

**The How to
get your
BUD
up and
performing
Manual
By FaTAir**

HOW TO for a Polar mount Parabolic BUD - Big Useful Dish.
Preface - Some required specifications for success.

Your feed Must be centered.

If your feed is not centered, it will affect the angle at which the dish looks. This can be vastly different than the angles you measured to calculate to adjust the declination.

On a single mount point feed ant, I.E: button-hook, or variant.
At zenith, if the feed sags, it is towards the bottom of dish.
So we compensate with the polar angle. But, The actual discrepancy is in the declination angle. When we drive the dish off of zenith, the feed doesn't sag to the same point on the dish. It's now sagging off to the left or right of the center bottom of the dish. This would mean the azimuth would also be off one way for sats to the east, and off the opposite way for sats to the west. The elevation is also thrown off by this asymmetric variance. There is no way to compensate for all this. Too many variables!

On a tripod mounted feed, if the feed is up or down from center, This will effectively add to or subtract from our calculated declination. We go to our Zenith sat, and adjust our polar axis angle compensating for the higher or lower look angle of the dish. Then we do the end of the arc, and adjust the AZIMUTH. But when we return to zenith, we have to make a large re-adjustment to Polar axis angle. This may then throw off AZIMUTH on the other end of the arc. We cannot compensate with the Polar axis angle. compensation must be made with the declination. Through much experience and experimentation, compensation can be made to the declination angle. But it is very time consuming.

If it is left or right of center, it will affect only the angle the dish is driven to by the actuator. A very slight re-adjustment of the polar angle and Azimuth may, or may not, be necessary to compensate for this.

Your dish must also be "TRUE"

Check it for true by running a string across the center of the face of the dish, lip to lip. Run another at 90 degrees to the first string.

Do the strings touch where they cross? If yes, your dish is true.

If no, your dish is warped. Now, the amount of warp, determined by the space between the strings at the crossing point, may be up to an inch, and may not degrade C band performance much, but would have a negative effect on Ku band. If you want Ku with your BUD, The space between the strings should be less than 1/4 inch.

If the space is between 1/4 and 1 inch, it will probably work ok on C, but Ku may be disappointing.

If your BUD is warped, Weigh your options, Straightening, or replacing? Or is the performance "good enough?".

All initial alignment is and should be done on C band ALONE.

The beamwidth of a BUD, at C band, is much wider than it is on Ku.

A signal on C may start out at a Q of 10 and we can tweak the dish left, right, up and down without losing it. On Ku, we may have to be "Right On" in order to see any signal Q.

After we have gotten the dish aligned on the arc and operation of C band is acceptable, can Ku be attempted.

If the dish is to be reassembled as it was.

Marking panels A-A, B-B etc.during disassembly helps.

Don't swap the positions of panels. or sections of the dish.

If it has a "Button-hook" feed, a single pole from the center of the dish, to mount the feed, mark its position, both distance from dish and what is aimed towards the top of the dish.

f/D calculations

Focal Length, What?

The dish is actually a lens, just like in a camera.

The antenna is actually in the feed. Now called a "probe".

If you have no clear indication of where the original feed was located, You will have to calculate the focal length and f/D ratio

Determining the focal length of a parabolic dish (axi-symmetric, circular)

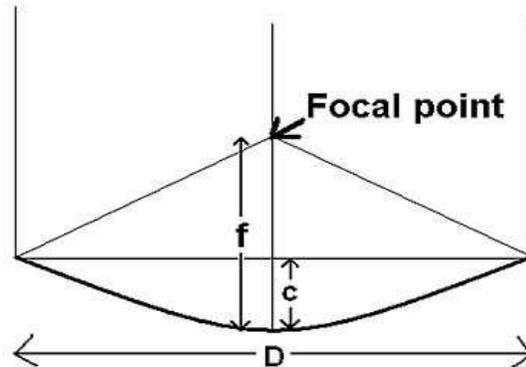
Focal length = f

Depth = c

Diameter = D

$$f = (D * D) / (16 * c)$$

Measure the depth using a tight fishing line across the dish and a rule to measure depth c.



f/D example: 10 ft dish, f calculates to 48 inches (4 ft) $4/10=.4$

Assemble the feed scaler ring assembly aligning the f/D ratio you calculate, to the corresponding f/D mark on the feed, to the front, or rear face of the scaler. (Refer to mfg's instructions)

Now, Assemble your feed mount so that the distance from the center of the dish to the feed is the calculated Focal length, MINUS 1/4 inch.

Get it centered, as outlined on the previous page, If your dish is a "button-hook style, adding guy wires or struts may be necessary. Aim it for the center of the dish. We want to use all of the dish, Not just one side.

Refer to the feed manufacturers documents to properly set the skew.

Usually there is a mark on the feed to align vertical , or horizontal, with the dish.

Most feeds with a servo for polarity, require the servo to be 45 degrees to the west of vertical. in the northern hemisphere.(or 180 degrees from there) East of vertical in the southern hemisphere

We must assemble the BUD with the proper DECLINATION

The important thing we have to know to properly assemble the BUD is your Latitude. North or south of the Equator makes no difference

Use this chart, find your Latitude and the Declination angle.

Latitude (deg)	Declination Angle (deg)	Latitude (deg)	Declination Angle (deg)	Latitude (deg)	Declination Angle (deg)	Latitude (deg)
1	0.18	24	4.07	46	6.92	69
2	0.36	25	4.23	47	7.01	70
3	0.53	26	4.38	48	7.11	71
4	0.71	27	4.53	49	7.21	72
5	0.89	28	4.67	50	7.30	73
6	1.06	29	4.82	51	7.38	74
7	1.24	30	4.96	52	7.47	75
8	1.41	31	5.10	53	7.55	76
9	1.59	32	5.24	54	7.63	77
10	1.76	33	5.38	55	7.71	78
11	1.94	34	5.51	56	7.78	79
12	2.11	35	5.64	57	7.85	80
13	2.28	36	5.77	58	7.92	81
14	2.45	37	5.90	59	7.99	82
15	2.62	38	6.02	60	8.05	83
16	2.79	39	6.14	61	8.11	84
17	2.95	40	6.26	62	8.16	85
18	3.12	41	6.38	63	8.22	86
19	3.28	42	6.49	64	8.27	87
20	3.44	43	6.60	65	8.31	88
21	3.60	44	6.71	66	8.36	89
22	3.76	45	6.81	67	8.40	90
23	3.92			68	8.44	

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ASSEMBLING THE DECLINATION ANGLE`

Whenever we measure angles of the polar axis, or dish offset, use the same reference. either 0 for horizontal, or 90.

If you want to measure from the pole that's ok also. but make all measurements from the same reference point.

I personally prefer horizontal as 0,

Once we know what our DECLINATION should be, we can measure our polar angle, Dish mount plane angle, and calculate our declination.

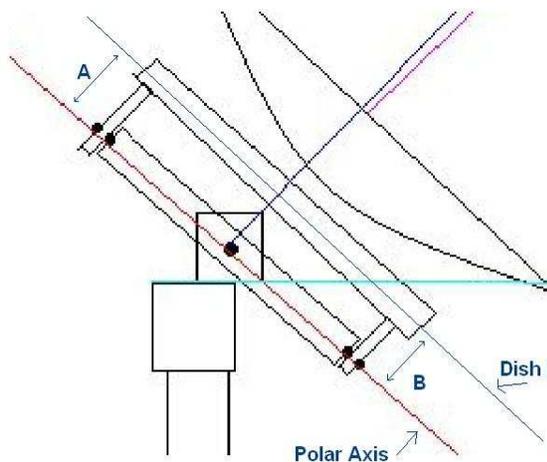
We will measure the Dish mount plane angle at ZENITH.

With your dish on the pole,

Drive the dish to the center of its rotation about the polar axis with the actuator, This is the dishes highest angle above the horizon

We Then adjust the Declination assembly so that the Polar mount angle and the Dish mount plane angle are Declination chart angle different. Note in the following figure that length A is greater than B

Declination Explained



Declination is the difference between the polar mount angle and the plane of the dish mount. This is built in, adjusted to the Declination charts value, for your latitude. Length A gets greater than B as you move N or S of the Equator.

Dish mount plane -
Can also be measured with a 2X4 spanning the face of the dish up and down

Note also that you may find it easier to to place a 2X4 up and down, spanning the face of the dish to measure the Dish mount plane angle.

Just remember to use the same reference for both angles.

Polar elevation, and dish mount angles.

It is the difference, between the two angles, that we adjust to the declination chart angle.

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 ADJUSTING for your ZENITH satellite

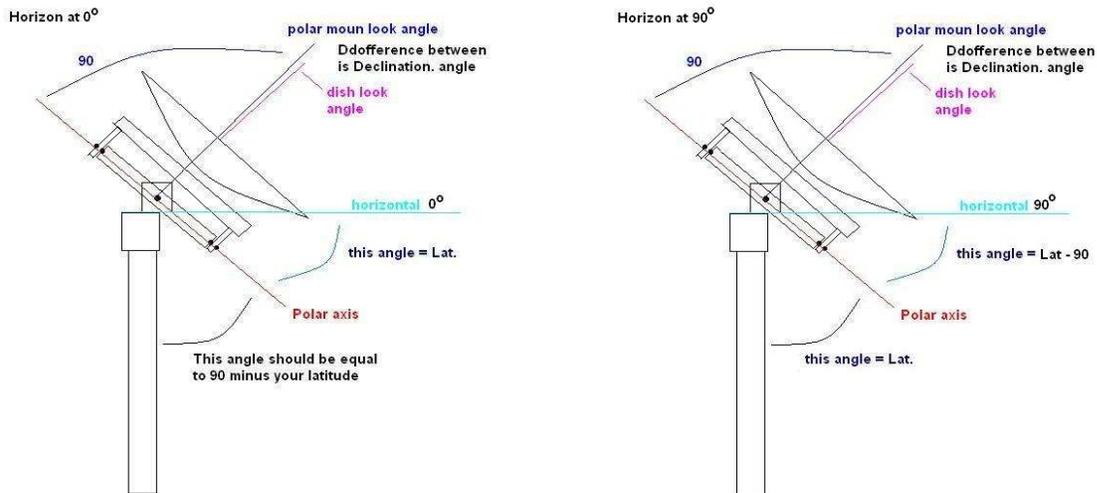
Zenith is the highest point, from your horizon, to the satellite arc.
 This will always be to your true south, if you're in the northern lats.
 It will be true north if you're in the southern latitudes.

In the following, "drive your dish" means use the actuator, or other device you use to rotate your dish about the polar axis.

From here on, North and South can be inter-changed, along with East and West.

Drive your dish to the center of its rotation on the polar axis.

Adjust your Polar Axis angle according to your Latitude and the following fig.



Note: again - Your horizon can be 90 or 0.
 Either is correct, just the reference is different.
 If your horizon is measured as 90 degrees-
 Adjust Polar axis angle to 90 minus your latitude ,

IE: lat = 40 90 - 40 =50 Polar axis angle = 50 degrees

Adjust it to latitude if your horizon is 0 degrees.

Definitions

AZIMUTH is rotation of the mount on the pole.

ELEVATION is the angle of the Polar axis.

Polar Axis is the axis of rotation of the dish provided by the actuator.

Now, watching for Q, on a known active transponder, on your zenith sat, rotate the mount on the pole, slightly, east or west, looking for a maximum Q reading.

Most receivers will require you to pause after each rotational adjustment, for the Q reading to be acquired or stabilized.

NOTE:

If your Zenith satellite more than a few degrees East of West from your longitude, you can "fudge" a little, I.E: drive your dish a little east or west.

If you are unable to get any Q, slightly adjust the Polar angle up or down and repeat the above.

When you have maxed your Q with slight rotations of the mount on the pole, adjust your Polar elevation for maximum Q.

This is usually a large turnbuckle or nut and bolt arrangement on the backside of the mount.

After locating our ZENITH sat by rotating the mount, ADJUST ELEVATION. for maximum Q, we would like Q to be 40 or more.

do not rotate the mount on the pole (AZIMUTH) at ZENITH again.

Explanation - -

From now on, the actuator moves the dish E-W. at ZENITH, so there is no need to adjust AZIMUTH (E-W), , the actuator does it.

We need only adjust ELEVATION at ZENITH from now on.

Note- If you are unable to get Q, and assembly of the dish is as outlined, Double check your receiver programming. Double check feed measurements. If that is correct, suspect an electronic failure.

If you have switches, remove them, run coax directly from the lnb to the receiver. Check all connections. Swap out receiver for known working unit. Swap out LNB? You should have something for Q

Now that you have good Q on the satellite directly south, or very close to south, we are going to find one end of the arc.

AZIMUTH ADJUSTMENT

AKA; The end of the arc, near the horizon.

Drive your dish so that the actuator retracts, shortens.

Watch for Q on known active transponders on sats East or West of your ZENITH sat. Whichever direction that is, when you retract your actuator.

When you don't see another Q reading, go back to the last Q indication you had. Peak the reading with your actuator. Take Note of Q reading.

Manually rotate the mount slightly East or west.

This is the AZIMUTH adjustment.

If the Q you had drops. rotate the opposite direction.

Maximize the Q indication by alternately rotating, then driving the dish back and forth with the actuator. If you can't get Q back to where it was, you've rotated the mount (AZIMUTH) the wrong direction.

Repeat as necessary until you get no more improvement.

Then repeat this whole paragraph until you're at the end of the arc.

NOTE:

When we are not at our ZENITH sat, we DO NOT adjust polar ELEVATION, When we are not at ZENITH, the actuator moves the dish up and down, the further from ZENITH, the more up and down. We, therefore, only adjust AZIMUTH.

When we have the arc aligned, tighten up the AZIMUTH bolts, drive the dish back to ZENITH and find the ZENITH sat again.

If Q dropped slightly, re-adjust polar elevation angle.

Should only be a very slight adjustment. (see NOTE- below)

Tighten up polar elevation angle locks. Check sats on the opposite side of where you tuned up the dish. Should be OK.

(NOTE)If the Polar Elevation angle changed by more than a degree or two, after returning to ZENITH, suspect an off center feed, improper declination, loose or sloppy polar axis pivots, or some other mechanical problem.

Feed tweaking for max performance or Ku

Now that you are tracking the arc on C band, If you think it will benefit you, you can try to "Fine Tune" the focal length and readjust the f/D on the scaler.

This is experimentation, so may be time consuming.

Using the calculated focal length, and calculated f/D usually results with very acceptable C band performance.

If you wish to do so, Adjust feed in or out for maximum Q on C band
The adjustment made usually isn't enough to make a significant change to the f/D setting of the scalar ring, and can be accomplished by only moving the feed, in or out, in the scaler.

If it is a large change, you may want to use spacers to move the feed closer, or further from the dish and readjust the f/D setting on the scaler.

This could be caused by the dish not being a perfect parabola. If it was stored, many years, face down or up, on the ground, the center area could have become "Flattened" , This could also cause Ku operation to become hard to get working.

If you have a C-Ku feed on your BUD, this could be very beneficial on Ku.

Wire in your band select switch, disqc or 22khz, whatever you use.

Program a Ku sat accordingly, and look for Q on an active transponder.

This is easier if the sat is C and Ku with active transponders on both.

Drive the dish E or W slightly, as many BUDS may focus Ku off of where C is focused. Adjust feed in or out for maximum Q.

Adjusting the feed is easier, if the sat is close to the horizon.

(Feed is closer to the ground in most instances)

Also, Polar elevation and Azimuth may have to be "tweaked" slightly.

Also note that an adjustment on Ku will usually be 1/4 of that you made while tuning/aligning the BUD on C band. The BUD "sees" the sky 1.5 to 2 degrees up/dn/E/W of where it is pointed on C band. On Ku, it's may only be .3 degrees or less.

This, in all, may decrease your C band performance somewhat.

It's up to you what you determine as acceptable performance.

(DMX741 C-Ku feed -

I have seen posts in forums where the C/Ku feed focal length was adjust adjusted for good Ku, C band performance was virtually dead, and vice-versa. Some have obtained good C and Ku by modifying the feed itself.)

Good Luck, and Happy Satellite Hunting.

ADDENDUM

Terminology used:

Q The quality reading produced by your FTA receiver when it is on an active satellite transponder. The higher the Q, the better the Quality of the received signal. (The S or Signal reading is the electrical connection to the LNB)

ZENITH Is the point in the sky where the satellite arc is the greatest angle above the horizon. It will be located straight south, if your in the northern hemisphere. Straight north if your in the southern hemisphere.

Zenith satellite Is the satellite closest to this point, with active transponders on the band you are using to align your dish

AZIMUTH The rotational position of the mount on the pole.

Polar Elevation Equal to your Latitude,
with the reference of 0 on the horizon, or 90 - latitude, if your reference is 90 on the horizon.

Dish offset angle Angle produced by mounting the dish, to the polar axis, with the top attachment longer than the bottom.
determined by your required DECLINATION, (from charts)

DECLINATION The difference between the polar elevation and Dish offset angle.