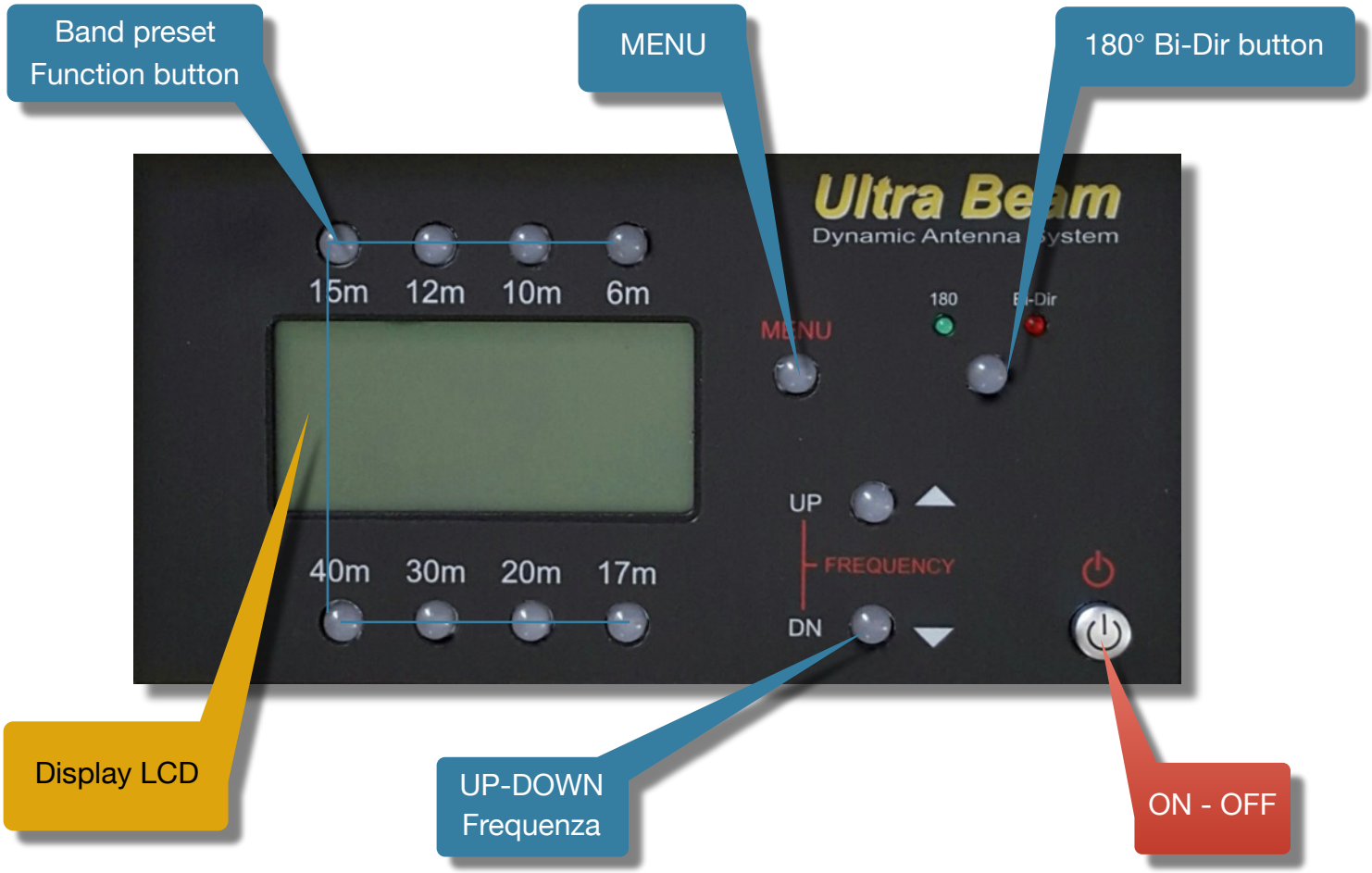
# Ultra Beam
## Dynamic Antenna Systems

MANUAL "**CONTROLLER**"


**Rev. 1.10**

# INTRODUCTION

The motor units employ stepper motors (stepper)
The communication between the controller and the stepper motor is unidirectional and is through the electrical wiring
The controller (> talks) by sending pulses to the stepper motor so that the copper belt reach the correct length.
The engines (<listen) receiving the stepper pulse and move until the controller transmits them.
If the electrical connection between controller and motor is correct and stable they will move endlessly with precision equal to 2 ° / revolution, allowing the copper tape to always reach the lengths with millimeter precision.
Where you had a problem with the wiring, the controller would play anyway his job
exchanging frequency and band, but it is obvious that the motors will not move regularly.
Same thing in cases where you have a problem with the driver card that drive the motors.
Example: if a radio has burned finals it still go into transmission, but nothing will come to the antenna.
It 's important to realize this so that you understand well the logic of communication between controller and antenna in order to use your UltraBeam consciously and correctly.

# INSTRUCTIONS USE

The electronic controller manages in an entirely automatic manner the length of the motorized elements in function of the selected frequency.

At first power on the controller will be in position "retracted ELEMENTS"

First, for a few seconds, will show the information about the model, firmware and serial number (Fig.1-2)

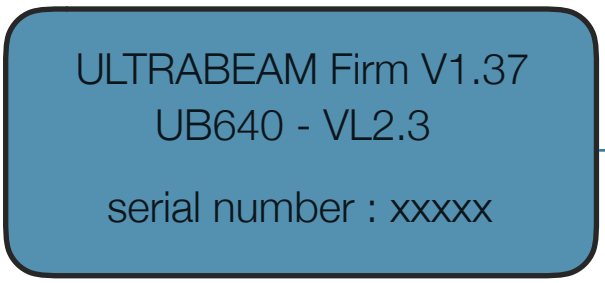



Fig.1

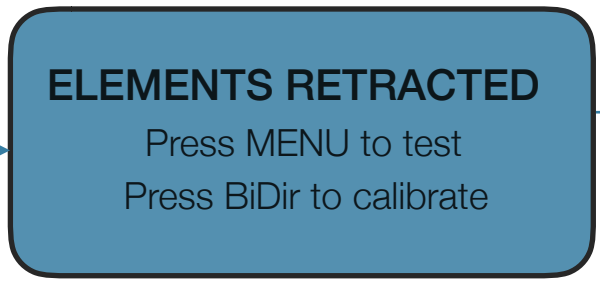



Fig.2

Selecting any of the band keys, the engine unit will slide the beryllium copper tape inside the fiber glass elements.

The elements will automatically stop only when they have reached the correct length that will resonate the antenna at the frequency indicated by the display (Figure 3)

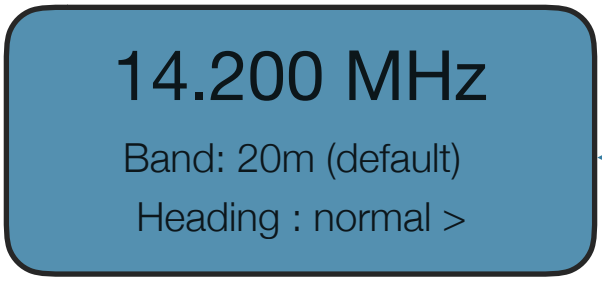
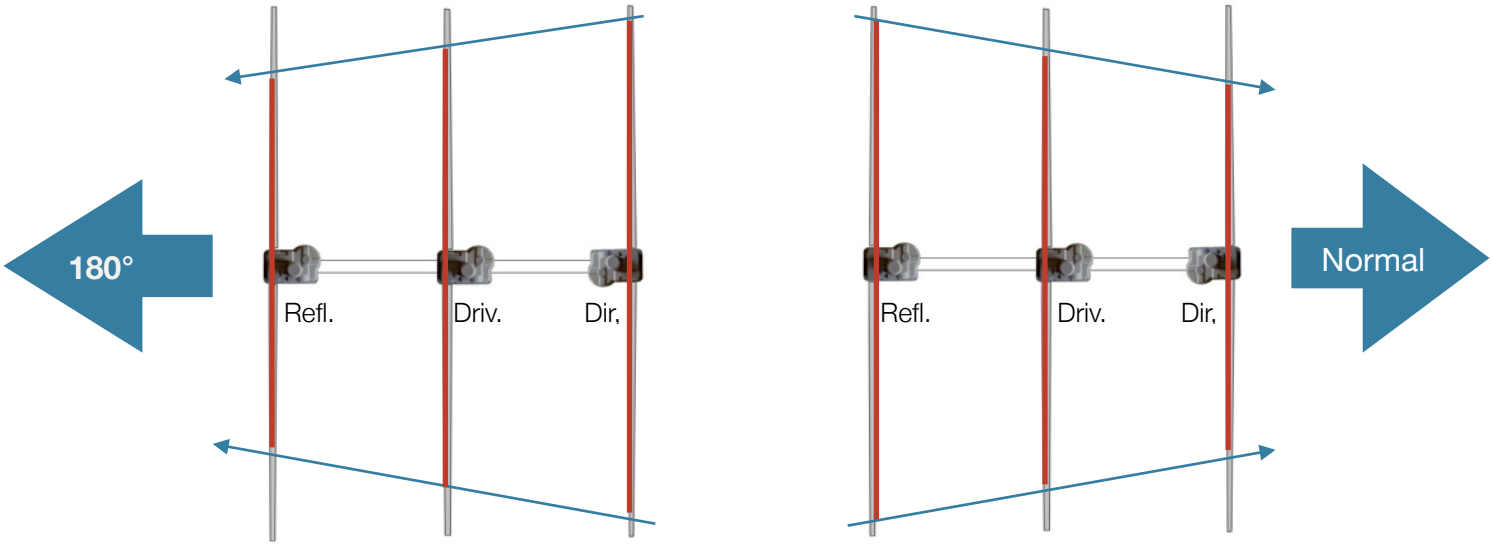



Fig.3

The controller employs backlit buttons that always show the status of the active function.
So if you're in 20 meter band the display will show the frequency in use and the band button will remain lit, flashes only to indicates that you are out of the amateur radio window.
During a band change the movement of the engines it will be indicated by three different warning:
1) Sound: A beep sounds during movement (you can adjust volume or mute)
2) Visual: the selected speed button will flash until all engines will not be stopped
3) Visual: a bar graph will appear in the display during movement.
The band preset buttons are used to change the band just like on radio
The UP-DN buttons are used instead to change the frequency within a band just like VFO radio with step of 25-50 kHz as a function of bandwidth.
These two functions allow you to quickly select the frequency in use
You need to remember that the Ultrabeam are still mono-band yagi with full-size elements as such offer a wide bandwidth (in function of frequency), therefore it will not be always essential that the frequency on the controller is identical to that of transmission, for this reason on many bands it will be enough to simply select a center band frequency.

# FUNCTION 180°

One of the most important and popular features with respect to the more traditional antennas with fixed elements is the ability to electronically reverse the pointing antenna without making it physically rotate.
In fact the use of motorized elements allows to invert the lengths of reflector and director passive elements, who are known to add gain and yagi direction pointing (fig.4-5)
When the 180 ° button is selected, the Reflector and Director reverse their lengths taking the functions of each other, the driver performs only a correction to compensate for a small difference in spacing, this is equivalent to having physically rotated the antenna by 180 ° reversing the antenna pointing without having actually rotated.
The 180 ° function is very useful in typical cases in which it is necessary to verify if the best signal either via long or short path, with a traditional antenna should be too much time especially if once reached opposite pointing, we should go back, the electronic 180° needs just 2-3 seconds.



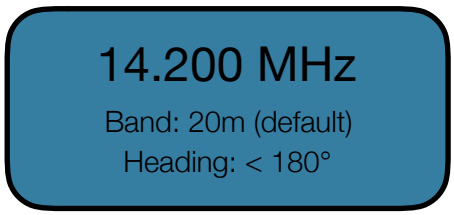




Fig. 4

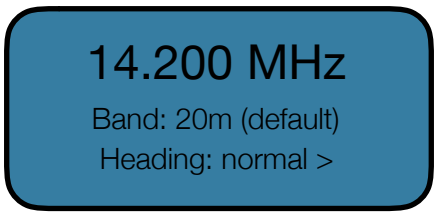



Fig.5

# FUNZIONE Bi-Dir

The Bi-Dir function allows the antenna to work in a bi-directional configuration where both passive elements acts like a directors.
This makes the antenna behavior similar to a dipole but with a higher gain and F / F
When the 180 ° and Bi-Dir are active two LEDs (green / red) placed next to the button will light up.The display will still show one of three ways in use: **<Normal>** / **<180 °>** / **<Bi-Dir>**

# TARATURA SWR

All controllers have in the CPU memory the correct measures according to the Yagi model in use so that the antenna can resonate and provide maximum gain at the frequency indicated by the display. These measurements are obtained with tests carried out on towers at heights (1/2 wave or +) and without the influence other antenna or conductive components which may affect the operation and impedance. However, each installation will inevitably present different characteristics from those of testing (height, interference from other antennas, length and quality of the coaxial line, etc., etc.).
So it is possible that your antenna after installation present a different impedance at feed point, and then a slightly higher value of SWR rather then 1.1.
In some cases you will have a 1.1 SWR value but on a different frequency from that indicated by controllers, this is caused by the same reasons described above, in both cases it will be possible to correct the impedance in a simple and fast way with the procedure described below.
It 's good to clarify that any SWR greater than 1.1 does not prejudge in any way the antenna gain, but since it is possible to make the correction of the elements so easily through the controller located in the station, it is advisable to do so.
The correction, where necessary, will be made only once, the antenna will resonate in the future always to the stored measurements.


The antenna impedance is given by the length of the driver and its interaction with the director.
Select on the controller a frequency identical to that of transmission (eg 14.200 MHz)
Select from the menu "Modify Elements", will appear all element lengths in millimeters.
Bring the transmitter on TX (rtty) and change the length of the driver (+/-) until you get the minimum SWR, if necessary also act on director, in any case never modify the reflector.
When you have reached the minimum SWR simply press MENU and save (Figure 6)

Repeat for the modes 180 ° and Bi-Dir
Remember: in the mode 180 ° passive elements Reflector and Director are reversed, so if you will need to correct the length of the Director, you must act on the reflector column, in each case modify the shorter element (fig.7)

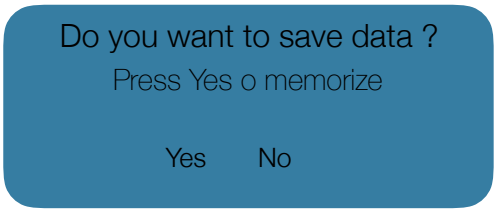



Fig.6

*NOTA: when the menu is activated the band buttons become function buttons

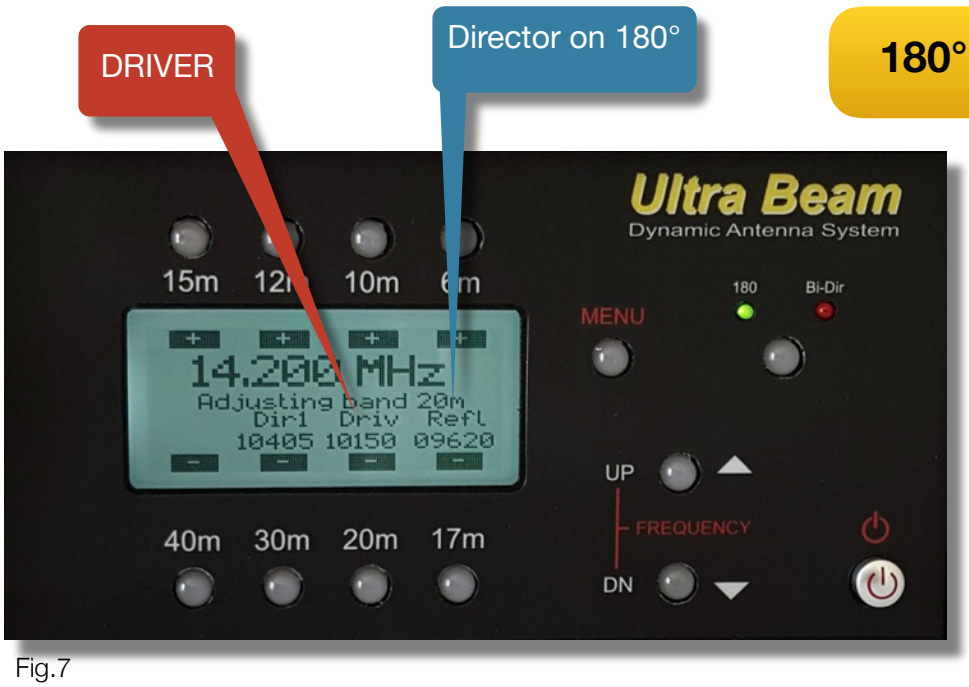



Fig.7

## ANTENNA MODEL WITH DOUBLE DRIVER


Fig.8

In Fig.8 an example of display on the UB640-VL2-3, one of the many dual driver models.
In this case the antenna will be fed (through the coaxial switching) on the director that thanks to a internal balun will work as drivers in the 30 and 40 meters bands.
If you need to correct the value of SWR apply the steps on page 5
On these two bands the central driver used from 6 to 20 meters will not be connected to the coaxial line, automatically switched by electronic switches, and its length will be such as not to affect in any way the two elements for 30 and 40.

# ELEMENTS HOMING ( RETRACT)

Such  function exists as inherent in the antenna, whose motor drives must necessarily be retracted for shipping and for the installation.
Having said that this function is not considered to be essential whenever you turn off the radio station, the controller can be switched off, leaving the antenna on last used frequency just as you do with the radio.
The next time you turn the antenna it will be ready to be used on the same frequency in which it is left.
However, this function can and should be used in cases where there are extreme weather conditions (strong wind). Retract the elements in these cases can prevent the tape to bent, in rare cases in which an element is broken.
In any case, you are free to retract the elements every time you want.
To retract the elements select MENU> Retract> Yes

NOTE: The antenna will also work with controller turned off as well as radio communication, The ON / OFF button only turns off the display and disables the selection keys.

# CALIBRATE

This function should be used only in the rare cases in which one or more motor units lost step.
The accidental loss of step can be caused by several factors, including the most common:
1) problem with the electrical wiring (poor electrical contact between the controller and motor)
2) sudden loss of power to the controller during a band change
3) increased friction in the sliding of the copper tape
4) poor contact of the DB25 to the controller or a motor unit connector
5) controller supply problem (low voltage)
These are some typical examples for which you can lose step, the condition in which obviously the antenna will not resonate properly in any band, in these cases it will be sufficient to run a "Calibrate", this will bring all the motor units to close completely, regardless of their real position.
If it was an accidental problem simply select any band and the antenna will return to resonate.
Otherwise if after the calibration the antenna continue to not resonate, it will be mandatory do visual and technical inspections as described in Troubleshooting UltraBeam, in order to establish the causes.

http://www.ultrabeam.it/site/index.php?
option = com_phocadownload & view = file & id = 7% 3Atroubleshooting & Itemid = 55 & lang = it

# RADIO INTERFACE

The controller can be interfaced to common radio Yaesu, Icom, Kenwoo, Flex, K3
The link will send the radio frequency in use to the controller, this will make the band change and frequency automatic without being necessary to intervene manually.
The controller already has in memory the radio set-up default (Figure 1), it will suffice to select the brand of your radio and connect the cable to the serial port on the controller and the radio.
In cases where you use a baud rate on the radio different from the default, it will be possible to modify it with  the menu. (Fig, 2)
The radio communication can be set to two modes plus off mode (Figure 3)
1) Band and frequency change
2) only band change
3) off
To select the appropriate protocol to your radio,
MENU> Other> RTX comm set-up> Protocol RTX

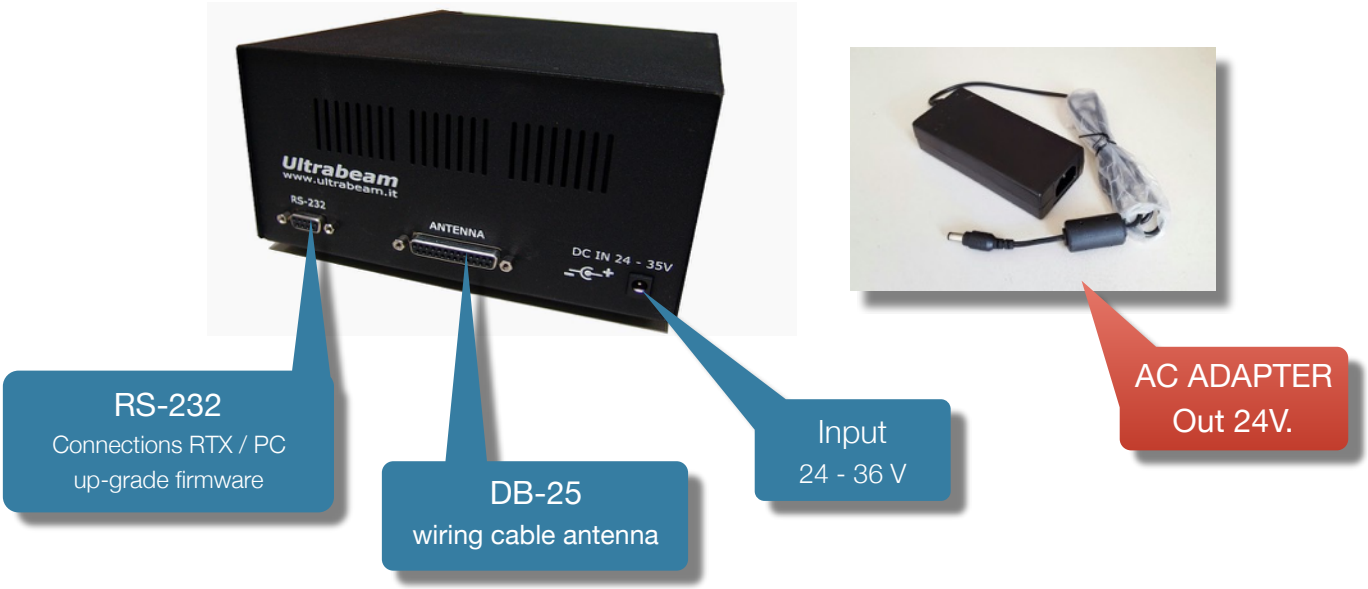

Fig.1


Fig.2


Fig.3

NOTE: If you have customized the communication parameters (Figure 2) they will remain in memory just exit with the menu button, if you select any of the cat again preset (figure 1) the customization will be lost, the preset buttons automatically set the default values when selected.

# CONTROLLER REAR CONNECTIONS




## IMPORTANT

-When You connect your controller to the motor unit of the antenna, all the units and controller must be in the retracted position.

-All the time that you need to disconnect the cable from the controller (DB25) BEFORE you must perform a "retract elements" from the menu.

-The Controller software works even if not connected to the antenna, which is why when you connects or disconnects the wiring (DB25) from the controller you must be certain that both drives (motors and controllers) are in the stowed position.

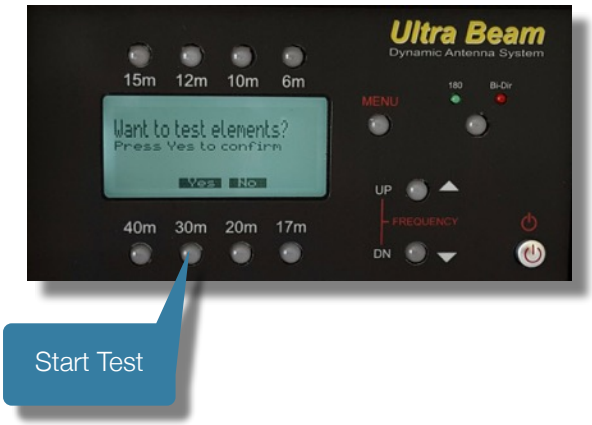
-Never Use the controller if the DB25 is not fixed with screws.

If you do not follow these important instructions you can lose synchronization between controller and antenna motor units, this does not allow the antenna to resonate and in some cases it could also cause permanent damage to the motor unit.

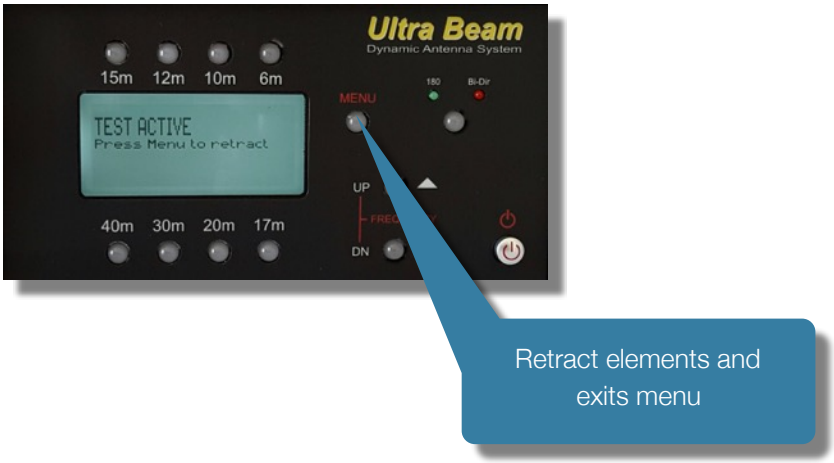
# PREASSEMBLY INITIAL TEST

The Elements Test function is used exclusively before the antenna assembly
It allows rapid testing of the all parties in order to verify the proper functioning
of the three main components, **Controller, Wiring, Power Unit**
Selecting any band key you still get the testing but also by selecting the
6 meter band it would have a higher extraction of copper tape from the motor unit.
The test function is activated only when the controller is in the "elements retracted"
Before running the tests:
1) Connect all the motor units to the wiring connectors
2) Place the motor unit on the floor or on a table.
3) Connect the DB25 to the controller (secure it with screws)
4) Connect power supply to the controller
The display will show for a few seconds the firmware in use, antenna model and serial number of the unit
then will appear "Elements Retracted" and instructions for testing

**TEST:**
press MENU> and then confirm with yes, the motors will release the copper tape for a short lenght.
To retract the copper tape, press MENU








IMPORTANT NOTE:
UltraBeam always performs a final inspection of all parts before shipment, however,
we recommend to perform the Test before installing the antenna, this will allow you to verify that
all received components are working properly and that nothing has been damaged during
transport and avoid any unpleasant surprises after mounting.