The Moonraker MLP62 Log Periodic Antenna

David Butler G4ASR took a break from his regular specialist v.h.f. column to try out an interesting antenna on behalf of PW. Here's what he thinks...

Take a look at the advertisements in this copy of *PW* and you'll notice that many manufacturers are producing transceivers with the information in the advertising stating "wideband receive, including civil and military air band", "scanner style coverage from 100kHz to 1300MHz", and rigs that cover 50, 70, 144, 430MHz, 1.3GHz, plus all of the h.f. bands.

As a v.h.f. DXer I'm interested in all of these bands and everything in between! I want to be able to track propagation events at frequencies outside of the Amateur Bands and I make use of television broadcast carriers, f.m. broadcast stations, and aeronautical beacon stations.

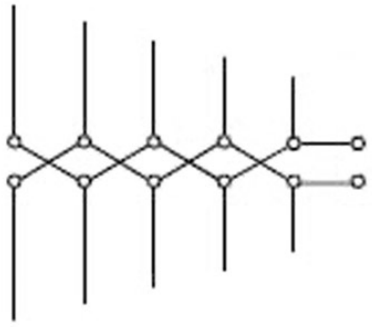

Fig. 1: The illustration shows that the log periodic antenna comprises of a set of dipoles that vary in size from smallest at the front, to the largest at the rear.

Now comes the problem! A v.h.f. DX station often operates on many bands, and it's common practice to mount a number of directive antennas onto a single mast. But not everyone can get permission for a back garden full of aluminium!

The scanning enthusiast or casual listener may encounter similar problems. You can use a wideband discone antenna but these are omni-directional - but with very low gain and vertical polarisation. What's needed is a wide bandwidth directional antenna with some gain and this is where I introduce you to the log periodic antenna.

The Log Periodic

One of the major drawbacks with many antenna designs is that they have a relatively small bandwidth. This is particularly true of the Yagi beam antenna.

However, the log periodic antenna (l.p.a.) is a somewhat novel but very useful design that's able to provide directivity and gain while operating over a wide bandwidth. The illustration, **Fig. 1**, shows that the l.p.a. comprises of a set of dipoles that vary in size from the smallest at the front, to the largest at the rear.

The antenna feed-line is connected at the front of the array to the transmission line formed by twin parallel booms on which the elements are mounted. The log periodic principle calls for a constant ratio of length and spacing of successive elements. The operating frequency range is determined by the longest and shortest elements and the gain by the taper rate.

Fig. 2: The antenna under review is the Moonraker MLP62 Log Periodic Antenna.

Only those elements within about 10% of half-wave resonance draw sufficient current from the feed-line to be involved in the radiating process. So, an l.p.a. designed to work over a wide frequency range is actually a succession of several limited-band antennas on one boom.

The gain of a typical wideband v.h.f./u.h.f. log periodic is about the same as a poorly optimised 3-element Yagi, because only about three of the elements are active (carrying significant current) at any given frequency. A realistic gain figure will therefore be no more than 7dBd (9.1dBi) although higher gains are achievable but only if the l.p.a. has been designed to work over a much narrower bandwidth.

The performance equivalent to a 3-element Yagi is quite respectable on the 50 and 70MHz bands (and possibly on the 144MHz band). However, on higher frequencies you'd probably want more gain than a log periodic can provide. That's the penalty of the broadband performance!

Review Antenna

The antenna that I have been asked to review is the MLP62 Log Periodic Antenna as shown in the photograph, **Fig. 2**. It's made by Moonraker, the Buckinghamshire based manufacturers, who produce radio communication antennas and associated products for both Amateur Radio and professional users.

The central construction of the MLP62, **Fig.**s **3** and **4**, is two close-spaced booms each 2m long, made from 15mm square aluminium bar. Both booms are drilled and tapped and into, which are screwed 10mm round aluminium tubes and 4mm stainless steel rods for the radiating elements.

There are 40 separate tubes and rods making up the 20-element array. And, as 14 of the smaller rod elements are already fitted to the boom, it only takes 30 minutes to fit the others with the aid of 7 and 13mm spanners.

There's a 2.5 metre long flying lead attached to the front of the log periodic in a plastic termination box filled with epoxy resin. The other end of this RG58AU coaxial cable is terminated in a female N-type socket over which is fitted a plastic cover filled with silicone sealant.

A five and a half turn air spaced coil 35mm in diameter is attached across the rear most element terminals. This is quite conventional, and acts as a shorted transmission line stub.

Pole mounting hardware is included for attachment to masts of up to 50mm (2in) diameter. The twin booms of the log periodic need to be isolated from the mounting clamp and insulators are provided that allow the MLP62 to be used in either horizontal or vertical configuration. Incidentally, you'll have to use a glass-fibre stub-mast if using it for vertical polarisation so that the mast doesn't interfere with the electrical characteristics of the antenna.

On Air Performance

Because I'm an active v.h.f. operator I was able to put the MLP62 antenna through its paces on the 50, 70, 144 and 430MHz bands. However, I was also going to try it on the 1300MHz band but I managed to get my plusses and minuses mixed up during the testing phase and blew up the transverter!

I mounted the antenna on top of a 20 metre tower, Fig. 2, and attached the MLP62 to a length of Andrew LDF4-50 Heliax cable that ran right into the shack. I started my measurements on the 50MHz

band using a Kenwood TS-690S transceiver and 6-element wide spaced DJ9BV Yagi as a reference antenna.

I tuned the receiver to the GB3BAA beacon located 160km (100 miles) from my QTH. By swapping antennas around I estimated that the MLP62 possessed around 4dB less gain than the DJ9BV Yagi. This Yagi has a calculated gain of 9.6dBd, so I estimated the log periodic has a gain of 6dBd at 50MHz, a reasonable figure for this band.

I made many v.s.w.r. measurements between 50 - 54MHz and none of them were greater than 2:1 within the band. The s.w.r. ratio did however, alter many times throughout this range, varying from 1:1 up to 2:1 within a few 100kHz.

The 70MHz Band

Up on the 70MHz band I used a Kenwood TS-660 transceiver, RN Electronics transverter and a 6-element NBS Yagi as a reference antenna. I first listened to the GB3ANG beacon (Dundee, Scotland) located 510km (317 miles) from my QTH.

Surprisingly, the MLP62, from my calculations, showed only 2dB less gain than the 6-element Yagi that has a calculated gain of 9dBd! So, on 70MHz I estimated that the MLP62 has a gain of around 7dBd, a very usable figure for this band.

Again I made a number of v.s.w.r. measurements and discovered that the log periodic's measurements indicated its response was very flat at 1.2:1 right across the band. This is very good!

Then it was up to the 144MHz band, where I used a Yaesu FT-221RD transceiver and a 17-element F9FT Yagi as a reference antenna. I again listened to the GB3ANG beacon and determined that the log periodic was approximately 6dB down on the 17-element Yagi.

The F9FT has a gain of 13.2dBd, and therefore I calculated that the MLP62 had a gain at 144MHz of around 7dBd, again a reasonable figure for this band. The v.s.w.r. was flat over much of the band at around 1.4:1, but there were some strange 'wobbles' in the readings. This occurred every

Fig. 4: Close up shot of the rod elements at the front of the antenna (see text).

Fig. 3: Close up shot of the MLP62 at ground level.

100-150kHz when the v.s.w.r. would suddenly jump up to 1.8:1 or so but then settle down within a few tens of kHz.

I used a Kenwood TS-790E and a 19-element F9FT Yagi as a reference antenna on the 430MHz band. I could hear the GB3BSL beacon located 70km (44 miles) from my QTH on the 19-element Yagi, but the log periodic was about 10dB down in strength.

At best I calculated the MLP62 to have 5dBd gain at 433MHz. The v.s.w.r. oscillated across the band being 1.2:1 at 430, 433-434 and at 436MHz, around 1.6:1 for much of the rest, apart from 431MHz where it increased to 2.5:1.

Whilst taking measurements on the 50, 70, 144 and 432MHz bands I determined that the log periodic had a beam width of around 80 to 90°. This is to be expected for this type of antenna. I also stress tested it by running 400W into the antenna on all bands (except 70MHz) with no noticeable effects.

Ideal For Many Applications

The MLP62 possesses a reasonable amount of gain that I calculated to be 6dBd at 50, 7dBd at 70 and 7dBd at 144. This is quite usable for transmitting and receiving within these bands. The results matches the theoretical performance of 7dBd for this size of log periodic over this range of frequencies.

The gain I measured at 433MHz was around 5dBd. This may be satisfactory for local contacts, but somewhat lacking in gain if looking for signals further away.

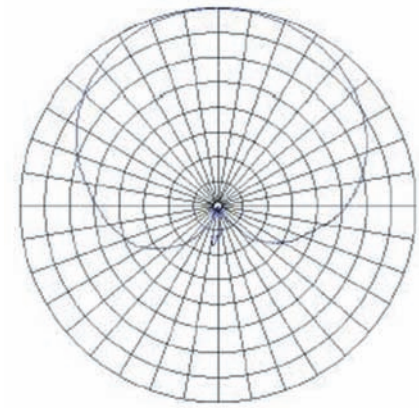

Fig. 5: Polar diagram of a typical log periodic antenna (see text).

The MLP62 is a particularly useful design when modest levels of gain are required, combined with wideband operation while retaining a v.s.w.r. level of better than 2:1. With this level of performance it's ideal for many applications. **PW**

Product
Moonraker MLP62 v.h.f. log periodic antenna.

Company
Moonraker (UK) Limited

Contact
Tel: (01908) 281705

Price
£189.95, plus £7 P&P (UK Mainland Only)

Pros & Cons
Pros
The MLP62 is a particularly useful design when modest levels of gain are required, combined with wideband operation - it's ideal for many applications

Cons
Does not provide as much gain as a Yagi array

Supplier

My thanks for the loan of the review unit go to; **Moonraker Ltd., Unit 12, Cranfield Road Units, Woburn Sands, Buckinghamshire MK17 8UR. E-Mail: sales@moonrakeruklimited.com**

Website: www.amateurantennas.com

Manufacturer's Specifications

Model name:	MLP62
Type:	20-element Log Periodic
Claimed Frequency Range:	50 - 1300MHz
Claimed Gain:	10-12dBd
Claimed Front to Back Ratio:	15dB
Claimed v.s.w.r:	< 2:1
Impedance:	Unbalanced 50Ω
Polarisation:	Horizontal or Vertical
Power Handling:	500W
Boom Length:	2 metres
Longest Element:	3 metres
Weight:	5kg
Connection:	Fly lead with female N-type socket