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C-Band LNB Focal Depth (f/D) And Skew Settings

Mounting the LNB

The dish is basically just a reflector that focuses the energy into a small tube called the LNB. Inside the LNB is two small antenna, one mounted vertical and the other horizontal. Knowing this will allow you to see how important it is to properly mount the LNB.

Do not assume that because all the supports holding the scalar ring are the same length that centering is automatic. Make sure that all the supports are the same distance from the edge of the dish to the scalar ring. Each measurement should be within 1mm of each other. You need to be sure that the scalar ring (the supporting ring for the LNB, it comes with the LNB) is parallel to the bottom of the dish and that it is perfectly centered in the dish. If all this isn't done, then you will have imperfect reception. Having the focal point off by as little as 13mm can cause a fifty percent loss in signal strength!

You can measure down from the scalar ring to the centre of the dish on three points around the scalar ring to check if it is parallel to the dish surface.

Focal Depth (f/D)

Focal Depth (f/D) (for the more technical DIY)

The f/D ratio is the focal distance of the dish (f), divided by the diameter (D). When dealing with most prime focus antennas, the number should come out between .28 and .42. If you notice, most of those numbers are also on scale on the side of the LNB. You simply set the top edge of the scalar ring even with the line that corresponds to your correct f/D setting. What this adjustment actually does is determines how wide of an angle the LNB can "see".
To calculate the focal distance, you need to measure the diameter (D) and the depth (d) of the dish. Measurements should be in like units (you can't use feet for the diameter and inches for depth). For this example, let's say we have a dish that is 120 inches in diameter (D) and 18 inches deep (d). Focal distance (f) equals the diameter squared (D x D) divided by 16 times the depth (16 x d) or:

D x D = 120 x 120 = 14400
16 x d = 16 x 18 = 288
D x D/16 x d = 14400/288 = 50
Therefore focal distance f = 50 inches
After you have calculated the focal distance (f), you can use that figure to calculate the f/D ratio of your dish. In this case, using the same diameter of (D) = 120; and the calculated focal distance (f) = 50

f / D = 50 / 120 = .416
f /D = .416
And round up to give a setting of .42.

Focal Depth (f/D) the easy way

Our 2.4m and 1.8m solid petal dishes have a focal depth that need the LNB to be mounted at 38 (markings on the side of the LNB). Fine tune the LNB position in and out after everything is running. Some LNBs do not have these markings. We have shown how to configure this in the sections below.

This C Band LNB has the f/D markings on the side. The red arrow points to 38.
The measurement of the f/D is taken on the topside of the scalar ring against the LNB marking.
The scalar ring is the ring that the LNB mounts in.

If you are using the Dual Local Oscillator C Band LNB then the correct setting is shown below.

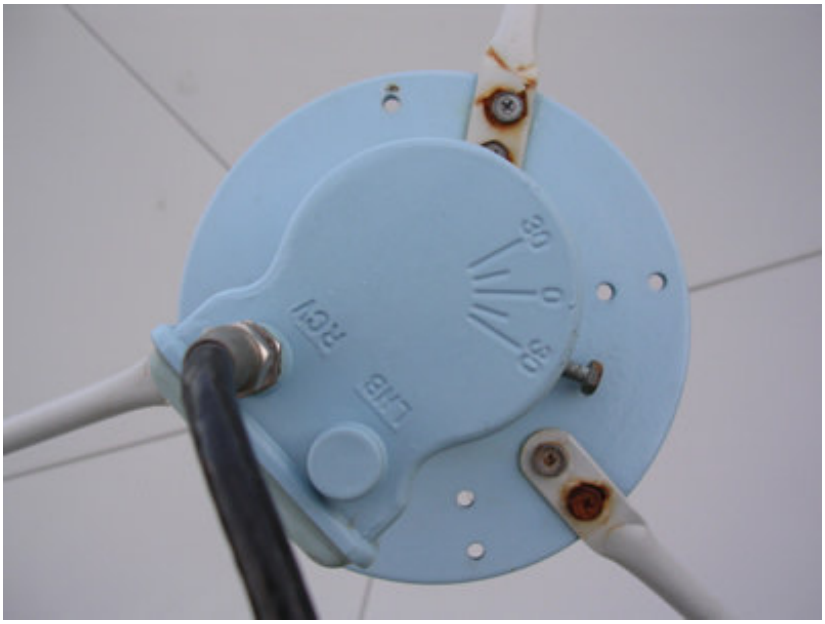
Note: The measurement from the front of the LNB to the back of the scalar ring is 45mm.
This corresponds to 38 on an LNB with markings.

If you are using the C/Ku Band LNB then the correct setting is shown below.

Again the measurement is from the front of the LNB to the back of the scalar ring.
50mm is the measurement for this LNB. Note that the C Band output of the C/Ku Band LNB, is the lower connection.

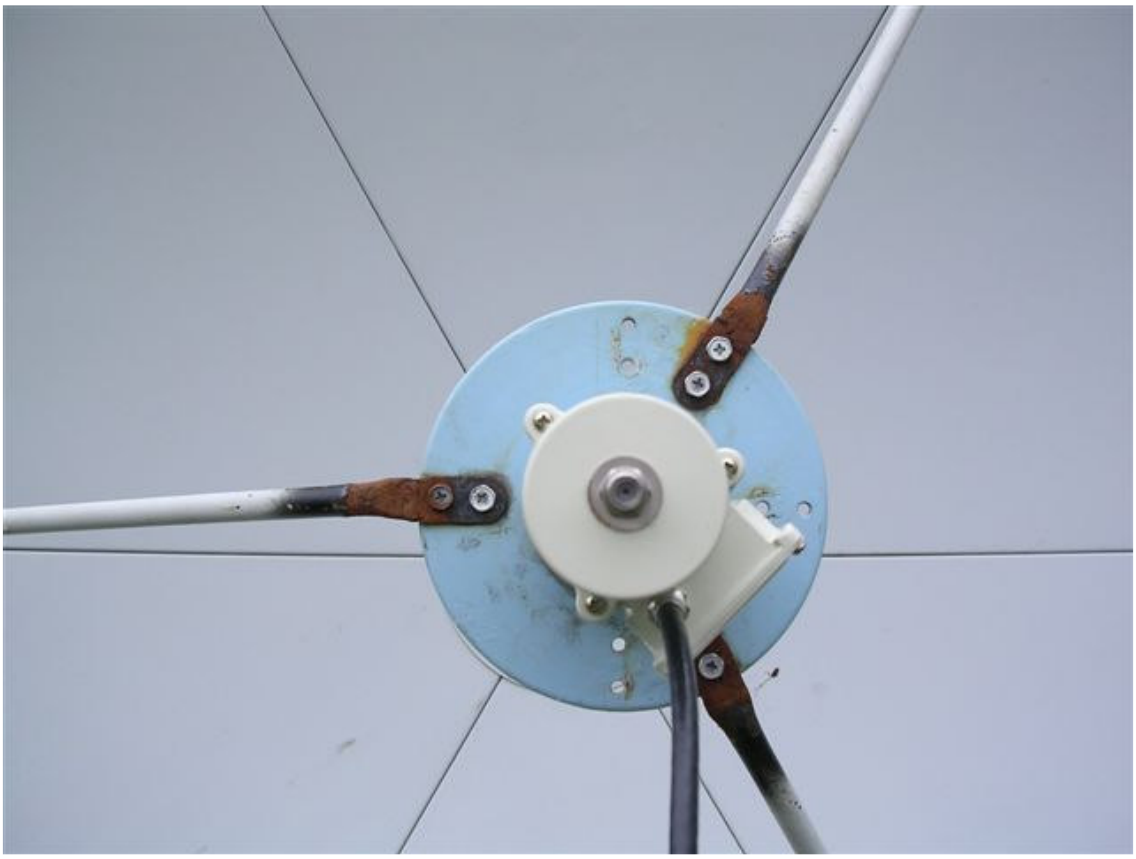
Zeroing the Polarity (skew) Setting:

As with the f/D setting, the skew setting is fine tuned later. However you need an approximate starting point. First you start at ‘zero’ and then adjust it for your longitude and latitude. The pictures below give you the ‘zero’ point.



This is a standard C Band LNB with skew markings.
This is what you would see if you were looking into the front of the dish. The 'zero' mark should start at horizontal.
Mount the LNB into the scalar ring with the 'zero' mark horizontal and facing the right like it is in the picture.

This is the Dual Local Oscillator C Band LNB. This LNB has no markings to indicate skew. Use this picture to help you identify the ‘zero’ mark. Start with your LNB at this point.



This is the C/Ku Band LNB. Once again there is no mark to indicate skew.
Use this picture to set your LNB to ‘zero’. You will be adjusting it to the correct setting and then fine tuning it shortly so do not waste time trying to find the perfect ‘zero’. It isn’t that critical.

Adjusting the Polarity (skew) Setting:

You have just set the ‘zero’ for the skew setting. Now this is just the initial setting. To know where to adjust the LNB to from here you need to download and read our ‘**satellite positions and compass settings**’ tables at the very end of this guide. They make up the last four pages of this guide. Choose the nearest major city to you and use this for your adjustments. This will let you receive the satellite and then you can adjust it further from there.

On the guide you will see the calculations for Polarity (skew) adjustments. Use the calculations in the orange called HPT CW. Turn the LNB the appropriate amount of degrees. This will be very small in some instances.

A slightly more technical version:

Adjusting the skew like this will put the antenna inside the LNB in the correct position to receive from that satellite. You do not need to worry about choosing between the vertical or horizontal adjustments as the antenna in the LNB are exactly 90deg apart, which means if you align the vertical adjustment (for example) then the horizontal adjust is automatically correct. And vice versa. You only need to do one adjustment and the zero mark should point to the calculated degree.

An example: Suppose you live in Christchurch and you wish to receive from the satellite Panamsat 8 (PAS 8). For Christchurch the adjustment you need to make for polarity is this: **Turn the LNB clockwise 6.71 deg**. Now obviously you can't get it exact but try to guess about 6.5 deg.

Using the C Band LNB with the skew markings on it, you know ‘zero’ degrees is with the ‘zero’ mark horizontal and to the right. Therefore 90deg is with the 'zero' straight down, 45deg is half way between that - do some division and you should get it close. For polarity/skew an educated guess is usually a good enough start. Then after you get the satellite you can adjust it to peak the signal levels.

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Satellite Positions and Compass Settings from Auckland, NZ

Table Key:

Compass	Use compass to point dish in this direction
Elevation	The up and down angle to set the dish. Use an inclinometer or markings on dish.
VPT CW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**lock **W**ise direction
VPT CCW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
HPT CW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**lock **W**ise direction – see DIY Guide
HPT CCW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
	If Polarity degree is shown as negative, turn anti clockwise

Satellite Name		**Compass**	**Elevation**	**VPT CW**	**VPT CCW**	**HPT CW**	**HPT CCW**
NSS5	177W	354.2	46.7	78.66	-101.34	-11.34	168.66
IntelSat 701	180E	349.3	47.2	82.57	-97.43	-7.43	172.57
GE23 or AMC23	174E	339.2	47.6	90.62	-89.38	0.62	-179.38
Intelsat5 (was PAS2)	169E	330.9	47.2	97.32	-82.68	7.32	-172.68
Intelsat8 (was PAS8)	166E	326.0	46.7	101.24	-78.76	11.24	-168.76
OptusD1	160E	316.6	45.0	108.64	-71.36	18.64	-161.36
OptusC1	156E	310.7	43.4	113.16	-66.84	23.16	-156.84
JCSat2	154E	307.9	42.4	115.28	-64.72	25.28	-154.72
OptusD2	152E	305.2	41.5	117.30	-62.70	27.30	-152.70
Measat 2	148E	300.1	39.3	121.05	-58.95	31.05	-148.95
Telstar18 / Apstar5	138E	288.8	33.0	128.76	-51.24	38.76	-141.24
Apstar 6	134E	284.9	30.2	131.24	-48.76	41.24	-138.76
AsiaSat 4	122E	274.6	21.2	136.97	-43.03	46.97	-133.03
Palapa C2	113E	267.9	14.1	139.88	-40.12	49.88	-130.12
AsiaSat 3S	105.5E	262.9	8.2	141.58	-38.42	51.58	-128.42
AsiaSat 2	100.5E	259.7	4.2	142.40	-37.60	52.40	-127.60
NSS6	95.0E	Below the horizon					

Calculated from Auckland 36.51S Lat 174.46E Long

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Satellite Positions and Compass Settings from Hamilton, NZ

Table Key:

Compass	Use compass to point dish in this direction
Elevation	The up and down angle to set the dish. Use an inclinometer or markings on dish.
VPT CW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**lock **W**ise direction
VPT CCW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
HPT CW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**lock **W**ise direction – see DIY Guide
HPT CCW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
	If Polarity degree is shown as negative, turn anti clockwise

Satellite Name		**Compass**	**Elevation**	**VPT CW**	**VPT CCW**	**HPT CW**	**HPT CCW**
NSS5	177W	352.5	45.5	80.19	-99.81	-9.81	170.19
IntelSat 701	180E	347.7	45.9	83.96	-96.04	-6.04	173.96
GE23 or AMC23	174E	337.9	46.2	91.68	-88.32	1.68	-178.32
Intelsat5 (was PAS2)	169E	329.9	45.7	98.06	-81.94	8.06	-171.94
Intelsat8 (was PAS8)	166E	325.1	45.1	101.78	-78.22	11.78	-168.22
OptusD1	160E	316.0	43.4	108.81	-71.19	18.81	-161.19
OptusC1	156E	310.3	41.8	113.10	-66.90	23.10	-156.90
JCSat2	154E	307.6	40.9	115.12	-64.88	25.12	-154.88
OptusD2	152E	305.8	40.8	117.04	-62.96	27.04	-152.96
Measat 2	148E	300.0	37.8	120.62	-59.38	30.62	-149.38
Telstar18 / Apstar5	138E	288.8	31.6	128.03	-51.97	38.03	-141.97
Apstar 6	134E	284.9	28.8	130.42	-49.58	40.42	-139.58
AsiaSat 4	122E	274.5	20.0	135.98	-44.02	45.98	-134.02
Palapa C2	113E	267.8	13.2	138.81	-41.19	48.81	-131.19
AsiaSat 3S	105.5E	262.8	7.3	140.46	-39.54	50.46	-129.54
AsiaSat 2	100.5E	259.4	3.28	141.24	-38.76	51.24	-128.76
NSS6	95.0E	Below the horizon					

Calculated from Hamilton 37.77S Lat 175.3E Long

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Satellite Positions and Compass Settings from Wellington, NZ

Table Key:

Compass	Use compass to point dish in this direction
Elevation	The up and down angle to set the dish. Use an inclinometer or markings on dish.
VPT CW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**lock **W**ise direction
VPT CCW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
HPT CW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**lock **W**ise direction – see DIY Guide
HPT CCW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
	If Polarity degree is shown as negative, turn anti clockwise

Satellite Name		**Compass**	**Elevation**	**VPT CW**	**VPT CCW**	**HPT CW**	**HPT CCW**
NSS5	177W	350.5	41.62	80.36	-99.64	-9.64	170.36
IntelSat 701	180E	348.4	42.1	83.70	-96.30	-6.30	173.70
GE23 or AMC23	174E	339.3	42.4	90.53	-89.47	0.53	-179.47
Intelsat5 (was PAS2)	169E	331.7	42.1	96.21	-83.79	6.21	-173.79
Intelsat8 (was PAS8)	166E	327.3	41.6	99.55	-80.45	9.55	-170.45
OptusD1	160E	318.6	40.2	105.94	-74.06	15.94	-164.06
OptusC1	156E	313.1	38.8	109.90	-70.10	19.90	-160.10
JCSat2	154E	310.5	38.0	111.79	-68.21	21.79	-158.21
OptusD2	152E	307.9	37.2	113.60	-66.40	23.60	-156.40
Measat 2	148E	302.9	35.3	117.00	-63.00	27.00	-153.00
Telstar18 / Apstar5	138E	291.7	29.7	124.20	-55.80	34.20	-145.80
Apstar 6	134E	287.7	27.2	126.58	-53.42	36.58	-143.42
AsiaSat 4	122E	276.8	19.1	132.20	-47.80	42.20	-137.80
Palapa C2	113E	269.7	12.6	135.13	-44.87	45.13	-134.87
AsiaSat 3S	105.5E	264.2	7.05	136.86	-43.14	46.86	-133.14
AsiaSat 2	100.5E	260.7	3.33	137.70	-42.30	47.70	-132.30
NSS6	95.0E	Below the horizon					

Calculated from Wellington 41.17S Lat 174.46E Long

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Satellite Positions and Compass Settings from Christchurch, NZ

Table Key:

Compass	Use compass to point dish in this direction
Elevation	The up and down angle to set the dish. Use an inclinometer or markings on dish.
VPT CW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**lock **W**ise direction
VPT CCW	Degrees of **V**ertical **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
HPT CW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**lock **W**ise direction – see DIY Guide
HPT CCW	Degrees of **H**orizontal **P**olarisation **T**ilt in **C**ounter **C**lock **W**ise direction
	If Polarity degree is shown as negative, turn anti clockwise

Satellite Name		**Compass**	**Elevation**	**VPT CW**	**VPT CCW**	**HPT CW**	**HPT CCW**
NSS5	177W	354.8	38.9	78.93	-101.07	-11.07	168.93
IntelSat 701	180E	351.0	39.4	81.99	-98.01	-8.01	171.99
GE23 or AMC23	174E	342.4	40.0	88.27	-91.73	-1.73	178.27
Intelsat5 (was PAS2)	169E	335.1	39.9	93.57	-86.43	3.57	-176.43
Intelsat8 (was PAS8)	166E	330.8	39.6	96.71	-83.29	6.71	-173.29
OptusD1	160E	322.3	38.5	102.80	-77.20	12.80	-167.20
OptusC1	156E	316.8	37.4	106.64	-73.36	16.64	-163.36
JCSat2	154E	314.2	36.7	108.46	-71.52	18.48	-161.52
OptusD2	152E	311.6	36.0	110.26	-69.74	20.26	-159.74
Measat 2	148E	306.6	34.3	113.63	-66.37	23.63	-156.37
Telstar18 / Apstar5	138E	295.1	29.3	120.91	-59.09	30.91	-149.09
Apstar 6	134E	290.9	27.0	123.35	-56.65	33.35	-146.65
AsiaSat 4	122E	279.6	19.4	129.24	-50.76	39.24	-140.76
Palapa C2	113E	272.1	13.3	132.38	-47.62	42.38	-137.62
AsiaSat 3S	105.5E	266.3	8.00	134.28	-45.72	44.28	-135.72
AsiaSat 2	100.5E	262.7	4.42	135.22	-44.78	45.22	-134.78
NSS6	95.0E	258.7	0.46	135.98	-44.02	45.98	-134.02

Calculated from Christchurch 43.32S Lat 172.37E Long