

The EIMAC Story

by William I. Orr, W6SAI

"We must have been crazy", say Bill Eitel and Jack McCullough, speaking of the chances they took back in 1934 when they began producing vacuum tubes. Neither one was an electrical engineer, and neither had much in the way of capital. However, the company they founded (Eitel-McCullough, Inc.) of San Bruno, California, has grown to become one of the world's largest and best known producers of electron power transmitting tubes. Now a division of Varian Associates and located in San Carlos, California, EIMAC produces the 3-500Z and other famous tubes well known to radio amateurs and commercial users.

In the early 30's vacuum tubes had an unpredictable life, were very ex-

pensive and extremely fragile. Worst of all, they had poor performance in the new high- and ultra-high-frequencies then being opened. Bill and Jack (W6UF and W6CHE), radio hams who worked for a small electronics firm, had a great deal of experience in shortwave communication and they were convinced that sweeping improvements could be made in tube design. Short on cash, but long on sales ability, they sold quarter-interests in their proposed venture to two friends for \$1250 each, and also borrowed \$1250 from each friend. With the \$5000 capital, they incorporated in the summer of 1934 and went to work in a small store in San Bruno.

Five weeks later they exhibited five

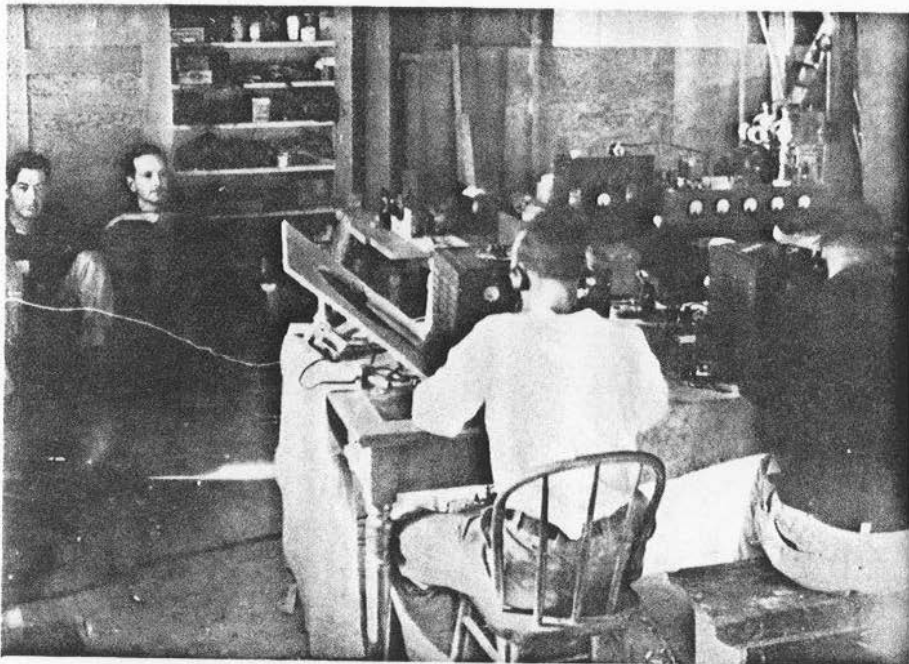


Figure 2. - A rare photo of the Eimac hams on Field Day (about 1937). (Left to right): Bill Eitel, W6UF; Tom Hall, W6SC; Gordon Howes, W6CEO. Operator at right is unidentified. Two Breting 12 receivers were used and "portable" transmitter ended up with two 300T's in push-pull--running white-hot!

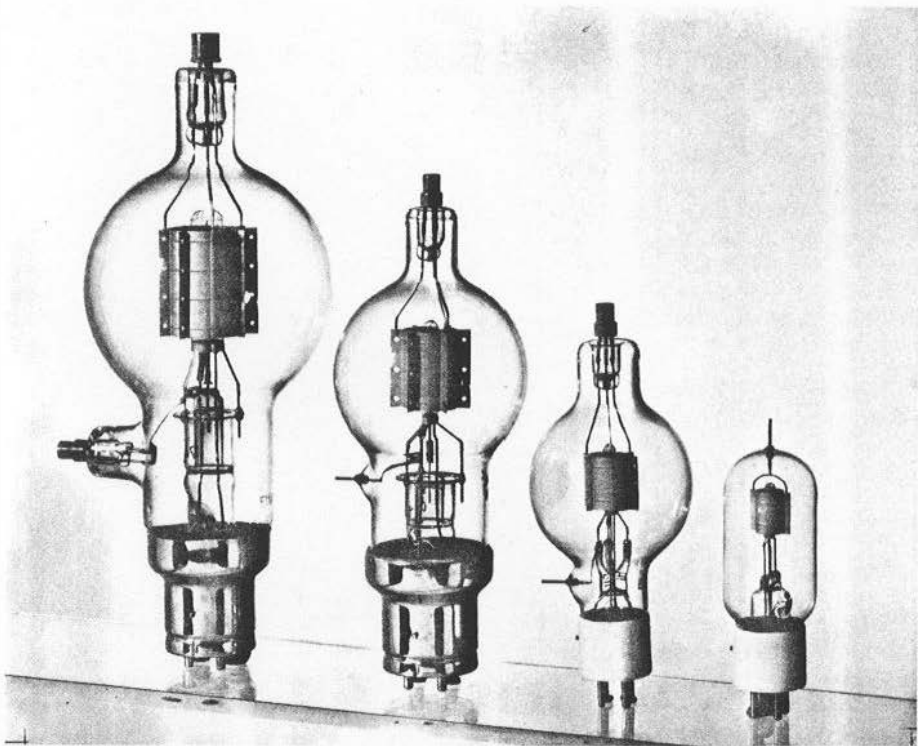


Figure 1. - The tubes that revolutionized radio communication. At left is the 300T, next the 150T, followed by the 50T and the 35T (right). The 35T nearly ruined the new company, as the manufacture and processing of the very small grid structure was nearly a state-of-the-art technique in those early days. Orders for the 35T piled up as Bill and Jack struggled with the problem. Meanwhile, Taylor was filling the available sockets with the TZ-40 and the T-55! The new Eimac tube designs, however, proved their worth in World War II radar equipment.

of their radically new tubes at the ARRL Convention in Fresno. Each of the tubes was a "dud", having a cracked filament stem, but Bill and Jack gambled that the defects would go unnoticed by the admiring hams at the convention, and they won. Then they ran an ad (written by Bud Bane, W6WB) in the November, 1934 issue of QST, offering the EIMAC 150T triode for sale at \$24.50. Orders came in at the rate of three to five tubes a week and they went into production, with Bill blowing glass and Jack working the vacuum pump. The problem of cracked stems was solved, more tubes were sold and the first, new EIMAC employee was hired on December 1, 1934. By 1936, sales

were high enough to support a dozen employees, the original \$1250 loans had been paid back and a new plant built in San Bruno. Eitel-McCullough, Inc. was a going business.

Of course, many of the original employees were hams. Two of the first amateurs who went to work for Bill and Jack were Tom Hall (W6SC) and Gordon Howes (W6CEO).

Between 1935 and 1939 the little company grew rapidly. The 50T and the 35T were added to the line, as well as the 300T. The original tubes were upgraded in 1936 to the 100TH, 250TH and 450TH. The giant 750T, 1000T and

2000T were created. In July of 1940, Eitel-McCullough received an order for 10,000 tubes from the Western Electric Co., and--to put it mildly--all hell broke loose. Converting from hand methods to mass production kept everyone working day and night, sent the hiring rate skyrocketing, tossed out all routines and techniques and created an incredible situation! Somehow, the firm gradually found itself on a production basis and by July, 1941, Eitel-McCullough started hiring women for production work--a radical step in those days.

Also, during 1941 one of the investors sold his quarter interest back to the company for \$57,000. The other held on until 1945 and then sold his interest back for about \$223,000.

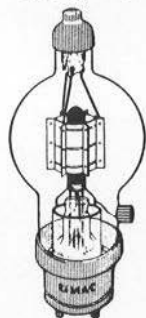
World War II brought about an additional expansion of the company, including a new plant at Salt Lake City,

Utah under the direct charge of W6UF. Tube production increased to a record level of 12,000 a month in 1943. Included in this record output were the famous 304TL, VT-158 and VT-127A, three of the earliest radar pulse and r-f tubes. Peak production of tubes reached better than 100,000 per month during the closing months of the war.

Luckily, Eitel-McCullough was not ruined at the end of the war by its best customer (the government) dumping vast quantities of surplus vacuum tubes on the market at a few cents on the dollar. The new 4-125A, 4-250A and 4-400A tetrodes developed by Eitel-McCullough rapidly obsoleted the glut of World War II surplus tubes and by 1948, Eitel-McCullough had readjusted itself to the post-war electronics era. The Salt Lake City plant had been closed in 1945, but by 1949 Eimac returned to Salt Lake and the reopened plant produced thousands of black and white TV picture tubes. Then, in 1950, because

EIMAC The Tube You Asked For 150-T Is Here At Last!

IN EVERY IMPORTANT FEATURE— UNSURPASSED



HERE is a tube, new and original in design. It fulfills the most severe requirements of amateur practice. High output is obtained with low grid driving power and low plate voltages. Exceptionally high vacuum increases usable filament emission and prolongs tube life. Tantalum grid and plate construction permits maintenance of high vacuum even when overloaded. Extremely low inter-electrode capacities make for high efficiency at high frequencies. Isolated grid and plate leads, in con-

junction with elimination of internal insulators, insure freedom from arc-over or breakdown. Low voltage double-V filament reduces hum, increases filament ruggedness and life and increases mutual conductance. The large NONEX envelope, free from discoloration, allows maximum heat radiation without bulky physical dimensions. Improved 50-watt base insures rigidity and freedom from short-circuiting. "Ghost" grid structure minimizes electronic shadowing effects on the plate.

Characteristics:

EIMAC-150-T Triode

Fil. Voltage 5 V.; Fil. Current 10 A.;
Rated Plate Dissipation 150 W.; Amp.
Factor 13; Max. Plate Current 200 MA.
Plate Voltage 1000 2000 3000
Plate Resistance 2750 1900 1250
Mutual Conductance 5800 7300 1200
Normal Power Output
(75% eff.) 150W, 300W, 450W.
PRICE \$24.50. Sold Only by Reputable
Dealers.

More POWER per dollar! Fewer dollars per hour of useful life! The result of six years' experience exclusively building transmitting tubes for ship, mobile, portable and amateur use. Unconditionally guaranteed to be gas-free, and against mechanical defects for two years.

"COMPARE AND REFLECT"

EITEL-McCULLOUGH, INC.
San Bruno, California, U. S. A.

Figure 3. - First Eitel-McCullough advertisement in November, 1934 issue of QST. Feature article in this issue was new equipment for the 224 megacycle ham band. RCA, on rear cover, extolled the virtues of the 852 and the 210. National advertisement featured the HRO receiver. (Where are the snows of yesteryears?)

of the Korean war, the production of picture tubes was halted, and the plant was converted over to making power tubes. During the "fifties", moreover, the company expanded into the microwave region, adding high power klystrons, travelling wave tubes, planar triodes and other exotic items to the standard product line. The giant microwave klystron, the X-626, developed a peak pulse power output of 10 megawatts with a pulse length of 10 microseconds.

The decade of the "sixties" brought the development of the famous line of zerobias triodes, including the 3-400Z, 3-500Z and 3-1000Z. In 1965, Varian Associates of Palo Alto, California, bought controlling interest in Eitel-McCullough, Inc. and the company became the EIMAC division of Varian. Still active in the direction of both EIMAC and Varian (and still both active on the ham bands) W6UF and W6CHE often think that sometimes it pays to be crazy.

(You'll find W6UF operating now from his extensive farm in Nevada as WA7LRU on high speed 80 meter c-w. W6CHE is often found in DX pileups on 20, 15 and 10 meters with his 4 element Quad).

ANOTHER TRICK TO REPAIR A.F.T.

Using an ohmmeter, place a fine needle on one terminal and the other on the outside connection of the open winding. Probe windings with needle until you get the highest reading. Note the location, tin a sharp piece of strong fine wire and drive it into the hole. Fold back outside lead and fasten secure to A.F.T. frame and run to open terminal --- and you're in business again.... (W2HDR)

SILENT KEYS

BLAN "The "Radio Man", New York City
A long time dealer in old "Radio Row"

A.W. MUSGRAVE (W0ZGB) Emporia, Kansas

HAROLD BURHOP (W4ZL/SZL, ex-9RW)
Dafer, Michigan

ROB ROY (W8HR) Canton, Ohio

HERB WESCOTT (K2BBJ) Rochester, N.Y.

HAROLD GREENWOOD (W6MEA) Glendora, Cal.
Author of "Wireless and Radio"

REMARKABLE JOB

The 1971 YEARBOOK published by the Society of Wireless Pioneers can be summed up in one word "terrific!"

Bill Breniman puts all other editors to shame -- the time and material one man devoted to one publication is unbelievable until one sees the Society's 1971 Annual -- 120 pages chuck full of historical information, stories and pictures for the commercial radio operator.

Even the layman will find interesting bits of information. Did you know, for an example, the United Fruit Company's "Great White Fleet" had a very good reason for painting their vessels white? Shipping bananas from Central America required refrigeration and a white vessel lessen the temperature problem by 10 degrees!

A.W.A. BADGES

The large orange badges worn by members at radio meets are again available. The badge has a large plastic window and insert which the wearer writes his name and other identification. A masthead and old radio call letters surround the opening.

Send \$1 to:

Lincoln Cundall
69 Boulevard Parkway
Rochester, N.Y. 14612

FERROWATT ELECTRICAL MUSEUM

673 Great Western Highway
Faulconbridge, N.S.W.
2776
AUSTRALIA

A.W.A. members visiting Australia will find this museum of great interest. Hiding under the name "Ferrowatt" is our old friend Fin Stewart, well known tube and lamp collector/historian. In addition to a huge collection of tubes, Fin also has a fairly large display of early equipment. He has on several occasions swapped material with American collectors and contributed to the AWA Museum.