Walton Hot-Air De-Icing Application Note
Infrared Heating Does Not Work

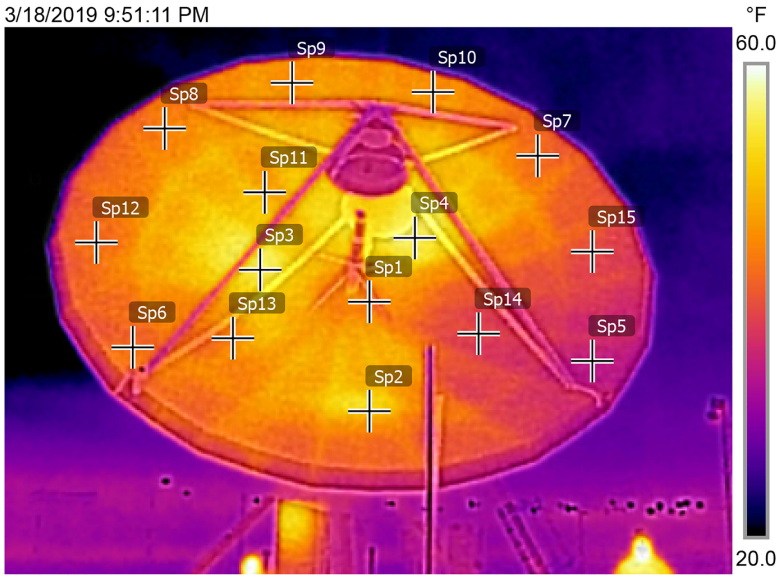
This note explains why Infrared heating systems should not be used to attempt to cheaply provide heating for earth station antenna anti-icing. Infrared (IR) heating problems are especially troublesome for Ku- or Ka-Band.

INFRARED HEATING?

Figure 1: 8m Antenna

Figure 2 below shows a thermal image of the same 8-meter antenna shown in the photo to the right in **Figure 1**. The thermal image was taken as *ten (10) residential grade* **Infrared Heaters** were placed inside the antenna's rear enclosure structure and activated in an attempt to perform anti-icing. The temperatures of different spots on the Infrared-Heated Dish in **Figure 2** correspond to their colors in the thermal image. The vertical color spectrum / legend on the right of the image shows the range of temperatures from 20 °F to 60 °F. **Table 1** shows temperature measurements at 12 spots (Sp1, Sp2…Sp12) on the antenna reflector. For example, Spot 4 (Sp4) is 48.4 °F, while spot 5 (Sp5) is 30.7 °F, below freezing.

Figure 2: Infrared-Heated Dish



REFLECTOR SURFACE INFRARED-HEATING CAUSES DISTORTION

Aside from the fact that 10 Infrared heaters fail to warm the surface above freezing required to melt ice, A makeshift Infrared (IR) heating approaches creates more serious problems. The difference between the coldest and warmest two spots is nearly 18 °F. This large variation in surface temperatures causes a reflector's metal components to contract unevenly, de-focusing the antenna. Warped or distorted antenna reflectors cause losses and signal attenuation. Off-axis antenna transmissions could even result in interference to a satellite, outages, and penalties. This shows why such a makeshift IR-heated solution, when attempted, has cause problems and complaints, and why it should not be used for Ku-Band antennas, let alone Ka-Band antennas, which require more accurate beam pointing.

Table 1: Infrared-Heated Antenna Measurements	
Sp1	36.1 °F
Sp2	42.4 °F
Sp3	47.5 °F
Sp4	48.4 °F
Sp5	30.7 °F
Sp6	36.0 °F
Sp7	35.9 °F
Sp8	37.1 °F
Sp9	37.6 °F
Sp10	37.7 °F
Sp11	39.4 °F
Sp12	35.8 °F
Sp13	37.0 °F
Sp14	33.5 °F
Sp15	34.2 °F

Figure 3: Walton Hot-Air De-Icing Creates Uniform Surface Temperatures

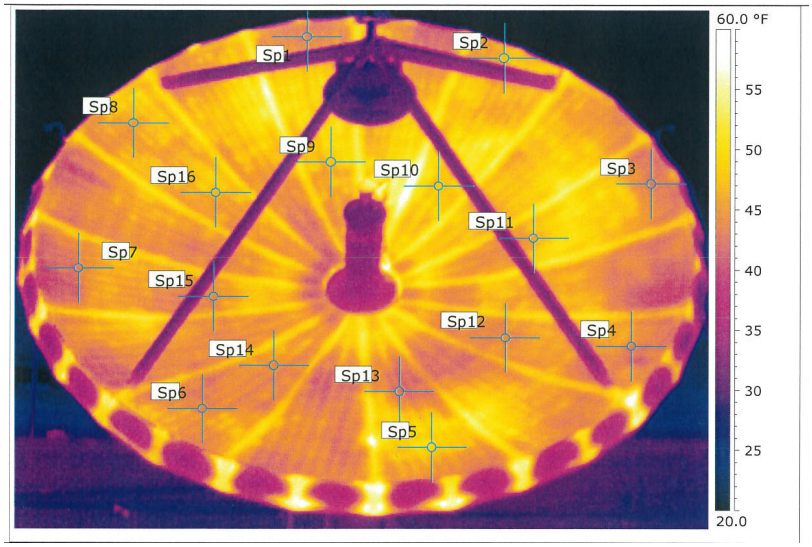


Table 2: Walton Hot-Air De-Ice Antenna Measurements	
Sp1	43.3 °F
Sp2	47.3 °F
Sp3	43.2 °F
Sp4	42.9 °F
Sp5	48.4 °F
Sp6	43.2 °F
Sp7	42.9 °F
Sp8	45.3 °F
Sp9	47.0 °F
Sp10	48.3 °F
Sp11	46.3 °F
Sp12	44.4 °F
Sp13	42.8 °F
Sp14	44.1 °F
Sp15	43.7 °F
Sp16	47.0 °F

Unlike the Infrared-heated system, a **Walton Hot-Air Plenum De-Icing** system uniformly heats reflector surfaces. As a result, surface temperature variation stays around 5 °F Delta. These tolerances have proven widely acceptable in the industry, including 100s of Ka-Band large dish sites at operators around the globe. **Figure 3** shows the thermal image of a Walton Hot-Air Plenum De-Icing system, using Walton's energy-efficient industrial forced-air Heating system on an 8m antenna. **Table 2** shows corresponding spot measurements.

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