BREAKOUT

The Newsletter of the Hastings and Napier Amateur Radio Clubs

Hastings Branch 13 NZART – Napier Branch 25 NZART

Volume 5, Issue 8, September 2007

Editor

John Newson

ZL2VAF

Hastings Br 13

Club Call

ZL2AS

Napier Br 25

Club Call

ZL2GT

IRLP

Node

6793

147.250

HB DX Cluster

ZL2AL-1

144.650

Connect and type

Branch Nets

9.00 AM

Sunday

Morning

3615 Hz

147.250 MHz

CQWW Winners!!!

Our world class DX team pull it off!!!

Join the KIWI DX Group

Talk to ZL2AL for Details

Inside This Issue

HASTINGS BRANCH 13

President: *Warren Harris ZL2AJ 027 564 9284 or 856-8587 email warren@technaserve.com*

Vice President: *Robert Wallace ZL2SG Ph. 878 4993 email robandtina@freenet.co.nz*
Secretary:
Treasurer: *Bill Lowes ZL2UBG Ph. 877 5078 email bill.lowes@clear.net.nz*
AREC/CD: *Robert Wallace ZL2SG Ph. 878 4993 email robandtina@freenet.co.nz*
AREC Deputy: *Warren Harris ZL2AJ 021-649284 email warren@technaserve.com*

Committee: *- John Newson ZL2VAF Ph. 879 7977 email john.newson@xtra.co.nz*
- Wayne Wilson ZL2WL Ph. 027 499 7109 email autoworxcarvalet@airnet.net.nz
- Chris Johnson ZL2VC Ph.879 5219 email zl2vc@paradise.net.nz
- Lee Jennings ZL2AL Ph. 876 6662 email leejen@paradise.net.nz
- Peter Dingley ZL2LF Ph. 843 2664 email

Hastings QSL Distribution: *Chris Johnson ZL2VC Ph.879 5219*
Hastings Newsletter Distributors: *Lee (ZL2LE) & Morrie (ZL2AAA) White Ph 876 7904 email zl2aaa@paradise.net.nz*

NZART License Examiners: *Lee - ZL2AL and Peter - ZL2LF*
Club Call: ZL2AS

Club Nights: Fourth Wednesday each month at 7.30 pm Surf Club Rooms, Windsor Park, Hastings

Hastings Branch 13 - President's Report

Hi all.

This has been a busy time for me. The 2 wheel drive an classic car rally is just about on us and I am desperately seeking operators for this event. If you are available please let me know ASAP.

670 Repeater has found a new lease on life with its replacement aerials. The signal leaving Kahuranaki is 2dB better than before antenna change and the sensitivity of the receiver is up to 10dB better, suggesting the receive antenna may have been faulty. Comments are that the interference we still get on 670 has lessened, and that Palmerston North stations are able to trigger 670 with ease, in many cases on 5W.

I'm hoping to get my own antenna tower up soon, and will forward some pics for the magazine. It has been a while coming so I am quite excited about getting it done.

The Jock White field day date has been set for the final weekend in February. Time to start thinking about teams. The VHF UHF field day is on the first weekend of December. I would like to take a team up Taraponui again. If you are keen to bear the elements at 1300m please let me know. If not, please make yourself available on the day for contact points. We won on 50MHz and 432MHz last year, and came second on 144MHz, I'm sure we can take out 144MHz this year as well. The local contacts are invaluable.

That's all for September. The next branch meeting is on the 26th. After meeting topic will be a talk on CTCSS - what is it - what can it do - what are we doing with CTCSS in Hawkes Bay.

NAPIER BRANCH 25

President: *Laurie Winton ZL2TC 843 8519* *email laurie@wilcom.co.nz*
Secretary: *Stan White ZL2ST 845 2422* *email stan.white@paradise.net.nz*
Treasurer: *Stan White ZL2ST 845 2422* *email stan.white@paradise.net.nz*

AREC: *Tony Wall ZL2RZ* *email* ***ttwall@paradise.net.nz***

Committee:

Tony Wall ZL2RZ *email* ***ttwall@paradise.net.nz***
Gary James *ZL2GAZ 843 9596* *email gazaj@paradise.net.nz*

Committee Meetings: *Third Monday of the month 7pm at Club Rooms*

Club Call: ZL2GT

Club Nights: First Wednesday each month (except January) 7.30pm at the Club Rooms: 123 Latham Street Napier

Branch 25 Napier News...

The next Napier meeting will be on Wednesday 3 October at the clubrooms at 7.30 pm

At our last meeting Peter ZL4TCC was all set to do a presentation on his visit to UK radio establishments but unfortunately the pc available did not have a suitable programme. Peter has offered to return when we can arrange a suitable pc.

The November meeting is the AGM and Pan Pac constructors trophy - get your projects ready!

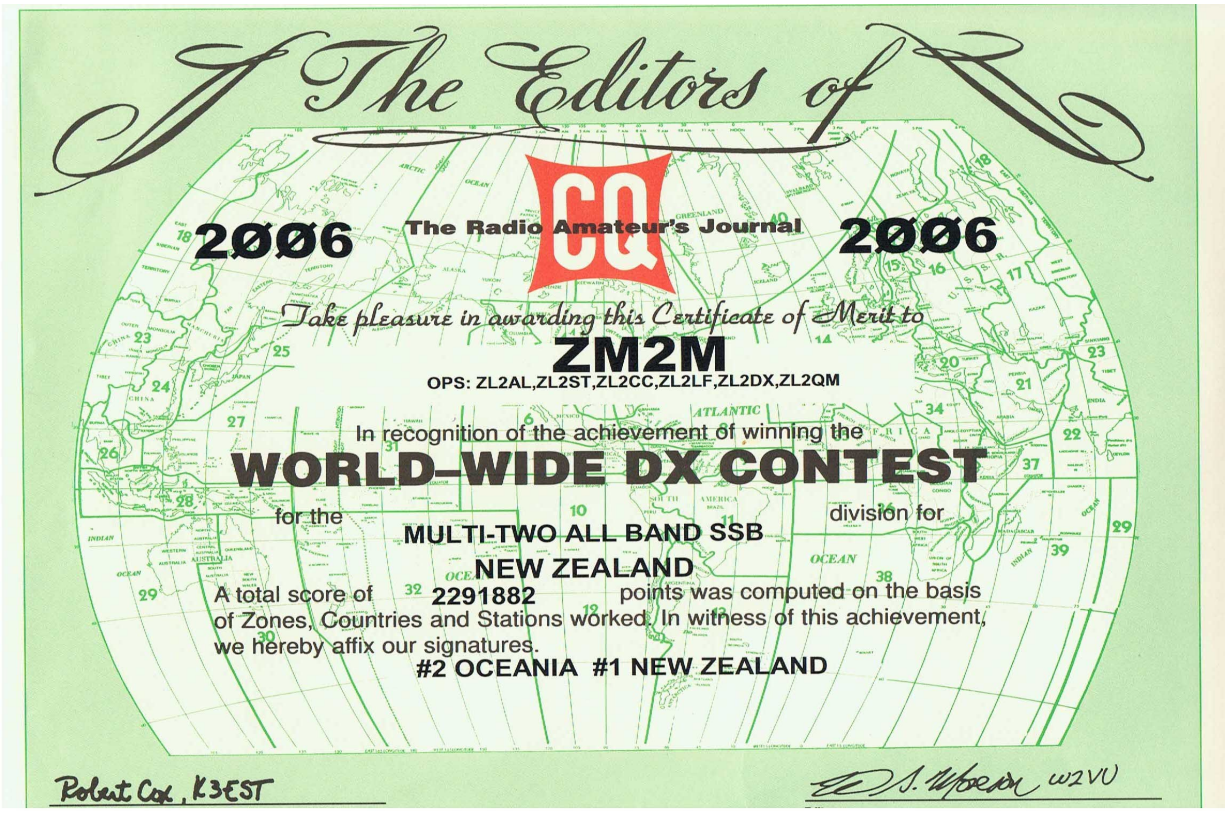
During the last month two ex club members have become silent keys. Fred Smith ZL2NP an ex Civil Aviation technician and Gordon Frazer ZL2NF ex the accountancy profession both passed away.

At this time there is again activity from St Brandon Island in the Indian Ocean. There was another group there several months ago. This group will be active until 24 September on all bands. This is the group that did 3B9C several years ago and were worked on all bands from here. To date Lee ZL2AL has them on CW on 80, 40, 30 metres while I have only scored on 80 CW at 1830 Z today. They have been worked on 160 metres by a ZL3 in the early hours of the morning.

Remember the flea market Saturday October 20 (Labour weekend) 10 am at the Pakowhai hall. If you aren't in a buying or selling mood call in and socialise with fellow hams

de STan ZL2ST

CQWW Contest Winners

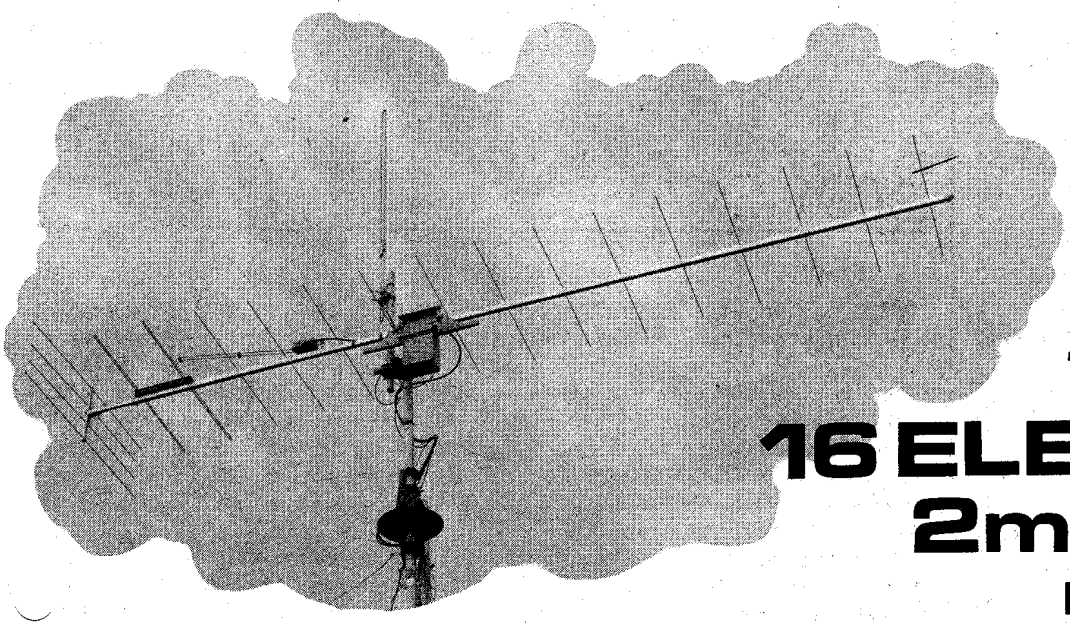


The team of Stan ZL2ST, Mike ZL2CC, John ZL2QM, Peter ZL2LF, Chris ZL2DX and Lee ZL2AL contested the CQWW SSB Contest in October 2006. With 2700 + Contact points and 2,291,882 points managed to achieve No. 1 New Zealand and No. 2 Australasia in the two station, multiband, multi operator class. It was out first time out as a team and we are looking forward to doing the 2007 Contest from the same location on the cliffs above Tongoio beach north of Napier in late October this year.

The CQWW is a very old contest with over 10,000 participants world wide each year. If anyone needs any advice on how to enter and what to do if you haven't worked a contest before please contact me. The CQWW has many different classes of entry from the huge Multi, Multi stations with amazing antenna arrays and high power on every band to small single operator, single band classes with limited antennas. It is interesting to compete as you can improve your skills, meet a lot of nice guys over the years and find out how good your station is in comparison with others in the same class. Go to http://www.cq-amateur-radio.com/cqwwhome.html for the 2007 Contest rules.

The CQWW is a 48 hour contest beginning on the last Saturday in October at 0000 UTC (around noon local time) to the same time on Monday. To achieve a certificate you will need to operate a minimum of 12 hours total time. If you simply want to pick up a few new countries you only need to go on the air as little or as often as you like.

73, Lee ZL2AL



'2BCX 16 ELEMENT 2m BEAM

F. C. JUDD G2BCX

High-gain beam aerials of the conventional Yagi type for 2-metre operation are of necessity rather long, the average being 5 to 6 metres to achieve a gain of more than about 14dBd (dB relative to a dipole). The alternative way of obtaining high gain would be a pair of beams of smaller dimensions which, suitably phased, should (in theory) provide an increase in gain of 3dB over that of one by itself. Unfortunately this rarely works out in practice, and the extra gain is usually somewhat less than 3dB.

In fact, the possibility of using a suitably matched and phased pair of 12-element ZL beams (designed by the writer and published in *PW* November 1978) was considered, since this aerial is physically smaller (3·2m) than a normal Yagi type having the same gain of 13dB. However, this would have involved double the amount of material required for a single aerial (and thus twice the cost) and a spacing between the pair of at least 0·75λ (almost 2m) in order to achieve anything approaching the extra 3dB gain. Such an array would present a rather large total area to the wind. Neither did the 12-element ZL lend itself to achieving higher gain by simply adding more directors, at least not without extensive modification and increasing the length considerably.

A gain of 3dB over the existing gain of an aerial may not seem worth while, but it does in fact mean twice the original radiated power. For example, with an aerial such as the 12-element ZL having a gain of 13dB and radiating all of, say, 10 watts applied to it, the effective radiated power (e.r.p.) would be almost 200 watts. Another 3dB would mean an e.r.p. of nearly 400 watts!

Taking into account all of the foregoing observations, it was decided to investigate the possibilities of a beam aerial that would provide at least 16dBd total gain, be not unduly long, not too expensive to construct, be of reasonably light weight and not present too much area to the wind.

The '2BCX 16-Element Beam

The basis of this aerial is a double driven element and plane reflector system, designed to provide the highest possible initial gain. The driven elements are a pair of folded dipoles, coupled by a short crossed transmission line so as to obtain current in one element in phase opposition to that in the other, i.e., they are driven with 180° phase difference. Such a system is commonly called an end-fire array (Ref. 1) which with close spacing between the elements (approx. $\frac{1}{8}\lambda$) provides the highest gain possible (nearly 4dB) with any driven linear pair (Ref. 2). The configuration of such an array and its radiation pattern compared with that from a dipole are shown in Fig. 1.

We now have a driven element system with a relatively broad bandwidth, by virtue of the folded dipoles, and a large amount of radiation in two directions which allows the use of a reflector as well as a series of directors. The self impedance of this type of array is, however, only a few ohms and this becomes even less when parasitic elements are in close proximity. Hence the use of a half-wave line section to secure a direct match to 50 ohm coaxial cable.

Details of the whole aerial are given in Fig. 2, which includes all radiator lengths, etc., but not those of the plane reflector elements, the phasing line and the matching line sections. Details for these are included in other diagrams. The total length of the aerial is 4·26m and it has a measured gain of 16dBd. Three prototypes were constructed and tested, and the final version as described here has been in use for almost a year at a height of about 25 feet above ground and 70 feet a.s.l. Distances of 100 miles and over have been worked consistently on 2 metres f.m. regardless of conditions, and large numbers of continental stations (in France, Belgium, Holland and Germany) have been worked direct with average signal reports of well over S9 during only medium "lift" conditions.

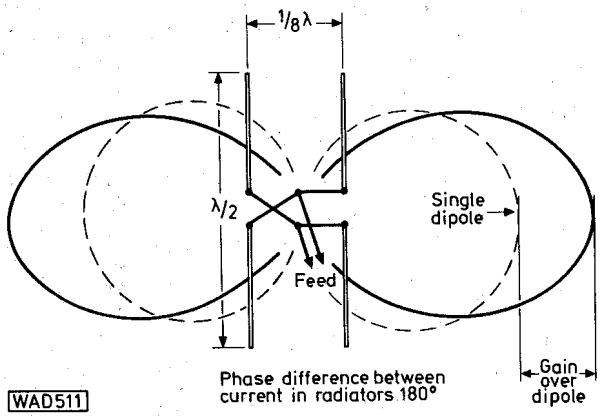


Fig. 1: Function of the two half-wave driven radiators with currents 180 degrees out of phase

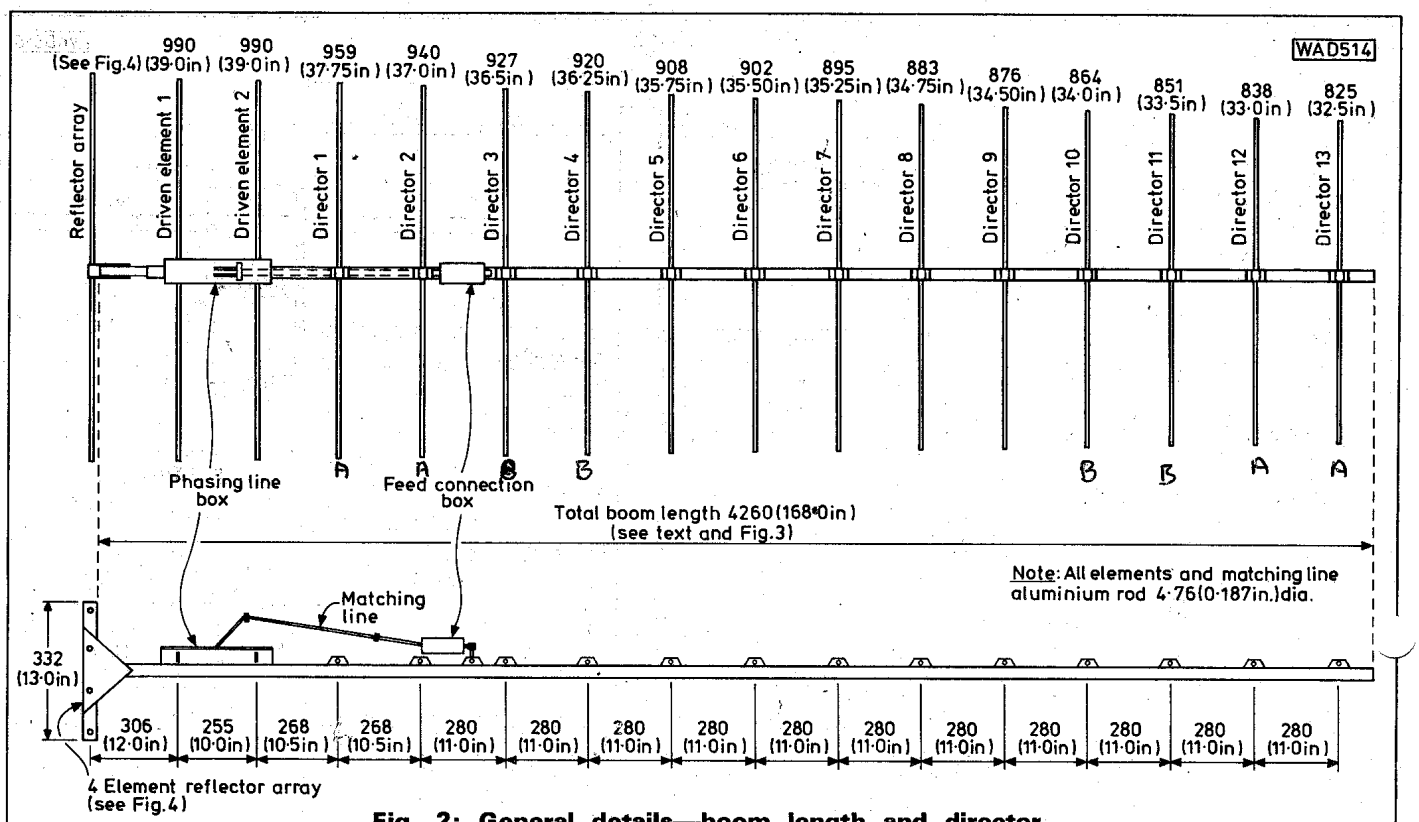


Fig. 2: General details—boom length and director lengths and spacing, etc. See also Figs. 4 and 5 for assembly of reflector and matching line

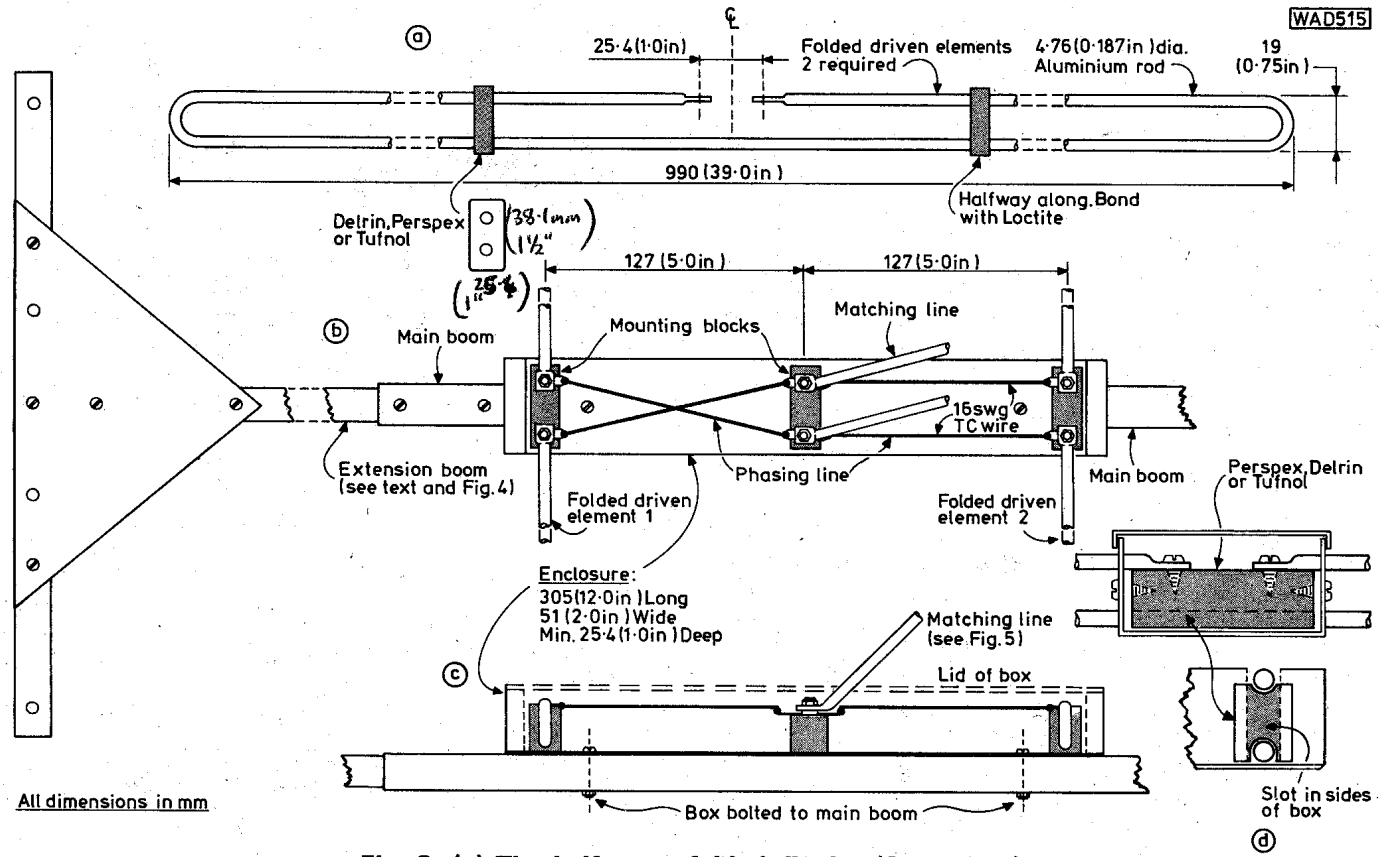


Fig. 3: (a) The half-wave folded dipoles (2 required). (b) Phasing line and dipole connections—top view. (c) Side view—box bolted directly to boom. (d) Suggested method of securing dipoles within box

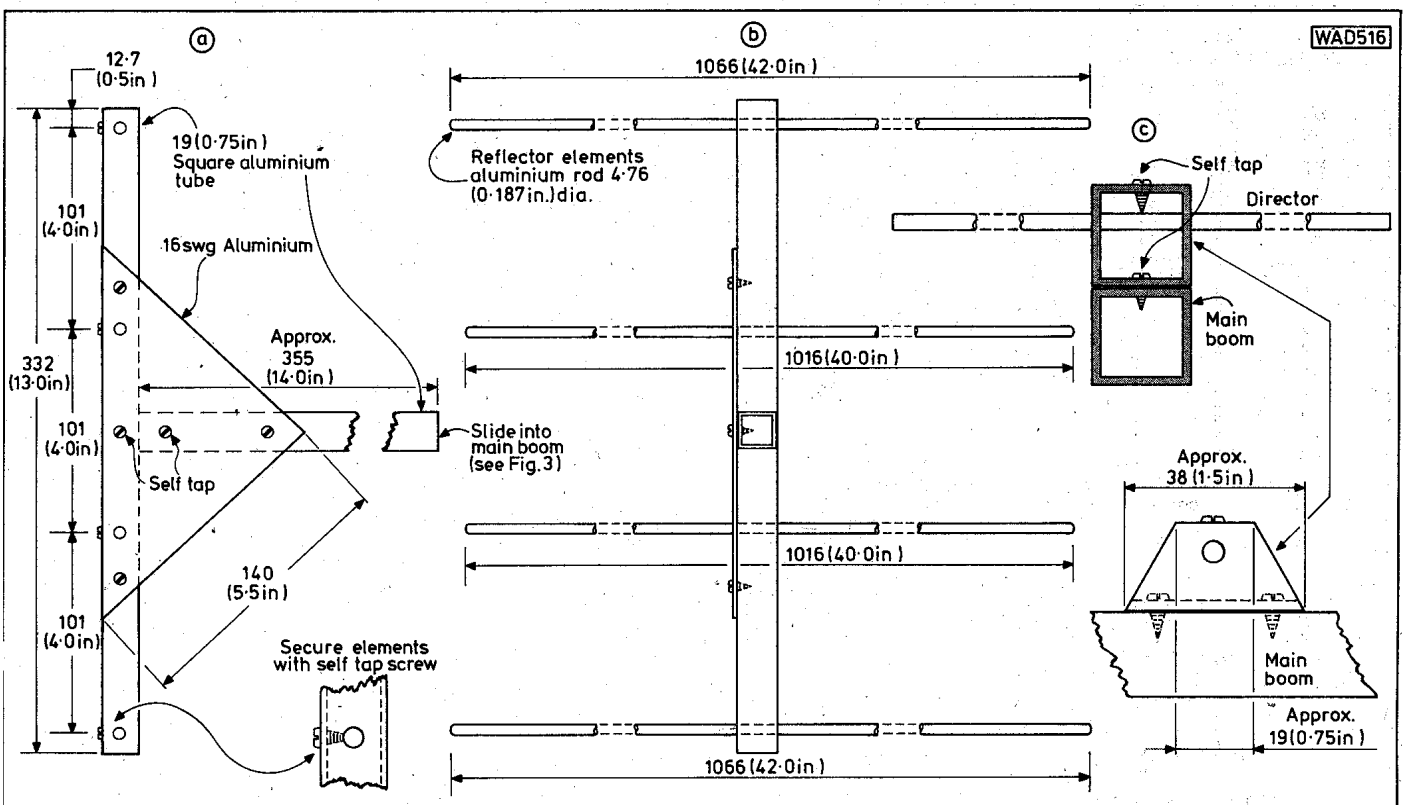


Fig. 4: (a) Side view—assembly of plane reflector. (b) Reflector details. (c) Method of securing directors to main boom

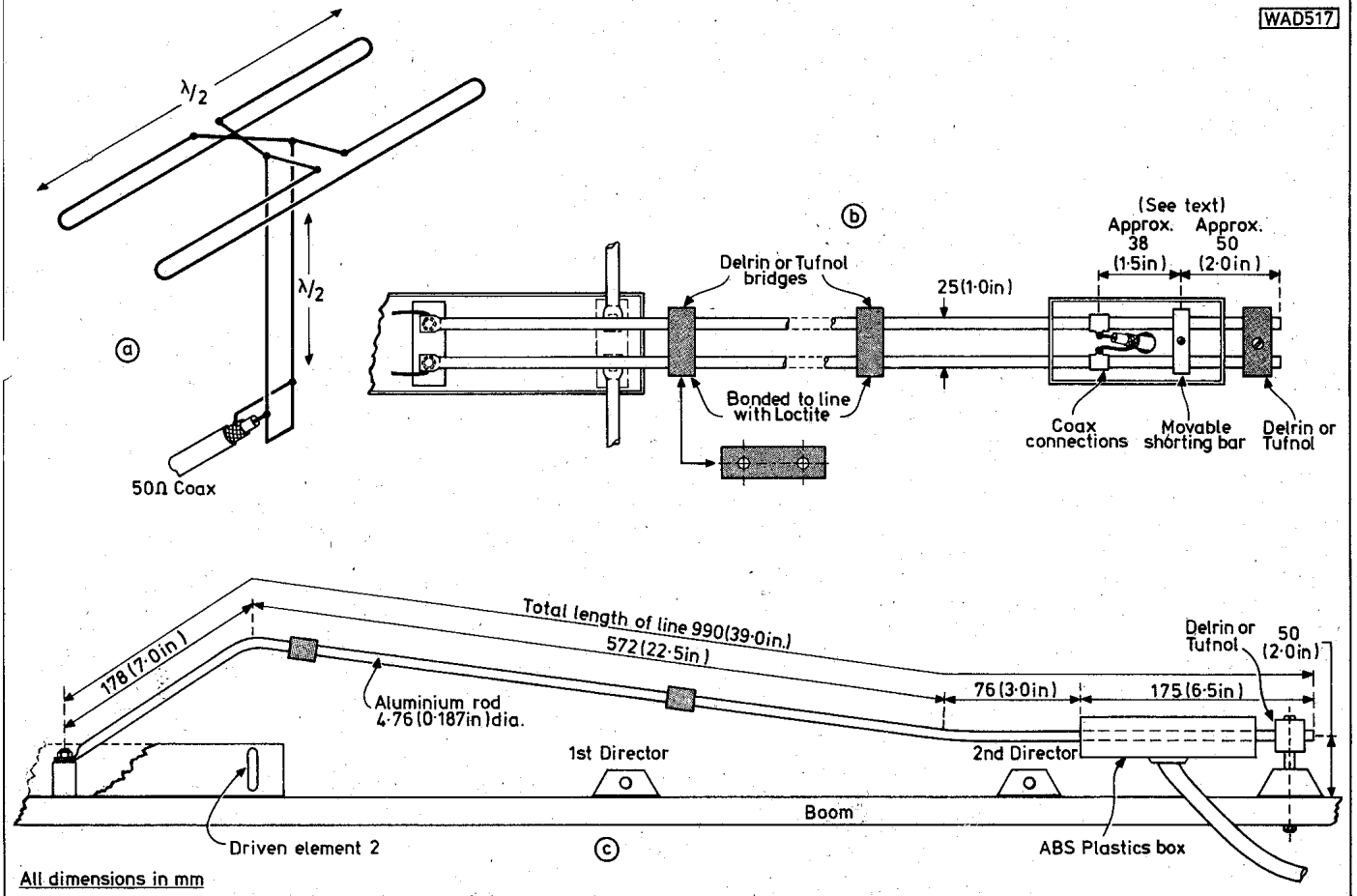


Fig. 5: (a) Method of half-wave line match to primary radiators. (b) Top view of matching line assembly. (c) Side view

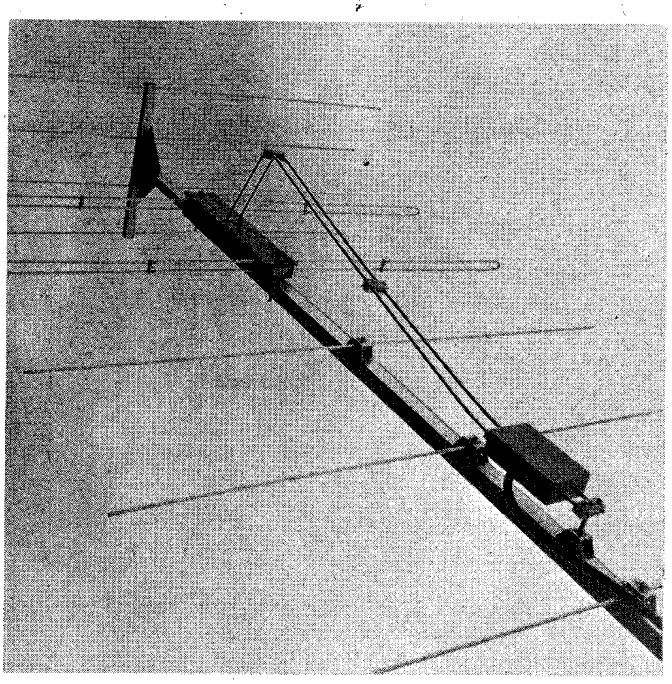


Fig. 6: Photo of phasing line box, matching line and coaxial connecting box

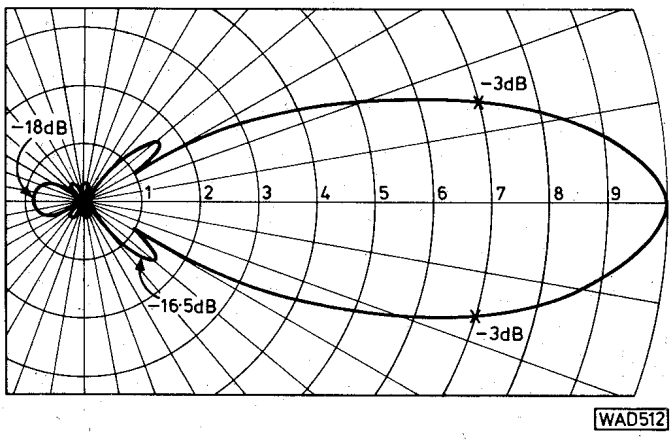


Fig. 7: Radiation pattern in horizontal mode under ideal test conditions

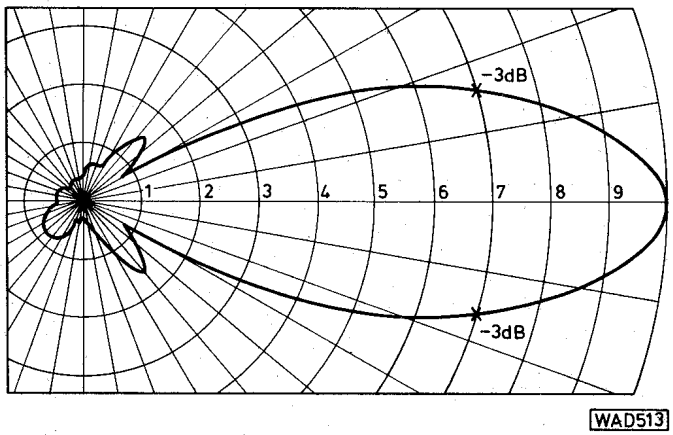


Fig. 8: Radiation pattern in horizontal mode with aerial in normal environment (see text)

Construction

All details for construction as for the prototype shown in the photo, are included in the various diagrams. It is important to maintain good insulation at the driven element and phasing line junctions, and along the matching line and at its feed point, and also to ensure that water cannot enter the phasing line and coaxial cable connection boxes.

The main boom is of 1in (25·4mm) square-section aluminium tube and this is usually sold in standard lengths of 4m. The plane reflector is therefore mounted on a short length of 0·75in (19mm) square section tube that will fit into the end of the main boom as in Figs. 3 and 4.

Construction of the two driven dipoles and assembly with the phasing line box is shown in Fig. 3. This box can be made from plastics electrical trunking, blocked at each end with Perspex or plywood about 10mm thick. The mounting blocks for the elements and phasing line may be Delrin, Tufnol, Perspex or PTFE. Note how the matching line is connected to the centre of the phasing line, so make entry holes for this in the lid of the box. The two driven elements can be "U" formed at each end by means of a round piece of metal or wood clamped in a vice. Heat the point where the "U" bend is to be made but bend slowly and gradually and don't overheat the aluminium. A trial on a scrap length is recommended. Remember however to put the element spacers on before the bends are made and thread these to the appropriate points before the connecting flats are hammered out and drilled.

Construction and assembly of the plane reflector is shown in Fig. 4. It consists of four elements to form the required plane area and the lengths of these are set to take velocity factor into account. Note also the method of securing the self-tapping screws (zinc plated) through the vertical boom, which is attached to the horizontal boom section by the triangular aluminium plate. Lengths and spacings for the 13 directors are given in Fig. 2 and these are mounted on the main boom by supports cut from 1in (25·4mm) square section tube as in Fig. 4(c).

The final part of construction is the half-wave matching line and coaxial line feed box as in Fig. 5, in which (a) shows the theoretical arrangement, (b) a view of the line from above and (c) from the side. The photo, Fig. 6, shows a close view of this assembly. Make the holes for the line just large enough for the coaxial feed box to move backward or forward to facilitate the setting of the shorting bar and the points of connection for the cabl When these have been established the box can be secured to the lines by Araldite.

Adjustment and performance

Setting the feed point and shorting bar positions are the only adjustments necessary, but must be carried out with the full length of coaxial cable to be used, preferably low-loss cable such as UR67. Set the aerial up at least 6 feet above ground and in a clear space. This will most likely be in the garden, and if the transmitter can be taken out near the aerial it will be much easier to watch the power or v.s.w.r. meter whilst adjustments are being made. Set the shorting bar and coaxial feed points as shown in Fig. 5(b). Adjust both one way or the other to obtain lowest v.s.w.r. or maximum power into the aerial at mid-band, i.e., 145MHz. It should be possible to get the v.s.w.r. down to 1·1 to 1·2 to 1 at mid-band, and this should rise only slightly at each end of the band.

continued on page 78 ▶▶▶

'2BCX 16 ELEMENT 2m BEAM

▶▶▶ *continued from page 24*

Before the aerial is finally hoisted to the mast, make sure that the phasing line and coaxial connection boxes are sealed everywhere against the ingress of water, e.g., ɔund the entry of the driven elements and matching line, etc. Suitable sealants are Scotchkote, Araldite or Evostik. Give the phasing line and its bridge spacers one or two coats of polyurethane varnish. This is important for the prevention of r.f. leakage that could occur with rain or frost.

Finally, the radiation pattern of the aerial which is shown in Fig. 7 was obtained under ideal conditions and is the true pattern with a main lobe beam width of 30° at 3dB down. The radiation pattern in the vertical mode is almost identical except that the main lobe is a degree or so wider at 3dB down. The second pattern, Fig. 8, was taken from signals arriving from a fairly long distance and with the aerial operating in a normal environment, i.e., at the top of its mast at the writer's home QTH. As will be seen, there is no distortion of the main lobe, and the minimal differences in the small side and rear lobes are due to random reflection likely to occur in normal conditions. Finally, it may be worth mentioning that the overall performance of this aerial in terms of gain and radiation pattern is virtually identical with that of a well-known commercial 16-element beam with a total length of 6m. ●

References

1. *Antennas*. Kraus. McGraw-Hill
2. *Antenna Arrays with closely spaced elements*. Proc. IRE. Feb. 1940

NOTICES

TO GIVE AWAY

a tilt over pipe mast, 40ft approx. Needs to be recovered from the site in Hastings

Flea market Saturday October 20 (Labour weekend) 10 am at the Pakowhai hall.

VHF UHF Field Day is on the 1st and 2nd of December 2007

Jock White Field Day 23rd & 24th February 2008

NZART Conference Hawkes Bay Labour Weekend 2009

Please feel free to sent notices to iohn.newson@xtra.co.nz

The Last Bit

Well I finally got the blessed thing out – sorry for the magazine being so late I am not in "MagMode" yet and do not have any articles etc waiting to go so have had to chase around at the last minute to get stuff for the magazine. As every editor says "GIVE ME STUFF!!"

Warren ZL2AJ and I went to the Daybreaker Rally and had a bit of fun sliding around in the mud there - the 4 wheel drive vehicles we had couldn't climb a slight rise due to mud so we asked the local farmer with his 4 wheel drive tractor if he could help us out and he only got halfway up the hill we were trying to get to the top of. It was then a slog to get two repeaters and all the gear required up the last half of the hill. The bloody stuff was about a meter deep once you got through the crust. I spent the day in HQ and Warren was out in the field not far from the furtherest out repeater site ready to pull down once it wasn't required any more. Pretty successful all round as far as the event and comms went.

We have had the first meeting of the 2009 Conference Committee and are underway with the stuff required for that. We have a good core team that will be looking for assistance as we go along.

Looking forward to the 2 Wheel Drive Rally – its quite a fun day out and not very stressful if you want a low key entry into, or a look at, what we do for Rally Comms. Some of the cars get really smashed up but keep on going – you gotta see it to believe it.

I would like to give Lee ZL2AL his dues – he's left me with a huge job trying to emulate what he did with the magazine, I only hope I can maintain his high standards.

Til next time

John ZL2VAF