Here's a ubiquitous gem of an antenna that will work from 48 MHz to 148 MHz and harmonically operate on 220 and 420 also.

A Log Periodic Antenna For All V.H.F. - U.H.F. Bands

BY T.E. WHITE*, K3WBH

The author postulated one day that a single antenna could be designed, constructed and operated on all frequencies from 48 to 148 MHz, and harmonically on the 1¼ and ¾ meter bands also. A boom limit of 24′ was a criterion, and gain requirements were set at a consistent 7 dB for all lower frequencies, rising to 10 dB on 2 meters and 11.5 dB on u.h.f. (These are honest gains over a dipole, not ephemeral isotropic manufacturer-type ballooned figures.)

Lo and behold, what emerged was a Texas-sized Log Periodic. To enhance 2 meter gain (and 432 gain: LP antennas work well on 3rd harmonic), a director string was added, projecting on a single boom out from the front terminating block of the main twin-boom assembly. By the way, electrical 3rd harmonic resonance is not exactly physically ⅓ times a fundamental length, but the broadness of the 220 and 420 bands allows for some rubber here.

Using the twin boom method of LP feeding not only provides a bridge-girder-like boom structure but enables the elements to be attached directly to the booms without insulating mounts, which would be needed on a single boom. The twin booms must however be insulated from the mast, as they are really part of the feed line. They are shorted together at the rear end only, effectively terminating the feed system and enhancing front-to-back ratio.

Not only to conserve space and turning radius, but to sharpen the forward main lobe, elements are swept forward rather than perpendicular to the booms (for some LP "Theory," see the author's April '78 *CQ* article).

This array will receive all signals in the following bands (and of course may be used for two-way contact in the ham bands):

49 MHz experimental
50 MHz amateur
54-88 TV BC
108-136 aeronautical
136-144 Govt. & satellite
144 MHz amateur
220 MHz amateur
420 MHz amateur

Thus the amateur who also likes to monitor air traffic (despite its horizontal polarization, the antenna will pick up vertically polarized aero signals quite well), and fool around with DX TV and f.m. reception will be able to do so with the very same array he operates his v.h.f. and u.h.f. gear on.

The feed system evolved for the antenna is a twin one. For all low v.h.f. reception and 6 meter work, a 50 ohm coax line is baluned to the feed point in a standard manner (the balun is cut 55″ for 6 meters; reception on other frequencies will not be adversely affected). For listening above the f.m. band and for 2, 1¼, and ¾ meter operating, a twinlead line is connected through a mast-mounted relay. Baluns for these operations are at the shack end, for lowest loss (fig. 6).

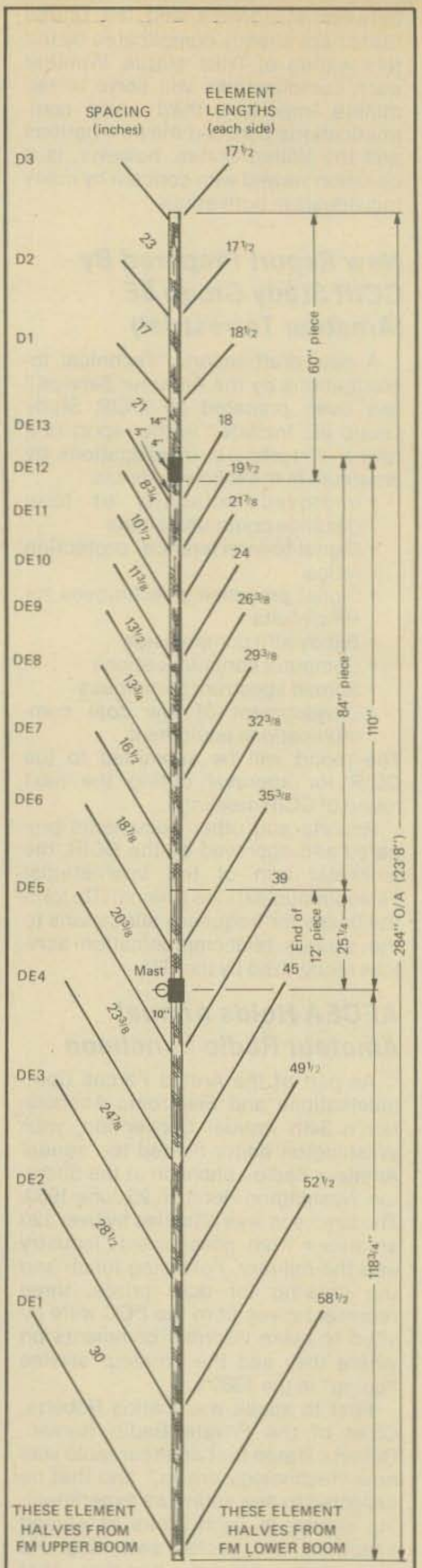

Fig. 1- Overall dimensions for the multi-band log periodic antenna.

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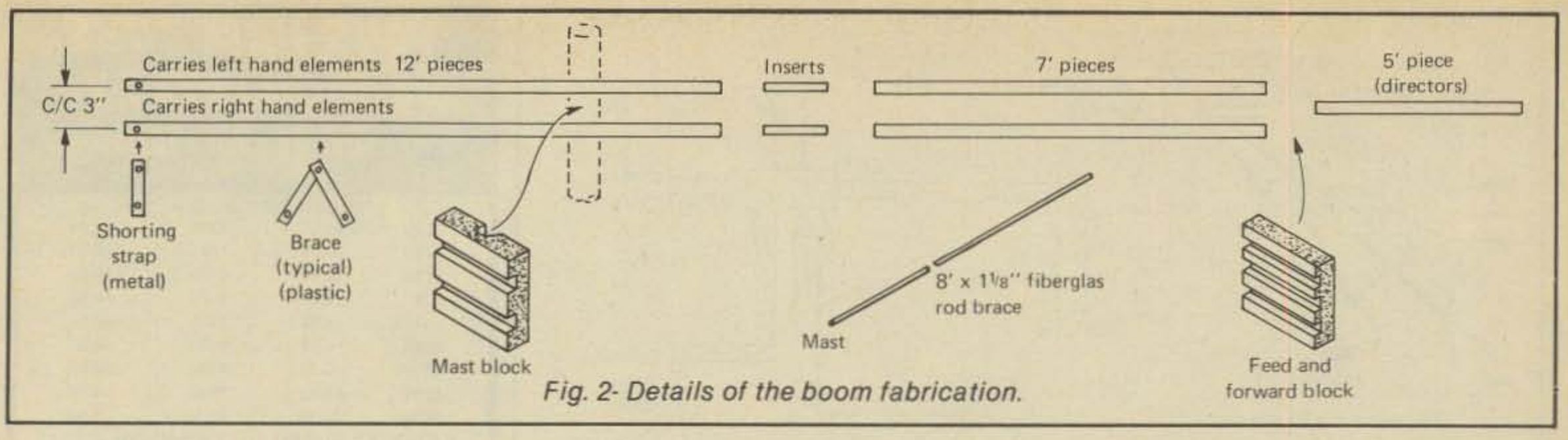

Fig. 2- Details of the boom fabrication.

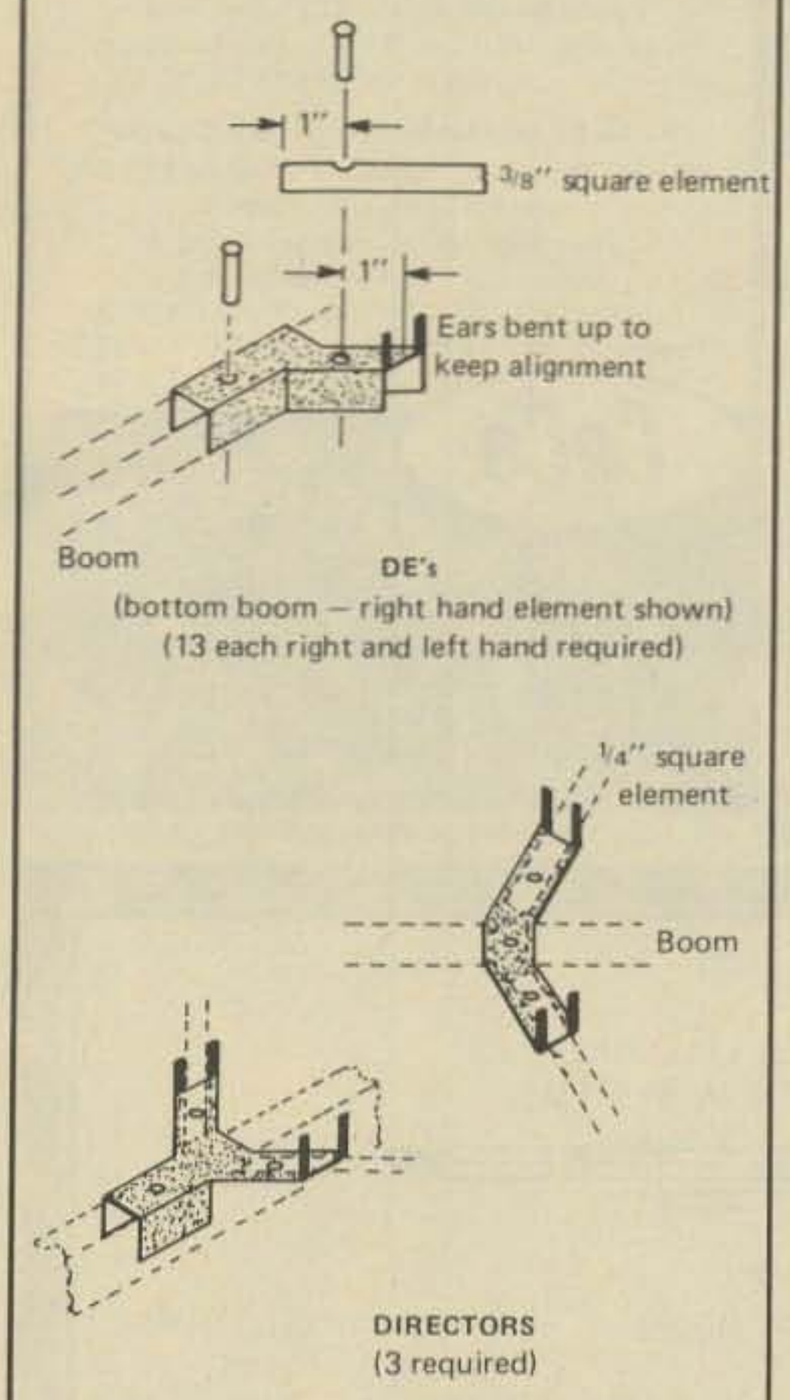

Fig. 4- Clips used to secure elements.

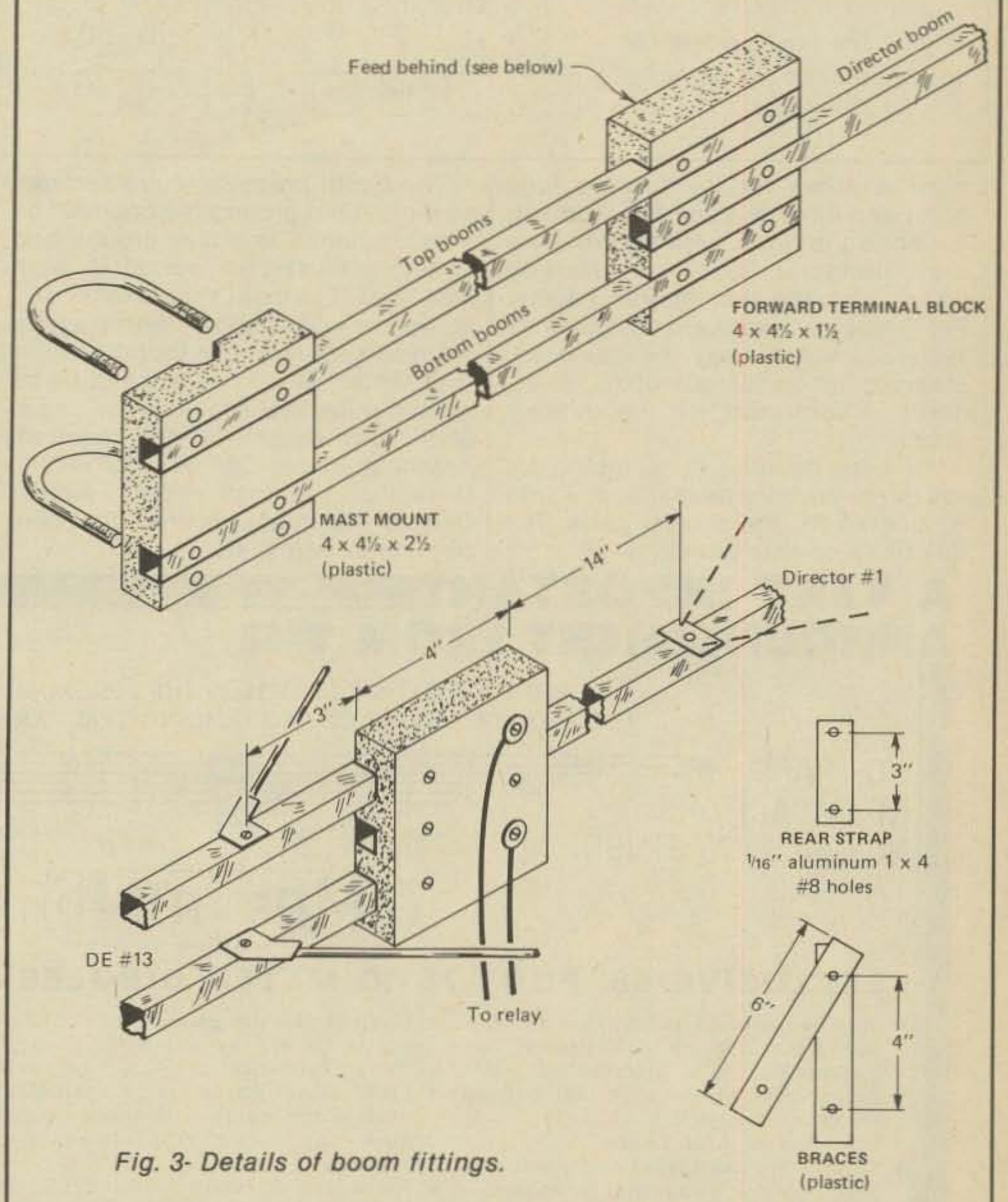

Fig. 3- Details of boom fittings.

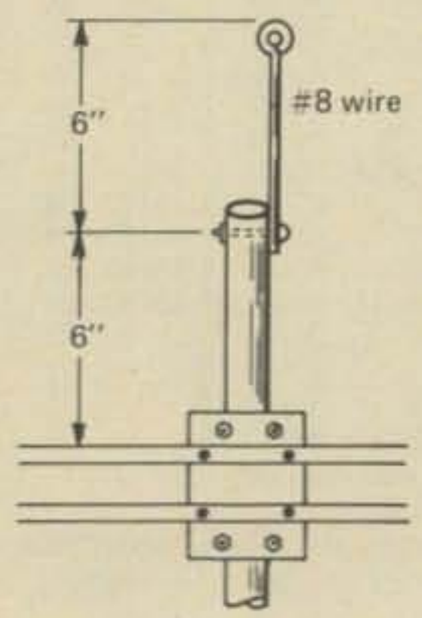

Fig. 5- A static drain.

Before proceeding to construction details, a cautionary note: This antenna will radiate any spurious out-of-band transmitter products. Make sure your rig's spurious emissions are at least 60 dB down. A low-pass filter on six is mandatory.

Square tubing is much stronger than round, and despite what you may think, offers no more wind resistance or loading. Standard 12′ lengths of 1″ sq. 60-61-T6 grade are available from stock from any Reynolds or other aluminum distributor. We need four lengths, broken up as shown in fig. 2. The whole lengths are spliced at point "T" of fig. 1 to the partial lengths, using inserts of square maple (the kind used for drawer guides in good quality furniture) about 9″ long.

Plastic blocks of hi-impact Lexan, Cycolac or equivalent, one for the

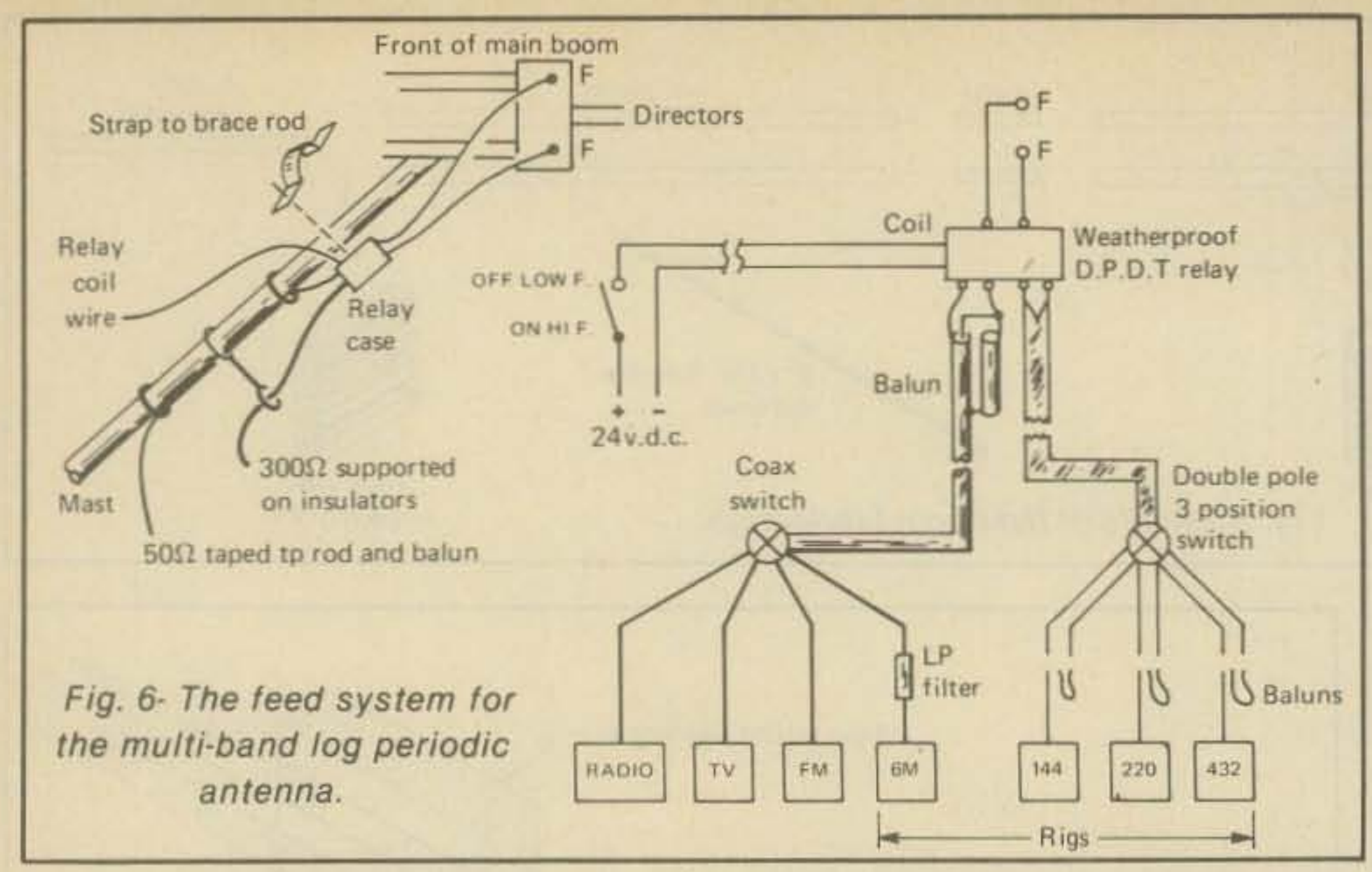

Fig. 6- The feed system for the multi-band log periodic antenna.

mast and one for the forward feed point and director boom attachment, are shown in fig. 3. Also shown there are triangular plastic stiffening straps and the rear shorting strap. Fig. 4 shows the zip element clamps required, which may be punched, stamped or diecut out of $^{3}/_{64}$ alum. sheet. Also shown are the director clips.

Element material is $^{3}/_{8}$ tubing for the larger ones in the rear and ¼ into $^{3}/_{8}$ sleeves for the shorter pairs. The director elements are all ¼".

The boom brace is fiberglass rod, as it must not ground the booms. The whole antenna is above ground and arrestors must be inserted in both feed lines. The mast should extend 6" above the upper boom, with a static drain of #8 wire above that (fig. 5).

LP antennas do not seem to be as ground-reflective sensitive as yagis, and great height is not required. Anything above 25' will do nicely. More important than height is a clear field of fire in any desired direction: no foliage, wires, etc.