



Fast Transient Burst (FTB) Case Study

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EN 61000-4-4

What is it? How can it effect electrical and electronic equipment? Do I need to worry about it?



Electrical switchboard in marine environment

Sparking occurs whenever a current is switched

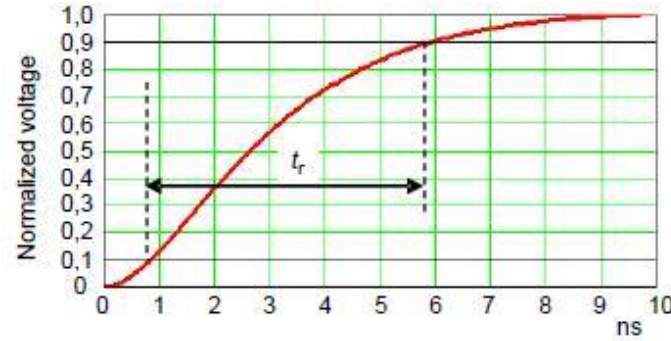
Sparks contain electrical energy

Sparks produce transient currents, voltages and electromagnetic fields

Electronic equipment susceptibility

What does it look like?

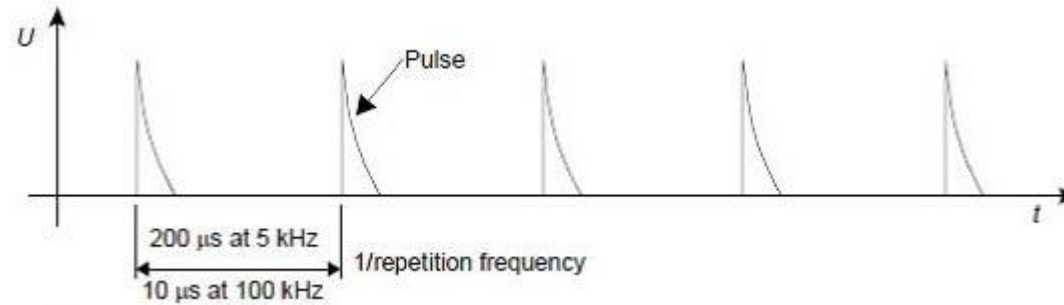
Fast



Simulated Spark

Rise Time 5ns

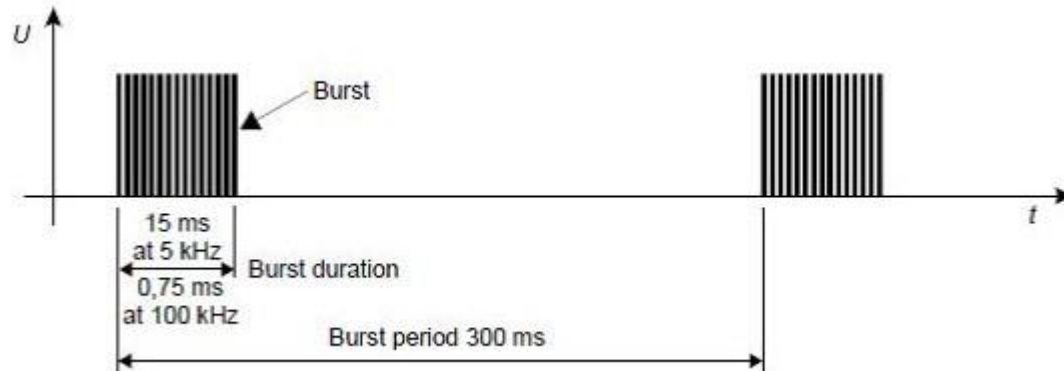
Transient



A series of **Pulses**

Repeated every 200 μ s
or 10 μ s

Burst



Delivered in a **BURST**

Lasting for 15ms or 0.75ms

Repeated every 300ms

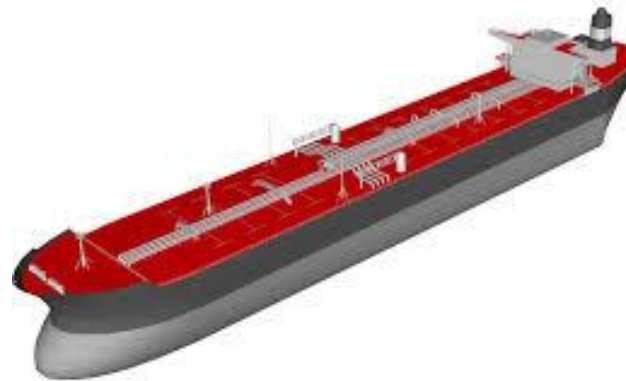
Case Study: Setting the scene

New build gas carrier

Maiden voyage to Qatar

1 of 3 new builds

What could possibly
go wrong???



Build cost ££££££££££!

Flag ship

Contracted to deliver cargo on time

Built in Korea

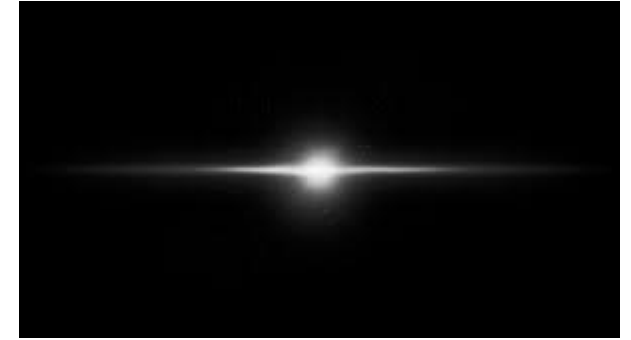
What could possibly go wrong?



Fully Loaded

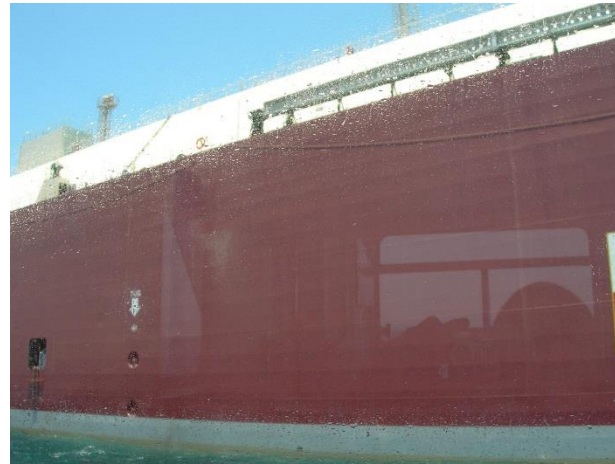


Parallel Generators



LIGHTS OUT!

6 Weeks later @ \$750,000 a week.....



Holiday is over



What could it be?

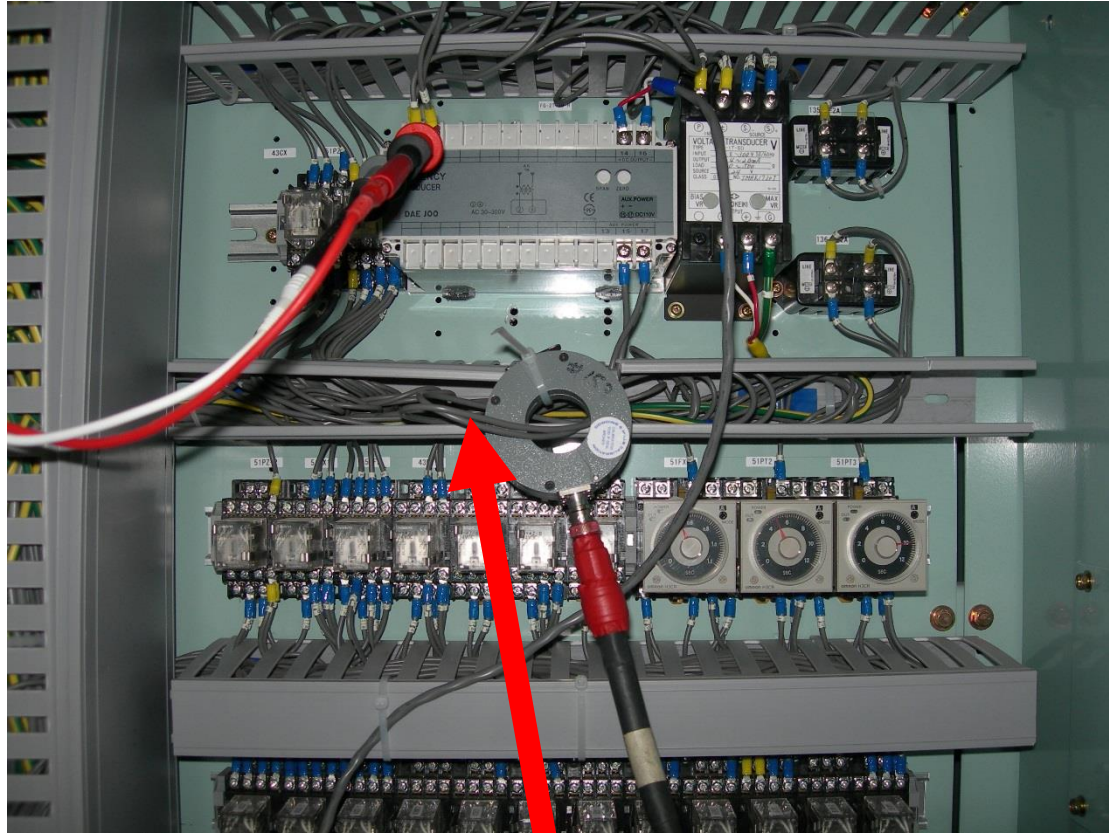
What do we know?

What kit has survived the trip?

Time to investigate.

Trials commence.....but no lights out please!

Data, data, data and more data



12V DC input signal line, with lots of broadband TRANSIENT energy sat on top.



Who Dunnit?

Was it the Butler?

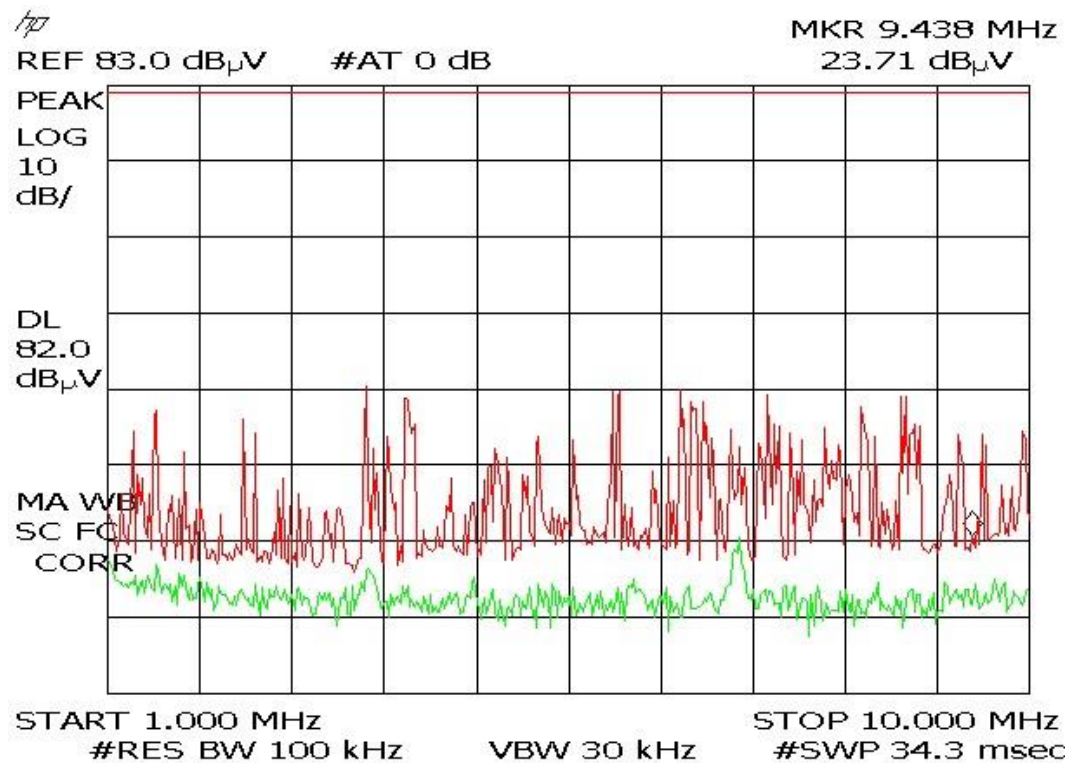
Was it the Test Engineer?

Was it Brexit?

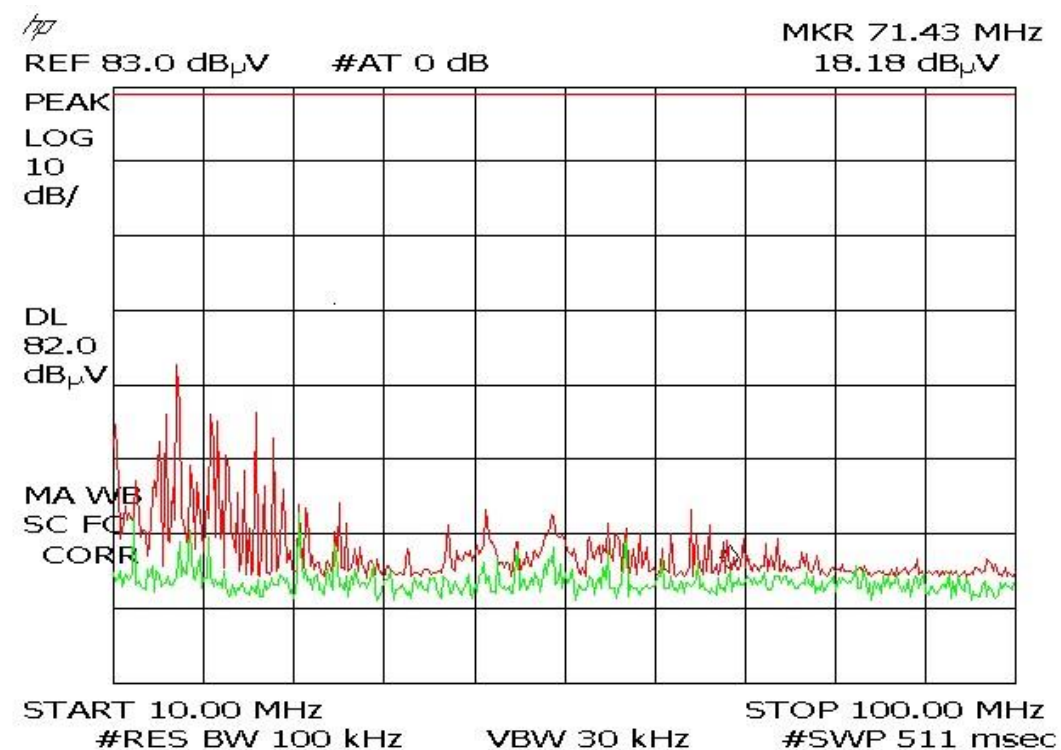
Was it a Chattering Relay?



It was the Contactor your honour

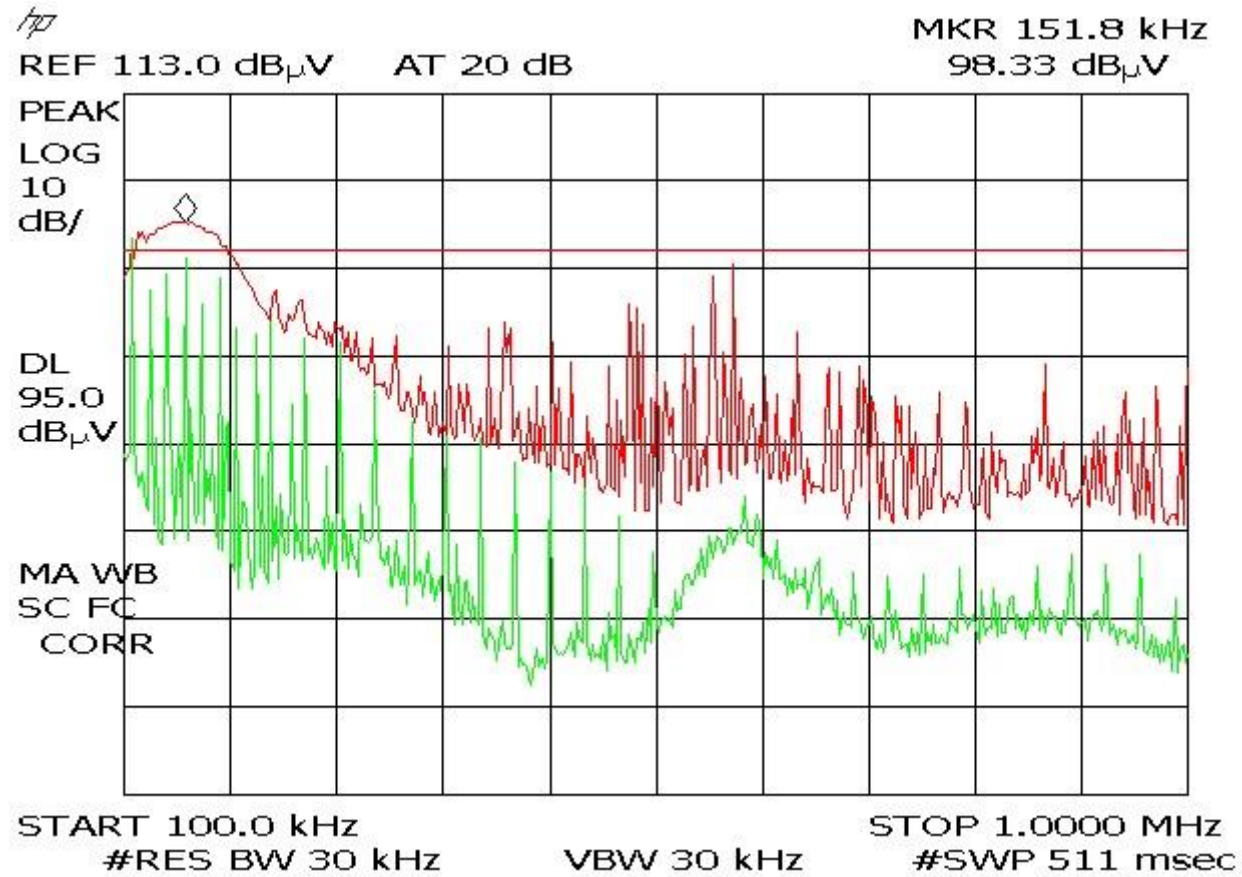


1 MHz to 10 MHz



10 MHz to 100 MHz

There's more.....



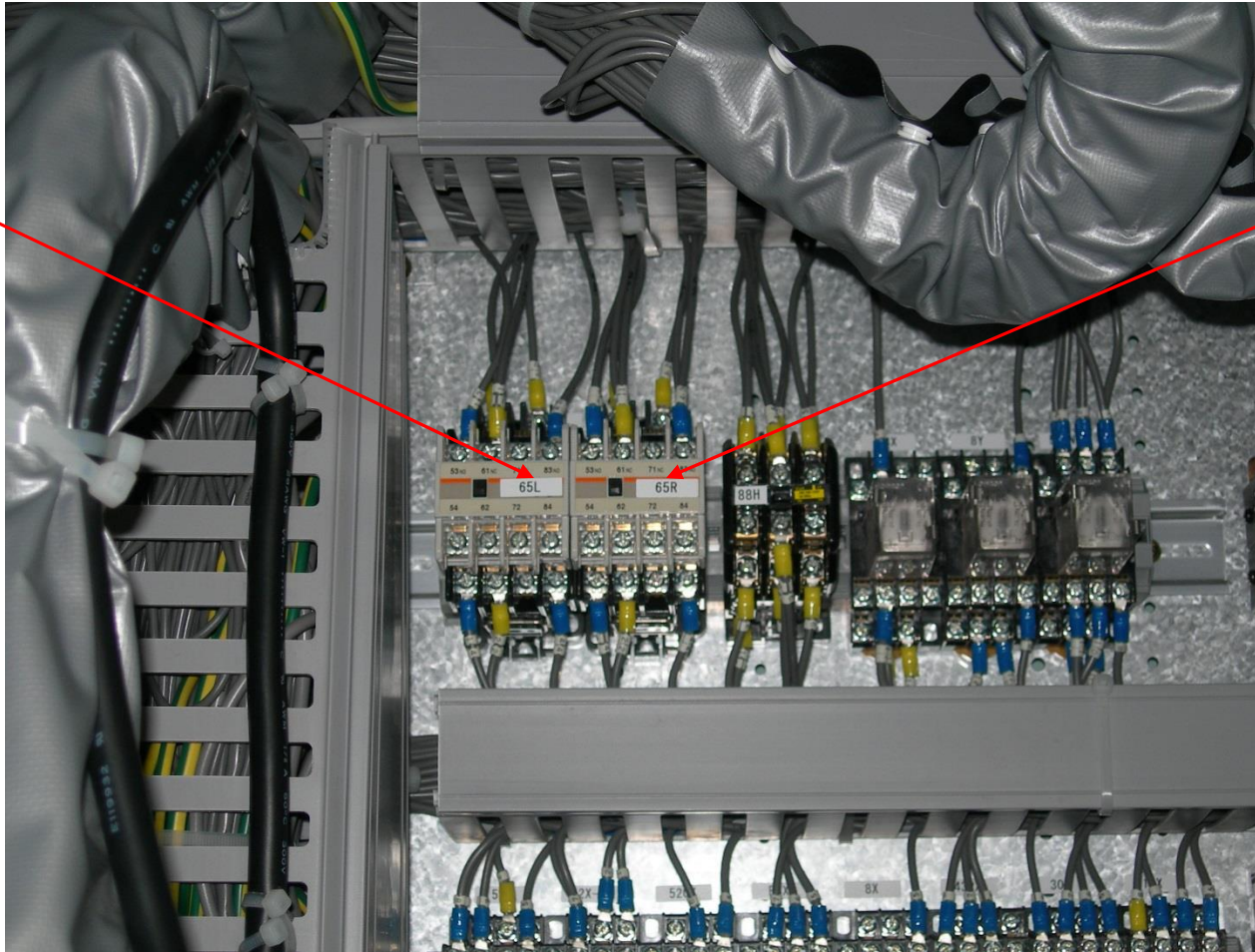
100 kHz to 1 MHz

The source of interference

SPEED UP

There is nothing like
good cable
management

And this is nothing
like it!



SLOW DOWN

How did the contactor noise get to the controller?

Victim

Source of interference



So you reckon this is FTB? Prove it!

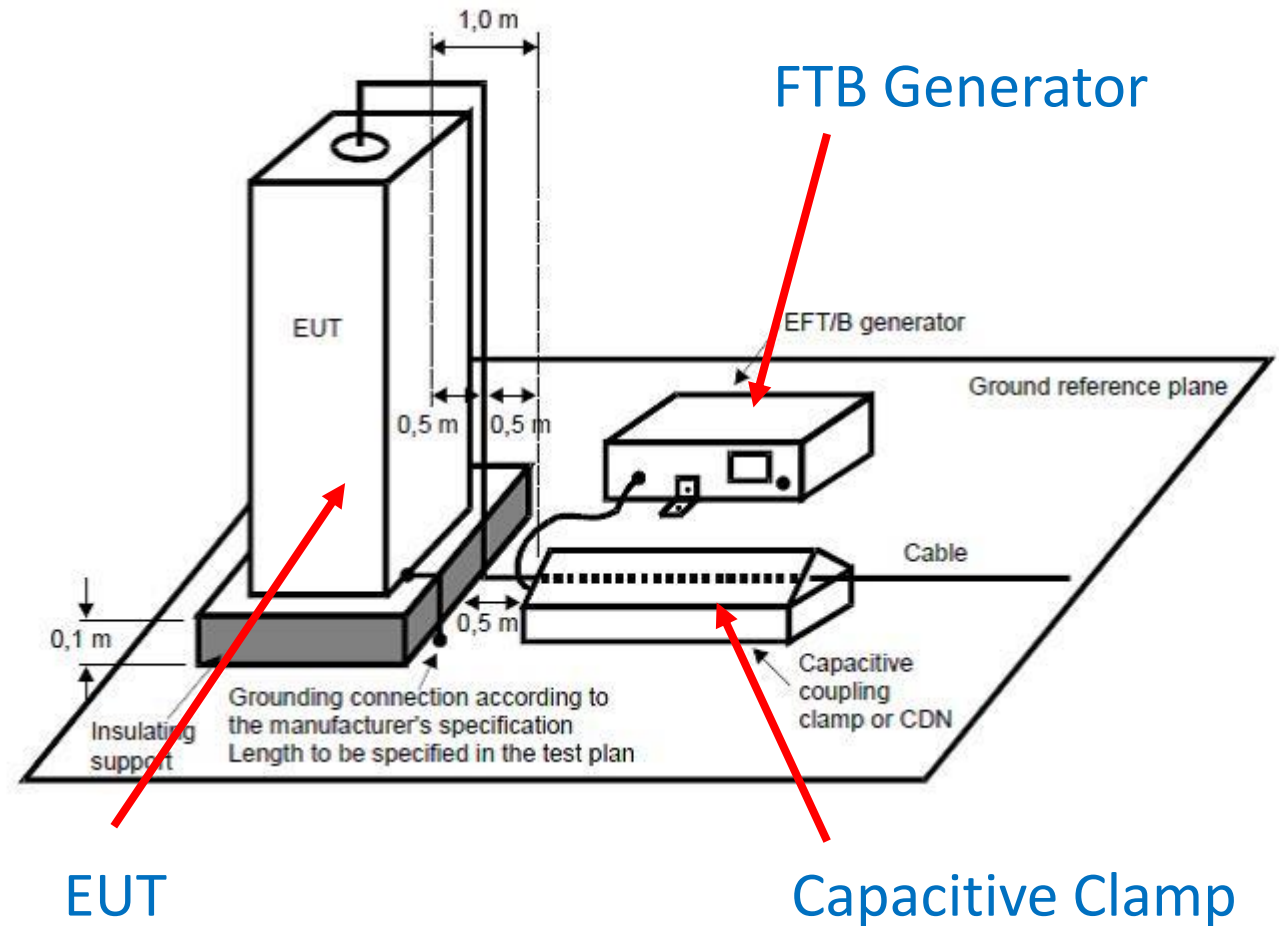
Testing of the Frequency Controller at HURSLEY EMC

Test applied: EN 61000-4-4

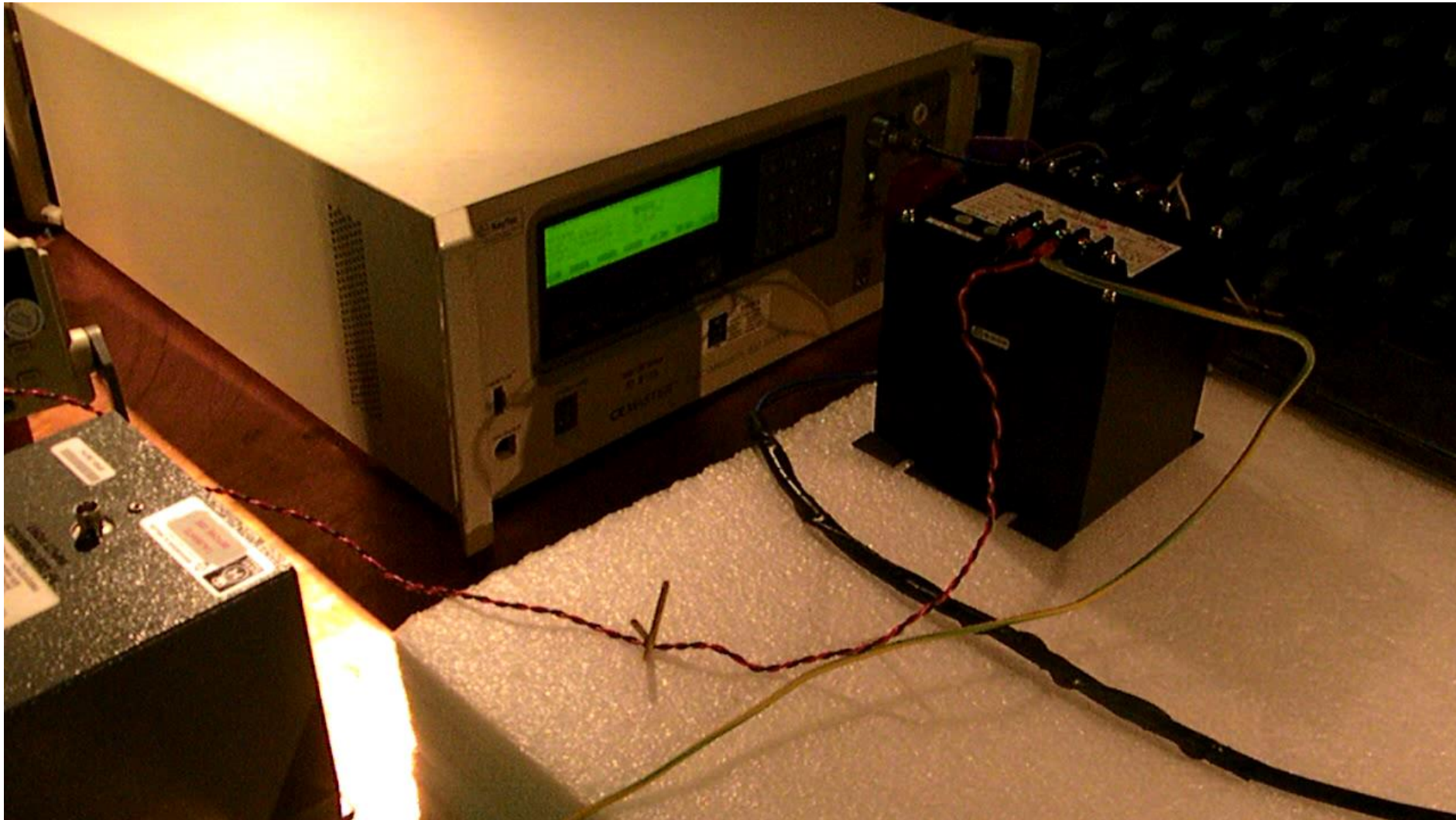
Test level: +/- 2kV

Coupling: Capacitive Clamp

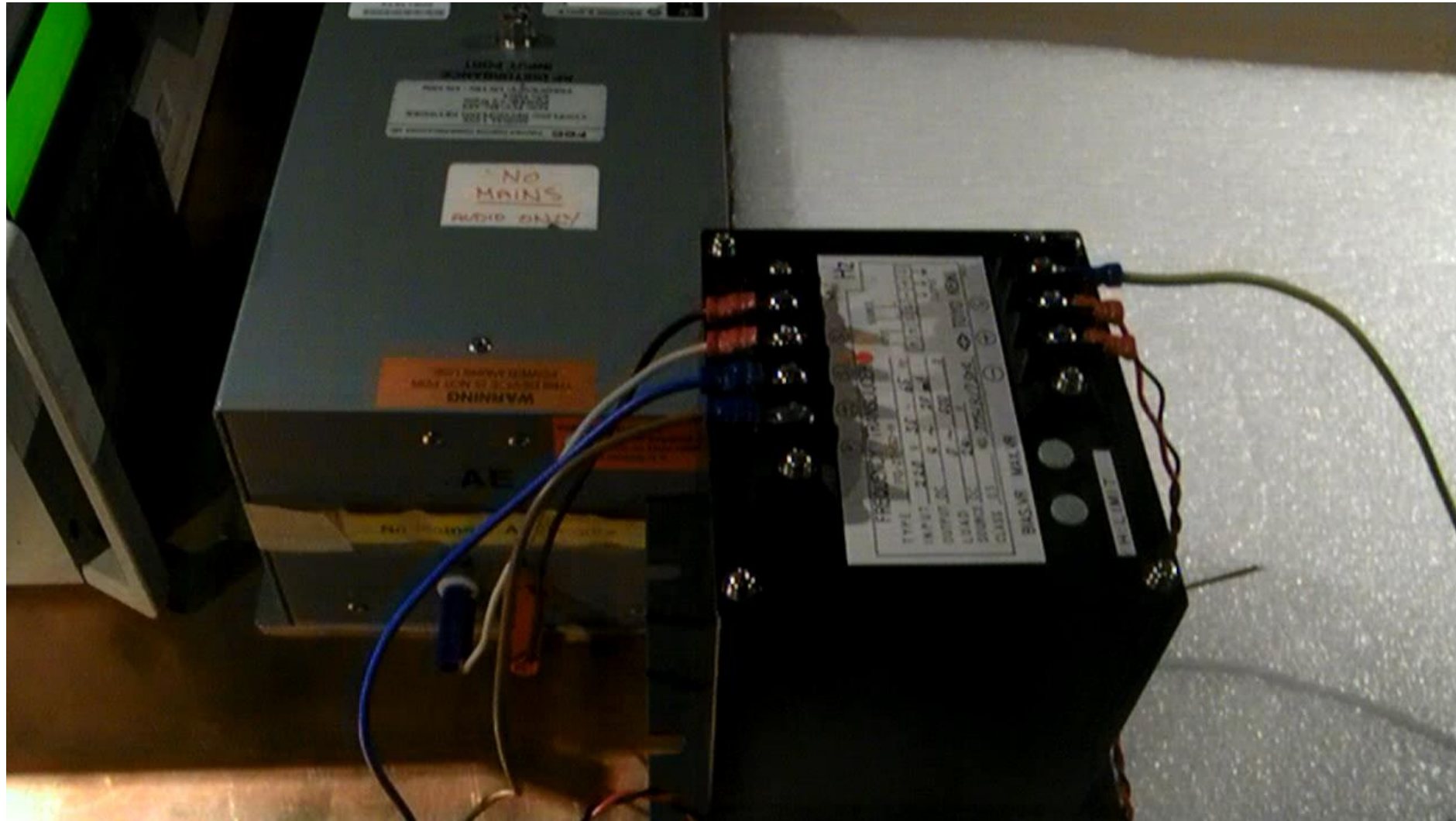
Line: 12V DC input



Frequency Transducer – No Input Filtering



Frequency Transducer – With Input Filtering



So what have we learnt?

- Fast Transient Burst interference is a real world problem.
- It can be very costly; remember 750,000 Dollars a week for 6 weeks = 4.5 Million Dollars.
- Failures due to FTB can be prevented by simple EMC design.
- Have your electronic products tested by a third party competent body.



Thank you for listening

Any questions?