HOT SWITCH HEATING SYSTEMS

The Best of the Best

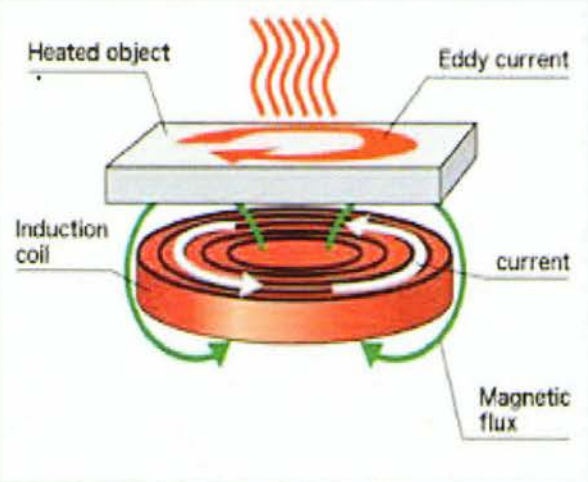
Proven reliability in environments as far north as the US Alaskan territories.

- ★ The most powerful Switch Heater System on the Market.
- ★ Operates on 120 VAC and uses 40% of the energy of a typical Cal Rod System.
- ★ Photo was taken on 800 Watts power setting. 1800 Watts available.
- ★ Photo was taken at a temperature of minus 14°F and with 15 - 20 MPH wind chill.

Contact Us at: http://www.hotswitchheatingsystems.com

HOT SWITCH HEATING SYSTEMS

Electromagnetic Induction Heat Illustration



How Does It Work

Our patent pending products heat the rail by using electromagnetic induction heating. When a high frequency alternating current passes through the induction coil, the electromagnet creates a magnetic field which penetrates the object generating electric currents called eddy currents. As the currents flow through the object, the resistance of the movement of the electrons caused by the current produces heat within the object.

Why is it Better

An important feature of the induction heating process is that the heat is generated inside the rail itself, instead of by an external heat source via heat conduction or resistive heat. Thus, objects can be heated very rapidly. Once the rail is heated to the optimal temperature, our heaters will automatically cycle to a power saving mode. In addition there is no need for any external contact, which can be important where space is limited and other objects are present. Lastly, the product can operate on 120VAC which is much safer for your field employees than a 480V 3 phase service needed for other heating alternatives.

- **Rapid Heat**
- **Automatic Power Saving mode**
- **Can heat tight spaces**
- **Safer to operate 120VAC**

Lower Costs

+

Less Environmental Footprint

=

Better Operating Ratio

Improved Operating Ratios

Rail operators continue to look for new ways to reduce operational costs. Additionally, each year rail operators implement new initiatives to reduce their overall environmental impact. Thermal Brick Energy switch heaters offer a win—win solution. Not only will our switch heaters reduce your operational costs by automatically switching to a power saving mode but our heaters will also help your company show meaningful reductions in energy which is always good for the environment.

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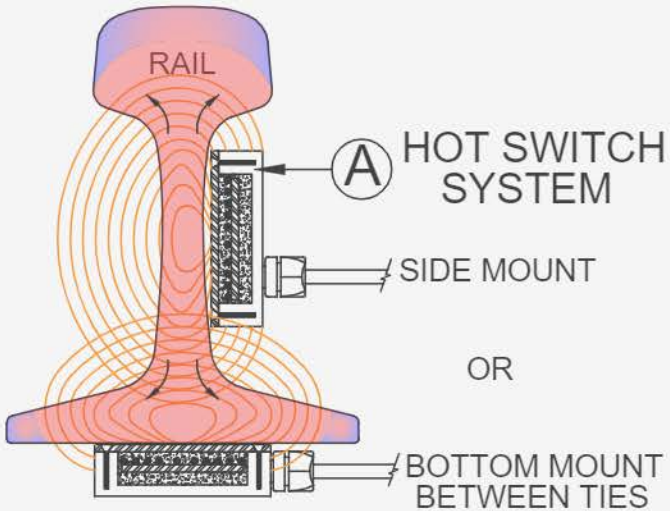
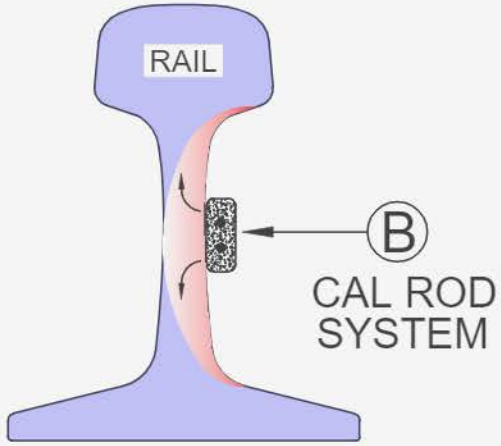
THE HOT SWITCH DIFFERENCE:



A

- The Eddy Current Field generated by the inductive heads excites the steel atoms within the rail and the core of the rail becomes the heat source.
- The magnetic field extends beyond the HOT SWITCH BRICK on the side or the bottom of the rail and covers up to 80 % of the mass of the rail. As the surface area of the heat source is many times that of the Cal Rod, the heating efficiency is greatly enhanced over that of a Cal Rod.
- The Inductive Heads operate on 120 VAC which is the most widely available operating voltage in the US and only consumes about six amps per head.
- The HOT SWITCH BRICKS can deliver 500 to 1000 WATTS per foot on demand.
- The system can instantly adjust power levels at the heads and neutralize a cold weather event.
- Unlike the Cal Rod system, maintaining firm contact with the rail is not necessary. The HOT SWITCH BRICKS can be up to 1/2 inch away from the rail and the eddy current field is fully effective.
- Should a problem occur with a head, it can be repaired in seconds while the other adjacent heads continue to heat the rail.



B

- Typical flat Cal Rod systems induce heat to the rail by thermal transfer with ½ the heat expended to the outside air.
- The Cal Rod units have a maxim of 500 Watts per foot.
- Most Cal Rod Systems require high input voltage, but 240/480 Volts is not always available in remote locations.
- The Cal Rod Systems overall efficiency is dependent on maintaining good surface contact with the rail.
- When a Cal Rod fails, you lose heating on the entire side of the switch and replacement of the rod takes significant time. Also, upon failure, electricity can be induced into the rail creating dangerous situations.
- Because a large portion of the heat generated by Cal Rods escapes into the atmosphere, testing has shown that HOT SWITH SYSTEMS can heat more efficiently reducing power consumption for a single switch by as much as 50%.

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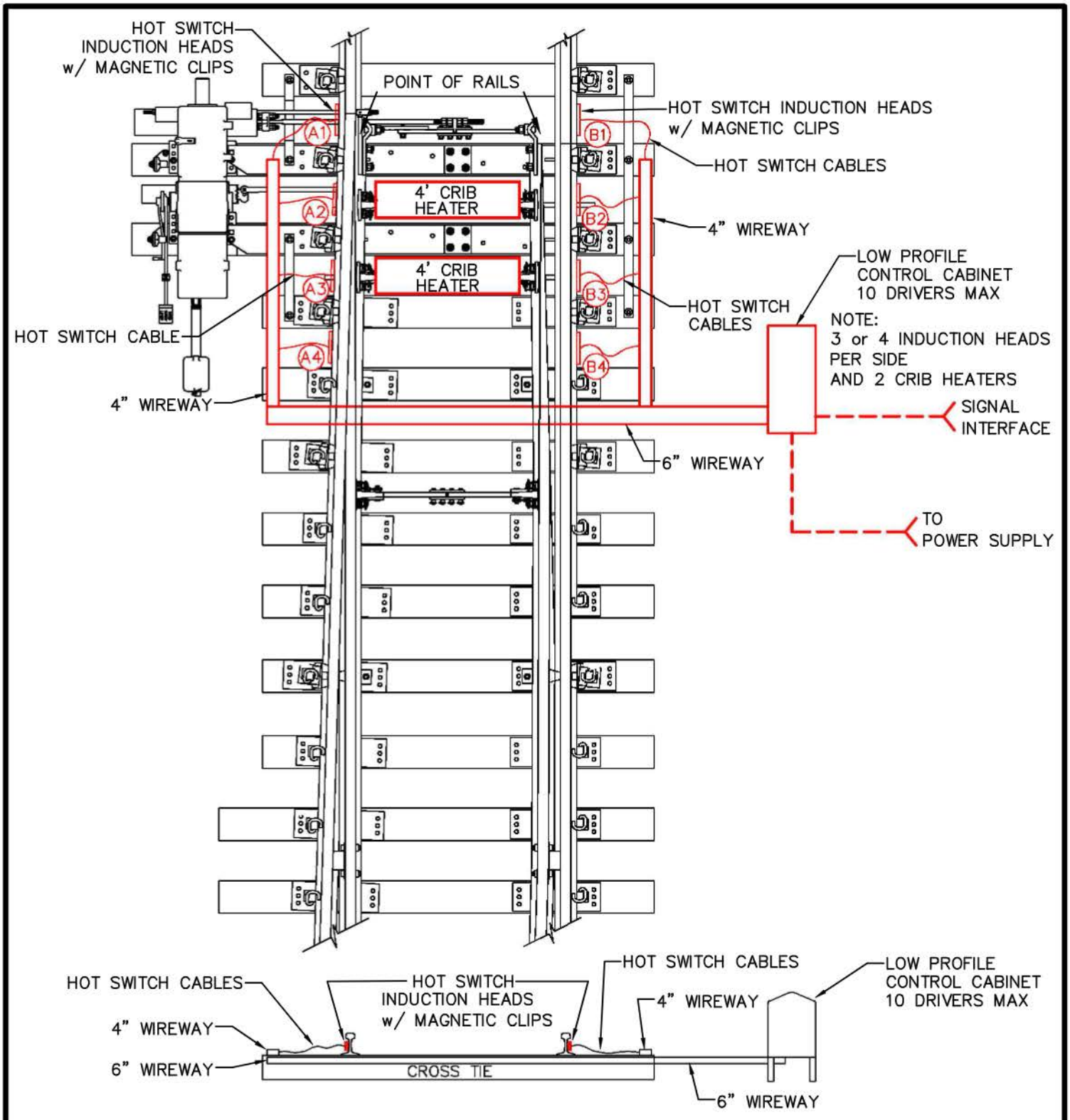

SWITCH #8

HOT SWITCH HEATING SYSTEMS

NORFOLK SOUTHERN RAILROAD

SWITCH #8

SCALE: N.T.S. DATE: 3/11/2020 DRAWN: JSS CHK'D: RCG	PROJECT NUMBER	DRAWING NO. SHEET 1

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Hot Switch Heating Systems:

Hot Switch Performance Evaluation:

Background: Winter heating season 2019-2020

A major US Class One Railroad has been using Cal Rod Systems and Hot Air Blowers to keep there railroad switches clear of snow and ice during the winter season. Over the years, the Hot Air Blower units have proven to be the most energy efficient after the propane gas prices fell. This railroad has also had Hot Switch Induction Switch Heater equipment installed and operational for the past 4 years. It is located in the Great Lakes Snow Belt region. The overall performance of this equipment was viewed to be superior to the Cal Rod and or Hot Air Blowers adjacent to the Hot Switch Equipment. This generated the desire to open a capital project by the Chief Engineer of Signals to do further evaluation on the overall energy consumption and heating performance of the Hot Switch Equipment. As a result, the railroad invested in electronic and mechanical metering instrumentation and outfitted two switches adjacent to each other at another site. These switches were convenient for 24 hour observation by railroad personnel.

The Magnetic Induction Equipment for this test incorporated 8 induction heads on each rail and two standard 4 foot Crib Heaters. The Switches involved were a #15 turnouts.

The Hot Air Blower was a standard Rails 3 HP unit.

With the heating systems in place and all instrumentation calibrated and zeroed, the test was ready for the winter heating season.

Typical Snow Event:

8 Degrees – 10 inches snow – 12 mph wind off of lake.
Typical sample period: 48 days

During the sample period, all switch heaters remained in joint operation as governed by the Dispatcher.

Hot Air Blower:

For a typical 48 day window, 213.2 gallons of propane was used at a rate of $1.37 per gallon with 363 Kwh of electrical power consumed for the blower motor. The cost per Kwh was .085 or $30.36. The combined total of energy used by the system was **$322.45.** The average rail temp mid point of the switch was 110 degrees.

Hot Switch Induction System:

The induction driver cards were set at 800 watts per head and to pulse every 4 seconds in the power saving mode. This was typical of the hot switch equipment settings located at other sites. During the test interval, the average rail temperature maintained by the induction system was 240 degrees mid point of the switch. The Hot Switch Equipment primary voltage is 120VAC and the full load current at startup was less than 47 amps on the main buss.
For the 48 day window the Hot Switch unit used 877 Kwh at the rate of .085 cents per Kwh or **$74.50** total.

Total Utility Energy Used:

Hot Air Blower (Rails 3 HP Unit): $322.45

Verses:

Hot Switch Induction System: $ 74.50

This represents a substantial annual savings on the railroads utility budget....

Cal Rod Unit:

The railroad indicated that the the utility usage was substantially higher than that of the Hot Air Blower System.

Summary:

As a result of this test, the railroad has stated that they felt that they could remove or shut off some of the induction heads to reduced the electrical load per system. It was a great advantage to know that the induction equipment had the higher power settings, should an extreme weather event accrue. Also, noted was that they can now power a switch heater system on the same power feed they typically have available at the Signal Bungalows along the Main Line Track.

Track maintenance personal stated that "The Hot Switch System was by far the easiest to maintain of all the systems, due to the way the Induction Heads remove from the rail and the Driver Cards are self-diagnosing smart cards.

All of this is made possible by the fact that any other switch heater technology utilize an outside heat source to push heat into into the rail. The Hot Switch System induces heat directly into the core of the rail which has no heat losses. The driver / coils are 98.9 % effective at placing heat right where you need it.

This equipment is the only Railroad Switch Heater System that will qualify for "Green Energy Tax Credits" on the market...

The Hot Switch Difference: