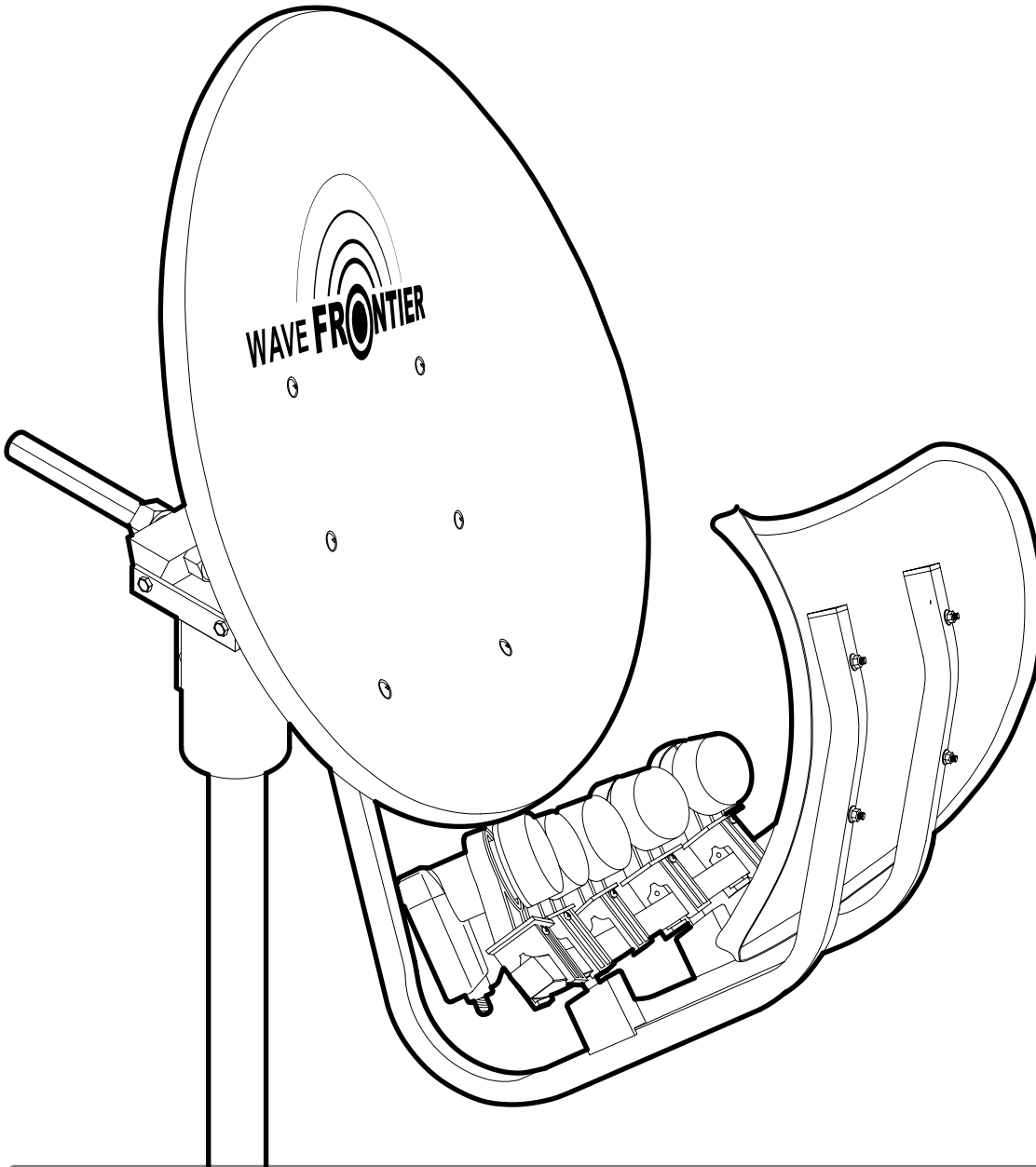
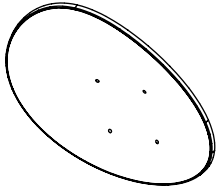


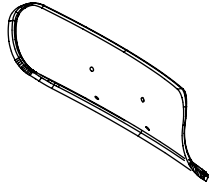
Installation Manual for Toroidal 90 Multi-beam satellite antenna



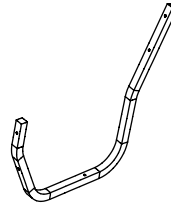
A1 : Main Reflector
(1ea)



A2 : Sub Reflector
(1ea)



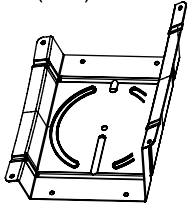
A3 : Support Arm
(2ea)



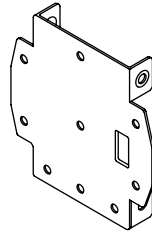
A4 : LNBF Guide
(1ea)



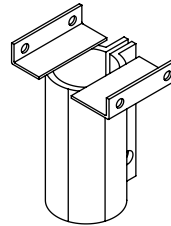
A5 : Back Mount Tilt
(1ea)



A6 : Back Mount Elevation
(1ea)



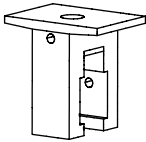
A7 : Weaving Tube
(1ea)



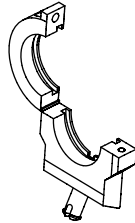
A8 : LNBF Guide Seat
(2ea)



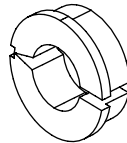
A9 : Holder Supporter
(5ea)



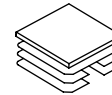
A10 : LNBF Ku Band
Holder (5ea)



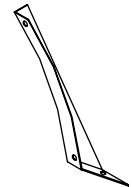
A11 : LNBF Ku Band
Adapter (5ea)



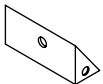
A12 : Support Arm Cap
(4ea)



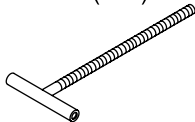
A13 : BKT (2ea)



A14 : BKT (1ea)



A15 : M16 T-Bolt
(1ea)



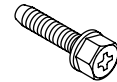
B1 : M6*12 (8ea)



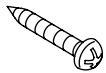
B2 : M6*35 (4ea)



B3 : M6*35 (4ea)



B4 : M6*37 (2ea)



B5 : M5*15 (2ea)



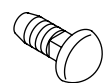
B6 : M5*15 (15ea)



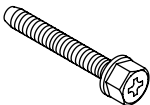
B7 : M8*20 (1ea)



B8 : M8*20 (6ea)



B9 : M10*140 (2ea)



B10 : M10*25 (2ea)



B11 : M6 NUT
(16ea)



B12 : M8 NUT
(7ea)



B13 : M10 NUT
(4ea)



B14 : M16 NUT
(2ea)



B15 : M10 SPRING
WASHER (4ea)

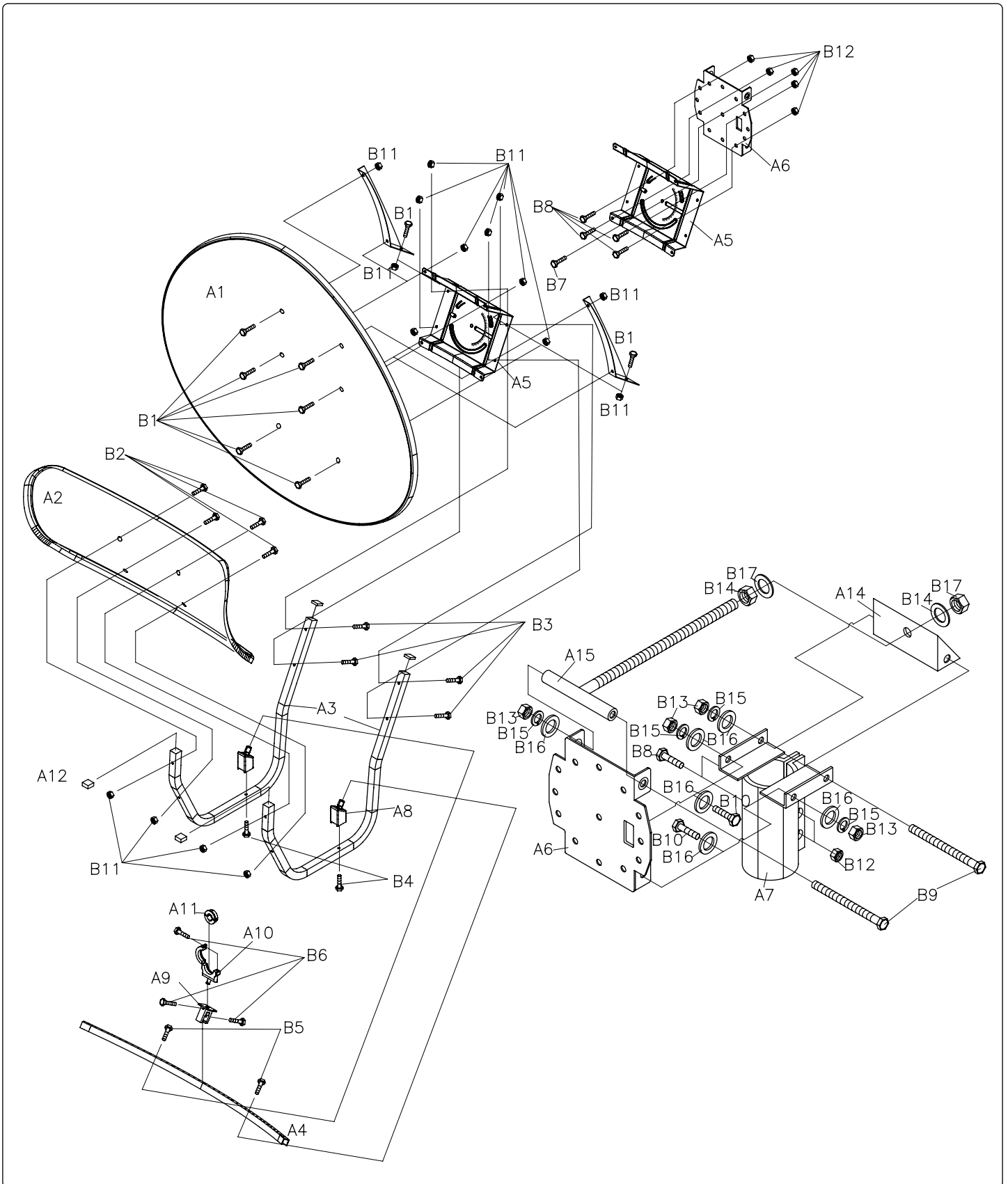


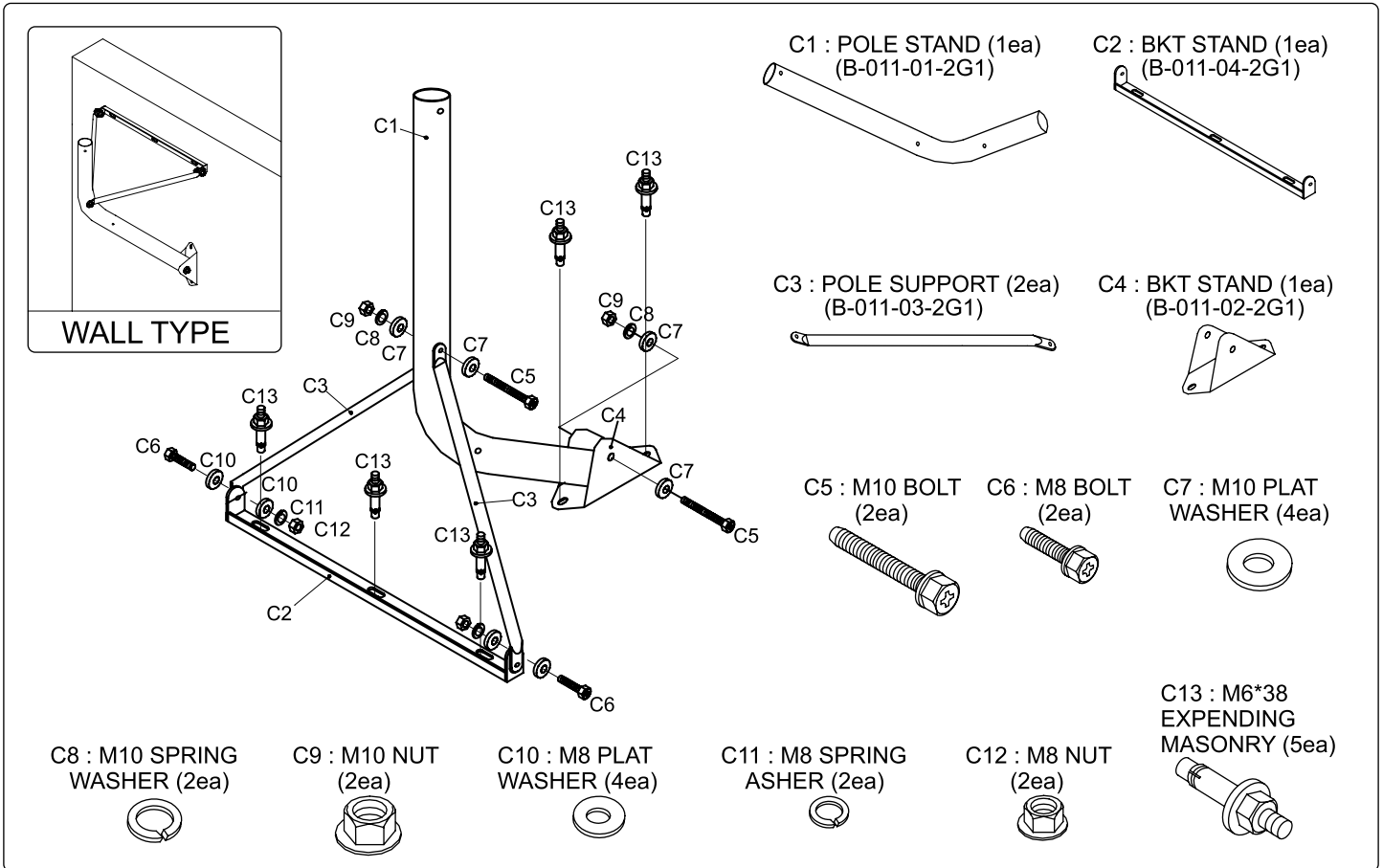
B16 : M10 WASHER
(6ea)



B17 : M16 WASHER
(2ea)







Basics: How Toroidal works

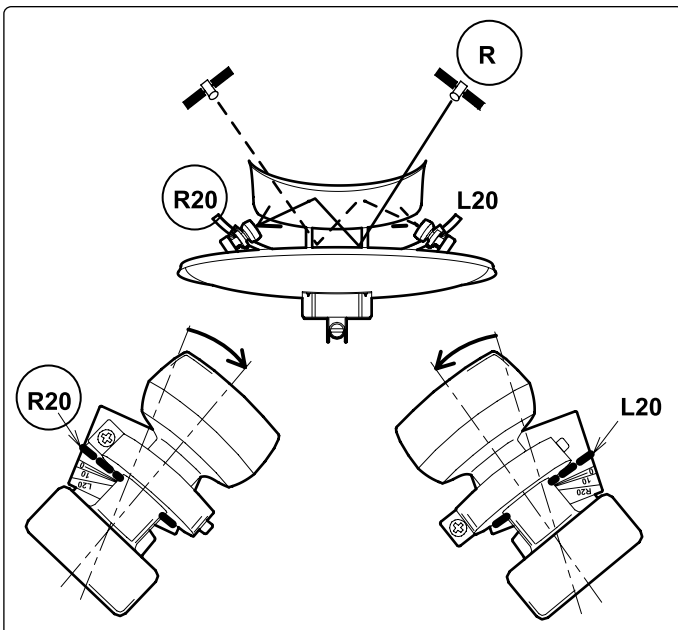


Figure A

The Figure A illustrates how signals travel through Toroidal. Signals are reflected twice, 1st on the main reflector and 2nd time on the sub reflector.

Note that the **LNBF position** for the upper right positioned satellite shown as (R) is located at the left-side of the guide (assuming you are behind the dish) as shown on Figure A.

Also note that there are markings on the guide and holder supporter measuring from L20 to R20.

If your LNBF position for 119W is at R20,

1. Align the LNBF Holder Line to the R20 on the supporter (Fig. C)
2. Place the center of LNBF at R20 on the guide.

Step 1 : LNBF Holder Assembly

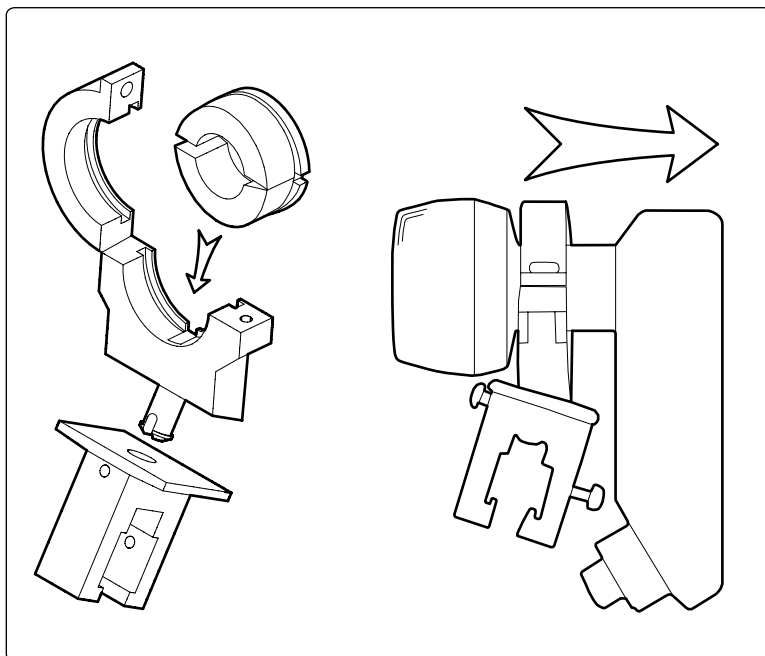


Figure B

1. Please refer to the setup information emailed to you. If you have not received this info, please request your setup info @ www.multilnbdish.com/setup.htm.
2. Assemble holder first by hand. Adapter will be required if the neck size of LNBF is less than 40 mm. The Toroidal LNBF holder is designed to accommodate 40 mm and 23 mm neck size with adapter provided in the package.
3. Place LNBF away from the main reflector.

Step 2 : LNBF Holder Alignment

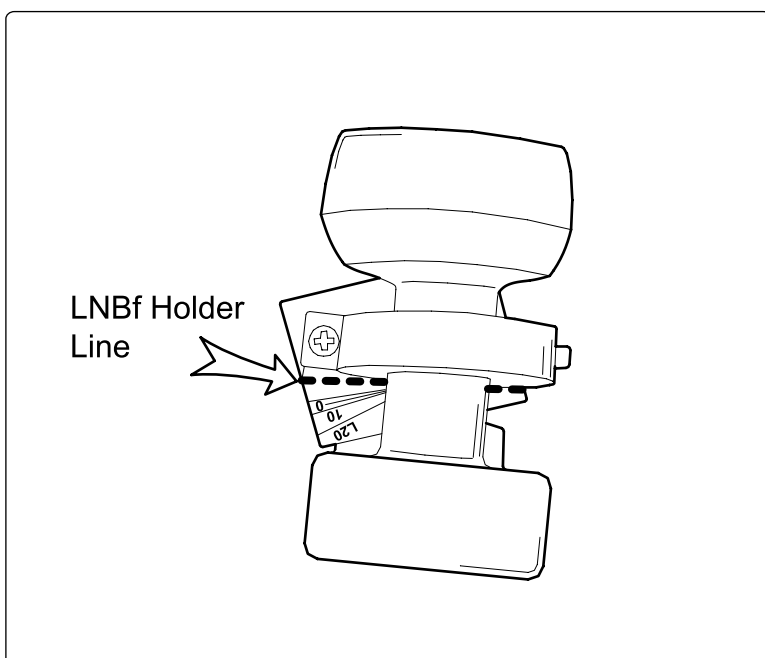


Figure C

1. Align the LNBF holder line to the corresponding scale on the holder supporter. If your set-up info indicates that 119W is R20, rotate the holder till the holder line reaches the R20 line on the supporter, as shown on the figure B. This adjustment has the smallest impact in optimizing the setup. If your setup indicates that holder position is R13, align the line between R10 and R20.
2. These set-up values are used again to locate the LNBF on the guide as well. Note that the LNBF guide has the markings from R20 ~ L20. If your setup info indicates that 119W is at R20, place the center of LNBF at R20 on the guide. Place all LNBFs on the guide as required. Do not tighten these LNBF holder with screws to the guide, since you will be adjusting locations of each LNBF later on to maximize signal.

Step 3 : Elevation Adjustment

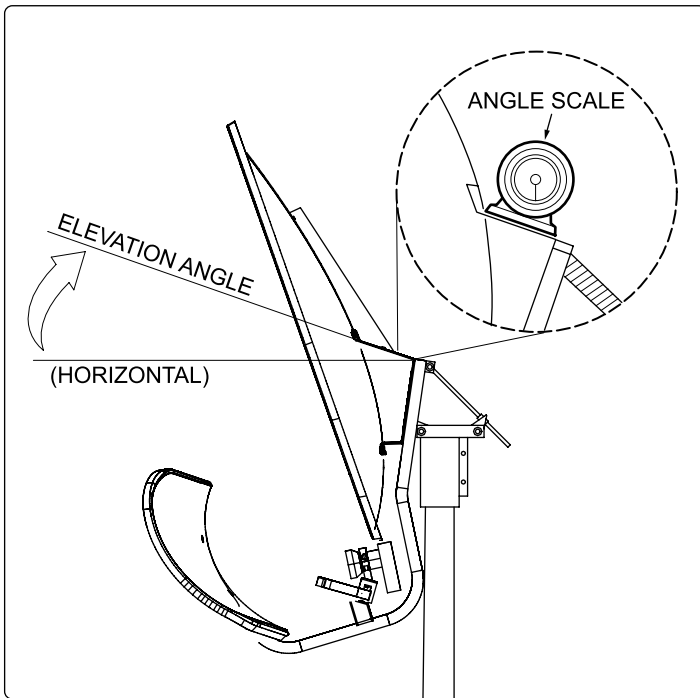


Figure D

Tip: You will be making adjustment on elevation, skew and azimuth angles when optimizing your setup throughout the process. Do not use excessive force when securing moving parts.

1. Before adjusting elevation angle, make sure that the pole mount is installed vertically.
2. Place angle scale over the bracket as shown on Figure D and secure the reflector part to the pole. (Angle scale is available at most hardware stores. If you do not have one, you can use your receiver later on to determine the correct setting. Simply secure the reflectors to the pole mount.)

Note: Elevation is the most critical factor in aligning any satellite dish.

Step 4 : Skew Adjustment

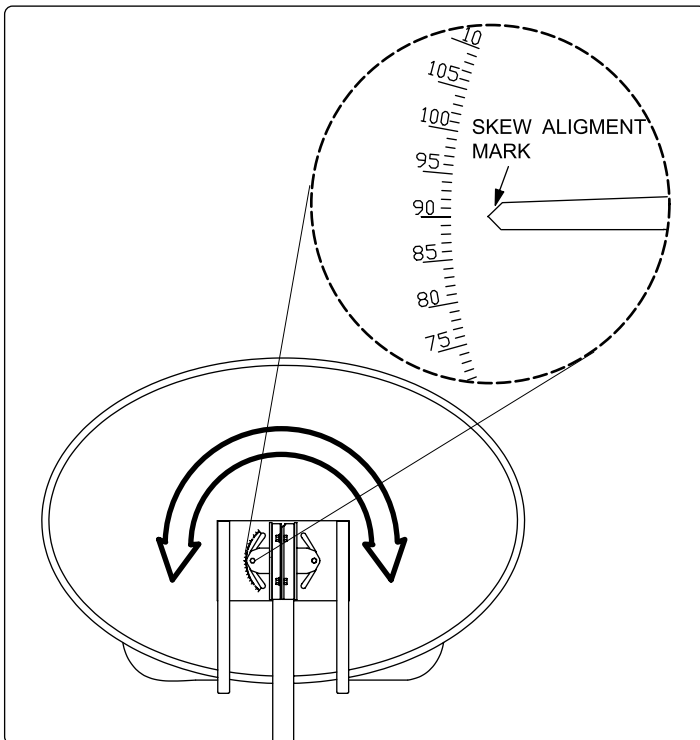


Figure E

1. Adjust skew angle as give in the setup information and secure the reflector.

Step 5 : Azimuth Adjustment

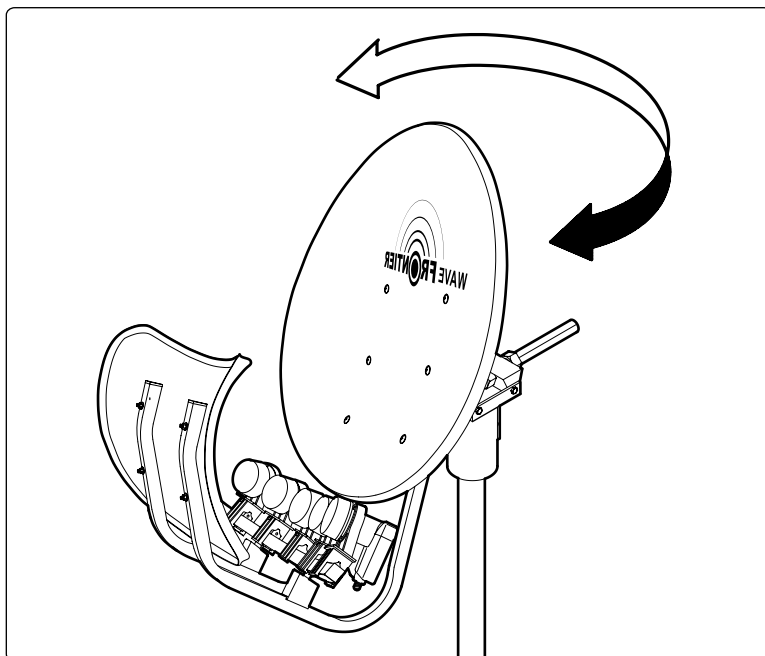


Figure F

1. Connect the center-located LNB (101W or 110W) in most cases) to your receiver. Adjust the reflector's azimuth (swing the dish left or right). If you don't get any signal, you may need to adjust elevation angle.
2. Once you got a signal on the center-located LNB, move on to the elevation adjustment. This is where you make a fine adjustment for elevation. Move up and down by 1 degree and check the signal simultaneously.

Note: The azimuth provided in the setup information is the value with magnetic deviation adjustment.

Step 6 : LNB Location Adjustment

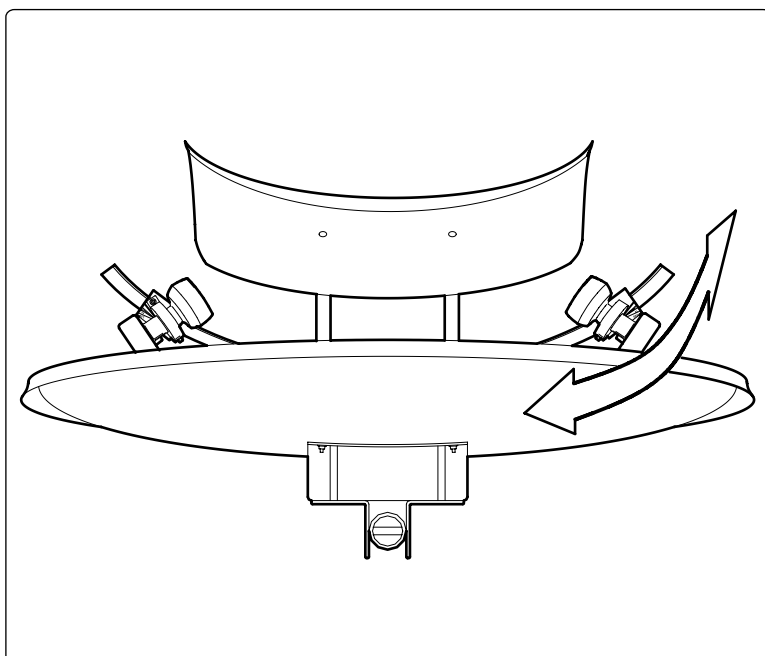


Figure G

1. Once you have a satisfactory signal strength on the center-located LNB, move onto other LNBs. You can also make adjustment on the location of each LNB by moving left or right on the guide.

Tip: Even if your azimuth is off from the optimal value, you can recover azimuth offset by adjusting the LNB location on the guide.

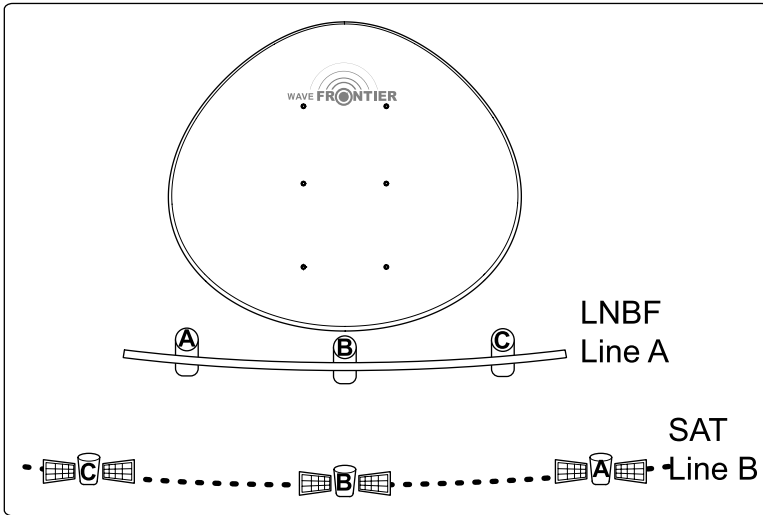


Figure H

1. Alignment process of your Toroidal is the same as follows;
 - a. You have a line formed by multiple LNBFs on your guide (shown as Line A: A, B & C LNBFs on Figure H)
 - b. You have another line formed by your target satellites shown as Line B.
 - c. You are trying to make these two lines parallel. Space between LNBFs will be the space between your satellites.

However, your B line is not parallel nor straight line unless you live at the equator.

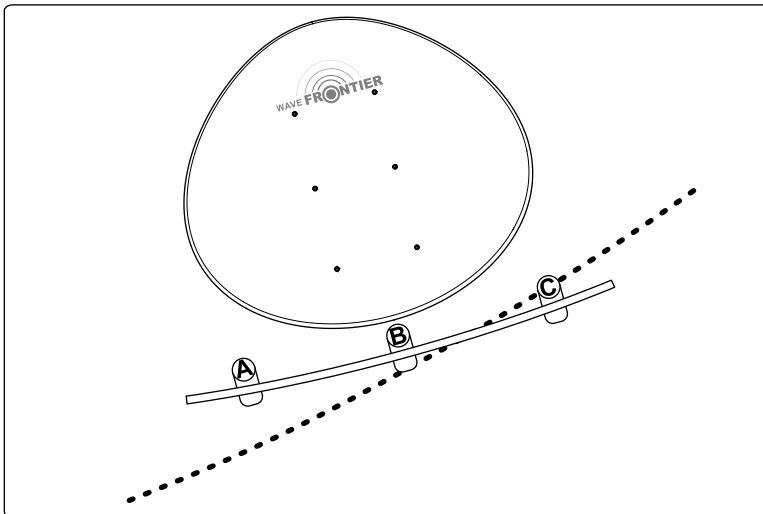


Figure I

2. Assume that you have 3 LNBFs and signal strength is as follows;

Sat A = LNBF A : 70%

Sat B = LNBF B : 80%

Sat C = LNBF C : 95%

Your setup is most likely one shown on Figure I. The center of your LNBF line is higher and not properly skewed.

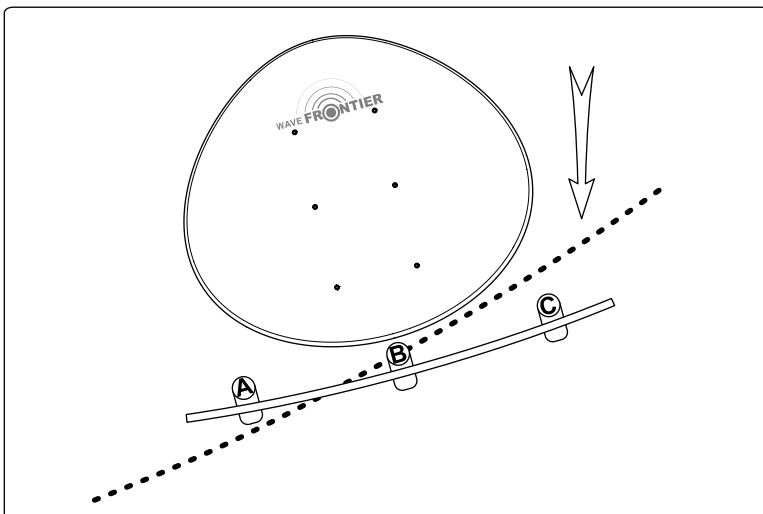


Figure J

3. You will need to adjust elevation first to get a better signal strength on your center-located LNBF. You will be lowering the elevation on this example.

Sat A = LNBF A : 80%

Sat B = LNBF B : 100%

Sat C = LNBF C : 80%

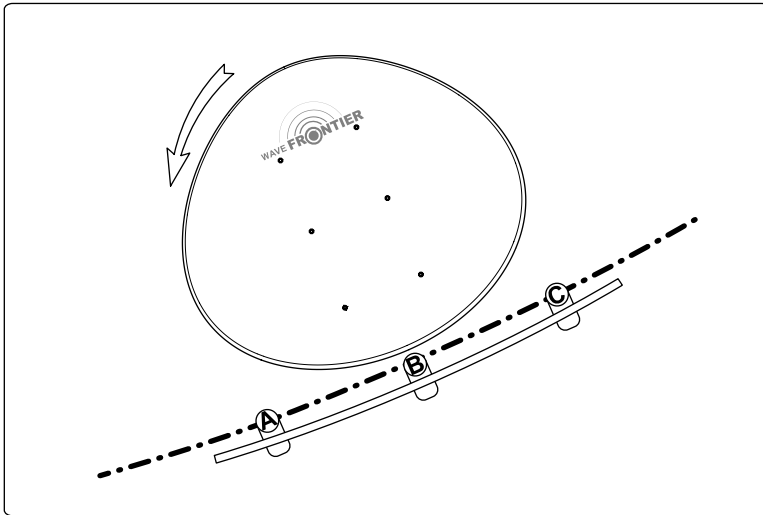


Figure K

4. Adjust skew angle to align your LNBF to the satellite line.

Sat A = LNBF A : 100%

Sat B = LNBF B : 100%

Sat C = LNBF C : 100%

5. The final step will be adjusting location of each LNBF so that they are properly positioned to their respective satellites.

Your Setup Value

The following table is provided so that you can preserve your final setting value in case you need to add or make extra adjustment on your Toroidal in the future.

Elevation Angle

Skew Angle

Satellite	Orbital Slot	LNBF Location	Remarks
Sat A			
Sat B			
Sat C			
Sat D			
Sat			
Sat			
Sat			
Sat			
Sat			