Anthony Valencia

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Professor Fothergill

Coordinating Seminar

**Failed Tether Experiment Worksheet**

**Background Information:**

In February of 1996, USA and Italy sent a space shuttle with a tethered satellite attached to the shuttle. The purpose of this experiment was to generate 5000 volts of electricity, by dragging a satellite via cable. The braided cable attached to the space shuttle was to be dragged through the stationary magnetic fields of space and would be used to gather the necessary volts of electricity.

**Reason for Failure:**

The cable that held the satellite to the shuttle, snapped as a result of air bubbles present in the nylon core, which caused the air bubbles to turn into plasma, creating the rupture within the cable.

**Data for the original experiment:**

Travel Speed (based on research): 17,500 mph or 5 miles/second

Miles per one voltage 17,500/3500 = 5 miles per voltage

Miles/second to miles per one voltage ratio= 5:5 1 volt is collected per second

So 3,500 volts collected would take 3,500 seconds

It takes 3,500 seconds to collect 3,500 volts, which is what was collected before the wire exploded

3,500/60 minutes= 58.33 minutes to gather 3500 volts

It would take 5000 seconds to gather all 5000 volts necessary for this experiment

5000/60 minutes= 83.33 minutes to gather 5000 volts.

Bases on the research I found, it takes 35,500 degrees Fahrenheit to turn air bubbles or space bubbles into plasma.

So it was concluded for the original experiment that if the shuttle was traveling 5 miles per second that it would take 58.33 minutes for the cable to reach 35,500 degrees and explode, without collecting the necessary voltage required.

**Data for my experiment:**

Travel Speed: 16,500 mph or 4.58 miles/second

Miles per voltage: 16500/5000= 3.3 miles per voltage

Volts per second gathered: 4.58/3.3= 1.39 volts/second

Time it would take for collecting all volts necessary: 5000\*1.39= 6939.39 seconds

6939.39/60 minutes = 115.65 minutes

So it would take 115.65 to collect 5000 volts going at 16500mph

17,500mph/16,500mph= 0.94

Since 16,500 is .94 or 94% of 17,500 we can then multiply the break rate temperature to the new percentage

35,500 degrees\* .94 = 33,471 degrees Fahrenheit

Therefore, since the temperature is less than 35,500 degrees, then the cable won’t burst making this experiment valid.

**Conclusion:**

If the space shuttle, with the technology and materials used from 1996 were used, and the cable width and length stayed the same, it can be determined that if the ship was traveling at 16,500 mph it would collect all 5000 volts necessary in 115.65 minutes and burn at the temperature of 33,471 degrees Fahrenheit, therefore not destroying the cable.