

PREVENTATIVE MAINTENANCE SURVEY

TRANSIENT ELECTRICAL VOLTAGE AND LIGHTNING SUPPRESSION

BOARDWALK & BASEBALL, INC.

(Written by: Alexander E Othmer - Certified Inspector/Rides Maintenance Manager, H.B.J. Corp.)

For the past 28 years I have been involved with inspection and preventative maintenance on projects throughout the world. During this time I have had the misfortune to write countless reports on loss of life, equipment and production time due to the effects of transient voltage and lightning damage. In some cases these reports followed thermographic preventative maintenance inspections which clearly located potential problem areas months prior to the catastrophic final failure.

Though the loss of equipment and production time is of importance I can not stress the value of transient voltage surge protection on the growing amount of computer controlled safety systems on the wide range of equipment being used in today's production and people moving devices. I have seen the failure of such systems, due to transients being interpreted as data pulses in the computer CNC system of which the end result is the computer attempting to perform a function not called for in its normal logic. This has caused disruptive and destructive effects on equipment and personnel. Imagine if you will an automatic paper cutting machine with all of its safety equipment functional; but, the computer tells the blade to come down at the wrong time.

During my last assignment, I was in charge of the maintenance on 34 high risk people moving devices with the awesome responsibility of

Safely moving up to 10,000 men, women and children through my system hourly. Twenty-five percent of the above equipment contained computers that controlled various safety systems and 100% of the equipment contained electric motors and various other electrical and electronic devices critical to the equipment's safe operation. If this was not enough, my facility was located in Orlando, Florida, the LIGHTNING CAPITOL OF THE WORLD. My prior experience, as noted above and the lack of built-in protection devices prompted my call to you back in the spring of 1987.

I thought you may be interested in the end results now that I have had the operating time to formulate some qualitative data after the installation of your equipment. Please feel free to share the following with your associates. For the sake of brevity, I have listed the following data in basic total categories from 1987 losses (Unprotected) to 1989 (Protected) systems.

LIGHTING (BULBS):

Total in system - 81,255 bulbs
Replacements
1987 - 33,452 = 41% of total
1989 - 8,570 = 11% of total
(Replacements reduced by 74%.)

ELECTRIC MOTORS:

Total in system 149 motors which 1 total 1,618 HP.
Replacements
1987 - 83 motors
1989 - 2 motors

(Replacements reduced by 97.5%.)

COMPUTERS & BOARDS:

Total circuit boards in system- 1,540

Replacements

1987 - 563 circuit boards

1989 - 2 circuit boards

(Replacements reduced by 99.6%.)

EQUIPMENT DOWN TIME IN PERCENT OF OPERATING HOURS DUE TO ELECTRICAL PROBLEMS:

1987 - 21.25%

1989 - 0.07%

(Down time reduced by 99.9%.)

ELECTRICAL MAINTENANCE COST - LABOR AND MATERIALS PER OPERATING HOUR:

1987 - \$ 92.33 per hour

1989 - \$ 57.45 per hour

(Operating cost reduced by 37.7%.)

This reflects a \$34.88 per operating hour savings on electrical maintenance for the total equipment package. In some cases on individual equipment the reduction was as high as \$18.37 per hour in 1989. (Equipment operations would total 4,368 hours per year based on operations of twelve months per year and 12 hours per day, seven days per week. Calculating at the savings of \$34.88 per operating hour, we could estimate 4,368 x \$34.88= \$152,355.84 savings the first year, the next year, the next year and the next year.)

Of course this is dollar savings, the real savings is the fact that over 2 million men, women and children

were safely moved through our facility with no injury due to electrical or mechanical equipment malfunction. I consider your product a very wise investment. Of course, I will admit that we did more to the equipment than add your devices, as with any electrical system proper maintenance is essential. I can say that your little boxes did the job. In fact, during one instance where one main feed serviced two systems in the same control room, I installed Suppressors on the feed side of my sub-panel, while another department head neglected to do the same for

his sub-panel. "Bang"! One lightning hit during an afternoon storm, all the breakers tripped in both sub-panels. My electricians re-set our breakers and a 1.2 million dollar piece of equipment was up and running. The other department lost \$30,000.00 worth of equipment in one shot. Remember, now, this is in the same control room off the same main feed and my system was the heavier service (larger wire gauge IE. less resistance). If Mr. Ohm was correct, the path of least resistance should have hit me first. Of course, you know the rest of this

story as you were kind enough to assist the other department manager in protecting some of his equipment shortly after the above occurrence.

I would like to thank Mr. Butcher for all of his assistance. It was a pleasure this past year at every company meeting after a storm to be able to say "RIDE MAINTENANCE "0" DAMAGE". Thanks for a fine product and the engineering and application expertise to back it up. A rare find in today's maintenance world, I am sad to say.

Lightning Protection
&
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