

DX COMMANDER

DX Commander Classic 10m Antenna Kit User Guide

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About the antenna

Safety note: DX Commander antenna components are designed for hobby radio amateurs who 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 and smooth with emery paper where necessary.

Power Rating: Tested to 1,500W continuous – 60 seconds max (14.0 MHz)
* See QRO note end of this guide

ATU: When all the elements are cut correctly, an ATU is not required

Overview: The antenna runs up to SIX elements on a 10m pole with a single feedpoint and is similar in concept to a fan-dipole but turning the “fan” 90 degrees on its axis and placing one side of the fan vertically.

Each element resonates automatically. The remaining wire supplied in the kit used as radials that you place on the ground. No other hardware other than coax and guy stakes are required.

Assumptions: *This manual assumes you will have watched the first part of the video for the DXC Rapide which focuses on element cutting and radials and then video of the DXC Classic build which focusses more on the plates and element installation. Both have tips and nuances which can be difficult to convey in the written form.*



Although not exactly the same model, the concepts and components used in the Classic and the Rapide are extremely similar. Both videos will assist your build.

Installation options

For the installation there are three options. It is important to know what you are going to do with the antenna. Please read the options before you continue.

Option 1: Run all 6 elements as quarter-waves in a naturally resonant manner giving you 40m, 30m, 20m, 17m, 15m (as a $\frac{3}{4}$ off the 40m element), 12m and 10m. The 40m element gives a good match at around 50.150MHz. The 30m element resonates just above this, ideal for the FT8 portion of the band. 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

Option 2: You can exchange the 30m element for an 80m element. See the 80m section later in this document

Option 3: Build any 3 or 4 element antenna for the bands of your choice. The hole spacing on plates cater for this

Option 4: If you want CB band / 11m / 27MHz, just change out the 12m element by cutting that element shorter by 24cm (9.5 inches)

- See cut-chart later in this document for element sizes.

Contents of the package

Each package is shipped with the corrugated cardboard wrapped DXC pole, 100m DX10 roll of wire (or 2 x 100m if 80m configuration ordered), a 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 we sent you on the order confirmation / shipping and I'll sort it out ASAP. Remember to tell us your name. We appreciate you may be in Outer Mongolia - but we'll still sort it out.

We have a user guide for the 10M pole which can find the user guide on the m0mcx website under User Guides.

Supplied are:

- 10m Pole (physical length circa 9.5m),
- 100m DX10 Antenna Wire,
- Plate set (aluminium and UHMWPE plates)
- Bag of nuts/bolts etc.
- The 80m kit has an additional 100m DX10 wire for extra radials.

Detailed parts list:

- DX Commander 10m Pole
- Ground plate 3mm aluminium
- Radiating Plate 3mm aluminium
- Guy Plate - UHMWPE
- Mid-Spreader - UHMWPE
- Upper Spreader Plate – UHMWPE
- Double Eye - UHMWPE
- SO239 Assembly with flying lead
- Appropriate qty 6mm stainless bolts
- Appropriate qty Stainless wing nuts
- Stainless Washers
- Fork connectors (large for elements and small for radials)
- 1 Hose clamp and tubing to secure Driven Plate
- Industrial Re-usable 7.5mm Zip-Ties
- 3M Temflex Tape
- Long length of 4mm marine shock-cord (Marlow)
- Long length paracord (guying)
- Plastic "snap" Carabiners for elements
- Lengths of glue lined shrink-wrap

Guying Stakes: None are supplied in the kit because no one solution will work for all customers due to differing soil solutions and requirements

The Build

The build contains of the following steps:

- 10) Pre-assembling the plates
- 11) Preparing the stay-up solution
- 12) Assembling the ground- and driven plate on the pole.
- 13) Cutting the elements
- 14) Preparing the radials
- 15) Placing the spreader plates and the elements on the pole
- 16) Erecting the antenna and guying it
- 17) Tuning advice

***TIP:** Before you start, remove all the nuts and bolts and other small items etc from the dispatch bag and place them safely on a tray.*

Step 1: Pre-assembling the plates

Inspect the aluminium plates. These are laser cut then tumbled by a special machine to give you a smooth finish, however some sharp edges may remain.

De-burr these sharp edges and screw the 6mm bolts in place using a 10mm spanner and torque these up sensibly (do not over-tighten else you will strip the threads).

Please note: You only need a maximum of 7 bolts for the Driven Plate (6-elements plus SO239 connection) and 7 bolts for the Ground Plate. Any extra bolts are supplied as spares only.

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.



You may use some thread locking compound if you wish on the SO239 threads.

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

Step 2: Preparing the hose-clamp

For 2022, we are supplying just ONE hose clamp. This is to secure the driven plate and stops it rising upwards.

Prepare this clamp by unscrewing completely cutting and installing some of the rubber / PVC tubing to protect the tube from the bare metal clamps.

***TIP:** If we supply a little bit too much, measure the tubing first by wrapping it around the tube at the base and cut to suit. You may cut a notch in the tubing for the screw-thread to fit nicely.*

Step 3: Assembling the ground plate and driven plate on the pole

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

If you inadvertently pull one of the sections completely free, simply unscrew the bottom cap and reinsert it from the bottom. You will be securing these anyway with tape so a small tolerance is acceptable.



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.

Slip over the driven plate from the top of the pole. You may find this quite a neat fit. You can free any tightness with some sandpaper or a file on the inside hole of the driven plate before gently pushing it down.

Do not force the plate down. In the unlikely event that the hole of the aluminium plate and the dimension of the pole have a mismatch, use a file to remove material from the hole – or contact DX Commander for replacement.

Conversely, you may remove any looseness between the plate and the pole by wrapping one or two turns of electrical tape just above the base before slipping over the plate for a snug fit.



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.

Install the hose clamp directly above the driven plate to stop it lifting upwards, as picture.

Sealing the sectional joints

Previously, we have recommended using hose clamps and tubing to stop the pole telescopic back down due to expansion and contraction over time due to heat and cold temperature changes. We now recommend 3M Temflex Tape and 7.5mm Zip Ties.



Apply two firm wraps of electrical tape (supplied) to each of the fiberglass joints. This creates a waterproof seal and also assist with holding each section together.

To create an even more secure fit, you may use 2 wraps only of self-amalgamating tape to each joint BEFORE adding the electrical tape.

Once the supplied 3M Temflex tape has been applied, use one of the supplied re-usable cable ties prevent it from collapsing by fitting this ABOVE the joint.

This stops the tape from in effect “collapsing” and stops the pole from slipping. Snip the spare end off the cable ties (to achieve a tight fit, you may use pliers to snug the zip tie tight)

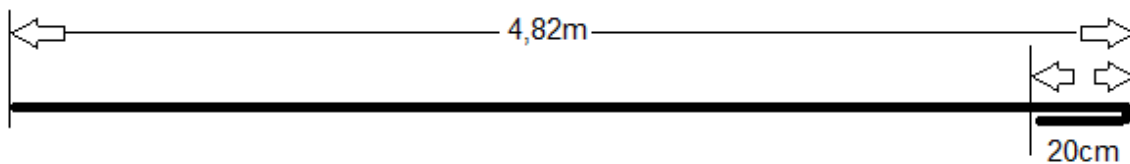


Step 4: Cutting the Elements:

Please note – don't start with the radials, **cut the elements first**. Make up your elements according to the cut chart as follows:

DX Commander Wire Cutting Guide											
	Meters			Element Length			Fold Back	Total Length		Cutting Lengths	
	Element	FoldBack (CM)	Total	In Feet	Ft	Inches	Inches	Inches	Inches	Feet	Inches
10 meter	2.45	5.00	2.50	8.038058	8	1/16	1 15/16	98	7/16	8	2 7/16
12 meter	2.78	6.00	2.84	9.120735	9	2/16	2 6/16	111	13/16	9	3 13/16
17 meter	3.83	6.00	3.89	12.56562	12	9/16	2 6/16	153	2/16	12	9 2/16
20 Meter	4.82	20.00	5.02	15.81365	15	13/16	7 14/16	197	10/16	16	5 10/16
30 meter	6.74	6.00	6.80	22.11286	22	2/16	2 6/16	267	11/16	22	3 11/16
40 Meter	11.15	0.00	11.15	36.58136	36	9/16	0	439		36	7
80 Meter	19.50	0.00	19.50	63.97638	63	1	0	767	11/16	63	11 11/16

For example: 20m element. The end-to-end length is 4,82m plus 20cm fold-over:



We recommend cutting your element initially 5cm / 2-inches longer than required (so a little bit more than this chart). This saves you effort in the long run in the case that you make a mistake with the fork connector.

TIP: Once fork connector is installed, cut as per cut chart

Strip around 6mm / ¼ inch of insulation off the beginning of the element and crimp / solder / connect one fork connector per element.

Once satisfied with your fork-connector installation, measure again and cut to suit as per cut-chart above. 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 about 24mm / 1-inch of glue-lined heat shrink, slip over the element, all the way down to the fork connector and apply that to the exposed fork-connector barrel, where the element joins the fork connector to keep out water and reduce corrosion. Heat it and seal.

Create the fold-over as mentioned in the chart above 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.

***TIP:** If you are concerned about making adjustments to your elements as part of the final tuning, instead of using heat shrink on your little loops at this point, you can instead use some of the tape provided to make a temporary loop. Once you have tested the antenna and made any adjustments to the length of the element, you can simply replace with heat-shrink.*

Please note: the loop for the 20m element is longer than of the other elements. This is done on purpose to provide enough space to install it with some shock-cord as otherwise it would be too close to the spreader plate.

For the 40m element, do **NOT** create any fold-over (yet)

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 cube beads on eBay. These are not supplied in the kit but are great fun for labeling your elements.

***TIP:** Sometimes we supply two different sizes of Fork Connector. Use the heaviest for the elements.*

Step 5: Preparing your Radials

The ground plate allows for up to 7 radial connection points. Callum recommends no more than four (4) radials per fork connector ease of use. You may fit more than one fork connector on each radial point but 4 radials per connector is easier to handle in the future, during installation or portability.

Tip: It is genuinely up to you how long your radials need to be. After cutting all the elements, you will be left with around 70m of wire on the 40m kit and around 150m for the 80m kit.

This document is not a discussion about "how many radials do I need". Callum has published many videos about that. This one might suit you: <https://youtu.be/M0qSRjltgoo>

A very basic rule of thumb is more radials of a shorter length are better than fewer at longer lengths. Here are some examples based on about 70m of wire and your 7 holes on the ground plate:

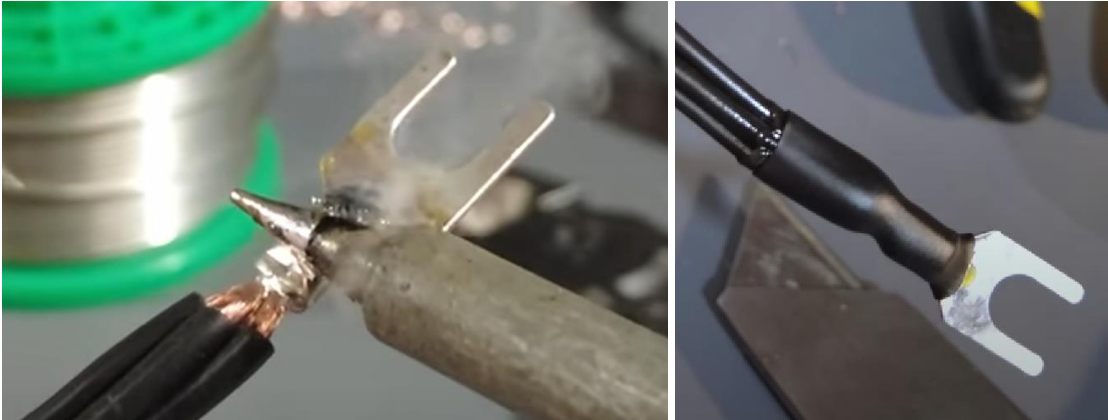
- 7 Radials 10m long
- 14 Radials 5m Long
- 21 Radials 3m long (Callum's favorite)

If you have an additional 100m of wire and **ONLY** need to go as low as 40m band (in other words, you don't need 80m but you have 2 x reels of wire), then consider:

- 28 radials (4 per connector) at 6m long each

28 radials at 6m length will give you around 1dB (approximately and debatable) extra gain over the 70m of wire (at say 21 x 3). Of course, you may also cut these shorter (probably not less than around 3m) and create more radials too.

Strip around 25mm (1 inch) of the insulation of the ends. LIGHTLY twist these together depending on how many radials you want per fork connector (suggest 4). Do not over-twist these little lengths. The more twist you induce, the fatter the little bunch will become and it might be more difficult to insert down the fork-connector barrel (which may be widened if necessary with a small screwdriver).



Cut approximately 24mm (1 inch) of glue-lined heat shrink from the supplied 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 or solder.

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

Step 6: Element Installation

You may elect only to have a 3-element or 4-element system. The hole patterns allow for this. Let us assume we are building the 6-element system (diagram in blue).

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

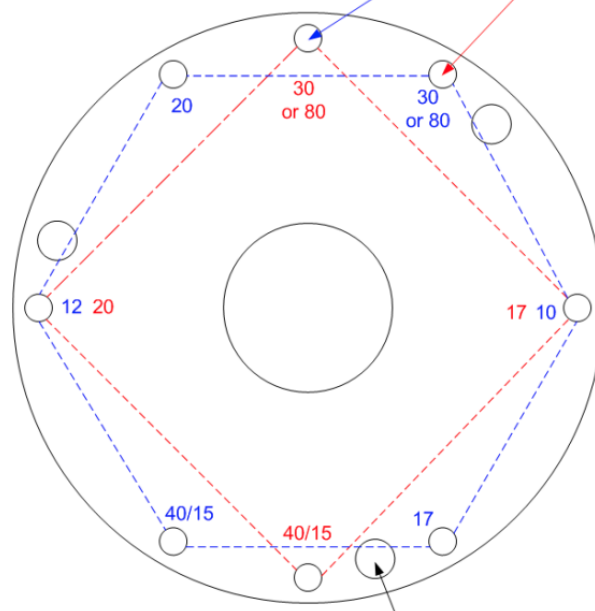
10m ABV Classic HOLE PATTERN

Square (4-element) or Hex (6 element)

For 3-elements, cut use every-other Hex hole

4-Element (in red) and fit SO239 here

6- Element (in blue) SO239 here



Larger holes are Guy Points

Although it does not matter which element you start with, let us start with the 30m 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 plate sets and thread the 30m element through the guy plate, the mid-spreader and the upper spreader.

At around 30cm (1-foot) down from the upper Double-Eye, you will already have made a loop with your element, securing it with electric tape on a temporary measure. You can finish this off in time permanently with a small section of heat-shrink after the complete build and test and you are comfortable with the tune.

Make up a single-ended shock-cord extension of approximate length slightly longer than required and connect it to the to upper double-eye (the top plate) with a snap-hook carabiner via this loop you have just made.

Connect this little extension to the upper double-eye and tension the shock-cord for a trial fit by hand down to the loop you have made previously. 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.

We recommend tensioning the shock-cord to around 90% of full stretch. Repeat for all the other elements.



40m element: Make a small tensioning loop parallel (and at the same distance from the driven plate to where the 30m element stops). In other words, match the loop for the 30m element. This is to keep all the elements below the upper double-eye at a steady tension. Again, use electric tape or heat shrink to secure it.

Continue the element to the top, optionally go through the little metal eyelet and come back down towards the upper-spreader. Supplied in the kit are TWO different diameters of PVC tubing. Cut these into half-inch sections and use some of these to slip over the end of the pole and secure the 40m element in place.



NOTE: USA / Region 2 Ham Radio: Reduce the foldback (cut the wire) by around 12-inches for resonance above 7.2MHz.

The remaining elements connect to the large Upper Spreader (with shock-cord extensions) apart from 10m and 12m. Connect these only to the second (mid-spreader) UHMWPE plate. They do not need to continue up the pole.

Step 7: 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 secure to your guys stakes. Bring each of the three paracord lines towards the centre of your working area where the antenna will be. Make a small loop just over half-way between the guy stake and the guy point will be. To confirm, this will be around 50cm / 2-feet from the guy plate.

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.

Double-tie off your guys with more half-hitches.

TIP: *DO NOT use the supplied carabiners for guying. You may use 3rd party carabiners for the guy plate if you must. You can instead also choose to loop the wire through the guy-plate and use tent rope tensioners. This way you can always add or remove tension as you wish.*

Personally, Callum prefers a simple loop and some half hitches.



Step 8: Tuning

The antenna will tune perfectly as is. The cut chart we have created will give you perfect tunes on all bands at centre of SSB operation.

If you want to tune your element lower, say for dedicated FT8 or CW, you can use this SWR calculator 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/>

Once perfectly tuned to your requirement, you can replace any electrical tape with supplied heat shrink and do the final tension of your shock cord.

This concludes the build, congratulations!

Notes about 80m:

In the event you wish to use 80m instead of 30m, simply disconnect the 30m band and install an inverted L for 80m instead. This will work on 80m very well (almost all my 80m Live-Streams are on this configuration) and you will still get a tune on 30m with your ATU button as a third-harmonic.

Cut 19m of wire and make a regular element with a 6cm fold-back right at the very end for supporting the end of your inverted L.

Go up to the main UpperSpreader and thread your element through here and connect the very end to the nearest tree or fence post.

TIP: In time, you will notice wear between the element and the plastic. You can circumvent this by making up a very small 6-inch shock-cord extension with 2 x plastic carabiners and creating a small loop for the element to hold on to. If you have already previously made a 30m element, just use the same shock-cord extension here.

Radials for 80m kit:

You will find that after cutting your radials, you will have around 150m of wire left over. Your options for radials are therefore:

- 14 Radials 10m Long
- 28 Radials 5m long (my favorite – with a little wire left for making adjustments)

Adjustment notes:

DX10 wire can be extended easily. Just join as you would any piece of copper wire by stripping around 25mm (1 inch) of insulation and twisting the wires together. Solder is optional because glue-lined heat shrink will stop oxygen and moisture entering the join. Glue lined heat-shrink can easily be removed by carefully slitting the heat-shrink down the middle with a sharp knife.

Maintenance:

We suggest inspecting your installation every 6-months for early warning signs of inappropriate wear or element damage etc.

UV Protection on your UHMWPE plastic plates can be achieved with 303 UV Spray which is available world-wide. This stops the plates from cracking in very hot / direct UV sun. If necessary in extreme UV climates, make a diary entry every 8-weeks to do this.

Waterproofing connectors: Callum M0MCX always uses Vaseline on the SO239 threads and PL259s and then coats the whole connection assembly with one half teaspoonful of petroleum jelly on his installations. He repeats annually and has never had a water ingress failure.

Wind gust protection:

It is possible that storm winds may have enough severity to cause local damage to buildings, infrastructure and even antennas. We do a replacement service for the antenna if this happens. Just get in touch with us and we can ship you another telescopic pole at cost.

To protect your investment though, we recommend a number of solutions to assist in keeping your antenna working, even through stormy weather.

- The base of your antenna can move (rare)
 - You can drill a small hole in the base of the screw cap and sit the pole on a small wooden dowl hammered into the ground below the pole
 - You can add ground guys: Connect loops of cord between the driven plate and the ground plate and connect these directly to your guy stakes
- Storm damage
 - You may also use light cord from the Upper Spreader to the same guys stakes you used previously. You can lightly guy these only. They are there only to assist your pole in the event a large wind gust only

It should be noted that the vast majority of users report years of service without conducting any of this additional work and the price of a replacement pole is light

compared to a new system. However if you really know that you are going to be experiencing a serious storm ahead of time, perhaps loosen one guy and lay the antenna on the ground.

100% duty / RTTY / FT8 QRO (above 500W continuous)

For SSB at 1,500W, you do not need any further adjustments - however for sustained carriers over 500W, for instance FT8, RTTY or serious AM use at 100% duty cycles above 7MHz, (10MHz and above) we recommend you use a small nylon thimble at the top of each element.

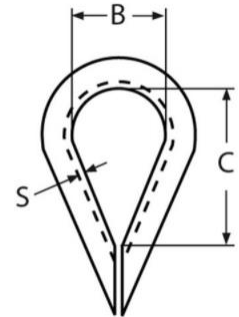
Wrap your element around this thimble and reconnect it with some solder to form a complete loop around this thimble. You can then heat-shrink your closed loop with supplied heat-shrink. You will find that your element is now a tiny bit smaller electrically using this method so you may want to add in around 25mm / 1 inch to your element to compensate.

The ideal thimble size will have a width of not more than 6mm and a cable guide of around 2mm. You just want to make sure the little carabiners supplied will fit through the hole. They are available in the UK for around £0.22 each. In US dollars, that's around \$2 for 10.

Once this adjustment has been completed, you should be able to QRO at 100% duty cycle 24/7.



B	13mm
C	19mm
S	2mm



-- end