive coating allowed components and wiring to be soldered to the strips.

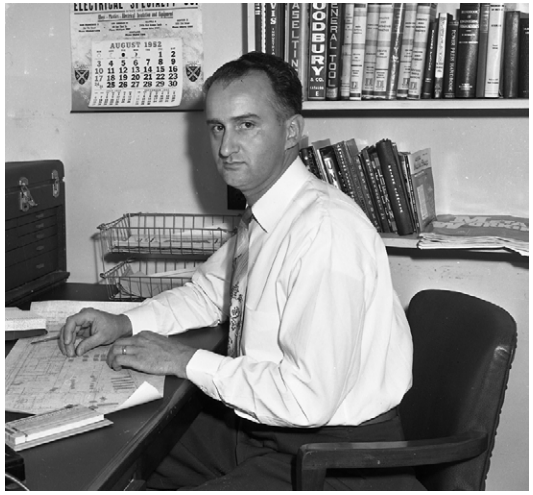
This made assembly, troubleshooting and repair much easier. The observation was made that Tek scopes looked as good on the inside as on the outside. Later, the ceramics capability was used to make cathode ray tube funnels.

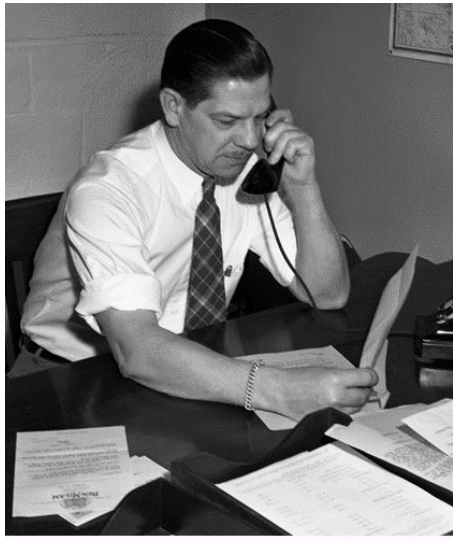
The lower photo was taken of ceramic strips used in a Type 549 oscilloscope at the vintageTek Museum.

vintageTEK museum

Miles Tippery, Milt Bave, Dal Dallas and Logan Belleville







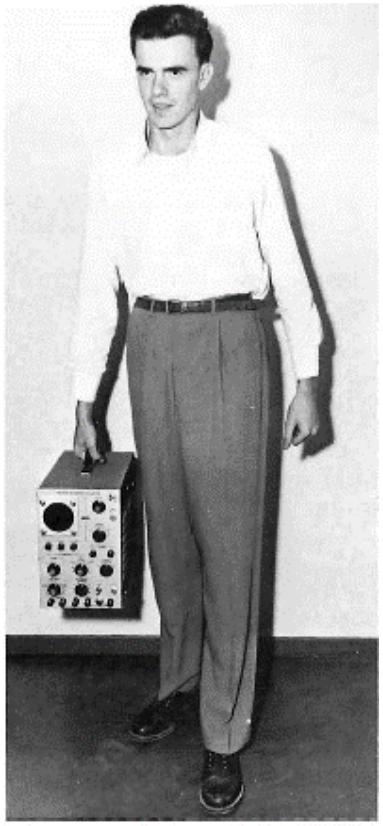
Miles Tippery (top far left) met Jack Murdock in the Coast Guard and they became close friends. He had experience in radio repair and was responsible for evaluating and organizing components and testing the first Type 511s at the Hawthorne plant. He took on a role as personnel manager at Sunset.

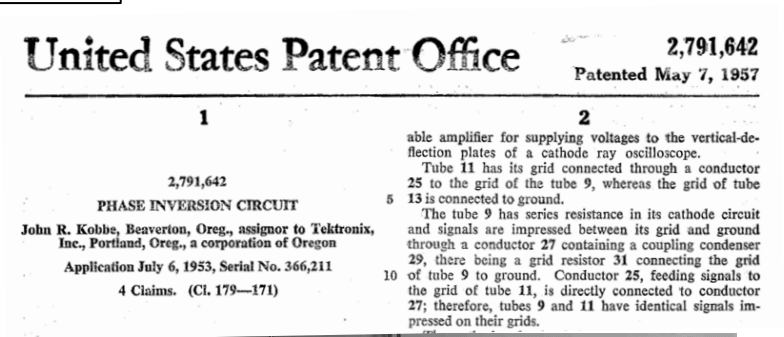
Milt Bave was also a friend of Jack's in the Coast Guard. Because of his mechanical skill and experience, Jack asked him to join the startup team to assist Howard with mechanical layout for the Type 511. He later was manager of mechanical engineering.

"Dal" Dallas (on the phone) was Tek's first sales engineer. He had many years of experience and an excellent contact network. He was instrumental in setting up Tek's field offices.

Logan Belleville was an experienced electronic engineer, who, like Howard worked in radar research during the war. He designed the Type 512 scope and contributed to the design of the Type 517. He also undertook management responsibilities in the early days.

First Tek Patents





United States Patent Office

2,791,642

Patented May 7, 1957

1

2,791,642

PHASE INVERSION CIRCUIT

John R. Kobbe, Beaverton, Oreg., assignor to Tektronix, Inc., Portland, Oreg., a corporation of Oregon

Application July 6, 1953, Serial No. 366,211

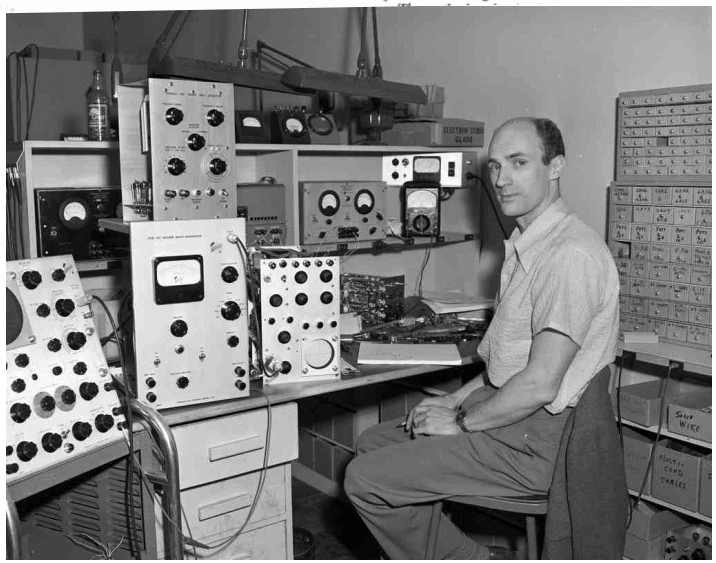
4 Claims. (Cl. 179—171)

2

able amplifier for supplying voltages to the vertical-deflection plates of a cathode ray oscilloscope.

Tube 11 has its grid connected through a conductor 25 to the grid of the tube 9, whereas the grid of tube 13 is connected to ground.

The tube 9 has series resistance in its cathode circuit and signals are impressed between its grid and ground through a conductor 27 containing a coupling condenser 29, there being a grid resistor 31 connecting the grid of tube 9 to ground. Conductor 25, feeding signals to the grid of tube 11, is directly connected to conductor 27; therefore, tubes 9 and 11 have identical signals impressed on their grids.



United States Patent Office

2,752,527

Patented June 26, 1956

1

2,752,527

METHOD OF MAGNIFYING WAVEFORMS ON A CATHODE-RAY TUBE AND CIRCUIT THEREFOR

Richard L. Ropiequet and Clifford H. Moulton, Portland, Oreg., assignors to Tektronix, Inc., Portland, Oreg., a corporation of Oregon

Application August 18, 1953, Serial No. 374,871

12 Claims. (Cl. 315—26)

2

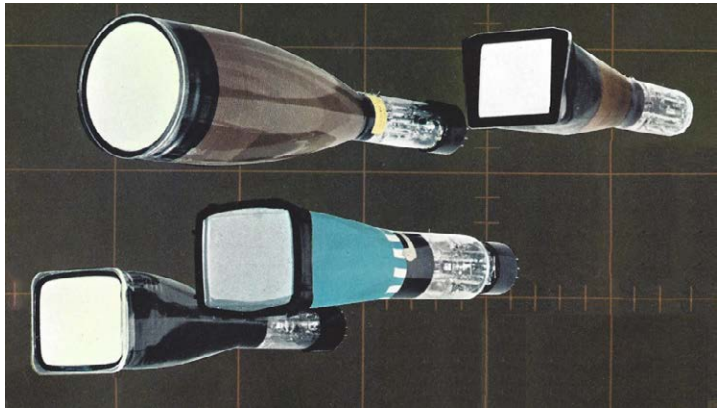
resistance 21 to a negative potential. The cathode 20 of tube V2 is also connected through the parallel combination of resistance 22 and capacitor 23 to the grid 24 of cathode follower tube V3. The plate 25 of tube V3 is connected to a positive potential and the cathode 26 is connected through resistance 27 to a negative potential, as indicated.

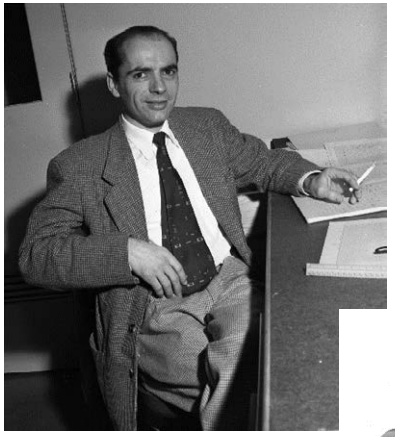
The cathode 26 of cathode follower tube V3 is also connected to the grid 28 of amplifier tube V4. The cathode 29 of this tube is connected through potentiometer 30 to the cathode 31 of another amplifier tube V5, said cathodes 29 and 31 being also connected through the respective resistances 32, 33 to the negative potential, as

John Kobbe is shown carrying a Type 315 portable scope, which he co-designed. He contributed to the design of the 300 and 500-series scopes and to numerous plug-ins. A total of thirteen patents were awarded in his name.

Dick Ropiequet received Tektronix's first patent, with Cliff Moulton as co-inventor. Dick Ropiequet received Tek's first four patents, and a total of seven. He was Tek's first engineering manager once Howard Vollum started fulfilling more of his executive management duties.

Cathode Ray Tube Development





Jean DeLord

Derrol Pennington

Joe Griffith

By the 1950's precision resistors, capacitors, plastic knobs and transformers were being produced internally at Tek when suitable pre-existing parts were not available. In 1950 a procurement problem with what was arguably the most important single scope component, the cathode ray tube, reached a crisis level. CRT vendor quality issues and performance limitations prompted a bet-the-company decision to start making CRTs internally.

A team led by Joe Griffith, Jean DeLord and Derrol Pennington, who would later manage the CRT operation, were able to develop a CRT design and production capability in time for a Tek-built CRT to be used in the Type 531 and 535 scopes, introduced in 1954. That CRT was produced for 21 years.

Eventually Tek would employ almost one thousand people producing over 150 CRTs in two dedicated buildings on the Beaverton campus.

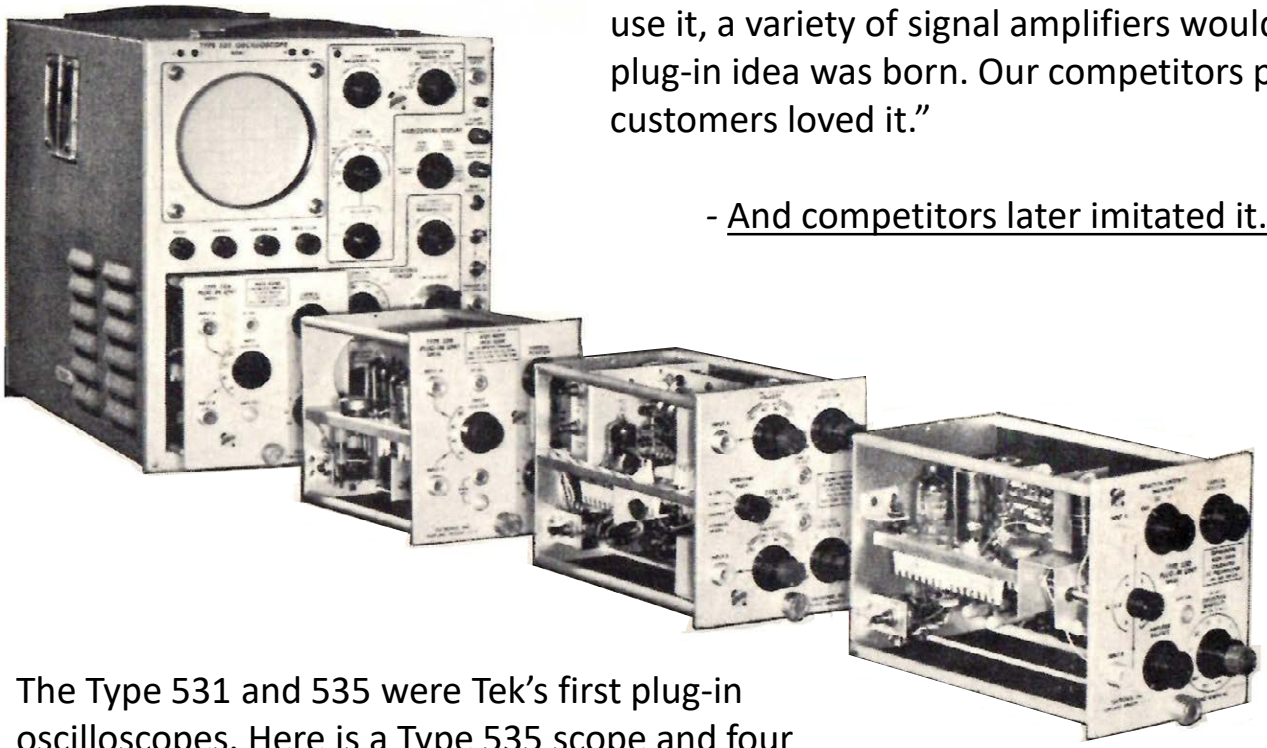
At upper left, the newly-developed CRTs used in the 530 scope series are shown.

Plug-Ins

The plug-in concept, a Tek innovation, was introduced in 1954. In the 1971 product catalog, Tek's 25th year, Howard Vollum wrote a summary of Tek oscilloscope advances implemented since the founding of the company. Regarding plug-ins, he wrote:

"A sweep that would work as slowly as 12s/cm and as fast as 20ns/cm (nine orders of magnitude) was developed in 1952….to fully use it, a variety of signal amplifiers would be needed. Thus the plug-in idea was born. Our competitors poked fun at it – but our customers loved it."

- <u>And competitors later imitated it.</u>



. . . the "convertibles" of the Tektronix line

The Type 531 and 535 were Tek's first plug-in oscilloscopes. Here is a Type 535 scope and four of the over thirty available plug-in units.

Read Howard's entire discussion of Tek innovations in 1971 on the vTM website

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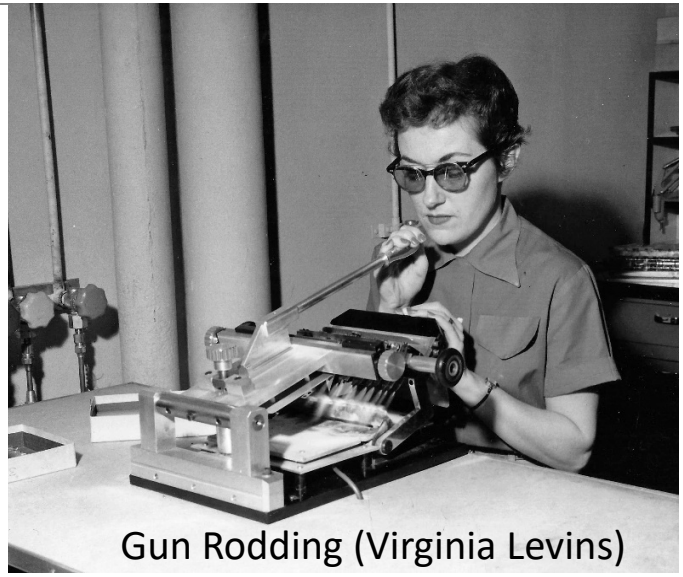
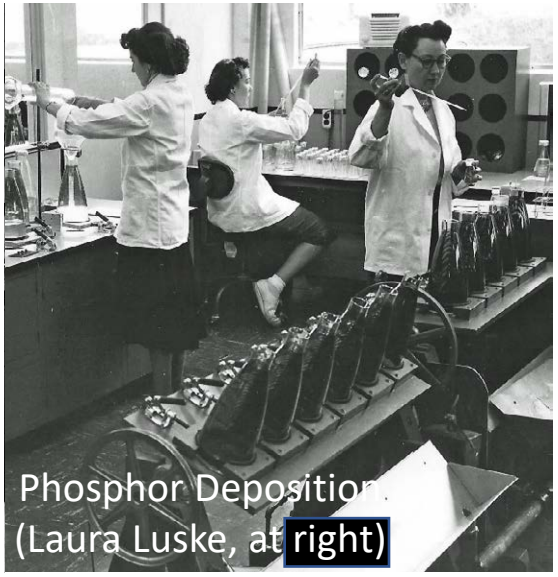
Cathode RayTube Production at the Sunset Plant

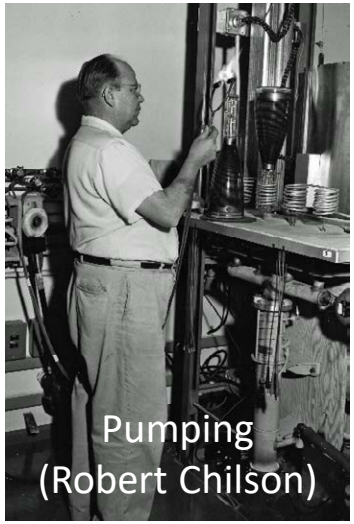

Gun Welding (Beulah Stumma)


Gun Rodding (Virginia Levins)


Phosphor Deposition
(Laura Luske, at right)

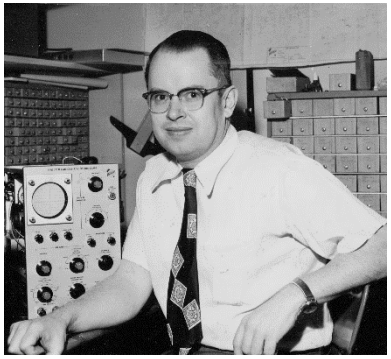

Helix Application (Rose Duane)


Gun Seal (Byron Williams)


Pumping
(Robert Chilson)

vintageTEK museum

Need For Speed



Frank Hood

Frank Hood was hired at Tek as a design engineer in 1949. He was employee #32. In his memoir*, he made an insightful observation about the evolution of Tektronix oscilloscopes:

"As it turned out, when we brought out a higher speed scope, people were able to design equipment of greater bandwidth and needed even faster measuring instruments. The cycle was regenerative. Having faster, more accurate measuring tools created a demand for even more measuring tools."

Type 513 - 18 MHz
Introduced 1950

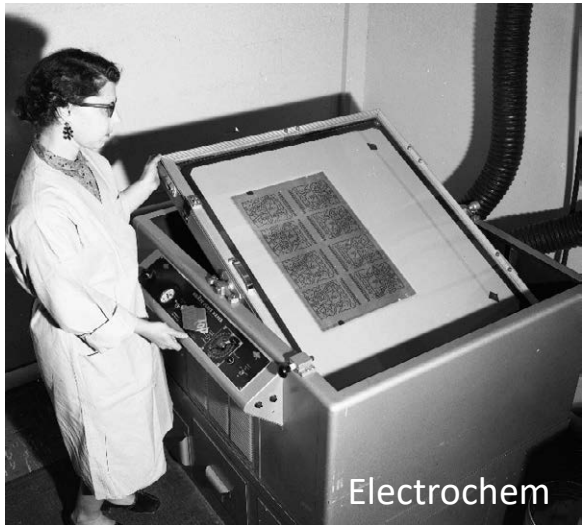
Type 517 - 50 MHz
Introduced 1951

Type 519 - 1 GHz
Introduced 1961

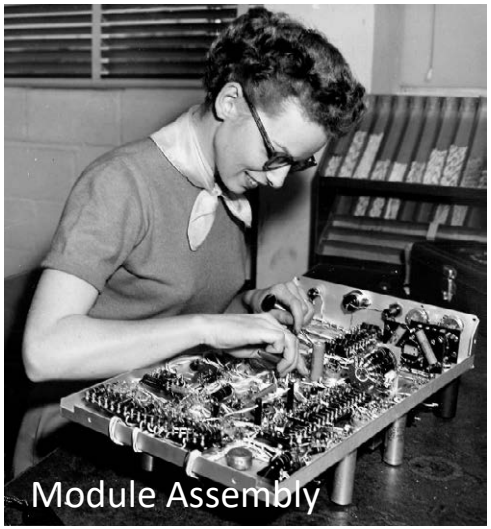
* Read Frank Hood's memoir on the vintageTek Website

vintageTEK museum

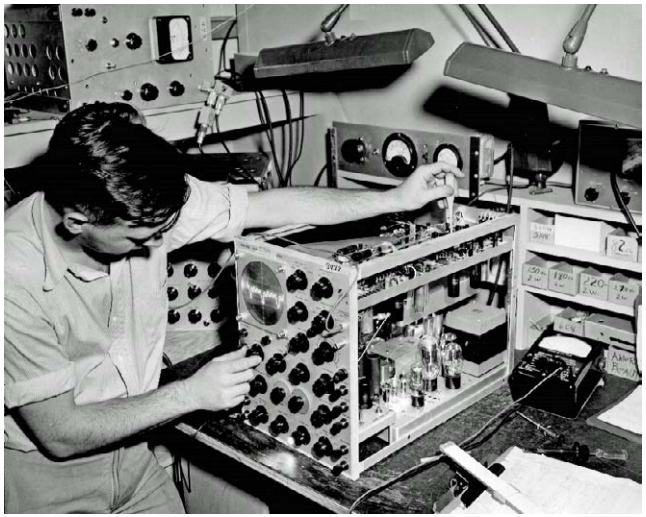
Instrument Production at the Sunset Plant


Electrochem


Cable Prep


Module Assembly


Final Assembly


Calibration

Scope Cart Shipping

Growth at the Sunset Plant

September 1954

Late 1950's

These aerial photos of the Sunset Plant taken roughly five years apart show the dramatic growth in the site and in the workforce. Compare the dramatic size change of the parking space in the two images.

For reference, the Sunset Highway (Highway 26) runs diagonally in the upper left corner of both photos, which roughly face southwest.

St. Vincent's Hospital would later be built in part on the land shown in the lower right corner of the upper photo.

Highway 217 had not yet been built.

Part of Bldg 86 (marked with a star) is still there today, visible from HW 26.

Construction and move-in at the Beaverton campus had already begun at the time of the lower photo.

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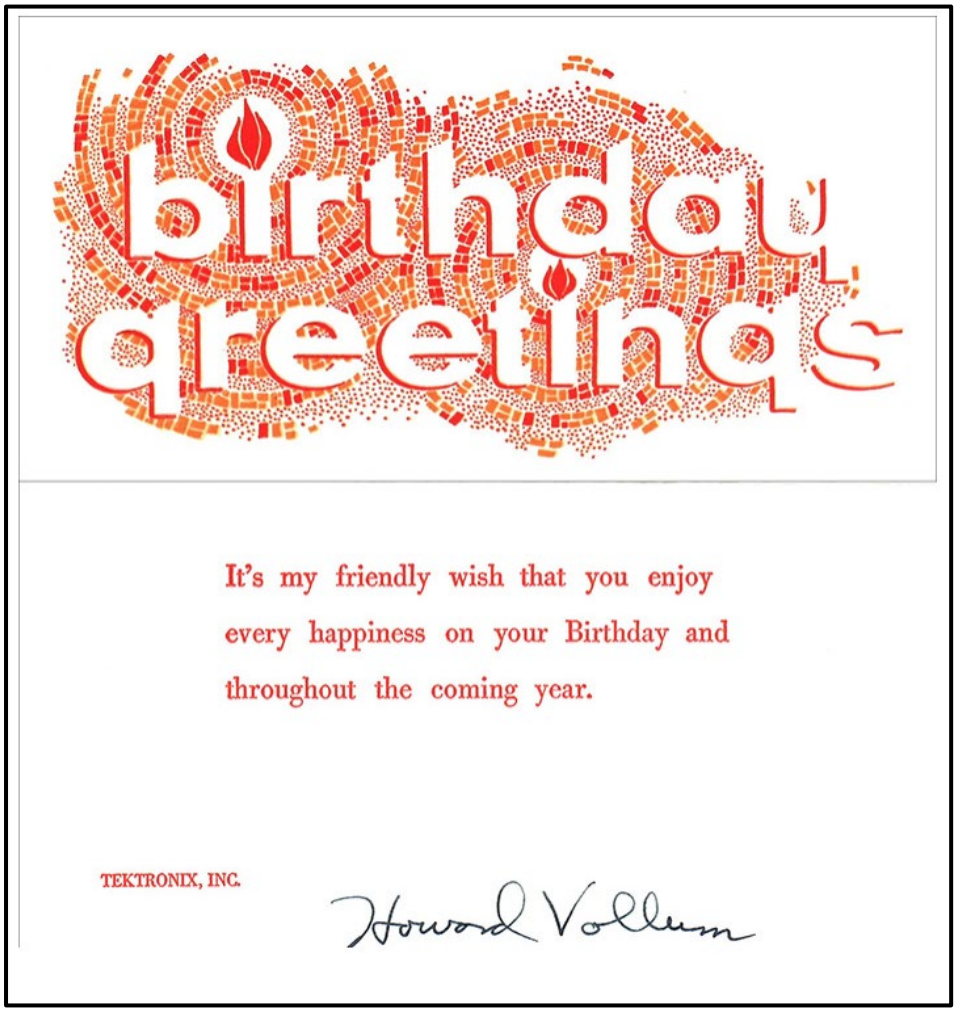
Birthday Cards from Howard



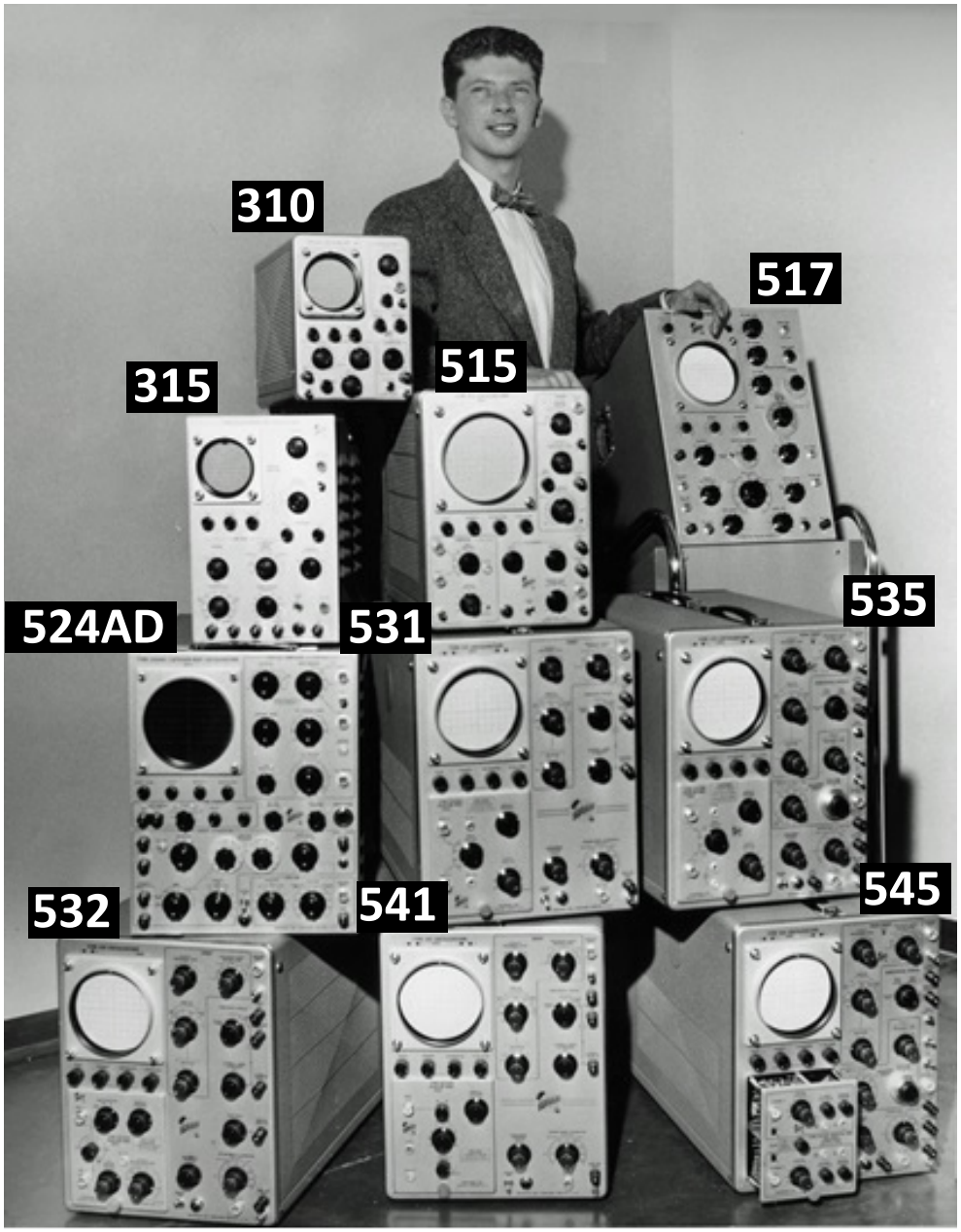
At the time of Howard Vollum's passing in 1986 Tek employees were asked to contribute their reminiscences. This remembrance was from Harry Steward:

"Until the early 1970s, Howard used to send personal greetings to all employees on their birthdays. The company had (I believe) over 2,000 employees at this time.

When Roger Carter had his 10th anniversary with Tek, Howard gave him his pin at the party and we gathered around to congratulate him and Howard. We were just chatting when Howard said: 'You have a birthday coming up this month, Harry. I just signed your card this morning.' Someone asked him if he signed all of the birthday cards that were sent out. He said: 'Yes, my secretary makes them up ahead of time and brings them to me in batches. I look at who they are for and sign the cards.' "

He was asked: "What about the people you don't know?" He replied: "Oh, I just sign them. But those who I do know, I hold their cards and reminisce."

Tektronix Product Line Sampling in 1957



This photo was used in ads posted in trade magazines in early 1957 (without the labels).

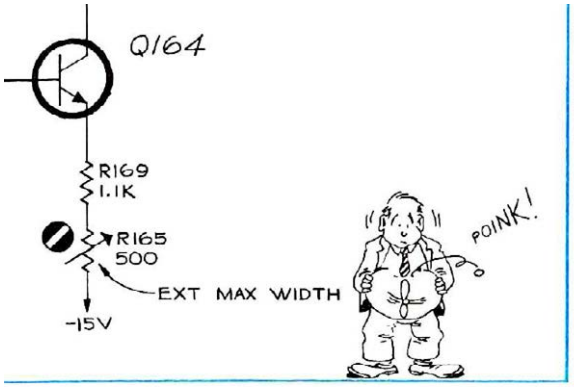
Field Engineer, Robin Hoag, stands behind oscilloscopes that range from the 4 MHz Type 310 at $595 to the 50 MHz Type 517A at $3500. These would sell for $5,640 and $33,200 today, respectively.

Five plug-in scopes from the 53X and 54X families are shown, demonstrating the importance of this feature to the Tek scope line.

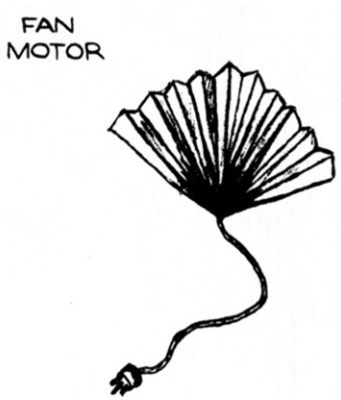
The Type 524AD was presented. It was the first Tektronix product specifically targeting the rapidly growing television market.

Humor

Cartoons in schematics



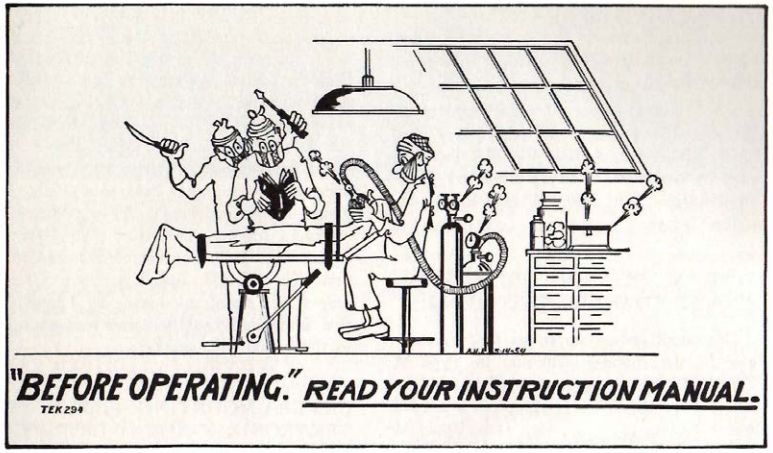
R293 Programmable Pulse Generator / Power Supply



Type 468 Scope

650 TV monitor

From *Service Scope*, a Tektronix customer newsletter



From *Tek Talk*, the first Tektronix employee

vintageTEK museum

Storage Cathode Ray Tubes and Scopes

Regarding Bob Anderson's invention, Howard Vollum wrote in the September 16, 1965 *Tektronix Newsletter*:

"One of the most significant technical breakthroughs made by Tektronix Engineering has been the development of low-cost, rugged, practical storage."

At a time when electronic memory was expensive, bulky and slow, transient waveforms were stored on the screen of an oscilloscope CRT using clever vacuum physics. Through the late 1950's and 1960's most of the leading instrument companies built some form of storage CRT, but they were expensive, fragile and not that effective.

Tek engineer Bob Anderson (at upper left), invented a simple and inexpensive storage CRT that was used in the Tektronix Type 564 oscilloscope, introduced in 1962, with bandwidth up to 15 MHz, depending on the plug-in.

Bob Anderson's invention led to long line of Tektronix analog storage oscilloscopes. It also enabled Tek to create a pioneering series of products that enabled a massive new market - computer graphics, that previously didn't exist in realistic terms. Tek dominated this market for over 15 years.

One of the early storage scope uses was speech therapy for the deaf. The therapist would speak a word or phrase and the deaf child would attempt to duplicate the teacher's stored audiogram on the screen.

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Getting into Television

Charles Rhodes adjusting a Type 520 Vectorscope

An Emmy at the vintageTek Museum

Tektronix TV products in a television control room in the 1970s

As television sets became commonplace in American households after World War Two, there was a need for new test instruments to design TV sets and broadcast equipment. Some measurements of television signals require features not found in general purpose scopes.

Tektronix' first product for the television market, the Type 524D, was introduced in 1952. This scope is shown on the cover of *Electronics* magazine (August 1954) at left where it's being used to adjust an early color TV chassis.

Waveform monitors and vectorscopes – specialized oscilloscopes - and other TV test instruments led Tektronix to become the pre-eminent marque in television control rooms throughout the world.

Charles (Charlie) Rhodes was a recognized technical leader in television broadcast test systems. During his 26 years at Tek, his many product designs, technical papers, articles and regulatory committee appointments made him a legend in the television industry. He was named a Fellow of the IEEE in 1980.

Tek would later be a market leader in video servers with its Profile line of products, used, for example, in instant replay in sports broadcasting and other special effects.

Tek and its subsidiaries have received twelve Emmy Awards. One is on display at the vintageTek Museum and pictured above with a rack of Tek TV products.

vintageTEK museum

Beaverton Campus

Looking east at the newly-purchased Beaverton site in 1956, the view is from over the wing of Jack Murdock's plane. Jenkins Road runs diagonally from the far left of the picture.
Murray Blvd had not been built. It would be located in the foreground.

The star marks the location of Bernard's Airport. Traffic on Jenkins had to watch for planes taking off and landing. There were Tek employees who commuted by plane.

The airport operated until 1969 when the Beaverton Mall, later Cedar Hills Crossing, was built.

vintageTEK museum

Tektronix Guernsey Ltd.

In the mid-1950s, Tektronix sales in Europe increased more than tenfold and this caused management to focus on the region. A decision was made in 1958 to establish a European manufacturing and assembly operation. Seeking an English-speaking location, the island of Guernsey was selected due to several additional factors including a well-qualified work force, an available site and a favorable relationship with the European Common Market.

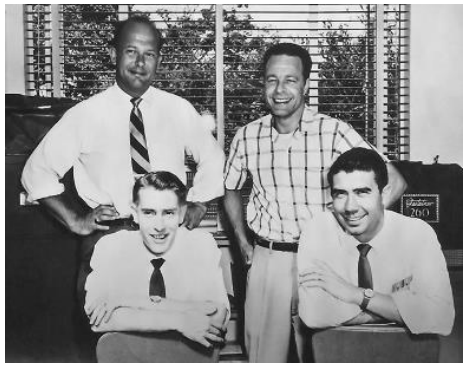
Guernsey is an approximately 38 square-mile island in the English Channel, located ten miles off the French coast from Normandy.

From Beaverton Earl Wantland, who would later become President of Tektronix, was assigned as manufacturing manager, and David Spinks was to be personnel manager. Al Hannman and Don Alvey shared European sales and marketing responsibilities.

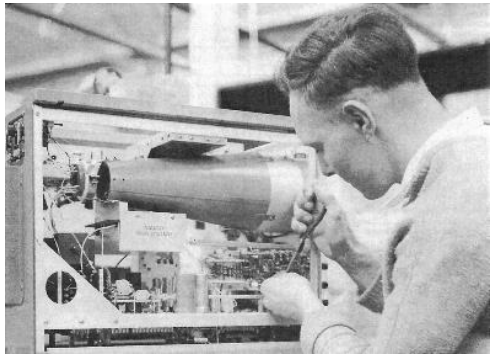
After some doubts – one of several rumors was that this oddly-named US company would be testing nuclear devices onsite - the populace welcomed the newcomers in the fall of 1958. The workforce, which peaked at roughly 600 in the early 1980s, fully embraced the Tektronix Spirit, at one point celebrating employees receiving their 30 year service pins.

Tek was the largest employer on the island and eventually two buildings occupying 80,0000 square feet produced Tektronix products on Guernsey.

The Guernsey manufacturing plant closed in 1990 and all manufacturing was moved to Heerenveen.



Al Hannmann, David Spinks, Don Alvey, Earl Wantland (back/front, L to R)



John Tongs is engaged in final scope assembly at the Guernsey Plant

Read more about the Tektronix plant at Guernsey on the vintageTek Museum website

Tektronix Holland H.V. (Heerenveen)

Earl Wantland, at left, directing a tour of the new facility.

Taking introduction of the 7504 scope seriously, Tek Holland built a model.

On June 22, 1962 Earl Wantland impressed all in attendance at the formal opening of the Tektronix Heerenveen plant in the Netherlands by opening the ceremony with a speech in fluent Dutch. A native Dutchman did the translation to English. The plant was situated in the center of the northern province of Freisland. During the opening ceremony the crowd took note when the Freisland anthem was played and it was visualized on eight Tektronix oscilloscopes.

Wantland, later Tek's president, had been part of the team that started Tek's first offshore venture at Guernsey, and he was chosen to drive the creation of their second facility, reinforcing Tek's presence in Europe on the mainland.

During the plant's existence over 45 different Tek scopes, many plug-ins and several Tek computer monitors were manufactured there. The scopes ranged from the 500 series to the 7k, 11k and TDS models. As seen in the adjacent photo, the first building was designed to resemble similar structures on the Beaverton campus.

Eventually the business from the European operations resulted in an additional 3,000 jobs in Oregon.

Heerenveen engineers designed new products including the 2212 and 2216 mixed analog/digital portable scopes.

Total headcount reached approximately 800 people in 1980. The facility was closed down in 2000.

Read more about the Tektronix Holland plant at on the vintageTek Museum website

Sony/Tektronix

Akio Morita and Howard Vollum

Type 323 Scope

In the 1950s and 1960s Japan had strict policies limiting foreign corporate ownership. With the rapid growth of the Japanese electronics market in the early 60's, Tek sought a partnership in order to sell instruments there.

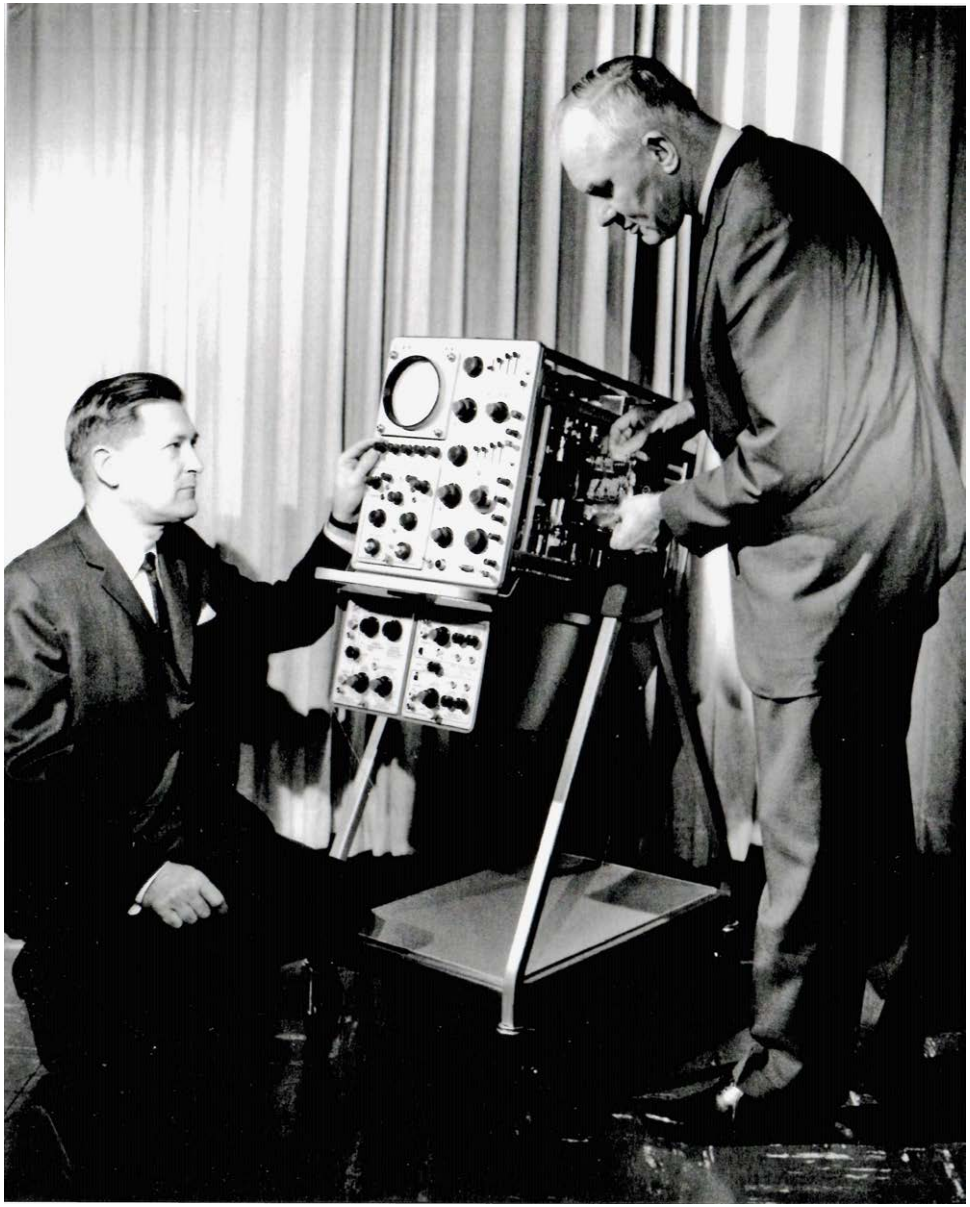
Formed in 1964, Sony/Tektronix was the first 50:50 - owned American company in Japan. The foundation of the company was the personal relationship established between Howard Vollum and Akio Morita, respective company co-founders. At the time the companies had a similar employee headcount and annual revenue.

Sony/Tektronix sold Tek products in Japan and developed and sold co-branded products for markets in Japan, elsewhere in Asia and throughout the world.

The first jointly-developed product was the Type 323 mini-oscilloscope, where John Gates was the project leader. At just under seven pounds, the 4MHz instrument was introduced in 1968. Over 10,000 were sold during the eleven-year product life.

Sony/Tek continued as a joint venture until 2002 when Tektronix fully acquired the company as Tektronix Japan. Tek Japan was relocated to Beaverton in 2008.

Type 547 Oscilloscope



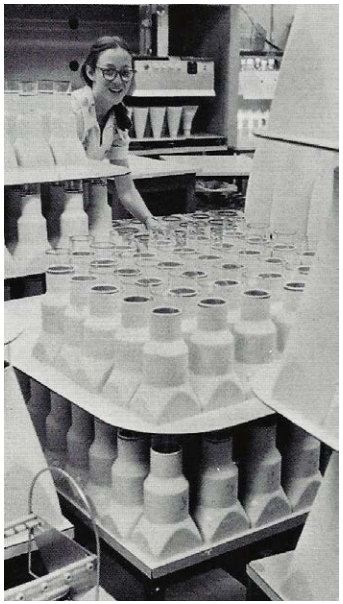
Jack Murdock and Howard Vollum are shown demonstrating the Type 547 oscilloscope. The 50MHz scope was introduced in 1964 and was produced until 1975. It cost $1,875 (the equivalent of $15,820 today) and was among the most popular of Tek's plug-in oscilloscopes. Bob Rullman was the project lead for this and two other 500-series scopes.

The scope is known for its small and crisp electron beam spot, the product of Connie Wilson's CRT design.

The 547 is shown mounted on a Type 204 Scope-Mobile Cart, designed by Gale Morris. It features a carrier for two plug-ins and a six-position tilt adjustment.

Tektronix Components

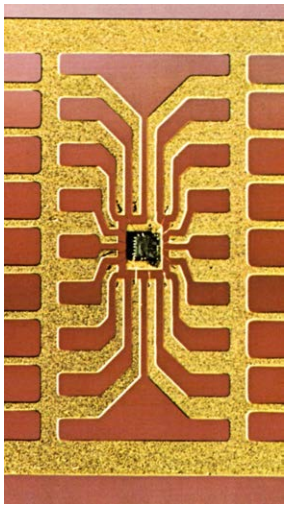
Electroplated, electroformed and photoetched parts



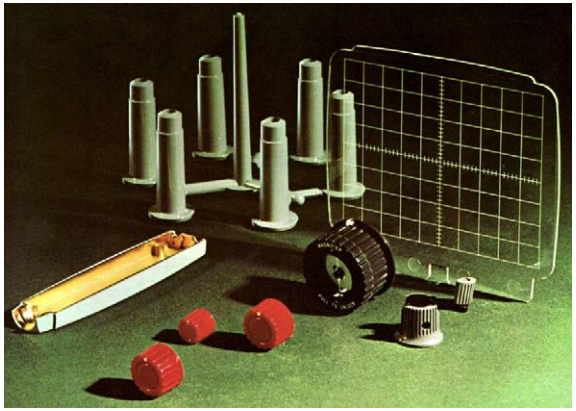
Ceramic funnels for cathode ray Tubes

Within a few years of the Tektronix' founding in 1946, there was already a willingness to produce certain components internally when those were not available with appropriate specifications or demonstrated quality. These components included precision resistors, capacitors, transformers, cables, printed circuit boards, parts made from plastics and ceramics, etched and electroplated components, sheet metal and machined parts, cathode ray tubes and integrated circuits and hybrids.

- Internal production allowed Tek to offer a lifetime warranty for its transformers.
- Tek had a 49,000 square foot building (Bldg 13) devoted entirely to ceramics – strips, CRT funnels and other parts. Most all CRTs produced after 1962 with screen sizes from 2" to 11" diagonal used ceramic funnels.
- There was a period where over two million feet of probe cables and delay lines were produced per year.



IC and lead frame from a Type 576 Curve Tracer (1969)



Plastic knobs, probe bodies and graticules

vintageTEK museum

Tektronix IPO – Public Stock Offering on the NYSE

This picture of Howard Vollum was taken on the floor of the New York Stock Exchange on Friday, January 10, 1964, the first day Tektronix stock was offered there, using “TEK” as the trading symbol. Howard purchased the first 100 shares at the opening price of just over $23.

There was a short-lived controversy based on false merger rumors. Tek led trading for the entire exchange during its first two days. The stock price reached almost $31 and then settled into the high-teens when the company denied the rumors.

However, the long-term investor was rewarded as there was a steady increase in the stock price into the $70 range and a 2:1 split in 1977.

Employees were especially proud of the fact Tektronix was the first company incorporated in Oregon to be listed on the NYSE.

vintageTEK museum

Field Engineers

Sorry, it's a sign of the time

The cartoon at left is part of an article* about Field Engineers from the September 28, 1959 issue of *Tek Talk*, the company employee newspaper. Field engineers were the primary domestic sales force for Tek products through the early 1970s, but they were much more than traveling salespeople. FE's were also technical advisors, responsible for advising customers which instruments to select and how to use them. They were also maintenance and repair experts, carrying a full compliment of tools and spare parts. Note the term "teacher": FE's were also expected to instruct classes on instrument use and maintenance. These skill sets helped them obtain a customer loyalty and access that competitors found hard to overcome.

Ed Sinclair, retired FE and co-founder of the vintage Tek Museum, noted that when he was hired in 1968 before being assigned a territory, he was moved to Beaverton for ten and a half months for training on every functional aspect of the company. The training class had monthly lunches with Howard Vollum, who personally described the Tek Philosophy as it related to customers and how he expected them to be treated. There was a "scope down" policy, which meant that FE's were able to obtain priority for delivery of a failed component in the field, even if it meant a new scope would not be shipped.

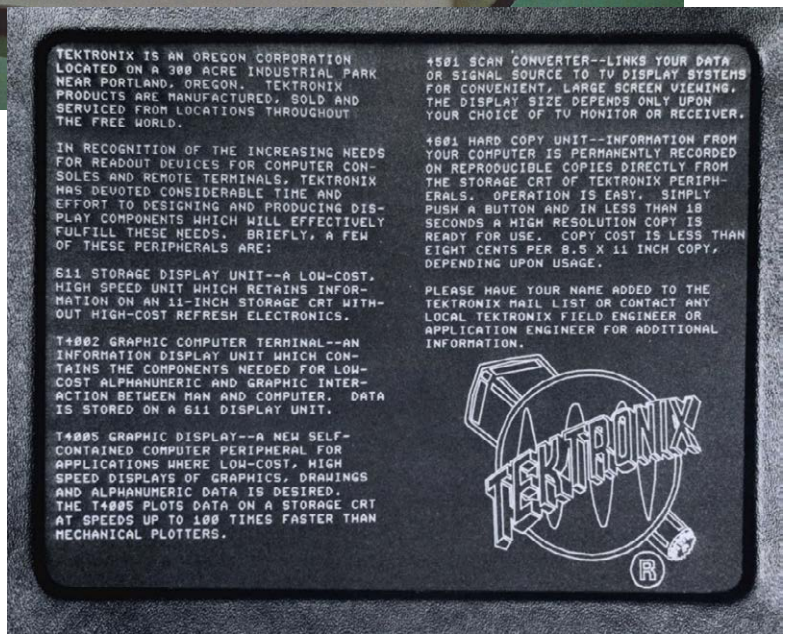
An undated ad for Tek Field Engineers is shown at left. It's probably from the late 1950s or early 1960s, which explains the limitation in gender vision…

* The entire *Tek Talk* article can be found on the vintageTek Museum website.

vintageTEK museum

Direct-View Storage Tube Monitors

Norman Winningstad



A few years after the introduction of Tek's 564 storage scope in 1962, reports came back to Beaverton from field engineers that 564 scopes were being "hacked", as it would be described today. Computer system developers were using the screen storage function of the 564 CRT to create a computer monitor! At the time there were no components suitable for use as video memory. The typed input and output for mainframe computers was being stored for viewing on the interfaced 564 scope screen. It was a revelation – and the start of a revolution.

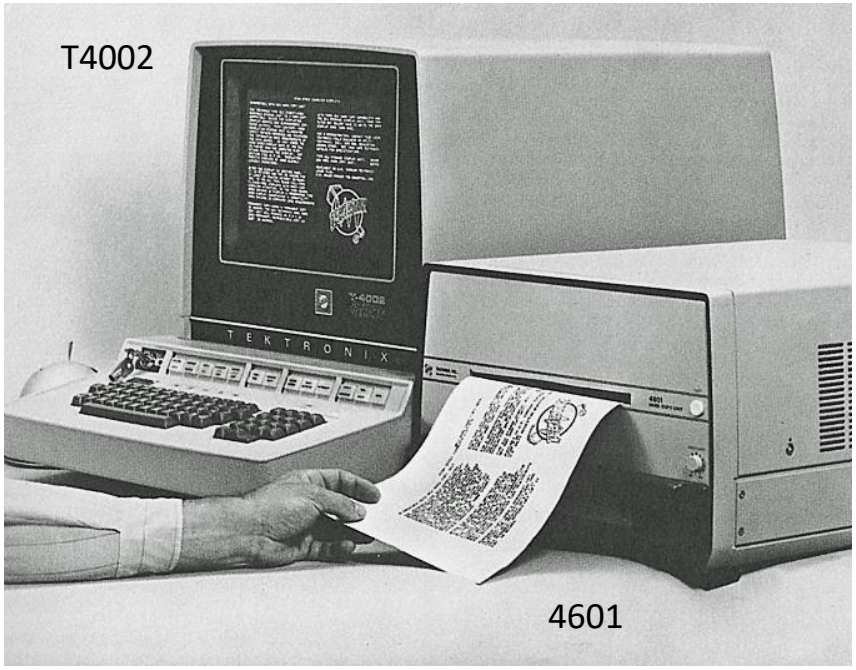
Norman Winningstad, Tek engineer and up-and-coming entrepreneur, was able to convince Howard Vollum that this could be Tek's first non-oscilloscope business opportunity.

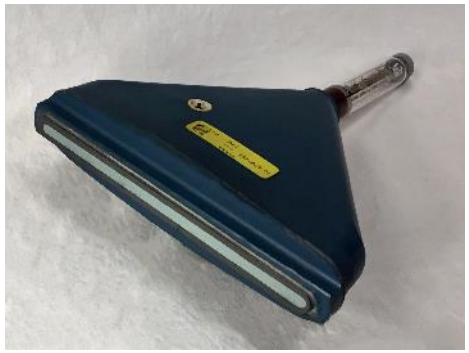
A larger screen was needed for computer use so a storage CRT with an 11" screen was developed. It was the largest CRT Tek had built up to that time. The CRT and monitor in which it was incorporated were both called "611". The monitor was employed in Tek's first computer graphic terminal, the T4002, shown in the adjacent photo. Introduced in 1968, it was the first low-cost, graphic computer terminal suitable for readout of complex graphics and high density text. It sold for $8,800 at a time when IBM graphics terminals with conventional CRTs cost $80,000 to $100,000.

A screenshot in black and white from a T4002 is shown at left. Note the quality of the rendering for the Tek bug logo. The screenshot is from the 1971 Tektronix catalog.

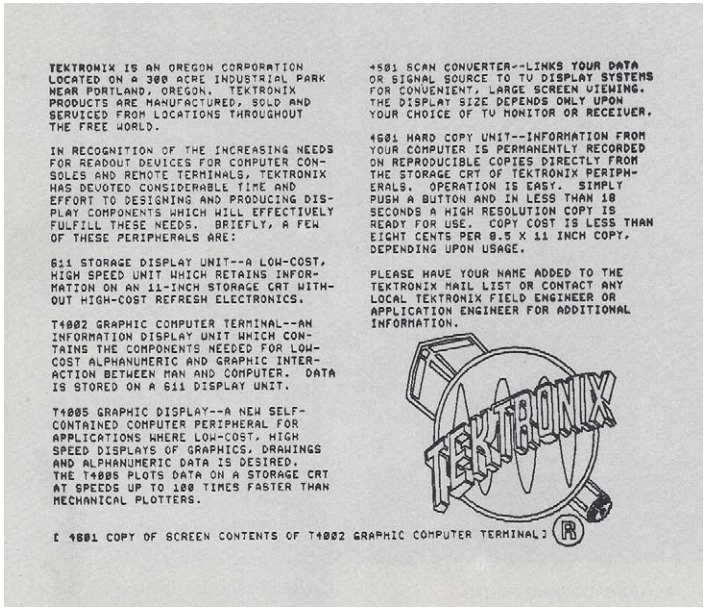
vintageTEK museum

Hardcopy for Storage Monitors





T4601 CRT



TEKTRONIX IS AN OREGON CORPORATION LOCATED ON A 300 ACRE INDUSTRIAL PARK NEAR PORTLAND, OREGON. TEKTRONIX PRODUCTS ARE MANUFACTURED, SOLD AND SERVICED FROM LOCATIONS THROUGHOUT THE FREE WORLD.

IN RECOGNITION OF THE INCREASING NEEDS FOR READOUT DEVICES FOR COMPUTER CONSOLES AND REMOTE TERMINALS, TEKTRONIX HAS DEVOTED CONSIDERABLE TIME AND EFFORT TO DESIGNING AND PRODUCING DISPLAY COMPONENTS WHICH WILL EFFECTIVELY FULFILL THESE NEEDS. BRIEFLY, A FEW OF THESE PERIPHERALS ARE:

611 STORAGE DISPLAY UNIT--A LOW-COST, HIGH SPEED UNIT WHICH RETAINS INFORMATION ON AN 11-INCH STORAGE CRT WITHOUT HIGH-COST REFRESH ELECTRONICS.

T4002 GRAPHIC COMPUTER TERMINAL--AN INFORMATION DISPLAY UNIT WHICH CONTAINS THE COMPONENTS NEEDED FOR LOW-COST ALPHANUMERIC AND GRAPHIC INTERACTION BETWEEN MAN AND COMPUTER. DATA IS STORED ON A 611 DISPLAY UNIT.

T4005 GRAPHIC DISPLAY--A NEW SELF-CONTAINED COMPUTER PERIPHERAL FOR APPLICATIONS WHERE LOW-COST, HIGH SPEED DISPLAYS OF GRAPHICS, DRAWINGS AND ALPHANUMERIC DATA IS DESIRED. THE T4005 PLOTS DATA ON A STORAGE CRT AT SPEEDS UP TO 100 TIMES FASTER THAN MECHANICAL PLOTTERS.

4501 SCAN CONVERTER--LINKS YOUR DATA OR SIGNAL SOURCE TO TV DISPLAY SYSTEMS FOR CONVENIENT, LARGE SCREEN VIEWING. THE DISPLAY SIZE DEPENDS ONLY UPON YOUR CHOICE OF TV MONITOR OR RECEIVER.

4601 HARD COPY UNIT--INFORMATION FROM YOUR COMPUTER IS PERMANENTLY RECORDED ON REPRODUCIBLE COPIES DIRECTLY FROM THE STORAGE CRT OF TEKTRONIX PERIPHERALS. OPERATION IS EASY. SIMPLY PUSH A BUTTON AND IN LESS THAN 10 SECONDS A HIGH RESOLUTION COPY IS READY FOR USE. COPY COST IS LESS THAN EIGHT CENTS PER 8.5 X 11 INCH COPY, DEPENDING UPON USAGE.

PLEASE HAVE YOUR NAME ADDED TO THE TEKTRONIX MAIL LIST OR CONTACT ANY LOCAL TEKTRONIX FIELD ENGINEER OR APPLICATION ENGINEER FOR ADDITIONAL INFORMATION.

TEKTRONIX®

[4601 COPY OF SCREEN CONTENTS OF T4002 GRAPHIC COMPUTER TERMINAL]

Photo of 4601 hardcopy

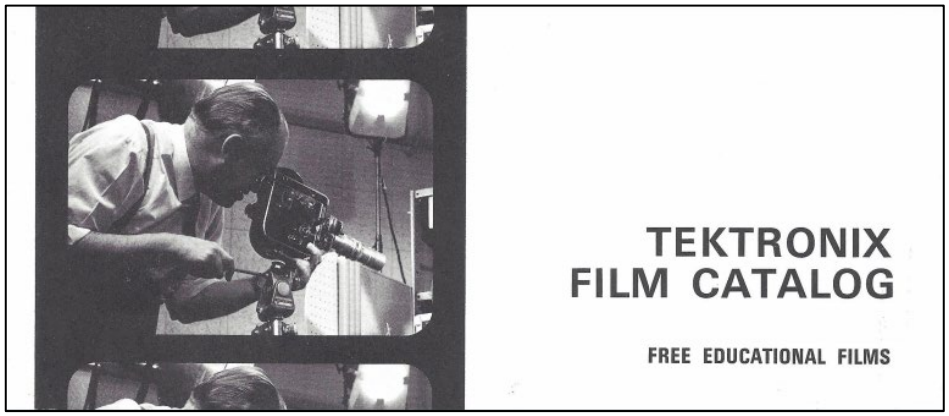
Early sales of Tek's new storage monitors were limited by an inability to make hardcopy of the screen content. Customers created impressive high resolution graphics onscreen, but it was difficult to incorporate these into a presentation or a written report.

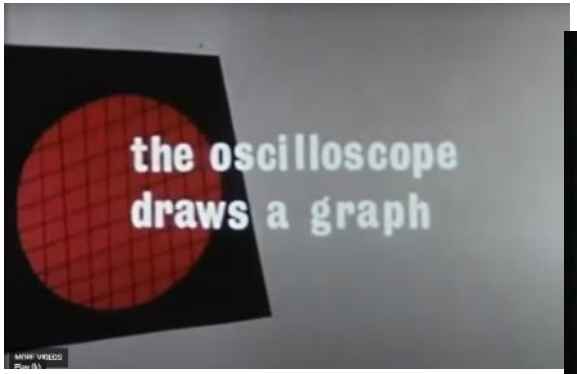
The 4601 Hard Copy Unit solved this problem using 3M™ light-sensitive, dry-silver paper and a Tek-made CRT. The 4601 first appeared in the 1971 catalog for $3750 (almost $25k today).

The very unusual CRT incorporated a ceramic funnel and a fiber optic faceplate to columnate the emitted light. It exposed the light-sensitive paper a line at a time.

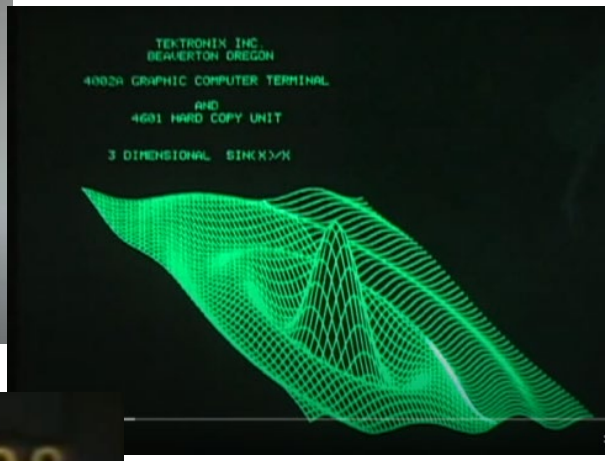
The 4601 was the first of many Tektronix hardcopy products and printers, offered into the 1990s.

Films Produced at Tek





The Oscillograph Draws a Graph (1963)



Demo of a 4002 storage monitor

Circuit Boards – Design and Manufacture (1969)

Frank Hood was one of Tek's early design engineers. Photography and filmmaking were two of his hobbies and he made use of both in his work at Tektronix. He produced a number of educational and promotional films during his 22 years at Tek. Several of these and other Tek-made films are available for viewing on the vintageTek website. Check out the video gallery.

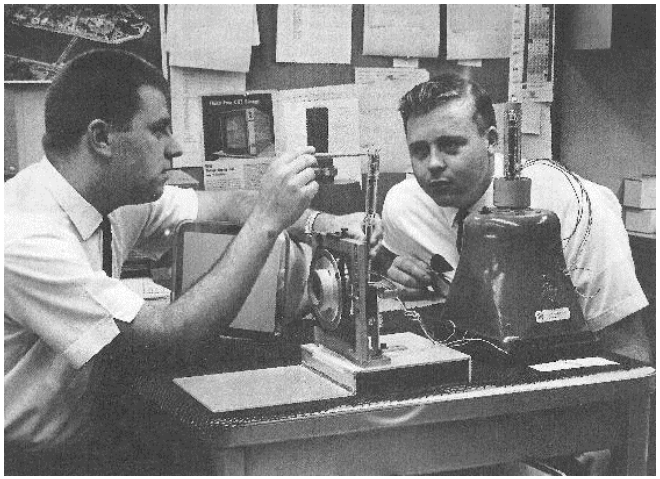
One of Frank's earliest Tek films is from 1955: *A Precision CRT*, describing how cathode ray tubes were made. It was shown to thousands of high school students in addition to engineers and scientists, as were many of his movies.

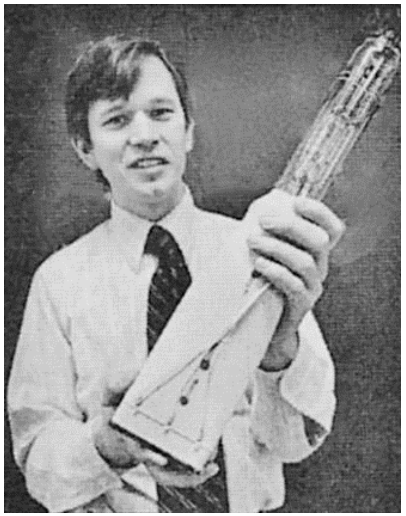
Films on the vintageTek website include:

- Overviews of Tek from 1968, 1977, 1979 and 1996
- Howard Vollum speaking to an Area Rep group in 1977
- Tours of Tek Beaverton, Guernsey and Herenveen
- Educational videos on a number of scope-related topics
- Several marketing videos for early products

vintageTEK museum

CRT Innovation





Electron gun designer Connie Wilson was one of Tek's first women engineers. She designed electron guns for the CRTs used in the Type 547, 555 and 561 oscilloscopes and the Type 529 television waveform monitor. She managed an electron gun design group during the 1960s.

Pete Perkins and Larry Virgin are shown examining an electron gun from a T611 storage CRT. Pete was also the designer of the gun for the CRT used in the Type 647 scope. Larry Virgin was the CRT designer for the Type 7613 scope. He was also a leading contributor to the 19" and 25" graphics storage CRTs.

Vilma Leeto and Jack Neff were among the first members of the Tek CRT production team. They hold a plaque commemorating the production of the 250,000th T465 portable oscilloscope CRT in 1982. Many more were produced.

Chris Curtin holds the storage CRT he co-designed that was used in the Type 7623 scope. He was the designer of the CRTs used in the Type 549 and 601 scopes and went on to be the General Manager of the CRT operation.

vintageTEK museum

The Entire 1965 Tektronix Product Line

A parking lot on the Beaverton campus was the site for showcasing the 1965 Tektronix product line. There are 53 scopes, 27 plug-ins, 7 carts and 4 cameras.

The Clone Scope Lawsuit

A genuine Tek Type 545 scope at the vintageTek Museum

A 545 Clone: Jetronic MX-2330A/G Oscilloscope with a Hickok 1B23 plug-in, also at the museum

IN THE

United States Court of Claims

No. 79-61

TEKTRONIX, INC., *Plaintiff*

v.

THE UNITED STATES OF AMERICA, *Defendant*

and

THE HICKOK ELECTRICAL INSTRUMENT CO., LAVOIE LABORATORIES, INC., JETRONIC INDUSTRIES, INC., *Third Party Defendants.*

Apparently dissatisfied with Tek's pricing, a procurement office for the US Air Force In 1959 awarded contracts to the Hickok Corporation for production of Tektronix Type 545 oscilloscopes. The contracts, which also included Lavoie and Jetronic, led to a bizarre lawsuit spanning almost two decades that pitted Tektronix against not only the three contractors, but the US Government itself.

The three companies did not produce a scope of their own design with Tek 545 specifications. Prompted by the government, they built a near-exact replica of the 545 which incorporated several Tek-patented circuits. When the contractors were notified by Tektronix that they were infringing, the government asked Tek to license the use of these patents to the contractors. Tek refused.

After protracted negotiations failed, Tek retained legal counsel, filing suit in February, 1961 against the Federal Government and the three contractors for patent infringement. The situation became more convoluted when the government counterclaimed that Tek had infringed on US Government patents. It was the first time the government had ever accused US citizens of this sort of violation. The counterclaim took time but was eventually dismissed.

The trial ended in March, 1966, but it took over a year for the court to provide their decision. In May, 1970 Tek received a favorable ruling on all patent claims which allowed recovery of reasonable compensation for the unauthorized use of their patents. In September, 1975 Tek received judgement that they were entitled to an award of over $7 million; however, that ruling did not stand and final judgement provided Tek with slightly more than $4 million in March, 1977. This probably barely covered legal fees, but almost eighteen years after the initial suit, Tektronix v. The United States of America *et al* was over.

Find more details at the vintageTek website

vintageTEK museum

Tektronix Circuit Computer

In the the early 1960s engineers did calculations on slide rules that some carried on their hips in holsters. The Tektronix Circuit Computer was created during this time. It was designed to solve problems directly involving resistance, capacitance, inductance, frequency, and time.

The 7.75” circular slide-rule contained seven scales. It was most commonly available in white plastic, but there was a limited run of aluminum circuit computers, pictured here.

The computer came with the instruction book shown at left.

These can be found on display at the vintageTek Museum.

vintageTEK museum

Beaverton Aerial Site Photos

This 1968 photo is composed similarly to the aerial shot taken from Jack Murdock's plane of the unbuilt Beaverton site (Slide 32). Again, Jenkins Road runs diagonally on the left side of the image. From building 55 in the foreground going clockwise: 47 (Assembly West), 39 (Assembly East) 19 (Metals/Plastics), 13 (Ceramics), 38 (Electrochem), 46 (CRT) and 50 (Technical Center) are present.

Building 58, to be located in the foreground near buildings 55 and 50, was not built until 1973.

Looking south, building 47 and the corner of 39 are in the foreground beyond the very full parking lot. Left to right further back are buildings 46 (now demolished), 50 and 55.

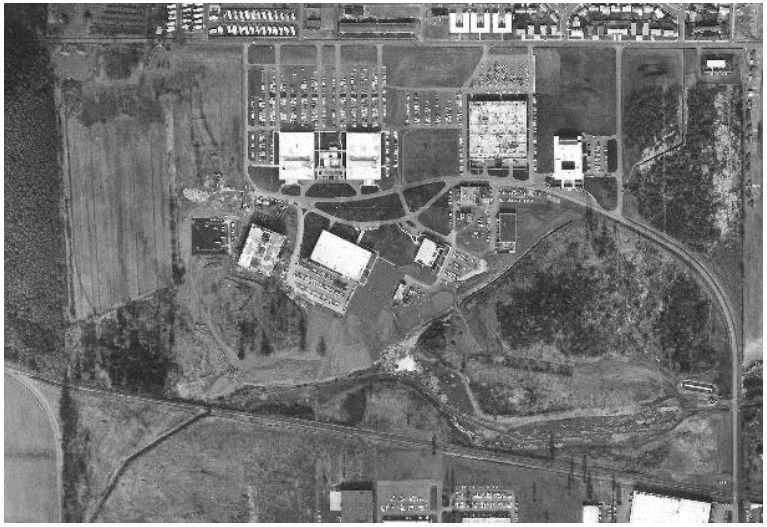
Murray Road has not been built. Canyon Road and St. Mary's are in the distance.

More photos and details are found on the vintageTek website. Search: "Beaverton Campus".

vintageTEK museum

Beaverton Aerial Site Photos

Pre1960: CW from the upper left: 47 (Assembly West), 45 (Cafeteria), 39 (Assembly East), 28 (Utilities), 19 Metals/ Plastics), 13 (Ceramics), 46 (CRT, under construction)



1965: 38 (Electrochem), 46 (CRT), 50 (Tech Center)

The Tek Building Maintenance Group had aerial photos taken regularly of Tek property. These four shots show the buildout of the Beaverton Campus from the late 1950's through 1985. Jenkins Rd runs across the top in all photos. More photos and details are found on the vintageTek website. Search: "Beaverton Campus".

1976: 16 (Mech Products), 48 (Electron Devices), 58 (Gen'l Purpose), 55 (Operations), Murray Rd is complete (Left Side)

1985: 46A (CRT), 78 (Automated Warehouse, 59 (Microelectronics)

vintageTEK museum

Finished Goods, around 1968

This photo shows an unidentified Tek employee in front of a rack containing finished goods tagged for shipping. It was taken near the first floor shipping dock of Building 39 (Assembly East) in ~1968.

In the foreground there are five Type 611 Storage Display monitors on the shelves. On the top shelf Type 601 Storage Display Units and 528 Television Waveform Monitors are found. In the near lower corner there are two Type RM504 scopes. RM indicates rack mounting.

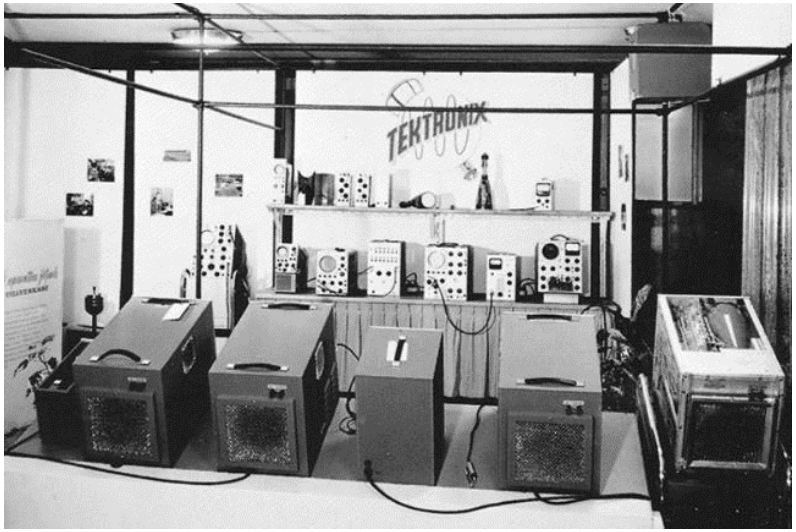
The center and far sections hold a variety of oscilloscopes, including the smaller Type 502 and 503, as well as the plug-in scopes, Type 535A, 547 and 647. The lone 647 has a square CRT and bezel.

Tradeshows

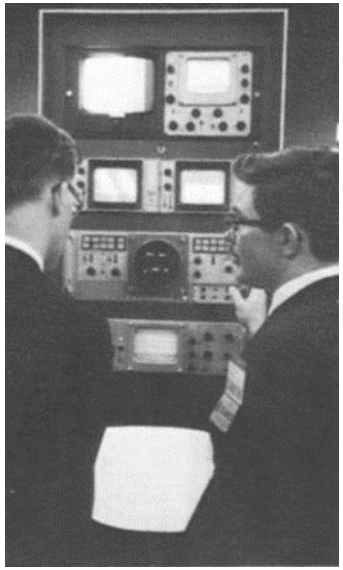
1960 Westcon Show

At every show engineers and salespeople, including Howard Vollum, stood ready to discuss the latest developments,.

Preparation for tradeshows was always a stressful time. There was a desire to show the newest available products and features.
It was also a time to demonstrate experimental designs, sometimes resulting in engineers burning the midnight oil right up to the time when hardware had to be shipped. It was not uncommon for designers to bring components or even instruments on the plane with their luggage.



A 1954 meeting in Stockholm, one of the first overseas showings

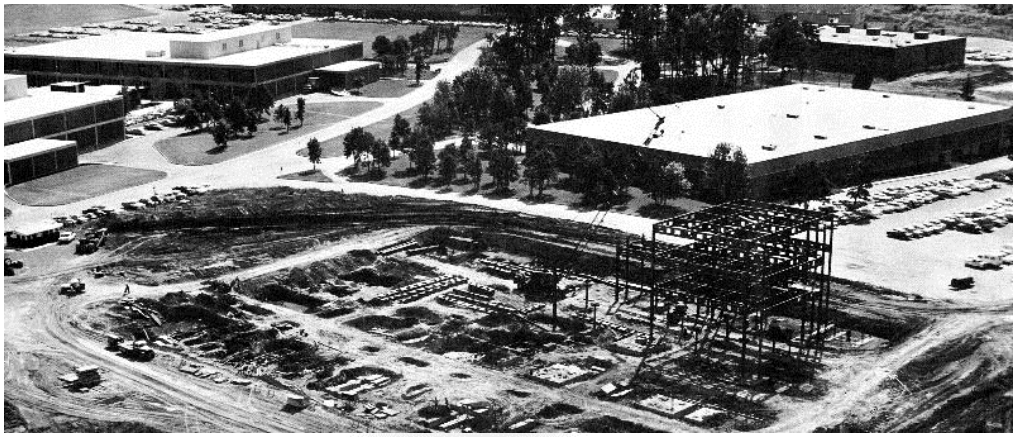


TV Products engineer, Phil Crosby, talks with a customer

Mid-1960s IEEE Show

vintageTEK museum

The Technical Center - Building 50



Tektronix continued to expand through the late 1950s and early 1960s, launching their most aggressive building expansion with the construction of the five-story Building 50 Technical Center. The structure was to house the engineering model shop, environmental test, the analytical chemistry laboratory, engineering tube lab, display and semiconductor device research, advanced instrument engineering, computer research, corporate offices, a cafeteria, and later, the home of Tek Labs.

The construction site was formerly a marsh so in order to secure the foundation, ninety-foot long pilings were driven into the ground. In spite of this attempt to stabilize the building, it settled, resulting in floors that were not level. Before this was corrected, pencils rolled off desks and engineering benches, which had to be shimmed.

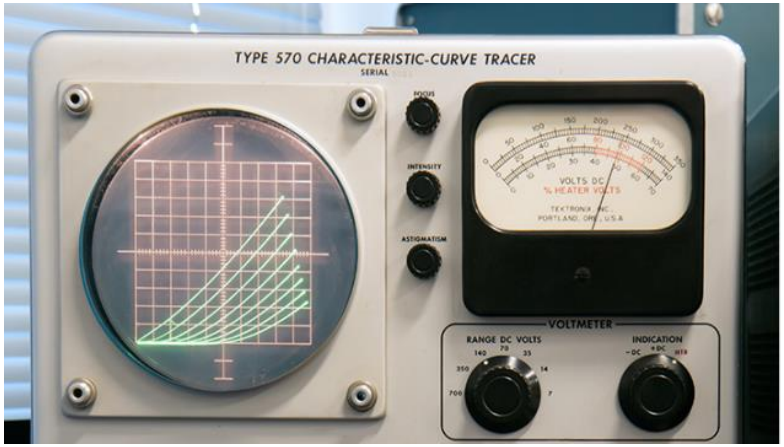
The upper photo, looking northeast, shows Building 50 under construction. Building 46 (CRT) is found across the street to the right and Buildings 39 and 47 (Assembly East and West, respectively) are at the top left. This photo is from the 1964 Annual Report.

A later view of construction from the front of the building is found in the middle photo.

The lower photo, from March 28, 1966, shows the completed Technical Center. Note the bridge to Building 48.

Curve Tracers

Here are three of the museum's curve tracers. L to R: Types 570, 575, 577



This photo shows the museum's 570 displaying characteristics for a 6C4 triode vacuum tube with the exponential-characteristic curves.

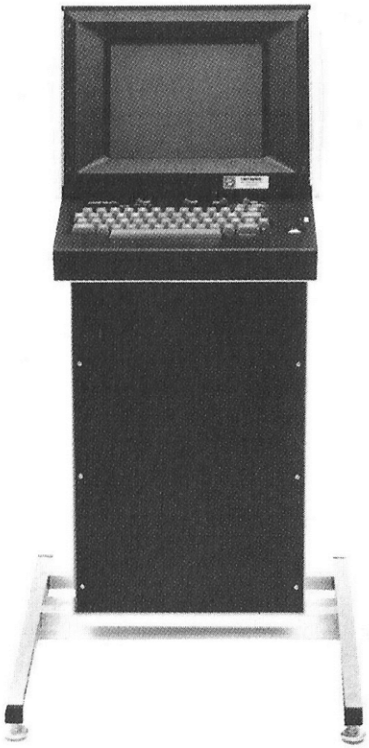
For many years oscilloscopes had been used for displaying the response curves of passive and active electronic components. Specially-designed curve tracers were eventually created to graphically display the characteristics of vacuum tubes and later, transistors, other semiconductors and many other components. The Type 570 vacuum tube curve tracer and Type 575 transistor curve tracer were introduced by Tektronix in 1955 and 1959, respectively. Both were self-contained and included power supplies for the devices being tested. In his memoir, John Kobbe recalled the origin of the 575:

> "While I was working on the 540 series vertical amplifier, Virgil Briton, whose bench was next to me, had put together a vacuum tube curve tracer using stepping relays and other mechanical devices. I remember thinking that, that was a neat display even if it did a lot of clicking and was slow. After putting the cross hatch generator together, I knew it would be very easy to do the curve tracer electronically. It started for in house use, but after putting a self-contained instrument together, Tek decided to call it 575 and sell it. It used a similar step generator as the tube curve tracer but otherwise needed mostly new circuits. I remember a day at the beach, I was trying to hide from the sun while everyone else was getting their sunburn. I dug the sand out from under our new 1954 Chevy, got comfortable and figured out the circuits for the curve tracer soon to become the 575. Deane Kidd did the hard part when he designed the switches."

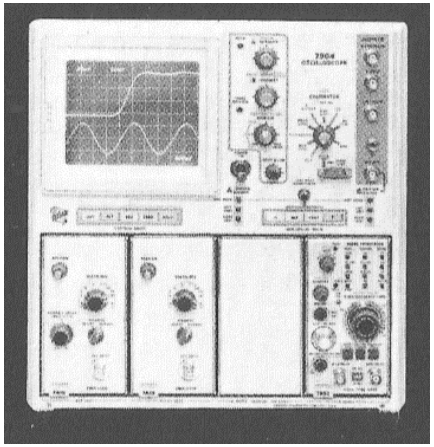
The 570 has found new life and demand – it's highly sought by audiophiles due to the interest in matching vacuum tubes for stereo systems.

vintageTEK museum

1971 – Tek's 25th Anniversary



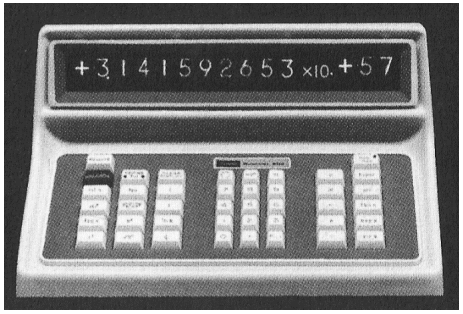
4010 Low-cost Graphics Terminal



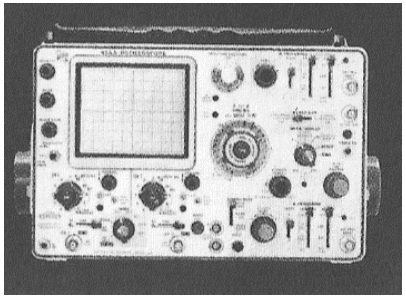
7904 500MHz General Purpose Oscilloscope

The year 1971 marked Tek's 25th birthday. The annual report announced that during the fifteen-month period since the start of the prior fiscal year, exactly one hundred ten new products were introduced or announced. Only a few of those products are shown here.

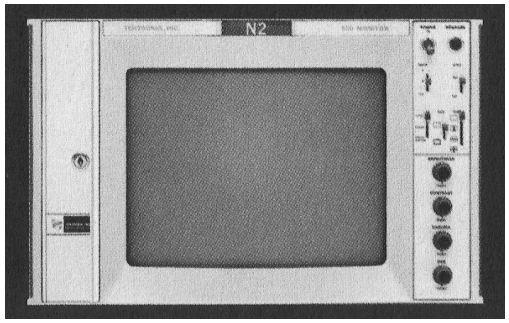
Did you know Tek made a programmable calculator? Or a controller for machine tools? Or a graphics plotter? You can see the entire 1971 Annual Report (and all the reports through 1985) on the vintageTek website.



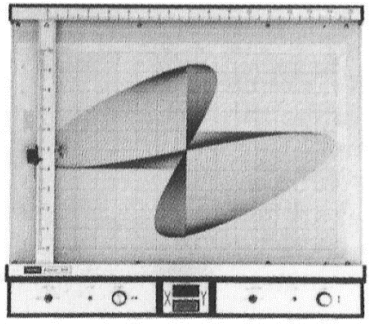
909 Scientist Calculator



454A 150MHz Dual-Trace Portable Oscilloscope



650 Color Reference Television Monitor

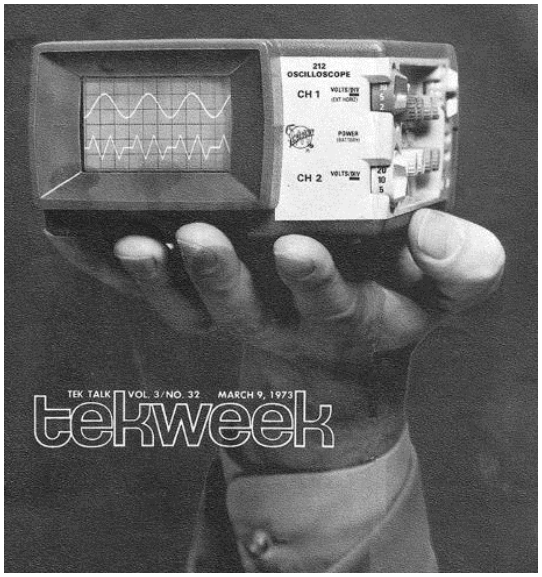


915 Graphics Plotter

1701 Machine Control Unit

vintageTEK museum

Mini-scopes



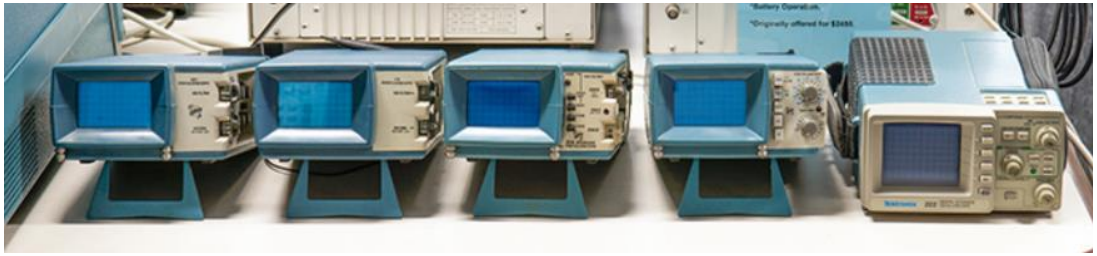
The March 9, 1973 issue of *TekWeek* featured the 212.

To celebrate the production of the 1000th 211, project manager David Allen presents a gold-plated mini-scope to Howard Vollum.

In the late 1960s Howard Vollum suggested that Tektronix design a handheld oscilloscope. The key challenges for the instrument were a low power CRT, custom ICs to minimize power and size, and a compact physical design. In 1971 the 211, the Mini-scope, was introduced as the first of a very successful line of seven products:

- Type 211: 500 KHz, single channel
- Type 212: 500 KHz, dual channel
- Type 213: 1 MHz, DMM
- Type 214: 500 KHz, dual channel, storage
- Type 221: 5 MHz, single channel
- Type 222: 10 MHz, digital, dual channel
- Type 224: 60 MHz, digital, dual channel

The CRTs used in the 200 series scopes were the smallest tubes Tek ever made.



Here are five Mini-scopes on display at the vintageTek Museum. Left to right: Type 221, 211, 214, 213, 222

vintageTEK museum

Jack Murdock 1917 - 1971

Photo courtesy of the M.J. Murdock Charitable Trust

Eulogy from Tektronix 1971 Annual Report

The life of M. J. Murdock, Tektronix founder and board chairman, ended in a seaplane tragedy May 16 when he drowned in the Columbia river. He was 53.

Jack and I became friends 34 years ago, well before Tektronix began. A warm, outgoing man, he was also humble and unassuming, and probably the best listener I have ever met. Despite his business achievements and national stature, he was publicly not well known. This was by choice; he was an unpretentious man who shunned the limelight.

Jack had not been involved in our day-to-day operations for some years, but as board chairman he continued to contribute sound advice and invaluable insights. In the earlier days, he led largely by setting an example. His orientation toward the customer's point of view, his informality and his disregard of status symbols have all become part of the way Tektronix operates. His influence will live on in our practices and policies.

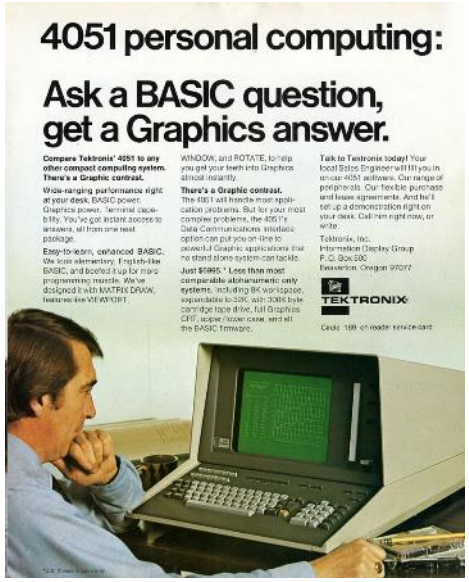
The world is always poorer when a positive influence is lost. So it will miss Jack Murdock, a good man and a close friend to so many of us.

Howard Vollum

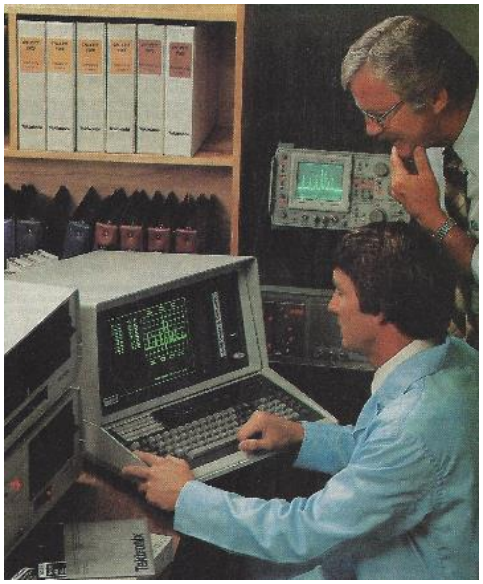
August 5, 1971 President

Tek Desktop Computers: 4051, 4052 & 4054

4052 and 4054 Tektronix Desktop Graphics Computers



4051 Ad from April 1976



4052 Ad from November 1981. Note software notebooks on the shelf.

In November 1975 Tektronix introduced a transformational product called the 4051. Tek literature initially had some ambiguity as to whether it was a “Graphics Computer System” or a “Desktop Computer”, but it didn’t matter. Customers loved it.

The 4051 was a follow-on to the Tek calculator line and the 400X line of computer graphics terminals. It consisted of a 1024x768 Direct View Storage Tube (DVST), a 3M tape system (essentially an industrial-strength cassette tape with 300kB capacity), and a Motorola 6800 running BASIC language. The maximum RAM available was 32kB. There was no video memory – screen content was stored on Tek’s proprietary DVST. Note that the IBM Personal Computer was not introduced for another eight years.

The 4051 sold for $7,500 ($35,700 today).

Thousands of programs were created for the 405X computers, including some great games.

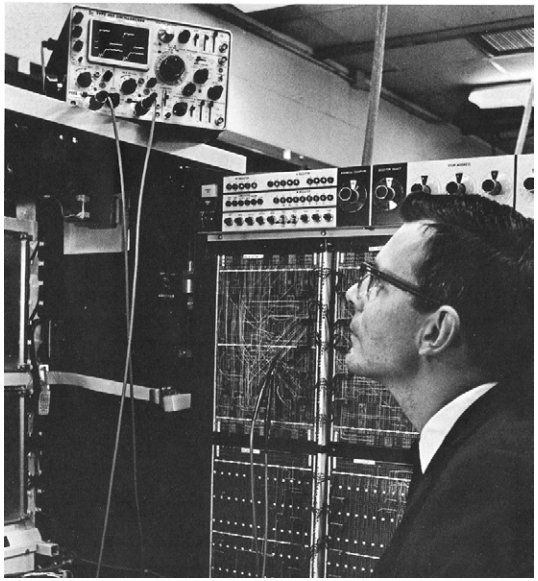
There was an upgrade to an AMD processor in the 4052 which increased performance by a factor of thirty. The 4054 was offered in the 1980 catalog. With a 19-inch DVST, screen resolution was increased to 4096x3072.

An engineer with a 4051 on their desk was a happy camper!

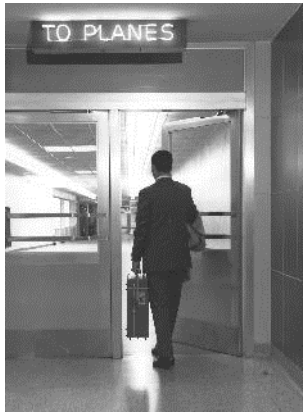
vintageTEK museum

Portable Scopes

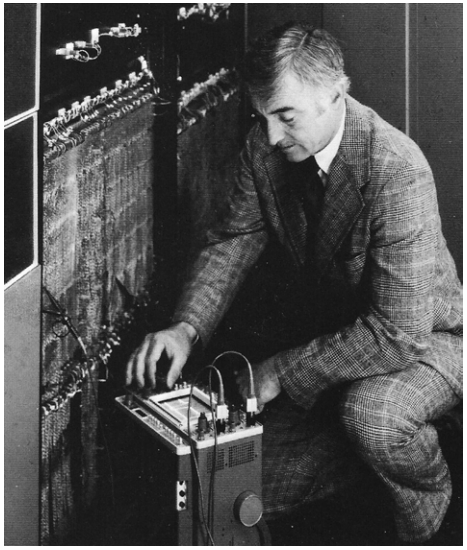
Type 310 scope ad from 1955.



A service call for an IBM 360 computer using a Tek 453 oscilloscope



A photo from ads alluding to the portability of Tek scopes. Not all fit under an airline seat.



A Type 465B used to examine memory for a DEC computer.

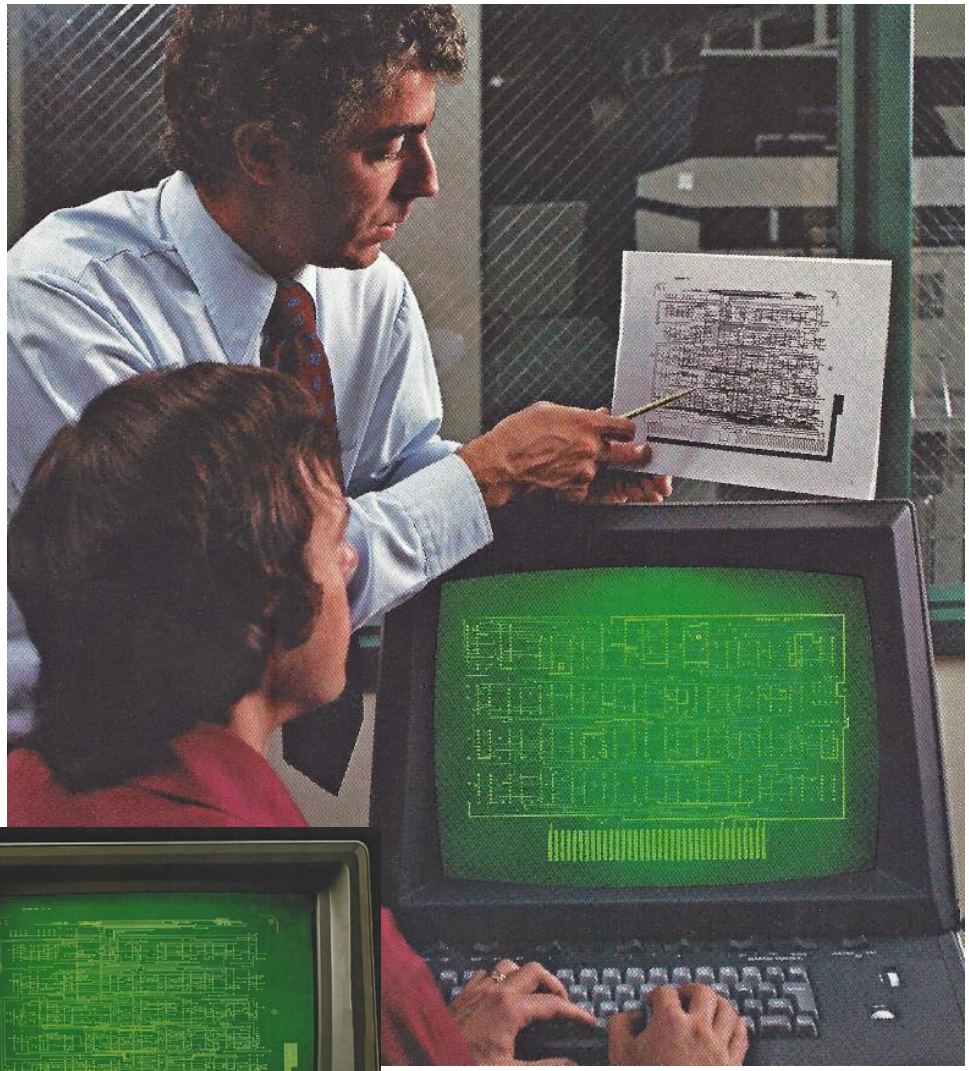
Through the post-war era portable oscilloscopes typically offered a bare-bones feature set. In 1952 Tek was the first to offer laboratory scope performance in a portable scope with the 5MHz Type 315 weighing 36lbs. The Type 310, built at the request of IBM for servicing their mainframe computers in the 1950s, was a further improvement at less than 24lbs and a 4MHz bandwidth. It sold for $595 ($5,860 today).

In the 1960s when it was learned IBM was pursuing making their own portable scope for field-service of their computers, a crash program for a new design was initiated at Tek. There were two requirements from IBM: it had to be suitable for servicing the IBM 360 computer line and had to fit under an airline seat. The 50MHz Type 453 oscilloscope was introduced in 1965 to meet these requirements. A companion portable, the Type 454A, offered 150MHz bandwidth.

One of Tek's best-selling scopes, the 100MHz Type 465, was introduced in 1972 and sold for over ten years in several versions. There was an option for a digital multimeter that attached to the top of the instrument. A sister model, the Type 475, was introduced with 200MHz bandwidth in 1972 and was later modified to a 250MHz model as the 475A. The Type 464 and 466 scopes offered a storage option at bandwidth up to 100MHz.

Also introduced in 1972, the portable bandwidth champion of the era was the 450MHz Type 485, weighing only 20.5lbs. This was the first portable scope to allow measurements on a nanosecond (billionths of a second) time scale.

4014 and 4016 Computer Graphics Terminals



Carl Machover, a pioneer in computer graphics, was quoted as saying: “Before the storage tube, computer graphics was a cure for no known disease – an expensive one at that. After the storage tube, CG became a cure for every known disease”.

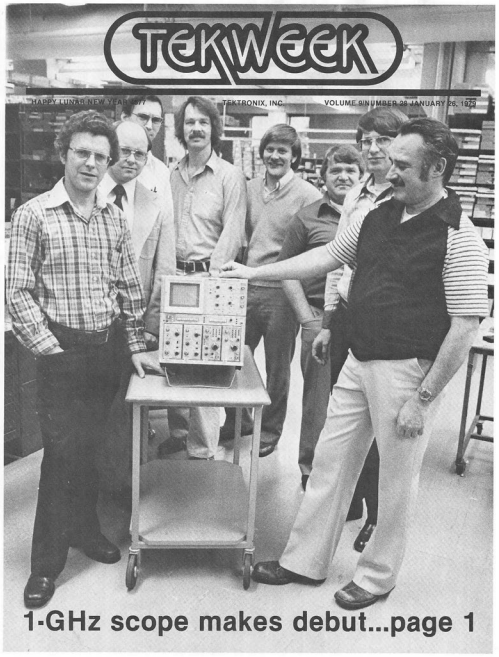
The 4014 Computer Display Terminal was the world’s best-selling graphics display terminal, introduced in 1972. Used with remote mainframe computers, it featured a 19-inch DVST (Direct View Storage Tube) developed and manufactured at Tektronix. Screen resolution was 4096x3120 viewable points.

In 1979 the 25-inch 4016 terminal was introduced, the largest graphics terminal in volume production. It is shown in the lower left.

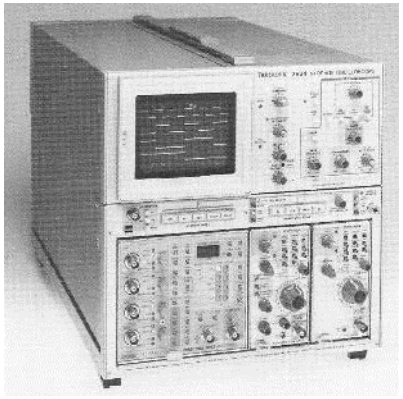
With these terminals and others to follow, Tek was the dominant force in the first decades of computer graphics displays.

vintageTEK museum

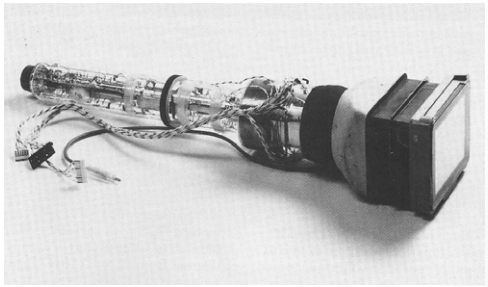
7000 Series Oscilloscopes



Part of the design team for the Type 7104 Oscilloscope



Type 7934 500MHz Storage Oscilloscope



T7100 CRT Used in the Type 7104 Oscilloscope

Type 7904 500MHz General Purpose Oscilloscope on the Type 204-3 Scopecart and 12 plug-ins

In 1964 Howard Vollum circulated a memo describing his proposal for a new line of oscilloscopes to replace the highly successful, but aging 500-series scopes. His proposed concepts for this new scope line included a much smaller cabinet requiring reduced-size plug-ins, an on-screen readout of parameters, extensive use of storage and even taking photo screenshots from the *backside* of the CRT screen (the last feature was never implemented). This was to be the iconic 7000 oscilloscope series.

There was much to do and there were some stops and restarts. It took five years until 7000 series products were ready. The first of the line, the 90MHz 7504 and the 150MHz 7704, were introduced in 1969. These were worthy offerings, but Hewlett-Packard had developed scopes of comparable or better performance.

This threat to Tek's analog scope dominance was a real motivator. A new scope was introduced in 1971 with 500MHz bandwidth, called the Type 7904. it reclaimed Tektronix' pre-eminent position.

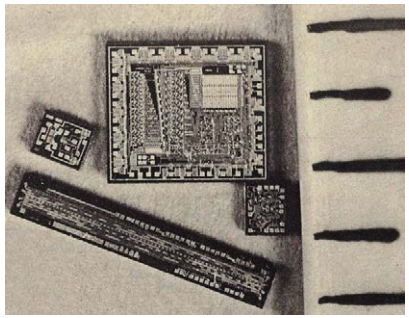
It 1978, a milestone that has never been surpassed was reached with the introduction of 1GHz 7104 real-time oscilloscope. Making extensive use of custom integrated circuits and hybrids, it featured the most complex oscilloscope CRT Tek ever produced. The adjacent *TekWeek* photo shows some of the design team, L To R: Hans Springer, Bruce Hofer, Gene Andrews, John Addis, Wink Gross, Howard Nutt, Dave Morgan and Gary Bohms.

In 1986 Tek introduced the Type 7934. At 500MHz bandwidth, it was the fastest analog storage scope.

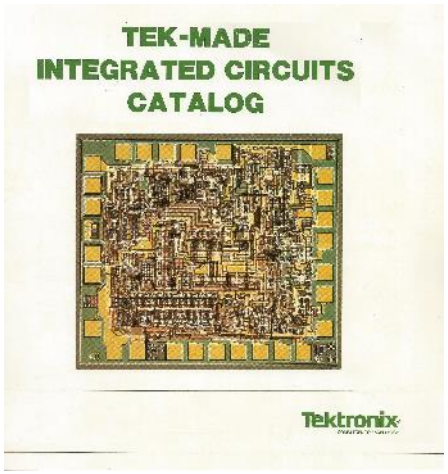
The 7000 series scope line consisted of 25 different instruments and a score of plug-ins during its almost quarter-century product life. It was a mainstay of the Tektronix product line until the final year of production in 1993. Fittingly, the last 7k scope manufactured was a 7104.

vintageTEK museum

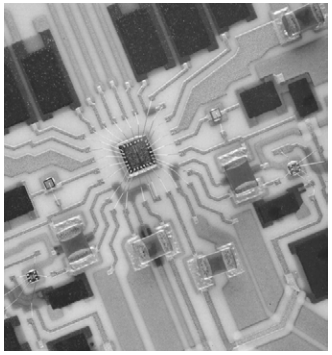
Integrated Circuit Operation



Tek ICs, 1981. For scale, a ruler showing 1/16” marks is included

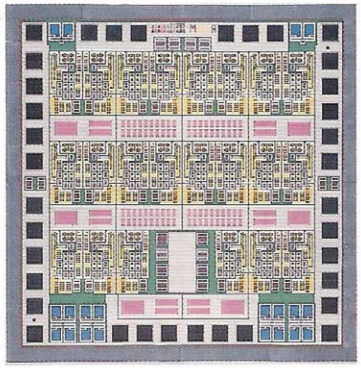


Tek IC catalog for internal-use only (1983)

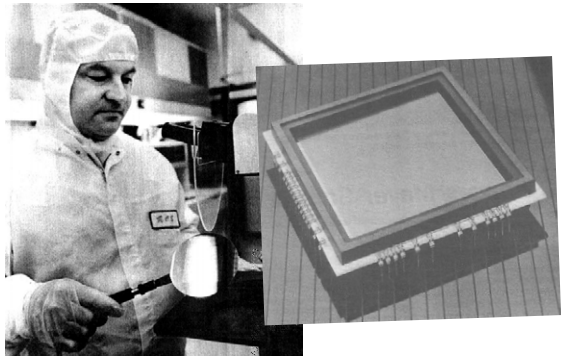


A hybrid circuit used in the 2465 scope in 1984

Building 59 in 1980



A QuickChip™ IC



Morley Blouke and a 2048 x 2048 pixel CCD

As yet another example of Tektronix’ willingness to produce its own components when suitable commercial parts weren’t available or acceptable, Tek developed an internal integrated circuit (IC) fabrication capability in the 1960s. The first Tek ICs were used in the 7000-series scopes introduced in 1969. These were produced in Building 50, but a full-fledged production facility was later located in Building 48.

The Integrated Circuit Operation (ICO) developed a series of bipolar and CMOS processes for use in high speed and high voltage ICs employed in Tek’s 400-series oscilloscopes, 7k scopes and plug-ins, scope probes, television products and other Tek instruments. Many of these ICs were packaged on ceramic substrates as hybrid circuits.

In 1980 the Tek ICO moved into Building 59, a custom-designed 226,000 square foot facility on the Beaverton campus. It was the last major building built on the property.

The operation published detailed catalogs describing their products for Tek use only. The 1983 edition had 332 pages.

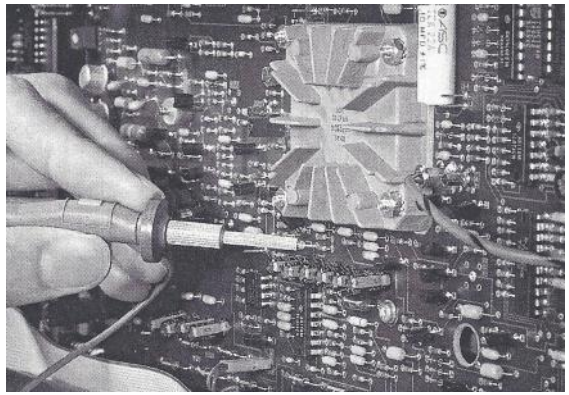
However, in 1986 the QuickChip™ line of analog ICs was offered commercially. It featured circuits capable of unity-gain bandwidth of 6.5GHz and a digital clock rate of 500MHz.

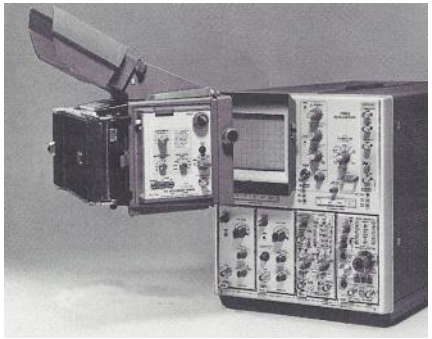
One of the most noteworthy uses for Tek’s IC technology was in the development of imaging CCDs (charge coupled devices) for astronomical imaging. In an effort led by Morley Blouke (photo at left), Tek CCDs were among the largest and highest resolution available. CCDs from Tek were incorporated into the original Hubble Telescope, but they were swapped out when the defective optics were replaced (not the fault of the CCDs) several years after Hubble was placed in orbit.

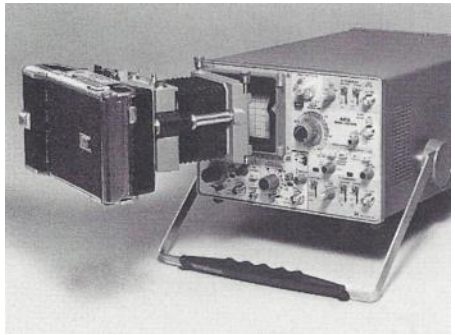
In 1994 Tek sold the IC Operation and Building 59 to Maxim Integrated. The CCD line was spun out of Tektronix as Scientific Image Technology, Inc. (SITe). They produced CCDs used in the Hubble.

vintageTEK museum

Accessories







Tek products offered as “accessories” were not simply trivial add-ons typically given that label. Tek Accessories were offered to complement and fulfill the performance of Tek instruments and in doing so, were among Tektronix most profitable products.

Gale Morris brought industrial engineering to Tek. This as a discipline that strives to optimize functionality, physical appearance and manufacturability in the design process. Gale’s influence was first realized with the series Scope-Mobile™ carts. His sketched and air-brushed rendering of the cart is shown at the upper left. He later went on to design an award-winning probe product series and managed the group doing the industrial design for the iconic 7000 series scopes. A Type 200-1 cart for portable scopes is shown in use at the near left.

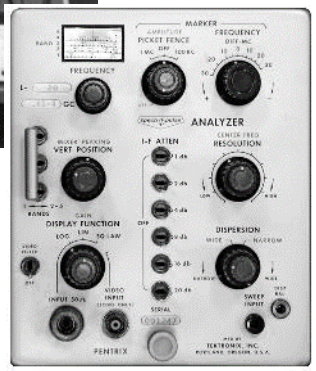
Probe design and selection can be critical for making accurate oscilloscope measurements, especially at high frequencies. One of Tek’s early patents went to John Kobbe and Bill Pollits for a breakthrough probe design.

Probes were built in-house and made use of most of Tek’s component groups: cables, plastics, metals, ICs and hybrids.

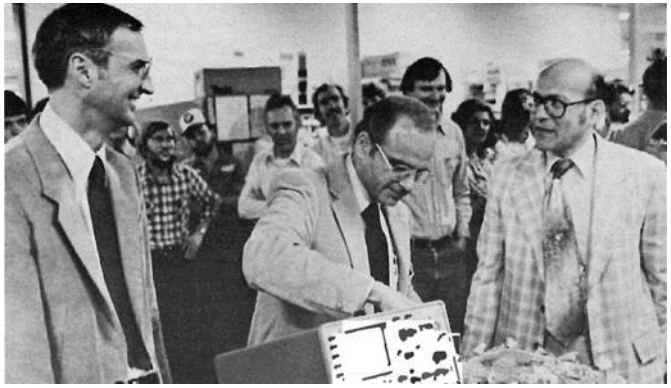
Before digital storage allowed for capture of screen content, photographic film was the most widely-used means for taking oscilloscope screenshots to document measurements. Tek started producing instrument cameras in 1959 in response to customer requests. Maury Merrick was the architect for many of Tek’s scope cameras and he led the camera design group for many years. Most cameras employed instant Polaroid film, but conventional film was also available. There were 14 different camera models offered In the 1973 catalog.

Spectrum Analyzers

The Pentrix booth at the 1964 IEEE Show



The 1L20 SA Plug-in



Arnie Frisch and Morris Engelson (center and at right) are part of the celebration of the retirement of the 491 spectrum analyzer in 1981. At left is Jack Doyle of FDI Manufacturing.

Spectrum analyzers (SA) measure the strength of a signal, often a wireless waveform, versus frequency. Spectrum analyzers are used for quality control of wireless signals, testing of electromagnetic interference, radiolocation and characterization of radar. Morris Engelson described SAs as “glorified radios, but considerably more expensive”, where instead of converting radio frequency signals to audio, the SA displays the waveform of the radio emission on a CRT screen.

In 1962 a Brooklyn, NY company called Pentrix designed a spectrum analyzer plug-in for the 530/540 series of Tektronix oscilloscopes, further confirming the utility of Howard Vollum’s plug-in concept. The photo at left shows a Pentrix booth at the 1964 IEEE show. In 1964 Tek acquired Pentrix and the three founders Arnie Frisch, Morris Engelson and Larry Weiss became Tek employees. New plug-ins, the 1L20 (shown at left), 1L30 and 1L5 were designed and marketed as Tek’s first SA products. In 1966 the Tektronix 491, the first portable spectrum analyzer, was introduced, and while it had limitations, it proved to be a solid product that was sold for 15 years. It was later replaced by the 492, 494 and 496 products offering specific frequency ranges up to 18GHz and a broad range of features.

The Frequency Domain Instruments (FDI) business unit was formed from the 491 development team and since the first Pentrix-derived products over 60 different models have been produced, leading up to the present day. For more discussion of the history of spectrum analyzers at Tek and Morris Engelson’s recollections on the origin of Pentrix, go to the vintageTek website.

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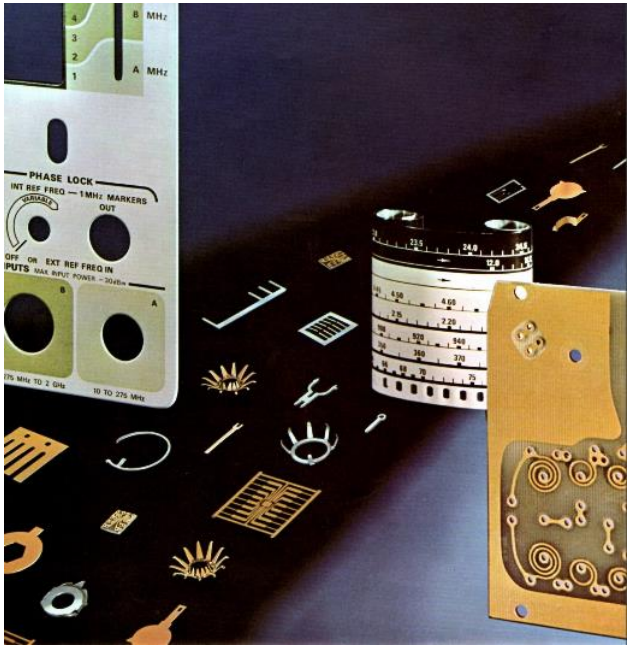
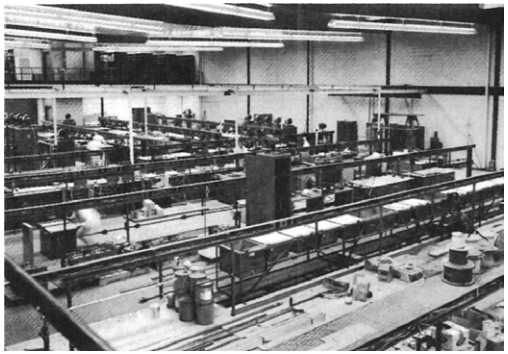
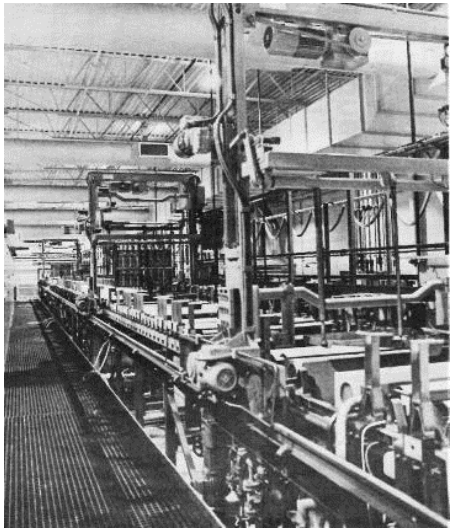
Electrochem



Electrochem products from the October 1969 Tektronix Calendar



Etching and anodizing lines in Building 38



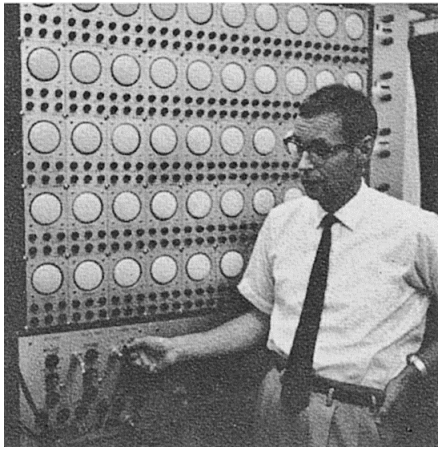
Electroplating line at the F1 facility in Forest Grove

Chemical processing of metal and plastic was started at Tek before 1950 when photoetching of scope front panels was undertaken. In the mid-1950s low-volume production of printed circuit boards was started. These processes and other similar activities were consolidated into the Electrochemical Group in 1960 and they moved into their home for two decades, Building 38, in 1963. The building was doubled in size in 1968.

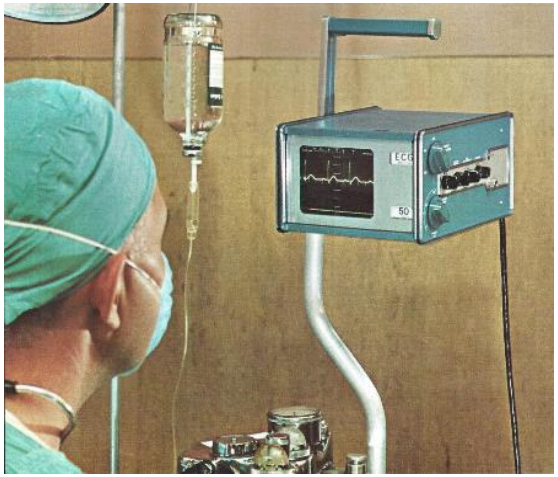
Electrochem, as it was later called, housed a broad range of processes that included electroplating, anodizing, photolithography, electroforming and etching. Perhaps their most well-known product was printed circuit boards, but electrochem components and processes were used by virtually every Tek product group. In particular, Electrochem's decorative, but durable, external finishes were a feature of Tektronix instruments throughout their tenure.

In 1983, the group moved to the new F1 building in Forest Grove. In 1984 it was spun out of Tek as the Merix Corporation. Merix is now part of TTM Technologies.

Medical Instruments

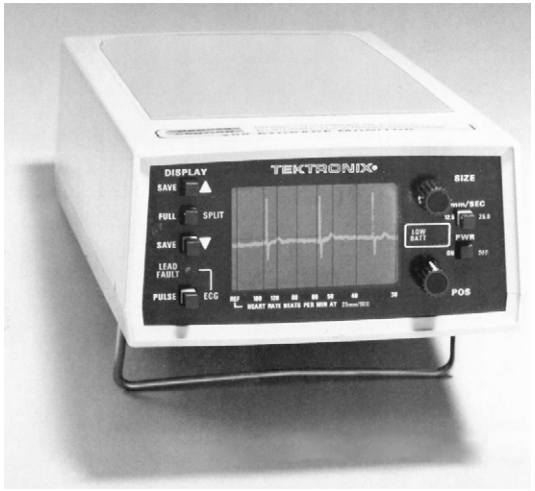


Experimental fifty channel oscilloscope



410 Medical Monitor

414 Patient Monitor



208 Heart Monitor

Tektronix management supported use of its instruments for medical research early in the company's history. Around 1952 a custom fifty-channel oscilloscope was developed for a Univ. of Oregon Medical School (now OHSU) researcher to study canine electrical brain impulses.

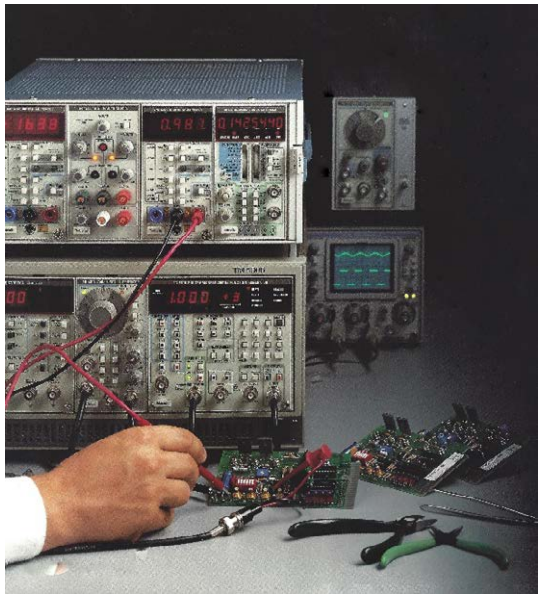
In 1967 Tektronix introduced the 410 Physiological Monitor for use in displaying electrocardiogram and electroencephalogram waveforms in clinical medicine.

In 1971 Howard Vollum spent time in the hospital after a heart attack and after examining existing instrumentation during that time, his view was strengthened that Tek's medical monitor business should be expanded.

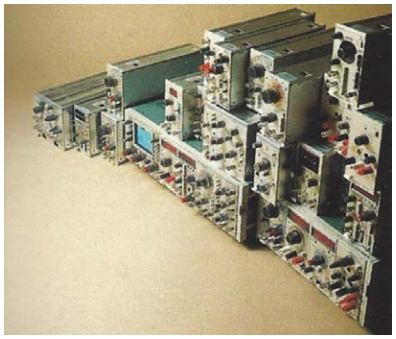
A portable patient monitor and a neonatal monitor were introduced in the mid-1970s. The portable monitor, called the 414, is shown at left with a paper strip recorder. In addition, a portable heart monitor employing a storage CRT, the 208, was also introduced. It is pictured at the lower right.

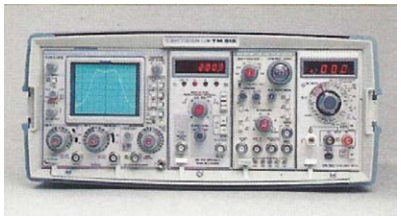
The medical business unit was located in the Merlo Road facility, about one mile west of the Beaverton campus. Interest in the medical market waned and the business was sold to Squibb Corporation in 1980.

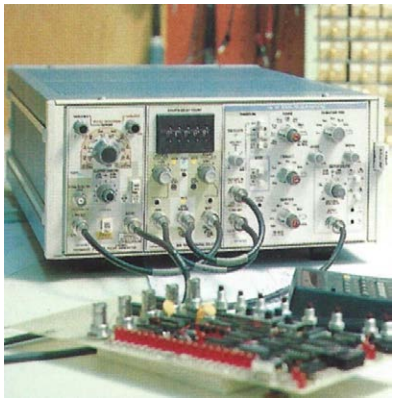
TM500/5000



TM5000







"A new dimension in plug-in instrumentation" was the way the new TM500 product line was described in the May 1972 issue of *Tekscope*. Configurable, compact, low-cost, modular and general-purpose were the descriptors used to describe the new test and measurement product.

Several mainframes were offered that had built-in power supplies and room for up to six plug-ins. Over one hundred plug-ins were offered, including digital multimeters, pulse and function generators, digital counters and timers, external power supplies, modules for oscilloscope calibration and even modular storage and conventional oscilloscopes, with bandwidth up to 80MHz.

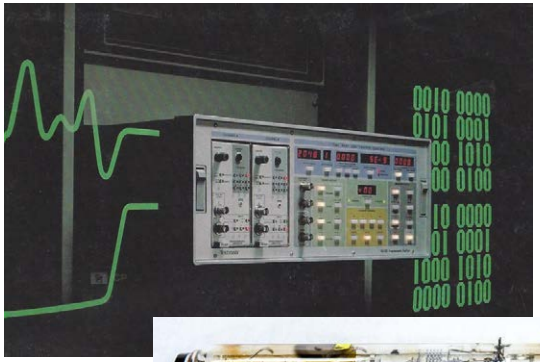
The mainframe chassis could be used on a benchtop, as a rack-mount and there was a portable, five-plug-in unit that could fit under an airline seat.

In 1981 the TM5000 line was introduced, replacing the TM500 and offering computer control of each module using the General Purpose Interface Bus (GPIB).

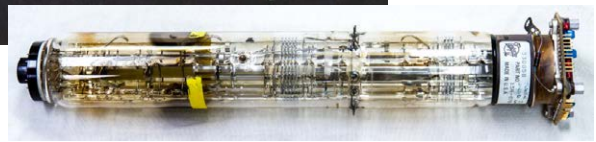
Need For More Speed

7104

7912AD &
T7912 CRT



7612D &
T7610 CRT



With the introduction of the 1GHz 7104 oscilloscope in 1979 Tektronix doubled the bandwidth ceiling previously owned by another Tek scope, the 500MHz 7904. This performance was largely made possible by a microchannel plate CRT that increased trace brightness by almost a factor of one thousand. The 7104 remains that fastest analog scope ever sold.

One of the most challenging tasks in oscillography is to capture fast, single shot waveforms. Introduced in 1973, the Tektronix R7912 was able to record repeated signals on the order of half a nanosecond (one billionth of a second) in duration. For reference, it takes light about one nanosecond to travel one foot. This achievement was made possible by another Tek CRT innovation, a unique tube where the electron beam scanned a diode array target instead of a phosphor screen. Another electron gun scanned the backside of the target for readout of the recorded data on a separate monitor. The CRT is shown at left. The R7912 was widely used in weapons research, laser studies, fusion investigations and studies of sub-microsecond fluorescence in biological systems. It was offered in Tek catalogs through 1989 in three different versions.

The 7612D Programmable Digitizer operated with 8-bit resolution at 200 million samples per second, the fastest analog to digital converting product available when introduced in 1980. It had a unique pre-trigger capability, allowing the user to view the signal preceding the trigger. Again, the heart of the instrument was a unique Tek-designed CRT. Similar to the R7912, it was a so-called electron-beam scanned semiconductor tube. Tektronix was the only company to offer catalog products based on this technology.

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Tektronix Products in 1979

This photo from a 1979 brochure shows a cross section of that year's Tektronix product offerings.

7912HB in MP1101 Programmable Digitizer

4010-1 Computer Terminal

5111 Storage Scope

4016-1 Computer Terminal

GMA125 OEM Graphics Monitor

4052 Graphics Computer

8002A Micro-processor Lab

414 Patient Monitor

528 Waveform Monitor

650HR TV Monitor

4907 File Manager

634 Video Monitor

4054 Graphics Computer

7104 Scope

4663 Digital Plotter

7603 Scope with C53 camera

520A Vectorscope

1450 Demodulator

NTSC Generator

GMA102A OEM Graphics Monitor

T932A Scope

4027 Color Graphics Terminal

833 Data Communi-cations Tester

577 Curve Tracer

7603 Scope

TM515 Traveler Mainframe

465B Scope

4024 Computer Terminal

576 Curve Tracer

1502 TDR Cable Tester

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Color Displays Come to Tek

4027

4113

4105 – a Unicorn Monitor

4115B

As remarkable as Tek's Direct View Storage Tubes were, these CRTs could not render a full color image. Historically, the only CRT able to display full color was the shadow mask tube, mass produced for color TVs in the second half of the 20th century. However, the resolution of color TV tubes was too low for computer graphics use and in addition, prohibitively expensive video memory was required for computer graphics applications.

By late 1970s both of these shortcomings were gradually being remedied, largely by Tek competitors, and the natural attraction to a full color image caused Tek monochrome monitors to look dated.

Tek offered its first color monitor, the 4027, in 1978. It had a 11-inch screen with modest 640x350 resolution, but it was a product beachhead for color graphics at Tek. The Information Display Division had considerable experience in the design of computer monitors and development of graphics software. They also had a huge installed customer base. However, Tek's proprietary CRT edge was lost since a commercially-available, full-color tube had to be utilized. As part of the color graphics initiative, Dr. Jerry Murch was hired to provide direction on the effective use of color in computer graphics.

While the screen resolution of the 19-inch 4113 monitor was limited to 640x480, it had the ability to manipulate an image of 4096x4096 addressable points, the same as Tek's DVST monitors. With the introduction of the 4115B in mid-1983, the Stars Wars-themed proclamation that the "Graphics Empire Strikes Back" in *TekWeek* added to the momentum. The 4115B offered 1920x1280 screen resolution, industry-leading fast graphics and proprietary CRT technology. Tek was back in the lead of computer graphics.

The introduction of the Unicorn line of low-cost color terminals in 1983 further strengthened Tek's leading role in computer graphics.

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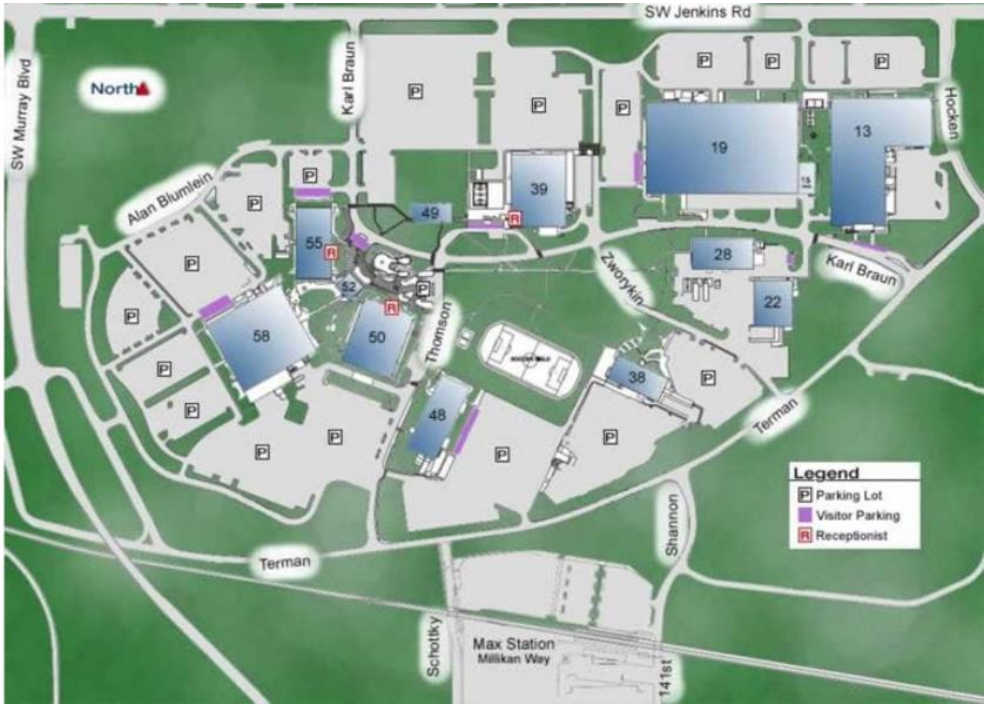
Beaverton Campus Street Names



Did you ever wonder how the streets on the Tek Campus got their names? Howard Vollum led the effort, choosing scientists and engineers he admired:

Karl Braun Dr: It's fitting that one of the major streets on the Tek campus is named for the German physicist credited with inventing the cathode ray oscilloscope in 1897. Along with Marconi, Braun received the 1909 Nobel Prize for their work in radio technology.

Zworykin Ave: Vladimir Zworykin was a Russian immigrant who pioneered the development of television at RCA. Initial designs for the TV camera and picture tube were based on concepts he developed. Zworykin also contributed to advances in computers and the electron microscope.

Thomson Trail: British physicist J.J. Thomson was awarded the Nobel in 1906 for his discovery of the electron.

Alan Blumlein Rd: A brilliant British circuit designer, he was awarded 138 patents before he died at age 38 in World War Two. Tek licensed some of his designs in the early days.

Bardeen Rd – John Bardeen was an American physicist, co-recipient of the 1956 Nobel Prize for the invention of the transistor. He later received another Nobel for a theory of superconductivity. Bardeen Rd is located west of Bldg 58.

Knowlton Rd - The street now called Hocken Rd east of Bldg 13 was initially named for a Reed College professor who was a favorite of Howard Vollum's. Dr. A.A. Knowlton taught physics and was well known for his mentorship of students.

Schottky Terr: Walter Schottky was a German physicist who made significant advances in vacuum tube technology and later was influential in semiconductor physics.

Shannon Rd: Claude Elwood Shannon was a pioneering researcher in information theory and Boolean algebra, both important in the development of computer technology.

Terman Rd: Frederick Terman, a Stanford University electrical engineering professor, authored several early influential texts on radio theory and electronics. Terman is credited as being the father of the Silicon Valley for his mentorship of the founders of Hewlett Packard, Litton, Varian and other early SV companies.

Millikan Way: Robert Millikan won the 1923 Nobel Prize in physics by quantifying the charge of an electron and discovery of the photoelectric effect. The road runs east-west south of the MAX Station.

Hocken Rd was named by the city of Beaverton for a former mayor. Jenkins Rd is named for prominent early Beaverton property owners. Murray Rd, formerly 145th, was named for a Beaverton pioneer, Owen Murray.

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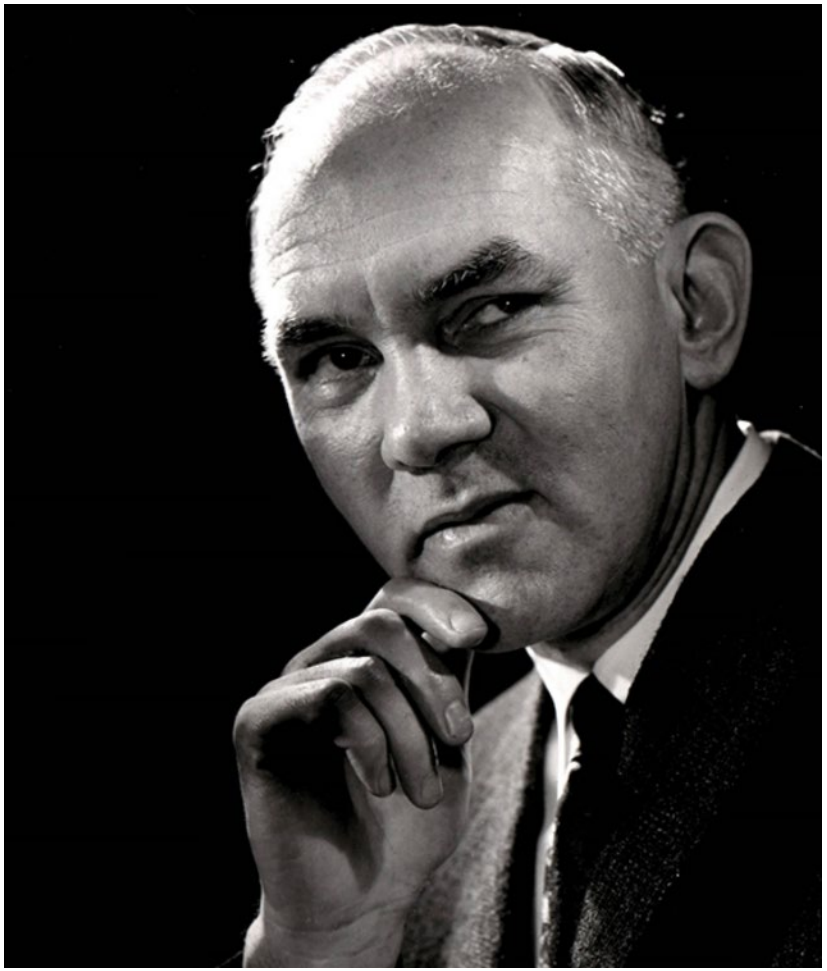
Howard Vollum 1913 – 1986

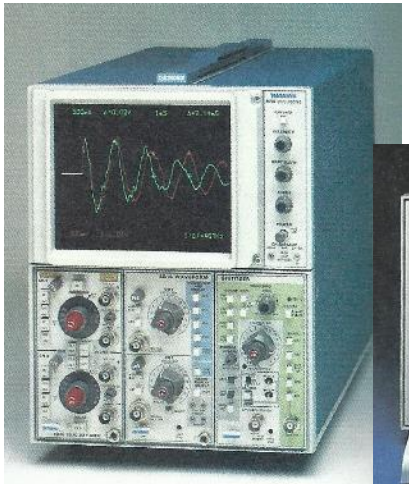


The man who planted Silicon Forest

A dedication ceremony for the Howard Vollum Memorial Garden was held on August 14, 1987 in front of the Technical Center. Area Rep employee, Julie Stark, shared a story at the ceremony, quoting Frank Hood, Tek engineer and company photographer and videographer:

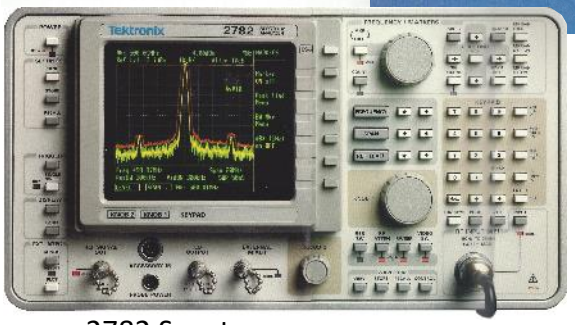
> "In the 1950's Tektronix was hiring people at an astonishing rate. One day a man with a slightly rumpled suit, sans necktie, came into the personnel office. He looked around, then proceeded to walk down the hallway. A woman stopped him and explained that everyone was busy, but if he would take a seat, she would give him a job application. The man obliged, writing, 'Name: Howard Vollum, Position Desired: assembly worker, or engineer.' "

Color Displays Come to Tek



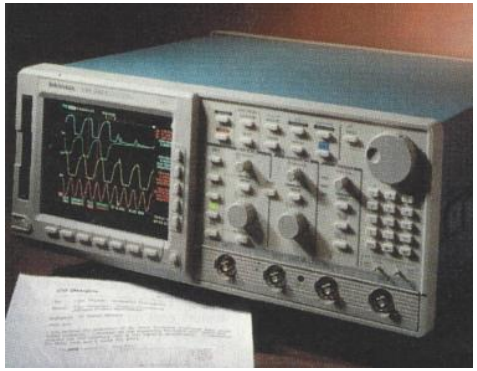
5116 Oscilloscope

DAS9100 Logic Analyzer



2782 Spectrum Analyzer

T8660 Avionics Color CRT



TDS684 Oscilloscope

Starting in the late 1970s several different approaches for producing a color display were pursued at Tek. One of the most intriguing fulfilled the long-held goal of creating a color display from a simple monochrome CRT. By placing a fast-switching liquid crystal cell and color polarizers in front of a white-emitting CRT, a multiple-color emitting display could be created. For example, if red and green polarizers were used, red, green and yellow (the combination of red and green) images could be created when the cell switched more rapidly than the eye could perceive the individual primary colors. A full color design was also developed.

The system was called the Liquid Crystal Color Shutter (LCCS) and was eventually referred to as NuColor™ when marketed outside of Tek. There were constraints to the technology that prevented use in large-screen color applications, but a limited-color LCCS display was first introduced in the Type 5116 oscilloscope in 1984 and later in the 2782 spectrum analyzer and DAS9100 logic analyzer. A full color version was employed in the TDS600 line of oscilloscopes for several years in the 1990s before color flat panel displays were available.

Another development group produced a 5 and 6-inch square, high resolution, high brightness version of the shadow mask CRTs used in televisions and color monitors. These were marketed for use in military aircraft in the 1980s and 1990s. The Avionics Display Group, as it was called, was sold to Planar Systems in 1994.

Color Hardcopy

Ink preparation for the Tek 4692 Color Printer

4692 Color Printer

Phaser 320 Color Printer

Phaser™ printer shape-keyed solid ink

Ink Chemist is not a job description you would expect to find at an electronics company. This observation was made to accompany the photo at the upper left in discussing Tek's first color printer product in the 1984 Annual Report. Not satisfied with what was available off-the-shelf, a group was assembled in Tek Labs who formulated an improved ink set for Tek's 4692, shown at left. It was one of the first full color ink jet printers sold commercially. The 4692 and other hardcopy offerings provided color prints to support new Tektronix color monitors.

Even today, for the highest contrast and richest color, most ink jet printers need specially coated paper to avoid ink wicking into paper and thus compromising color saturation.

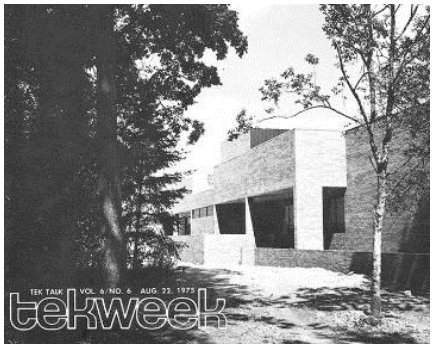
To address this issue, Tektronix found a clever solution. Tek engineers retained the speed and flexibility of ink jet printing, but created a solid wax-based ink that was melted in the print head and jetted to the paper as a liquid. The ink solidified on the surface of the paper before it could be absorbed, retaining the full color richness. Excellent color saturation and contrast was achieved on virtually any media – from two mil rice paper to vellum.

The Phaser™ line of printers got its name from the phase-change the ink underwent from solid to liquid and back to solid during printing. Unlike earlier Tektronix color hardcopy systems, the Phaser printer line was designed and built entirely at Tek.

The Tektronix Phaser 340 was offered as a successful networked office color printer solution in 1995. A sample of a shape-keyed ink block is shown in the adjacent photo. The unique shape for each color prevented mixing. In 1995 two Tektronix chemists, Wayne Jaeger and Don Titterington, were awarded the prestigious Howard Vollum Award for technical achievement for their work in developing the Phaser printer ink.

In 1999 Tek sold the printer business to Xerox Corp.

Other Oregon & Washington Sites



Wilsonville

Clark County WA

Walker Rd

Union Avenue

Tektronix had several properties in addition to the Sunset plant and Beaverton campus:

Wilsonville OR: On the east side of Interstate 5, the Wilsonville facility opened in September 1975. It was home to the Information Display Group, eventually comprising three office buildings and a warehouse on 265 acres.

Clark County WA: Opened in 1981 on a 270 acre site north of HW 14, the Clark County facility housed the Instruments Division. The atrium photo at left was used in the 1982 annual report.

Walker Road: Located at the corner of Walker Rd and SW 185th, the final acquisition deal involved an exchange for the Sunset Plant. It was a 38 acre site with three buildings, housing the Design Automation Group (moving there in 1977), Semiconductor Test Systems and Logic Analyzers.

Merlo Road: Portable Patient Monitors Division was located at Merlo Road in a leased building from the mid-1970s to 1980 when the business unit was sold to Squibb.

Redmond OR: Opened in 1982 in a one-time aircraft hangar near the Redmond airport, it was home for Communications Network Analyzers, employing as many 140 people.

Union Ave: Celebrated as Tek's return to Portland during its opening in 1980, the facility, located at NE Killingsworth and Union, manufactured 200 and 300 series scopes and employed as many as 50 people.

Property was also purchased in Lebanon OR and in Fairview, near Gresham in the early 1980s, but was never used.

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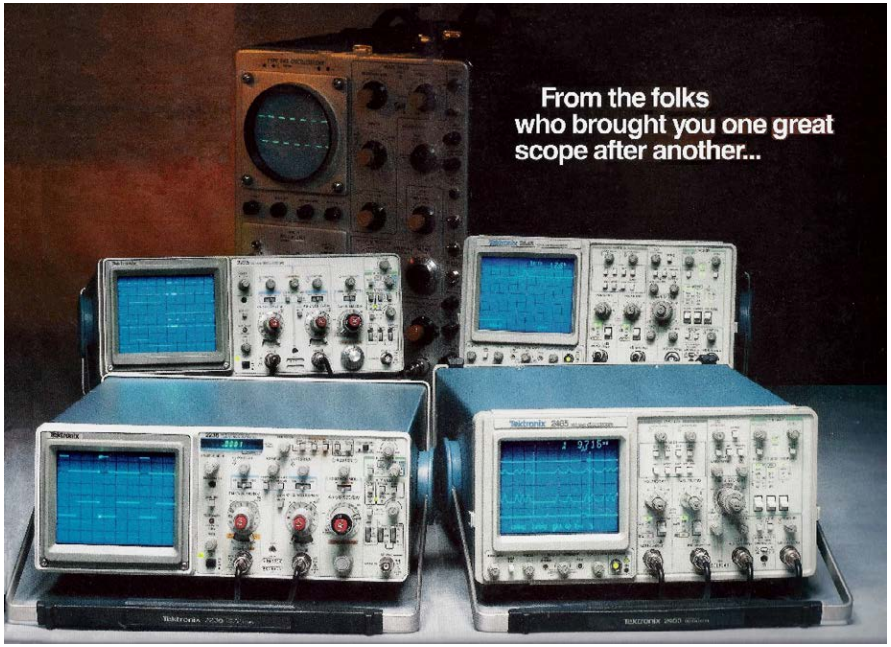
Portable Scopes



The upper photo is from a 1983 ad introducing the 2235, 2236, 2445 and 2465 portable oscilloscopes. The 2200 series of scopes was introduced in 1982, designed to counter the substantial low-cost Japanese scope competition. The 2200 scopes were light weight, rugged and competitively priced. A 60MHz model, the 2213, was sold for $1,100.

The 2445 and 2465 portable scopes, initially were offered with bandwidths of 150 and 300MHz, respectively. They were later upgraded in the 2445B to 200MHz and in the 2465B to 400MHz. The 2400 series was microprocessor driven and firmware controlled, similar in appearance to the 2200 series, but decidedly more advanced. The unique CRT employed in the 2400 series enabled this high level of performance. The CRT was shorter in length due to a special quadrupole gun design, maintaining a more compact scope package. There also was a 2430 series of digital storage scopes with sampling up to 500MSamples/sec.

The 2467 CRT incorporated an electron-multiplying microchannel plate CRT similar to the 7104, so the CRT offered a bright trace sufficient to make low level transient signals visible in room light. Called the Bright Eye™, it was introduced in 1987 with 350MHz bandwidth and was later upgraded as the 2467B to 400MHz.

With a total of 33 models and a 14 year run, the 2000 series portable scopes were one of the company's most enduring product lines. In particular, the 2445, 2465 and 2467 represented the ultimate in portable analog oscilloscope performance for their time.

Tektronix Spinouts

One of the first Tek spinouts was Rodgers Organ Company in 1958, created by Rogers Jenkins and Fred Tinker. Howard Vollum, an organ enthusiast, was a supporter of the company's formation. The company currently still manufactures organs in Hillsboro. It is now part of Roland Corp.

Norman Winningstad, Tek engineer and executive, founded the Floating Point computer company in 1970. It grew from $42M to $127M in sales in three years in the 1980s. By 1985 the company had 1,600 employees. With the rise of microprocessors the company faded and was liquidated in 1991.

Mentor Graphics was formed in 1981 by Tom Bruggerre as an electronic design automation company. Their products include simulation tools for mixed-signal design, manipulation of network data and heat transfer and fluid dynamics modeling. At the time of its acquisition by Siemens in 2017, the company had almost 6,000 employees and revenue of $1.3B.

Planar Systems spun out of Tektronix in 1983 under the leadership of Jim Hurd and Chris King. The company became the leading provider of electroluminescent flat panel displays and later evolved into a diverse display systems company. Planar was acquired by the Chinese company, Leyard Optoelectronic in 2015.

TriQuint Semiconductor spun out of Tek Labs in 1985 with Tek support to pursue gallium arsenide semiconductors, a high-speed alternative to silicon. The company posted $879M in revenue in 2010 with about 25% coming from business with Apple Computer. After a merger in 2015 the company is now called Qorvo.

Tek's circuit board operation spun out as the Merix Corporation in 1994, employing 700 people. In 2006 the company had revenue of $309M. There was a merger in 2009 and Merix is now part of TTM Technologies.

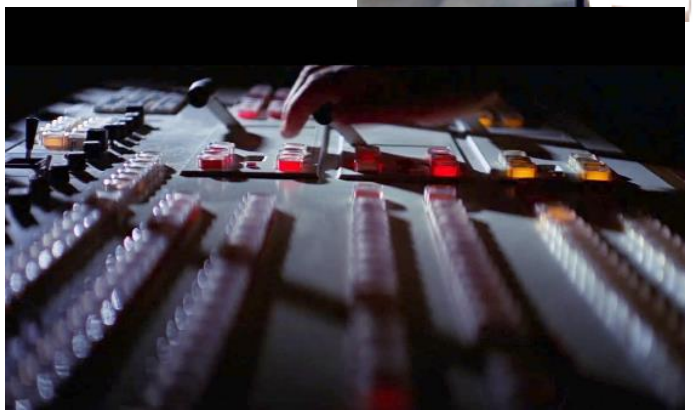
Office furniture company Anthro spun out of Tektronix in 1988 and reached $38M in sales before being acquired by Notek in 2015. It is now part their subsidiary, Ergotron.

A part of the Tek Ceramics Group spun out as VisPro in 1994 and was acquired by Kyocera Corporation.

Tek in the Movies and on Television

Hidden Figures (2016)
Type 545B scope

Young Sheldon (2021)
Type 502 scope



Alderaan destruction by the Death Star in *Star Wars: Episode IV - A New Hope* (1977)

Movie directors often use oscilloscopes to give the impression something related to science or high tech is occurring in a movie or television scene. Tektronix instruments have been widely used in Hollywood productions since the founding of the company.

In the movie *Hidden Figures* from 2016, a Type 454B oscilloscope with a G plug-in was a prop in a NASA computer lab. That model is appropriate for the time (1960s) and setting of the movie.

The fourth episode of the 2021 season for *Young Sheldon*, a CBS television sitcom, employed a Type 502 oscilloscope and a 500 series Scope-Mobile cart in a laboratory scene.

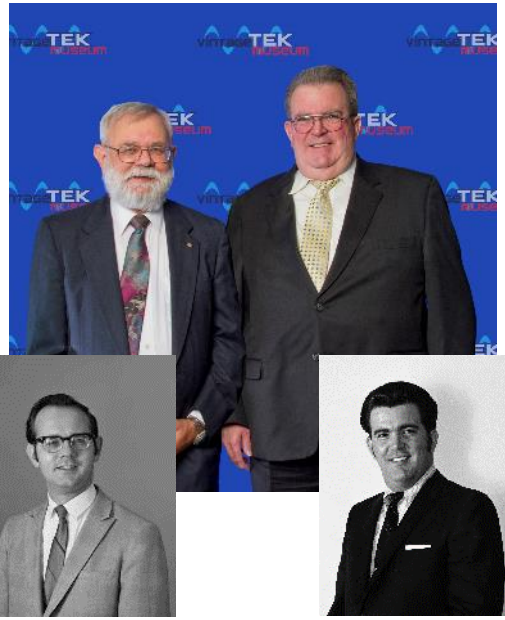
In a galaxy far, far away… in the first Star Wars movie (1977), Darth Vader orders the planet Alderaan destroyed by the Death Star. The perfect prop for the firing control turned out to be the handle from Tektronix' Grass Valley Group's Model 1600 Video Switcher. It would not be surprising if you don't recall the scene; it's only onscreen for about two seconds. The Museum has one of these switchers on display.

Go to the Museum's website for many more examples, including the *Battlestar Galactica* television show from 1978, *Columbo*, *Midsomer Mysteries*, *Ghostbusters* and more.

https://vintagetek.org/tektronix-in-movies-shows/

vintageTEK museum

vintageTEK Museum



Stan Griffiths and Ed Sinclair
vintageTEK co-founders

What do the Thomas Edison National Historical Park, the Hewlett-Packard garage, Signal Hill, the Computer History Museum and the Alexander Graham Bell laboratory have in common with vintageTEK? They are all sites listed along with vintageTEK on the *10 sites of electrical history to visit on your next road trip*, an article written by Brian Santo, contributing writer for *Electronic Products*.

vintageTEK is a 501 (C)(3) organization founded by Stan Griffiths and Ed Sinclair, former Tek field engineers, on September 10, 2010. The museum and website is dedicated to displaying functioning Tektronix products which enabled generations of scientists, engineers and technicians in creating the future and to the memory of those Tektronix employees that created this legacy. Our mission is to encourage the next generation of students to pursue careers in the fields of engineering, science, and technology by sharing this knowledge and history and supporting STEM programs in our community.

The museum is found online at vintagetek.org/ and on the Tek Campus in Building 13 at 13489 SW Karl Braun Drive. Check the website for current open hours. Phone: 503 644-0161.

vintageTEK museum