

2 way satellite Internet for Rving

Published by RV-anywhere@Earthlink.net
[800]529-6742 ext 85

© 2003. All rights reserved. Duplication or distribution in any form prohibited without written permission.



Introduction

It was Christmas week of 2002 and I was camped on the beach in Mazatlan, Mexico. While walking my dog before bedding down for the night, I noticed a Motorhome with a large dish antenna illuminated by a bright purple glow.

My morning inquiries revealed that the antenna was for 2 way satellite Internet service, no landline telephone service required. I was shocked!

The owner of the RV was proprietor of a building materials supply company, and was operating his business, even monitoring the time clock and inventory via 2 way satellite Internet. He had a high-speed connection to the Internet that was independent of landline telephone service.



My excitement faded fast when he told me that the collapsible, self aiming antenna was a \$6,000+ accessory. His monthly

service for satellite ISP was only \$99.00 since as a mobile installation he was classified as a business user. Quite a bit more than the \$21.00 I was spending for dialup Internet service. Instantly I flashed back to my memory of spending \$500.00 for a collapsible DirecTv satellite dish installed on my RV roof . For 3 years I had not been able to use it frequently. I still carry an 18" dish with 100' of coax for the frequent occasions when the roof top dish won't work. I also carry a 30" dish for Rving in Mexico and Canada, where the 18" dish produces anemic signal strengths. Why would I want to spend 10 times that amount for an Internet dish?

I like to camp where the weather is warm. Shaded, grassy campsites are always my first choice. I don't want to camp in the hot sun and listen to my air conditioning struggling every afternoon to keep me comfortable just so my dish has a clear view of the southern sky.

I tried to put the idea of 2 way satellite Internet with no telephone lines out of my head. It worked, but only for 2 weeks.

* * * *

Chapter 1

The weather was delightful in Kino Bay, Mexico in February, but I was frustrated because of the difficulty of obtaining landline telephone service.

I had planned to conduct my business from my RV for the winter. I had prepaid the annual rental for a campsite and storage room in Kino Bay last winter and received a firm commitment from the campground owner that a telephone line would be installed at my campsite by the fall.

All the many changes in my mail order business to enable me to spend the winter in Mexico and manage my business in the USA were complete.

The promise was empty. When I arrived in Kino Bay, I discovered that no work had been done on the telephone service. It was not until December that the trenches for underground cables were dug. Instead of burying preformed concrete utility vaults, I watched for two weeks as a crew of workers dug pits and built wooden forms for utility vaults they poured in place. Then all work stopped for 2 weeks.

I complained and learned that underground conduit was not available but was on order. After several weeks, the conduit was delivered and installed and the underground wires were pulled all work stopped again.

Telmex promised that the telephone would be in next week each time I called them. They were very polite and careful to never hurt my feelings by telling me the disappointing truth.

Each month the Telmex field engineer would visit our campground and insist that more improvements had to be completed before his crew would connect the telephone

service. The owner of the campground had to install the conduit and run pilot lines through them.

The campground joke was that telephone service would never be installed. Many guests of the campground had paid deposits to Telmex more than a year before and were unwilling to believe that they would ever have dial tone and ISP service at their campsite. Several obtained refunds of their telephone service deposit and departed in frustration after a year of waiting.

They were too impatient. In early March the telephone service began working at our campsites and we had the mixed pleasure of making Prodigy.mx ISP service offered by Telmex work.

Signing up was simple. The charges were added to my monthly telephone bill. Getting online was torture. The application form asked for my choice of a user id and password. When I couldn't log on I called their support number. When the customer service agent finally answered, and discovered I was not fluent in Spanish, I was put on hold and forgotten. I called back repeatedly and finally gave up.

When the Telmex field service engineer came to inspect the installation he agreed to call customer service for me. He was on hold for more than an hour before he could talk to anyone. He wasn't able to get my service working because he didn't know [and they wouldn't admit] that the password and userid I had selected on my service application form, were not the ones that were assigned to my account.

I spent a lot of money using Earthlink 800 access, but I got my business done on a slow dialup line. My incoming calls to my 800# reached me only after I stopped trying to use my Nokia cell phone purchased in the USA and switched to a Telmex provided Nokia cell phone. I lost thousands of dollars in business and was depressed. When December arrived and of

course business slowed down, it was cold in Kino Bay, so we decided to head south to the warmer parts of Mexico.

Two days of driving south on an excellent Interstate highway, through the beautiful farm country of Sinaloa state brought us to the city of Mazatlan, just south of the tropic of Cancer. We were at the same latitude as Honolulu. It was a palm tree studded Hawaii with Salsa.

We found a campsite in the only RV park on the beach. I inquired about having telephone service installed at my campsite and discovered that it wasn't going to happen this winter, but perhaps next year if I prepaid a campsite for 90 days. DirecTV was receivable, but only with an oversize dish. The going price for one was \$200, if I could find one, but I couldn't.

I made two or three bus trips to the nearby Internet café's each day. I found several that offered DSL high-speed service and were air-conditioned. The good news was that the busses run frequently and charge only a few pesos. The bad news was that the Internet café's did not have comfortable seats, and the tourists were jammed in, elbow to elbow.

I got my online business done but it wasn't pleasant or easy. The keyboards on personal computer in Mexico are without exception, missing some keys we rely on. They don't have the @ key. The arrow keys are often missing as well. Have you ever tried to navigate in Windows 98 Spanish edition? It was a struggle!

The smart folks had their laptops with them in the Internet cafe with DSL interface cards, enabling them to connect easily. I considered buying one but scratched that as a possibility when I realized I would need technical assistance installing it. I knew they would find Windows 98 English edition just as challenging as I found the Spanish edition. No you can't switch back and forth easily.

While motoring north, in late January we stopped at Las Palmas, a lovely but remote village. We could only stay for the weekend, because there was no cell phone service, Internet café's or anything else, just the campground. It was ideal beach camping on an endless beach. The local police patrol the area in a sand rail. The friendly vacqueros herded their cattle off the road and waved hello as we drove past their long horns.

As we walked around the campground after setting up our campsite, I saw it. Jeff was on top of his 5th wheel assembling his Direcway 4000 series satellite antenna. We chatted and I learned that this was his first solo effort. I became excited when Jeff told me that the entire installation was less than \$1500. And the monthly service cost was less than \$60. His rooftop mount had been installed 2 days ago, just north of the border in Arizona. The installer had been working out of an abandoned Gas Station in a small town and was busier than a one-armed paperhanger.



Jeff spent all day trying to get his Direcway satellite internet system to work but failed. He decided to head back to the border to find out what was wrong. The installer, who was in Gila Bend AZ did not offer telephone support, in fact he ignored my email and telephone requests to schedule an installation appointment. I later learned that Jeff got his system working by merely reinstalling the software while connected to a USA telephone line.

A few days later a big shiny diesel motorhome parked near our site in Kino Bay. As soon as they were settled, fulltimers Hal & Diane were happy to have my help setting up their Direcway 4000 series satellite antenna on the roof mount they had acquired yesterday in Arizona, before they crossed the border into Mexico. It took less than an hour and they were online. Hal learned quickly how to use a box-end wrench, aimed the dish while Diane called out the signal strength as

displayed on her monitor. No landline telephone service was required. I was hooked, I had to have it.

Earthlink was having a sale on Direcway 2 way satellite Internet service, so I called up to signed up. The equipment was \$600.00 instead of the usual \$800 and rooftop installation was free. If I wanted to mount the dish on a pole there was a substantial extra charge.

I learned from them that I could NOT have the service installed on my RV. It was ONLY for permanent locations. If I moved more frequently than twice a year I was not eligible. I did a quick calculation and ordered an installation on my home roof. Thinking, if it works, I will figure out how to install it on my RV, and I did and I will be happy to help you.

* * * *

Chapter 2

It took many calls over several weeks to Earthlink to set an appointment for an installer to come to my house. It was rainy on the appointed day and he called, wanting to cancel. I prevailed and he installed the dish on my roof, the twin lead coax cable and the software on my computer in less than 2 hours. He used 2 very specialized instruments to aim and align the dish with the satellite which is parked in orbit more than 20,000 miles above the equator.

I learned that the service would work in Mexico and if I wanted him to reinstall it next fall, he was willing to fly to Mazatlan at my expense to aim my dish. He had several installations in Mexico already and assured me there was no problem using the service there if I was assigned to the correct satellite. But he would not reveal any details. I was not allowed to know the identity of the satellite or any other technical details.

After a few days the speed of my connection deteriorated. A few calls to Earthlink technical support accomplished nothing so they handed my problem off to Hughes Network Operations Center. After a weeks wait for my appointment for a conference call with a technician, it took several hours on the telephone to resolve the problem which turned out to be a browser setting. I did not discover that until Direcway had shipped me a replacement transmit modem.

Hughes technical support told me what satellite I was connecting with but not it's area of coverage. The secrecy surprised me. It took some searching, but I was able to find the footprint map of the satellite.

Below is the region which enjoys coverage from Satmex 5, and it revealed that all of the USA and Mexico were covered. Different Satellite provide Direcway coverage for most of the Western world.



My goal of Internet from the road could only be achieved if I could acquire the instruments for aiming and aligning my dish.

I found a seller on ebay offering a dish pointing meter [OPI], After waiting for a month, it arrived without the software necessary to operate it. Another seller on ebay was moving to an apartment and wanted to sell a used Direcway 4000 system and I won the bidding. The equipment, which weighs more than 60 pounds, arrived in a jumble inside an old dishwasher box. No attempt at padding had been made. Some pieces were missing and it was dead on arrival. I was out \$400.00 and about to start a new career.

In the following chapters you will learn:

How Satellite equipment works

How to operate the software that aims your dish

How to install your dish on or *near* your RV

How to receive DirecTV from your Internet Satellite dish.

How to acquire the instruments you need to aim and align your dish

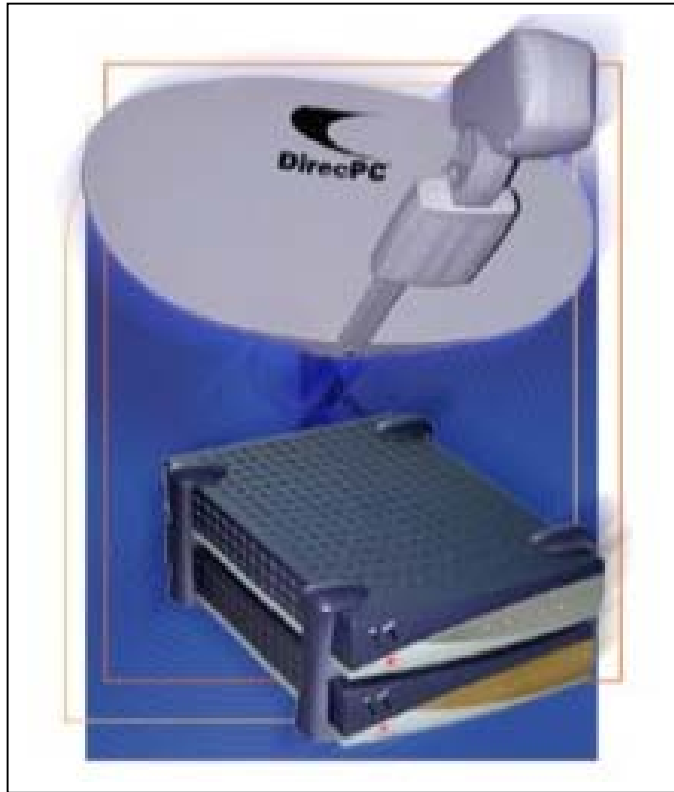
How to become trained in aiming your dish

How to acquire a kit containing all the items you need to reinstall your home mounted Direcway 4000 system on or at your parked RV.

How to find the satellite from your current location.

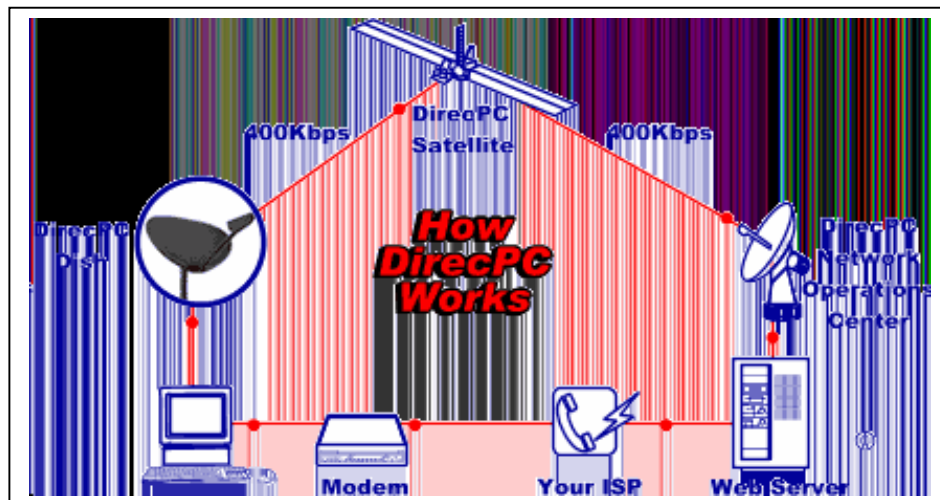
How to have your DW4000 system activated.

* * * *



Let's start with definitions:

DirecPC : When Hughes first started offering satellite Internet service to home users back in the mid 1980's, they called the product "DirecPC" . It was available in only the 1-Way / Dial Return configuration. That meant that you had to be connected to a phone line as well as the satellite dish. Signals came in from Space but went out from your computer via modem and telephone line.



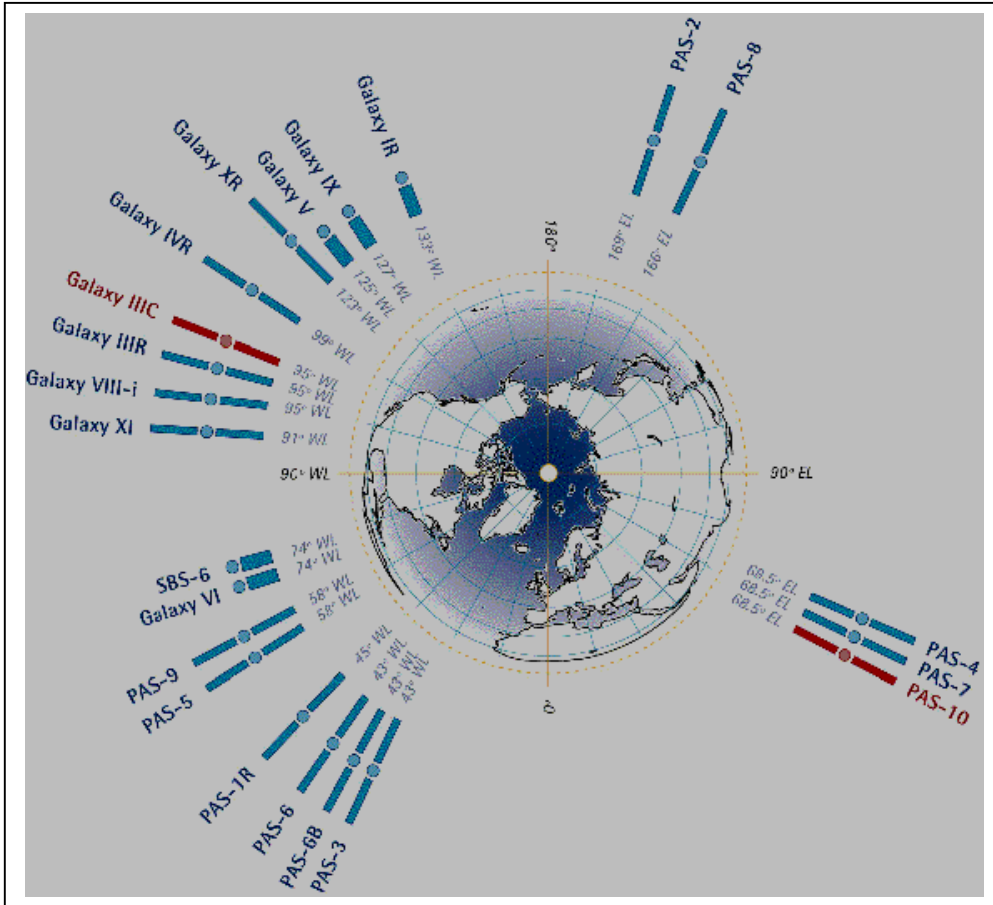
DirecDuo : Soon after the launch of the DirecPC product line, Hughes started offering the DirecPC dish with a small add-on capable of receiving DirecTV satellite television. This saved the customer from having 2 dishes on their roof ... one for TV & one for internet. Hughes called this package "DirecDuo" .

DirecWay : Shortly after Hughes started offering 2-Way / Satellite Return systems, they changed the name of the product line to DirecWay. Though the hardware has been slightly updated since the original DirecPC offering, the product is basically the same. DirecWay systems are available in 2-Way / Satellite Return configuration only.

iNetVu / MotoSat/Ground Control: While iNetVu & MotoSat are not actual Hughes products, these systems do use the Hughes DirecWay satellites. These systems are 2-Way / Satellite Return systems designed for use on mobile-home's / RV's . iNetVu and MotoSat systems are basically auto-deploying / auto-pointing DirecWay dishes. Monthly subscription costs are higher than those offered by Hughes Direcway.

The Direcway 2 way satellite system is manufactured by Hughes Electronics. This is the company that did the basic research & Development of the Satellites the USA developed during the cold war to watch from space what everyone on earth was up to. Hughes and IBM developed the production technology and equipment, which is used to make, integrated circuits. They are technologically proficient but have not yet mastered the art of understanding their customers and their needs. The first Internet access system marketed by Hughes and AOL was DirectPC. It received information from the satellite but all your mouse clicks and key strokes were transmitted over a dialup telephone line. With great high speed downloads it was no faster than dialup Internet access if you were sending a file. Not suitable for Rving when telephone service is not available.

The Direcway satellite Internet system uses a few of the communication satellites parked in orbit above the equator. Satellite TV is also broadcast from these orbiting communications links.



The next generation of equipment offered to consumers was the Direcway 4000 system. The system consists of a 50 pound dish and transmitting arm for roof top mounting, and a pair of independently powered, book sized modems for transmitting and receiving. The transmit modem is labeled 'tx' and the receive modem is labeled 'rx'.



Upload speeds range from 2x - 4x standard 56K modem upload speeds. While not blinding-speed, it should be better than normal and more importantly the 2-Way system eliminates the need for a separate ISP (which for most of us means shelling out \$19.95 a month and tying up a telephone line which is another \$15.00).

The DirecWay 2-Way (Satellite Return) system is advertised to have the same download speeds as the DirecPC & DirecWay 1-Way systems (Up to 400Kbps). However, most DirecWay 1 & 2-Way owners have been reporting speeds well in excess of 1000 Kbps and usually exceeding 2000 Kbps ! That's faster than most cable & dsl connections !

If you would like to test your computers compatability with the Direcway System, point your browser to <http://www.getdway.com/> there you will find a test which will answer your question. Don't click ORDER NOW. If you want to order Direcway, contact info@RV-anywhere.org

When your system is activated, Hughes records the internal serial number of the receive modem [you can't change it] in their system and records it on the hard disk of your computer. If you decide to change your computer or receive [rx] modem, the system must be reinstalled.

The outside equipment is powered by the modems connected to your computer's USB port. Because of the 1 watt power necessary to transmit to a satellite 20,000 miles away, FCC regulations require you to mount the dish so that the bottom edge is at least 5 feet [1.5 meters] above ground level. Some Rvers mount the dish on a large tripod. If you mount the dish on an elevated platform [RV roof] they want you to make certain the ladder is blocked and a High Voltage warning sign is in place.

The outside gear for a fixed location consists of a mounting bracket, which is screwed to your house roof or south facing outside wall. It is similar to the mount used for DirecTV dishes, just bigger and designed to take the #200 lb wind load of this larger dish.



If roof or wall mount won't work for you, your next choice is a pole mount. A 3x3 timber or 2 3/8" pipe set in concrete will work. If you choose this type of installation expect to pay extra.

The oval dish is clamped to the mounting bracket with three bolts that tighten a sleeve. The transmitter arm bolts to the dish. The Outboard end of the arm has a plastic pod covering the LBNF [low band noise filter] to which the cable leading to the receive modem, is attached. Halfway out the arm is the transmitter encased in a ribbed heat-dissipating casing. The RG6 coax connector is for the transmit modem cable.

When you examine the bracket with four bolts supporting the dish you will discover three axis of rotation. The dish can be moved left to right [east to south] and pointed up to the correct angle above the horizon to hit the satellite in the southern sky. The third axis is rotation of the dish and is used to adjust the cross polarization of your signal. This is the orientation of your send and receive signals which are assigned to horizontal or vertical orientation. Think of a double barrellled shotgun which is either side by side or over and under.



* * * *

Chapter 4

Activating your Direcway account

You purchased your DW4000 system at a great price, on eBay from someone whose neighborhood just got DSL. It has arrived and you want to get on the web ASAP. Hopefully the former owner settled his account with his provider. If not you have a big problem. As I write this in the summer of 2003, you have the following choices.

Activate your account with:

Direcway from DirecTV. www.getdway.com

Earthlink www.earthlink.net

Ground Control/ Motosat. www.groundcontrol.com

in Mexico with Internet Directo SA de CV www.interdirec.com

in Canada with Bell Canada.

The costs vary, but you must have an activated account before aiming your dish at the satellite. That means that the satellite must be expecting your signal before you power up your dish. Direcway will not welcome you until they know how to bill you. If you transmit a signal at their satellite without their invitation they will disable your system. You will not penetrate their defenses.

If you are accustomed to DirecTV, be advised that Direcway is NOT similar. That means you will not be able to aim a dish and receive signal with a 'pirate card' or avoid being billed any other way.

FCC regulations require that a certified installer aim your outdoor unit [the dish]. No certified installer will touch your equipment until Direcway has established your account.

If you are truly mobile, moving more than twice a year, you are not eligible for Direcway service. They have divided their marketplace and you fall into the business class mobile category. Contact Ground Control who will establish an account for you and allow you to attend their \$500.00 certification class. When you are certified you can aim your own dish. Your monthly charge for ISP service will be \$99.99 and you are welcome to use the service from anywhere on the North American Continent or anywhere your signal can be seen by the satellite.

If you want to have dialup internet access as well as Satellite service, Earthlink is your obvious choice. They will charge you \$800.00 for a DW4000, and will send a certified installer to your house for a rooftop or pole mount installation. NO RV's.

If you are budget conscious, you will probably choose to establish service with Direcway. Who offer two payment options. Pay \$579.99 for hardware and installation and monthly service is \$59.99 per month. Or pay 99.99 up-front and \$99.00 per month for 12 months [a 1 year commitment is required] then pay \$59.99 per month after 12 months. NO RV's.

Chapter 5

After your Direcway outdoor equipment is properly installed on your home roof, and connected to your computer via modems and USB port your installer will load software which controls your Satellite Internet send and receive equipment on your computer.

One of the programs is for aiming and aligning your dish and requires you to know your USA zip code or your latitude and longitude. The search engine, Google will provide the Longitude and Latitude for most cities worldwide, or use your zip code, or visit <http://www.lyngsat.com> which will calculate your dish elevation and compass direction from the place on the world map you click.

You can take your laptop onto the roof, or have someone call out the signal strength while you search the sky for the correct satellite. The signal strength is displayed on your screen and an audible tone indicates signal strength. If you have ever aimed your DirecTV or DISH NETWORK TV satellite dish you are already familiar with this part of the aiming procedure. The Direcway dish is bigger and the positioning much more critical. Expect to spend a lot of time if you use this procedure.

First use your compass to locate the southeastern sky. If you don't have an unobstructed view you must move the dish. A tree with leaves is enough to block the signal. Avoid pointing through power lines if you can.

Make certain that the mounting post supporting the dish is level. I use a carpenters level to confirm this.

Set the correct elevation by loosening the appropriate nuts on the dish mount and adjusting it.

Place the assembled dish, arm, and mounting bracket on the mounting pole.

Thread the RG6 cable from the receive modem through the Dish Arm and connect it to the LBNF [low band noise filter] connector . You will need to loosen three recessed screws on the plastic pod to locate the LBNF connector inside the plastic pod at the end of the Dish arm.

Attach the RG6 cable from the transmit modem to the transmitter amplifier. It is the ribbed box attached under the arm between the plastic pod and mid point of the arm.



Your physical installation is complete when you attach a ground wire from the mount to a cold water pipe or other suitable grounding point.

Install the Direcway software from the CD-ROM which is part of the kit, or if you are an Earthlink 2way satellite subscriber, download it from their website.

Restart your computer and click Start/Programs/Direcway/satellite pointing. Enter your zip code and in the next screen supply your correct parameters. On the next screen you will see the signal strength and by checking or unchecking a box you can enable

or disable the audible tone. This is your chance to tilt the dish up and down to the correct angle above the horizon and point it a bit east or west to find the satellite.

Aiming a satellite dish without an instrument to help can be very frustrating. With the aid of a satellite finder you will spare the frustration of wondering why you are getting no response on the signal meter displayed on the screen of your computer.

The delay between when you point the dish correctly and when the screen shows a signal strength is almost a minute and sometimes longer. It is very difficult to move the 50 lb dish only one or two degrees to the left or right [east or west] at a time. If you move it more, you will pass the satellite and never know it. After a while you will wonder if your elevation is set too high or too low or perhaps your cable to the receive modem is defective.

The use of a Satellite finder is invaluable here. This small box connects to the LNBF ahead of the cable from your receive modem and has a meter and tone to indicate when it is pointing at a satellite. The Satellite finders response is instantaneous and it is adjustable to help you fine tune the antenna. It permits you to slowly sweep the sky at the correct elevation above the horizon. You will discover that there are many satellites.

Unfortunately the inexpensive [less than \$500] finders do not give any indication of which satellite you are aimed at. A few years ago this was not a major concern, but now it is. There are a lot of satellites transmitting from orbit and more are being launched each year.

Hughes is launching three more for the Direcway service in the next 12 months. They are signing up more than 1,000 customers for Direcway each day. They plan to offer telephone service [voice over Internet] in a joint effort with Net2fPhone as an optional extra with Direcway in 2005. The subscriber base will grow even faster then.

Ground Control offers telephone over the Internet, which works with the Direcway system currently and Hughes and Net2phone have a joint venture, which plans to offer this service in 2005.

So you have found a satellite and used your satellite finder to achieve the highest signal strength. By now you are adept at making very small adjustments with the dish and have eased it up and down and left and right, but you are not through. Are you pointed at the correct satellite? If you are, the signal meter on your computer screen will be giving you a numeric value. You are on the roof and I suspect you didn't want to take your computer up there with you. Hughes has solved this problem by inventing an OPI [outdoor pointing interface]. This smaller than a palm pilot instrument has a small display which repeats the signal strength value displayed on your computer screen. The OPI is designed to velcro strap to the arm of your Direcway antenna so that you can read it while standing behind the dish.

The OPI provides feedback from the Direcway pointing software to the installer at the antenna during the pointing process in a DIGITAL READOUT.

A computer is still required, but the OPI eliminates the need to have the installer's laptop on the roof or ladder.

A necessary tool for inclement weather and eliminates shouting. Keep your laptop in the dry and use the weatherproof OPI to point the dish. It is an excellent tool in beautiful weather when glare on your computer screen makes it almost impossible to read.

The OPI is a pass-thru repeater that displays the same value as the computer running the pointing software and works in both receive pointing & transmit pointing modes. no batteries required since it is powered by the IRU.

Protect your valuable laptop - use the OPI.

You weren't planning on standing in the beam of the transmitter were you? If you installed the OPI in line with the satellite finder before you started aiming you will quickly know [less than 1 minute] if you are pointing at the correct satellite.



Cross polarization

Now that you have zeroed in on the satellite, it is time to fine tune your beam. Have you been assigned Horizontal or vertical polarization. Now it is time to adjust the skew of your dish to the correct setting you have been assigned.

The next screen allows you to perform an isolation test. This allows you to adjust your dish until it is rotated to the correct

angle. Think of your satellite dish as a wheel. I know it is elliptical. Loosen the four nuts on the back of the dish so that you will not have to struggle. Dishes shipped before 6/03 are more difficult to rotate. A set of bearings is available.

Select the Automatic test on the screen of your computer. It may be that you have a magic touch. You will probably fail the first automatic test.

Select manual test and get moving. You will be dropped in a few minutes if you don't succeed.

Rotate the dish slightly, as if you were spinning the wheel. Make small adjustments to maximize the signal strength. You must achieve a score of greater than 70%. If you have trouble, make a bold adjustment and start over.

When your score on the OPI meter is at the maximum you can achieve, tighten the locking nuts carefully.

Now run the Automatic Cross polarization test again. If your dish is correctly aimed, you are ready to go online. If not start the aiming process over, and this time make sure the dish support tube is dead level.

Congratulations you are ready to go online, provided your account has been activated. If you purchased a used Direcway system on Ebay you will need the assistance of a certified installer to activate your account. Hughes does not tolerate systems being activated by untrained people. Expect to pay about \$200.00 for activation and installation on your house roof. If you can find an installer who will help you do it yourself with telephone support, you may be able to save some money.

Area of coverage

New subscribers to Direcway service are currently being set up on SATMEX 5. If you already have Direcway service you can request a transfer to SATMEX 5. The coverage area [footprint] covers most of the USA and all of Mexico. You will need the help of a certified installer to re-aim your dish.

* * * * *

Safe Operation

The Federal Communication Commission [FCC] regulations require that you take precautions when installing and operating your Direcway system. The antenna must be mounted so that the bottom edge of the dish is at least 5 feet above the ground. If you mount it on a platform or RV roof which is accessible by stairs or a ladder, access should be restricted and a sign prominently displayed announcing "DANGER High Voltage Equipment in Operation"

* * * * *

Chapter 5

The obvious place to mount your antenna, when Rving is on the flat roof of your Coach, trailer or fifth wheel. I resist the idea of attaching anything to my roof, which might later be the source of a leak. If I decide to trade my RV for a newer model, will I be able to remove it? Extensive research uncovered a solution. A non penetrating roof mount already exists as a commercial product. It is a framework of welded 1" angle iron with a mounting pad which mates perfectly with the universal mount supplied with the Direcway kit. It is designed to be weighted down with cinder blocks so that it will resist the wind pressure on the big dish which might topple the antenna.



The idea of toting cinderblocks up to my RV roof is not appealing. I certainly don't want to travel with them, so an alternate ballast weight system is required. Ballast of 200 lbs is required to withstand wind pressure and keep the dish from wiggling. Two Igloo ice chests filled with water are perfect for the job. It is easy to fill them with water on the roof and drain them when you are ready to go back on the road.

Setting up the dish on the roof is simple, but one other modification makes it a lot easier. It is awkward but necessary to assemble the satellite dish and transmitter arm on the roof. The two are held together with a hex bolt, which is inserted through holes in each. I modified my transmitter arm and machined the hole into a slot. To install the transmitter arm under the dish antenna, just slide the arm

into position and then tighten with a wrench. Removal is just as simple.

Here are the steps to setting up the dish on the RV roof.

- ✓ Place non-penetrating roof mount on the roof
- ✓ Attach universal mount to roof mount with 4 bolts & nuts.
- ✓ Place Dish on top of universal mount
- ✓ Slide transmitter arm into slot at bottom of dish.
- ✓ Place Igloo chests on non-penetrating roof mount.
- ✓ Fill igloo ice chests with water from hose.
- ✓ Attach meters and coax cable to transmitter arm.
- ✓ Start aiming software on computer.

Total time required is less than 20 minutes. Trips up and down the ladder are eliminated when my wife hands the gear up to me. No object weighs more than 25 lbs. The only tool necessary is an open end wrench and a water hose. If a tree is in the way, a ground or picnic table mount is a possibility.

I prefer to use a large Tripod that is at least 6' tall. A special mounting bracket is needed between the tripod and dish antenna. I hang a large water jug from the mounting screw to add to the tripod stability when soil conditions prevent me from securing the tripod feet with tent stakes.

DirecTV

DirecTV can be received from the Direcway dish antenna. The DirecTV signal is broadcast from the same satellite that provides your Internet service. An accessory arm and LNBF are required [see below] and it is important to choose the correct kit to match the satellite to which you are aimed.

Installation of the DirecTV LNBF and its mounting arm is very simple. Once mounted with three screws just thread a third coaxial cable through the transmitter arm and down to your RV. No additional aiming is required. You will have a much

stronger TV signal than you are accustomed to with the standard DirecTV dish and can enjoy excellent reception in Mexico.



Ready to go on the road? Power down your DW4000 system. Use a permanent marking pen to create an index mark on the dish and post so re-aiming will be easier. Disconnect the coax cables from the outdoor unit. Loosen the bolt connecting the Arm from the dish. If you have used a jig saw or dremel tool to convert the hole to a slot, this procedure is much easier. If not, remove the bolt and don't lose the nut. The Dish comes off its post easily after loosening 3 nuts. Just lift it off the post.

Stow the arm, and dish, and modems in your rig and be sure you have your Rving kit in your rig. You can be connected wherever you stop in 20 minutes or less.

How to acquire the instruments and gear you need to aim and align your dish?

How to become trained in aiming your dish?

Visit www.rv-anywhere.org or send an email to Marco_az@yahoo.com or info@rv-anywhere.org.

END OF BOOK