

# Installation Instructions



## Satellite Dish Assembly

## Attention and Warning Symbols

You *must* be aware of safety when you install and use this system. This guide provides various procedures. If you do some of these procedures carelessly, you could *injure* or *kill* yourself or damage equipment or property. Some other procedures require special attention.



Marks a procedure where the following may happen:

- Personal injury or death may occur.
- Equipment or property may be damaged.



Marks the following issues:

- Important operation or maintenance instructions follow.
- Special attention is required.

## Important Safety Instructions

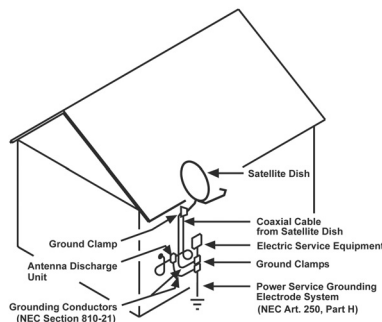
You *must* keep safety in mind when you install and use the DISH 1000. Refer to the safety instructions in the installation instructions that came with your system. In this guide, the following notes tell you when you need to pay special attention:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.

Keep the following in mind when you install the DISH 1000:

- Before you drill any holes in your building, make sure there are no wires or pipes near the holes.
- Install the equipment in accordance with the local building and electrical codes. If you aren't sure, call a licensed building inspector or electrician for help.
- Never install the satellite dish near power lines.
- Don't install the satellite dish on composite materials such as strand, chip, fiber, or particle board unless the fastener attaches securely to a wall stud, rafter, or other foundation material beneath the surface.

**Note to Satellite TV System Installer:** This reminder is provided to call the satellite TV system installer's attention to Article 820-40 of the *National Electrical Code* (NEC) that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building as close to the point of cable entry as practical.



## Introduction



**Attention!** These installation instructions are intended for use by qualified professional technicians due to the complexity of the installation and compliance to national/local building and electrical codes.

## Overview

These instructions guide you through the installation of a DISH Network DISH 1000 antenna. The DISH 1000 is capable of receiving digital television signals from three DBS satellite locations: 110°W, 119°W, and 129°W. These instructions cover wall mounting only. For other mounting options (for example, pole mounting, struts, non-penetrating mounting), see the Retailer Care Site at [retailer.echostar.com](http://retailer.echostar.com).

Your DISH 1000 antenna system consists of a reflector assembly, one DISH Pro Plus Twin LNBF and one DISH Pro Single or Dual LNBF.

## Installation Considerations

While all DISH Network satellite receivers can be connected to the DISH 1000, the following models cannot detect the 129°W location: 1000, 2000, 3000, 4000, 5000, JVC-DVHS, and the DishPlayer 7100/7200.

This installation does not support one lone Legacy receiver or two Legacy receivers. Legacy receivers do not have the DISH Pro or DISH Pro Plus logo (shown below).



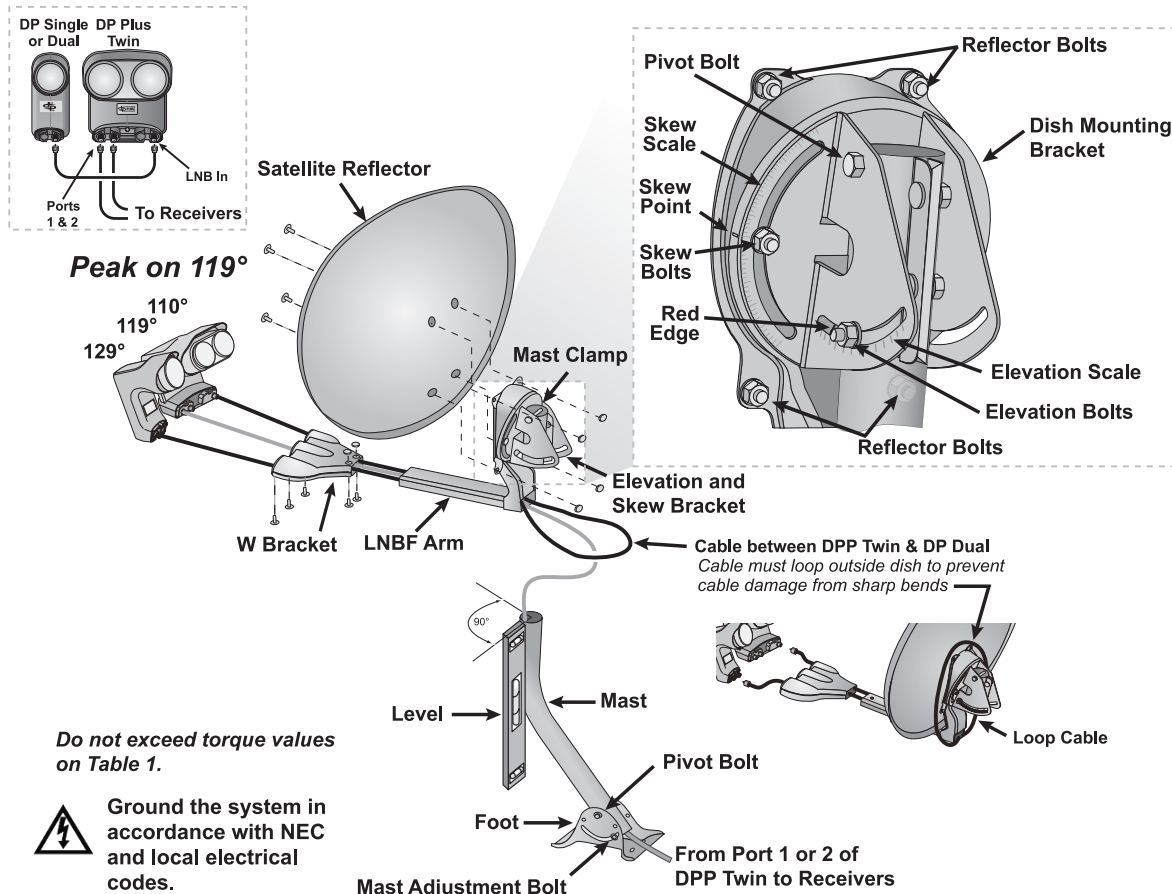
## About the System

The DISH Pro Plus Twin LNBF provides reception from the 110°W and 119°W orbital locations, and provides an input from a DISH Pro Single or Dual LNBF to receive programming from 129°W.

The DISH Pro Plus Twin LNBF supports connection of up to two satellite receivers in any of the following combinations:

- Single-cable connection to DISH Pro Plus (dual-tuner) receivers, when each input is used with a DISH Pro Plus Separator.
- Single-cable connection to DISH Pro receivers.
- Single-cable connection to a Legacy receiver provided that a DISH Pro or DISH Pro Plus receiver is also connected. No DISH Pro Adapter is required.

## Quick Installation Instructions



**Figure 1. DISH 1000 Antenna Installation Overview**

1. Find Azimuth/Elevation/Skew angles for your location (instructions on page 3 and tables on page 8).
2. Find a location for the dish antenna with a clear line of sight and a sturdy mounting surface (page 3, step 1).
3. Mount the mast, making sure it is absolutely vertical (page 3, steps 2 and 3).
4. Assemble the dish antenna, setting the skew and elevation angles in the process (page 3, steps 4-6).
5. Mount the dish antenna on the mast and point the dish to the azimuth angle (page 3, step 7).
6. Run cables between the dish antenna and the receiver(s) (page 4, step 1).
7. Connect the 5-1/2 foot long cable to the DISH Pro LNB and attach the LNB to the W-Bracket 129°W slot (page 4, step 2).
8. Using a peaking meter attached to the DISH Pro Plus Twin LNB Port 1, peak the dish on 119°W for maximum strength. Tighten all bolts (see Table 1) and re-confirm maximum signal (page 4, steps 3-6).
9. Connect the receiver cable(s) to the DISH Pro Plus Twin LNB Port 1 (and Port 2, as necessary) (page 5, step 9).
10. Connect the 5-1/2 foot long cable to the **LNB In** port of the DISH Pro Plus Twin and attach the LNB to the W-Bracket (page 5, step 7).
11. Confirm receiver software. Take a receiver download if necessary (page 5, step 8)
12. Run **Check Switch** test and confirm 110°W and 119°W reception (page 6, steps 10 and 11).
13. Take a software download, if you didn't already (page 6, step 12).
14. Run a **Check Switch** test and confirm 110°W, 119°W, and 129°W reception (page 6, step 13).
15. Install an additional receiver, if necessary (page 6, step 14).

## Locating the Dish Antenna

Use the *Angles Tables* starting on page 8 to find the azimuth, elevation, and skew angles using the ZIP code from your location. Write the angles in the space provided below.

**Azimuth:** \_\_\_\_\_ **Elevation:** \_\_\_\_\_ **Skew:** \_\_\_\_\_

Using these azimuth and elevation angles, find a mounting location for the satellite dish, which can be pointed towards the satellites located at these angles. Use a compass and the azimuth angle to find the direction along the horizon that the dish should be pointed. Then use the elevation angle to find out how high the satellites are in the sky from your location. Make sure nothing blocks the line of sight between the dish and the satellites. Make sure this line of sight will not be blocked by future growth of nearby trees or other foliage. Also make sure your mounting location provides sufficient clearance to rotate the reflector as needed to point toward the satellites.

## Assembling and Mounting the Dish

Follow these instructions to assemble the satellite dish, mount it, and point it in the direction of the satellites.

- 1** Using the azimuth and elevation angles, find a location for the satellite dish which can be pointed towards the satellites located at these angles. Make sure nothing blocks the line of sight between the dish and the satellites.
- 2** Mount the mast to a solid surface so that the dish antenna cannot move or be bumped out of adjustment. Keep in mind that physical and environmental conditions can block your satellite dish's ability to receive a clear satellite signal. Never mount to a tree or a public utility pole.
- 3** Align the top part of the mast so that it is absolutely vertical. If the top part of the mast is off vertical by only a few degrees, it will be difficult or maybe even impossible for you to find the satellites. Take at least two readings with a level, on the upper mast, that are 90 degrees apart from one another (see Figure 1).
- 4** Assemble the satellite dish as shown in Figure 1, except do not attach the LNBFs at this time.
- 5** Loosen both skew bolts and set the skew by rotating the dish mounting bracket to align the red mark with the required angle on the skew scale which you wrote down above. Tighten the skew bolts securely to keep the dish from rotating. See Table 1 for the required torque values. **After the skew is set, do not try to fine-tune the skew angle when aiming the dish.**
- 6** Set the elevation by tilting the dish mounting bracket to align the red edge with the required angle on the elevation scale. Tighten the elevation bolts snugly to prevent movement.
- 7** Slide the dish assembly down onto the mast. Make sure the pivot bolt rests on the top of the mast. Turn the dish assembly so that it points in the general direction of the satellites, using the azimuth angle you wrote above.

## Installing the Receivers

Use the steps below while referring to Figure 1 for this installation.

- 1 Run RG-6 coaxial cables from the DISH 1000 antenna to the receiver location(s) using the following cable requirements. Account for grounding or other devices and in-home cabling.
  - Only RG-6 coaxial cables rated for 950 to 2150 MHz can be used in this installation. Do not use existing cables such as RG-59. These other cables may cause signal loss. Also, be sure that any outdoor connections are made using waterproof F-connectors.
  - The length of the RG-6 cable from the DISH 1000 must not be longer than:
    - 200 feet for DISH Pro or DISH Pro Plus receivers.
    - 150 feet for Legacy receivers.



The center conductor must not extend past the rim of the F-connector more than the thickness of a nickel.



Tighten all outdoor cable connections up to the recommended manufacturer torque value to ensure seal against moisture. Damage caused by over-tightening is *not* covered by the limited warranty.

- 2 Thread a 5-1/2 foot long cable through the LNBF arm and 129°W slot of the W-Bracket. Connect the cable to the DISH Pro LNBF. Attach the DISH Pro LNBF to the W-Bracket 129°W slot with one screw.

- 3 Connect a temporary cable to a peaking meter. Thread the other end of the cable through the LNBF arm and 119°W slot of the W-Bracket. Connect the temporary cable to **PORT 1** of the DISH Pro Plus Twin LNBF and attach the DISH Pro Plus Twin to the W-Bracket with two screws.

**Note:** If the peaking meter does not have enough current (450 mA) to power the DISH Pro Plus Twin LNBF, connect **PORT 2** of the LNBF to the **SATELLITE IN** port of a powered receiver.

- 4 Peak the dish for the strongest possible signal on the 119°W satellite signal using the azimuth and elevation settings you wrote on page 3. Do not adjust the skew.

**Note:** If you cannot find the 119°W signal, try adjusting the elevation up one or two degrees.

- 5 With the peaking meter still connected, tighten the mast clamp and elevation bolts using the torque values listed in Table 1. Re-confirm signal strength after tightening the bolts.

**Table 1. Torque Values**

Location	Torque Value
Mast Adjustment Bolt <b>Note:</b> Do not adjust the tightness of the pivot bolt.	120 inch-pounds
Mast Clamp <b>Note:</b> Clamp must be fully seated with pivot bolt resting on top of mast <b>Note:</b> Do not adjust the tightness of the pivot bolt.	85 inch-pounds
Elevation Bolts	90 inch-pounds
Skew Bolts	100 inch-pounds
Reflector Bolts	70 inch-pounds

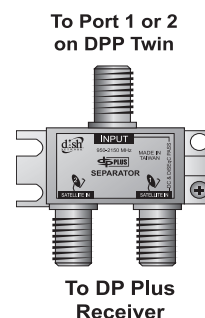
- 6 Remove the temporary cable used for peaking the dish. Thread the cable(s) from the receiver(s) through the LNBF arm and 119°W slot of the W-Bracket. Connect these cables to **PORT 1** and **PORT 2**, as applicable.
- 7 Thread the loose end of the 5-1/2 foot long cable through the LNBF arm and 110°W slot of the W-Bracket. Connect to the **LNBF IN** port on the DISH Pro Plus Twin LNBF. Attach the DISH Pro Plus Twin LNBF to the W-Bracket with two screws.  
**Note:** Make sure to loop the 5-1/2 foot long cable in a circle as shown in Figure 1 on page 2.
- 8 Connect the receiver(s) to the TV(s) and display the **System Information** screen (for most receivers, press **MENU-6-1-3** on the remote control). Make sure the software version meets the requirements on the Table 2. If the receiver has older software, go to *Special Downloading Instructions* on page 7. If the receiver has the required software, continue on to the next step in this procedure.

**Table 2. Software Required for Dual-Tuner Receiver Installation**

Receiver	Software Version
DISH 322	L054 or later or current download
DISH Player-DVR 522	L059 or later or current download
DISH 721	Current download
DISH Player-DVR 921	L052 or later or current download
Legacy Tuners	All
Single Tuner DISH Pro Receivers	All
DISH Player-DVR 625, DISH Player-DVR 942, and future DISH Pro Plus Dual-Tuner Receivers	All

- 9 Connect a cable from DISH Pro Plus Twin LNBF **PORT 1** (or **PORT 2**) to a DISH Pro or DISH Pro Plus satellite receiver's **SATELLITE IN** connection(s) (a Legacy receiver will be installed later in this procedure, if necessary). For DISH Pro Plus dual-tuner receivers with a single cable, install a DISH Pro Plus Separator as follows:

- a. Connect a cable from the DISH Pro Plus Twin LNBF output (**PORT 1** or **PORT 2**) to the DISH Pro Plus Separator Input.
- b. Connect cables between the receiver's **SATELLITE IN 1** and **SATELLITE IN 2** to **PORTS 1** and **2** respectively on the DISH Pro Plus Separator.

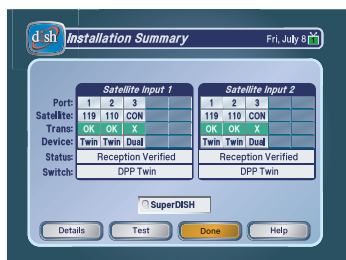


You must use a DISH Pro Plus Separator in this installation. A splitter or other device will not work in this configuration.



Tighten all indoor coaxial cable connections to the receiver *only* by hand. If you use a wrench, you may over-tighten the connections and damage your equipment.

- 10 From the **Point Dish** screen, run **Check Switch**. When the **Check Switch** procedure finishes, you should see an **Installation Summary** screen similar to the one shown below. Make sure the summary screen shows reception from the 119°W and 110°W satellites on all available satellite tuners. Also confirm the LNB is correctly identified as a **DPP Twin** (some early factory software on some models may identify this LNB as a **DP Twin**. This identification is OK).



**Note:** If you have current software, you might see **129°W** under **Port 3** on the Installation Summary screen.

- 11 Exit the **Installation Summary** screen and display the **Point Dish/Signal** screen. Make sure the signal strength bar is green and locked for the 119°W and 110°W satellites.
- Note:** If the signal strength bar is not green and locked, toggle the transponder number up one and then back down one.
- 12 Exit the **Point Dish/Signal** screen and follow your receiver user's guide instructions for taking a receiver software upgrade. If exiting the **Point Dish** screen does not start the upgrade process as described in the receiver user's guide, then turn off the receiver for at least 20 minutes (on most receivers) to allow the receiver to take a software upgrade.
- 13 Run **Check Switch** again and confirm reception for 129°W, as well as reception for the 119°W and 110°W satellites.



- 14 If installing an additional receiver:
- DISH Pro Plus - Connect the receiver and repeat steps 9 through 14 of this procedure.
  - DISH Pro or Legacy - Connect the receiver. Turn the receiver off to take a software download (takes about 20 minutes on most receivers). Run **Check Switch**. Make sure the summary screen shows reception from the 110°W, 119°W, and 129°W satellites. Note, on Legacy receivers, the DP Plus Twin will be identified as SW64. This indication is OK and does not indicate a problem.



## Connecting to a Switch

The DISH 1000 LNBFs can be connected to provide 119°W, 110°W, and 129°W satellite signals to a DISH Pro Plus 44 switch. In this installation, the DISH Pro Plus Twin LNBF **PORT 1** will default to the 119°W position, **PORT 2** will default to the 110°W position, and the **LNBF IN** port cannot be used. The DISH Pro LNBF supplies the 129°W signal directly to the switch. Refer to the instructions provided with the DISH Pro Plus 44 switch.

**Note:** The DISH Pro Plus Twin LNBF is NOT compatible with the DISH Pro 34 switch in any installation. To install the DISH Pro 34 switch, you must replace the DISH Pro Plus Twin LNBF with LNBF(s) compatible with the DISH Pro 34 switch.

## Special Downloading Instructions

Use these instructions directed by step 8 on page 5 to update dual-tuner receiver software.

**Note:** You will need a DISH Pro compliant splitter to complete this installation. The splitter is used only temporarily during receiver software upgrade and must not be left installed in the system.

1. Connect a single cable from either DISH Pro Plus Twin LNBF port (**PORT 1** or **PORT 2**) to the LNB port on a DISH Pro compliant splitter (not a DISH Pro Plus Separator). Then connect two cables from the receiver ports on the DISH Pro compliant splitter to **SATELLITE IN 1** and **2** ports on the receiver.



This DISH Pro splitter in this installation is used only temporarily for upgrading receiver software. This splitter must be removed and replaced with a DISH Pro Plus Separator following software upgrade or else the system will not work properly.

2. Display the **Point Dish/Signal** screen. Make sure the signal strength bar is green and locked for the 119°W or 110°W satellites on an odd transponder 11 or greater (for example, 11, 13, 15, etc.).

**Note:** If the signal strength bar is not green and locked, toggle the transponder number up one and then back down one.



Do not run **Check Switch** at this time. If you do run **Check Switch** by mistake, this situation can be corrected by completing the following:

- a. Disconnect all **SATELLITE IN** cables.
  - b. Run **Check Switch**.
  - c. When **Check Switch** finishes, exit the **Installation Summary** screen back to the **Point Dish** screen.
  - d. Reconnect all **SATELLITE IN** cables.
3. Exit the **Point Dish/Signal** screen and follow your receiver user's guide instructions for taking a receiver software upgrade. If exiting the **Point Dish/Signal** screen does not start the upgrade process as described in the receiver user's guide, then, turn off the receiver for at least 20 minutes (on most receivers) to allow the receiver to take a software upgrade.
  4. After the software upgrade is complete, remove the DISH Pro compliant splitter.
  5. Return to page 5 and finish the installation starting with step 9.

# Dish Pointing Angles

Use the tables below as follows:

1. Find the ZIP code for your location.
2. Find the row that contains the ZIP code or the first three digits of the ZIP code. For example, the correct row for ZIP code 80112 is 801XX.
3. Write down the number in the AZ column in the "Azimuth" blank on page 2.
4. Write down the number in the EL column in the "Elevation" blank on page 2.
5. Write down the number in the SK column in the "Skew" blank on page 2.

ZIP CODE RANGE	AZ	EL	SK
00001	118	15	71
00002	121	12	78
00003	118	17	69
00004	121	16	73
00006	122	15	76
00007	117	9	78
00008	141	26	83
00010	116	11	71
00011	122	17	74
00013	163	44	89
00019	162	42	89
00020	165	45	90
00022	157	43	85
00025	161	41	89
00028	161	43	88
00031	163	47	88
00032	165	48	89
00033	163	43	89
00034	157	41	86
00035	160	41	88
00037	158	42	86
00038	160	42	87
00039	157	42	86
00040	165	45	90
00044	163	44	90
00047	160	43	87
00048	159	43	86
00049	157	41	85
00050	157	41	85
00051	163	44	89
00052	163	44	89
00054	157	41	85
00055	157	41	86
00058	165	45	90
00065	162	43	88
00087	243	36	139
00097	243	38	142
00116	221	44	128
00119	224	43	130
00120	224	43	130
00124	221	42	127
00125	257	17	125
00126	256	19	126
00127	259	18	128
00128	254	19	126
00130	258	18	127
00132	257	18	126
00133	256	19	126
00134	259	18	128
00135	257	18	126

ZIP CODE RANGE	AZ	EL	SK
00136	258	18	126
00137	259	17	126
00138	259	17	127
00139	255	19	127
00140	256	19	127
00141	259	18	127
00145	256	19	127
00147	256	19	127
00148	259	17	126
00151	260	17	128
00152	248	26	131
00155	246	27	131
00156	246	27	130
00157	246	27	130
00159	254	21	130
00160	216	28	113
00161	214	28	113
00164	205	29	109
00165	207	29	110
00166	207	29	110
00168	255	20	127
00169	255	20	127
00170	254	20	126
00172	255	20	127
00173	255	20	127
00174	255	20	127
00176	255	20	127
00177	255	20	127
00179	255	20	127
00180	255	20	127
00181	254	20	127
00182	254	20	127
00183	255	20	127
00184	255	20	127
00185	254	20	127
00186	254	20	126
00187	254	20	126
00188	213	49	125
00189	213	49	124
00190	254	20	126
00191	254	20	126
00192	254	20	126
00195	154	36	86
00198	122	16	75
00199	180	50	100
00200	179	51	100
00201	183	50	103
00203	167	47	91
00205	166	46	91
00206	167	48	90

ZIP CODE RANGE	AZ	EL	SK
00214	165	49	89
00215	165	49	89
00216	166	49	90
00217	167	47	91
00218	161	43	88
00219	191	42	107
00222	240	36	137
00223	243	37	141
00225	243	36	139
00226	244	38	142
00228	244	37	142
00229	240	36	137
00232	240	38	139
00234	244	37	141
00236	168	39	93
00238	222	42	128
00241	213	28	112
00243	227	41	130
00246	175	34	97
00250	190	45	107
00252	191	48	108
00255	206	43	116
00257	156	38	86
00258	158	38	87
00259	159	40	87
00260	158	37	88
00266	178	42	99
00267	158	33	88
00268	161	36	90
00270	159	36	89
00276	177	37	98
00277	159	33	89
00278	158	38	87
00279	177	37	98
00280	163	44	89
00281	177	40	99
00282	178	40	99
00283	238	27	125
00284	252	20	126
00285	250	24	129
00286	245	30	133
00401	250	24	129
00501	252	23	130
00544	252	23	130
006XX	268	27	157
007XX	268	27	157
008XX	270	26	158
009XX	268	27	157
010XX	252	22	128
011XX	252	22	128

ZIP CODE RANGE	AZ	EL	SK
012XX	251	22	128
013XX	252	22	128
014XX	253	21	128
015XX	253	22	129
016XX	253	22	129
017XX	254	21	129
018XX	254	21	129
019XX	255	21	129
020XX	255	21	129
021XX	255	21	129
022XX	255	21	129
023XX	255	21	129
024XX	255	21	129
025XX	255	21	130
026XX	256	21	130
027XX	254	21	129
028XX	254	22	129
029XX	254	22	129
030XX	254	21	128
031XX	254	21	128
032XX	254	21	127
033XX	254	21	128
034XX	252	21	128
035XX	254	20	127
036XX	252	21	128
037XX	253	21	127
038XX	254	20	128
039XX	255	20	128
040XX	255	20	128
041XX	256	20	128
042XX	255	20	127
043XX	257	19	128
044XX	259	18	127
045XX	256	19	128
046XX	259	18	128
047XX	259	17	126
048XX	258	19	128
049XX	257	19	127
050XX	253	21	127
051XX	252	22	127
052XX	251	22	127
053XX	252	22	128
054XX	252	21	126
055XX	254	21	129
056XX	252	21	126
057XX	251	22	127
058XX	253	20	126
059XX	254	20	126
060XX	251	22	129
061XX	251	22	129

ZIP CODE RANGE	AZ	EL	SK
062XX	253	22	129
063XX	253	22	129
064XX	252	23	129
065XX	251	23	129
066XX	251	23	129
067XX	251	23	129
068XX	251	23	129
069XX	250	23	129
070XX	250	24	129
071XX	250	24	129
072XX	250	24	129
073XX	250	24	129
074XX	249	24	129
075XX	250	24	129
076XX	250	24	129
077XX	250	24	129
078XX	248	24	129
079XX	249	24	129
080XX	248	25	130
081XX	248	25	129
082XX	249	25	130
083XX	248	25	130
084XX	249	25	130
085XX	248	25	129
086XX	248	25	129
087XX	249	24	130
088XX	248	24	129
089XX	248	24	129
100XX	250	24	129
101XX	250	24	129
102XX	250	24	129
103XX	250	24	129
104XX	250	24	129
105XX	250	23	129
106XX	250	24	129
107XX	250	24	129
108XX	250	24	129
109XX	252	24	129
110XX	250	24	129
111XX	250	24	129
112XX	250	24	129
113XX	250	24	129
114XX	250	24	129
115XX	250	24	129
116XX	250	24	129
117XX	250	23	129
118XX	250	24	129
119XX	252	23	130
120XX	250	23	127
121XX	250	23	127
122XX	250	23	127
123XX	250	23	127
124XX	249	23	128
125XX	250	23	128
126XX	249	23	128
127XX	249	24	128
128XX	250	22	127
129XX	250	22	125
130XX	246	24	126
131XX	245	24	126
132XX	246	24	126
133XX	247	23	126
134XX	247	23	126

ZIP CODE RANGE	AZ	EL	SK
135XX	247	23	126
136XX	248	23	125
137XX	247	24	127
138XX	246	24	127
139XX	246	24	127
140XX	241	26	125
141XX	241	26	125
142XX	241	26	125
143XX	241	26	124
144XX	243	25	125
145XX	243	25	125
146XX	243	25	125
147XX	241	26	125
148XX	244	25	126
149XX	244	25	126
150XX	239	28	126
151XX	239	28	126
152XX	239	28	126
153XX	239	28	126
154XX	240	28	127
155XX	241	28	127
156XX	240	28	127
157XX	241	27	126
158XX	241	27	126
159XX	241	27	127
160XX	239	28	126
161XX	238	28	125
162XX	240	27	126
163XX	240	27	125
164XX	238	27	125
165XX	238	27	125
166XX	242	27	127
167XX	242	26	126
168XX	243	26	127
169XX	244	25	126
170XX	244	26	128
171XX	244	26	128
172XX	244	27	128
173XX	244	26	128
174XX	245	26	128
175XX	246	26	129
176XX	246	26	129
177XX	245	26	127
178XX	245	26	128
179XX	246	25	128
180XX	247	25	128
181XX	247	25	129
182XX	247	25	128
183XX	247	24	128
184XX	247	24	128
185XX	247	25	128
186XX	247	25	128
187XX	247	25	128
188XX	246	25	127
189XX	248	25	129
190XX	248	25	129
191XX	248	25	129
192XX	248	25	129
193XX	247	26	129
194XX	248	25	129
195XX	246	25	128
196XX	246	25	129
197XX	247	26	129

ZIP CODE RANGE	AZ	EL	SK
198XX	247	26	129
199XX	247	26	130
200XX	245	27	129
201XX	244	27	129
202XX	245	27	129
203XX	245	27	129
204XX	245	27	129
205XX	245	27	129
206XX	245	27	130
207XX	245	27	129
208XX	245	27	129
209XX	245	27	129
210XX	245	26	129
211XX	245	26	129
212XX	245	26	129
214XX	245	27	130
215XX	242	28	128
216XX	247	26	130
217XX	244	27	129
218XX	248	26	131
219XX	247	26	129
220XX	244	27	129
221XX	244	27	129
222XX	245	27	129
223XX	245	27	129
224XX	245	28	130
225XX	245	28	130
226XX	243	28	129
227XX	243	28	129
228XX	241	28	129
229XX	242	29	129
230XX	245	28	131
231XX	245	28	131
232XX	244	28	130
233XX	247	27	131
234XX	247	27	132
235XX	247	28	132
236XX	246	28	132
237XX	247	28	132
238XX	245	28	131
239XX	243	29	130
240XX	240	30	129
241XX	240	30	129
242XX	236	32	128
243XX	238	31	129
244XX	241	29	129
245XX	241	30	130
246XX	236	31	128
247XX	238	31	128
248XX	237	31	128
249XX	239	30	128
250XX	237	30	127
251XX	237	30	127
252XX	237	30	127
253XX	237	30	127
254XX	243	27	128
255XX	235	31	127
256XX	236	31	127
257XX	235	31	127
258XX	237	31	128
259XX	238	30	128
260XX	238	29	126
261XX	237	30	127

ZIP CODE RANGE	AZ	EL	SK
262XX	239	29	128
263XX	238	29	127
264XX	238	29	127
265XX	239	29	127
266XX	238	30	128
267XX	241	28	128
268XX	241	28	128
270XX	239	31	130
271XX	239	31	130
272XX	241	31	131
273XX	241	31	131
274XX	241	31	131
275XX	242	30	132
276XX	242	30	132
277XX	242	30	131
278XX	244	29	132
279XX	246	28	133
280XX	238	32	131
281XX	239	32	131
282XX	238	32	131
283XX	242	31	132
284XX	244	31	133
285XX	245	29	133
286XX	237	32	130
287XX	235	33	129
288XX	235	33	129
289XX	233	34	129
290XX	239	33	132
291XX	239	33	132
292XX	239	33	132
293XX	237	33	130
294XX	241	33	134
295XX	242	32	133
296XX	236	34	130
297XX	238	32	131
298XX	238	34	132
299XX	240	34	134
300XX	233	35	130
301XX	232	36	129
302XX	233	36	130
303XX	233	35	130
304XX	238	35	133
305XX	234	34	130
306XX	235	35	131
307XX	231	35	128
308XX	237	34	132
309XX	237	34	132
310XX	235	36	132
311XX	233	35	130
312XX	235	35	131
313XX	239	34	134
314XX	239	34	134
315XX	238	35	134
316XX	237	36	134
317XX	235	37	133
318XX	233	36	131
319XX	233	37	131
320XX	239	36	135
321XX	240	36	137
322XX	240	36	136
323XX	235	38	134
324XX	233	38	133
325XX	230	40	131

ZIP CODE RANGE	AZ	EL	SK
326XX	239	37	136
327XX	241	36	138
328XX	241	36	138
329XX	243	36	139
330XX	244	37	142
331XX	244	37	142
332XX	244	37	142
333XX	244	37	141
334XX	244	37	141
335XX	240	37	138
336XX	240	38	138
337XX	239	38	138
338XX	241	37	138
339XX	241	38	140
342XX	240	38	138
344XX	239	37	137
346XX	239	38	137
347XX	240	37	138
349XX	244	36	140
350XX	228	37	128
351XX	228	37	128
352XX	228	37	128
354XX	227	38	128
355XX	227	37	127
356XX	227	37	127
357XX	229	36	127
358XX	229	36	127
359XX	230	36	128
360XX	231	38	130
361XX	230	38	130
362XX	230	36	129
363XX	232	38	132
364XX	229	39	130
365XX	228	40	130
366XX	228	40	130
367XX	228	38	129
368XX	232	37	130
369XX	227	39	129
370XX	227	35	126
371XX	228	35	126
372XX	228	35	126
373XX	231	35	128
374XX	231	35	128
375XX	222	38	124
376XX	236	32	129
377XX	233	33	128
378XX	233	33	128
379XX	233	34	128
380XX	223	37	124
381XX	222	38	124
382XX	223	36	124
383XX	224	37	125
384XX	226	36	126
385XX	230	34	127
386XX	222	38	125
387XX	222	40	125
388XX	225	38	126
389XX	222	39	125
390XX	223	40	127
391XX	223	40	127
392XX	223	40	127
393XX	226	39	128
394XX	225	41	129

ZIP CODE RANGE	AZ	EL	SK
395XX	226	41	130
396XX	223	41	127
397XX	225	39	127
399XX	233	35	130
400XX	230	33	125
401XX	228	34	125
402XX	228	33	125
403XX	232	32	126
404XX	231	33	126
405XX	231	32	126
406XX	230	33	125
407XX	232	33	127
408XX	234	32	128
409XX	233	33	127
410XX	232	32	125
411XX	234	31	126
412XX	235	31	127
413XX	233	32	127
414XX	233	32	127
415XX	235	31	128
416XX	235	32	127
417XX	234	32	127
418XX	234	32	127
420XX	224	36	124
421XX	229	34	126
422XX	227	35	125
423XX	226	34	124
424XX	225	35	124
425XX	231	33	126
426XX	231	34	127
427XX	229	34	125
430XX	233	30	125
431XX	234	30	125
432XX	233	30	125
433XX	233	30	124
434XX	234	29	123
435XX	231	30	123
436XX	232	29	123
437XX	236	29	126
438XX	235	29	125
439XX	237	29	126
440XX	236	28	124
441XX	236	28	124
442XX	236	28	125
443XX	236	28	125
444XX	237	28	125
445XX	238	28	125
446XX	237	29	125
447XX	237	29	125
448XX	234	29	124
449XX	234	29	124
450XX	231	31	124
451XX	232	31	125
452XX	231	32	125
453XX	231	31	124
454XX	231	31	124
455XX	231	31	124
456XX	234	31	126
457XX	236	30	126
458XX	231	30	123
459XX	231	32	125
460XX	227	32	123
461XX	227	32	123

ZIP CODE RANGE	AZ	EL	SK
462XX	227	32	123
463XX	225	31	121
464XX	225	31	120
465XX	227	31	121
466XX	227	31	121
467XX	228	31	122
468XX	228	31	122
469XX	228	31	122
470XX	230	32	124
471XX	228	33	124
472XX	228	32	124
473XX	229	31	123
474XX	227	33	123
475XX	226	34	123
476XX	226	34	123
477XX	225	34	123
478XX	225	33	122
479XX	226	32	122
480XX	233	28	122
481XX	232	29	122
482XX	233	28	123
483XX	233	28	122
484XX	232	28	122
485XX	232	28	122
486XX	230	28	120
487XX	232	28	121
488XX	230	29	121
489XX	230	29	121
490XX	228	30	121
491XX	227	31	121
492XX	231	29	122
493XX	228	29	120
494XX	226	30	120
495XX	228	29	120
496XX	227	28	119
497XX	230	27	119
498XX	224	28	117
499XX	221	28	115
500XX	211	35	115
501XX	212	34	116
502XX	211	34	116
503XX	211	35	116
504XX	212	33	115
505XX	210	34	114
506XX	213	33	116
507XX	215	33	116
508XX	210	36	115
509XX	211	35	116
510XX	206	35	113
511XX	206	35	113
512XX	206	34	112
513XX	208	34	113
514XX	208	35	114
515XX	208	36	114
516XX	209	36	115
520XX	217	33	117
521XX	215	32	116
522XX	216	33	117
523XX	216	33	117
524XX	216	33	117
525XX	214	35	117
526XX	216	34	118
527XX	218	33	118

ZIP CODE RANGE	AZ	EL	SK
528XX	218	33	118
530XX	222	30	118
531XX	222	31	119
532XX	222	31	119
534XX	224	31	119
535XX	219	32	118
537XX	220	31	118
538XX	217	32	117
539XX	219	31	117
540XX	213	31	114
541XX	222	29	117
542XX	223	29	118
543XX	223	29	117
544XX	218	30	116
545XX	218	29	115
546XX	217	31	116
547XX	215	31	115
548XX	215	30	114
549XX	221	30	117
550XX	212	31	114
551XX	211	31	113
553XX	210	32	113
554XX	211	31	113
555XX	210	32	113
556XX	216	28	113
557XX	212	29	112
558XX	213	29	113
559XX	214	32	115
560XX	210	33	114
561XX	207	33	112
562XX	206	32	112
563XX	208	31	112
564XX	208	31	111
565XX	204	31	110
566XX	208	29	111
567XX	203	30	109
570XX	204	34	111
571XX	205	34	112
572XX	204	33	110
573XX	202	35	110
574XX	199	33	109
575XX	197	35	108
576XX	194	34	107
577XX	191	36	106
580XX	202	31	109
581XX	203	31	109
582XX	201	30	108
583XX	198	31	107
584XX	199	32	108
585XX	194	33	106
586XX	191	33	105
587XX	193	31	105
588XX	189	32	103
590XX	181	35	100
591XX	181	36	100
592XX	185	32	102
593XX	186	34	103
594XX	175	34	97
595XX	177	33	99
596XX	174	35	97
597XX	174	36	97
598XX	170	35	95
599XX	169	34	94

ZIP CODE RANGE	AZ	EL	SK
600XX	223	31	119
601XX	223	32	119
602XX	223	31	120
603XX	223	31	120
604XX	223	32	120
605XX	223	32	120
606XX	223	31	120
607XX	223	31	120
609XX	223	32	121
610XX	220	32	118
611XX	220	32	119
612XX	218	33	118
613XX	221	33	119
614XX	219	34	119
615XX	220	33	119
616XX	221	33	119
617XX	222	33	120
618XX	224	33	121
619XX	223	33	121
620XX	220	35	121
622XX	221	35	121
623XX	217	35	119
624XX	223	34	122
625XX	222	34	121
626XX	220	34	120
627XX	220	34	120
628XX	223	35	122
629XX	223	36	123
630XX	219	36	121
631XX	220	35	121
633XX	218	36	120
634XX	216	35	118
635XX	214	35	117
636XX	219	36	121
637XX	221	36	122
638XX	222	37	123
639XX	220	37	122
640XX	212	37	117
641XX	211	37	117
644XX	210	36	116
645XX	210	37	116
646XX	212	36	117
647XX	211	38	118
648XX	212	39	119
649XX	211	37	117
650XX	216	37	119
651XX	216	37	119
652XX	215	36	119
653XX	213	37	118
654XX	217	37	120
655XX	217	37	120
656XX	214	38	120
657XX	215	38	120
658XX	214	38	119
660XX	210	38	116
661XX	210	37	117
662XX	210	37	117
664XX	207	38	115
665XX	207	38	115
666XX	209	38	116
667XX	211	39	117
668XX	208	39	116
669XX	204	38	113

ZIP CODE RANGE	AZ	EL	SK
670XX	205	40	115
671XX	205	40	115
672XX	206	40	115
673XX	209	39	117
674XX	205	39	114
675XX	202	40	113
676XX	201	39	112
677XX	198	40	110
678XX	199	41	112
679XX	198	42	111
680XX	206	36	113
681XX	207	36	114
683XX	206	37	114
684XX	206	37	114
685XX	206	37	114
686XX	204	36	112
687XX	203	36	112
688XX	201	37	111
689XX	201	38	112
690XX	198	39	110
691XX	196	38	109
692XX	197	37	109
693XX	192	38	107
700XX	225	42	129
701XX	225	42	129
703XX	223	43	129
704XX	224	42	129
705XX	220	43	127
706XX	219	44	126
707XX	222	42	128
708XX	222	42	128
710XX	217	42	124
711XX	216	42	123
712XX	220	41	125
713XX	220	42	126
714XX	218	43	125
716XX	219	40	124
717XX	217	41	123
718XX	215	41	122
719XX	216	41	122
720XX	218	39	123
721XX	218	39	123
722XX	218	40	122
723XX	221	38	124
724XX	220	38	123
725XX	218	38	122
726XX	215	39	121
727XX	213	40	120
728XX	215	40	121
729XX	213	40	120
730XX	207	42	117
731XX	207	42	117
733XX	210	47	121
734XX	209	43	118
735XX	206	43	116
736XX	203	43	115
737XX	205	41	115
738XX	202	42	114
739XX	198	42	112
740XX	209	41	117
741XX	209	41	118
743XX	211	40	118
744XX	211	41	119

ZIP CODE RANGE	AZ	EL	SK
745XX	211	42	119
746XX	208	41	116
747XX	212	42	120
748XX	209	42	118
749XX	213	41	120
750XX	210	44	120
751XX	211	44	120
752XX	210	44	120
753XX	210	44	120
754XX	211	43	120
755XX	214	42	122
756XX	215	43	122
757XX	213	44	122
758XX	213	44	122
759XX	216	44	124
760XX	209	44	119
761XX	209	44	119
762XX	208	44	119
763XX	206	44	117
764XX	207	45	118
765XX	210	46	121
766XX	210	45	121
767XX	210	45	121
768XX	206	47	118
769XX	204	47	117
770XX	215	46	124
772XX	215	46	124
773XX	215	45	124
774XX	214	46	124
775XX	216	46	125
776XX	217	45	125
777XX	217	45	125
778XX	213	46	122
779XX	212	47	123
780XX	209	48	121
781XX	210	48	122
782XX	209	48	121
783XX	212	49	124
784XX	213	49	124
785XX	213	50	125
786XX	210	47	121
787XX	210	47	121
788XX	206	49	119
789XX	212	46	123
790XX	199	44	113
791XX	199	44	112
792XX	202	44	114
793XX	199	46	113
794XX	200	46	113
795XX	204	46	116
796XX	204	46	114
797XX	200	48	114
798XX	196	50	112
799XX	192	49	109
800XX	190	41	106
801XX	191	41	107
802XX	190	41	106
803XX	190	41	106
804XX	188	41	105
805XX	190	40	106
806XX	191	40	106
807XX	194	39	108
808XX	193	41	108

ZIP CODE RANGE	AZ	EL	SK
809XX	191	42	107
810XX	194	42	108
811XX	189	43	106
812XX	189	42	106
813XX	185	44	103
814XX	185	43	104
815XX	183	42	103
816XX	186	41	104
820XX	190	39	105
821XX	177	37	99
822XX	190	38	105
823XX	185	39	103
824XX	181	37	101
825XX	181	38	101
826XX	186	38	103
827XX	188	36	104
828XX	184	36	102
829XX	180	40	100
830XX	177	38	99
831XX	179	39	99
832XX	175	39	97
833XX	171	39	95
834XX	175	38	97
835XX	166	36	93
836XX	167	38	93
837XX	168	39	93
838XX	166	34	93
840XX	178	41	99
841XX	177	41	98
842XX	176	41	98
843XX	176	40	98
844XX	176	41	98
845XX	181	43	101
846XX	177	43	99
847XX	177	45	98
850XX	181	49	100
852XX	181	49	101
853XX	178	49	99
855XX	184	49	103
856XX	184	50	103
857XX	183	50	103
859XX	184	48	103
860XX	180	47	101
863XX	179	48	100
864XX	176	47	97
865XX	184	46	103
870XX	189	46	107
871XX	190	46	107
872XX	190	46	107
873XX	186	46	104
874XX	186	45	104
875XX	190	45	107
877XX	192	44	108
878XX	189	47	106
879XX	190	48	107
880XX	189	49	107
881XX	196	46	111
882XX	196	47	112
883XX	193	47	109
884XX	195	44	110
885XX	192	49	109
889XX	173	47	95
890XX	172	46	95

ZIP CODE RANGE	AZ	EL	SK
891XX	173	47	96
893XX	171	43	95
894XX	165	43	91
895XX	164	43	90
897XX	164	44	90
898XX	170	41	94
900XX	168	49	92
902XX	168	49	92
903XX	168	49	92
904XX	168	49	91
905XX	168	49	92
906XX	168	49	92
907XX	168	49	92
908XX	168	49	92
910XX	168	49	92
911XX	168	49	92
912XX	168	49	92
913XX	168	49	91
914XX	168	49	91
915XX	168	49	92
916XX	168	49	92
917XX	169	49	92
918XX	168	49	92
919XX	172	51	94
920XX	171	50	93
921XX	171	50	93
922XX	173	49	95
923XX	170	49	93
924XX	170	49	93
925XX	170	49	93
926XX	169	49	92
927XX	169	49	92
928XX	169	49	92
930XX	167	49	91
931XX	166	49	90
932XX	165	47	90
933XX	167	48	91
934XX	163	48	89
935XX	168	48	92
936XX	165	46	90
937XX	165	46	90
938XX	165	46	90
939XX	162	46	87
940XX	160	45	87
941XX	159	45	86
942XX	161	44	88
943XX	160	45	87
944XX	160	45	87
945XX	160	45	87
946XX	160	45	87
947XX	160	45	87
948XX	160	45	87
949XX	159	45	86
950XX	161	46	87
951XX	160	46	87
952XX	162	45	88
953XX	163	45	89
954XX	159	44	86
955XX	157	42	85
956XX	161	44	88
957XX	162	44	88
958XX	161	44	88
959XX	161	43	88

ZIP CODE RANGE	AZ	EL	SK
960XX	159	42	87
961XX	163	43	89
967XX	101	41	33
968XX	100	40	33
970XX	157	37	87
971XX	156	37	86
972XX	157	37	87
973XX	156	37	86
974XX	156	39	86
975XX	157	40	86
976XX	161	40	88
977XX	161	39	89
978XX	163	37	91
979XX	166	38	92
980XX	157	35	88
981XX	156	34	87
982XX	156	34	88
983XX	156	35	87
984XX	156	35	87
985XX	155	35	87
986XX	157	36	87
988XX	160	34	90
989XX	160	36	89
990XX	164	34	92
991XX	163	34	91
992XX	164	34	92
993XX	162	36	91
994XX	165	36	92
995XX	119	15	71
996XX	118	15	71
997XX	119	11	76
998XX	136	22	81
999XX	139	25	82

## Radio Interference

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Modifying this receiver may void your authority to use the equipment. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

If none of the remedies stops the radio interference, you should contact a licensed radio/television technician, your satellite dealer or call the Customer Service Center at 1-800-333-3474, for assistance.

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