

How would you like to have a knock-out punch on our lowest frequency band? You may already have the makings in your shack.

Adding 160 Meters To The Heath SB-220 Linear Amplifier

BY ROBERT G. EVANS*, K6QAY

While wanting to put more power than 60 to 70 watts available on 160 meters without a large expenditure, it was decided to attempt to add the low band to my Heath 220.

With no information available I decided to go it on my own. After experiencing many problems such as parasitic oscillations, failure of the final to dip, r.f. getting into the filament supply, burning out of the zener diode and meter lights, I decided to write this article so other interested hams could take advantage of the countless hours of work and avoid the frustration I have been through.

Since the 220 has a pi network input it was decided to drive the 160 signal

through the 80 meter input. The pi network will pass frequencies below its resonant frequency. This eliminated the need to change the band switches and the addition of a 160 meter input coil.

It was felt that the drilling of one hole in the panel was justified, as the 160 meter feature can only add to the tradein value should you decide to upgrade at a later date.

You should add the changes to the schematic on page 87 of your manual and possibly add a copy of this article.

If you use your linear on 160 after sundown you must remember to reduce power in order to stay within the limitations for your area. You can reduce the input power by:

1. Reducing the exciter drive and
2. Reducing Mic gain, or as I do by separating the filament supply feeding the PRI of the filament transformer from the wall plug the PRI of the plate transformer from a variac voltage control.

Approximately 60 volts into the primary will place you into the 150 to 200 watt input range. Information on voltage control is included in this article. However, it is not necessary to the 160 m conversion. It may be plugged into the wall or a variac.

I hope you will have as many enjoyable hours with your linear as I have had with mine. If you follow the directions the conversion should take about two hours or less. Thanks must go to K6ZHJ, W6JUT, W6FVW and W6FPV for putting up with me while I was testing this rig.

Instructions

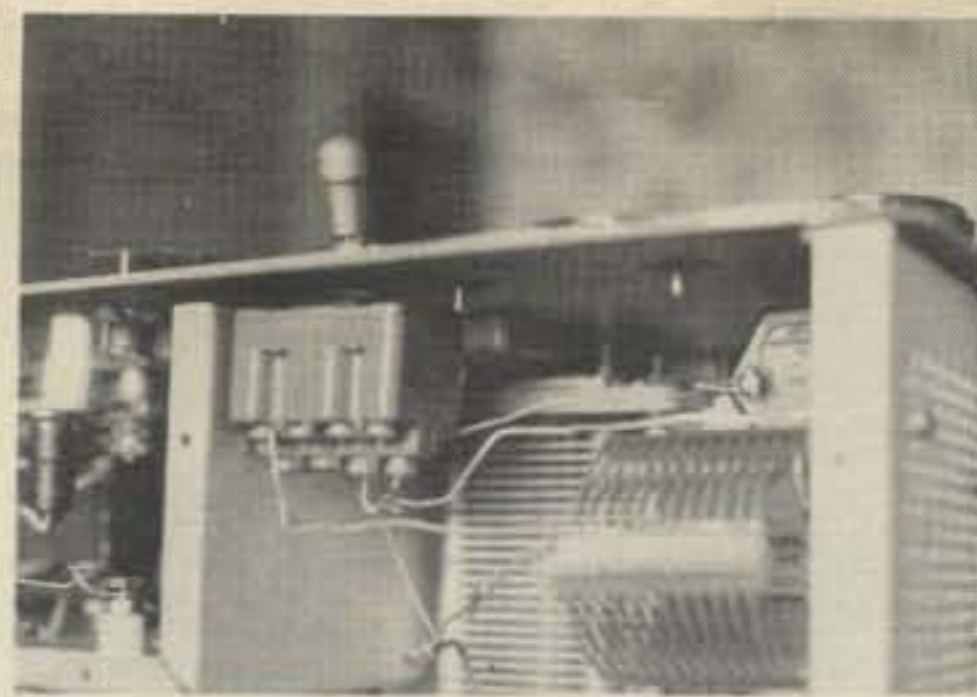
1. Remove r.f. choke part #45-61 replace with a National R175 or equivalent.
2. Remove bifilar choke part #45-78, replace with B&W FC30A or make your own as I did from page 155 of the 1978 *Radio Amateurs Handbook*.*

*This choke may be obtained in kit form from Amidon Associates, 12033 Ostego St., N. Hollywood CA 91607. The filament choke kit [30 A., 1.8 MHz (part number FL-KT-33-7)] or the ferrite rod (part number 30-37-7) may be obtained separately.

* 10509 Collett Ave., Granada Hills CA 91344

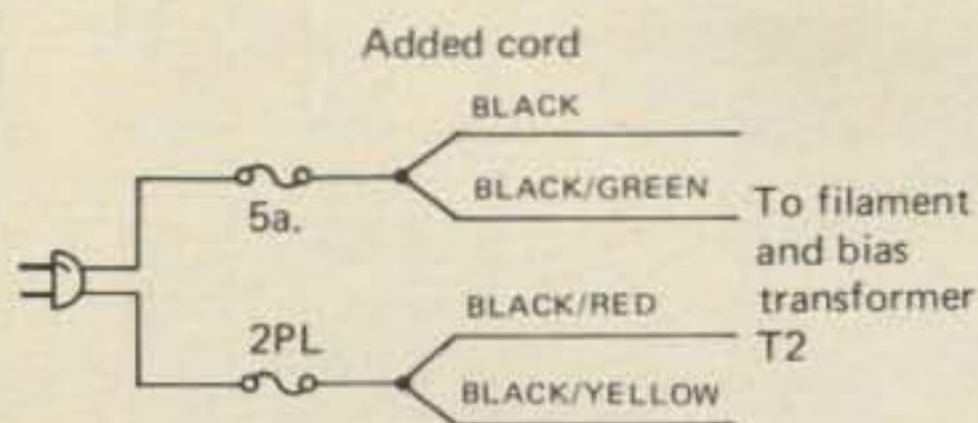


Left: The panel position of the added toggle switch. Right: Note the addition of the "160" decal.



Installation of the "80/160" toggle switch.

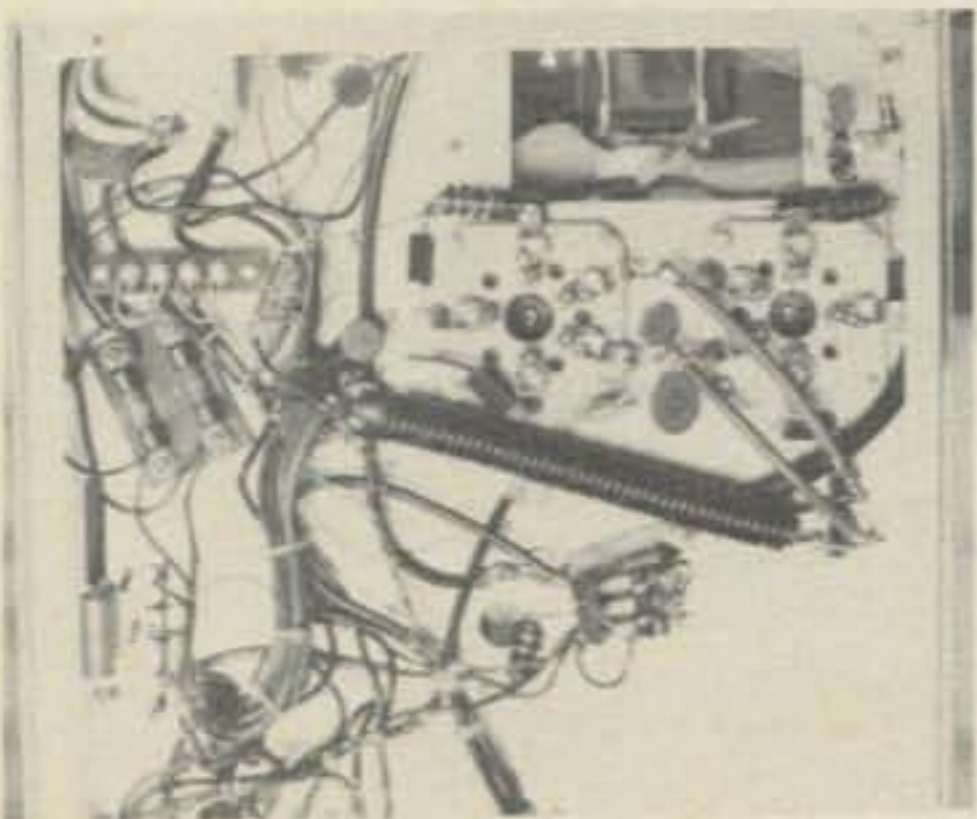
3. Install one each. $15\mu\text{F}$ 600 volt capacitor across each of C22 and C23 at filament choke.
4. Cut wires from 80 m inductor L7 going to output line and variable capacitor C57.
5. Install 160 m inductor. B&W mininductor #3907-1 2" dia. ten turns per inch, 24 turns needed. Install above C55 and C57 secure to



Unregulated 110v. Do not plug into regulated supply

Fig. 1 - Adding a line cord and fusing the filament and bias transformer (T2).

left hand perforated side panel. Slide one piece of $1/8" \times 1 7/8" \times 3"$ plexiglass or any other insulating material into the coil. Cement to the coil stiffeners. Fasten coil with two each $1" \times 1" \times 1/8"$



- homemade angle brackets. Bolt to left hand perforated panel.
6. Install one each $.00015\mu\text{F}$ mica 2,500 volt capacitor with a heavy lead to the RH tie bolt of the $250\mu\text{F}$ variable C55 at front panel.
 7. Install one each $.00075\mu\text{F}$ mica 2,500 volt capacitor with a heavy lead to the LH tie bolt of the $840\mu\text{F}$ variable C57 at front panel.
 8. Install a 4 pole double throw toggle switch on front panel. Drill hole to clear switch 1" down from top of panel and 2" to the left of the plate meter. Also toggle switch part #406N Newark stock #61F878.
 9. Connect the $.00015\mu\text{F}$ to term. #9 and the $.00075\mu\text{F}$ to term. #10 both with heavy wire. Install jumper between term. #5 and #6 run #5 to ground at left hand side of side panel.

Note: You might think breaking the ground of these capacitors is a mistake but it was done purposely to shorten the leads and pre-

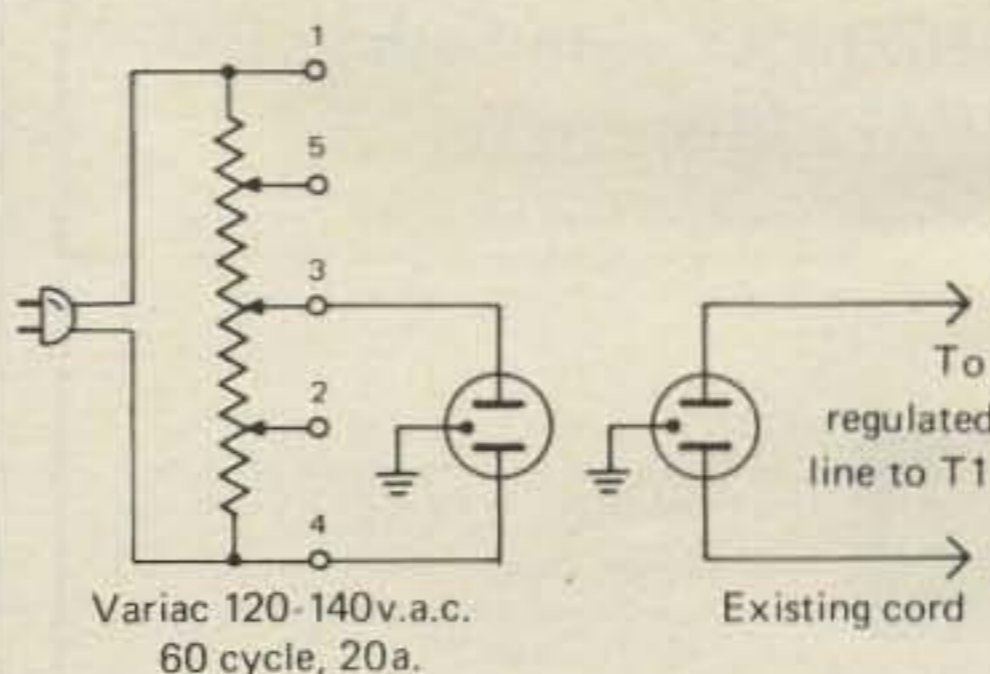
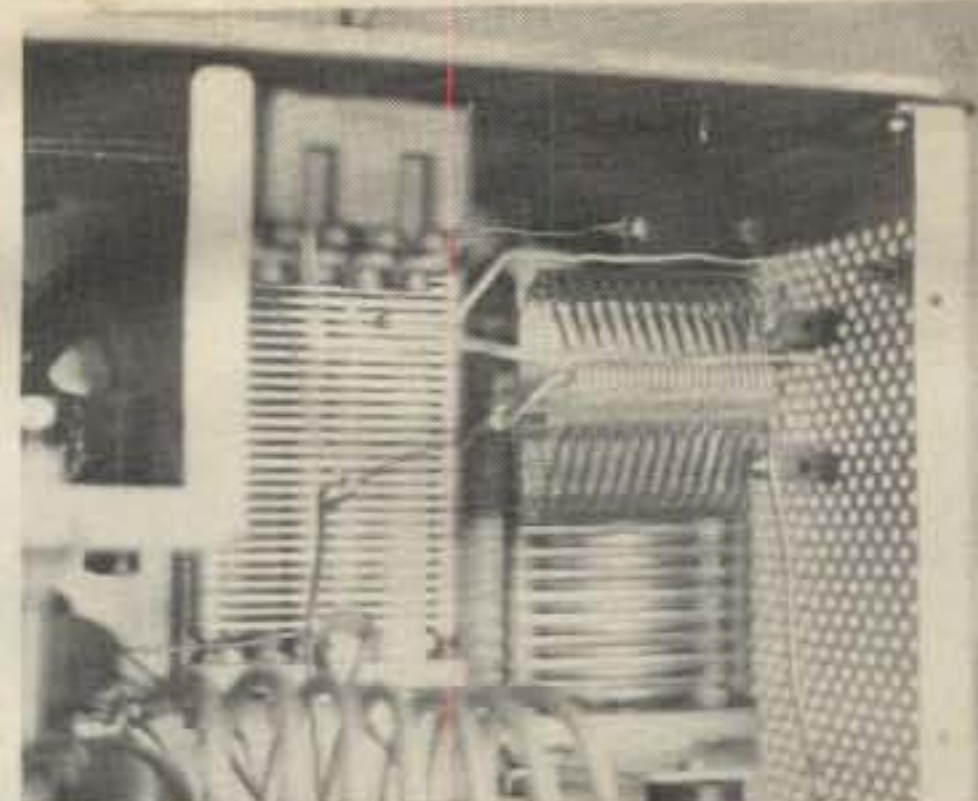


Fig. 2 - Wiring the Variac.

- vent a bad reaction problem encountered on the 80 m band.
10. Connect a heavy wire from term. #4 to the input end of the new 160 coil, connect a heavy wire from term. #8 to the output end of the coil.
 11. Bend one piece of buss or heavy wire (must be self supporting). Install from output of 80 m coil L7 1" from chassis bottom then to within 2" of the left hand side panel, then bend upward and toward the front panel to fit input end of new coil.
 12. Bend 1 piece of heavy wire, install between output of 160 coil to the disconnected output wire and the disconnected $840\mu\text{F}$ C57 variable capacitor.
 13. **Note:** The new toggle switch now introduces the 160 coil and the two capacitors into the circuit in the 160 m toggle



The added 160 meter inductor.

up position. It disconnects the two capacitors and shorts out the 160 m coil in the 80 m toggle down position.

14. Install the 160 decal to the right of the toggle up position of front panel. Install the 80 decal to the right of the toggle down position. Install the 160 decal above the ex-

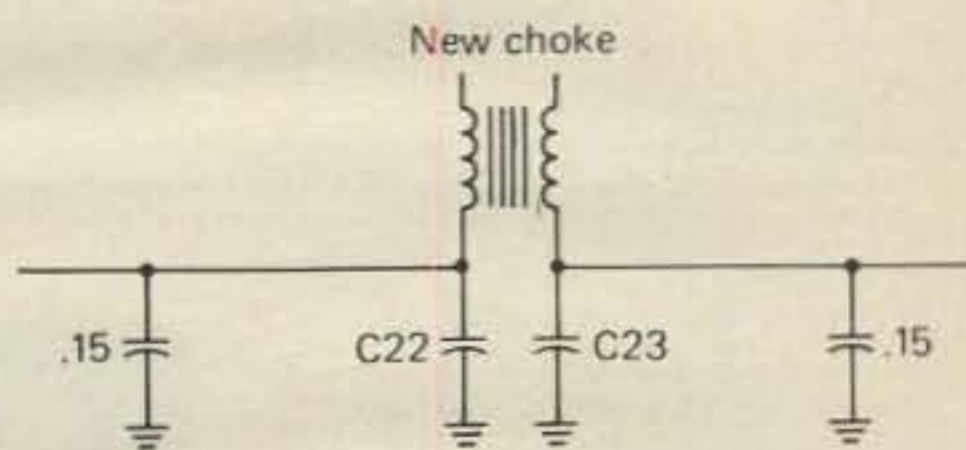


Fig. 3 - Wiring the new choke.

- isting 80 m decal at the left side of the resonating capacitor dial.
15. 160 m will dip from the low end to the high end of the 160 m band within the 80 m markings on the panel.
 16. When you wish the 160 band set the band switch to 80 m position. The toggle to 160, tune as you do

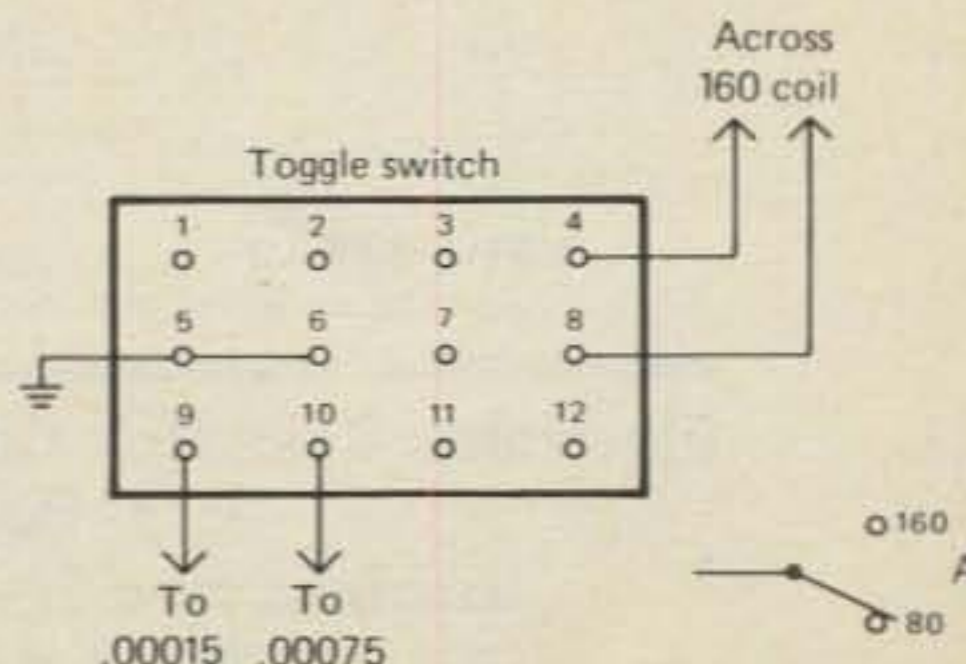


Fig. 4 - Wiring the toggle switch.

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Two digit readout displays SWR measured from 1.0 to 6.3 automatically to within 0.1 for power levels from nominally 20 to 2000 watts even under SSB modulation
Frequency range of 1.8 to 30 MHz
Insertion SWR negligible under 30 MHz



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* Patent pending

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NOTCH FILTER SPECS

Notch frequency positioning continuously variable from nominally 300 to 1400 Hz
Notch depth fixed at no less than 30 dB
3 dB notch width 50 Hz low end, 200 Hz high end
May be disabled completely



BANDPASS FILTER SPECS

Center frequency positioning continuously variable from nominally 200 to 1400 Hz
Bandpass continuously variable in width from 14 Hz to greater than 1400 Hz — 3 dB, 140 to greater than 1400 Hz — 20 dB
Bandpass controls are completely independent of notch controls

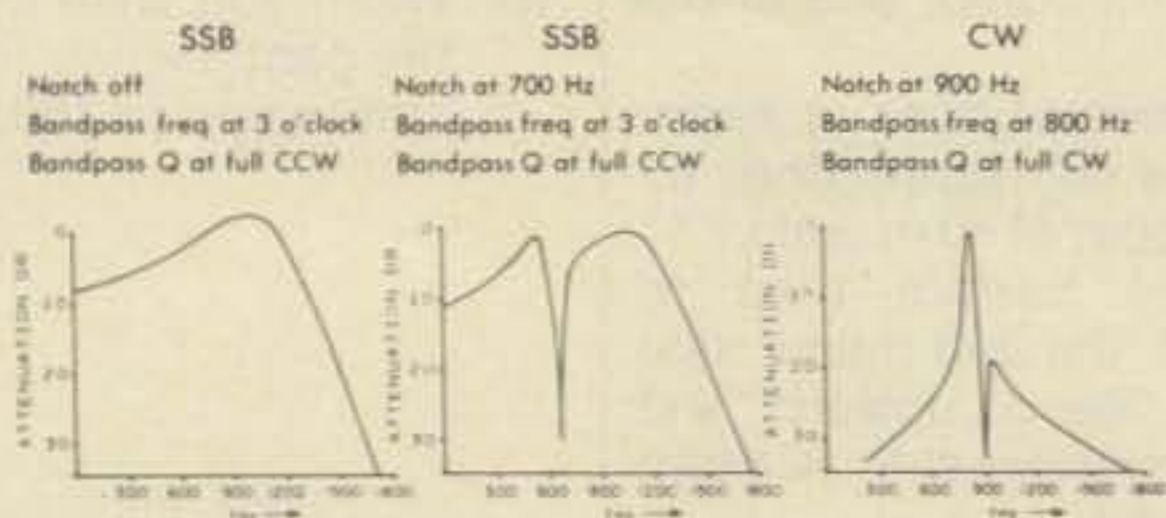
SL-55 Audio Active Filter

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HERE ARE THE PERFORMANCE CURVES



NET: \$72.50

Collins gray cabinet and dark gray wrinkle panel

all products postpaid in the USA and Canada. Virginia residents add 4% sales tax

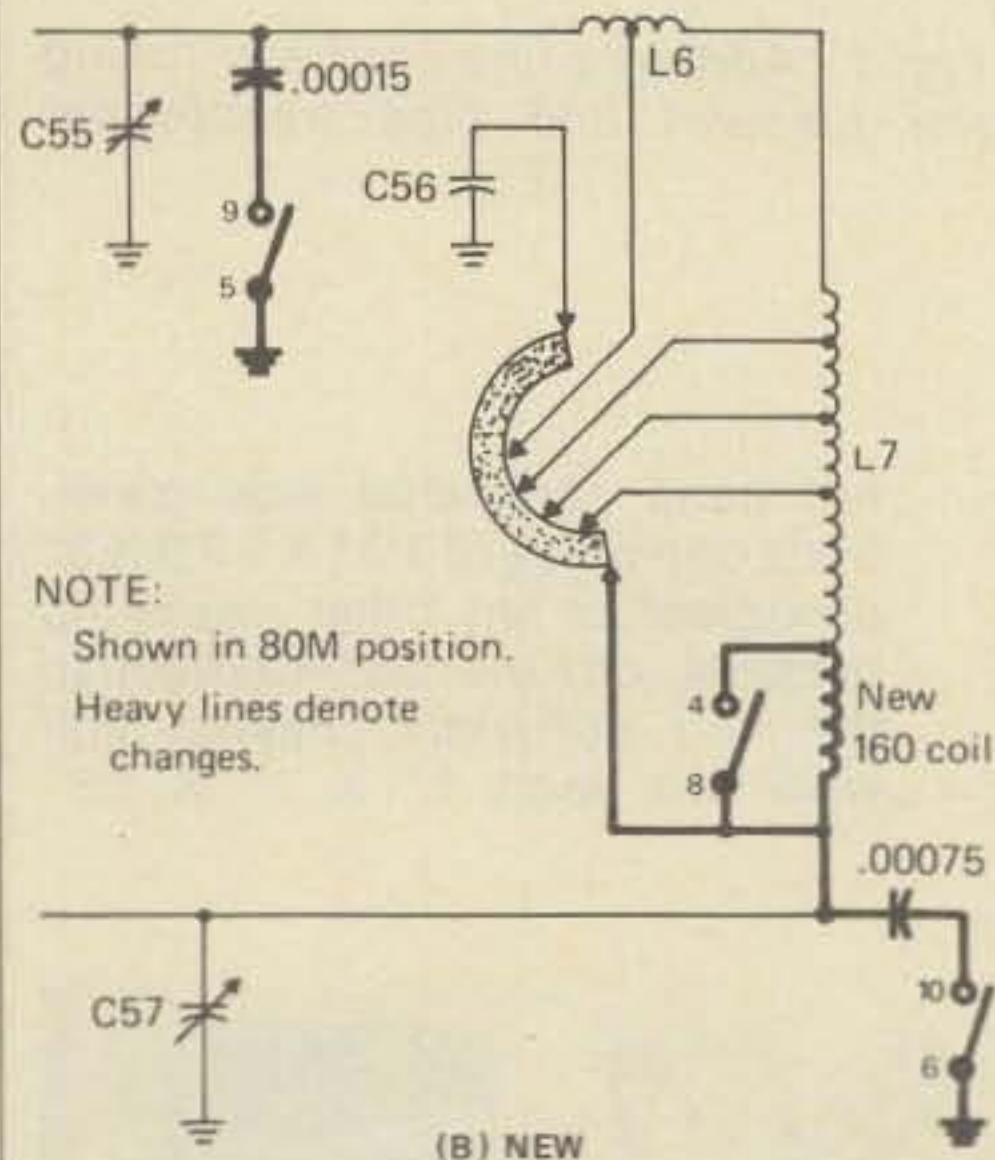
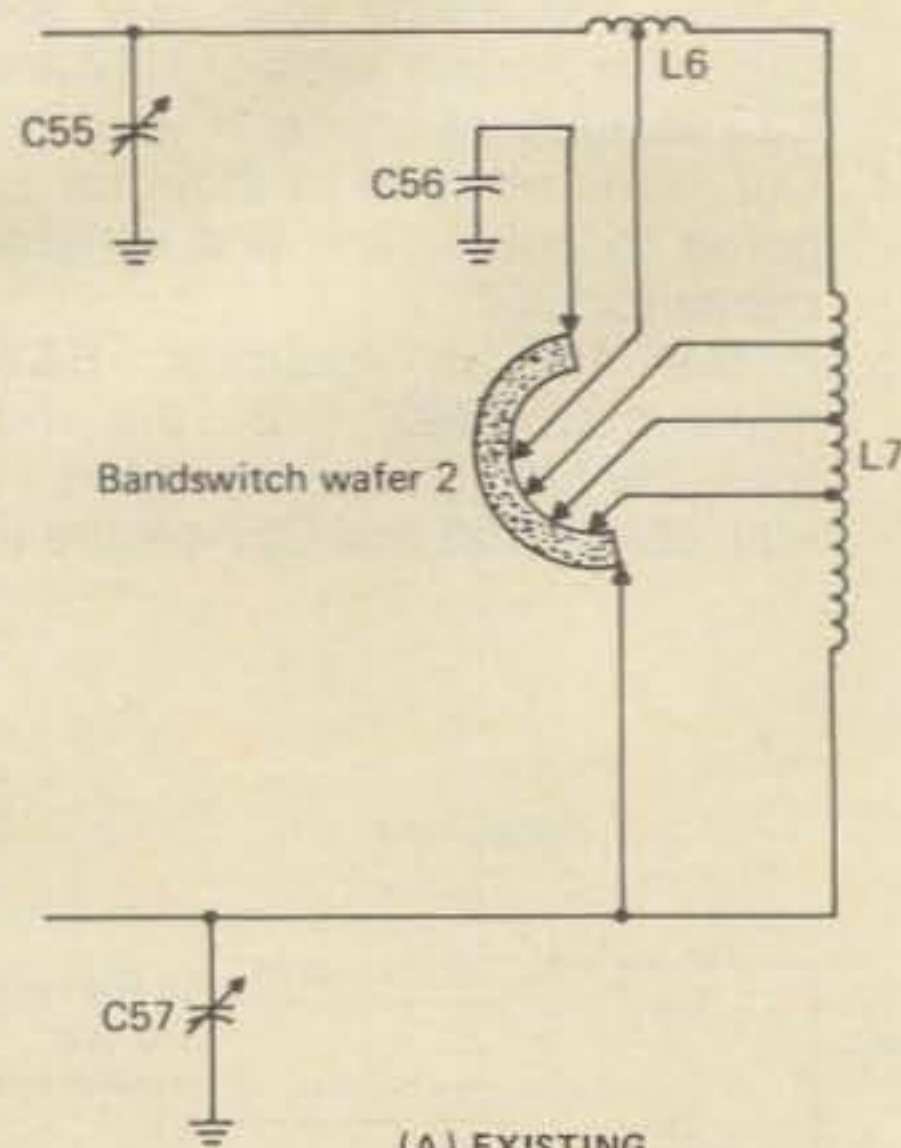
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Please send all reader inquiries directly

the other bands.

17. When you wish to tune any band other than 160, switch the toggle to the down position marked 80 and leave there.
18. This modification will not hamper the operation of any of the other bands.
19. If you use the voltage regulator system, do not allow drive to be applied without the place voltage being on, as damage to the 3-500Z's will result.

That's all there is. Have Fun. □



NOTE:

Shown in 80M position.
Heavy lines denote changes.

Fig. 5 - Adding the toggle switch and the new 160 meter inductor.