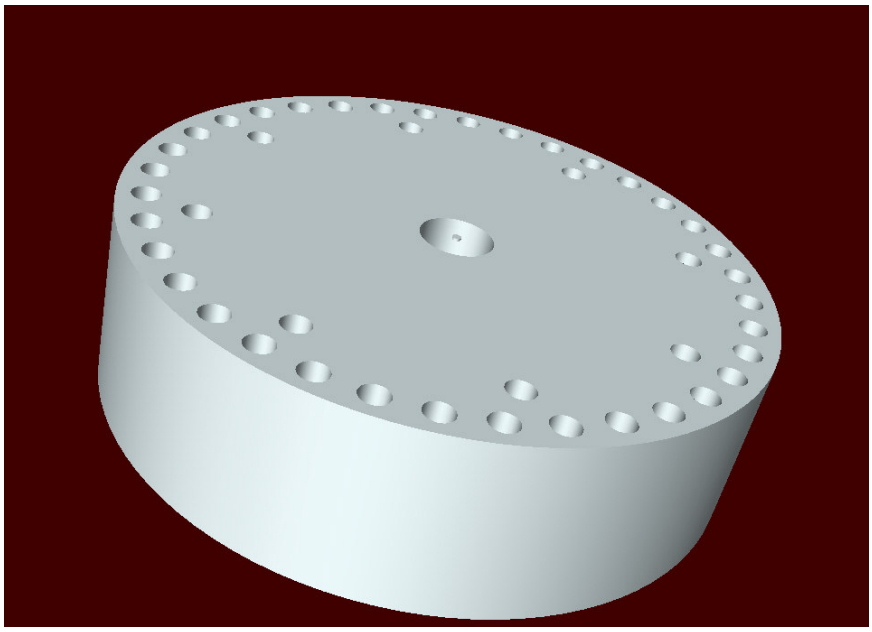
Pinnacle VR Universal Pano Head Tutorial

Thank you for purchasing the Pinnacle VR Universal Pano Head. This head allows you to use any lens on any camera where the tripod hole is in the center of the optical axis. Now when you upgrade your camera equipment, you don't need to purchase another head. Sometimes, two heads aren't better than one!

First, let's begin with an overview of the five components.

The Base



This part attaches to your tripod either on a leveling base, or on a ball head. It has two sets of holes. The inner set allows you to control the yaw of the camera in 45º increments. The outer set allows you to control the yaw of the camera in 10º increments. Between the two, you are able to shoot panoramics with 2, 3, 4, 6, 8, 9, 12, 18, and 36 columns. (Think of a panoramic image as a quilt or mosaic containing two or more images. Each time your rotate the camera for another picture, (yaw), you are creating another column. Each time you point the camera up or down, (pitch), you are creating another row. The minimum is two columns and one row if you are using a fisheye lens with 180 ° field of view). The center hole is threaded for a standard tripod bolt (3/8-20 pitch). Once attached, the next component, the Yaw Base bolts onto the remaining free space above the tripod bolt in the center.

Terms to know:

Yaw: rotation left to right 0 TO 360 °

Pitch: rotation up and down +90 ° to -90 °

Optical axis: center of the lens rotation.

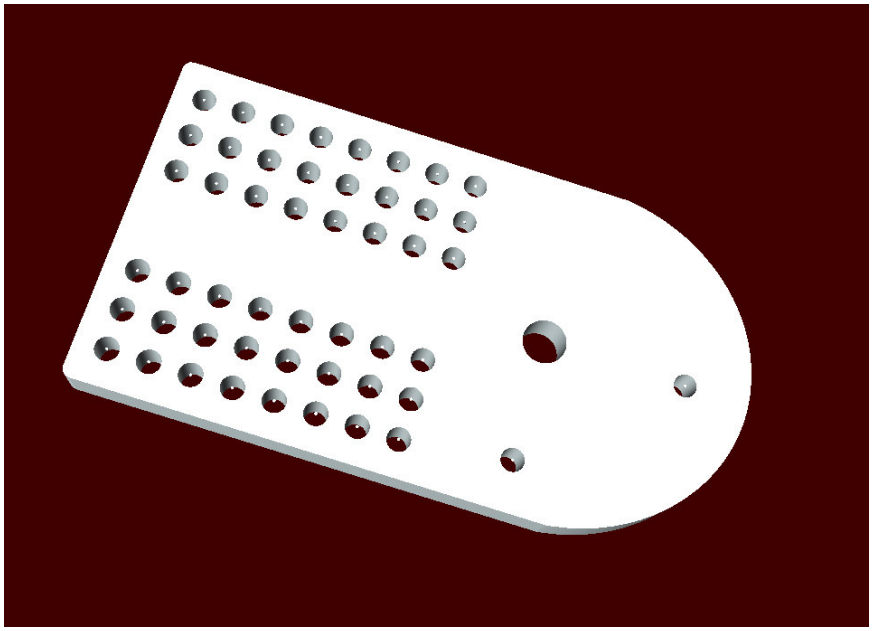
Zenith: top of the image (where pitch equals +90 °)

Nadir: bottom of the image (where pitch equals -90 °)

Parallax: misalignment of objects as you move the camera.

No Parallax Point: (NPP) where objects remain aligned as you move the camera.

The Yaw Base



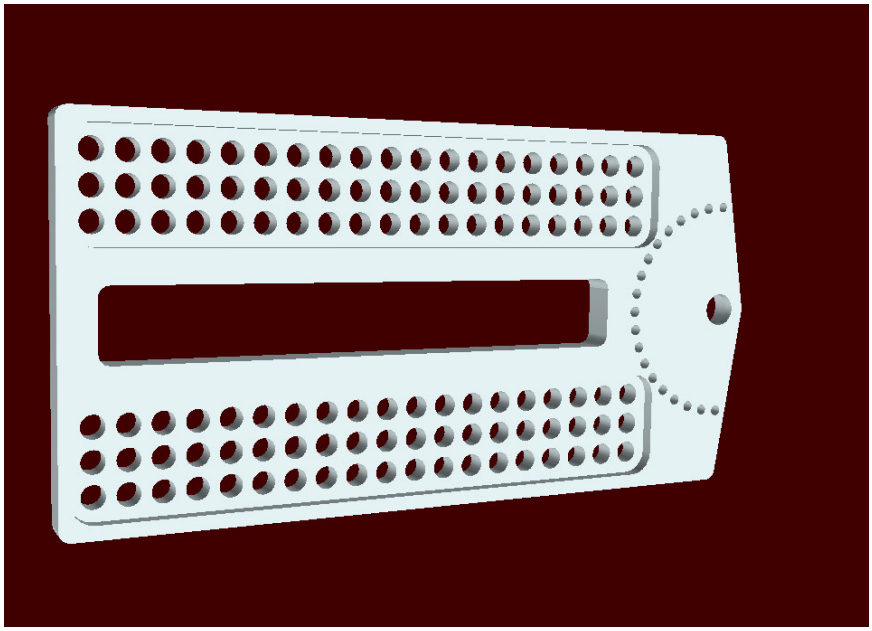
This component serves two purposes. First, it attaches to the Base unit mentioned above via the yaw pivot hole (large hole in the center of the right side). You will see two smaller holes on this side which line up with the inner and outer sets of yaw positioning holes on the base. The Yaw Base attaches to the Base via a supplied bolt. There is a spring loaded plunger that screws into either one of the two smaller yaw positioning holes. This plunger will poke through the Yaw Base and into the corresponding hole in the Base for pin registered control over yaw.

The second purpose is to control lateral, (side to side), placement of the camera over the yaw pivot hole. The 32 threaded holes to the left line up with holes in the next component, the Yaw Arm, and allow you to move the camera in 1mm increments so that the center of the optical axis is directly over the yaw pivot hole

The Yaw Arm

The Yaw Arm works with the Yaw Base to align the center of the optical axis over the yaw pivot hole as well as providing the pivot point for pitch control. The holes at the bottom line up with corresponding holes on the Yaw Base to move laterally in 1mm increments. At the top, the large hole is the point of attachment for the next component, the Pitch Plate, while the smaller hole is used for another spring loaded plunger, which allows you to control pitch movement with pin registered accuracy in 10º increments covering both +90º to -90º. This allows for easy zenith and nadir shooting, along with up to 17 rows of images. This combined with the maximum of 36 columns that the Yaw Base allows yields an upper limit of 614 images that can be taken in a full spherical image. That with a couple terabytes of RAM to stitch it, and you're all set!

The Pitch Plate

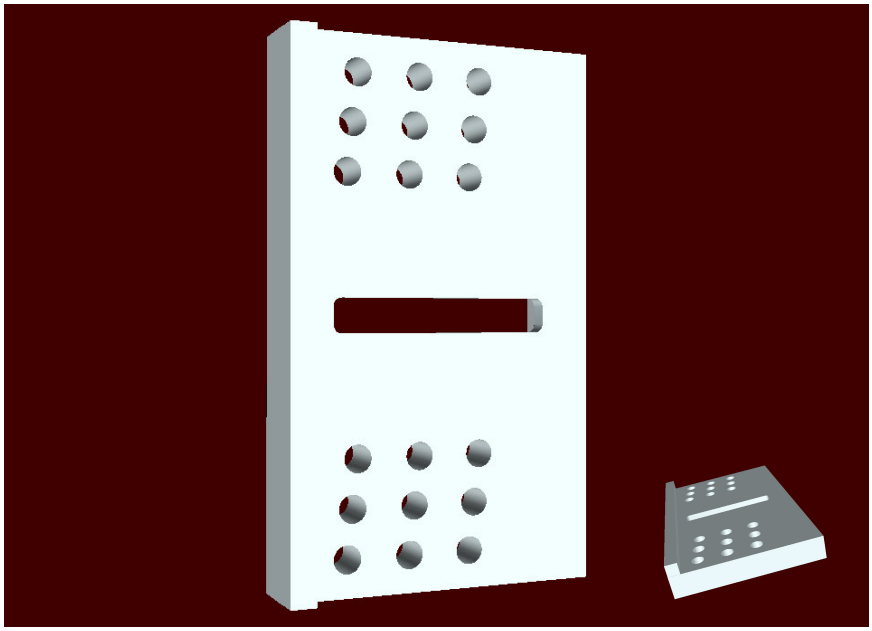


The Pitch Plate also serves two purposes. The first is to pitch the camera up and down for multi-row shooting, while the second allows the camera to move forward and backward to place it at the no parallax point (NPP).

The large hole in the front of the component is where the supplied bolt goes through both the Pitch Plate and the Yaw Arm, secured with the supplied nut. The semi-circular series of smaller holes are where the spring loaded plunger from the Pitch Plate enter for pin registered control of pitch from +90º to -90º.

The two series of holes moving toward the back of the component line up with holes in the Camera Plate, which has corresponding holes in the same layout as the Yaw Base, again allowing placement of the camera in 1mm increments. (Please note that this view is from the bottom of the Pitch Plate, showing the recessed area for the bolts which keeps them from interfering with the Yaw Arm when the component pitches up and down.) These holes allow you to use this unit with a variety of lenses, giving you the flexibility necessary to create everything from two shot fisheye panoramics to higher resolution multi row spherical panoramics to very high resolution partial panoramics with longer lenses.

The Camera Plate



The Camera Plate works with any camera that has its tripod hole in the center of the optical axis. This includes all Canon and Nikon DSLR's. A supplied bolt comes up from below through the central slot and into the base of the camera. The camera is then pressed back flush against the lip at the back of the component preventing the camera from twisting while shooting. (See detailed profile inset image.) The holes on either side of the slot line up with the corresponding holes in the Pitch Plate for 1mm control over forward and backward placement of the camera so that the nodal point is properly positioned.

Setting up the Universal Pano Head

1. Attach the Base Unit to your tripod using either your leveling base, such as a Bogen/Manfrotto 3416, or directly to the top of a ballhead, (you may need an adapter to step up from the 1/4"' bolt to the 3/8" thread of the Base Unit). Don't fully extend the legs of your tripod, because you will need to be able to look down through the viewfinder to make adjustments.
2. Using the yaw pivot hole, attach the Yaw Base to the Base unit with the supplied bolt. Depending on how many columns you will be shooting, screw the spring loaded plunger into one of the two threaded holes located next to the yaw pivot hole. For 2, 4, or 8 column shooting, use hole one closer to the pivot hole. For 2, 3, 4, 6, 9, 12, 18, and 36 column shooting, use the one further from the yaw pivot hole. (Please note, you can use either setting for 2, 3, or 4 column shooting.)
3. Align the Yaw Arm unit over the holes on the left side of the Yaw Base. You will notice that at any given placement, only two holes line up with the ones on the base below. Using the supplied bolts, attach the two units together. You can adjust the lateral position later once the camera is attached so that the center of the lens is over the center of the yaw pivot hole on the yaw base. (See the Camera Body NPP table later on.)
4. Attach the Pitch Plate to the large pitch pivot hole at the top of the Yaw Arm with the supplied bolt and nut. Screw the second supplied spring loaded plunger into the threaded hole on the top of the Yaw Arm and allow it to slide into one of the

corresponding holes on the Pitch Plate. This will keep the Pitch Plate from moving while you attach the Camera Plate.

5. Just as you did with the Yaw Arm, attach the Camera Plate to the Pitch Plate. Where you place it will depend on what lens you are using and its "NPP". (See the Lens NPP table later on.)
6. Finally, attach the camera to the Camera Plate by pushing the supplied bolt through the slot of the Pitch Plate and Camera Plates and into the tripod hole on the base of the camera. Don't tighten it until you have moved the camera backwards so that it is snug against the back lip of the Camera Plate. Then tighten it to lock it in place.

Finding Your Place in the Universe

Well, not exactly in the Universe, but maybe on the Pinnacle VR head. At this point, you have all the components attached, but you are likely not exactly where you want to be. First, you need to find the Camera Body NPP. This is the point where the center of the lens axis is directly over the Yaw Pivot Point.

One method is to point the Pitch Plate straight down so that the camera is looking directly at the Yaw Pivot Point. Do this by pulling out on the spring loaded plunger at the top of the Yaw Arm, moving the Pitch Plate to the top, then letting the plunger slide into place in the last hole.

Next, look down through the viewfinder to center the optical axis over the yaw pivot hole. If the center of the yaw pivot hole is in the center of the viewfinder, then great – you got lucky! If not, remove the two bolts that hold the Yaw Arm to the Yaw Base and move the parts until they are centered. (Please keep a firm grip on the unit so that your camera and lens don't take a nose dive!)

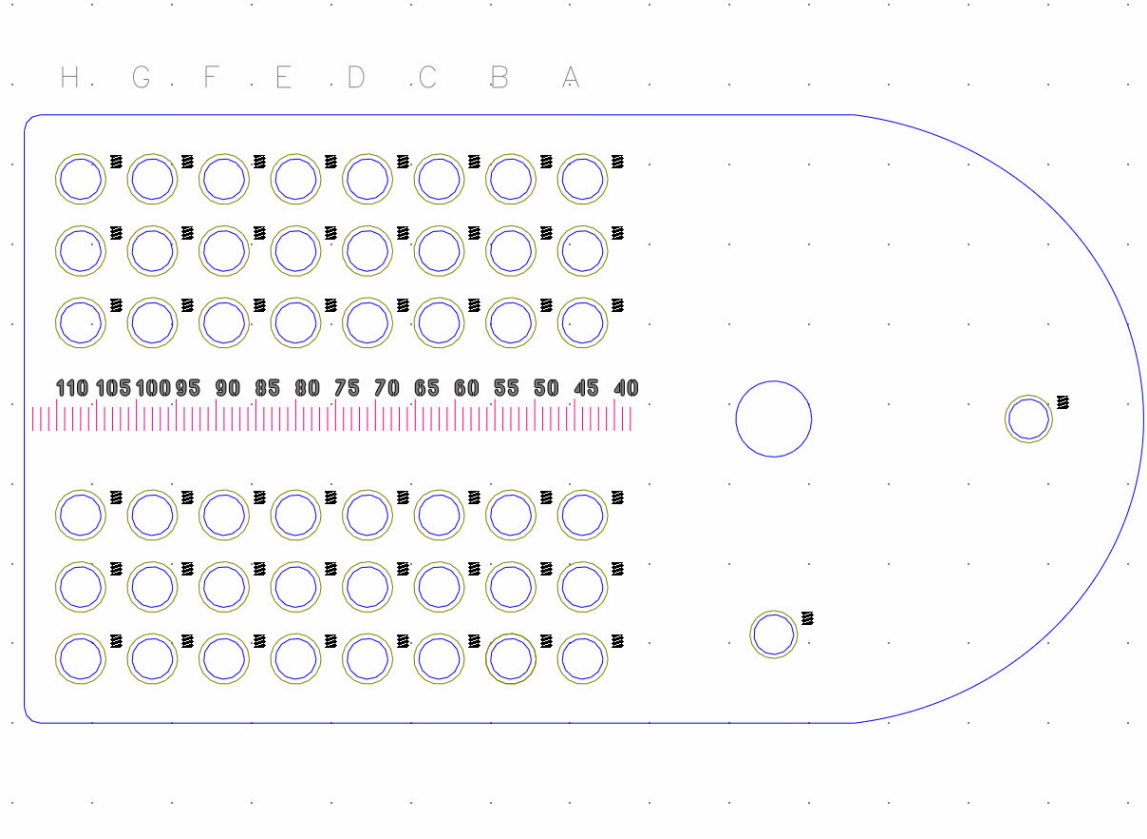
Another way to determine the Camera Body NPP is to measure from the base of your camera to the center of the lens mount opening. First, measure the diameter of the lens mount opening and divide that in two. That will tell you how far it is from the bottom of the lens mount opening to the center of the lens mount opening. Next, measure from the base of the camera to the bottom of the lens mount opening. Add the two together, and you have your Camera Body NPP. Use the table below to find the corresponding holes that will put you as close to that as possible. (Please note, all measurements are in millimeters. Also, the grayed out measurements are "theoretical". They would work except that the bolt that attaches the Yaw Arm to the Yaw Base prevents the Yaw Arm from getting this close to the Yaw Pivot Point.)

Lateral distance from YAW point of rotation to base of camera

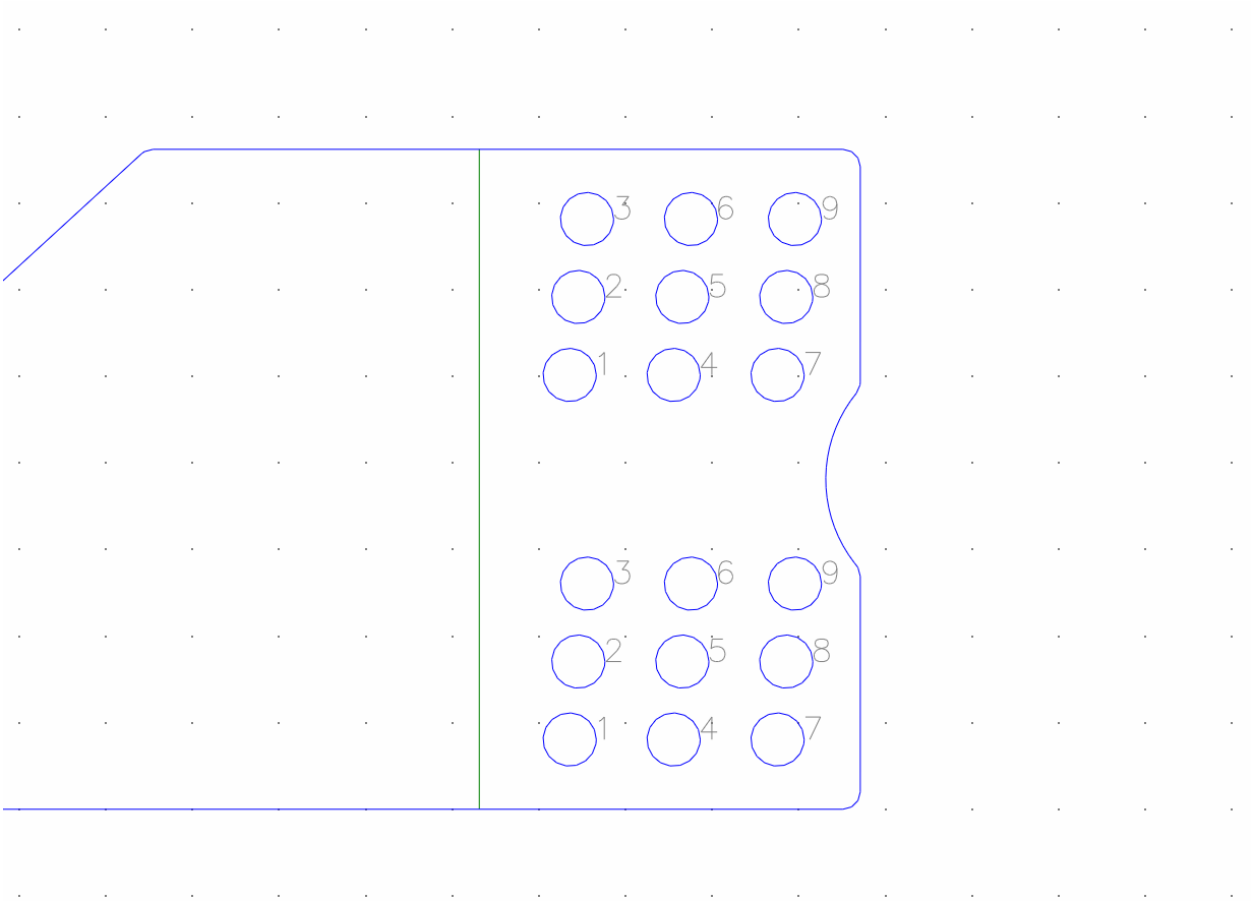
A	1	24.359	F	1	69.359
A	2	25.359	F	2	70.359
A	3	26.359	F	3	71.359
B	1	33.359	E	4	72.359
B	2	34.359	E	5	73.359
B	3	35.359	E	6	74.359
A	4	36.359	D	7	75.359
A	5	37.359	D	8	76.359
A	6	38.359	D	9	77.359
C	1	42.359	G	1	78.359
C	2	43.359	G	2	79.359

C	3	44.359	G	3	80.359
B	4	45.359	F	4	81.359
B	5	46.359	F	5	82.359
B	6	47.359	F	6	83.359
A	7	48.359	E	7	84.359
A	8	49.359	E	8	85.359
A	9	50.359	E	9	86.359
D	1	51.359	H	1	87.359
D	2	52.359	H	2	88.359
D	3	53.359	H	3	89.359
C	4	54.359	G	4	90.359
C	5	55.359	G	5	91.359
C	6	56.359	G	6	92.359
B	7	57.359	F	7	93.359
B	8	58.359	F	8	94.359
B	9	59.359	F	9	95.359
E	1	60.359	H	4	99.359
E	2	61.359	H	5	100.359
E	3	62.359	H	6	101.359
D	4	63.359	G	7	102.359
D	5	64.359	G	8	103.359
D	6	65.359	G	9	104.359
C	7	66.359	H	7	111.359
C	8	67.359	H	8	112.359
C	9	68.359	H	9	113.359

The alpha characters are the holes on the Yaw Base, and are labeled as follows:



The numbers are the holes on the bottom of the Yaw Arm, and are labeled as follows:



Once you have the camera properly centered over the yaw pivot hole, you won't need to change that unless you switch to a different camera body. Personally, I keep the Yaw Arm and Yaw Base attached to each other permanently, as I tend to just use one camera body for my panoramics.

The last step in the setup is finding the NPP for your particular lens. There are several methods posted on the web. Here are a few links:

http://www.path.unimelb.edu.au/~bernardk/tutorials/360/photo/nodal.html

http://www.kaidan.com/nodalpoint.html

http://www.outline.be/quicktime/tuto/

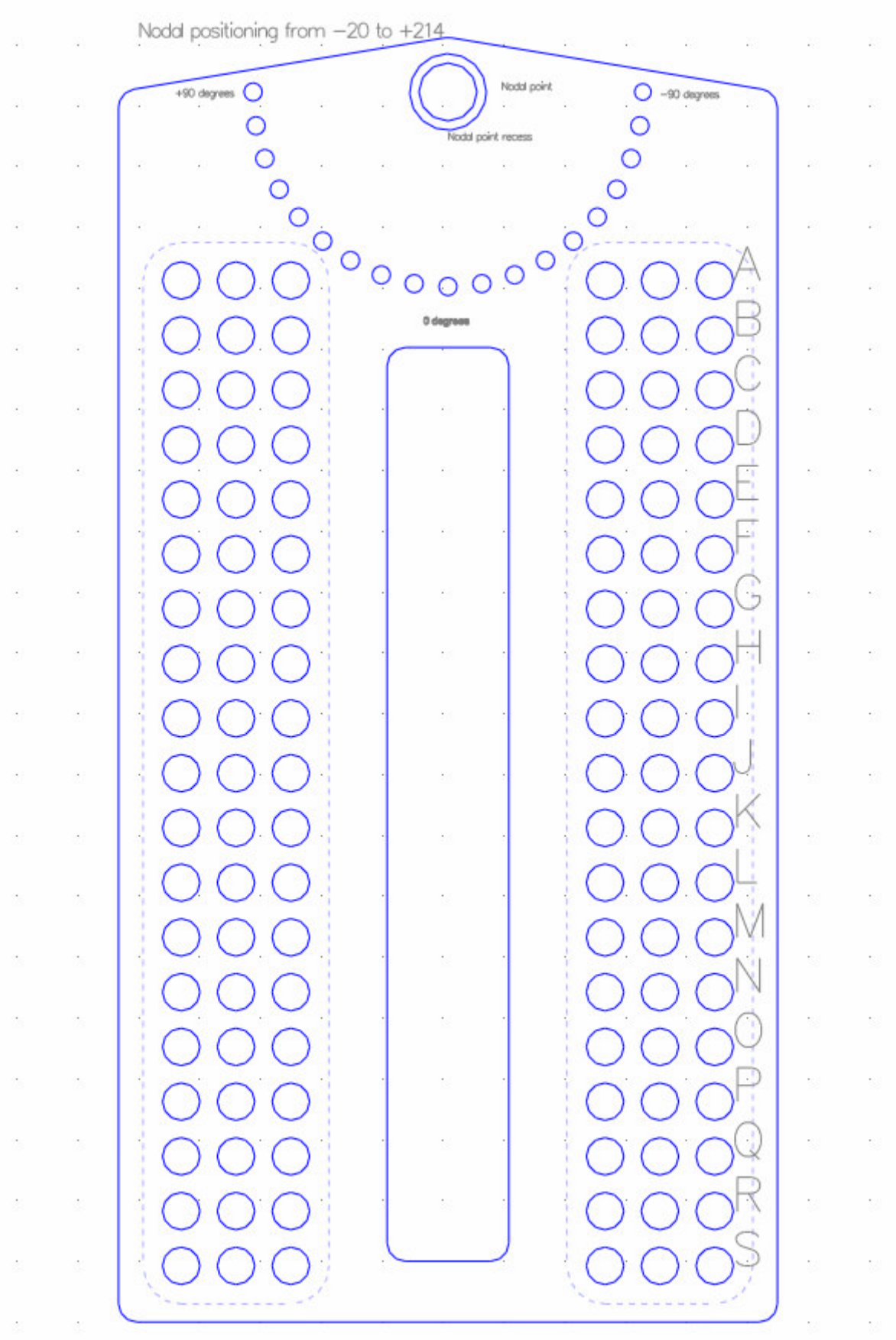
http://michel.thoby.free.fr/Liste-experiments.html

Below is a table that gives the distances from the back of the camera, (where the camera rests against the lip of the Camera Plate) to the point of rotation on the Pitch Plate. Again, these measurements are in millemeters.

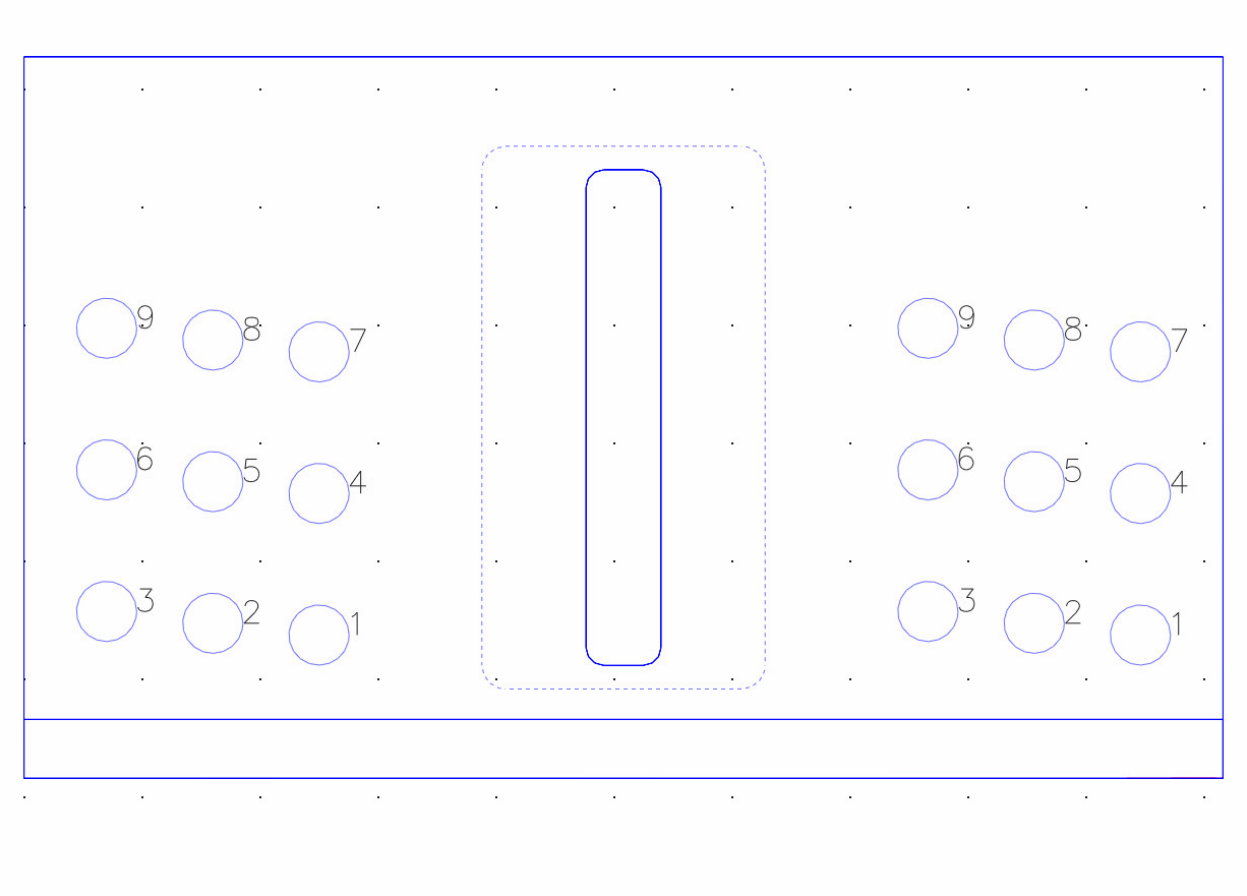
A	1	38	F	2	84	J	3	121	M	4	158	Q	5	195

A	2	39	F	3	85	I	4	122	M	5	159	Q	6	196
A	3	40	E	4	86	I	5	123	M	6	160	P	7	197
B	1	47	E	5	87	I	6	124	L	7	161	P	8	198
B	2	48	E	6	88	H	7	125	L	8	162	P	9	199
B	3	49	D	7	89	H	8	126	L	9	163	S	1	200
A	4	50	D	8	90	H	9	127	O	1	164	S	2	201
A	5	51	D	9	91	K	1	128	O	2	165	S	3	202
A	6	52	G	1	92	K	2	129	O	3	166	R	4	203
C	1	56	G	2	93	K	3	130	N	4	167	R	5	204
C	2	57	G	3	94	J	4	131	N	5	168	R	6	205
C	3	58	F	4	95	J	5	132	N	6	169	Q	7	206
B	4	59	F	5	96	J	6	133	M	7	170	Q	8	207
B	5	60	F	6	97	I	7	134	M	8	171	Q	9	208
B	6	61	E	7	98	I	8	135	M	9	172	S	4	212
A	7	62	E	8	99	I	9	136	P	1	173	S	5	213
A	8	63	E	9	100	L	1	137	P	2	174	S	6	214
A	9	64	H	1	101	L	2	138	P	3	175	R	7	215
D	1	65	H	2	102	L	3	139	O	4	176	R	8	216
D	2	66	H	3	103	K	4	140	O	5	177	R	9	217
D	3	67	G	4	104	K	5	141	O	6	178	S	7	224
C	4	68	G	5	105	K	6	142	N	7	179	S	8	225
C	5	69	G	6	106	J	7	143	N	8	180	S	9	226
C	6	70	F	7	107	J	8	144	N	9	181			
B	7	71	F	8	108	J	9	145	Q	1	182			
B	8	72	F	9	109	M	1	146	Q	2	183			
B	9	73	I	1	110	M	2	147	Q	3	184			
E	1	74	I	2	111	M	3	148	P	4	185			
E	2	75	I	3	112	L	4	149	P	5	186			
E	3	76	H	4	113	L	5	150	P	6	187			
D	4	77	H	5	114	L	6	151	O	7	188			
D	5	78	H	6	115	K	7	152	O	8	189			
D	6	79	G	7	116	K	8	153	O	9	190			
C	7	80	G	8	117	K	9	154	R	1	191			
C	8	81	G	9	118	N	1	155	R	2	192			
C	9	82	J	1	119	N	2	156	R	3	193			
F	1	83	J	2	120	N	3	157	Q	4	194			

The alpha characters are the holes on the Pitch Plate, and are labeled as follows: (top view)



The numbers are the holes in the Camera Plate, and are labeled as follows: (top view)



Shooting up the Town (so to speak…)

At last – time to take some pictures! Whether you are taking a single row panoramic or a multi row panoramic, the approach is very similar. When shooting a single row panoramic, you will only need to rotate the unit around the yaw pivot point.

First, level the system using either something like a Bogen leveling plate or a ballhead. Take your first picture, pull up the plunger on the Yaw Base, rotate the unit so that you will have overlap between the two shots, let the plunger slide into the nearest hole and take your picture. This page - http://www.worldserver.com/turk/quicktimevr/calculators.html - has some interesting calculators that will help you figure out how many rows are necessary for a particular lens. The rule of thumb is, as long as you have about 30% overlap between images, you should be fine.

When shooting a multi row panoramic, the same technique for rotating the camera applies, but you will also be tilting the camera up and down. There are two approaches to this.

One is to point the camera up, take a picture, bring it down to level, take another picture, then point it down and take a third picture. Then, rotate the unit and repeat. Obviously, your choice of lens will determine how many "up" and "down" shots you will need. You may find that you want to shoot one image straight up (the zenith) and one straight down (the nadir).

The other approach, which I prefer, is to set the camera pointing up, take a picture, rotate it, take another, and so on until the full 360 degrees are covered. Then, level the camera, take another row of pictures, and finally point the camera down and take the final row of pictures. The

advantage of this is that if there is any movement of clouds in the sky, or objects on the ground, you minimize the effect by shooting one row at a time. Try both approaches and see which you prefer.

Stitching Your Images

There are a number of software packages available to stitch your images, both for the PC and Macintosh. Here are some links to some of them.

www.ptgui.com
www.ptmac.com
http://graphicssoft.about.com/od/panorama/ (links and reviews to a number of software packages)

One resource that I HIGHLY recommend is joining the PanoTools list. This link - http://groups.yahoo.com/group/panotoolsng/ - will take you to the home page where you can join up. All your questions regarding shooting, stitching, and displaying panoramics have probably already been answered here. Do a search for the topic you are looking for, and if it doesn't come up, post a message to the group. You will likely get a response in a couple of minutes as there are over 2,600 members worldwide contributing to this group. Another resource is the PanoTools wiki, which has tutorials and other informative pages. This can be found here - http://wiki.panoramatools.org/Main_Page.

If you have any questions regarding the Pinnacle VR tripod head, feel free to email them to me at info@pinnacle-vr.com.

Again, thank you for your purchase!