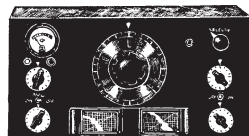


THE COMMUNICATIONS RECEIVER



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The 1928 Pilot Super Wasp

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The Pilot series of radios consisted of the original Wasp, the Super Wasp, and the AC Super Wasp. The intention is to report on all three of these sets in this and subsequent columns.

The original coils are often missing, along with the original fragile cardboard coil boxes. The distinctive blank forms could be purchased from Pilot, and the editor has a bag of them, most with either no windings or windings that obviously came from the workbench of some early amateur. Matching these to one of the Wasp receivers will be a considerable chore.

There is detailed information on the Internet to supplement that given here, (Google "Super Wasp radio") along with some very nice color photos, including some in commercial cabinets.

The Wasp receivers show up on eBay occasionally, and command prices in the several-hundred dollar range. And at radio auctions, expect considerable bidding—wf.

The standard receiver for almost all short-wave work from the very early 1920s until early 1928 was a regenerative detector followed by one or two stages of audio amplification. This is exemplified in the Pilot Wasp of 1927. Following on the success of this little radio, the Pilot Corporation introduced the Super Wasp K-110 Battery Type in Pilot Bulletin No. 7 in 1928. To see a copy of the Bulletin, which includes a schematic of the Super Wasp, visit www.eht.com/oldradio/arrl/2000-01/2000-01.html

The set was noteworthy in that it was the first short-wave receiver which used a tuned RF amplifier, followed by the regenerative detector and audio amplifiers.

The best information available indicates that in 1925 Isidore Goldberg formed the original Pilot Radio and Tube Corporation in Lawrence, Massachusetts and hired John Geloso as an engineer. Sometime during the development of the Super Wasp, the Pilot Company moved to New York City.

Pilot Corporation documents of the time reveal that Robert Kruse (the former technical editor of *QST*), along with Robert Hertzberg and John Geloso, developed the designs of both the Wasp and Super Wasp. The advertising of the time called the Super Wasp model K-110 "The

finest short-wave receiver available in the United States," and, reviewing 1928 and 1929 designs this was probably true.

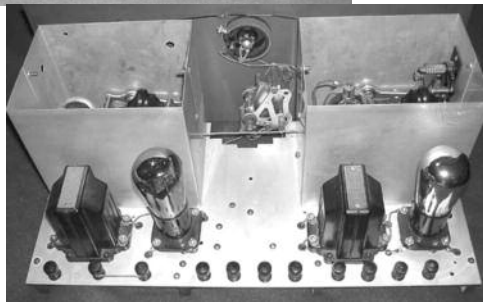
Radio frequency amplification had been tried prior to the end of 1927, but the introduction of the type 222 shield grid tube, the first production tube of that type, and available in the United States at the end of 1927, made RF amplification on the short waves practical. Prior to this the 201A and UV-199 triodes were used for RF amplification on the broadcast band. These required a "balancing" system, what we would now call "neutralization," due to the high grid-to-plate-capacitance. When the 222 became available many of the 1928 and 1929 designs utilized it



The complete set of amplifier and detector coils.



Two views of the Battery Pilot Super Wasp.



as an untuned coupling stage between the antenna and the regenerative detector. Examples of this include the National "Non-Regenerating Short Wave Tuner" sometimes called the SW-2, and the National SW-4. This approach reduced the interaction of the antenna with the detector tuning and eliminated the radiation of RF generated by the detector when it was oscillating.

However, the circuit added no selectivity and very little RF gain. The original (battery powered) Super Wasp used the 222 as an RF amplifier, followed by a type 200 or 201-A regenerative detector and two stages of audio amplification. The simplest and commonly used audio circuit employed two 201As, or a 201A followed by a 171 power tube. The bias and B+ leads of the last audio amplifier are brought out separately from the rest of the power circuits.

The Battery Super Wasp is difficult to find in nice condition. The chassis and shields were made of aluminum, with the chassis stated as being $\frac{1}{8}$ " thick. The front panel is of steel and most are found badly damaged by rust. The panel steel is also $\frac{1}{8}$ " thick, but some have holes rusted through the panel, and front markings are often gone. The front panels were painted to match what appears to be stained mahogany.

Robert Kruse (the author of *Pilot Bulletin No. 7*) indicated that there were seven advantages of the Super Wasp as compared to other receivers on the market. These included: 1. Increased selectivity and sensitivity; 2. Universal coverage from 14 to 500 meters; 3. Absolutely no hand capacity effects; 4. Completely shielded; 5. Easily assembled from a kit of parts; 6. Inexpensive; and 7. The ability to bring in short wave stations

better than all previous receivers.

The major disadvantage of the Super Wasp was that there were four interacting controls: Antenna Coupling, RF Amplifier Tuning, Detector Tuning and Regeneration. To minimize this problem in the minds of potential users, Kruse said: "The tuning of the Super Wasp is like any straight regenerative receiver, except that

there are two tuning dials to handle instead of one. This sounds like a lot of work, but in reality it isn't. During the first few evenings you are bound to fumble a bit with the controls, and perhaps you won't bring in those foreign stations

so quickly. Have a little patience; remember that it took you more than a day to learn to drive your car."

There are a couple of other items in the *Bulletin* that indicate that the Super Wasp might be a little touchy. He talks about the importance of regeneration. This may require $22\frac{1}{2}$ volts or 45 volts B+ for the detector. He advises the owner to experiment with different tubes in order to better control the regeneration at one or the other of the voltages. If all else fails, he recommends a "Resistograd" (variable resistor) between the 45 and $22\frac{1}{2}$ volt taps so that the voltage on the detector can be adjusted.

Kruse recommends that the owner start with the short-wave station affiliated with KDKA to "set the tuning dials at 25 and 30, and get the detector oscillating. You then tune until the whistling is loudest and reduce the regeneration while jiggling the tuning controls back and forth. You should experiment with the antenna coupler and mark with a pencil where it works best."

The Super Wasp design uses a small variable capacitor between the antenna and RF coil (with the exception of the AM Broadcast band, where there is a separate primary winding on the RF coil.) The design automatically connects the antenna directly to the primary when this coil is used.

The coil is tuned by a parallel 160 pF variable capacitor. This tuned circuit is coupled to the grid of the 222, and the plate of the 222 is connected to the tuning coil for the detector. The 201A de-

tector is recommended, but according to Kruse the 200A can be used if you want a higher signal level, but with more noise.

The detector is a standard grid leak circuit with a 250 pF variable "Throttling" capacitor, feeding the signal back to the tickler winding on the detector coil. The detector is followed by two transformer-coupled stages of audio frequency amplification, which can include the 171 in the final

socket or a pair of 201As for headphone listening.

The Coils

The plug-in coils are made of Bakelite tubes with eight ribs equally spaced around the form, and with distinctive color-coded molded finger pulls for the different frequency ranges. The overall dimensions of the form are $1\frac{1}{2}$ " diameter, $2\frac{1}{2}$ " form height, finger pull height is $\frac{25}{32}$ " and the pins are $\frac{9}{16}$ ", giving a total height of $3\frac{3}{8}$ ". Unfortunately with time the colors have changed, so the best way to determine the coil frequency is to look at the windings.

There are 5 pins arranged to fit a standard 5-pin tube socket. The pin numbering used by Pilot is unusual, but the schematic indicates the pin locations as F1, F2, C, G, and P. Clockwise around the socket starting with pin 1 (opposite the four evenly spaced pins), this pin is also the Grid pin, pin 3 is the Cathode pin, pin 4 is the F2 pin, pin 2 is the F1 pin, and pin 5 is the Plate pin. (The AM coverage coils are bank wound so counting turns without destroying the coil would be very difficult.)

General

The tickler winding is below the tuned winding and spaced by about $\frac{1}{16}$ ". All are close wound with the exception of the AM coil which is bank wound in at least two layers.

The boxes for the Amplifier coils show part number 601-A, and mine were made in Brooklyn. The Detector coils are part number 601-D and have an address of Lowell, Massachusetts.

Turn Counts For The Various Coils

Frequency	Finger Pull	Amplifier Turns	Detector Turns	Tickler Turns
17M to 30M	Red	4%	3%	4%
30M to 52M	Orange	9%	7%	5%
48M to 105M	Yellow	20%	17%	6%
73M to 202M	Green	45%	46%	14%
200M to 500M	Blue	—	—	—

Pin Outs For The Amplifier Coils

Top of winding – Pin 1 and 3 for all but 200m to 500m coil
 Bottom of Winding – Pin 2
 On the AM coil the top of the tuned winding goes to Pin 1
 The bottom of the tuned winding goes to Pin 2
 The Antenna winding goes to Pin 2 and Pin 5

Pin Outs For The Detector Coils

Top of tuned winding goes to Pin 1
 Bottom of tuned winding goes to Pin 2
 Top of Tickler goes to Pin 4
 Bottom of Tickler goes to Pin 3

TRANSMITTERS, continued from page 50

transmitter is on frequency and running at full plate voltage:

1) Tighten the antenna coupling as much as possible. In the case of my transmitter this meant moving the antenna coil until it almost touched the tuning coil. At maximum antenna coupling, tune antenna loading for maximum output and note this "maximum output."

2) Back off antenna coupling to 75% maximum power (watts) or 85% output current (RF Amps) retuning antenna loading along the way.

3) Once you are at 75% power (or 85% RF current) output, detune antenna loading by adding capacitance to reduce output another 75% (power) or 85% (RF current). After detuning check your signal. In some cases Hull found that detuning antenna loading worked best if capacitance was reduced rather than added.

Hull plotted frequency vs. load capacitance.

His curves show a fairly steep curve around resonance and then they flatten out. When a self-excited oscillator is peaked up for maximum output, any changes in antenna loading will have a maximum impact on frequency. At this tune-up point an antenna swaying in the wind (changing the load that the transmitter sees) will have a maximum impact on the signal frequency. Detuning the oscillator output from peak output moves the operating point to the flatter part of the frequency vs. load capacitance curve. Then antenna sway will have less impact.

I now have a transmitter built as it might have been in 1928. It's usable on today's 80 and 40 meter bands running up to about 5 watts output. In fairness, I still find that moderate winds causing antenna sway do introduce some FMing, but my signal is acceptable. Given proper tuning that's about where mine is: a sweet, musical, T8 signal.