



73 Tests the Lafayette KT-390 Starflite *and likes it*

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EIGHTY DOLLARS, ninety watts, phone and CW. Those are the things that make the new Lafayette Starflite KT-390 transmitter a really desirable piece of gear for the ham-shack. While looking over the specifications, I wondered how Lafayette could get so much into such a small package for such a small price. Well, this transmitter comes as a kit, so *you* supply most of the labor, and cut most of the cost. The whole thing measures only 13 x 12 x 6¼ inches, and is very attractive in its two-tone steel cabinet. Size, cost, and performance make it even more attractive for the beginning ham who has to watch his cabbage.

There are 266 steps to final assembly, and since the instruction manual is liberally salted with diagrams, the job is foolproof (almost).

The circuit is simple enough for what it does. It consists of an oscillator that acts as a buffer stage with vfo operation, a driver, a modulator, and a 6146 final. A low-pass filter is built into the back of the cabinet, and the shielding of the entire rig is pretty thorough. This should help out the ham who lives in a forest of TV antennas (and who doesn't nowadays?).

A schematic of the Starflite is shown in Fig. 1. The 6CL6 (V1) functions as a modified Pierce oscillator with crystal control. When vfo operation is desired, the vfo is plugged into the appropriate jack, and the 6CL6 then functions as a buffer stage between vfo and driver.

The driver tube (V2, another 6CL6) operates as a class C amplifier. The plate circuit of this stage is tuned by the "DRIVE-TUNE" variable capacitor, and the coil L_s (or sections of the coil that are selected by the band switch). The entire stage operates straight through on 80 and 40 meters, functions as a doubler on 20, a tripler on 15, and as a quadrupler on 10. The drive level control (pot R5) controls the screen voltage of the driver, and therefore controls the output that is fed to the grid of the final.

A 6146, complete with parasitic suppressor, is used in the final, and operates straight through on all bands as a shunt-fed, neutralized amplifier. The tank circuit is made up of C20 (the final tuning capacitor), L_s (or sections of it that are selected by the band switch), and variable capacitor C22 (final loading). This final loading capacitor consists of three 450 mmfd capacitors in parallel, so that there is no need to switch fixed capacities in and out when band changing. A 69 mmfd disk ceramic was added to the tank coil to maintain a good L-C ratio on 80 meters. The whole thing is a pi network output, so any of the regular dipoles and antennas having 50 to 75 ohm impedance should work out well.

A metering switch is located just below the modern horizontal meter on the front panel. In the "GRID" position, the meter reads the voltage developed across a 620 ohm resistor in the final, and in effect measures the current passing through the resistor. In the "PLATE"

position, the meter reads voltage that's developed across R13 on the cathode of the 6146, and as before, the effect of measuring current is achieved. Although cathode current is actually a combination of grid, screen and plate current, the readings may be taken as actual plate current. The error caused by the addition of grid and screen current is very small, and on the legal side.

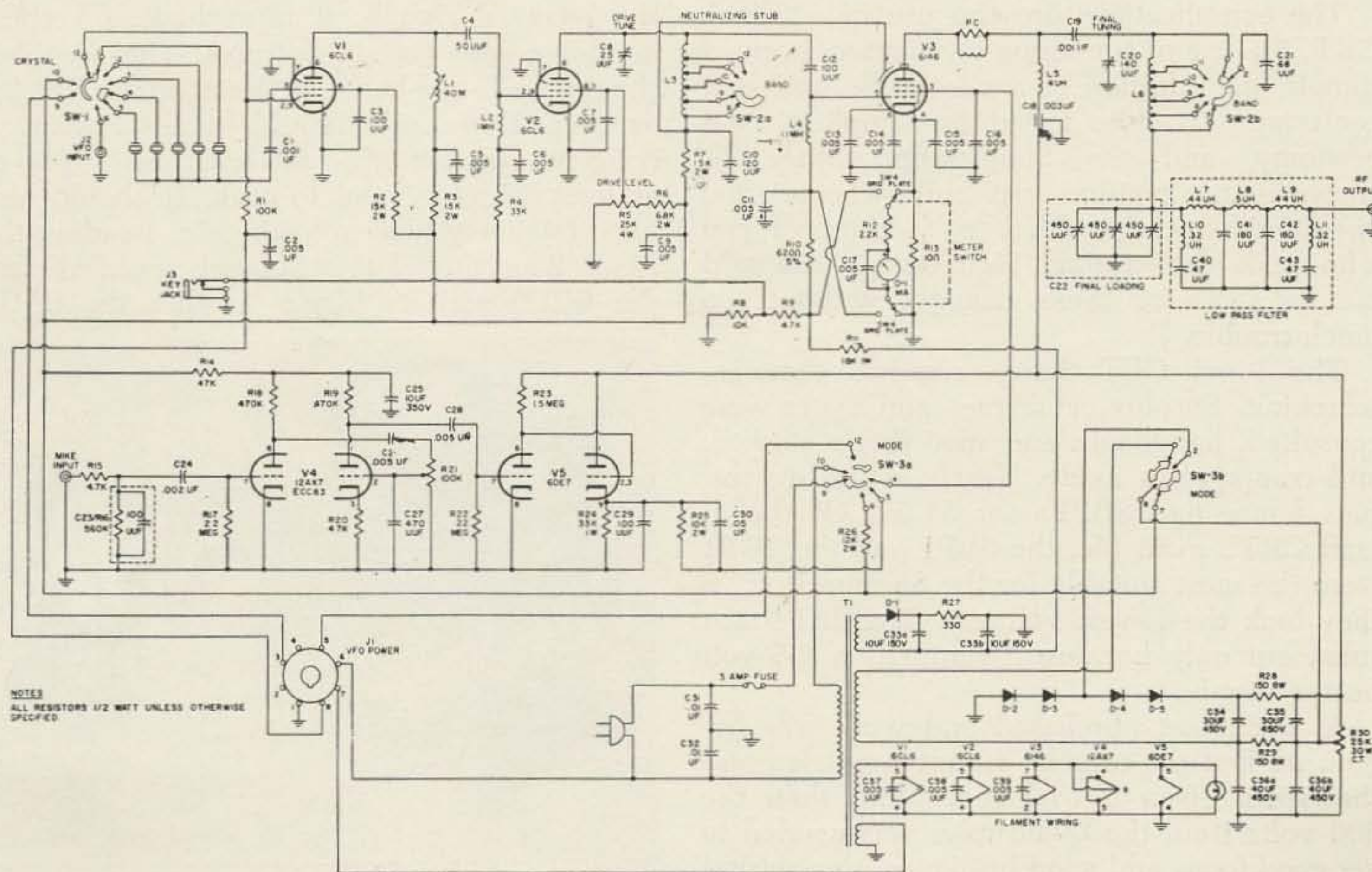
The Starflite uses carrier-controlled modulation, and judging by some on-the-air-reports that I've gotten, there seems to be a lot of misunderstanding about this sort of modulation in general. The 2 triode sections of a 12AX7 (V4) act as a regular resistance coupled audio amplifier. The output of the second triode section is coupled to the first half of the modulator tube through C28. The modulator tube is a 6DE7 (V5) that contains two dissimilar triodes, one with a power rating of 1.5 watts, and the other with a rating of 7 watts. The output of the low power triode is directly coupled to the grid of the higher powered triode which actually functions as the modulator. Bias voltage on the 6DE7 is arranged so that conduction is low when there's no audio input signal. This lowers the screen voltage of the 6146, and naturally when the screen voltage goes down, so does the plate voltage and output. An audio input signal that's caused when someone speaks into the mike reduces resistance in the modulator sec-

tion, and raises the screen voltage of the final. Naturally, this jacks up your plate current and output, giving you carrier-controlled modulation.

Grid block keying is used in the Starflite, and a good thing too! This method of keying gives the least trouble as far as clicks and things like that go. Grid block keying in the Starflite is accomplished like this: with an open key, a high bias voltage is fed into the grids of tubes V1, V2, and V3. This high bias voltage cuts off these tubes and eliminates any output. In the key down position, R8 is shorted, and this cuts out the high bias to V1, and V2. It leaves a small amount of bias on the final (V3) to protect it in case the drive is suddenly removed. The values of R8 and C2 were chosen by the Lafayette people to give the most desirable CW waveform.

Lafayette is using a unique power supply for this transmitter in that it uses four silicon diodes in a voltage doubler circuit. These diodes are more efficient than their tube counterparts because they use no filament power, and voltage drop is much less. Filtering is accomplished through a capacitor input filter that is made up of R28, R29, and C34, 35, and 36. Of course there is an accessory socket that provides the necessary voltages for convenience in operating vfo, CW monitor, etc.

On the air tests proved this little transmitter to be extremely satisfactory (satisfactory



SCHEMATIC DIAGRAM

enough so that the writer had a short fist-fight with the editor when the latter decreed that the Starflight had to be sent back to Lafayette after testing). Operation on 80, 40, 20, and 15 meters was good, but a little critical tuning on 10 was necessary to keep a good quality signal going out.

All in all, this rig turned out to be quite

a surprise, and just a hair short of fantastic for the price tag. It makes a sweet rig for the Novice who will get his general class license and won't be able to afford a new rig. It makes a swell rig for the ham who'll want to keep it around as a standby rig, or who'll use it portable on Field Day or vacation.

... WIMEL

Complicating the Simplescope

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THE "Simplescope"* was conceived as the simplest form of an oscilloscope that would give adequate service as a phone monitor. But it was too simple for some ambitious builders who wanted to complicate it by adding various features they felt a scope should have. Of all the ideas for improvement, a few had merit. Here is how you can "Complicate the Simplescope" to get the "LARGE Economy Size."

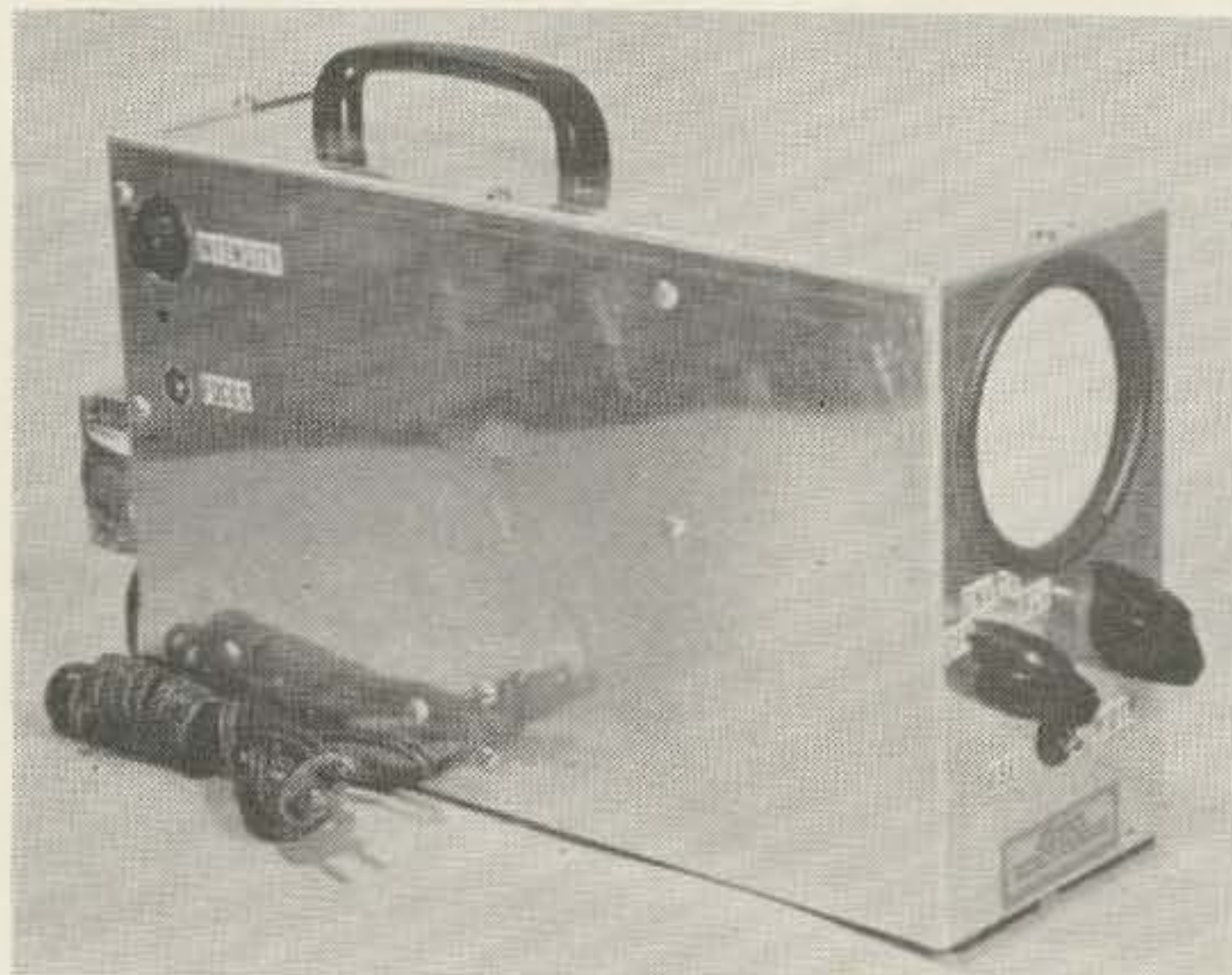
The complications are the use of a 3-inch CRT, the use of the scope to monitor received signals, the addition of a pilot light, and spot centering. All were tested for simplicity and economy, and the Simplescope Mark II, shown in the pictures was built. The original circuit was merely added to, so those of you who built the original Simplescope can add one or more of these changes without too much trouble.

The 3-inch CRT change required some researching. Surplus catalogues and flyers were consulted, handbooks and spec sheets studied, and comparisons made. Nearly every big surplus house had 3BP1's for \$1.95. Of the 3-inch CRT's available, the 3BP1 and the 3GP1 were the most suitable for the Simplescope, as they took the lowest voltages. The 3AP1 was ruled out only because it required a 2.5 volt heater supply.

A 3BP1 was purchased and work was begun. At first the original circuit was tried and the 3BP1 given a trial run. More than the 600 volts from the quadrupler was needed to get good focus and good brilliance, so a second power transformer with a voltage doubler cir-

cuit was added and connected in series. With about 900 volts pushing the electrons, the 3BP1 worked fine. Focus was good, brilliance good, and deflection sensitivity good. 'Scope design is a compromise between brilliance and sharp focus on one hand and deflection sensitivity on the other. This one is no exception. The 2AP1 and 3AP1 should have at least 500 volts, the 3BP1 and 3GP1 at least 850.

If the Simplescope is to be used to monitor the received signals, it must have a vertical amplifier with certain features. The amplifier should be broad-band, at least up to 500 kc, or even 2 mc, so it could be used with all common receiver *if's*, and have an output of at least 75 volts peak-to-peak. It should also have relatively high voltage gain. Reading the RCA Receiving Tube Manual revealed that the 6CL6 and its bigger brother the 6AG7



The "Large Economy Size" Simplescope. Handle is mounted toward the rear for proper balance. Note NE2 pilot light below knobs on front.

*See the Sept., 1961, 73 Magazine.