160 Meter Conversion of the Ce tral Electronics CE100V and the CE200V

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The Central Electronics CE100V SSB transmitter is no longer in production but still is available at a reasonable price considering its versatility. You have a choice of AM, USB, LSB, PM, FSK, CW, from 10 through 80 meters with no tuning except for VFO knob and bandswitch. In fact there are no tuning knobs. Unfortunately, the set was too far ahead of its time and was a casualty in the "battle of PEP's", which is what sells a set these days.

With the liberalized ruling for 160 meter operation (one kilowatt in certain areas), manufacturers have one more headache to contend with as the demand for this band increases. Fortunately, for 100V and 200V owners, this fine transmitter has provision for an "X" band (you install whatever band you want, MARS, CAP, etc.) and no "cutting into" or reworking is necessary. If anything, the addition of the extra band enhances the value of the transmitter since the "X" band position normaly is left blank both dialwise and coil-socket wise.

The Conversion.

Conversion merely entails winding some wire on a final coil form and scramble-winding three slug-tuned forms which are then plugged into holes already provided. The entire job can be done in a few hours if you have a grid dip meter, but even this is unnecessary if you don't mind thecut and try method. The conversion is actually easier to perform than the description of the conversion.

Circuitry.

Refering to Figure one, the 8 mHz signal and 6-7 mHz injection produce a first mixer output of 14-13 mHz which is then converted to 1500-2500 kHz output with 15.5 mHz crystal injection. The output is amplified by a driver before application to the broadband final amplifier.

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The Final Tank Coil

When the original conversion was performed some 12 years ago Central Electronics had not yet released conversion data and therefore the author had to feel his way around. The low level stages gave no trouble, as they could be scaled up from studying the high frequency coils. However, the final patented "broad-band" coil was a secret device and I couldnot duplicate it and small wonder as will be seen later.

Referring to Figure 2, the primary coils L_1 and L_2 resonate at the high frequency end of the desired bandpass. Part of secondary L_3 and L_4 is bifiliar wound with the primary. The bifiliar winding has a distributed capacity between the wires. This capacity appears as a series resonant circuit with L_4 at the low frequency end of the desired bandpass. By controlling the size of the bifiliar winding and themutual coupling between L_1 and L_4 it is possible to show an essentially constant load to the amplifier plate across the desired bandpass assuming of course that a proper load is placed across the output.

The coils have a brass shim stock material between primary and secondary and there is no final tuning tank capacitor. Central Electronics said of their coil in a correspondence, "Althoughthe coils appear simple to wind, the winding is not the problem - it is to make them work at proper efficiency and to have the req ired band-pass characterisitic. Even with all our experience, we could get only a 50% yield". We hams don't appreciate the effort of some manufacturers and their production problems.

The Ham-Style Final Tank.

Forget about broadbanding the final tank. If you are interested in covering both segments of the band there is no alternative but to use a tuning capacitor for which there is no room in the coil compartment. But, if you don't mind sticking to one segment or winding two separte final tank coils and pluggingin the proper one, then this is the article for you.

Materials Needed.

Two double slug paper coil forms, a final tank coil form, a 15 mHz fundamental crystal in a Type HC6 or FA9 holder and #36, #28, and #22 magnet wire is required. In addition six mica or ceramic fixed padding capacitors and 1 watt loading resistors ar required. The exact value is not critical for these padding capacitors since they will be resonated by a grid dip meter. Study the high frequency coil forms and get the nearest physical size available. "Loop-stick" forms used in replacement sets are satisfactory with the addition of another slug through the bottom end. The 15 mHz slug form uses a single slug and any conventional form is satisfactory.

Crystal Oscillator for First Mixer Injection

The crytal oscillator is the easiest to work with and so should be tackled first. The exact frequency is immaterial since the dial is uncalibrated anyway and you will have to calibrate it. The idea is to heterodyne the 14-13 mHz output from the first mixer with a 15 mHz signal to produce 1500-2500 kHz output (if a 15,500 kHz crystal happens to be chosen).

Unplug the coil set marked "crystal oscillator", unscrew the two Phillip screws and remove thealuminum cover. You will see a hole where the "X" band coil should go.

Referring to figure 3, wind L_1 which is 21 turns of #22 enameled wire on a slug tuned form. Pad with a 45 mfd. (or nearest available) mica capacitor. Before installing the coil, check the resonant frequency with a grid dip oscillator by coupling to L_2 which is merely a two turn output link of #28 wire.

Second Mixer Coil

Similarly, expose the second mixer coil set. This one is a little tricky since the "X" band and 80 mete r coils are hooked up alike but the higher frequency coils have their leads reversed as will become obvious when compar ing the coils as they are installed and the manual. The coil prongs are numbered and should correspond to the start and finish as indicated in the drawing.

Unless you have facilities to wind "honeycomb coils", forget about the fancy winding job on the factory coils. Merely scramble-wind the wire by hand, similating honeycomb style as much as possible to reduce distributed capacity. Alternately, take turns off the inside of a standard pie-wound RF choke and resonate with a grid dip meter. However, let me assure you that the pregnant looking coils work just as well as any old time radioservice man will tell you who has had to handwind IF coils in an emergency.

Steal some "gunk" from the other coils and melt with a soldering iron to hold things in place. Use the grid dip meter to get "within the ball park".

Driver Plate and Final Grid coils.

The drier plate and final grid coils are wound in the same manner as the second-mixer coils. Reffer to the coil chart data for padding and loading values.

Final Amplifier Plate Coil

Coil forms are no longer available from the manufacturer. The prongs are the same as those from a standard AC plug. Constructr the forms out of lucite tubing as shown in figure 4. The prongs can either be made from copper sheets or from a standard AC plug.

Looking at the coil with the top pin facing left, the bottom spade pin nearest to you is the "B plus" and the spade pin away from you is the antenna output pin. However, double check your set by checking continuity from coaxial output to the socket, and from B plus lead to the other spade pin. The anchor pin at the top is the plate lead.

Starting fromthe top pin as an anchor, close-space wind about 125 turns of #24 wire, or as much as the coil form will take. Install a Centralab Type 858 transmitting ceramic capacitor of about 75 to 100 mmfd capacity. Place this capacity inside the coil form since there is no room elsewhere inthe coil compartment. Check resonance with a grid dip meter before winding the secondary winding.

The output link should be wound with well insulated wire, preferably glass insulation or Teflon insulation since it will have to isolate the DC from the output. A Centralab DD60 series 6000 volt 1000 or 1500 mfd. disc capacitor should be anchored to the spade pin and a 15 turn output link be wound and terminated at the otherspade pin.

Use the oscilloscope output indiator and tune the various stages for maximum output. In the 200V (not 100V), the dial scale will not be illuminated unless a jumper is installed on RF bandswitch section 1F (nearest the front panel) from the white-black-yellow lead to the unused lug on the wafer.

Additional by-passing and decoupling of the B-plus supply was recommended in a flier from Central Electronics just before it went out of production. The author has not had a chance to trythis additional by-passing .

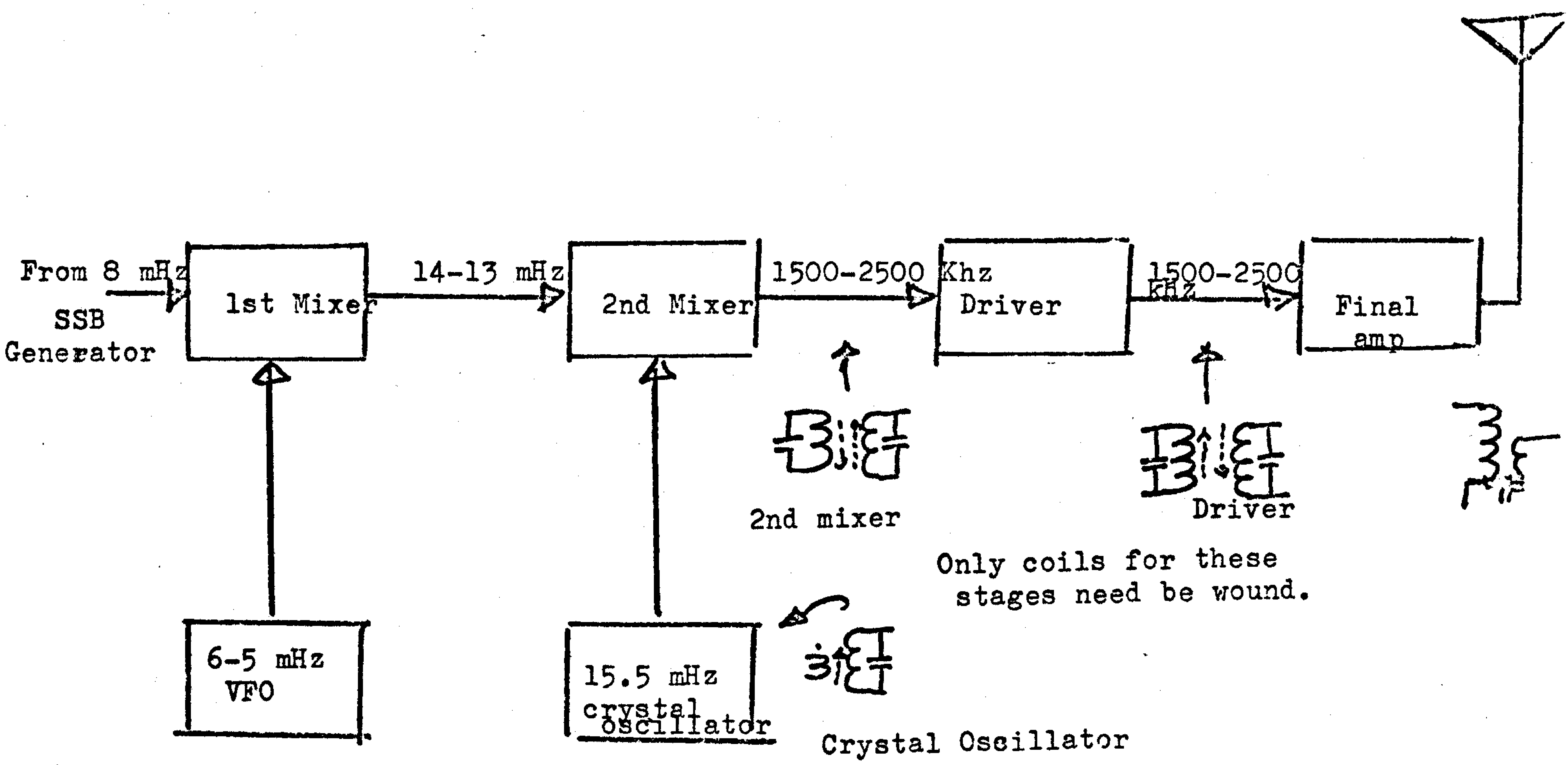


Figure 1

Block Diagram of Conversion Scheme for 160 Meter Operation of CE100 and CE200V

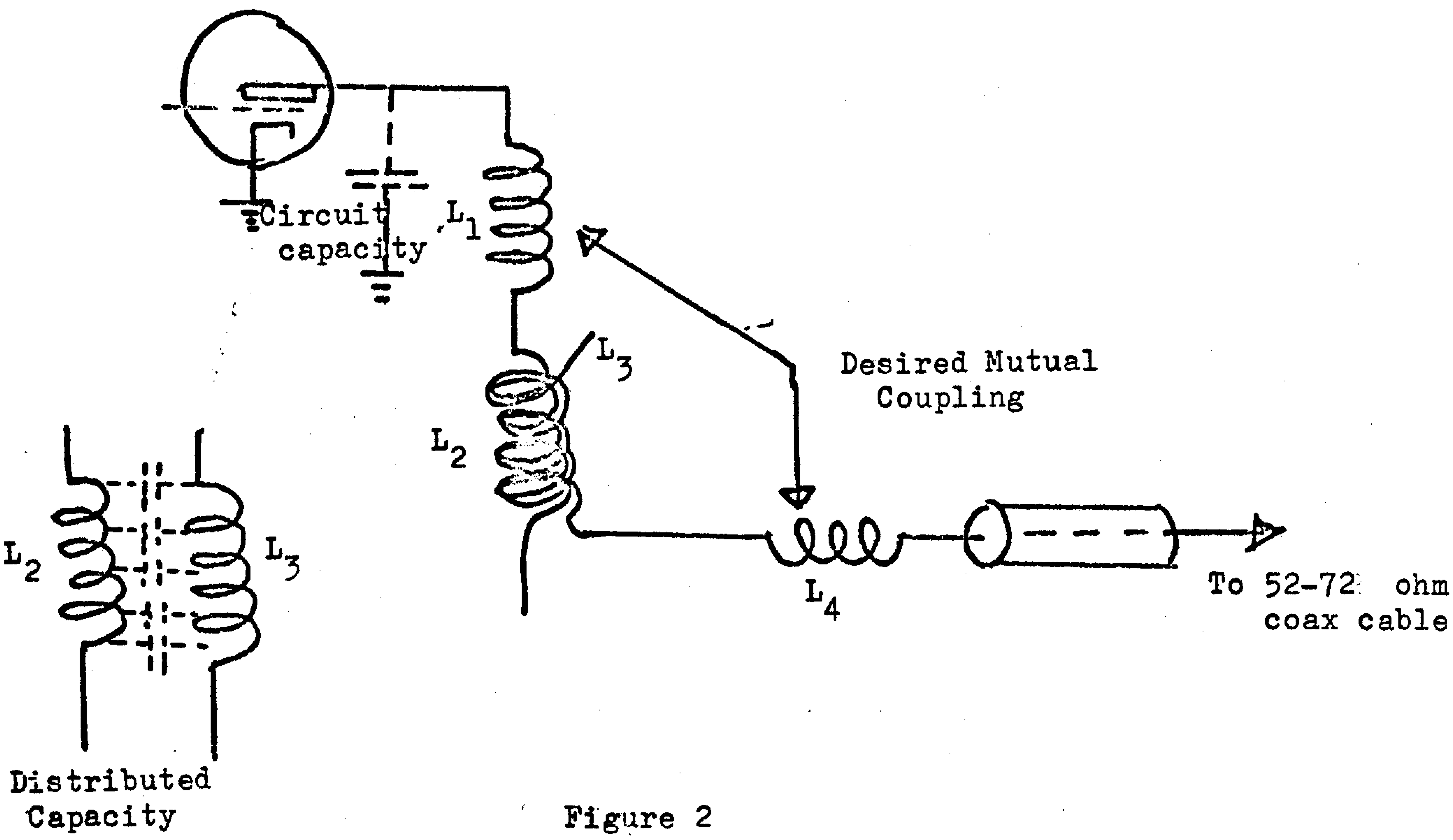
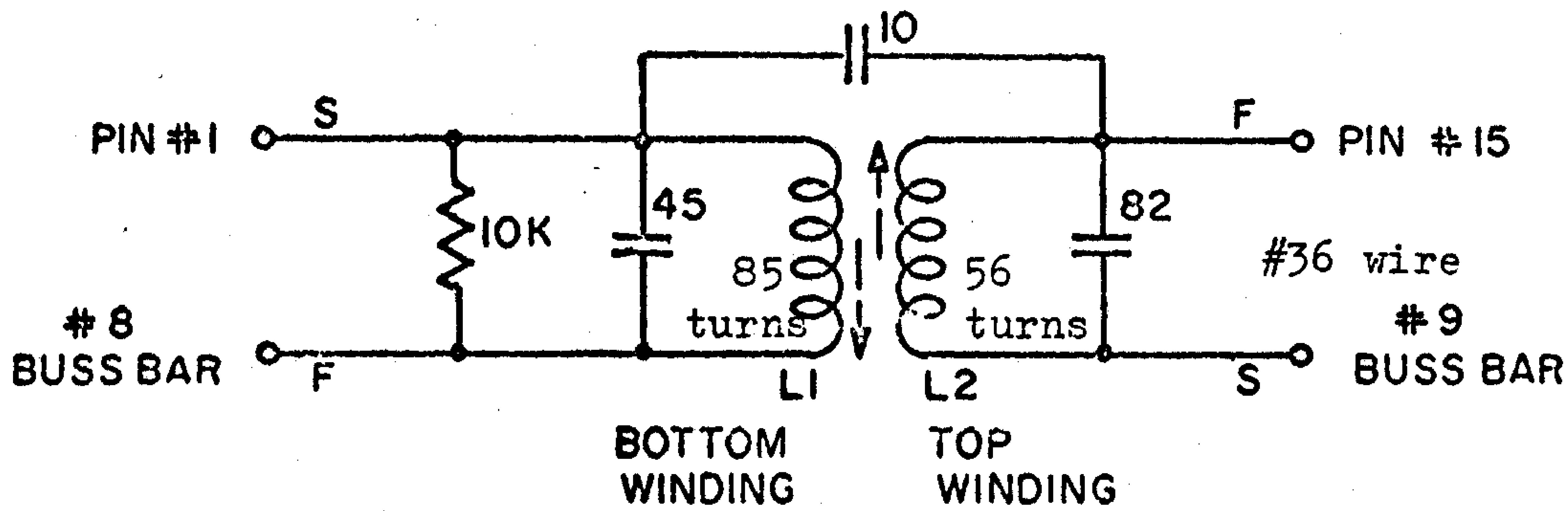
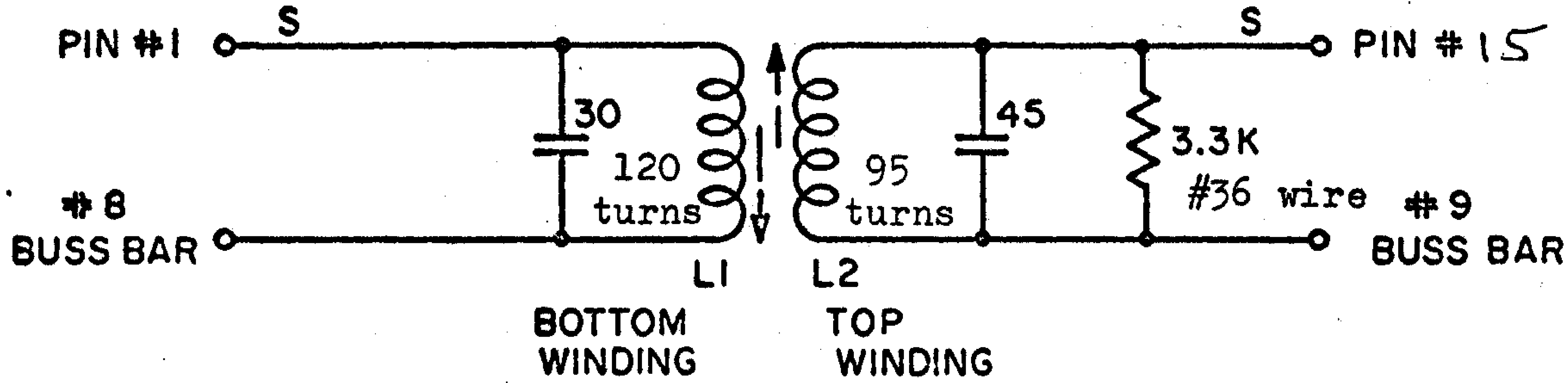


Figure 2
Original Method of Broadbanding
Final Amplifier Coil
in CE100V and CE200V

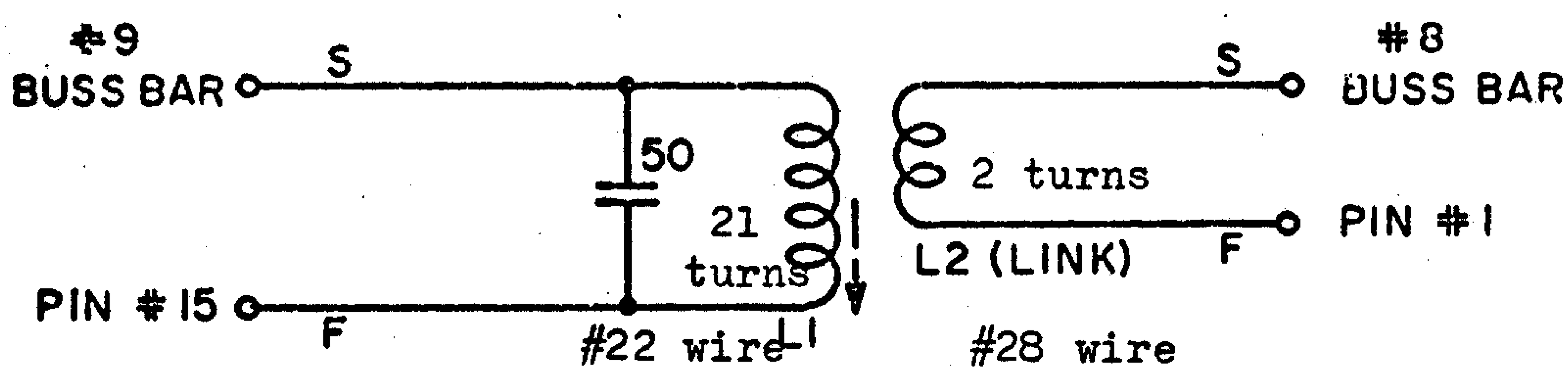
DRIVER - 160 λ



2ND MIXER - 160 λ



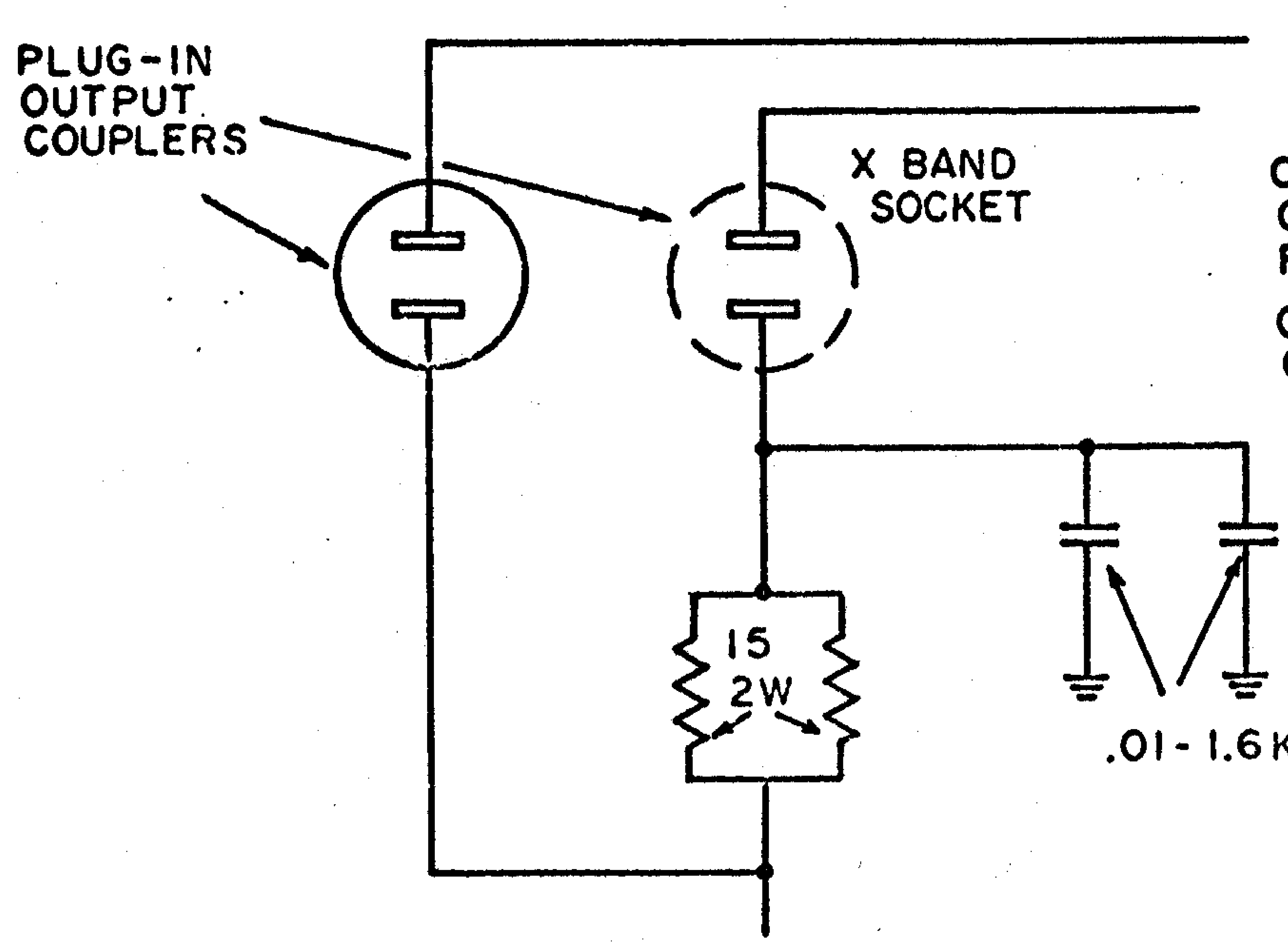
XTAL OSCILLATOR - 160 λ



COIL MOUNTED WITH L2 (LINK) ON TOP. CORE TO BE PEAKED AT THE BOTTOM OF L1 WINDING.

CAPACITOR VALUES ARE MMFD.

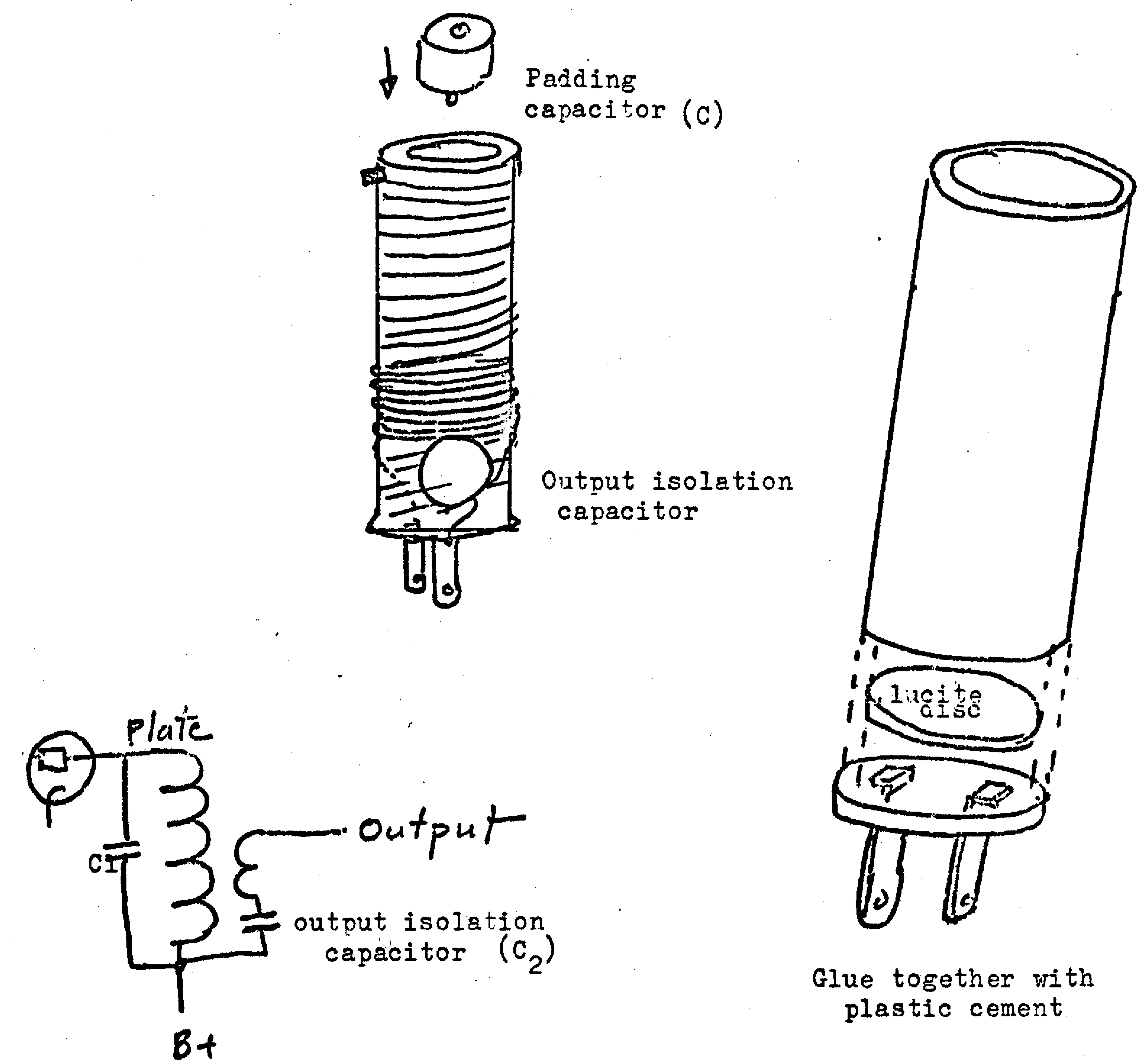
S & F INDICATE START & FINISH OF WINDINGS, RESPECTIVELY.



ON 100V, ADD TWO .01 MFD CAPACITORS & TWO 15 Ω RESISTORS AS SHOWN.

ON 200V, ADD ONE .01 MFD CAPACITOR & ONE 15 Ω RESISTOR.

Figure 3
Coil Data



C_1 50 mmfd. 6000 volts
C_2 .001 mmfd 6000 volts

Figure 4

Final Tank Coil construction and Circuit Diagram