

DX COMMANDER

DX Commander Rapide 7m Antenna Kit User Guide Version 1.2 June 2021

SAFETY NOTE

DX Commander antenna components are designed for hobby radio amateurs by Callum McCormick, M0MCX. Radio Amateurs pass exams where health and safety is included in the syllabus. Please be careful in your handling, erection and general usage of any DX Commander parts so that yourself, property or a third party in the vicinity of your antenna experiments remain safe. Note also that engineered parts may have some sharp edges so be careful before handling roughly with bare hands.

POWER RATING: Tested to 1,500W continuous – 60 seconds

ATU: Not required

ASSUMPTIONS: This manual assumes you will have watched the video for the DXC RAPIDE build on YouTube here: <https://youtu.be/WeR5bSycksA>

Overview: The antenna runs up to SIX vertical elements on a 7m pole with a single feedpoint and is similar in concept to a fan-dipole, but turning the “fan” 90 degrees on it’s axis and placing one side of the fan vertically. Each element resonates automatically with the remaining reel of wire supplied in the kit used as radials. No other hardware other than coax and guy stakes is required.

Supplied: 7m Pole (physical length circa 6.6m), 100m DX10 Antenna Wire, a Plate set and a bag of nuts/bolts etc.

Option a) Run all 6 elements as quarter-waves in a naturally resonant manner giving you 30m, 20m, 17m, 15m, 12m and 10m. The 30m element gives a very close match near 50MHz too, achieving better than -5db, low to the horizon gain, similar to a regular quarter wavelength radiator for DX. In this configuration, you will also get a tune on 4m and 2m – and even 70cms but the radiation pattern for 70cms will not be conducive for anything other than short walkie-talkie type chatter. See cut-chart later in this document for sizes.

Option c) Exchange 30m for 40m band. See the 40m section later in this document.

Parts list

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| 1. DX Commander 7m Pole | 10. Stainless Washers |
| 2. Ground plate 3mm aluminium | 11. Fork connectors (elements and radials) |
| 3. Radiating Plate 3mm aluminium | 12. 2 Hose clamps |
| 4. Guy Plate - UHMWPE | 13. Some tubing |
| 5. Mid-Spreader - UHMWPE | 14. Length of 4mm marine shock cord |
| 6. Upper Spreader Plate - UHMWPE | 15. Long length paracord (guying) |
| 7. SO239 Assembly with flying lead | 16. Plastic "snap" Carabiners |
| 8. Appropriate qty 6mm stainless bolts | 17. Length glue lined shrink-wrap |
| 9. Appropriate qty Stainless wing nuts | |

Each package is shipped with the single wrapped pole, 100m DX10 roll of wire, a white box with the plates and a heavy-duty plastic bag for the small components.

Please make yourself familiar with all the parts and satisfy yourself that all is present and correct. Wendy, Loki and I pack these boxes so if something is missing, it's our fault. If we do make a mistake, simply send an SMS / TXT message on the number that I sent you on the order confirmation / shipping and I'll sort it out ASAP. Remember to tell me your name. I appreciate you may be in Outer Mongolia - but I'll still sort it out.

I have a user guide for the 10M pole which mirrors this 7m antenna pole. You can find the user guide on the m0mcx.co.uk website under User Guides.

The Build:

Remove all the nuts and bolts and other small items etc from the dispatch bag and place them safely on a tray.

Inspect the aluminium plates, de-burr as necessary for sharp edges and screw all bolts in place, using a 10mm spanner and torque these up sensibly (do not over-tighten else you will strip the threads).

Extend the pole FULLY with a robust pull (and twist) between each section Lay the pole down horizontally, perhaps on two garden chairs.

Install the SO239 connector in the bent-up tab of the ground plate. REMOVE and discard all the washers supplied for the SO239, they are not required. Tension the SO239 nut on the thread so that the flying lead faces inwards.

Wrap a section of self-amalgamating tape around the SO239 assembly (supplied) to eliminate possibility of water seeping in between the PTFE and thread body.

Remove the bottom cap of the pole by unscrewing the cap and install the ground plate, tab facing away from the base of pole. Screw the cap back in place. Be gentle when re-assembling. It is best to slightly unscrew the cap initially to get a feel where the threads are before screwing the cap in place.

Prepare the two hose-clamp assemblies by unscrewing each clamp apart and cutting and installing some of the rubber / PVC tubing to protect the tube from the bare metal clamps. TIP: Measure the tubing first by wrapping it around the tube and cutting to suit.

Slip over the driven plate. You may find this a VERY snug fit. You can free the tightness with some sandpaper on the inside hole of the driven plate before gently pushing it down.

Install the first hose clamp directly above the driven plate to stop it lifting upwards.

Place the second hose-clamp assembly just ABOVE the first join, where the guy plate will be installed. You will find it easier to install this clamp BELOW the guy plate to allow easy access to the screw. Tighten appropriately, making sure the pole is fully extended.

Apply two firm wraps of electrical tape to each of the fiberglass joins. To create an even more secure fit, you may use lengths of self-amalgamating tape to each join BEFORE adding the electrical tape, as per the video.

Install the remaining UHMWPE (plastic) plates on the pole.

Connect the SO239 assembly flying lead to the driven element, creating a little loop in the process. This allows for the driven element to slightly "float" and not tear off the flying lead.

Elements:

DO NOT MAKE YOUR RADIALS YET – CUT ELEMENTS FIRST

Make up your elements according to the cut chart as follows

- 30m 7.99m (* See note below)
- 20m 4.95m
- 17m 3.85m
- 15m 3.29m
- 12m 2.81m
- 10m 2.50m

NOTE:

Cut your elements 50cm / 2-inches longer than required and crimp / solder / connect one fork connector per element. Once satisfied over your fork-connector installation, measure again and cut to suit as per cut-chart. Don't include the whole fork-connector in your measurements, just the wire which is now embedded at the bottom of the fork barrel.

Cut just over a 12mm (half inch) section of glue-lined heat shrink and apply that to the exposed fork-connector, where the element joins the fork connector to keep out water and reduce corrosion.

Create a fold-over of 6cm long at the end of each element and secure with a small section of glue-lined heat-shrink or electrical tape. Do not add any more wire to your calculations to make this fold-over loop, use that as part of your cut (as per chart).

30m note: Do not add a loop (yet) at the end of your 30m band. Instead, refer to the video described earlier in this document. The 30m band requires some tension to match the 20m element at the upper spreader. The element continues up to the top of the pole and comes back down again a short way before the top of the upper spreader. It is up to you if you want to use the metal eyelet or not. You will not be able to get made-up loop through this eyelet. However the supplied aquarium tubing satisfactorily holds this element in place (or electrical tape). To conclude, you will end up with a small loop to match the 20m height and also a loop at the very end to connect to the element which is now coming back down upper spreader.

Suggest you label or color/colour code your elements at this point and put them safely aside. I found a supply of children's number beads on eBay. These are not supplied but are great fun for labelling your elements.

Radials:

The ground plate allows for up to 6 radial connection points. You may fit up to four (4) radials per fork connector.

From the remaining reel of DX10 wire, measure out 20 x lengths of 3.2m (10.5 feet) of wire

Keep the last 4-radials on the reel for the end of the project. DO NOT CUT these. Use as spares for element changes or until you are totally satisfied with your final element tune, then make the remainder of the wire up into radials.

In batches of four radials, strip around 25mm (1 inch) of the insulation.

LIGHTLY twist these together. Do not over-twist these little lengths. The more twist you induce, the fatter the little bunch will become and it will be more difficult to insert down the fork-connector barrel (which may be widened if necessary with a small screwdriver).

Cut approximately 25mm (1 inch) of glue-lined heat shrink from the pack and slip this section over the exposed copper wires in preparation of sealing this connection from the weather.

Insert the wire into the fork-connector and crimp and or solder.

Apply the glue lined heat-shrink and heat with a flame or a hot-air gun.

Element Installation:

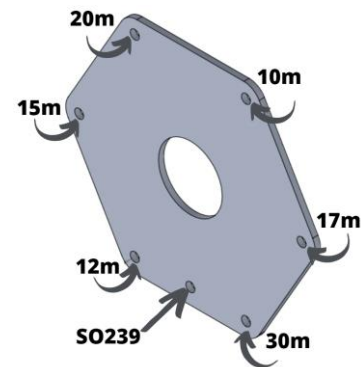
The placement of each element on the driven plate will have an affect on the lengths of other elements. The cut chart assumes that the elements are connected as per drawing..

The 12m (or 11m) and 10m elements need to be directly opposite each other, this is to make sure that the mid-spreader is balanced in tension when connected with the shock-cord (discussed in a moment).

Although it does not matter which element you start with, let us start with the 20m element for sake of argument. Connect the fork-connector to the aluminium driven plate by slipping a washer over the top of your fork connector and secure with a supplied wing nut.

Line up all your plastic pate sets and thread the 20m element through the guy plate and the mid-spreader.

Make up a single-ended shock-cord extension of approximate length that will eventually extend your element to the upper spreader with a snap-hook carabiner. Connect this little extension to the upper spreader. Tension the shock-cord for a trial fit by hand and consider where a knot should be tied for the snap-hook base. Remember to mentally add about 25mm / 1-inch in your mind for the end of the snap-hook carabiner for full tension. Slip over the base of one of the snap-hook carabiners and tie a single overhand knot to stop it coming off. When you are comfortable with the likely fit, you may connect the other part of the snap-hook to make a permanent dedicated length for use with that element in future. I recommend tensioning the shock-cord to around 90% of full stretch. Repeat for all the other elements.



30m element: Make a small tensioning loop parallel (and at the same distance from the driven plate to where the 20m element stops). This is to keep all the elements below the top spreader at a steady tension. Heat-shrink that loop permanently in place. Continue the element to the top, optionally go through the little metal eyelet and come back down towards the upper-spreader. IMPORTANT: The return of this element should be on the other side of the pole to keep a small distance for the linear loading.

Erecting your antenna

Install three guy-stakes (not supplied) 120 degrees apart and approximately 1.2m (4-feet) away from the base of your proposed installation.

Cut the paracord into three sections and make a loop at the end of all three.

Slip the loop over your guy stakes and bring each of the three paracord lines towards the centre of your working area where the antenna will be.

Make a small loop half-way between the guy stake and the guy point will be.

Site your antenna and lean it on your shoulder, reach down and grasp the first guy. Insert the end of the guy rope through one of the guy holes in the guy plate, and pull it down towards the loop you have just made. Place this return line through this little loop and tie off with a gentle half-hitch.

Repeat for the other two guys, then adjust where necessary. For fine-tuning the vertical appearance, you can simple relocate the base of the antenna a small amount..

NOTE: You may use 3rd party carabiners for the guy plate. DO NOT use the supplied carabiners for guying.

Tuning

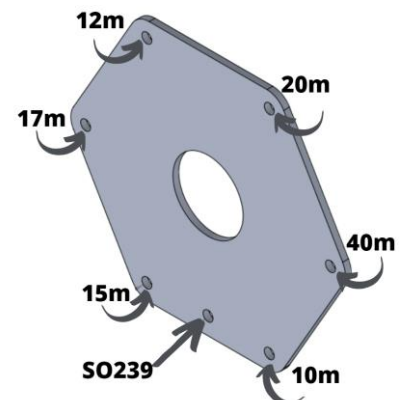
The antenna will tune perfectly as is. The cut chart I have created will give you perfect tunes on all bands however for the slightly wider bands, 20m, 15m and 10m, the cut chart assumes centre of operation at 14.235MHz for 20m, 21.200MHz for 15m and 28.450MHz for 10m. You will still be at less than 2:1 SWR for bottom edge of the CW portion of each band apart from 10m band. If you would like to still be under 2:1 SWR at 28.0MHz whilst still achieving say 28.6MHz, cut your element for 28.3MHz.

Use the SWR calculator found on this page to determine where you would prefer the tuning to be: <https://www.m0mcx.co.uk/quick-swr-calculator-for-vertical-and-dipole-ham-radio-antennas/>

40m Adjustment

For those who would like to experiment with the 40m band, you may wish to try the following adjustment. This is a permanent adjustment to the Rapide because almost all your element sizes will have to change AND the location of each element is ONLY tested as per graphic.

- 10m 2.65m
- 12m 3.04m
- 15m 3.21m
- 17m 3.81m
- 20m 4.78
- 40m 10.03



See THIS video: <https://youtu.be/gf6pnzPpphk>

For every band (not 40m) create a 6cm loop and secure with electrical tape (don't add 6cm to the cut, just create it after cutting)

40m Region 1 (7.00 to 7.200 MHz) Wrap 14 turns of wire just below the white band on the pole (about 24cm up from the base) then continue to top and come back down 60cm. This assumes your pole is 6.5m long.

40m Region 2 (say you need 7.200 to 7.300 MHz) Wrap 13 turns of wire just below the white band on the pole (about 24cm up from the base) then continue to top and come back down 130cm. This assumes your pole is 6.5m long

Fine tuning can be made by cutting or adding wire to the fold-back element at the very top. Bear in mind that each turn of the coil is around 220 kHz change. So if your best SWR is at 7.22MHz, removing one turn will centre you at 7.00MHz.

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Callum, M0MCX June 2021.