

A HOMEBREWED SLOT ANTENNA FOR 432 MC

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A LOT of hams must have built the homebrew slot for two meters, judging from the mail I have received since this article appeared in February 1965 *CQ*¹. Many of these letters asked dimensions of the slot for different frequencies in the two meter band; others simply expressed satisfaction in the performance achieved. The original slot for two meters was 45" x 15" and was cut for 145 mc. One of the advantages of the slot antenna is that it is a broadbanded device, and I used mine quite successfully on a MARS frequency at 143.95 mc without any change in its dimensions. The purist who wants to cut exactly at 144.1 for example, would make the slot dimensions 46³/₄" x 15³/₄", not a very great difference as you can see.

All of this has no bearing whatsoever on a homebrew slot for 432 mc except to point up one of the main advantages of this fine antenna our British cousins have been using so successfully on u.h.f. The 420 mc band is 50mc wide, and if you plan to operate up in this rarified atmosphere it is well to have an antenna which is tolerant of frequency variations, gives excellent gain, and is compact in size. The slot is the best answer I can think of to all three.

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¹Baldwin, R.M., "The Homebrew Slot Antenna," *CQ*, Feb. 1965, p. 26.

My interest in this band, by the way, developed when the ham TV bug bit, but that is not part of this story. Suffice it to say that this antenna does a real fine job on ham TV and the one I built was from dimensions obtained from the Indiana TV and U.H.F. Club, an organization of avid ham TV'ers located all over Indiana and meeting every six to eight weeks in Indianapolis. Several of us Kentucky ham TV enthusiasts have been commuting to Indianapolis for these fascinating meetings held at Naval Avionics. With no claims as to originality in design, let us proceed to build it. I might say that you can also buy the British version which is imported and currently advertised for about \$25.00.

Materials

For raw materials I can suggest the same procedure recommended in the first article. Pay a visit to the TV stores in your city, and the chances are you might be able to scrounge some old TV antennas. If they throw them away as fast as they put up new color antennas, then try to arrange to be present and pick up the pieces. What I am saying is that you should be able to get material for little or nothing, but you'll need several old TV antennas as this slot is a ten over ten, and that means two booms and twenty elements including the slot.

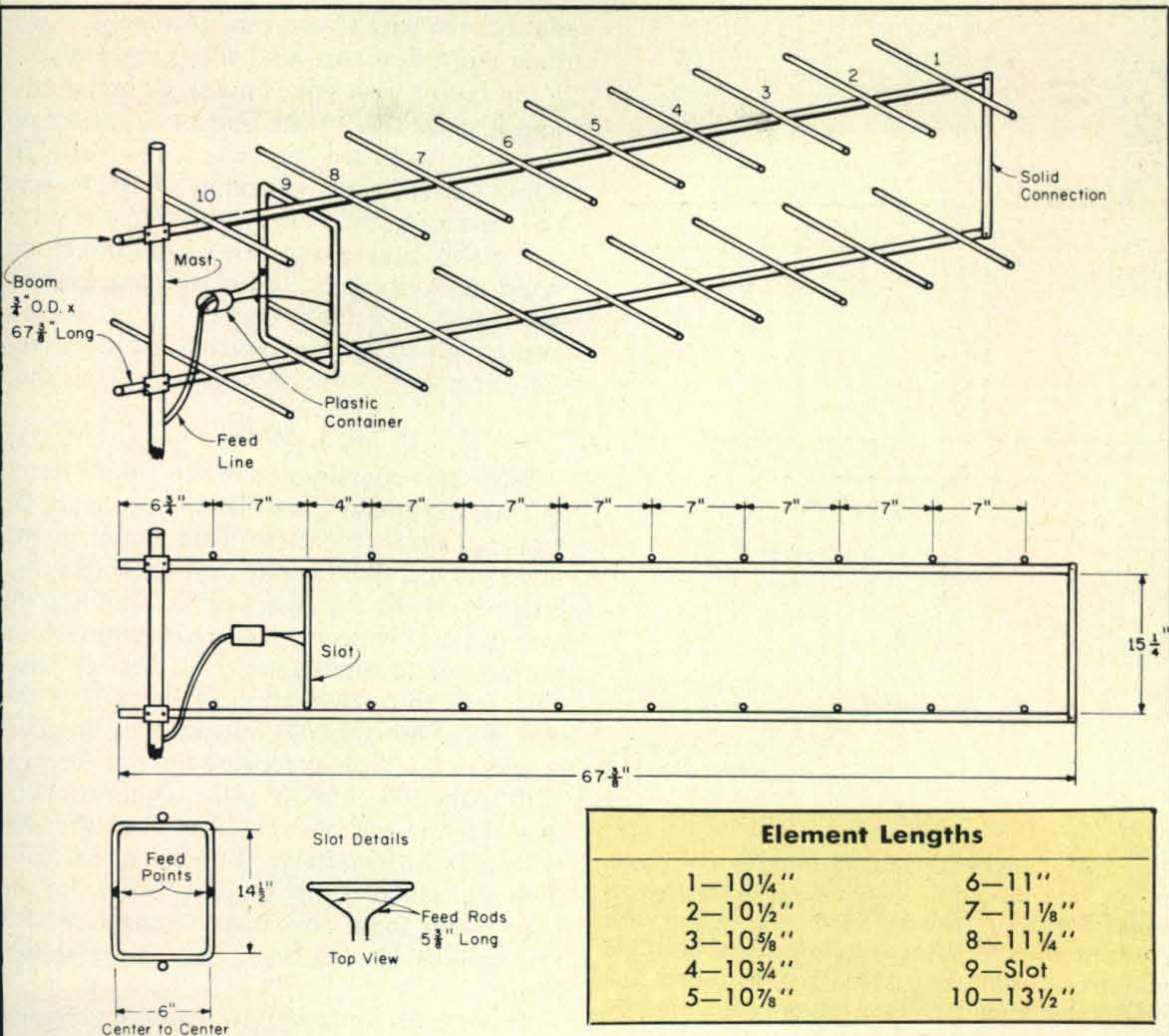
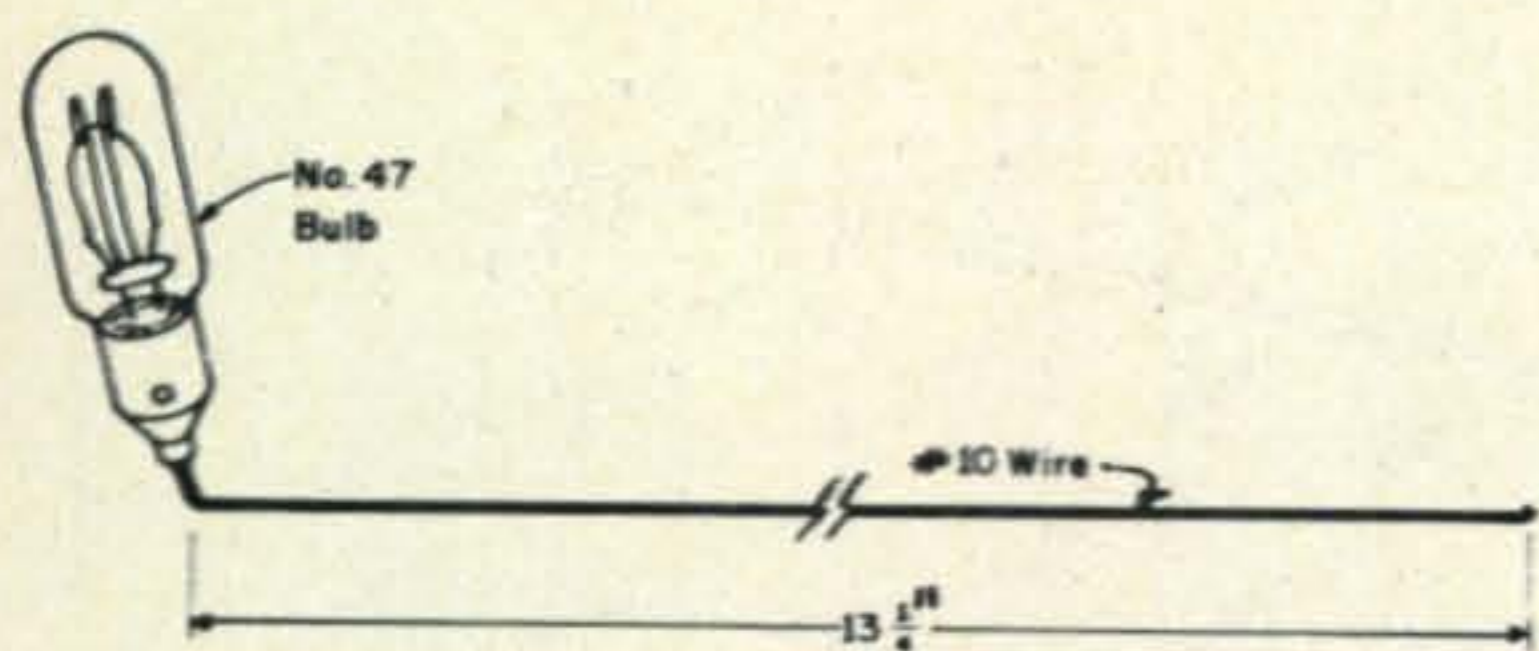


Fig. 1—Two views of the 432 mc slot antenna and details of the driven element. All elements are fabricated from 3/8" o.d. aluminum tubing while the booms and the forward upright are made from 3/4" o.d. aluminum tubing.

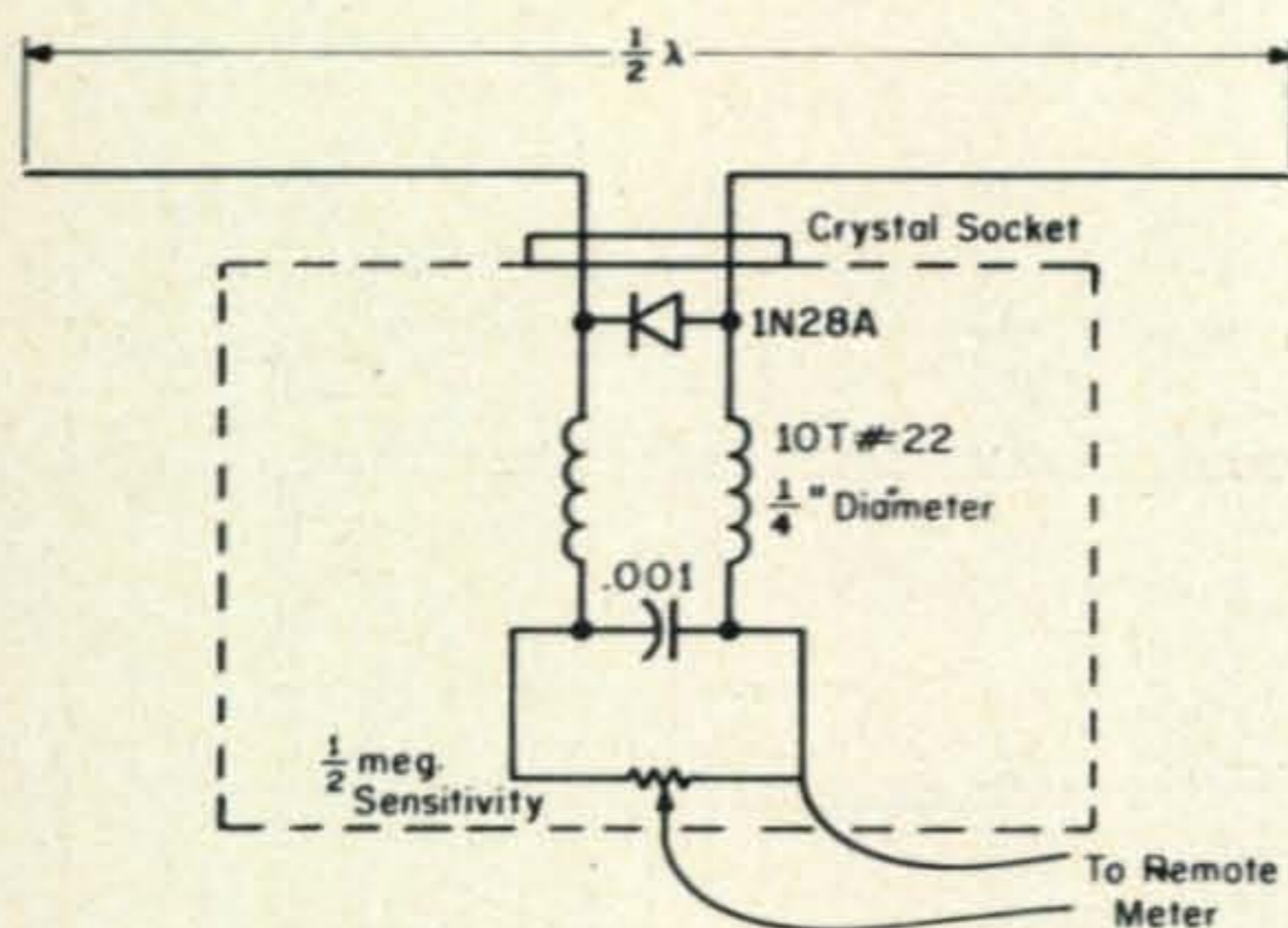
Construction

Figure 1 is a sketch of the antenna and the dimensions of its elements. As you see, it has two booms approximately 68" long and at least 3/4" in diameter. No regular TV boom will be this long, and you'll either have to piece them together or resort to other sources for aluminum tubing for the booms. If you piece them do it well so that the joint is strong. These booms are spaced 14 7/8" apart by the slot, and they are clamped to the mast by TV clamps behind the reflector which is element ten. A solid spacer also joins the booms just in front of the first director, so the assembly really is rigid after you mount it. The front spacer can be the same material as the booms, or it can be slightly smaller in diameter. Bolt it securely to each boom.

Make the reflector, and the directors out of ordinary 3/8" O.D. TV antenna elements. You will need two of each length listed in the table. The slot itself is best made from 3/8" solid aluminum rod, as it bends nicely at the corners, and is more rigid. While this is recommended, I made mine out of hollow TV elements and it works OK, although it isn't as easy to make a nice looking job or to attach the impedance matching stubs which are 5 3/8" long. These should be attached by self tapping screws through holes drilled in the slot at the mid-points on each side. They are angled toward each other, and then parallel about an inch from the ends to fit in two holes drilled in a piece of polystyrene about a half inch apart. Thread a self tapping screw and a washer into the end of each stub to attach the leads of your transmission line.



(A)



(B)

Fig. 2(A)—Simple test dipole using a #47 bulb as an indicator. (B)—Simple u.h.f. field strength meter that may be used as a tune-up aid. The antenna wire for both units should be #10, a half wavelength long, $13\frac{1}{4}$ ". The dotted line indicates a small metal enclosure sealed against the weather and mounted on the roof. The sensitivity control is set according to the power of your transmitter.

The reflectors and directors may be attached at the indicated points either with nuts and bolts or with pop rivets. I drilled holes and used pop rivets and it worked out well. In either case put a lock washer between the element and the boom, it helps prevent turning.

Pattern

One of the advantages of this antenna is that it is small enough for you to build in the basement, or wherever your workshop is, and still be able to get it out of the door in one piece. This means you can hook it up to your transmitter while it rests on a table or across a couple of chairs and check out the radiation pattern. You can also test various feed lines before you put it up on the mast. For a simple r.f. indicator solder a no. 47 dial lamp to the end of a piece of stiff wire $13\frac{1}{4}$ " long, as shown in fig. 2(A). Use

number ten wire if you can, or at least something stiff. You can hold this simple dipole in the center with your fingers, or better still tape it crosswise to the end of a yardstick. The lamp will light for quite a few yards in front of your beam, depending on the power. You can also trace the r.f. around the edge of the slot, and at the tips of the directors. Stand in front of the beam and you can see how large a pattern comes off of it. It's surprisingly sharp; move even a few inches off the direct line of fire and the lamp goes out.

F. S. Meters

We used a combination of this simple tester and a little home brew field strength meter mounted on the roof (with the meter in the shack) to test out various feed lines. (See fig. 2[B].) Between the two you can get a good idea of how efficiently you are matching your transmitter to the antenna. At first we tried coax feed through a balun at the ends of the slot stubs, but this did not produce as good results in our case as feeding the slot directly with foam 300 ohm TV cable. Other users of this antenna tell me that they feed the slot with coax with no balun. You can check your own particular situation out easily in the shack with these two handy gadgets and a few lengths of feed lines. Details are shown in fig. 2.

Having determined how you are going to feed it, be sure to weather-proof your connections at the antenna. You can use a plastic container and seal it with cement.

Because the slot has quite a sharp directional pattern, you really should provide a means of rotating it unless you plan to work only one direction on 432. If you followed the advice about putting a little field strength meter on the roof, you will find this little device handy in helping you at all times to get all possible r.f. out of your antenna. Simply rotate the antenna enough toward the field strength indicator to get a good reading and tune for maximum output.

If I've sold you on the slot for 432, perhaps you are now wondering how to get on ham TV. This is beyond the scope of this article but there has been quite a lot of good material published in *CQ* and other magazines in the past few years.

Whether you're simply tired of QRM, or interested in looking at your pal's ugly mug as well as talking to him, try the 420 to 45 mc band. It's easier than you think, and lots of fun.