Review

M2 LEO Pack – a 2m/70cm satellite antenna system

The M2 LEO pack and M2 antennas in general have a good reputation in the USA and when Martin Lynch & Sons announced that they were stocking the LEO pack, we asked if we could try it out.

Peter, 2M0SQL is one of the UK's most experienced satellite operators and if there was anyone who could give the aerials a work-out, it's him. Tony Wiltshire at ML&S kindly agreed to send the LEO pack up to Elgin for Peter to look at.

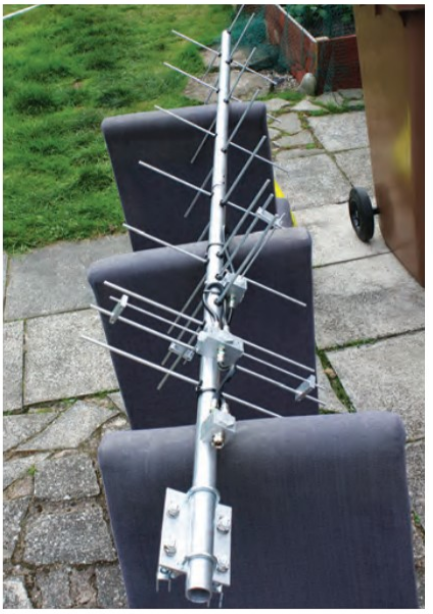
Before we get into how Peter found the LEO pack, let's take a look at what M2 have to say about it.

The 436CP16 and 2MCP8A are light weight, circularly polarized antennas optimized for Low Earth Orbit (LEO) Satellite communications or other applications where a small circular polarized antenna is required. Optimum match and gain designed for the satellite band. Rear mounted for easy coaxial cable routing. A preamp can be mounted close to the antenna for almost no coax loss before the preamp, maximizing your receive performance. Computer design techniques help keep spurious side lobes down for optimum signal to noise rations. Both the 436CP16 and 2MCP8A feature the same CNC machined, O-ring and silicone-gel sealed, driven element assemblies common to all M2 Yagi Antennas. This ensures years of trouble-free performance regardless of weather. We went a step further and designed a custom LEO cross-boom to pair these two antennas together for a very manageable amateur satellite ground station.

Out of the box

On unboxing the antennas, Pete's first impression was that all the parts were very well made, all bolts and screws that are included are nicely packaged up to make the assembly process as easy as possible.

Rubber boots are used to hold the elements into the boom. Pete quickly discovered that these can be quite hard to fit and require a fair amount of force to push them into place. Although on Pete's temporary installation there was no need to use the retaining clips. If you were putting the system up permanently, you'd want to do this. Be warned, these clips can bite, so take care as you fit them!



70cm Yagi after construction was completed.

2m Yagi completed (Molly the dog shown for scale!).

The cross-boom is supplied with the antennas, which is a nice touch. Don't make the mistake of assembling the cross-boom fully before you fit it through the elevation rotator.

The manual supplied describes how to set the phasing harnesses up. If you follow the procedure exactly as described in the manual, you should find that the SWR for each antenna is good, but slight deviations from the procedure can result in high SWR values.

The antennas were connected to SHF Electronics preamps with 2 lengths of Ecoflex and then 15m of LMR400 to the shack.

How did the antennas perform?

Pete was impressed. As supplied, they are fixed Right Hand Circular Polarisation (RHCP) – there is an additional option to provide polarisation switching. With fixed RHCP you will experience periods of fading, but you quickly get used to that. Pete found that he was able to work all satellites from the moment they came up over the horizon (AOS) until they dropped under the horizon once again (LOS).

During the review period, Pete made over 500 QSOs through a wide selection of satellites and you can see from the map attached that he worked some very nice DX indeed.

Pete normally uses WiMo X-Quads in his satellite station and was very interested to see how the LEO pack compared. Very well, as it happened and Pete had a sense that perhaps the LEO pack antenna was just a fraction better on 2m than the X-Quad. Useful on the AO-7 downlink.

The ISS crossband repeater is always very busy and QSOs tend to be limited by the amount of interference that the ISS receiver is hearing. However, when the repeater was

Tim Kirby, GW4VXE
& Peter Goodhall, 2M0SQL
longworthtim@gmail.com,
peter@magicbug.co.uk

quiet, late at night, Pete found that he could work through the it from AOS to LOS with power as little as 2W, which is excellent.

Terrestrial operations

Can you use the antennas for terrestrial operation as well? Of course! Pete's location in the Highlands didn't lend itself to a substantial test on tropo, however they worked great for working SOTA stations. Be aware that with RHCP, you will see some polarisation loss when working stations using either vertical or horizontal polarised antennas, although in reality, signals are not usually 'perfectly' horizontal or vertical if they have been reflected from buildings, mountains or aircraft.

The only problem that Pete encountered during the review period was that when it was raining, the SWR on 70cm was increased considerably. We read around and learned that this had been noted elsewhere.

The finished installation, complete with azimuth/elevation rotator.

Conclusion

In general, we were both impressed with the results of the LEO pack. The antennas and cross-boom are well engineered and should last well even when exposed to fairly severe weather. The LEO pack is fairly expensive, but, after we had seen the quality of the antennas we felt more comfortable that they represented reasonable value for money.

The LEO Pack costs £609.95 and is available from Martin Lynch and Sons (https://www.hamradio.co.uk). We would like to thank Tony Wiltshire, MOTNY of ML&S for the loan of the antennas and his willingness to answer our questions about the M2 LEO pack antenna system.

Contest Calendar November 2022

Ian Pawson, G0FCT

RSGB HF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Mon 7 Nov	Autumn Series DATA	2000-2130	RTTY, PSK63	3.5	RST + SN
Sat 12 Nov	Club Calls (1.8MHz AFS)	2000-2300	CW, SSB	1.8	RS(T) + SN + Club info
Wed 16 Nov	Autumn Series SSB	2000-2130	SSB	3.5	RS + SN
Sat 19 Nov	2nd 1.8MHz Contest	1900-2300	CW	1.8	RST + SN + District code
Thu 24 Nov	Autumn Series CW	2000-2130	CW	3.5	RST + SN
Mon 28 Nov	RSGB FT4 Contest	2000-2130	FT4	3.5, 7, 14	Report + 4-character Locator

RSGB VHF Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange
Tue 1 Nov	144MHz UKAC	2000-2230	All	144	RS(T) + SN + Locator
Tue 1 Nov	144MHz FMAC	1900-1955	FM	144	RS + SN + Locator
Wed 2 Nov	144MHz FT8 AC	1900-2100	FT8	144	Report + 4-character Locator
Sat 5-Sun 6 Nov	144MHz CW Marconi	1400-1400	CW	144	RS(T) + SN + Locator
Tue 8 Nov	432MHz UKAC	2000-2230	All	432	RS(T) + SN + Locator
Tue 8 Nov	432MHz FMAC	1900-1955	FM	432	RS + SN + Locator
Wed 9 Nov	432MHz FT8 AC	1900-2100	FT8	432	Report + 4-character Locator
Thu 10 Nov	50MHz UKAC	2000-2230	All	50	RS(T) + SN + Locator
Tue 15 Nov	1.3GHz UKAC	2000-2230	All	1.3G	RS(T) + SN + Locator
Thu 17 Nov	70MHz UKAC	2000-2230	All	70	RS(T) + SN + Locator
Tue 22 Nov	SHF UKAC	1930-2230	All	2.3G	RS(T) + SN + Locator

Best of the Rest Events

Date	Event	Times (UTC)	Mode(s)	Band(s)	Exchange (Info)
Tue 1 Nov	Silent Key Memorial	0600-0900	CW	3.5, 7	RST + a SK callsign
Wed 2 Nov	UKEICC 80m	2000-2100	SSB	3.5	6-character Locator
Sat 12-Sun 13 Nov	WAE DX RTTY	0000-2359	RTTY	3.5-28	RST + SN
Sun 13 Nov	UKuG Low Band	1000-1400	All	1.3-3.4G	RS(T) + SN + Locator
Wed 30 Nov	UKEICC 80m	2000-2100	CW	3.5	6-character Locator
Sat 26-Sun 27 Nov	CQ WW DX CW	0000-2359	CW	1.8-28	RST + CQ Zone (UK = 14)

For all the latest RSGB contest information and results, visit www.rsgbcc.org