Rainier Satellite's In school learning series.

Setup and align your dish like a pro…

Brought to you by Rainier Satellite, The HD Leaders.

SETUP AND ALIGN YOUR DISH LIKE A PRO

READ ALL THESE INSTRUCTIONS BEFORE BEGINNING

If you follow the instructions contained within and adjustments are done in the correct order, you will have a dish that tracks perfectly.

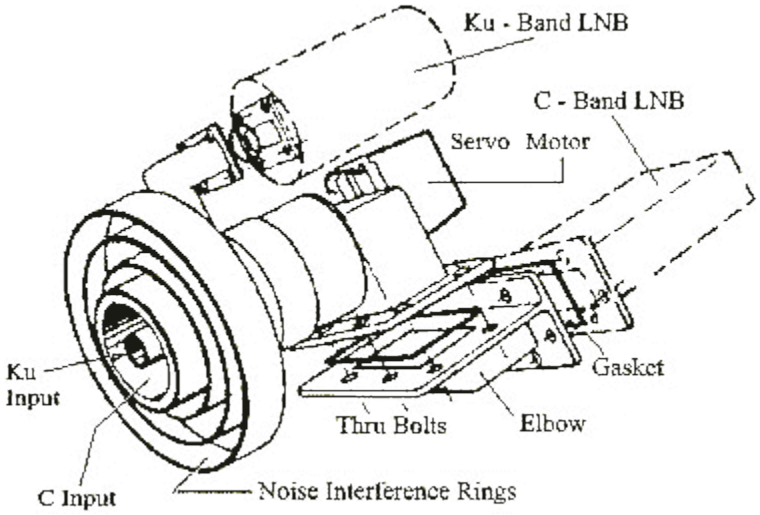
You should have an unwarped satellite dish, and a perfectly vertical mounting pole, it will make things easier. It is suggested to take a TV and the 9865 satellite receiver to the dish rather that run back and forth to the house to see what is happening. ***This document deals with prime focus (or center focus) satellite dishes***, meaning incoming signals are directed to a point at the center of the dish. It is impossible to cover every little detail in a document such as this. Some details, such as using UV resistant tie wraps to tidy your cabling is common sense.

INSTALLATION AND TRACKING/TUNING:

- **Begin with assembly of feedhorn and LNB**

and checking mounting of the feedhorn. In a center focus (prime focus) system, all legs supporting the feedhorn should be the same length, measure them to be sure, and do any adjustment you can if they are not the same length.

Next, check the distance from three different points on the edge

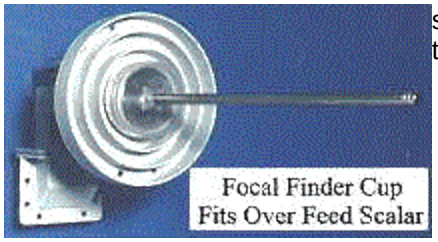


of the dish, to the center of the feedhorn, to be sure feed is

set to be in the center of the dish. I like to use a focal finder

to determine if the feed is aimed at the center of the dish.

It is a plastic cup (dual cups, for standard C and Ku-band feed



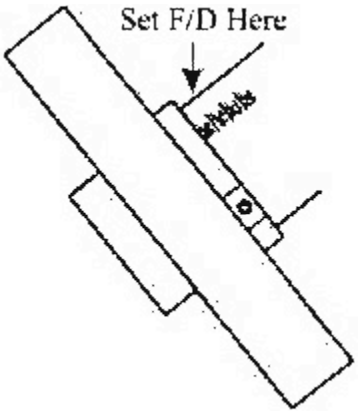
scalar rings) that fits over the innermost scalar ring with a telescoping

pointer which, when extended, will

indicate exactly if the feed is directed to the center of the

dish. Remember, even if the feed legs

have the same length, that does not mean the feed is centered!



You might have to bend the feed

into the center of the dish, or adjust the feed support legs

for the feed to be centered in the dish. In assembly of the feedhorn/LNB,

do not place sealant on feed gaskets - they are

meant to be installed dry; ***and the*** gasket thickness

should be such that there is metal-to-metal contact of the flange

contacts after bolt tightening. ***Do not*** overtighten

bolts, flanges will crack. Leave off the elbows, if you want,

and let the LNB(s) stick out to the side - you will gain three

dB if you do. If you are using an adjustable noise interference

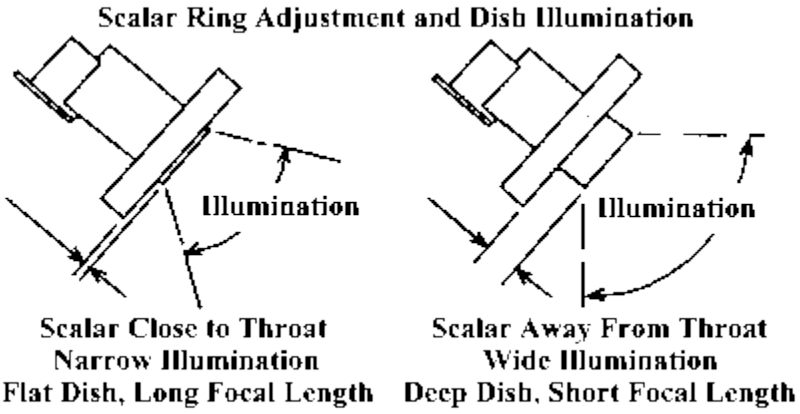
ring (commonly called scalar rings) then set the F/D ratio in

accordance with manufacturer's instructions. (If you do not know

the F/D ratio, then calculate it using formula in diagram below.)

Rainier recommends our Harvard Scientific tuned Ortho Feed.

Used with our Emp Centauri DiSEqC switch.



Do not overtighten the screw/bolt that connects the scalar ring to the feed throat as those pieces will also crack. During the feed installation process, *be sure **do not** touch the probe inside the feedhorn nor the probe inside the LNB throat* as oil from your fingerprints could interfere with signal reception; and definitely do not bend the probes as they are finely adjusted and any impairment to their shape or position will inhibit their performance.

After feed is mounted, use a measuring tape to ensure focal

distance of the feedhorn is properly set; the measurement distance can be found in the instruction

manual of the dish. Measure from the absolute center of the dish

to the front of the polarotor and adjust the distance to as exactly

as possible to what the dish instructions say. A 1/8" either

way will greatly affect video reception performance on weaker

satellites. Imagine wearing eyeglasses and understand that a

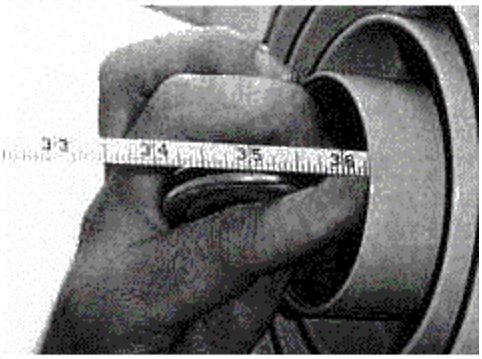
dish focuses beam energy into the feed as do glasses focus light

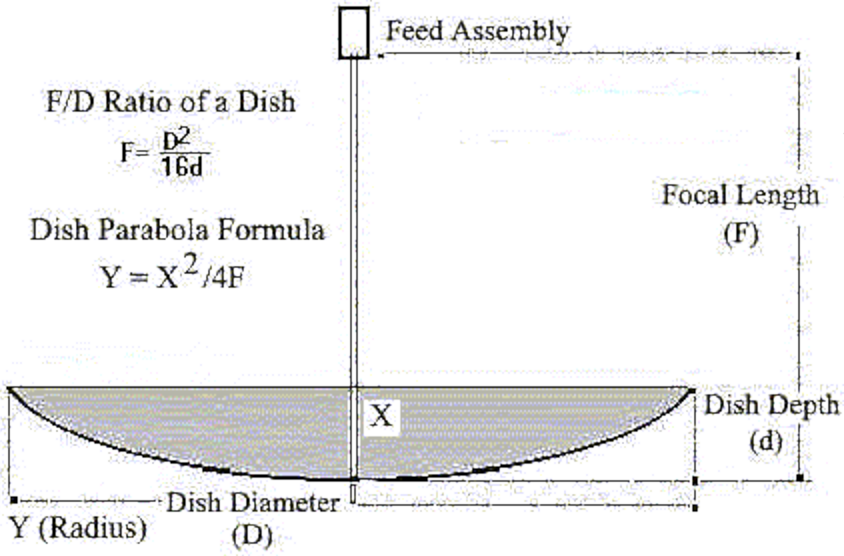
into your eyes; your eyes and dish can only see as well as they

are focused. Dish to feedhorn misalignments of 0.5" reduces

collected C-Band signal power by 50% (-3dB)!!

Some Feeds Measure to Inside of Throat 1/8"





For instance, the difference in signal gain between a 10 foot dish and 7 foot dish is about 3dB; an improperly aligned feedhorn wastes this gain differential.

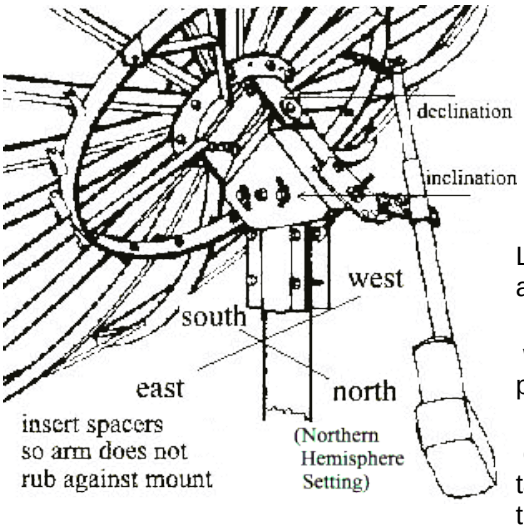
Without a doubt, an incorrectly placed feedhorn compromises BER quality resulting in pixilation or no lock condition. If you do not know the focal length, then calculate it.

At the end of all feedhorn adjustments and installation, once again check to be sure feed is still centered within the dish.

If the face of the scalar is not parallel (equidistant) to the dish face then you will have to *carefully* bend it into place if the feed legs do not allow for appropriate adjustment.

When adjusting the feed, *be sure not to touch the probe inside the feedhorn* as oil from your fingerprints

could interfere with signal reception; in fact, there is no need to remove the plastic cap covering the feed throat probe except to slide on the scalar rings and to measure the focal length, then immediately replace the cap. Now you may connect the coax cable and servo cables to the feed assembly. When connecting any wiring to the dish or receiver, including LNB coax cables, *turn off power to the receiver*; better yet, unplug the receiver. NOTE: On F/D ratio, the antenna manufacturer's focal length measurement is probably from a center plate (in the middle of the dish) and is not the value used to calculate the curvature of the dish as the center plate will sit atop the center of the dish by some thickness of metal (most center plates are on the order of 1/8" thick); you can use the recommended focal length setting to set the feedhorn location but you can not use it in calculations without adding the thickness of the center plate.



- **Install the actuator.**

Linear actuators, sometimes called 'jacks', consist of a motor and gears with an arm that telescopes in and out of a fixed tube. The purpose of the actuator is to provide stability to the dish while targeting (stopping at) a specific satellite on command from the satellite receiver. The actuator attaches between the polar mount and the satellite antenna.

Knowing the satellite arc at your location

will tell you what direction the dish needs to travel in order

to see the satellites - this will tell you whether the actuator

needs to be on the right side of the dish or the left.

- **Rule of thumb.**

Standing behind dish.

East of the Mississippi - Actuator goes on right side.

West of the Mississippi - Actuator goes on left side.

Attaching the arm will mean having to set the clamp distance on the actuator

where it attaches to the mount. The only real way to set this

distance is to mount the clamp to the actuator and leave it somewhat

loose but not so loose that it slides in travel. Check that no parts of the actuator rub on the mount during

travel - insert washers (spacers) where needed on the actuator

bolts to 'lift' the arm away from the mount to prevent any contact

with the mount other than the attachment points - this is important

as otherwise the natural movement of the actuator as it positions

the dish may put itself in a bind and over time this could bend

the actuator tube (which is why I do not recommend a one inch

tube actuator). There is no set rule on this other than observation

as each brand of dish is slightly different in how the actuator

attaches and each actuator manufacturer is slightly different

in its attachment design. The clamp to the mount will need to

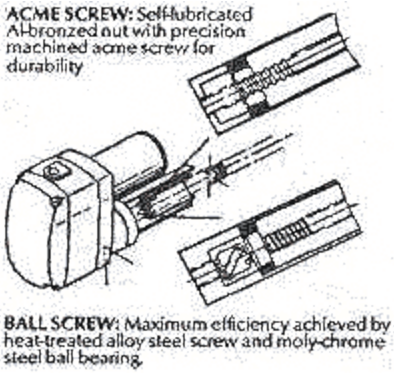
be set to a point where it appears that the arm will travel to

a point just beneath the lowest look angle it needs to be. This

position will probably have to be reset during the tracking process

so do not be too fussy on this setting in the beginning. When you feel reasonably sure the retracted position of the actuator will lower the dish sufficiently to be just past the lowest satellite of interest on the horizon then tighten the clamp at the mount axis and program into the receiver the east and west limits of travel.

To prevent overdrive at the top of the arc, set the actuator limits (in the receiver) before performing any tuning. If you happen to overdrive it at the top of the arc - to the short side (and the dish flops), do not panic; just have someone lift the dish by the lip while you drive it back using the receiver controls and then be sure to check the setting of the limits better. For dish diameter greater that 2.0m *always* use a 2.0 inch diameter actuator tube (it will serve you much better over time - *a one inch tube just does not cut it*); for actuator stroke 24 inches and greater a ball actuator is recommended though often more difficult to locate. Acme model actuators consist of a threaded shaft which moves in a threaded collar and are usually rated for loads up to 500 to 700 pounds in the 24 inch length model. A ball actuator features ball bearings instead of a threaded collar and provides smoother movement and is always rated for greater loads than the same length acme actuator - up to 1500 pounds in some cases. However, manufacturing advances in the internal gears and assembly parts have given us confidence to use a 24 inch acme actuator



(on mesh dishes) whereas in the early years of the satellite industry they were designs for failure. one would not consider using an acme for actuator requirements over 24 inches in stroke length. To repeat, a one inch tube for dishes over six feet in diameter is a *recipe for failure*. Actuator manufacturers whose products we like are Venture, and Thomson Saginaw.

Rainiers 36" Venture Ball Screw Maxi Actuator

The motor has in its sensing 'section' the greater the counts will be per shaft revolution. When choosing an actuator, hold the extension tube in one hand and the body in the other and check for slop in the tube and if too much free movement then choose another brand because that is the amount of movement the dish will experience in wind. Also, some manufacturers ship actuators without middle swivel clamp so be sure to ask if it is included. The better quality actuators also have internal limit settings, called mechanical limits, that I never fool with, but I always buy the brands that build them that way so I recommend you do to as it gives me more confidence in the integrity of their product. The mechanical

limits are to be set in case your receiver goes wacky and tries to overdrive the dish so that it would flop (see next paragraph) and the mechanical limits (in the motor housing) will stop the receiver from overdriving the actuator. The mechanical limit switch consists of a plastic cam that trips a microswitch that stops the motor; you set the cam to trip the switch just past the point where the receiver is programmed to stop the dish.

When the actuator is in the extended position, program that limit to be just past the last satellite of interest; by no means allow the actuator to be extended to the point where it looses its operating leverage thereby causing the dish to 'flop' over to the other side. If you accidentally flop your dish, commonly called 'dumping', then do not panic but simply have a companion lift the dish by its lip while you run the actuator back into its housing and then reset the high side limit - no harm will have been done except to your ego!! All dish controllers are designed to not work when pulses are not received from the actuator motor sensor, i.e. reed switch, and you will see a message saying 'actuator error' (or something similar). If this is the case, do not panic, the greatest probability is that you only need to reverse the pulse and sensor wires and you can do this at the back of the receiver. You must program the east/west limits before beginning tracking procedures otherwise the dish will only move for a few pulses then display the actuator error message.

When you move the dish to the east or west; if the dish moves in the opposite direction of the direction intended, then simply reverse the two actuator control wires either at the dish or at the receiver. Remember, after tuning the dish and programming the end satellites, run the dish back and forth between end satellites to be sure actuator sensor counts properly, i.e. to make sure it stops in the same place each time.

For maintenance, be sure to install the actuator so that the motor is setting in the direction dictated in manufacturer's instructions for water drainage, i.e. rain protection. Over time, if the actuator arm itself becomes slightly corroded with rust then clean gently with fine steel wool and wipe down with a light grease or oil. Your actuator should last at least five years and probably ten years under normal operating conditions and in most cases will require only normal tube maintenance and annual inspection of wiring connections inside the motor housing for corrosion with the worst problem being to replace the reed switch. However, expect a one inch diameter tube actuator on dishes larger than 2.0m to fail much sooner.

- **Set declination/elevation.**

Move the dish to the highest point in its travel arc, i.e. centering the dish at its zenith. Do this by using the actuator;

it can be done by visually looking at the dish. It is now time

to set your declination/elevation angles. I use a common carpenter's

inclinometer, with magnetic base, to set angles. I like it better

than the much more expensive digital inclinometer.

First set the elevation angle,

it is measured on the polar axis (sometimes the elevation angle

is called the polar axis angle). By elevation, it means the angle

in degrees which the dish must be tilted up from the horizon

prior to addition of the declination angle. Use az/el charts

to get total elevation for your latitude location

then subtract the declination value for your latitude location and the remainder is the elevation

angle to set in this step. (NOTE: The true dish pointing angle is the angle given by all az/el

calculation programs and is in fact the sum of the zenith elevation

angle (when the dish is at the top of the arc) plus the declination

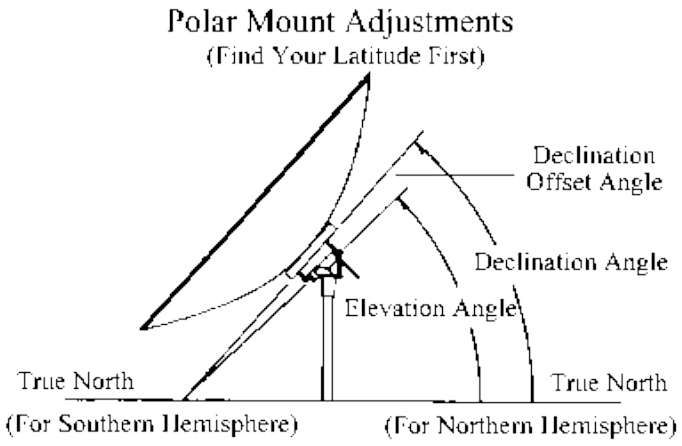
offset angle therefore substract the declination offset angle

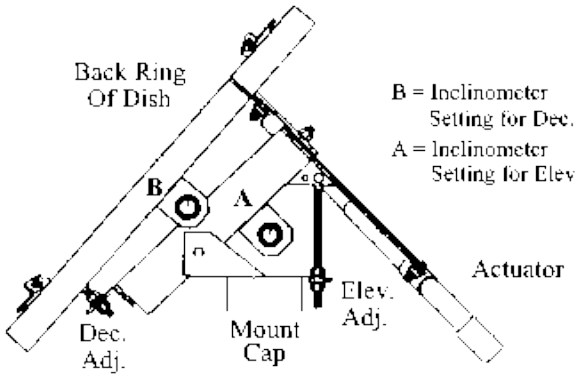
from the zenith az/el value to get the zenith elevation angle.

This is not very critical at this point because you will adjust

this angle for best reception later but be as accurate as possible.

Next, set the off-set angle on the polar mount, this is the declination. This is an adjustment





that tilts the dish 'forwards' at an angle depending on what

latitude you live. This adjustment is usually measured on one

of the mounts connected directly to the dish, i.e. in the plane

of the dish but on its back ring, it depends on your type mount.

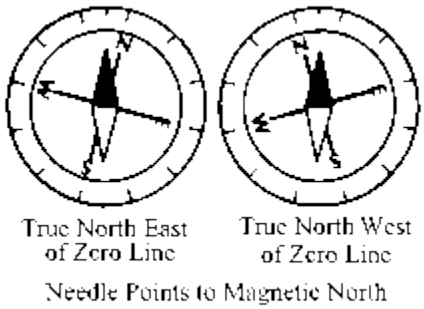
(In practice, use azel charts to get total zenith elevation angle, i.e. from the

ground to the dish face, for your latitude location and this will be the value to set in the declination adjustment.).

- **Set magnetic deviation.**

Align the polar axis to the true north-south line for your

site (don't forget to adjust for magnetic deviation



and to apply the deviation to the correct 'side' of the north

needle on the compass) and check that the satellite dish mount

cap is vertical on all sides after you tighten it. Tighten

the dish on the mount, then loosen it just enough so it will

turn. Sometimes, though, the weight of the front of the dish

will typically cause it to drop a little so that the mount cap

will not be plumb - this is especially true if the pole diameter

is in centimeters and the polar cap is in inches; when this happens,

I jam a screwdriver between the pole and cap until the cap is

plumb then tighten the cap bolts. NOTE: Sometimes the act of

tightening mount cap bolts will cause the dish/mount to rotate

slightly so after tightening mount cap bolts check that the dish

is still aligned to the true north-south line.

In case you haven't used a compass in a while, remember it's

a circle, 360 degrees. Zero is North, East is 90, South is 180

and West is 270. Put the needle on North and pick something in

the distance that is in line with North. Make sure the needle

moves freely as you turn the compass around and that it is not

too close to the dish or anything metal. It may help you to tie

a string to the mount and walk out away from the dish. Line your

compass with the string and have someone hold it, or tie it to

something such as a rod in the ground. When you are behind the dish, this will give

you a reference to work with.

Remember, the dish will look south if you are in the northern

hemisphere and will look north if you are in the southern hemisphere

and will look straight up if you are on the equator.

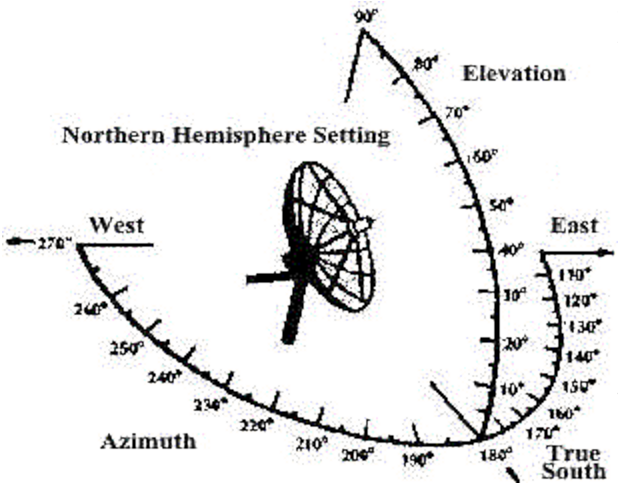
- **Program first satellites.**

Move a television (or spectrum analyzer for advanced installers)

and our D9865 satellite receiver and AP-600 mover to a table near the dish, if possible;

it will save time from running in the house to look at the receiver meter

then go outside to make dish adjustments. Begin with a satellite



that is located as close as possible to due south of your location

(if in the northern hemisphere and otherwise locate a satellite due north if you are in the southern hemisphere), this is the highest point of the arc and it is easiest to accurately adjust the polar axis angle (elevation angle) from this position.

(A few degrees off will not make much difference because the dish moves almost flat in the center of arc.) It is usually best to look for a C-band satellite when you begin (if you are working

with a C/Ku system), they will be easier to find than a Ku satellite;however, try a Ku satellite because the accuracy your system will have will be much greater if you tune to Ku satellites although Ku satellites are more difficult to find initially.

If you have a Ku system only, of course, look for the nearest Ku satellite due south of your installation. The quickest way to track a dish, though, is to program all the C-band satellites first then put in the Ku satellites.

If the elevation setting is way off or if the magnetic adjustment is way off, you might not find this first satellite. If so, while having the dish located at the highest point of the arc (due south), you have to turn the entire polar mount on the ground pole until you 'hit' the satellite.- this is where using a spectrum analyzer comes in handy. If you do not have a spectrum analyzer (and I did not for years), then set the receiver to 'scan' mode (you will find a button, switch, on the back of the receiver to accomplish this) so it will rapidly scan the channels and you will be sure not to miss an active transponder as it flashes across your TV screen. If your first satellite is not at the top of the arc, or near to it, continue with this procedure until you locate the top of the arc satellite; always program all satellites you find into the receiver, as you find them, and do not forget to use the skew adjustment to fine tune polarity. When you find a satellite, take the receiver off scan mode and check with a current copy of your local satellite TV guide to confirm which satellite you have found. Remember to adjust the polarity to its best at each satellite and program into receiver.

- **Program azimuth-elevation satellite.** If

you are using an az/el mount, i.e. not a polar tracking mount, then you will have aligned the azimuth setting to the true heading (not the magnetic heading) of the satellite you are seeking and in this step you will raise (lower) the elevation setting to the elevation of the satellite you are seeking and you will be finished with your installation except for fine tuning the two settings.

- **Fine tune north-south alignment (tracking the sides of the arc).**

After you are satisfied with the elevation and declination adjustment at the top of the arc, it is time to program middle and end of the arc satellites. This is where most people fail. DO NOT adjust any elevation angles on the mount at this point! Choose the side where the satellites are lowest on the horizon and move the dish, using the actuator, to each consecutive satellite from the top of the arc to the lowest one you can find. Peak the dish on the satellite, the lowest on the arc you can locate, using the actuator. Next, push or pull upwards and downwards on the dish (remember not to stand in front of the signal so as to block incoming signal). You don't have to use much force, just a bit to see if the signal gets better or worse when you push/pull on the dish. What you are actually doing is changing the elevation angle a bit. For instance, if the dish is pointing at a satellite to the east of center and you have to push up on the dish to get a better

signal, then the elevation angle must be adjusted higher.

At this time, you adjust this by turning the entire mount to the east (to the west if you are in the southern hemisphere) and not by adjusting either the elevation or declination angles!

Most errors in tuning a satellite system are due to improper north/south alignment. To repeat, if the dish needs to be pulled down (lowered) for a better signal, then turn the mount the opposite direction (towards the higher point on the arc) and if the dish needs to be pushed up (lifted) to get a better signal, then rotate the entire mount away from the top of the arc. *BE SURE TO MARK*, using a piece of chalk or place a strip of masking tape on the pole and mount cap, the pole and mount to know exactly where your original position is - rotate the mount only *SLIGHTLY* (no more than 1/16inch). Note from the chart, a very small movement on the pole can translate to a very large amount in degrees of rotation. Best method to rotate the dish is to barely loosen the cap bolts then stand in front of the dish and grasp the lip of the dish with both hands and gently move the dish in the desired direction. Then retighten the cap bolts, checking that mount cap is still plumb, and mark the new cap position on the pole.

Chalk the Pole!!!

Degrees per Mount Rotation

(For Mount Pole Diameter)

Outside Diameter Inches	mm	Circumference mm	mm/degree
2.0	50.8	159.6	0.4433
2.5	63.5	199.5	0.5541
3.0	76.2	239.4	0.6650
3.5	88.9	279.3	0.7758
4.0	101.6	319.2	0.8866
4.5	114.3	359.1	0.9975
5.0	127.0	399.0	1.1083
5.5	139.7	438.9	1.2191
6.0	152.4	478.8	1.3300

After moving the mount, use the actuator and move the dish east/west as necessary to peak the signal on each satellite encountered. Observe the results on a satellite at each end of the arc and at the top of the arc after each mount adjustment. Repeat this

procedure until the dish has the correct north/south alignment, as you do this you should be able to locate the satellite lowest on the arc if you could not find it at first. *Always* go back to the top of the arc to make sure it is still in view and *always* check the satellites on the low ends of the arc.

If you peaked the dish for center, and then for one side, and the center is still in view then the other side should be very close, of course, this will depend on the ground pole being vertical and offset angle/elevation angle settings.

Remember, when you rotate the mount on the pole, each satellite will need to be reprogrammed into the receiver as rotating around the pole changes the location of the satellite in respect to the memory of actuator setting (per satellite) internal to the receiver. If, when the end of the arc satellite is in view and the top of the arc satellite is not in view, then the elevation angle adjustment is grossly wrong and you have to readjust the elevation angle and repeat the procedure until you get one side of the arc, including the top, all in view and programmed into the receiver. If you suspect your elevation adjustment is grossly wrong, go back to the first satellite, the one at the top of the arc, and adjust the elevation so that the satellite remains in view when the mount is set back to its true north-south axis then repeat procedures of this step. Ideally, what you want in this step is to be able to see the entire arc (even if the dish is not hitting center on either ends or the top); what you are

looking for at this time is a compromise on the north/south setting

that allows all satellites, from end to end, to be in view. After

this compromise is reached then it is time to fine tune elevation/declination

settings. *Always*, as you move the dish from side to side,

stop at a couple of satellites in the middle and at the top to

monitor your adjustment effects.

- **Fine tune elevation.**

Once again, lift and pull the dish on the satellites on the low ends of the arc to see which direction

produces a better picture (stronger signal). As stated in previous

step, lifting and lowering the dish has the momentary effect

of making elevation changes to the mount – while observing the quality meter in the 9865 to tune the dish then you will be able to visibly see if the signals are weaker

or stronger as you lift and lower the dish otherwise

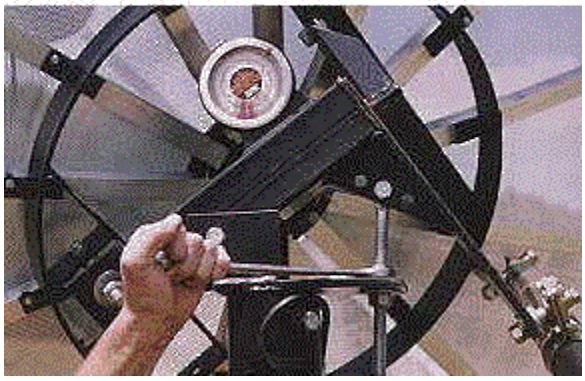
watch the quality meter of the receiver on theTV screen.

If lifting the dish on both sides produces a better

Higher quality, including the center satellite (or at least does not affect the center) then slightly increase the elevation angle.

If lowering the dish on both sides produces a better quality numbers, including the center satellite (or least does not affect the center) then slightly reduce the elevation angle.

Adjust Elevation Just a Bit



Keep track how much you turn the bolt(s) that adjust the elevation angle

so in case you overadjust you know how much to 'back up' the

adjustment. A rule of thumb is to only move the elevation adjustment

bolts no more than a quarter of a turn per adjustment. After

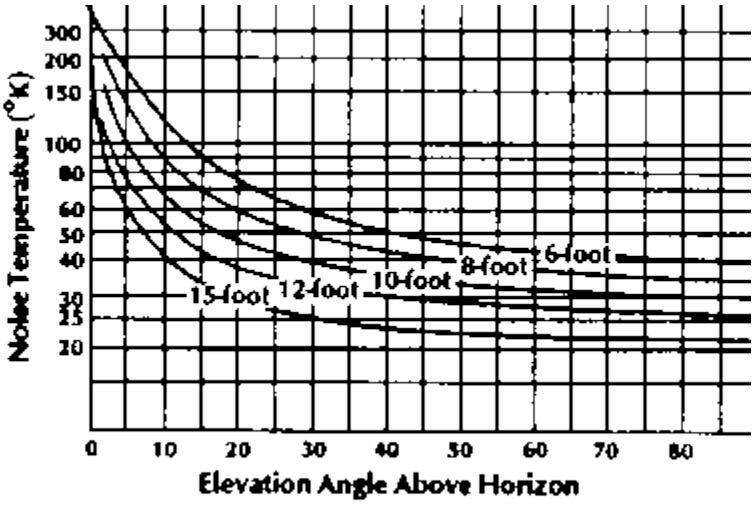
each adjustment quickly check all satellites to see if they are

better or worse. You might have to go from side to side and repeat

the elevation adjustment steps before the dish tracks to your satisfaction.

- **Fine tune declination (end of the arc adjustments).**

If, and ONLY if, you can not get both sides to peak, and both sides would be too low or too high while the center remains the same; you can then do a small adjustment of the declination angle to get the two sides into peak with the top. BUT, only do this if you can confirm that both sides are low or high while the center remains the same. If the dish is too high on the sides (arc ends), but fine in the center, the declination angle is too low so increase the declination and decrease the elevation angle the same amount. The two adjustments will cancel each other in the center of the arc while tracking lower on the sides. Conversely, if the dish is too low on the sides (arc ends), but fine in the center, the declination angle is too high so decrease the declination and increase the elevation angle the same amount. One thing to remember, the satellite dish also receives random noise, earth thermal noise, from the earth in addition to signals from space. Random earth noise is something we can not control and is generated by internal molecular motion of all matter; therefore, when the dish is at its peak, it is receiving less thermal noise than when it is positioned looking out on the horizon. Therefore, lower end satellites will always show a weaker signal than higher



arc satellites - all things being equal. If your satellites of interest are on the low end of the arc and those satellites are delivering weaker signals to your system after your best efforts at tuning the dish, then you will require a larger diameter dish though installing the best rated LNB you can afford might overcome this. Note, a larger diameter dish will take in more thermal noise, of course, but the increased satellite signals it will gather are more significant than the increased thermal noise it will pick up. The side lobes of a larger dish are smaller in comparison to its main lobe so a larger dish receives less per cent noise per signal as compared to a smaller dish and, as the chart indicates, consequently shows to receive less noise than a smaller dish. so that a larger diameter satellite dish is the clue to overcoming weak signals from low end of the arc satellites.

- **Advanced tuning: Using spectrum analyzer.**

You should now have a perfectly peaked dish and you can check this using a spectrum analyzer although I have installed many systems to complete customer satisfaction without an analyzer. A spectrum analyzer displays frequency vs. amplitude of all carriers, per polarization, per satellite. If you used Ku-band satellites for peaking, it will be as good as it can be. If you used C-band satellites, you will want to repeat the fine tuning steps using Ku satellites. As you go from satellite to satellite in the tuning process, note the weakest channels on each satellite and see

A spectrum analyzer shows all active transponders, per polarity, at same time.

what effect your adjustment process has on them. If at the end of the adjustment process and there are still weak channels then check eirp footprint charts for your area for that satellite and channel (transponder) to see if they are aimed into your region and, if possible, use a spectrum analyzer to look at the weak channels (transponders) and see how weak they really are in comparison with the stronger channels on other satellites with similar eirp patterns to see if ground effects are playing a role in reception and/or if your tuning is that much off.

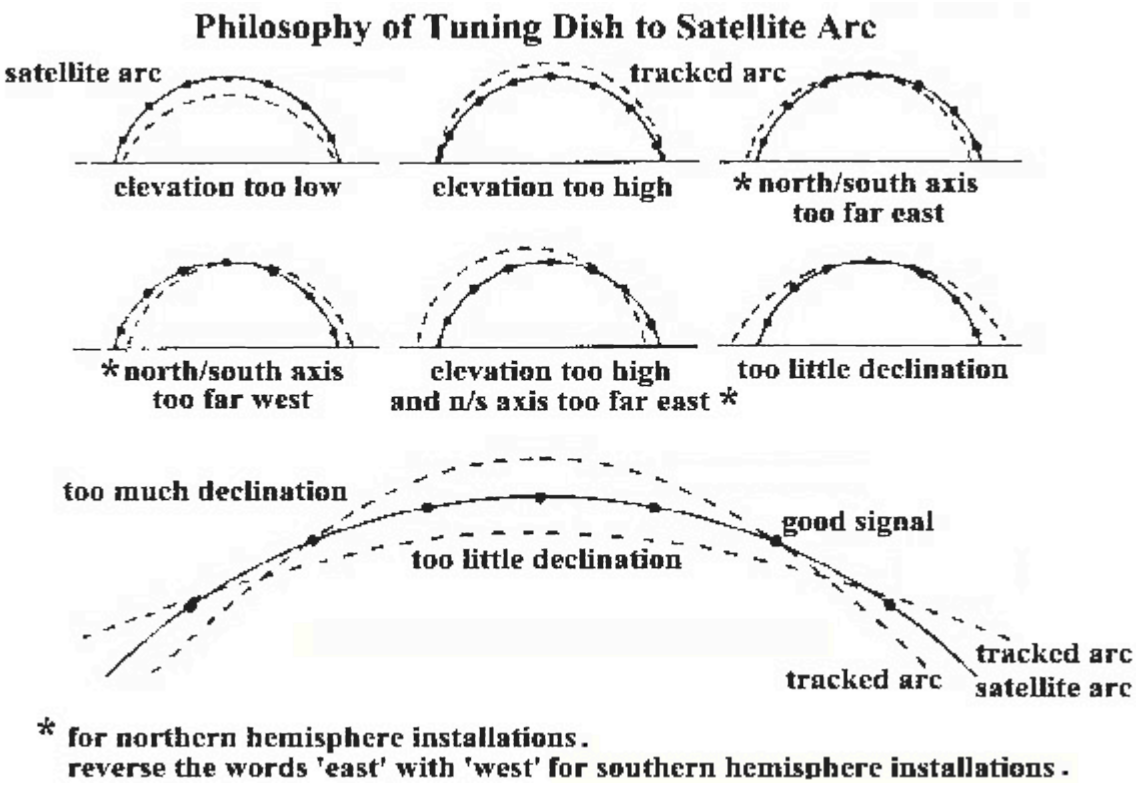
Also compare weak channels to strong ones on the same satellite to see if the weak channels might belong to a broadcaster that is simply not uplinking a strong signal or is uplinking a half transponder signal. All these actions will give you peace of mind that you have done the best job possible and will tell you if what you need is a bigger dish to receive the weaker channels. On older satellites it is a fact that some transponders age quicker than others and thereby are inherently weaker. A spectrum analyzer allows more quantative understanding of the variations in transponder reception per satellite than does monitoring each channel with a TV. In regards to final tracking of the dish, in general, it is said that Ku reception is three times more sensitive to tracking errors than is C-band and tracking Ku satellites is really where a spectrum analyzer comes in handy.

➢ SUMMARY

Find the top satellite first then satellite at lowest arc position then program satellites in the middle between these two then program your way down to the lowest satellite at the other end of the arc. Always adjust north-south axis before making elevation/declination adjustments.

Always adjust elevation before making any declination adjustments.

To determine whether to make elevation or declination adjustment, program as many satellites as possible into satellite receiver then use this chart to analytically see which adjustment is appropriate.



(The best manner to understand these diagrams is to understand

that the satellite arc makes a half circle and that the tracking movement of mount of dish makes another half circle and when these two half circles are aligned then dish is properly tracked.)

If at any time a satellite signal quality can be improved by manually lifting or lowering the dish then your adjustments are not complete. A perfectly tracked C-band arc can appear to be 'all over the place' when you go to program the Ku satellites - do not be shocked. So repeat fine tuning steps on the Ku arc but stay away from further north/south adjustments in Ku fine tuning unless you are really convinced it will be beneficial or you can really get 'mucked up'!! Be sure, on Ku, that you are not chasing weak or half transponder channels and that your dish size relative to site location relative to transmitted footprint is conducive for high quality reception from the questionable weak signal, i.e. check the footprint of that transponder to see if it is being transmitted to your region.

Ku signal strength can vary greatly from transponder to transponder within a satellite - especially on hybrid C/Ku satellites. On Ku, national news feeds are usually strong throughout the coverage region; regional feeds may be on a spot beam; local news feeds may be uplinked weakly and dependent on a very large dish at the home station to bring in a quality picture; private educational classes are often half transponder transmissions and depend on a very large dish at the receive site to bring in a quality picture.

For dedicated Ku satellites the energy level of the transponders is more even and your major problems will be one of spot beams - you may be under a strong regional coverage yet be marginal in a spot coverage.

If you really want to 'play' with your system further position and leave the dish on the satellite with weak channels and experiment with moving the focal point (the feed) in and out slightly then with moving the setting of the F/D ratio slightly. Remember that warped dishes (antenna symmetry), missing panels, hail damaged panels and loose bolts in the mount (especially check the bolt that connects the pivot axis tube to the mount cap) will deter top performance from your system - and Ku reception is the most sensitive to incorrect focal length and F/D settings.

When you are satisfied with your efforts, recheck that all bolts are completely tight and definitely tighten the mount cap to axis tube bolt. Also, make a definitive mark on the pole/mount cap for the correct alignment just in case extremely high winds should cause the dish to rotate slightly on the pole. In high winds, position the dish at the top of the arc at which point is the least resistance to wind forces; aiming the dish into the wind will put the most strain on your installation.

- **If you followed these instructions correctly your system should be receiving good quality number on all satellites. With that done it's time to start enjoying Rainier Satellites PURE HD programming**.

REQUIRED RAINIER EQUIPMENT

D9865H HD or D9865B SD receiver required for our subscription service.

OPTIONAL ACCESSORIES

Rainier 9 Ft Satellite Dish Antenna

Core Electronic Package

AP-600 dish mover.

Venture Maxi Ball Screw 24 & 36 inch Actuator

Harvard Scientific Tuned Dual C-Band ORTHO Feed

Rainier 4.5 GHZ solid copper center Coax and actuator cable

Exclusive C Band Subscription Programming Packages

Products available at our store: http://www.shop.rainiersatellite.net/webstore/storehome.htm

- For more information call Rainier at 509-486-4137

RAINIER™ SATELLITE
HD LEADERS

- http://www.rainiersatellite.com