

HUGHES NETWORK SYSTEMS

PES FIELD SERVICE BULLETIN

SUBJECT: Prodelin 1.2M Antenna with
Prodelin Anti-icing

FSB NUMBER: 1146A

FSB ISSUE DATE: 5/9/96

SUBMITTED BY: M. Pinkerton/V. Reichert

APPROVED BY: S. d'Adolf

CHANGE TO BE IMPLEMENTED BY:
 AUTHORIZED HUGHES REPRESENTATIVE CUSTOMER

DOCUMENTATION AFFECTED:
Supersedes FSB 1146

CATEGORY:
 HARDWARE FIRMWARE SOFTWARE OTHER

EFFECTIVE DATE: 5/9/96

IMPLEMENT:
 IMMEDIATELY
 NEXT SERVICE CALL
 OTHER

COMMENTS:

REMOVED MATERIAL DISPOSITION

SHIP TO N/A
ATTENTION N/A
COMMENTS N/A

BACKGROUND

Prodelin is now supplying a complete regular 1.2M antenna system with an integral anti-icing system with moisture/temperature sensor. The antenna and anti-icing system are supplied together as one unit, listed in table 1 as HNS P/N 3000173-0003. For situations where anti-icing is to be added to a 1.2M antenna at an existing site, the anti-icing reflector and anti-icing system can be ordered as HNS P/N 3000173-0004. The anti-icing reflector is applicable to either the regular 1.2M antenna or the light weight 1.2M antenna. In this situation, the existing reflector without anti-icing is removed and discarded.

The moisture/temperature sensor supplied with the Prodelin anti-icing system has special operating characteristics as described below.

The previously supplied RayChem anti-icing system is being phased out and discontinued for new site installations.

Table 1. 1.2M Antennas and Anti-Icing

Description	HNS P/N	MFG P/N	Comment	References
Regular 1.2M Antenna with Integral Prodelin Anti-Icing	3000173-0003	1123-136 (Prodelin)	Antenna and anti-icing together as one unit. Being phased in for new sites. Applicable for all wind zones.	PES General Reference Manual chapter 7, section 2 and FSB 1146
Prodelin 1.2M Anti-Icing Reflector	3000173-0004	0800-936 (Prodelin)	Can be ordered separately and be used to retrofit existing 1.2M sites, but requires throwing away existing reflector.	FSB 1146
Regular 1.2M Antenna (without Anti-Icing)	3000173-0001	1123-132 (Prodelin)	Applicable for all wind zones.	PES General Reference Manual chapter 7, section 2
Light Weight 1.2M without Anti-Icing	3000172-0002	1123-139 (Prodelin)	Not available with anti-icing. Can be retrofitted with anti-icing.	FSB 1095A and FSB 1146
Ray-Chem 1.2M Anti-Icing	3000360-0001	- (RayChem)	Full backshell. Being phased out for new sites. Temperature sensor only.	VSAT info bulletin 055

This field service bulletin, FSB 1146A, differs from FSB 1146 in the respect that feedhorn heater and moisture temperature sensor are now defined as field replaceable parts. Replacement procedures are given.

MATERIAL REQUIRED

Complete Regular 1.2M antenna including Prodelin Anti-icing, HNS P/N 3000173-003, Prodelin P/N 1123-136

SHIPPING CONFIGURATION

The complete 1.2M Antenna System with Prodelin Anti-icing is shipped in two cartons:

Prodelin P/N	Description	Weight	Dimensions
• 0800-936	1.2M Anti-ice Reflector	60 lbs	53" x 49" x 6"
• 0800-127	1.2M Az/EI Mount with Feed System	48 lbs	50" x 10" x 16"

The 1.2M anti-ice reflector with feed mtg. carton (0800-936) includes:

Prodelin P/N	Description	Quantity
0181-370	Assembly, 1.2M Anti-ice Antenna HNS with full backcover, reflector heater and anti-ice controller	1

The 1.2M Az/EI mount carton with feed system (0800-127) includes:

Prodelin P/N	Description	Quantity
0176-213	Feed Rod 1.2 M VSAT	2
0181-256	Assembly, Elevation Adjustment Rod	1
0181-259	Assembly, Reflector Support 1.2M	1
0181-258	Assembly, Az/EI Positioner	1
0200-086	Kit, Hdwe. 1.2M VSAT Feed Support	1
0200-512	Kit, Elevation Indicator	1
0490-312	Weldment, Feed Support	1
0800-309	51 Degree Feed Horn	1
5005-155	0800-127 Checklist	1

FIELD REPLACEABLE ELECTRICAL PARTS

Table 2 lists the part numbers for the field replaceable electrical parts.

Table 2. 1.2M Antenna Anti-icing Field Replaceable Electrical Parts

Description	HNS P/N	Prodelin P/N	Prodelin Description	Environmental Technologies
Moisture/ Temperature Sensor	-	0800-1690	120VAC TEMP/MOISTURE SENSOR REPAIR	Model LCD-3SHS P/N 17171
Feedhorn Heater, Circ.	-	0800-1695	51/39 KU FEED HORN HTR (120VAC)	not applicable

ACTION REQUIRED

Install and assemble the regular 1.2M antenna according to PES General Reference Manual, Chapter 7, Section 2.

Install the anti-icing portion of the antenna according to the attached instructions. Be aware of the special operating characteristic of the moisture temperature sensor as listed in attached instructions.

SERVICE NOTES

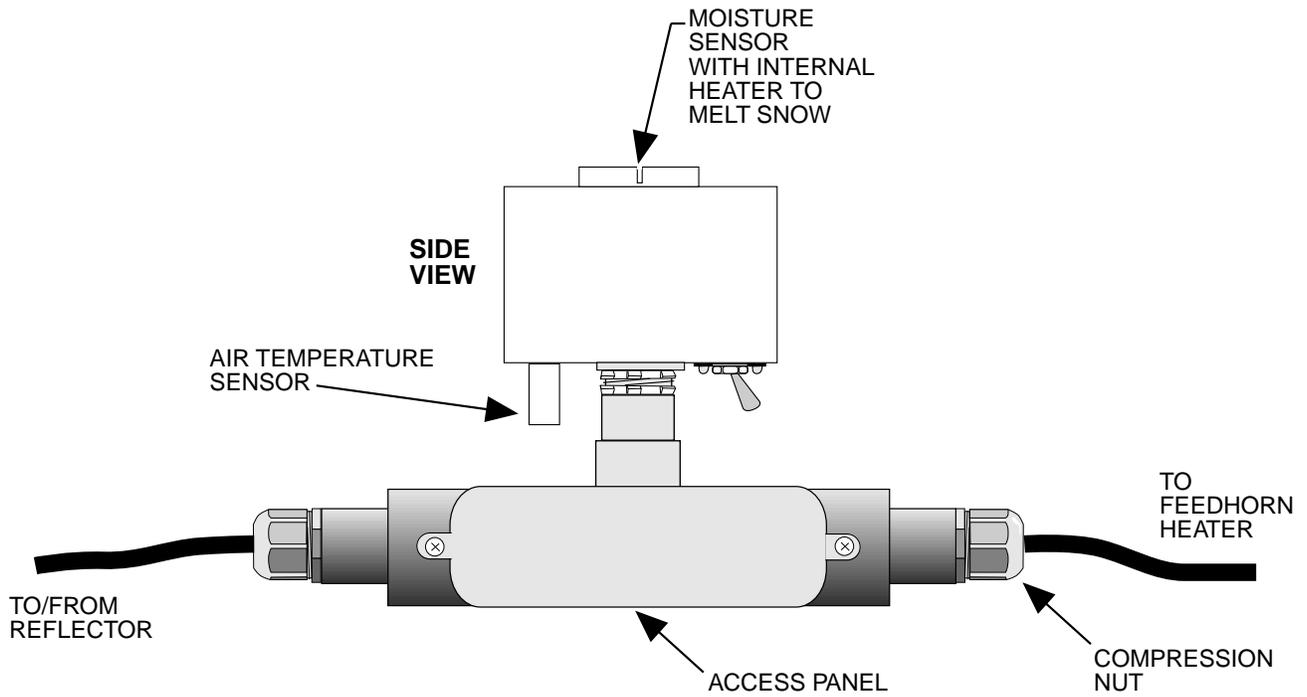
As listed in table 2, the feedhorn heater and moisture/temperature sensor are individually field replaceable components. If the reflector heater fails, replace the entire anti-icing system.

MOISTURE/TEMPERATURE SENSOR FIELD REPLACEMENT

Perform the following steps to replace the moisture/temperature sensor.

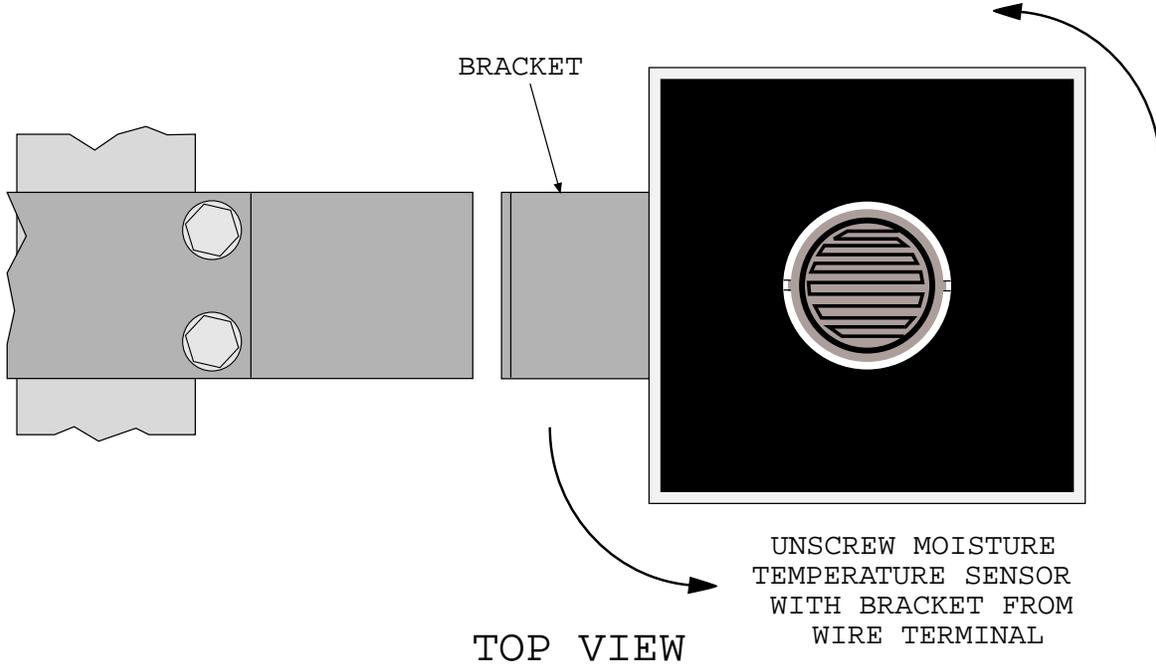
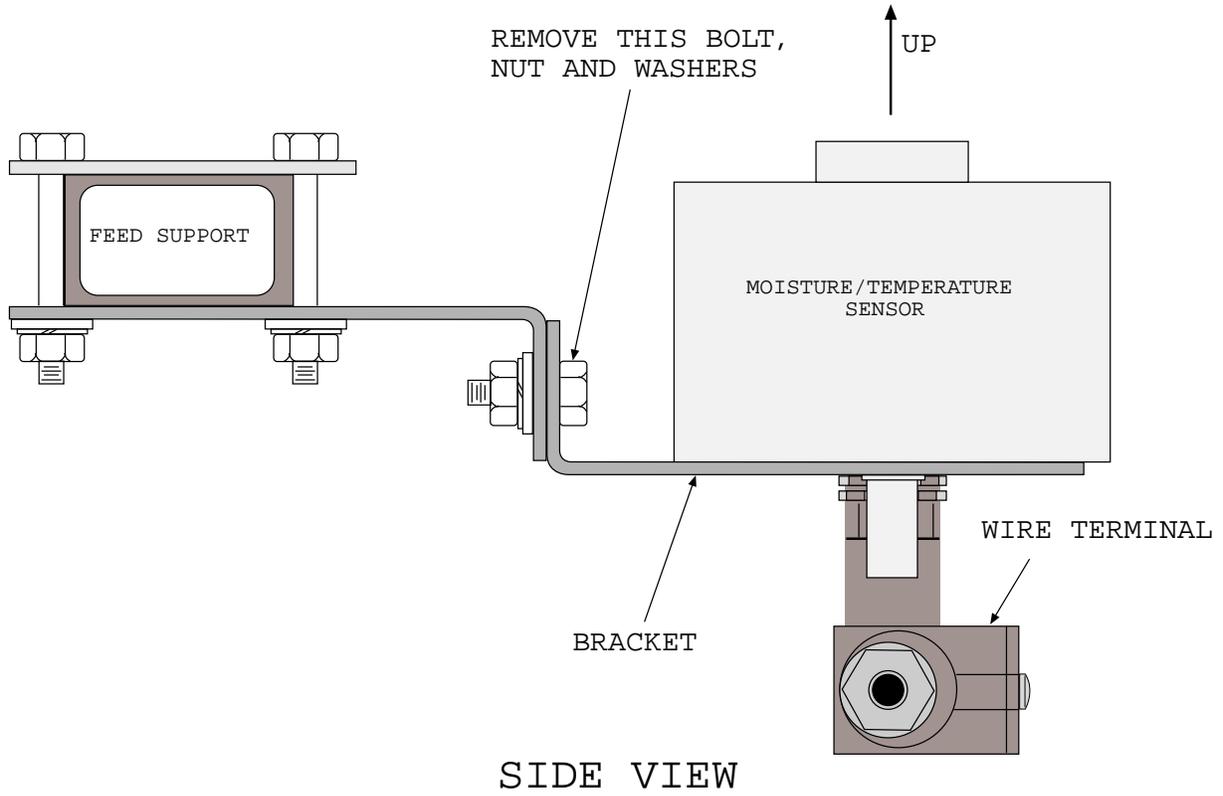
- STEP 1. Remove the anti-icing system power cord from the wall socket and place a tag on the power cord so that someone does not plug in the power cord while you are working on the electrical connections.
- STEP 2. Remove the access panel shown in figure 1. Disconnect the three wires to the moisture/temperature sensor to be replaced. If the wires are connected using wire nuts, unscrew the wire nuts. If the wires are connected using crimp-on terminals, first try loosening and removing the crimp-on terminals by squeezing them in a direction 90 degrees from the original crimps. If you are unsuccessful in loosening/removing the crimp terminals, you may have to cut them off and restrip the wires in the wire terminal junction box.
- STEP 3. As shown in figure 2, remove the nut and bolt which hold the clamp bracket to the moisture/temperature sensor bracket. Unscrew the moisture/temperature sensor with its bracket from the wire terminal junction box.
- STEP 4. As shown in figure 3, remove the threaded pipe stub with lock nuts and bracket from the moisture/temperature sensor to be replaced and install these parts on the replacement moisture/temperature sensor.
- STEP 5. Feed the wires from the replacement moisture/temperature sensor thru the wire terminal and screw the replacement moisture/temperature sensor onto the wire terminal. Replace the bolt, nut and washers that hold the moisture/temperature sensor bracket on the clamp bracket. Adjust the moisture/temperature sensor so that it is level and tighten the bolt and nut.
- STEP 6. Using the crimp terminals (Prodelin part number 0200-490) provided in the replacement kit, make the electrical wire connections accordings to figure 4. Replace the wire terminal access panel.
- STEP 7. Remove the tag from the power cord and plug the power cord in the wall socket. Place the switch in the BYPASS position and verify proper operation. After the one minute self-test, if the temperature is below 44°F, the HEAT LED should glow and the feedhorn heater and reflector heater should become warm. After the one minute self-test, if the temperature is above 44°F, the HEAT LED should glow and energy should be applied to the heaters for one minute of any six minute period. After proper operation is verified,

place the switch in the AUTO position. Discard the moisture/temperature sensor that has been replaced.



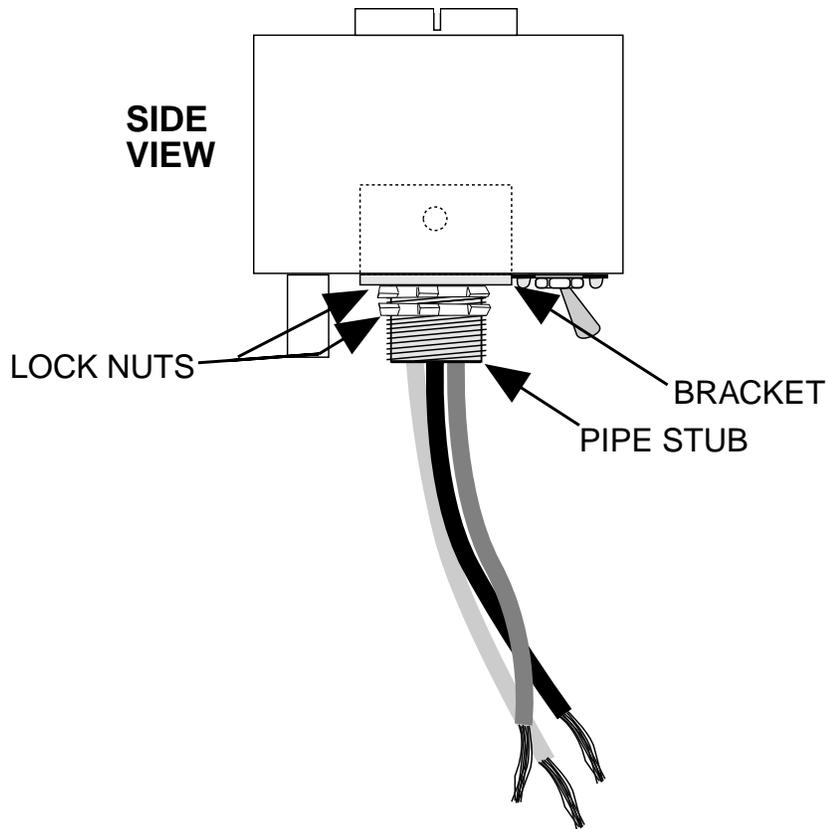
95W396.FH3

Figure 1. Moisture/Temperature Sensor with Wire Terminal Junction Box



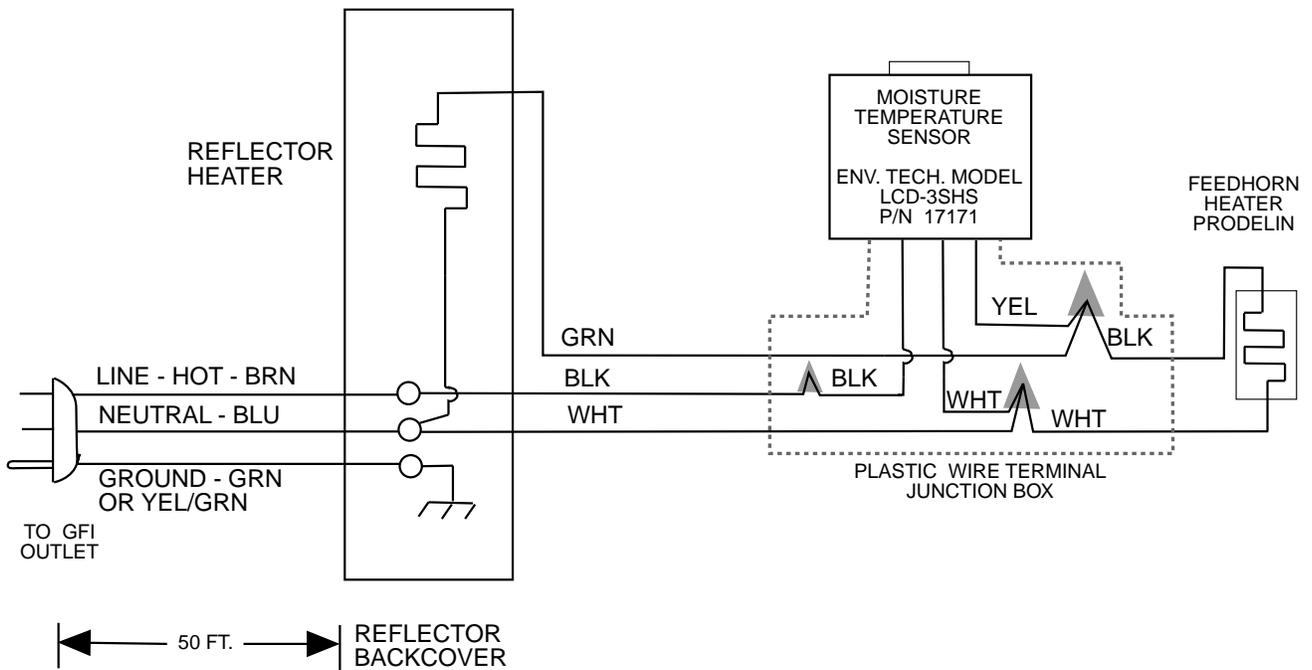
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Figure 2. Removing Moisture/Temperature Sensor from Wire Terminal Junction Box



95W405.FH5

Figure 3. Removing Pipe Stub from Moisture/Temperature Sensor



PS31751.FH3

Figure 4. Wiring Diagram for Prodelin 1.2M Anti-Icing

FEEDHORN HEATER FIELD REPLACEMENT

Perform the following steps to replace the feedhorn heater.

- STEP 1. Remove the anti-icing system power cord from the wall socket and place a tag on the power cord so that someone does not plug in the power cord while you are working on the electrical connections.
- STEP 2. Remove the access panel shown in figure 1. Disconnect the two wires to the feedhorn heater to be replaced. If the wires are connected using wire nuts, unscrew the wire nuts. If the wires are connected using crimp-on terminals, first try loosening and removing the crimp-on terminals by squeezing them in a direction 90 degrees from the original crimps. If you are unsuccessful in loosening/removing the crimp terminals, you may have to cut them off and restrip the wires in the wire terminal junction box.
- STEP 3. Loosen and remove the compression nut from the the wire to the feedhorn heater. Remove the old feedhorn heater from the feedhorn. Install the replacement feedhorn heater on the feedhorn. Place the compression nut on the wire of the replacement feehorn heater.
- STEP 4. Feed the wires from the replacement thru the wire terminal and tighten the compression nut.
- STEP 5. Using the crimp terminals (Prodelin part number 0200-490) provided in the replacement kit, make the electrical wire connections accordings to figure 4. Replace the wire terminal access panel.
- STEP 6. Remove the tag from the power cord and plug the power cord in the wall socket. Place the switch in the BYPASS position and verify proper operation. After the one minute self-test, if the temperature is below 44°F, the HEAT LED should glow and the feedhorn heater and reflector heater should become warm. After the one minute self-test, if the temperature is above 44°F, the HEAT LED should glow and energy is applied to the heaters for one minute of any six minute period. After proper operation is verified, place the switch in the AUTO position.

MOISTURE/TEMPERATURE SENSOR NOTES

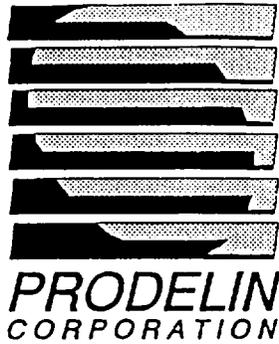
Over the years, Environmental Technologies has supplied somewhat similar appearing but different models of moisture temperature sensors for use on HNS antennas, table 3. These models have sufficient differences so that they cannot be substituted for one another. Table 3 is intended as reference information to be used when replacing the moisture/temperature on other HNS anti-icing systems. Make sure that you have the correct replacement temperature sensor before exchanging units. For purposes of distinguishing it from units used on prior systems, it is Environmental Technologies model LCD-3SHS, part number 17171. It is distinguished by the presence of LED indicators.

Table 3. Comparing Moisture/Temperature Sensors

Model	LCD-3	LCD-3	LCD-3	LCD-3S	LCD-3SHS
Environmental Technologies P/N	--	15610 (1)	15908 (1)	--	17171
Anti-Ice Supplier P/N (Supplier)	Standard Product	-- (RayChem)	-- (RayChem)	--	0181-368 (Prodelin)
Year Introduced	1986	--	--	1992	1994
Supply	120 Vac	120 Vac	120 Vac	120 Vac	120 Vac
Listing	UL or CSA	None	UL	None	None
Hold-On Timer	1 hour	1 hour	1 hour	1 hour	1 hour
Operating Temperature (2)	38°F ± 1.5°F	38°F ± 1.5°F	38°F ± 1.5°F	38°F ± 1.5°F	38°F ± 1.5°F
Lock-Out Temperature	17°F ± 2°F	10°F ± 2°F	10°F ± 2°F	17°F ± 2°F	17°F ± 2°F
Relay	external or internal	external	external	internal	internal
Wires	3 wires, if exterior relay 4 wires, if interior relay	3 wires (external relay)	3 wires (external relay)	4 wires	3 wires
Cable Length	18 ± 6 inches	6.5 ft ± 0.5 ft	6.5 ft ± 0.5 ft	18 ± 6 inches	18 ± 6 inches
Smart Bypass Switch (3)	yes	yes	yes	yes	yes
Heater Cycling if Bypass Software Left in MANUAL Position	N/A	N/A	N/A	N/A	yes
Self-Test	N/A	N/A	N/A	yes	yes
Indicator Lamps (LEDs)	N/A	N/A	N/A	N/A	yes

NOTES:

- (1) These moisture temperature sensors are special order from Environmental Technologies to have a longer cable, 6.5 ft, and a 10°F lock-out temperature. Environmental Technologies can supply replacement, but there is a long lead time.
- (2) Temperature at which heaters are activated if moisture is present.
- (3) "Smart Bypass Switch" means that sensor reverts to AUTO operation after 40 hours regardless of switch position.

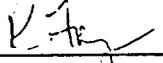


4096-338
REVISION A
February 28, 1995
INSTALLATION MANUAL

1.2M ANTENNA ANTI-ICE INSTALLATION

PRODELIN CORPORATION
1700 NE CABLE DRIVE
CONOVER, NC 28613-0368

1.2M ANTENNA ANTI-ICE INSTALLATION

A	ADDED SECTION ON ANTI-ICE OPERATION	10/06/94	
-	ORIGINAL RELEASE	11/08/93	DLM
REV.	DESCRIPTION	DATE	APPROVED

The **ANTI-ICE SYSTEM** for the 1.2M Antenna System is a half aperture application of heating elements installed in each of the reflector's six lower panels.

It is an automatic system that will activate when the temperature falls approximately below 38 degrees Fahrenheit (3 C.) and sufficient moisture is present to permit the formation of solid precipitant. The system de-activates the heaters when the temperature falls below 16 degrees Fahrenheit (-9.C.) when the moisture is so low as to preclude the formation of solids. The temperature/humidity sensor is equipped with a selector switch permitting the operator to energize the heaters at any time or to disable (turn off) the automatic feature at his discretion. The system operates at 315 watts and requires a minimum 5 amp circuit breaker.

Implementation of the anti-ice installation should be delayed until the initial assembly of the antenna is complete. After assembly of the antenna, the following steps will need to be completed to commission the system.

- Step 1: Attach moisture/temperature sensor to feed support using clamp bracket and 1/4" hardware provided. After pointing antenna, loosen 1/4" bolt and orient so that sensor is pointed up. (see Figure 2)
- Step 2: Attach feed horn band heater around feed horn pulling tie wrap clamp through. Tighten firmly and trim off excess to within 1/2". (see Figure 3).
- Step 3: Route the sensor/heater cable along the feed support securing it with tie wraps provided. (see Figure 1).
- Step 4: The 50' power supply cord leading from the side of reflector, is equipped with a standard safety ground plug. It is recommended that the use of this power cord is only acceptable with a ground fault isolation (GFI) outlet. Should it be necessary to remove the plug to lengthen/shorted the power cord or to wire direct, note that the wires inside are European color coded as shown below.

Green or Yellow/Green	Ground
Blue	Neutral
Brown	Line

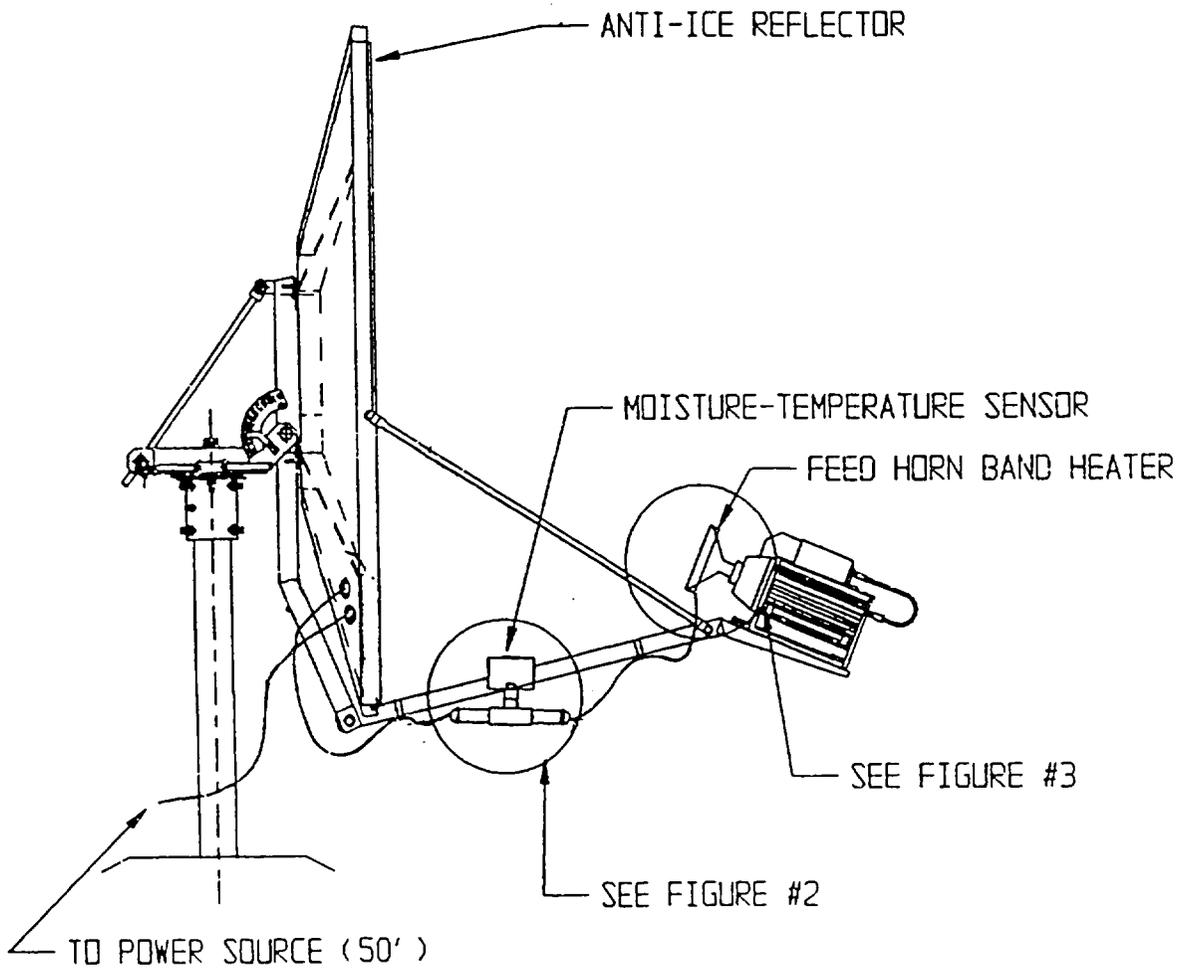


FIGURE 1

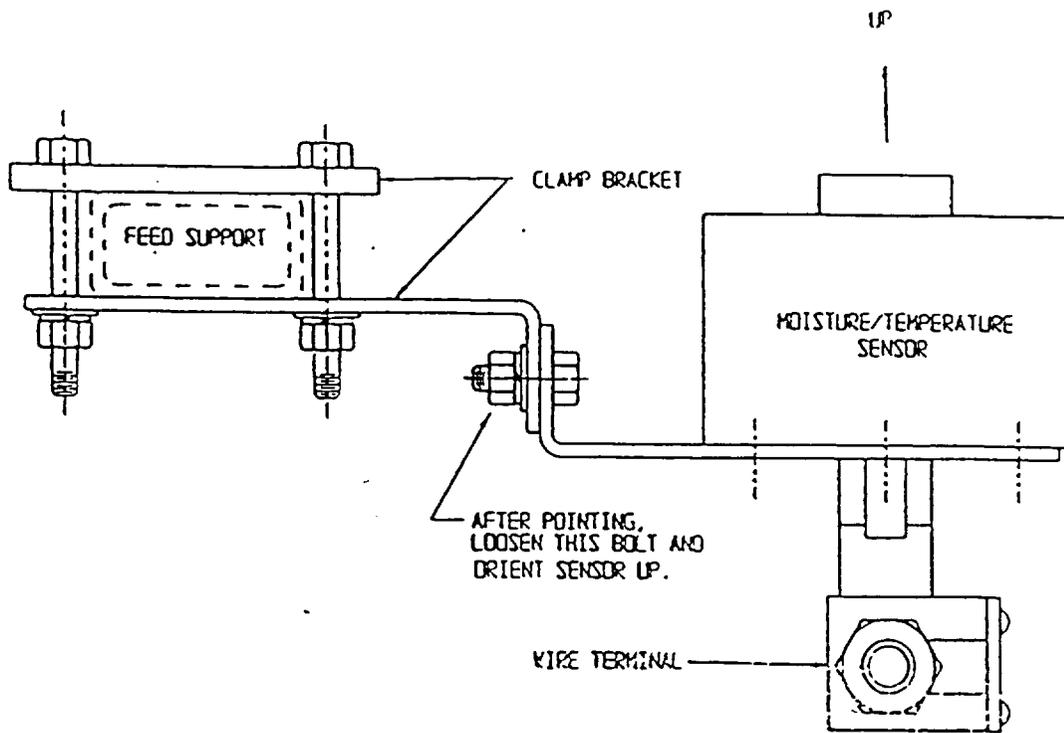


FIGURE 2

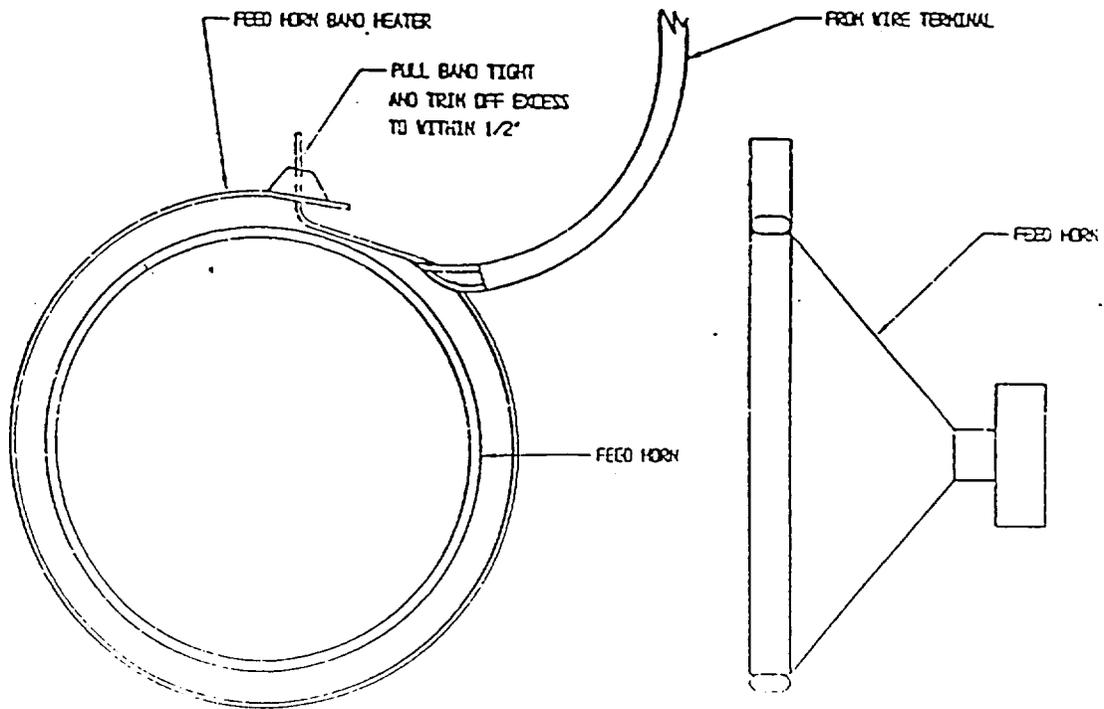


FIGURE 3

ANTI-ICE OPERATION

The wiring connections for the Prodelin anti-icing system are sealed in potting compound. Therefore, the feed horn heater, reflector heater, and moisture/temperature sensor are not intended as individually replaceable parts. If a component fails, replace the entire anti-icing system.

Upon application of power (plugging in the power cord), the anti-ice system conducts a 60 second self-test as described in the attached table. At conclusion of the test, control of the unit is accomplished through the switch located on the bottom of the moisture/temperature sensor (see figure 1). The switch has OFF, AUTOMATIC, and BYPASS positions. Normal operation is with the switch in the AUTOMATIC position. The attached table describes the operation of the system in each position.

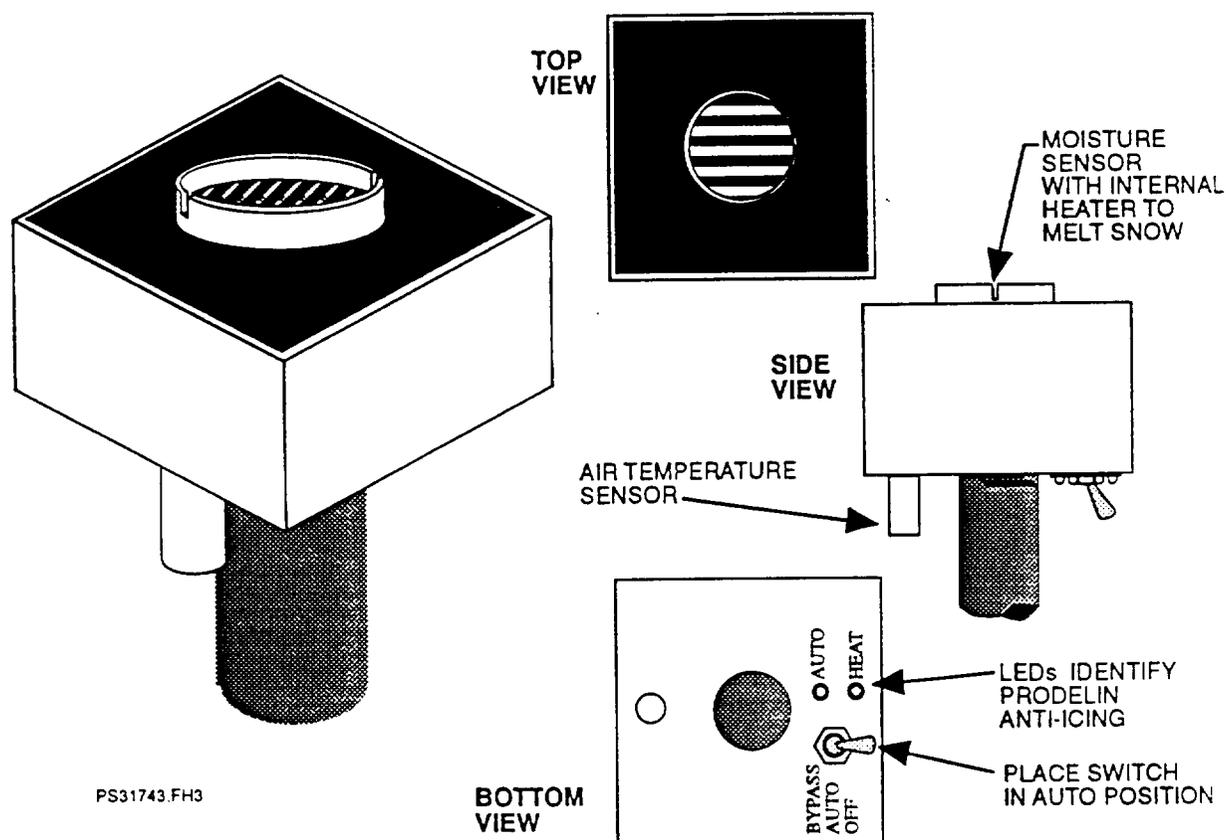


Figure 1. Moisture/Temperature Sensor for Prodelin Anti-icing

ANTI-ICING CONTROLLER OPERATION

Mode	Description
Self-Test	<p>Upon the application of power (plugging in power cord), the anti-ice system conducts a 60-second self-test cycle:</p> <p style="padding-left: 40px;">30 seconds - relay closed, heaters on, HEAT LED glows 30 seconds - relay open, heaters off, HEAT LED glows 60 seconds - total self-test cycle</p> <p>During the first 30 seconds you should be able to feel warmth at the feedhorn heater and should see the HEAT LED glow (very dim-shield from sunshine to see).</p> <p>Note that self-test occurs when power is first applied at all three switch positions: OFF, AUTO and BYPASS.</p>
OFF Mode	<p>When the switch is in the OFF position after self-test has occurred, no power will be applied to the heaters for a duration of 40 hours (1 2/3 days). After 40 hours, the controller will revert to automatic mode operation even though the switch remains in the OFF position.</p>
Automatic Mode	<p>Automatic mode may be entered by either of the following methods:</p> <ul style="list-style-type: none"> - Switch place in AUTO position - Switch left in OFF or BYPASS position for more than 40 hours <p>During automatic mode, the AUTO LED glows. During automatic mode, the heaters are activated if temperature is between 38°F and 17°F and if moisture is present. Once the heaters are activated, they remain activated for one hour after snow stops to provide complete melting. The heaters are deactivated at temperatures below 17°F to conserve energy when the temperature is too low for effective melting.</p>
Bypass Mode (below 44°F)	<p>When the switch is in the BYPASS position after self-test has occurred and when the temperature is below 44°F, the heaters are activated whether moisture is present or not. After 40 hours, the controller will revert to automatic operation even though the switch remains in the BYPASS position.</p>
Bypass Mode (above 44°F)	<p>When the switch is in the BYPASS position after self-test has occurred and when the temperature is above 44°, the controller starts a repeating cycle:</p> <p style="padding-left: 40px;">1 minute heaters on, HEAT LED glows 5 minute heaters off</p> <p>This cycling pattern prevents overheating. After 40 hours, the controller will revert to automatic mode even though the switch remains in the BYPASS position</p>