BART MOLINARI – ARCHIVIST'S COMMENT ON HENRY DICKOW'S BIOGRAPHY OF PHILO FARNSWORTH AS POSTED ON SOWP.ORG.

By Bart Lee, K6VK, CHRS Archivist and Fellow in History

Phil Farnsworth's Chief Engineer Bart Molinari won the national amateur radio association ARRL contest for the best amateur radio station in the country in 1924. The nearby *QST* article describes his San Francisco station, 6AWT. He would have been the perfect candidate for an electronics engineer for a new start-up in novel electronics in San Francisco circa 1925.

QST Photo

Molinari kept a now-lost large scrapbook of all the work on electronic television that Farnsworth – and he – did in San Francisco, according to Pem

Farnsworth in her biography of her husband and his inventions. (Farnsworth, Elma G. ["Pem"] DISTANT VISION: ROMANCE AND DISCOVERY OF AN INVISIBLE FRONTIER (1990)).

Henry Dickow, who founded the San Francisco Radio Club in 1909, in about 1970 wrote a biography of Philo T. Farnsworth, the San Francisco inventor of electronic television in the 1920s. He mentions Bart Molinari:

"Bartholomew Molinari - While Phil Farnsworth was devoting his efforts to the Philco Laboratory of Television in Philadelphia, the original San Francisco laboratory continued to operate under the direction of Bartholomew Molinari, one of San Francisco's earliest wireless pioneers and an ardent believer in Farnsworth's system. "Bart," as he is known to all in the radio fraternity, was the designer and builder of the portable equipment used throughout the nation for demonstrating the Farnsworth system. He journeyed with this apparatus from city to city, giving lectures and demonstrating wherever he went. He also is an internationally known radio amateur, with the call letters W6AWT, and the 1927 [sic: 1924] winner of the Hoover cup for the most outstanding amateur achievements of that year. His six years of service with Farnsworth brought him no remuneration in cash, for he agreed to accept stock in the company instead. Had he sold his holdings at the opportune time when the market was at its peak

level he could have profited substantially. But he was not to be so fortunate. He sold his entire holdings for a mere $16,000, bringing him a net salary return of only $2666 per year."

(http://www.sowp.org/wp-content/uploads/2019/03/LR-1303101901-Farnsworth-by-Dickow.pdf at pages 12-13).

San Francisco investor George Everson was a principal in the Farnsworth enterprise. He also wrote a biography of Farnsworth and the business aspects of his early television endeavors, in 1949. It was published as THE STORY OF TELEVISION --THE LIFE OF PHILO T. FARNSWORTH. He makes three laudatory mentions of Bart Molinari:

"For the benefit of [another investor] Mr. McCargar and me this one-tube radio set was duplicated in the San Francisco laboratories in a demonstration set up by Bart Molinari, the brilliant radio technician in charge of the San Francisco operations." (At page 139).

Everson goes on to praise Molinari's dedication to his work:

"Two engineers, Bart Molinari and George Sleeper, working independently in the San Francisco laboratories, were fortunately far enough away from this influence to have proper appreciation of the equipment developed up to that time. They were particularly enthusiastic about the dissector tube and had the patience

to do the monotonous engineering required to achieve the best possible performance. Working alone, they developed a television camera of beautiful and efficient design around the dissector tube. They got most of the bugs out of the auxiliary equipment and stabilized the circuits to insure dependable operation." (At page 208).

Everson goes on to assert that Molinari's work was instrumental in securing the financing Farnsworth needed:

"The Philadelphia plant was so engrossed in advance research work that there was an inclination to put little emphasis upon the demonstration there. However, Bart Molinari, who was carrying on as a lone wolf in our San Francisco laboratories … had a determination to set up a practical television unit to show what could be done with the Farnsworth equipment. As has been indicated previously, Molinari, whom we nicknamed Moli, is a very colorful figure, the son of a wholesale baker in San Francisco. He was in high school during the early days of radio and became one of the very first 'hams' to set up a short-wave radio transmission and receiving unit in his home. It was the cherished desire of his father that he finish high school and then go on to Stanford University to graduate in engineering. Young Molinari had other ideas. During his last year in high school he so frequently played hookey to work on his amateur radio equipment that he lost out on making his entrance requirements to Stanford. While he disappointed his father in this respect, he went on to win distinction and

international recognition by capturing the Hoover Cup offered by the then Secretary of Commerce for the best amateur transmitter for short-wave broadcasting. Moli came to us as a glass blower, but proved to be such a skilled and apt radio technician that we gave him almost as free a hand in development work as was accorded Farnsworth. The back of any radio chassis that Moli built was as precisely constructed as a piece of jewelry. As time went on, almost single-handedly he designed and built up a very practical television camera control and monitor panel. It was beautiful in its simplicity and dependability. At about the time that this was finished, matters had progressed to a point where it seemed to Mr. McCargar and me that with the help of Kuhn, Loeb & Company we might be able to work out a plan for the expansion of our activities into the manufacturing of radio and television equipment." (At pages 226ff).

As Henry Dickow mentions, Molinari frequently demonstrated Farnsworth's television system before World War Two. For example, in Dallas, Texas in 1940, as reported there:

"Friday October 4 [1940] $100,000 WORTH OF TELEVISION EQUIPMENT TO BE IN OPERATION AT STATE FAIR [in Dallas, Texas]. The first television unit to cross the nation from coast to coast will arrive in Dallas for the opening of the State Fair of Texas on Oct. 5. The Farnsworth Television and Radio Corporation of Fort Wayne, Indiana are sending to the State Fair of Texas over a hundred thousand dollars worth of the most modern type of electronic

television equipment, designed by Philo T. Farnsworth who is conceded the inventor of electronic television. Such organizations as American Telephone and Telegraph, Radio Corp., and Philco have taken out licenses under Farnsworth patents. A complete television studio will be installed in the Hall of Gold and transmissions will run continuously from 10:00 a.m. to 10:00 p.m. In addition to transmitting equipment, there will be receiving equipment. The Farnsworth installation at the State Fair is said to be more complete than the television shows at either one of the World Fairs. The visitors at the Fair will be invited to appear before the television camera and each one that is televised will receive a television test certificate. Professional talent will be used for the regular telecast. Director of the unit is R. B. Gamble. Other members of the staff are Bart Molinari, engineer in charge. Mr. Molinari was awarded the Hoover trophy in 1924 as the most outstanding radio engineer in the United States. John Staganero, who is considered the Dean of Television camera men, will operate the Farnsworth dissector camera, which alone is valued at $12,000. William Davies is the program director."
(https://arlingtonlibrary.org/sites/default/files/Documents/Newspapers/journal1940.pdf).

Appended hereto is a scan of most of the *QST* article of May 1925. The equipment and the antennas are amateur radio state-of-the-art for the day. *Radio Broadcast* magazine also ran a photo of Molinari and his station

in 1925 in connection with communications with the famous yacht *Bowdoin* stranded in the artic.

AMATEUR STATION 6AWT, SAN FRANCISCO

With the owner and operator, Bartholomew Molinari, at the key of his 250-watt tube set. Molinari has exchanged radio messages direct with WNP, the *Bowdoin*, which is now frozen in off Greenland on its slow way to the North Pole

A recent historical note attributes Molinari's success in the early 1920s to his willingness to go to shorter and shorter wavelengths, 20 meters and below, 14 MHz and above:

" … in February [1925], the first confirmed QSO between the US and Japan took place when 6AWT worked JA2 at the Imperial Naval Academy in

Nagasaki. Bartholomew Molinari, owner of 6AWT, was a baker who operated from his home on Union Street in San Francisco. By the end of the year, his station had been heard in multiple countries on all continents and he had worked all forty-eight states. Not due to any special equipment or antennas, his success rather stemmed directly from pushing to ever-shorter wavelengths, brought about in part by necessity. He had originally moved down to concentrate his operation on 80 meters because with fifty broadcast listeners within a six-block radius of his home, he could not use 200 meters lest he be deluged by interference complaints. He later received the 1924 Hoover Cup, following Don Wallace, 9ZT, the year before."

(Ham radio History - "DX Records and Shortwave Reflections" Posted on 2329z - 2 February 2014 http://w2pa.net/HRH/dx-records-and-shortwave-reflections/).

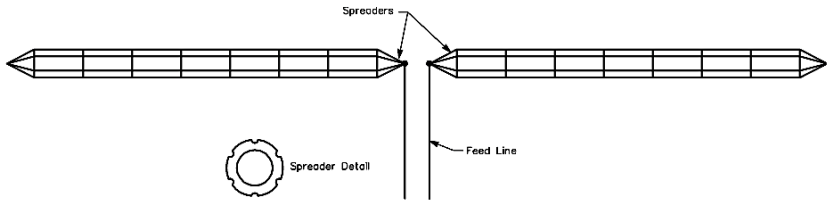
For amateurs far from the United States, including the Territory of the Philippines Islands, Molinari's 6AWT was DX indeed *circa* 1925:

"I pressed the headphones closer to my ears. *What a thrill*. Here were dots and dashes, extremely weak, but partially readable by straining the ears. At last I was able to make out the call letters of 6AWT, of San Francisco, California. Today, 7500 miles range and short-wave amateur communication between the Philippines and the United States is almost commonplace. But let us go back, for

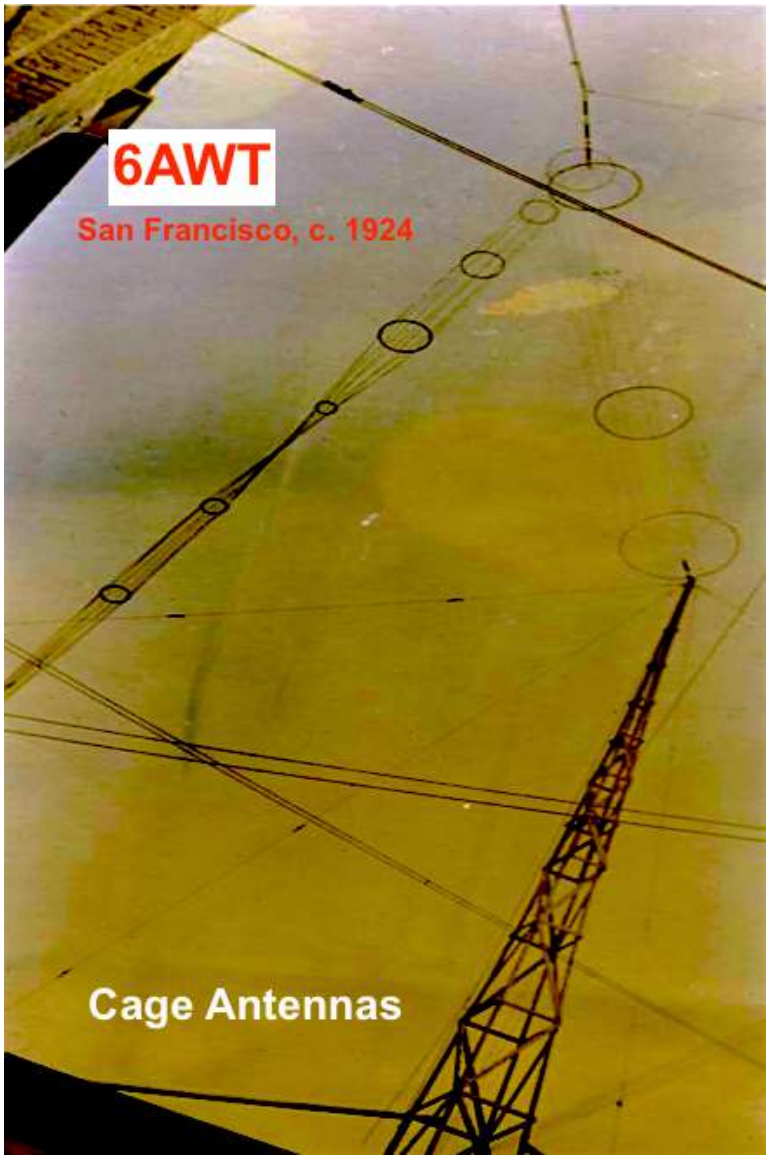
a moment, and get a picture of what it meant eight years ago…. [*i.e.*, 1925]" (Haydn [sic] P. Roberts, "Amateur Radio on the Short Waves," *Radio Ne*ws, Vol. XV, No. 4, October 1933 at page 201 (emphasis added)).

An image of the station 6AWT QSL card follows:

Molinari notes his cage antennas on his QSL card. He erected at least one tower to elevate them. Cage antennas at least broaden the resonance of the antenna, and were believed to provide otherwise superior performance. 6AWT's antennas do seem to have helped. A diagram follows:



(from http://new-ham-radio.blogspot.com/2010/07/what-is-cage-dipole-antenna-and-what.html).



The 1977 edition of THE RADIO HANDBOOK notes some of its history, placing Molinari in distinguished company.

"The 'West Coast Handbook,' as it was popularly called, was born in the years of the Great Depression and represented the combined efforts of a group of well-known and dedicated radio amateurs and engineers living in the San Francisco Bay Area of California. Established as the Pacific Radio Publishing Company, the group edited the magazine *Radio*, among whose early contributors were F.E. Terman (ex-6FT), now Provost of Stanford University; Don Wallace (W6AM) … Bart Molinari (W6AWT)."

(https://www.americanradiohistory.com/Archive-Handbooks/Radio-Handbook-20-1977.pdf).

Although he seems to have been on the road a great deal in the late 1930s, Molinari had at least one patent to his name, for an "anode modulated" cathode ray tube.

This is U.S. patent number 2,290,377, filed April1, 1940 and issued July 21, 1940, assigned to the Farnsworth company:

July 21, 1942. B. MOLINARI 2,290,377

ANODE MODULATED TUBE

Filed April 1, 1940

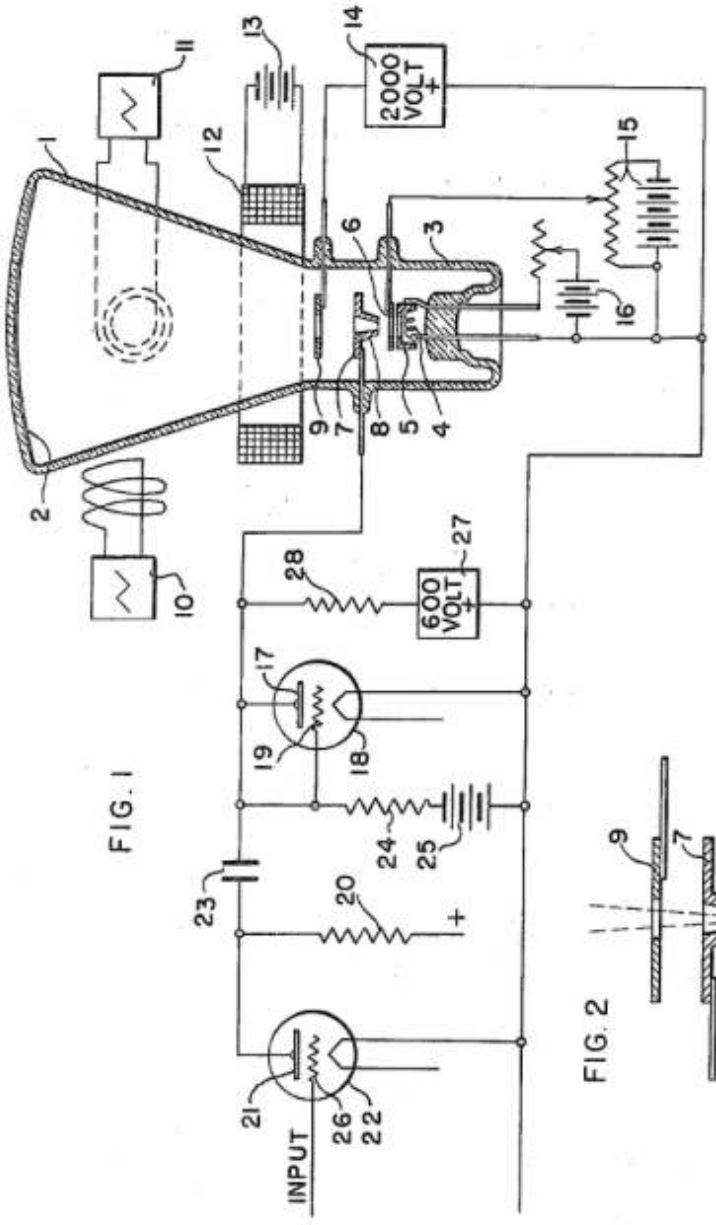


FIG. 1

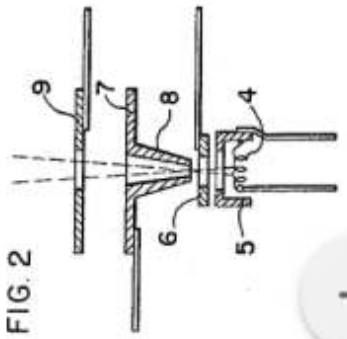


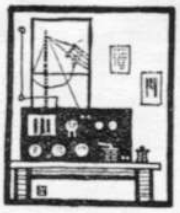
FIG. 2

The amateur radio callbooks show 6AWT as early as 1920-'23 at 653 Union Street in San Francisco (Department of Commerce list). This is the North beach and then-Italian neighborhood of San Francisco. The Spring 1938 Radio Amateur Callbook shows W6AWT, Bartholomew Molinari, at 2190 22nd Av., San Francisco.

A 1987 W6AWT FCC license renewal record also shows this address. (FCC Registered Amateur Radio Licenses in San Francisco, California ... www.city-data.com/aradio/lic-San-Francisco-California.html).

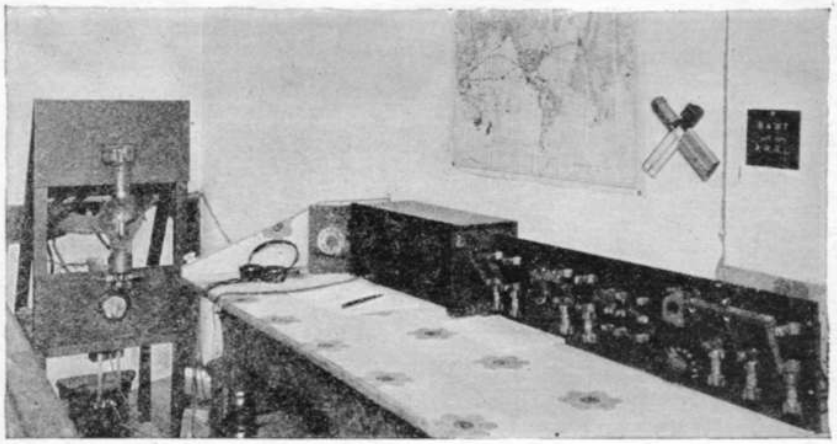
Public records show that a Bartholomew Molinari died in 1991.

The 1925 *QST* article follows:



Amateur Radio Stations

6AWT, Hoover Cup Winner 1924!



Bartholomew Molinari of San Francisco and 6AWT—he has made the call synonymous with the city—has achieved through his love for the game the distinction of be-

ing owner of the "Best All-around American Amateur Station." Don Wallace, 9ZT, winner of the 1923 cup, ran him a very close race.

6AWT was described in the January issue of *QST* but the transmitter, antenna system and receiver have been changed since then. It is a striking example of the progressiveness required in a successful amateur station.

The location of the station is apparently highly undesirable. Nevertheless, partly because Molinari has made the best of it and partly because appearances are deceiving, the station has been a consistent DXer. The first night the new antenna system was in use 6AWT's signals were reported from India and the Philippine Islands. All states of this country have been worked and Canada, Alaska, Hawaii, Mexico, Porto Rico, New Zealand, Australia, Indo-China, Japan, Java, and Brazil. In addition, England, Argentina, Cuba, Panama, Tonga, Tahiti, Samoa, China, Pribiloff Islands, Tasmania, Korea, Malay Straights, boats off Cape Horn and the coasts of Guatemala, Honduras, Nicaragua, and Costa Rica have reported Molinari. To sum: 6AWT has been heard in all of Asia, Australasia, Oceania, Polenesia, Europe, Africa and in North, Central, South and Danish Americas.

Truly we can say that Molinari sits in his shack, taps a rubber knob and the world listens.

General Information

The station log dates back to Sept. 1922, and has been kept continuously to now. It is a loose-leaf affair with at least a page devoted to each day. All reports are checked against it before confirmation of reception is sent.

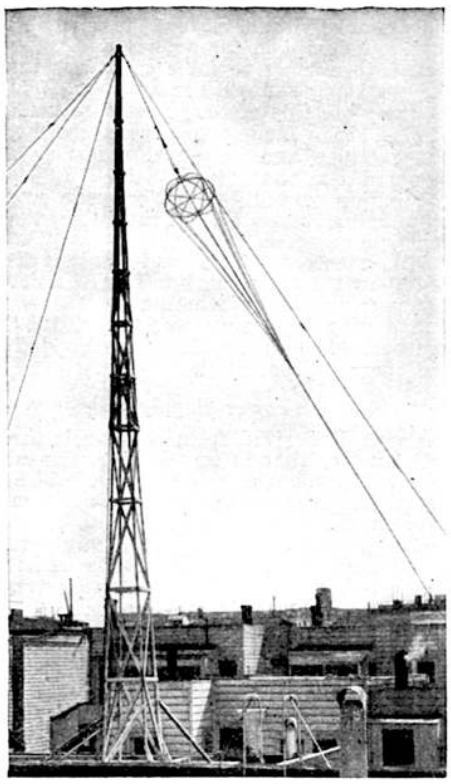
Messages are kept on A.R.R.L. message forms and each month are filed away regularly. Those addressed for within 300 miles of San Francisco are sent by mail, while city messages are delivered without delay. An average of 40 per month were handled during 1924. 6AWT holds an O. R. S. appointment.

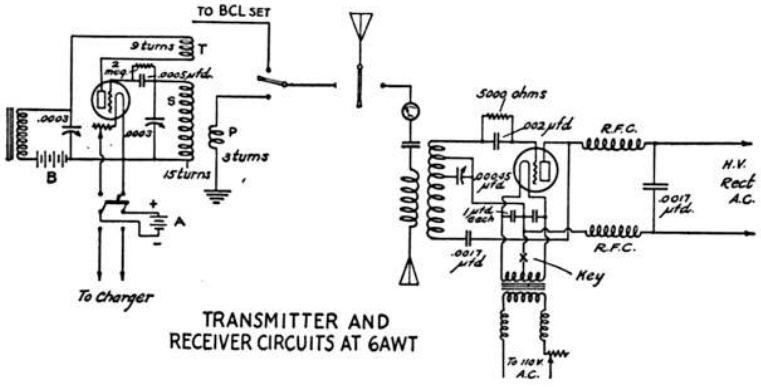
Though 6AWT is a one-man station, all cards are QSLed and will continue to be, even if a little late due to quantity. Cards are sent to those amateurs heard who are over 1000 miles from San Francisco.

The Transmitter

Due to having about 50 BCL's within a radius of about six blocks and not being able to run a 200 meter station without bothering them, 80 meters wavelength is being used because it causes less interference.

The transmitter has a wooden frame. A single 250-watt tube is used in the inductively coupled Hartley circuit and is shunt fed. The tube is mounted so that the air can circulate freely about it. The inductances were made from ¼ by 1¼ Bakelite strips and 18 gauge, ½ inch wide brass ribbon. The primary has 8 turns and the secondary 4. Dead end is avoided because all of both coils is in use. The plate series condenser is mounted on the upper panel, making the plate lead very short, while the grid-condenser and leak are mounted on the lower panel, as is the filament voltmeter, so that the grid leak, too, is short. The filament by-pass condensers are mounted on the upper base board and are the proper size for the operating wavelength, having been adjusted thereto. These chokes consist of 100 turns of wire wound on three inch diameter tubing.





TRANSMITTER AND RECEIVER CIRCUITS AT 6AWT

The antenna ammeter and the series antenna condenser are mounted near to the antenna change-over switch. This series condenser is made of two 5" x 8" brass plates separated ¾" by Pyrex rods and so insulated.

The primary inductance is 17 inches maximum diameter and the outside turn is all that is included in the grid side. A Cardwell transmitting variable ocndenser tunes the set being shunted across a single turn on the plate side of the filament return.

The high-voltage condensers, synchronous rectifier and power transformer are mounted next to the table.

Running normally with 3500 volts on the plate and a 750-watt input the antenna current is 5 amperes.

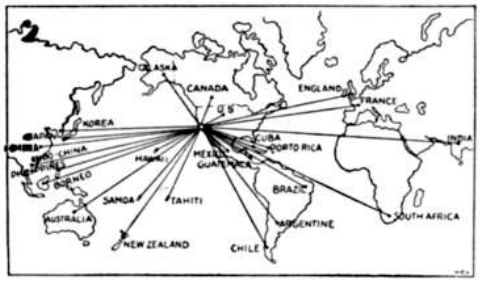
Nine months life has been obtained from a 250-watt tube. The tubes are hardened for regular use by starting at 3000 volts and adding 500 every week until 7000 is reached. Then the voltage is dropped to the operating potential.

Power Supply

Power is derived from a 220-volt three-wire service that is connected to the main line switch on the power panel which is beside the receiver and from which everything in the station can be operated.

The filament supply is from a rewound pole-transformer which is capable of handling three 250-watt tubes. A rheostat in the primary controls the filament voltage.

The plate voltage is supplied by a 3 k.v.a. pole transformer fed so that the maximum voltage obtainable is at 7000. A rheostat in the primary makes it possible to obtain



as low a potential as might be desirable. This transformer, too, is larger than needed, but it provides the convenience of being able to operate for hours with heating or danger of breakdown. 6AWT has not been known to go off the air because of transformer trouble.

The line is protected by kickback preventers. Most amateur stations seem to have forgotten this necessary thing although C.W, in Molinari's case, is worse than spark in illegal surges.

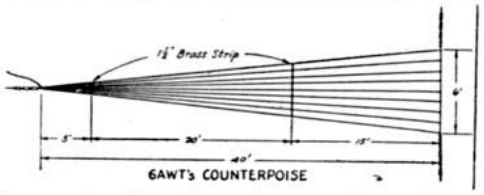
The high-voltage is rectified by a special Advance synchronous rectifier* that has a D.C. winding fed by the storage battery, which winding always makes the machine start right side up.

The Receiver

The receiver is the usual tickler circuit with one-step and careful low-loss construction. It has been put behind a panel specially engraved for it with controls from, and cabinet that formerly housed, a Grebe 13. It was found that the set properly built would operate satisfactorily cabinet-style as well as undressed; and the appearance and operating satisfaction were more in the former. The tuner proper is wound on glass rods set in Bakelite ends, and is tuned by glass insulated condensers. Baldwin phones are used. The detector tube is a 201-A without the base.

The Antenna System

The antenna is a semi-vertical, inverted cone cage with a cage ball in the top. The ball is illustrated rather well in the photographs. It is three feet in diameter and on



its equator the other wires terminate. From the tip of the cone to the top of the ball is a length of 15 feet: the antenna having a total length of 85 feet. Plain copper wire painted with asphaltum was used. The mast supporting this impressive aerial is 90 feet high. The idea, of course, in this construction of the antenna, was to obtain maximum top capacity.

6AWT IS A BAKER

The counterpoise is a nine-wire, fan-shaped affair 40 feet long with a spread of 6 feet at the free end. It is strung between turn-buckles and is kept taut. It is 8 feet high and between it and the free end of the antenna is a distance of 72 feet. The insulation consists of Pyrex for the lead-ins and antenna strain insulators, with Ohio Brass porcelain on the counterpoise. Approximately two feet of insulation is provided at the free ends of counterpoise and

(Concluded on page 58)

* It may seem peculiar to find fault with a star station, but even the best has flaws. We want to particularly advise against the use of a "synk" rectifier without filter as is 6AWT's practice. We'd go further and say not to use a "synk" rectifier at all.—Ed.

This article goes on to note on page 58:

" … the antenna system has proven effective, and well worth the time taken to install it.

"We feel the necessity of calling your attention to the fact that although 6AWT is in a continual state of flux, it nevertheless is kept in neat operating condition. This is an ideal state from an operating viewpoint and certainly makes for the successful relay station. Convenience comes first in something one must use continually and Molinari has achieved that. But, every successful relay station incorporates that same quality."

[Lee, 11 IV '19 for CHRS / SoWP ##]