

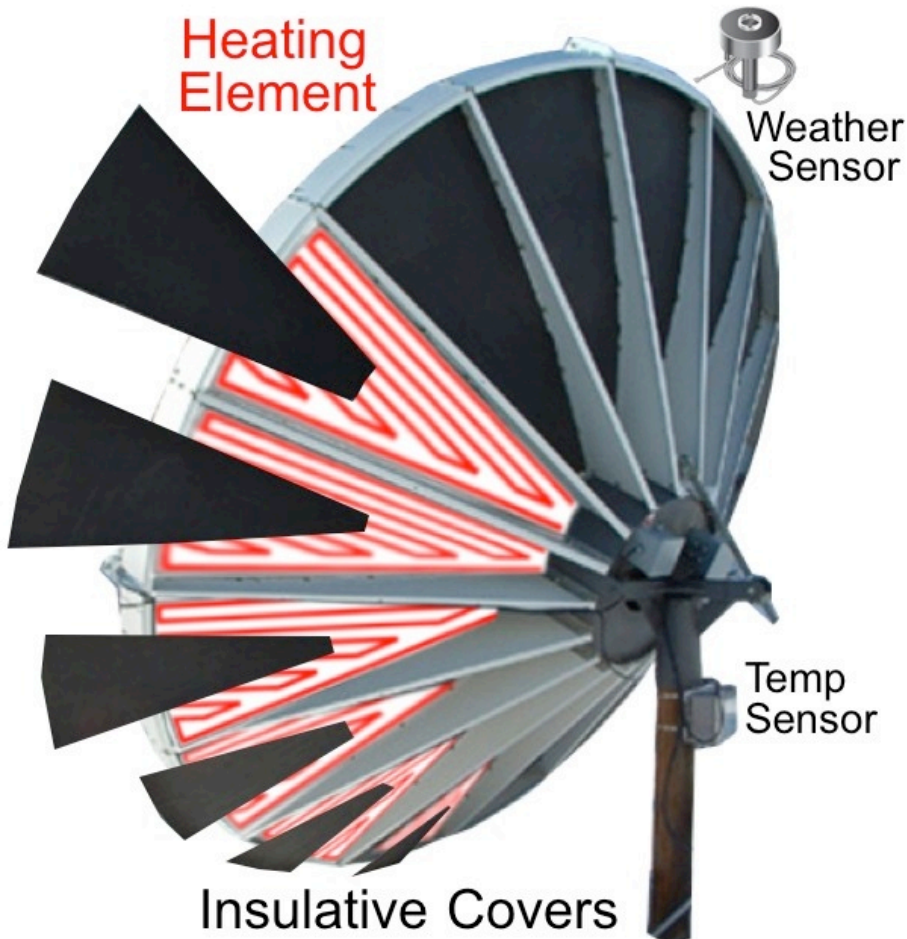


**DAWNco**

## HEATsat stops satellite signal outages

### Satellite Antenna Deicing System

with HEATER element that is applied to reflector back, and SENSORS for precipitation and temperature, and INSULATIVE BACK COVER for efficient heating.



Prevent signal outages caused by snow accumulation in a satellite “dish” antenna. Utilize DAWNco’s electric HEATING system for any satellite antenna in the 2.4meter to 9.3 meter size range. The heating system kit is customer installed on the back side of the satellite antenna. Customer chooses the kit for the make a size of antenna to be protected, and chooses lower-half-only heating, or full-reflector heating. Kit includes: specialized heat tape sized for dish, sensors for precipitation and temp, electric power junction box, wiring harness, and installation instructions. Customer must provide proper electrical power to dish, and installation of heater kit when outside temperatures are 50 degree F or higher. Made to order and not returnable. Customer specify satellite antenna make and diameter, existing feed type, and power type (1phase or 3 phase).

HEATsat deicing systems provide high performance and reliability with exceptionally low purchase and operating costs. All systems include Snow Switch sensors and controls for reliable automatic control and SafeHeat foil-tape heaters for main reflector, sub-reflector and feed heaters. Interconnecting wiring is also included for a system, ready to connect to the customer provided branch circuit. A unique HEATsat deicing system is engineered for each antenna to ensure optimal performance and installation simplicity. HEATsat deicing systems are adaptable to practically any size reflector, with systems deployed in the field from 2.4 to 10 meters. Heater configurations are specifically engineered to each antenna model based on the mechanical characteristics, site environmental conditions, and the level of deicing required. System voltages can be specified per available power from 100 VAC to 600 VAC. Typical nominal power densities include 40 watts per square foot for deicing up to 140 watts per square foot for anti-icing. SafeHeat foil-tape heaters use high temperature and mechanically robust Tefzel insulation to ensure a long trouble-free heater service life of at least 15 years. For heat transfer and ease of installation, the CSA Certified and NRTL Recognized heaters are sandwiched between layers of self-adhesive aluminum foil. HEATsat deicing systems are designed to be field installable without specialized tools to install and include weather-resistant insulation and electrical connectors.



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### Snow Switch Sensor and Controls

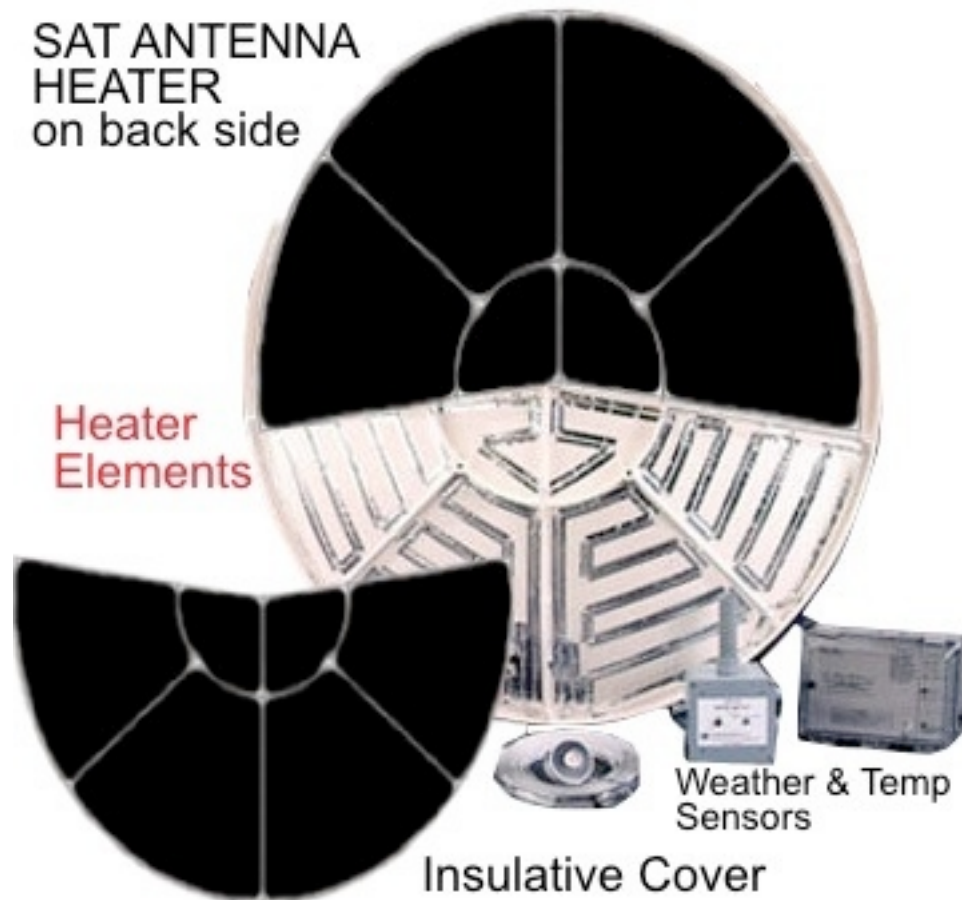
All HEATsat deicing systems include a Snow Switch sensing and control solution. Snow Switch sensors and controls have provided over 40 years of dependability and experience. Systems up to 16 amps typically use an LCD-7 controller, integrating sensing and power switching for cost effective deicing of small applications. Larger systems will use a CIT-1 aerial sensor in conjunction with an APS "C" series control panel and may include one or more SC-40C satellite contactors. Each APS-4C control panel and SC-40C satellite contactor includes integral ground fault detection and can switch up to 50 amps of direct heater load.

### Field Installable

HEATsat deicing systems are designed to be field installable. Each deicing system is provided with SafeHeat heater tape uniquely designed for each antenna along with a template which provides the pattern for laying out the tape. The self-adhesive foil tape used in the SafeHeat heater tapes applies easily to the back of the clean antenna. Then a spray-on adhesive is used to secure the pre-cut insulating backcover which improves the heating properties of the system while protecting the SafeHeat heater tapes. Clean the antenna back surface. Transfer the pattern. Peel and stick the SafeHeat heater tapes. Spray and secure the backcover. Four easy steps!

### Increase Signal Availability Up To 2% a Year

In today's telecommunications markets, a high degree of up-time is demanded. It is effectively impossible to market voice or data services without an up-time guarantee approaching 100%. We all know this is impossible, yet billions of dollars are invested in modern telecommunications systems trying to achieve this degree of service availability. Snow, ice, and freezing rain collecting on the surfaces of an antenna reflector changes the reflector's mechanical characteristics. These changes can disrupt the signals being broadcast and received, leading to signal break-up or loss. Compared to the high level of complexity involved in possible down-time issues from software and hardware issues affecting signal availability, managing the impact of snow and ice involves the addition of a simple, field installable HEATsat deicing system with low installation costs and operational costs kept reasonable through efficient, time-proven Snow Switch sensors and controls.





**Typical power draw requirements - HEATsat Delce Systems:**

DISH TYPE	3-Phase 208 draw		1-Phase 120v draw		1-Phase 240v draw		1-Phase 220v (nonUSA)	
	Half	Full	Half2	Full4	Half22	Full43	Half3	Full3
1.2m fiber HALF COV, Prodelin	N/A	N/A	5 amp	6 amp	2 amp	3 amp	2 amp	3 amp
1.2m fiber FULL COV, Prodelin		N/A	22 amp	16 amp	14 amp	8 amp	17 amp	N/A
1.8m fiber HALF COV, Prodelin	10 amp	N/A	11 amp	22 amp	6 amp	11 amp	5 amp	11 amp
1.8m fiber FULL COV, Prodelin	11A Single PH	N/A	22 amp	N/A	14 amp	28 amp	17 amp	N/A
2.4m fiber Half COV, Prodelin	10 amp	16 amp	N/A	N/A	17 amp	61 amp	17 amp	34 amp
2.4m fiber FULL COV, Prodelin	10 amp	20 amp	N/A	N/A				
3.7m fiber HALF COV, Prodelin	9 amp	N/A	23 amp	N/A	N/A	N/A	N/A	N/A
3.7m fiber FULL COV, Prodelin	N/A	18 amp	N/A	N/A	N/A	N/A	N/A	N/A
3.8m alum HALF COV, DH	N/A	11 amp	N/A	N/A	N/A	N/A	N/A	N/A
3.8m alum FULL COV, DH	11 amp	N/A	N/A	N/A	N/A	N/A	N/A	30 amp
4.2m alum HALF COV, DH	N/A	22 amp	N/A	N/A	N/A	N/A	N/A	N/A
4.2m alum FULL COV, DH	12 amp	25 amp	N/A	N/A	N/A	N/A	N/A	N/A
4.5m alum HALF COV, DH	10 amp	16 amp	22 amp	N/A	11 amp	25 amp	11 amp	27 amp
4.5m alum FULL COV, DH	10 amp	21 amp	N/A	N/A	14 amp	28 amp	16 amp	32 amp
5m alum HALF COV, DH	N/A	18 amp	N/A	N/A	14 amp	31 amp	N/A	N/A
5m alum FULL COV, DH	14 amp	28 amp	N/A	N/A	18 amp	35 amp	N/A	N/A
3.8m alum HALF COV, Patriot								
3.8m alum FULL COV, Patriot								
4.5m alum HALF COV, Patriot								
4.5m alum FULL COV, Patriot								
3.8m fiber HALF COV, Comtech								
3.8m fiber FULL COV, Comtech								
5.0m fiber HALF COV, Comtech								
5.0m fiber FULL COV, Comtech								



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EXAMPLE: Typical Installation on a 3.8 meter aluminum  
16-petal satellite antenna

Instruction Manual # 20559 for Deice System for 3.8 Meter Antenna, half, 208v,  
3Phase (PAT)

Materials Supplied

Before disposing of the packing material, verify the inclusion of items below in the  
packing list for the system purchased. Immediately notify customer service of any  
discrepancy or shipping damage.

Quantity

1 1 6 2 8 1 2 1 3 1 25 ft 1

1 30 1 1 1 1

Part Number

19910 18688 19026 21028 18684 19887 18699 18709 18703 18719 18323 20560

20559 18771 20552

19336 19337 19338

Packing List

Description

APS-4, 208Vac CIT-1 Junction Box Assembly 36 ft. heater tape 34 ft. heater tape  
Heater Tape Power Cable Power Distribution Junction Box Power Cable Wire Nut,  
Blue Wire Nut, Red Wire Nut, Gray Foil Tape (for patching) Heater Tape Layout  
Diagram/Template Manual, Instruction Tie Wraps Feedhorn Heater  
Sensor Mounting Kit Junction Box Mounting Kit APS Mounting Kit

Before you get started here is a list of tools and supplies needed to completely  
mount this deice system.

TOOLS:

Slotted standard screw driver (small and large) Clean Cloth Rags or Paper Towels

Ruler or Measuring Device Aerosol cooling spray

Phillips Screw Driver (small and large) Isopropyl (Rubbing) Alcohol (90%) Knife 2 oz.  
of water

NOTE: Manufacturer suggests mounting both the junction box and APS-4 on the antenna  
post. The CIT-1 should be mounted out along the feed arm or on the front, side or top of the  
reflector. Mount the sensor securely in upright position above or far enough away from the  
reflector so as not to be protected from the falling snow. Mounting in the front or on the side  
will provide service access.

Read these instructions carefully and follow all procedures for installation of system  
components. Electrical wiring must be performed in accordance with the appropriate  
electrical codes.



## EXAMPLE: Typical Installation on a 3.8 meter aluminum 16-petal satellite antenna

### CLEANING THE REFLECTOR

1. If the back surface of the antenna is very dirty (i.e., visibly darkened with dirt or film), first wash it with soap and water or other cleaning agent and then rinse thoroughly with water and allow it to dry before cleaning with isopropyl alcohol.
2. Wipe clean the lower half of the back surface of the antenna using copious amounts of isopropyl alcohol and paper towels. The 90 % (or better) isopropyl alcohol solution will produce the best results.

NOTE: It is important that the alcohol always be used as the last cleaning step because the rear antenna surface must not have any residue from other cleaning agents on it prior to the point of applying the heater tape. Isopropyl alcohol will evaporate completely leaving no residue, whereas other cleaning agents may leave a film of residue which could potentially affect the ability of the tape to properly adhere to the antenna surface.

NOTE: A minimum ambient temperature of 45 deg. F is required for the tape to achieve proper bonding. Note that the ambient temperature requirement applies to both the surrounding air as well as the dish surface.

### INSTALLING DE-ICE SYSTEM COMPONENTS UNDER DIFFICULT

**ENVIRONMENTAL CONDITIONS** Certain environmental conditions such as cold temperatures and high winds will pose problems when installing system components. These conditions will not only be unpleasant for the installer, but some system components, such as the heater tape, may not be able to be applied properly.

If the ambient temperature of the antenna is too low to achieve proper tape bonding, a heated tent can be put together using clear plastic sheet and a propane-fired portable heater. A sheet thickness of 0.004" is sufficient for constructing a tent. However, high winds and cold temperatures may impede the construction of the tent. If wind velocities exceed the range of 10 to 15 m.p.h., the force on the plastic exerted by the wind will make it very difficult to drape and appropriately anchor the sheets. If adhesive tape is being used to fasten the plastic sheets to the antenna or other fixed surfaces, or to attach sections of sheets together, cold outdoor temperatures may have the same adverse affect on bonding as with the heater tape. If adhesion is a problem in the tape used to anchor the plastic sheets, use weighted objects to hold the plastic in place where appropriate.

For antenna heater systems with backcovers (optional), windy conditions may also impede the back cover installation. Again, the force of high winds may make manipulation and attachment of the backcover difficult. If a tent has been constructed, it can act as a wind break during attachment of the backcover, if it is being attached inside the tent.





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## EXAMPLE: Typical Installation on a 3.8 meter aluminum 16-petal satellite antenna

**TAPING ON THE HEATERS.** Once the back surface of the antenna is thoroughly clean and dry, the heater tape is ready to be applied.

All adhesives require appropriate environmental conditions to achieve conformant to the bonding surface and proper curing. The adhesive on the heater tape is no exception. The heater tape adhesive is formulated to conform and bond at lower temperatures, but application in too cold of an ambient temperature will prevent the adhesive from conforming to the antenna surface, resulting in a poor tape bond. A minimum ambient temperature of 45 deg. F is required for the tape to achieve proper bonding. Note that the ambient temperature requirement applies to both the surrounding air as well as the dish surface. Tape bonding conditions will improve the closer ambient temperature is to room temperature (temps above room temp are also favorable).

3. Refer to the layout diagram as shown in Figure 1 for the appropriate spacing pattern for the tape. A layout template is supplied to assist with locating key points and bends on the antenna panel surface where the heater tapes are to be applied. Marking these locations will assist in proper placement of the heater tape. It may be helpful to tape the template to the back of the antenna panels when marking. Each template dot represents a point to be marked; punch through the paper at each dot location to penetrate the template for marking the antenna surface. Do a resistance test on the center conductor of each heater tape using a DVM (digital volt meter). See schematic of ohmic value of heater tape.

4. Starting with one end of a heater tape, apply it to the back of the antenna by removing the adhesive liner strip as you progress. Press firmly on the tape for application to the antenna surface, smoothing out wrinkles in the tape as it is applied. Use care when handling the adhesive surface; excessive handling and contamination of the adhesive will reduce the ability of the tape to stick to the reflector!

5. Carefully cut or tear the tape at the point a turn or bend is to be made. A knife may be required for this step. Use caution not to cut into the protective braid of the heater element. To dress out the ends of the heater tape, apply 2 pieces of aluminum tape (#18323) approximately 3" long in an AX@ pattern (refer to Fig. 1). Finish the end by applying one more piece of tape 3" long perpendicular to the heater tape. This dressing is done for stress relief and tear resistance.

**CAUTION:** Use care in smoothing out the wrinkles. It is recommended that this process be done using fingers. Smoothing the wrinkles with objects (particularly, sharp or pointed objects) other than fingers increases the risk of tearing the top Aluminum lamination, which can expose the grounding braid on the internal heater wire along the ridge in the center of the tape. Exposure can keep the heater wire from making good contact with the antenna surface, reducing thermal transfer from the heater wire. If a tear occurs and the grounding braid is exposed, the tear can easily be repaired. Cut a section of spare Aluminum tape (18323) the length of the tear, peel off the adhesive liner, and apply the Aluminum strip directly over the existing tape where the tear occurred.

### **INSTALLING THE FEEDHORN HEATER**

6. Take the feedhorn heater band and put it around the scalar ring on the feedhorn (largest diameter). Pull the heater band tie wrap tight to secure the feedhorn heater. Run the feedhorn power supply cable into the power distribution junction box. Secure the cable to one of the feedhorn support arms with tie wraps spaced approximately 24" apart along the length of the support arm.



## MOUNTING THE SENSOR AND CONTROL BOXES

The mounting bracket kits for the APS-4 box, distribution junction box, and the sensor box are designed to be a universal mount to fit a wide range of applications. The APS-4 box and the junction box brackets fit round king posts with an outer diameter from 2 inches up to 24 inches. For square king posts, the brackets fit a width of 12 inches up to 18 inches. The bracket for the sensor box fits round feed arms with an outer diameter from 2 inch to 33 inches, and square feed arms d inch to 23 inch wide. It is possible that these brackets may work for other sizes/shapes of king posts and feed arms. NOTE: The mounting brackets for the APS-4 box and the wiring junction box can only be mounted to the boxes one way. The brackets should be mounted to the boxes with the supplied hardware before trying to mount them to the king posts. If the brackets are mounted to the king post before being mounted to the boxes, they may bend and make it impossible to mount the boxes correctly. Before mounting the bracket to the box, make sure that the post clamp is in the approximate final position. When all the mounting hardware is tightened down to hold the box, it will also limit the movement of the clamp.

7. Refer to the APS-4 instruction manual for basic installation and operation. After mounting the brackets to the APS-4 control unit (#19910), and power distribution junction box (#19887), they are ready to mount to the king post. The APS-4 box is mounted in the horizontal position (APS-4 label text horizontal). Mount the distribution junction box so the incoming power cord enters the top of the box. If this is not possible, then it should be mounted such that the fewest number of cords are coming out of the top.

8. The CIT-1 snow sensor junction box (#18688) mounts in a similar fashion; choose one of the locations suggested on page 1. The mounting kit is designed so that the box mounts to the big plate, the smaller plate mounts to the feed arm with pipe clamps, and the two plates are held together with the pivot screw; this will allow the sensor moisture cup to catch falling snow. The orientation of the sensor box and the mounting plate so that the pivot screw and the sensor are on the Atop@. First, the sensor box should be mounted to its plate with the pivot screw still loose. Second, the whole assembly should be mounted to the feed arm so that the sensor points straight up. The pipe clamps should be tightened so that the assembly will not slide from the selected position. Do not tighten the clamps too much and crush the arm. Using the supplied tie wraps, secure the sensor cable along the support arm or along the reflector supports back to the junction box. Space the tie wraps approximately 24" apart. Refer to the CIT-1 instruction manual for basic installation and operation. Finally, select the final position for the sensor assembly, and tighten the pivot screw. At this point, all the hardware and clamps should be secure so that nothing will unintentionally move or fall.

9. Run the main power feed cable (#18699) from the APS-4 controller to the power distribution junction box.

10. Connect the heater power cables (#18684) to the heater tape as shown in Figure 2, and run the other ends into the power distribution junction box. Connect wires inside the junction box, following the appropriate wire color code (i.e., black to black, white to white, and green to green). Secure any excess power cables to the antenna pedestal using tie wraps.

11. Hook up incoming power to the APS-4 controller (208 V AC 3 Phase) using power supply cable (#18699).



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EXAMPLE: Typical Installation on a 3.8 meter aluminum  
16-petal satellite antenna

SYSTEM TEST AND CHECKOUT

12. To test and operate the system, first energize the power source. Begin the test by filling the moisture cup on the CIT-1 sensor with water. This will activate the moisture sensing circuit inside the control. Set the hold on timer on the APS-4 control panel so that it is not on zero hours (an approximate 30 minute setting is sufficient for this test).

13. Next, use the Aerosol cooling spray to cool the ambient temperature sensor on the CIT-1 (a brown tube protruding from the bottom of the unit's housing). Do this for approximately 20 seconds to sufficiently cool the temperature sensor. This will give it time to react to the temperature change. When the ambient temperature is nominally above 38 deg. F, the CIT-1 sensor is in an idle state. Once the ambient temperature sensor detects temperature below the 38 deg. F setpoint, and moisture is present in the moisture cup, the sensor signals the APS-4 control panel to close its internal contactor, energizing the heaters. After several minutes, the heater tape should become noticeably warmer to the touch. If either the ambient temperature sensor on the CIT-1 reaches 38 deg. F or above, or, moisture is no longer present in the moisture cup, the APS-4 control panel's hold-on timer will initiate a real-time count down cycle according to the timer's setting. The internal contactor will then remain closed (keeping the heaters energized) only for the duration of the hold-on cycle. Once the CIT-1 sensor detects ambient temperature above 38 deg. F, and/or moisture is absent from the moisture cup, there are several ways to halt this test before the hold-on cycle expires: 1) press the heater cycle button on the APS-4, 2) rotate the hold-on timer's knob counter-clockwise to zero hours, or 3) disconnect the power source at the load center or breaker box.





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## EXAMPLE: Typical Installation on a 3.8 meter aluminum 16-petal satellite antenna

### Installation Instructions for Manufacturer Antenna De-ice System Backcover

This backcover is designed specifically to fit your reflector. The pre-cut foam sections will be installed directly over the heater tape on the rear surface of the reflector, using the adhesive provided. The heater tape must first be in place on the rear surface of the reflector before installing the backcover. Read these instructions through before installation.

#### Materials Supplied

Before disposing of the packing material, verify that the appropriate foam sections, adhesive, and caulk have been included. Immediately notify customer service of any discrepancy or shipping damage.

#### Tools & Supplies Required:

Caulking Gun Clean Cloth Rags or Paper Towels (optional - see below) 90%

Isopropyl (Rubbing) Alcohol (optional - see below)

No special tools are required to install the backcover, although isopropyl alcohol and cleaning cloths (or paper towels) may be needed for cleaning the reflector's rear surface prior to backcover installation. Since the surface had previously required cleaning to apply the heater tapes, cleaning it may not be necessary if it has remained clean.

#### Pre-installation Instructions

Before proceeding with the backcover installation, verify that the resistance test has been conducted successfully on the heater tapes. This is important because in the event a heater tape requires replacement, it is easier to replace it before the backcover has been installed.

It is recommended that a "dry fit" of the sections be done on the back of the reflector surface prior to using the adhesive. This will help arrange the sections and identify them for proper location. Keep moisture and debris away from the surface of the foam that will face the reflector.

NOTE: A minimum ambient temperature of 45 deg. F is required for the backcover adhesive to achieve proper bonding. Note that the ambient temperature requirement applies to both the surrounding air as well as the dish surface. Do not allow the aerosol adhesive container to freeze prior to application. Read directions on adhesive container before using.

#### Installation

1) Refer to the figure showing the antenna coverage. Each section of the backcover is to be applied to the reflector as shown. Make sure the reflector surface is first clean and dry. Work with only one section at a time; spray the aerosol adhesive on the back surface of the reflector where the foam section is to be applied. Once coverage of the section with adhesive is complete, place the foam over the adhesive. If the adhesive does not tack immediately to the reflector surface, peel the foam section away from the reflector and immediately re-apply it. Environmental conditions such as high humidity may affect the length of tack time for the adhesive.

2) Repeat the application process until all of the foam sections are in place.

Manufacturer #19930 Page 1 of 2 Sep 9, 2003) Once the foam sections are all applied, use the caulk provided to seal the outside edges and seams for each section.



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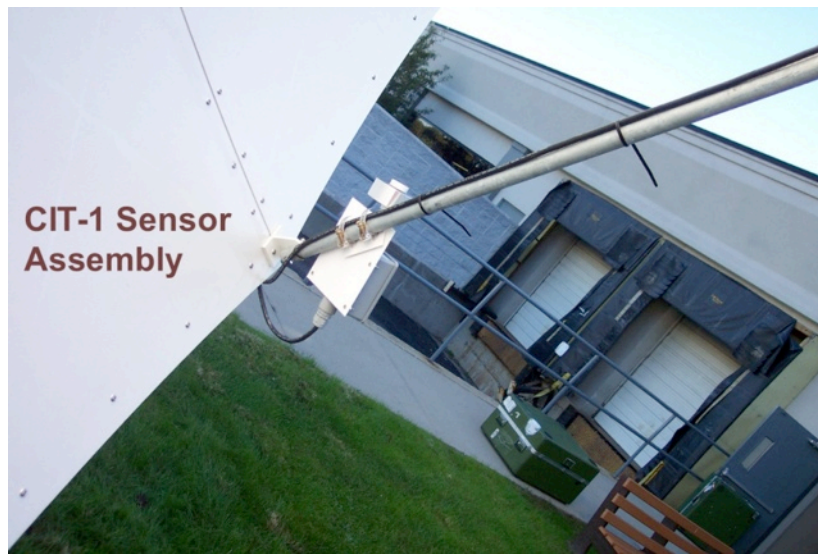






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De-Icing Ring



Feed & Sensor

