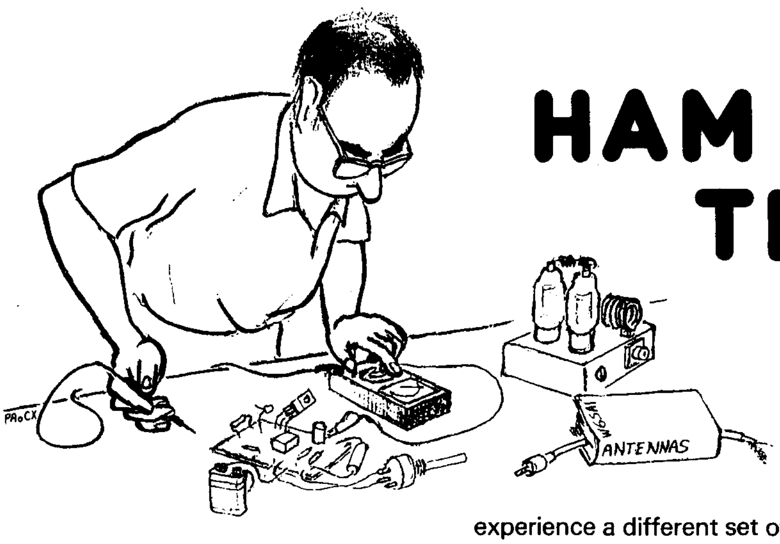


HAM RADIO TECHNIQUES

Bill Orr, W6SAI

"Son of Woodpecker," or, more of what we don't need!

The good news is that the sunspot cycle is rapidly rising and the MUF is increasing. Ten meters is now a *real* DX band. The bad news is that the rising MUF has revealed some noxious interference in the Amateur bands, and it's bound to get worse before it gets better.

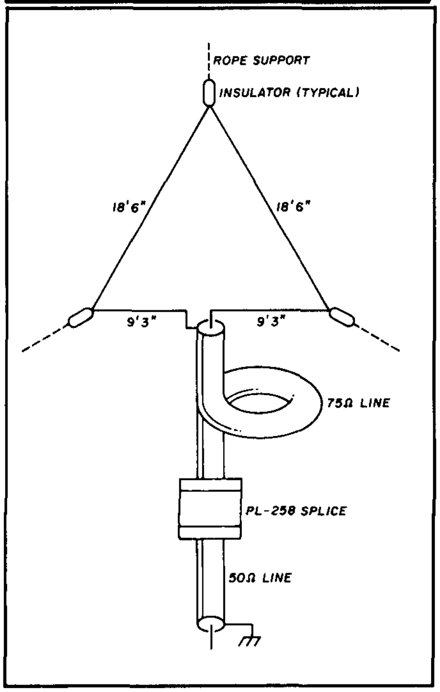
The interference I'm referring to is the "son of Woodpecker" radar signal in the 12-meter band. This buzzing source of interference is centered around 24.95 MHz and seems to be missile-tracking radar. It has a high repetition rate and sounds like a bumblebee. The signal peaks during the afternoon hours, indicating it's to the west of the Continental United States. When propagation is good, the buzzing noise blankets a large portion of the 12-meter band.

Direction-finding exercises have spotted the radar in the vicinity of Lake Baikal, and south of the city of Ulan-Ude, Siberia. I don't know if the radar runs continuously; I've only heard it at those times of the day when the MUF is high enough to support a propagation path between Central Asia and the United States. Unfortunately, the radar signal will become more disruptive as the MUF rises. And when the radar is absent, the "Woodpecker" takes over! What's next?

"Quickie" antennas for 18 MHz

It's fun to get on a new band and experience a different set of operating conditions. When the 24-MHz band was opened for general Amateur use, I found this band's propagation modes quite different from those on either the 21 or 28-MHz bands. As more Amateurs gain experience on 18 MHz, they'll find the propagation different from that on 14 or 21 MHz. I have monitored 18 MHz for years and have run transmissions using an experimental license (KM2XDW). Propagation experiments with the Cocos-Keeling Islands and India show that 18 MHz will quickly earn a reputation as a first class DX band!

FIGURE 1



Delta loop for 18 MHz. Coax transformer is 9 feet long, plug tip to plug tip. It's wound into a coil about 6 inches in diameter.

You can't do much on any band without an antenna. Here are several "quickie" antennas specifically for 18 MHz that are easy to build and put into service. They're designed to be hung from a yardarm on an existing tower. Because these antennas have their own feedlines, you don't need to disturb anything in the primary antenna system. The tower doesn't affect their operation, and the wire antennas don't interact with the antenna atop the tower.

The 18-MHz delta loop

The delta loop in **fig. 1** is a good "first" antenna for 18 MHz. It has a slight gain over a dipole and is very "user friendly." The feedpoint impedance of the loop is about 120 ohms. Use a 75-ohm quarter-wave transformer to provide a reasonable match to a 50-ohm coax line. The transformer is wound into a coil to choke off RF currents that might flow on the outside of the coax shield.

The feedpoint of the loop terminates in an SO-239 coax connector mounted on a small insulator plate. The transformer has PL-259 plugs on both ends. Make the splice between the transformer and the 50-ohm line with a PL-258 splice adapter. After making the connection, weatherproof the plugs and adapter with coax tape or heat-shrink tubing.

The loop is supported at the apex and the side insulators are tied off to objects nearby. The radiation pattern is similar to that of a dipole and is horizontally polarized.

A multiband version of the delta loop

You can operate the delta loop on the 18, 21, 24, and 28-MHz bands if

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Realistic, America's premier brand of scanners, CB radios and satellite TV systems introduces the HTX-100, the perfect first rig for a beginning Ham and a superb 10-meter mobile radio for any amateur. It's compact, yet loaded with "big rig" features.

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An easy-to-program memory stores 10 favorite frequencies and mike-mounted pushbuttons permit safe and easy up/down frequency selection while you drive. A front-panel lock control prevents accidental frequency changes. You can fine-tune reception with the ±1.5 kHz RIT control. Coverage is 28.0 to 29.6999 MHz, USB or CW. Convenient semi break-in keying and CW sidetone are built in.

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You can select 25-watt or 5-watt QRP power output from the front panel. The HTX-100 has a backlit LCD frequency display with mode and tuning-step indicators. You also get a 5-step LED signal/RF power meter, noise blanker, hefty 3-watt audio output, high-quality built-in speaker, front-panel headphone jack and a rear-panel jack for adding an external speaker.

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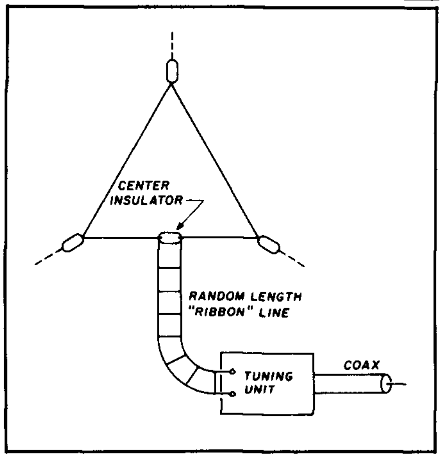
FIGURE 2



Balanced line feed with antenna tuning unit at station permits multiband operation of delta loop shown in *fig. 1*.

you feed it with a two-wire balanced line as shown in **fig. 2**. Transmitting-type 300-ohm ribbon line is satisfactory. You can also use open-wire style line. Match the line to a coax feed system by way of an antenna tuner (ATU or Transmatch) located at the station.

If you have difficulty loading the antenna on a band, change the length of the line between the antenna and the ATU. There is a standing wave on the line, and a particular line length may present an unacceptable load to the tuning unit. To solve this problem, add a few feet of line (a foot at a time) until you get a satisfactory match.

The bi-square array for 18 MHz

The diamond-shaped bi-square beam is much larger than the delta loop, but provides about 3-dB gain. This is a great antenna to try if you have the space. It's shown in **fig.3**.

The loop is a half wavelength on a side and open at the top. The feedpoint impedance at the bottom of the loop is about 2900 ohms; I use a two-wire 600-ohm quarter-wave stub to provide a more reasonable impedance value of about 122 ohms. Match it to a 50-ohm coax line by adding a quarter-wave transformer made of 75-ohm coax. Wind the 75-ohm line into a coil about 6 inches in diameter to reduce RF currents flowing on the outside of the coax. Under these conditions, the SWR on the transmission line is less than 1.2:1 across the band once the antenna is adjusted for resonance.

Tuning the antenna

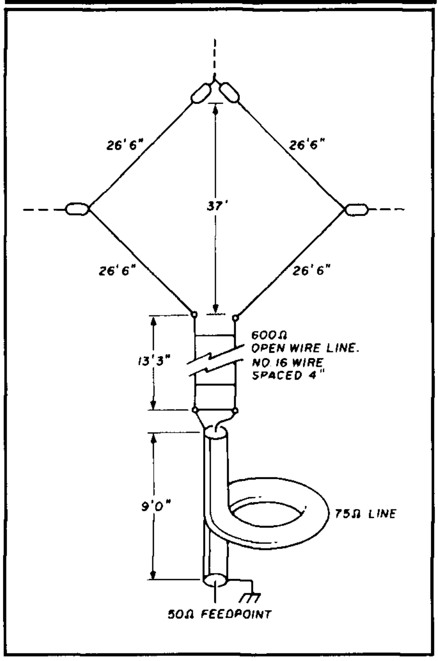
Resonate the loop and stub to 18.1 MHz with a dip meter. Temporarily close the stub at the bottom using a movable short with a 1-turn loop in the middle. I made mine with two copper alligator clips so I could move it up and down the stub a few inches. I adjusted the position of the short until I achieved antenna resonance with the dip meter, as monitored in a nearby receiver. As soon as you find the resonance, remove the short and place an SO-239 coax receptacle across the bottom of the line.

You'll need to waterproof the coax receptacle and all plugs and splices in the system. It's imperative to use coax tape or other weatherproofing compounds to keep water out of the line.

An extended dipole for 18 and 28 MHz

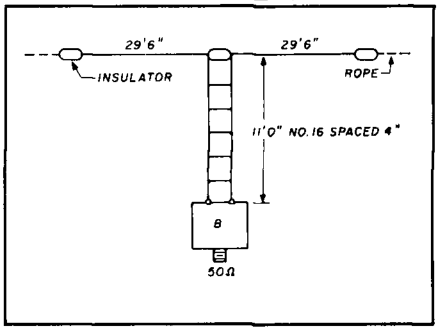
The extended dipole in **fig. 4** will work on the 18 and 28-MHz Amateur bands. I discussed the theory behind this antenna in my April, 1987 *Ham Radio* column. The antenna consists of two extended half waves in phase on 18 MHz, fed by an open-wire matching stub. The total wire length of antenna and stub on 10 meters is about 2-1/2 wavelengths. You can achieve a good resonance on both bands. The feedpoint impedance is close to 50 ohms.

FIGURE 3



"Bi-square" beam provides a bi-directional pattern and about 3-dB gain over a dipole. Note that top of loop is open.

FIGURE 4



Dual-band dipole is fed with open-wire section and 1:1 balun (B). Antenna may be mounted in inverted-V configuration.

The antenna presents a typical dipole radiation pattern on 18 MHz; on 28 MHz the pattern has a cloverleaf shape.

Use a 1:1 balun at the feedpoint or coil the coax line into a 5-turn RF choke, as described for the previous antenna.

A trap dipole for the 18 and 24-MHz bands

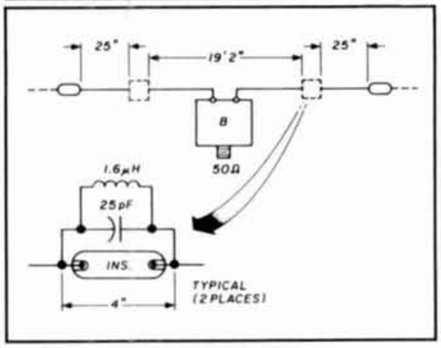
This simple trap antenna covers the 18 and 24 MHz bands and makes an ideal companion to a tribander beam. The two antennas cover all bands between 20 and 10 meters at the flick of a coax switch.

A practical design is shown in **fig. 5**. The trap is designed around a 25-pF 5-kV ceramic capacitor. You can find some of the older Centralab-type 850 capacitors at flea markets. High Energy Corporation, Lower Valley Road, Parkesburgh, Pennsylvania 19365, manufactures new capacitors. The coil is made of Barker and Williamson coil stock. The coil-capacitor combination is mounted to a short ceramic insulator, as shown in the illustration.

Before placing the traps in the antenna, check their frequency with a dip meter and a calibrated receiver. The design frequency is 24.95 MHz. Place the trap in an area free of metallic objects and couple it loosely to the dip meter. Note the resonant frequency; it should be within ± 100 kHz, of the design frequency.

One end turn of each trap can be broken free of the coil bars, and moved about or trimmed to set the exact point of resonance. Do this after attaching the trap to the insulator — the capacitance across the insulator influences the resonant frequency of the trap to a degree.

FIGURE 5



Trap antenna for 18/24 MHz. Trap is mounted across ceramic insulator. Coil consists of 12-3/4 turns, no. 20, 5/8-inch diameter, 16 turns/inch. (Barker and Williamson 3007.)

You can trim the end sections "on the nose" by erecting the antenna in the clear about 6 feet above the ground. Place a half-turn coil across the center insulator of the antenna and check the 18 and 24-MHz resonances with a dip oscillator. Removing 1 inch on each side of the center sections moves the resonant frequency 100 kHz at 24.9 MHz. You must adjust the inner sections before resonating the tip sections. I cut my tip sections about a foot long and twisted the extra length back on the antenna. I took off the extra length upon reaching the right resonant point at 18.1 MHz. The SWR across either band will be less than 1.5:1 when the antenna is in place.

A really simple shortwave receiver

Are you tired of modern high-tech radios? Do you yearn for the good old days when radios had only a couple of knobs? Well, **fig. 6** shows the receiver for you. The radio uses only three tubes and runs on inexpensive A, B, and C batteries. I've included a layout of the aluminum chassis to help you build this little set. You say your local ham store doesn't carry plug-in coils, radio tubes, tube sockets, tuning capacitors, etc? Well, what does it carry?....Oh!

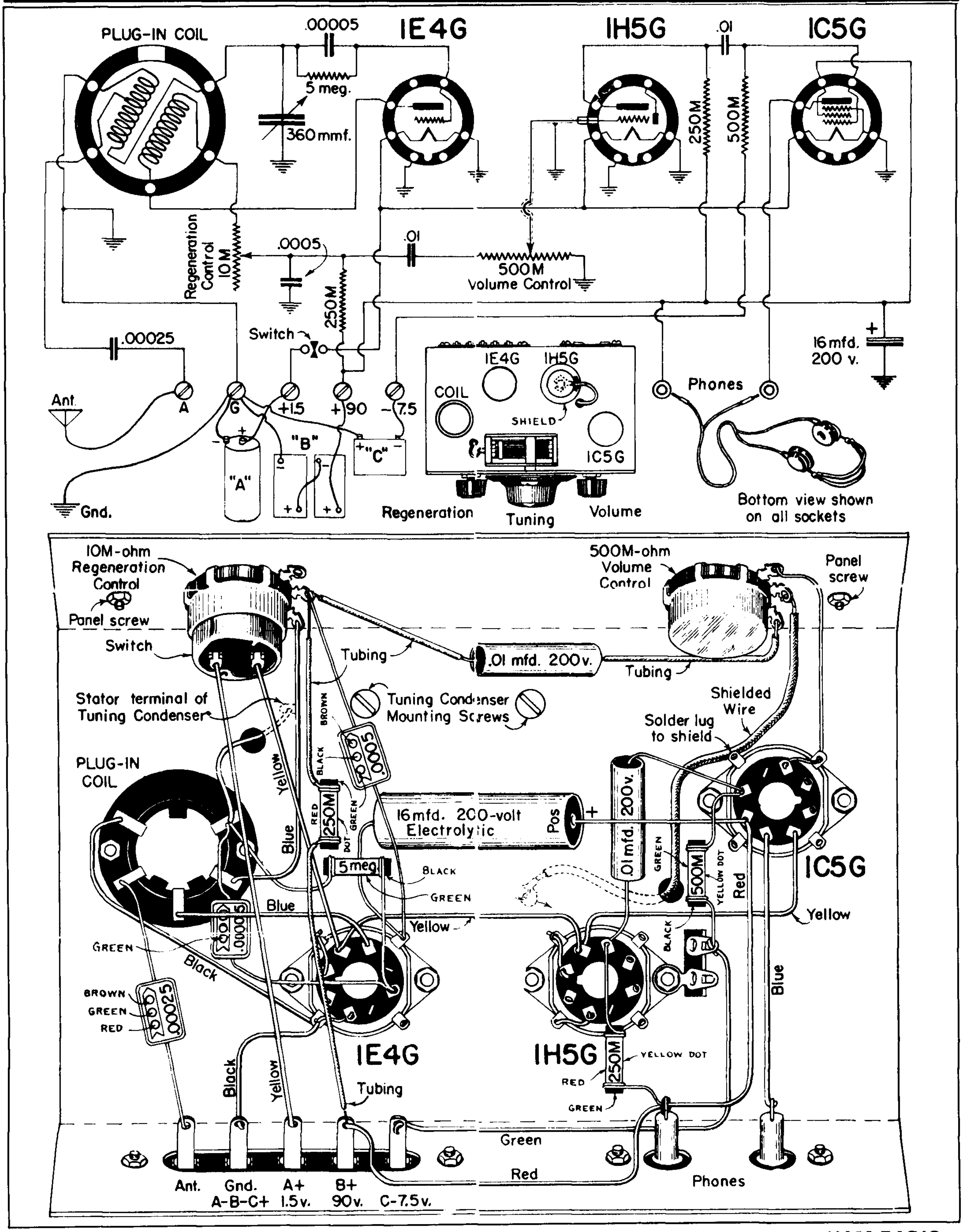
The W6SAI "Dead Band" contest

I salute my readers who spotted the quotation from *Catcher in the Rye*, by J. D. Salinger. The remark was made by the anti-hero, Holden Caulfield. Kudos to the following with a special salute (*) to those who really know their rye:

Tony Emanuele, WA8RJF; Lou Axeman, N8LA (*); Bill Wootton, WO7J; Steve Buol, KBØBDS; David Raskin, W5TYL; Jim Fox, N7ENI; Jack Starin, WF8M; Bob Eslaire, W9UI/8; Larry Walsh, W5SMA; Martha Wilder, N3FZB; Phil Brandt, W3ELJ; Bruce Rossi, NF7J; Jim Lignugaris, N2IDV; Dick Olson, NSØW; Marty Johnson, W3YOZ (*); Marty Davidoff, K2UBC (*); Preston Douglas, WA2IFZ; Roger Leone, K6XQ; Serafino Conflitti, VE3LKN; Eric Nichols, KL7AJ; Bill Calderwood, K1CT; Roger Tobin, N1EYZ; and Frank Smith, W4EIN. Congratulations to all!

School is out and this is winter break. No quiz this month. Instead, I want to recommend a great book. It has nothing to do with Amateur Radio, but it's the best adventure story I've ever read. It covers territory from Vladivostok to Odessa in an exciting tale about two great men. *The Cowboy and the Cossack*, by Clair Huffaker was published by Trident Press, New York (1973). Unfortunately the book is out of print, but it's worth your time to check in a second-hand book store. This is a wonderful book to read when the band is dead!

FIGURE 6



Article B **Schematic of 3-tube regenerative receiver. Just the thing for the new Amateur!** **HAM RADIO**