Risk

Failure is an Option

Doug Phillips
American Global Maritime

October 9-10, 2007

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FAILURE IS AN OPTION

Doug Phillips

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Marine Technology Society

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REUTERS

Introduction

- What is a failure - recap?
- Happening in practice - trying to make it fault tolerant not independent
- Some examples
- Conclusions

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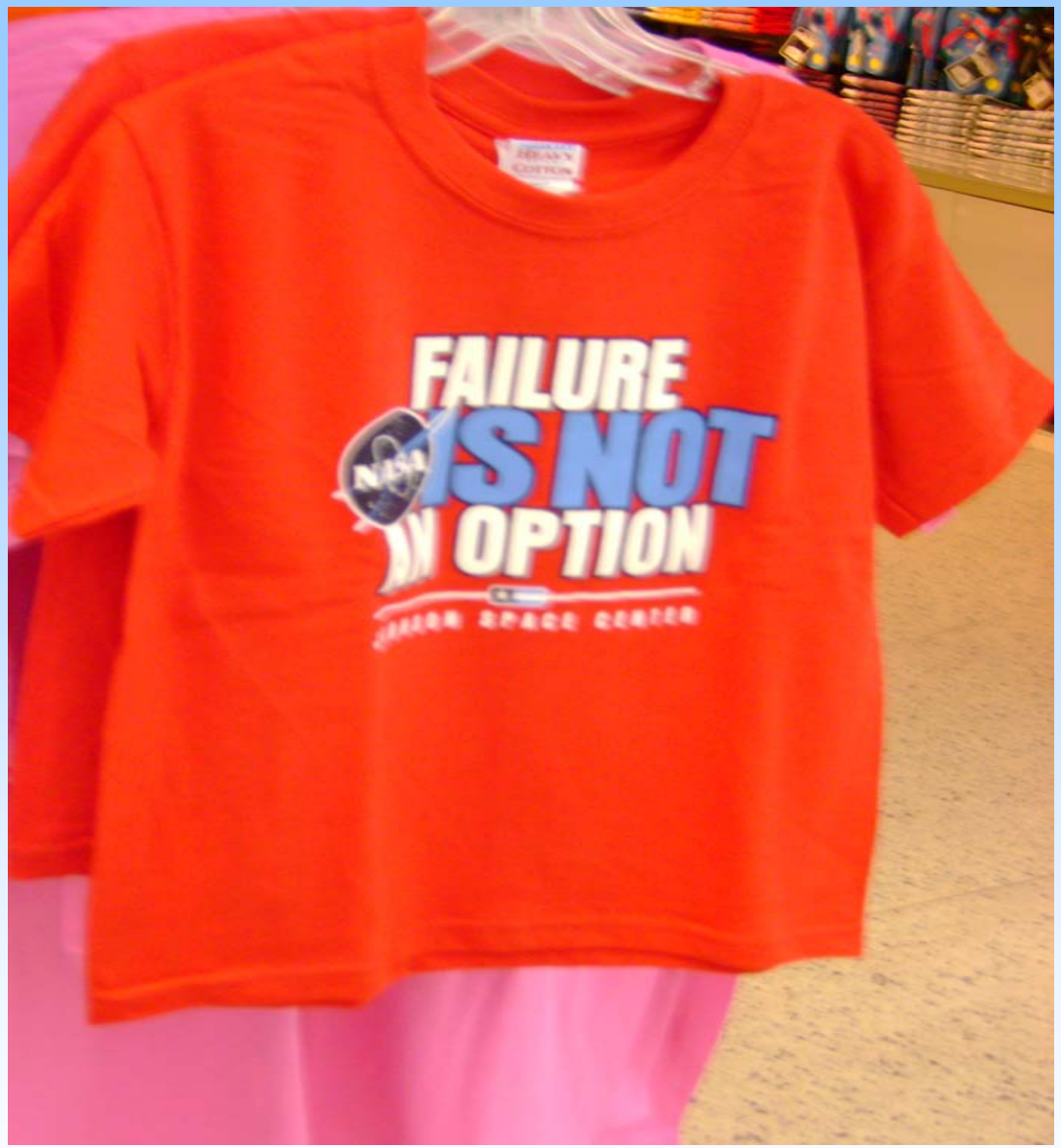

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DP - 'Failure is an option' - IMO

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- **For equipment class 2**, a loss of position is not to occur in the event of a **single fault** in any **active component or system**.
  Normally static components will not be considered to fail where adequate protection from damage is demonstrated, and reliability is to the satisfaction of the Administration.

DP - 'Failure is an option' - IMO

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- **Single failure criteria include**:

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- **Single failure criteria include**:
- Any active component or system

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- **Single failure criteria include**:
- Any active component or system
- Any normally static component (cables, pipes manual valves, etc.) which is not properly documented with respect to protection and reliability.

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- **For equipment class 3,** a **single failure as class 2**, and any normally **static component** is assumed to fail.

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- All components in any one watertight comp, from fire or flooding.
- All components in any one fire sub-division, from fire or flooding
- For equipment classes 2 and 3, a **single inadvertent act** should be considered as a single fault if such an act is reasonably probable.

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- **Hardware modification management**

In Practice

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- Very often on site modification or 'improvements'
- **And of course my favorite the dreaded**

In Practice

- **DIODE OR!!!!!!!**

In Practice

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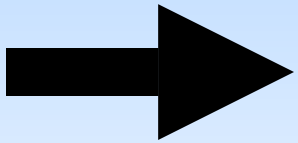

In Practice

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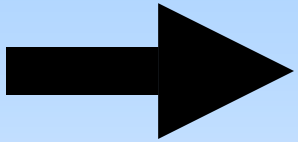

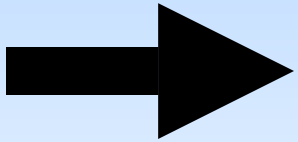

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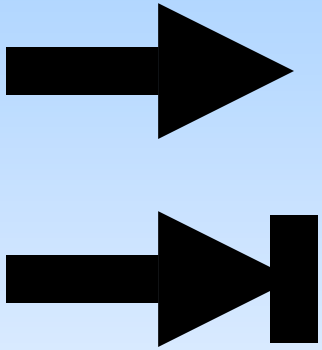

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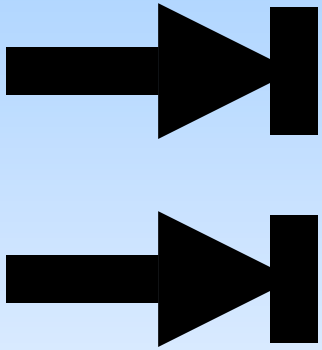

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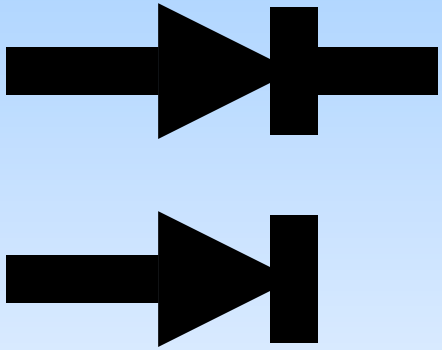

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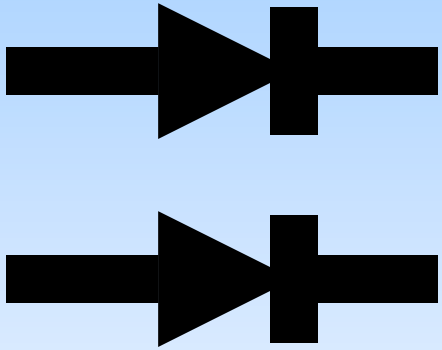

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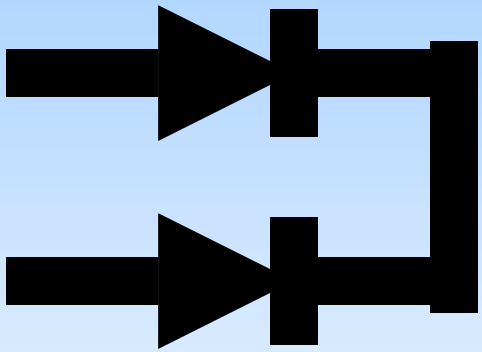

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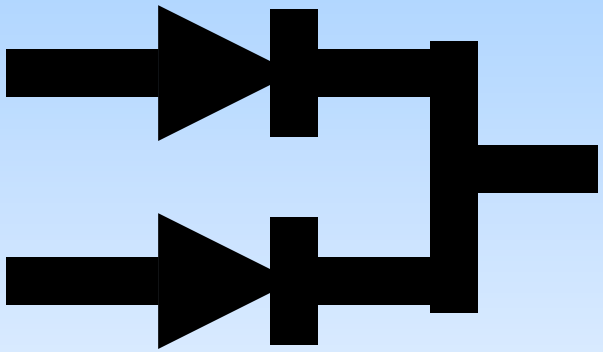

Before Electrical Examples

- Rube Goldman
- Health Robinson
- **Wallace and Grommit – cracking contraptions**
- All mechanical classic over designs
- No electrical ones – except on DP ships
- One electro mechanical one

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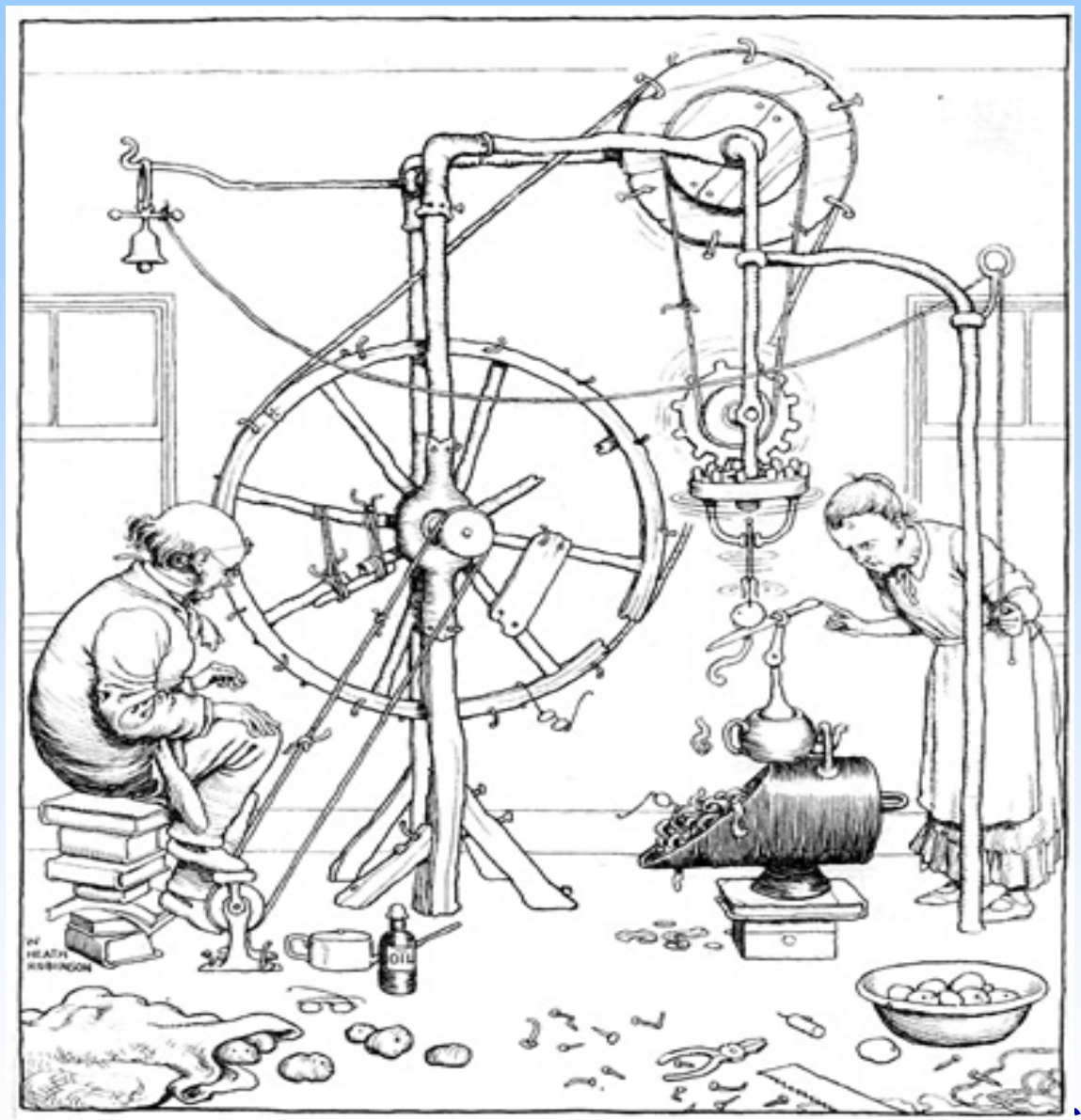
All Mechanical



The Professor's invention for peeling potatoes.

Electro Mechanical

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June 8, 1965 H. L. SHATTO, JR., ET AL 3,187,704
Filed March 14, 1961 SHIP CONTROL SYSTEM
3 Sheets-Sheet 2

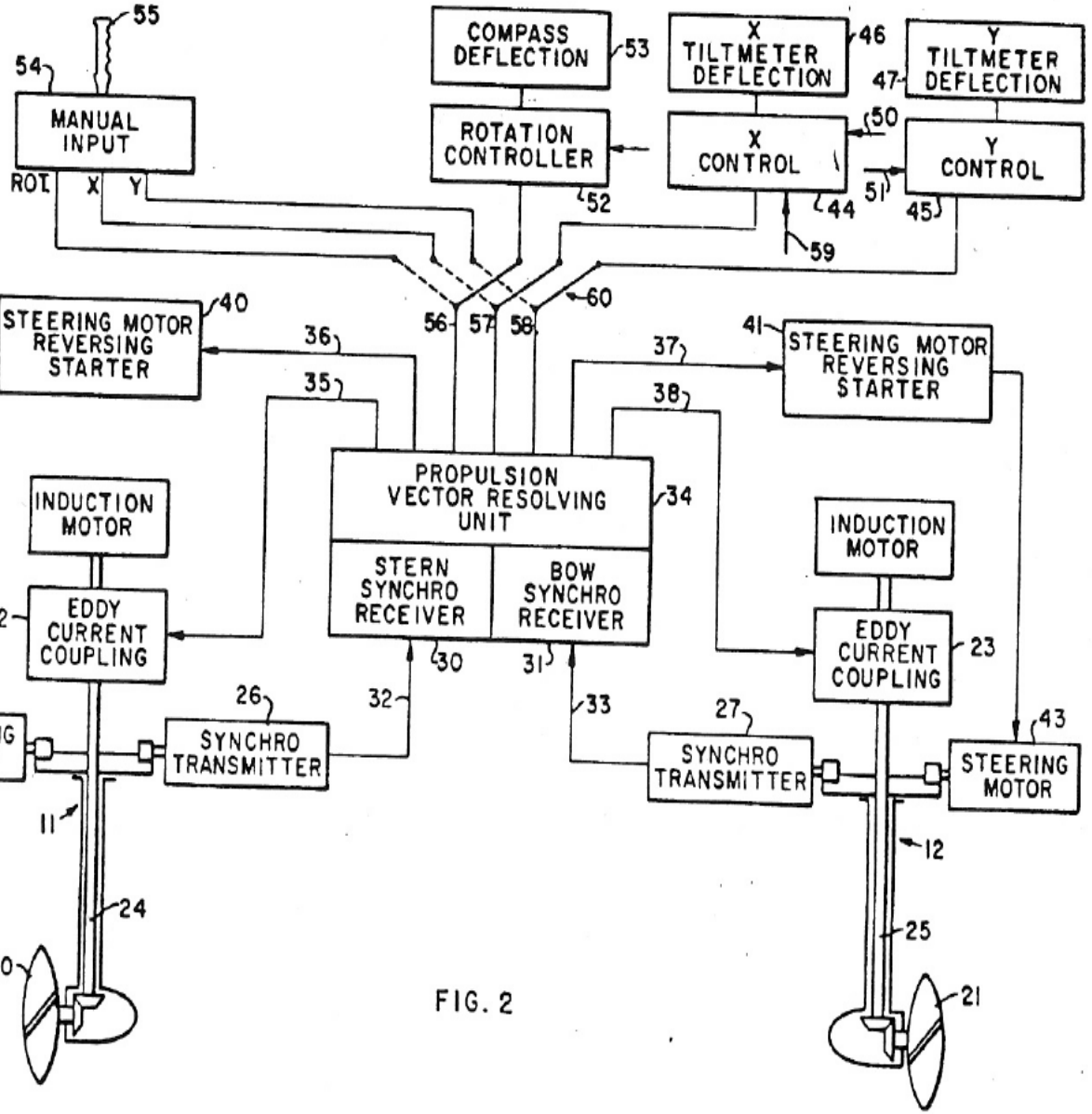

FIG. 2

INVENTORS:
H. L. SHATTO JR.
J. R. DOZIER
BY: Thurston E. Ridout
THEIR ATTORNEY

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1 in P 9205; Kolb-

June 8, 1965 H. L. SHATTO, JR., ET AL 3,187,704

SHIP CONTROL SYSTEM

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Shell Oil Co

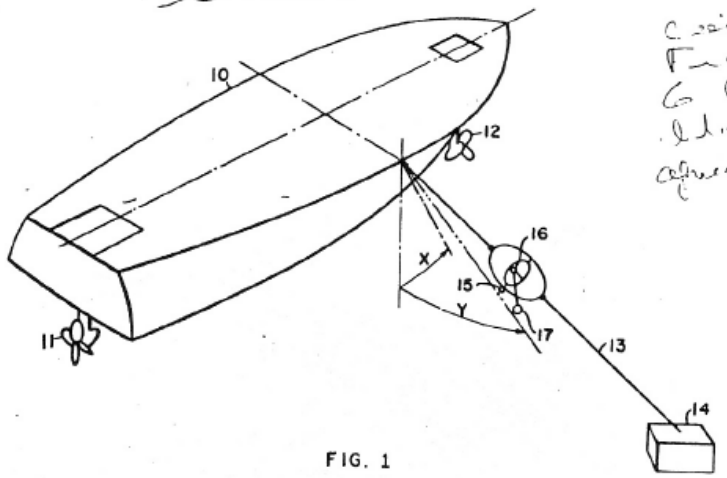

FIG. 1

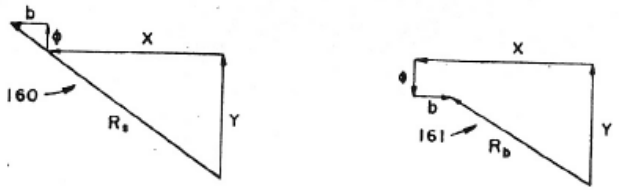

FIG. 4

INVENTORS:
H. L. SHATTO JR.
J. R. DOZIER
BY: Theodore E. Bieber
THEIR ATTORNEY

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SHIP CONTROL SYSTEM

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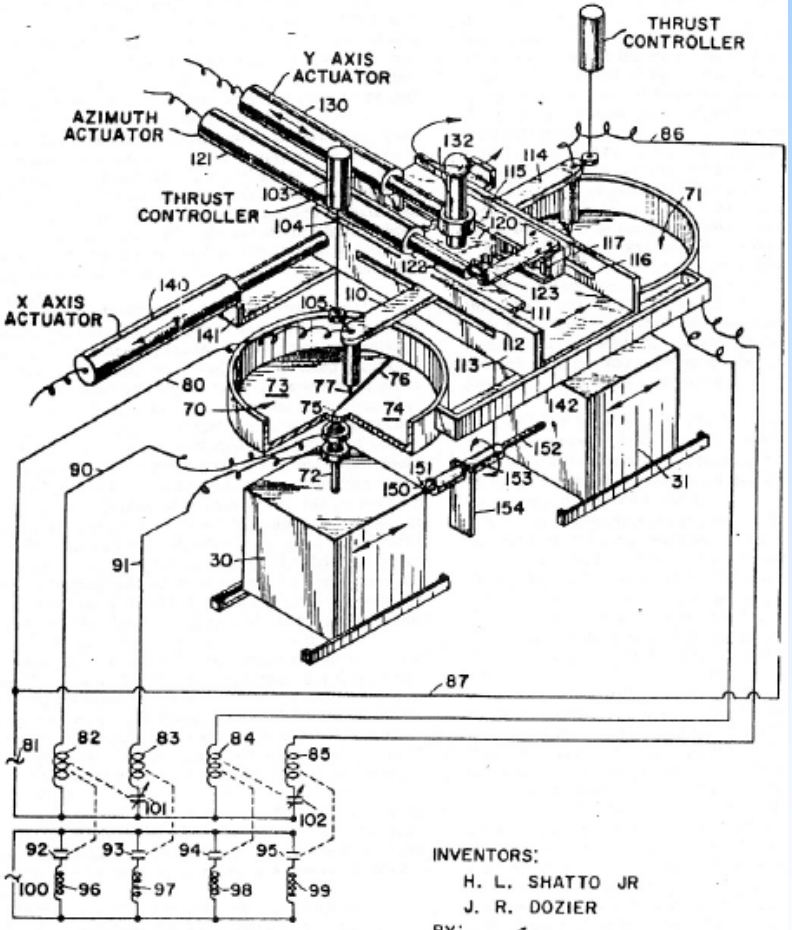
FIG. 3



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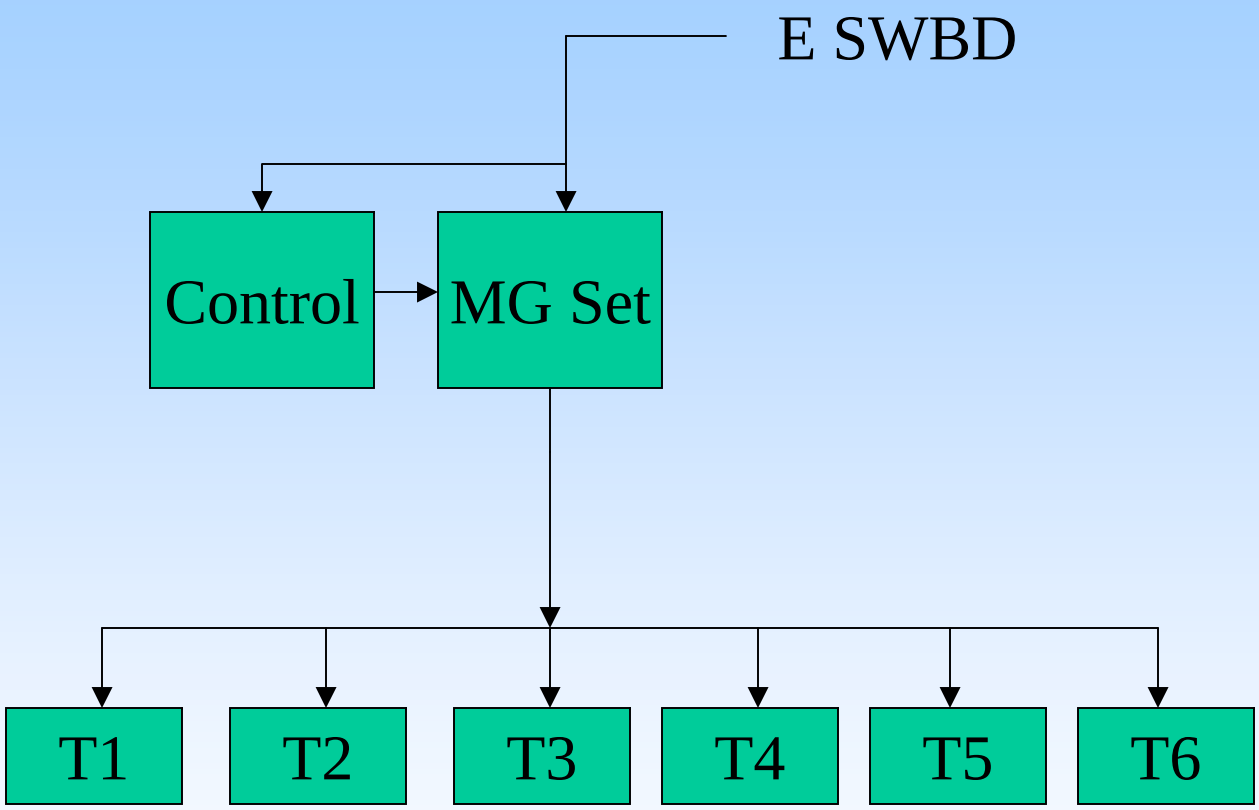
Electrical Examples from Experience

9 Examples (plus 1)

- block diagrams to keep it simple
- all DP vessels – mainly modification but not all
- *the thought process all my own*
- All well intentioned

Example 1 - 'Clean Supply'



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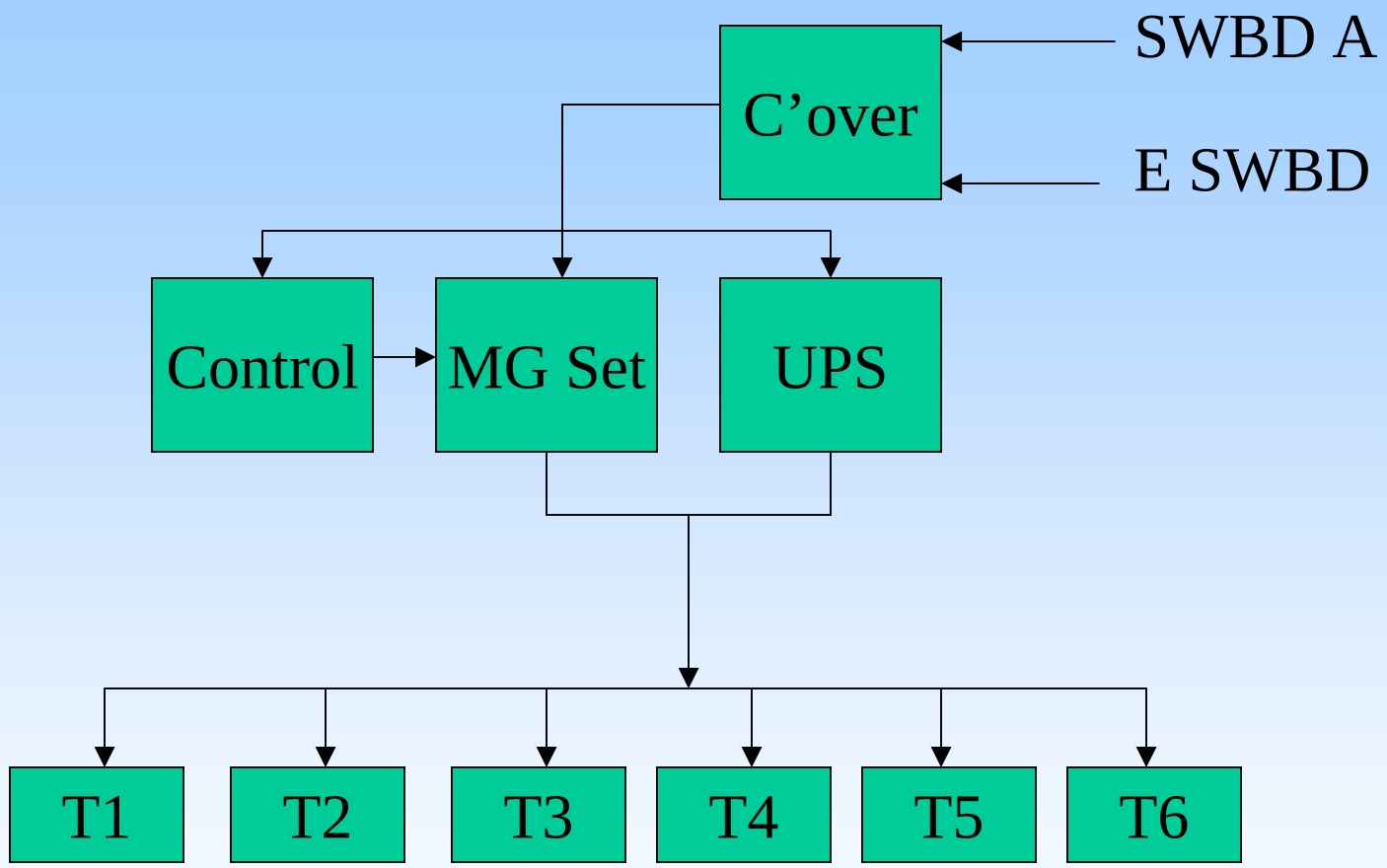

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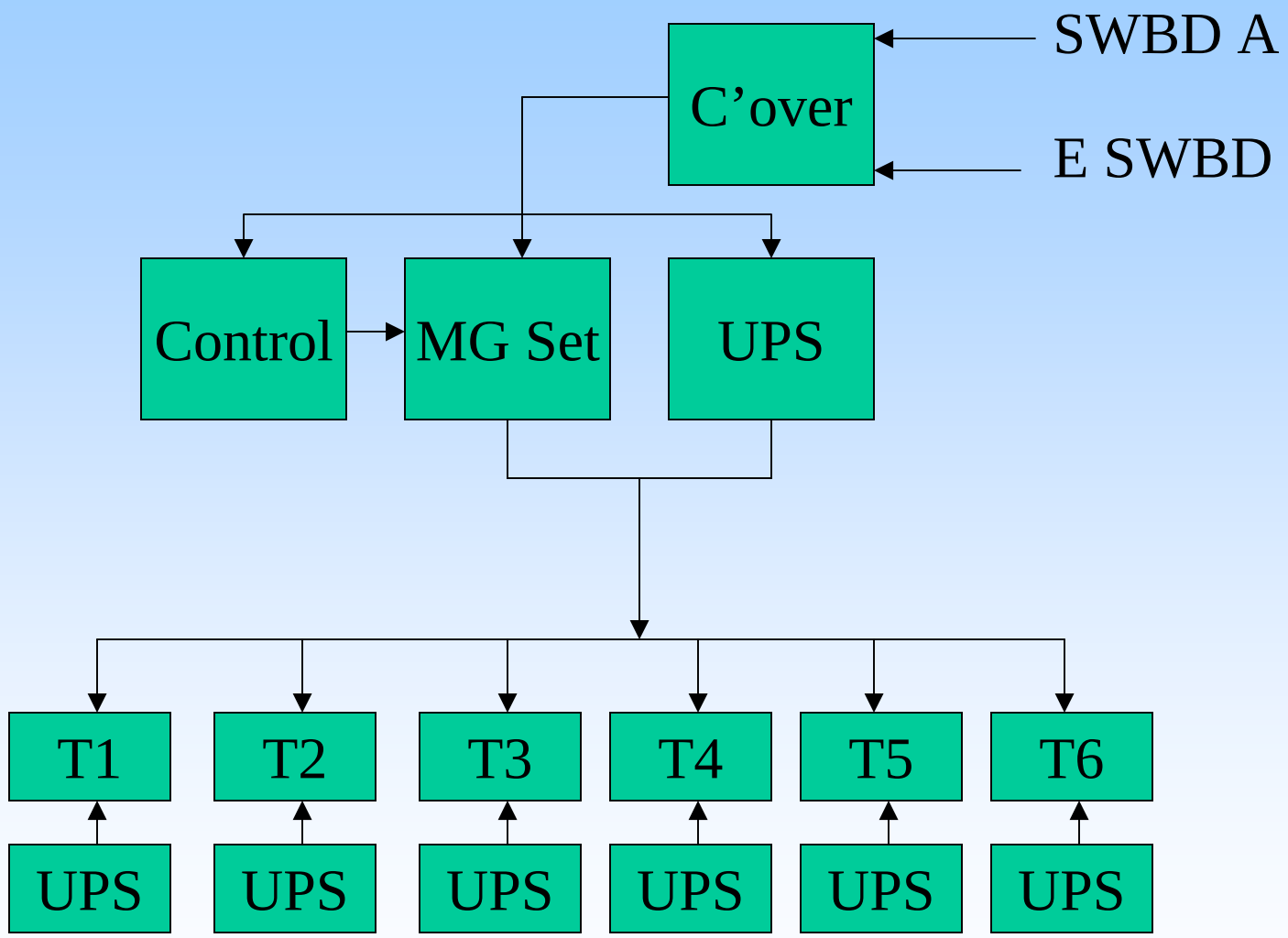

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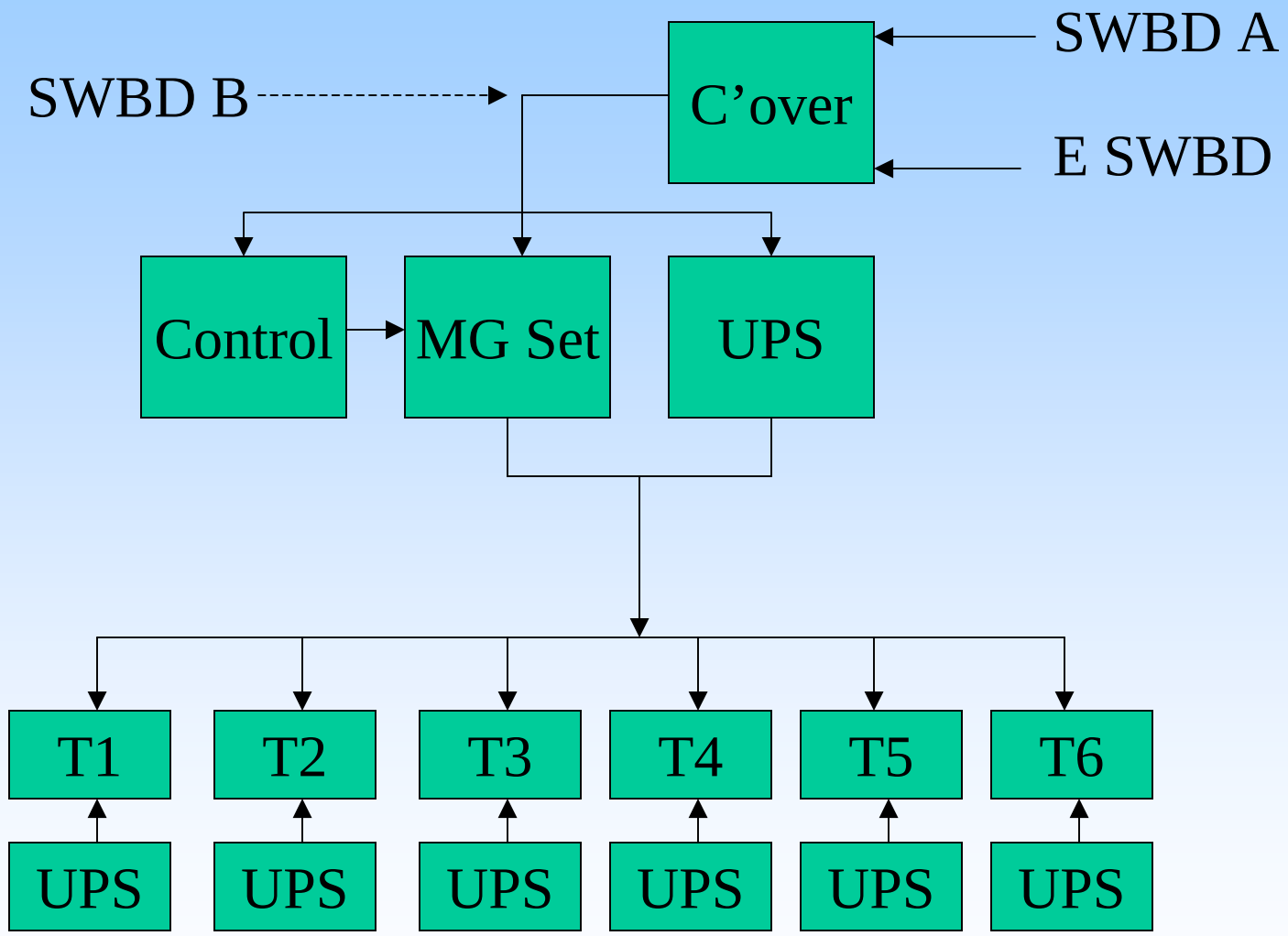
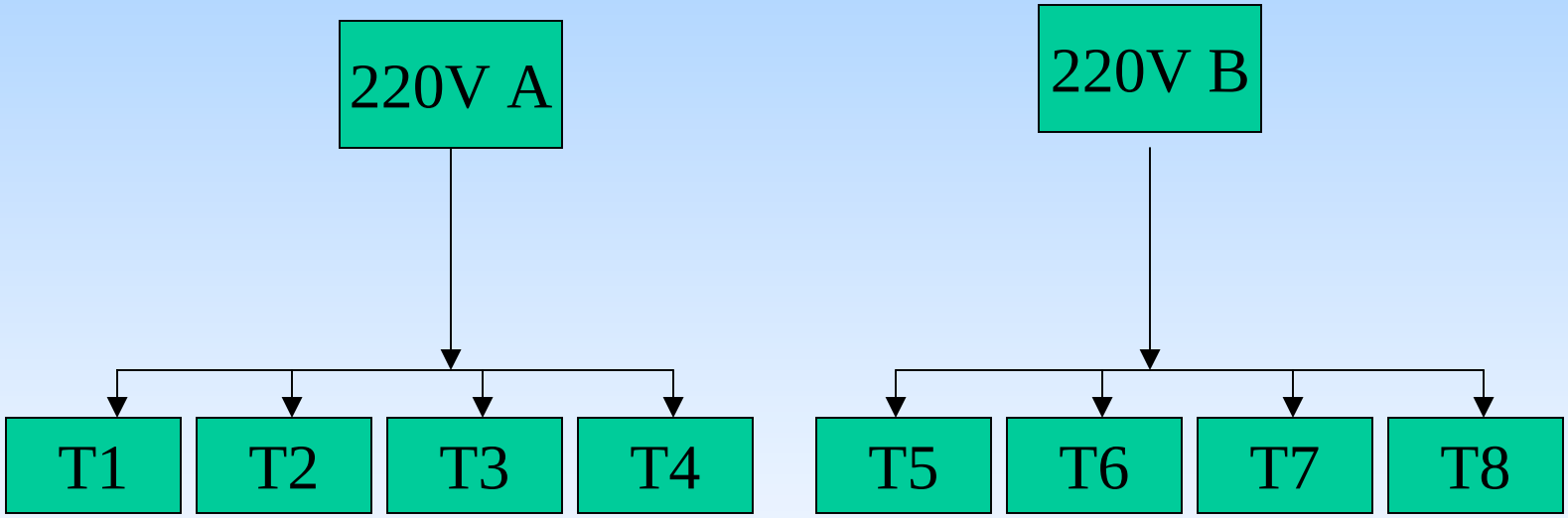


Example 2 - “Back Up Supplies’



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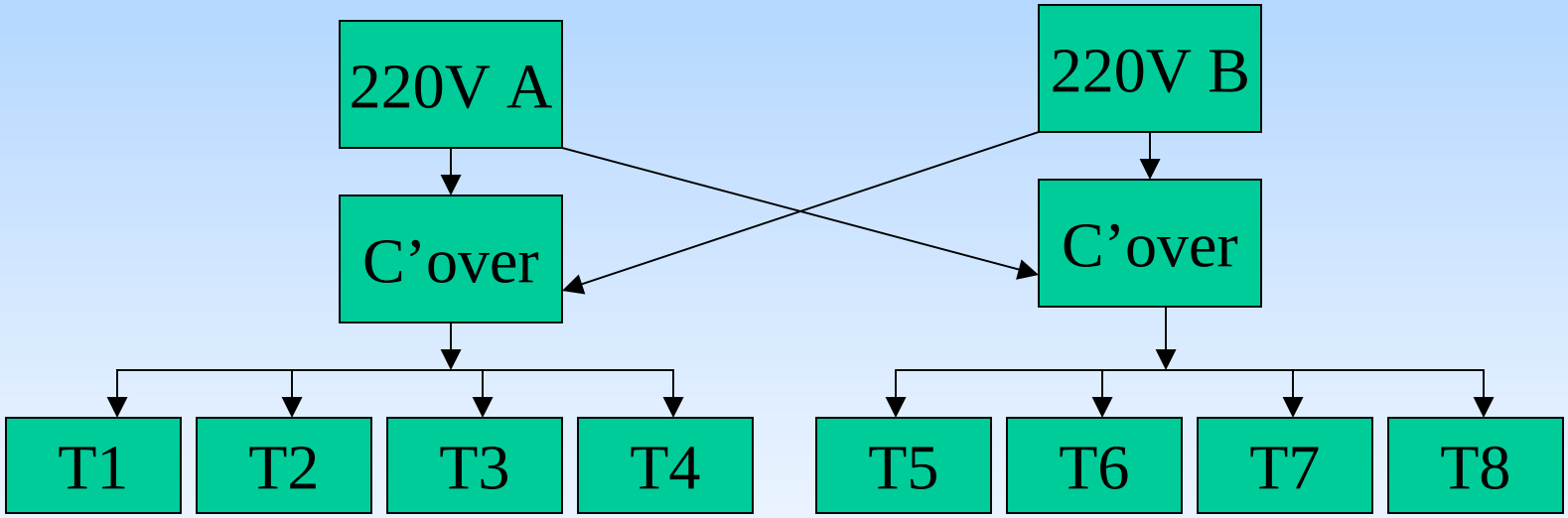

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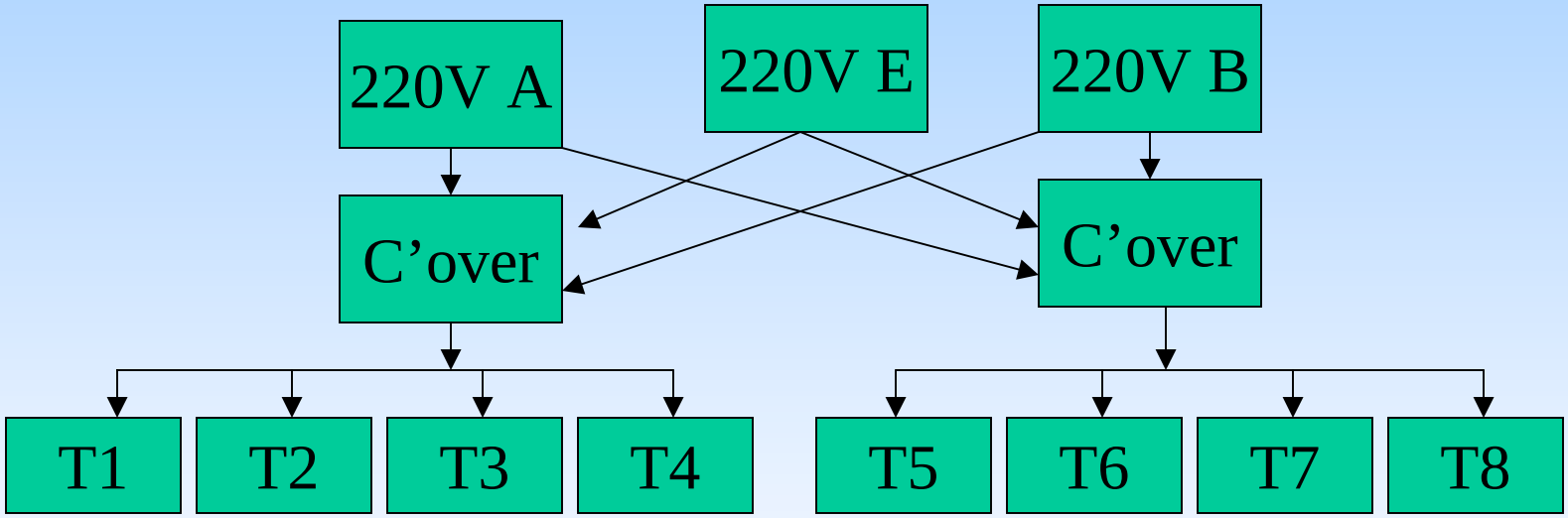

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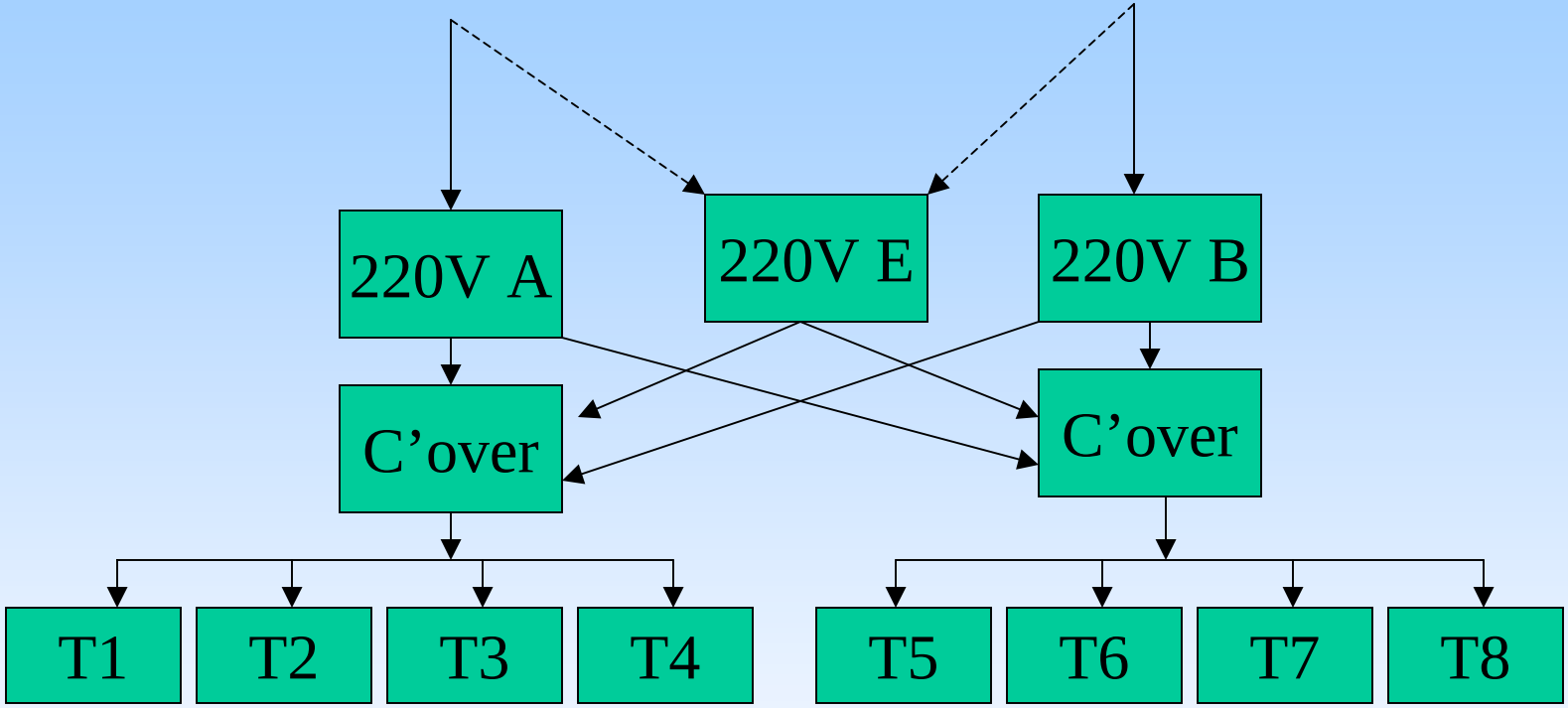
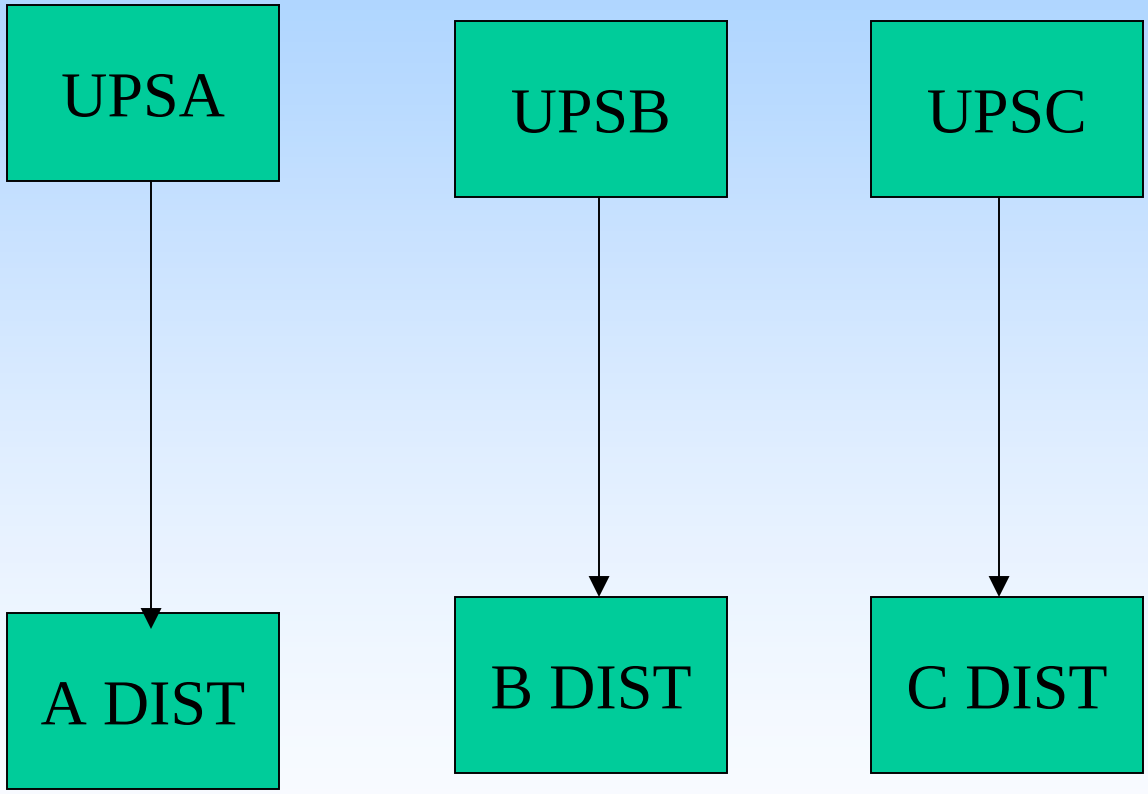


Example 3 - UPS's's's



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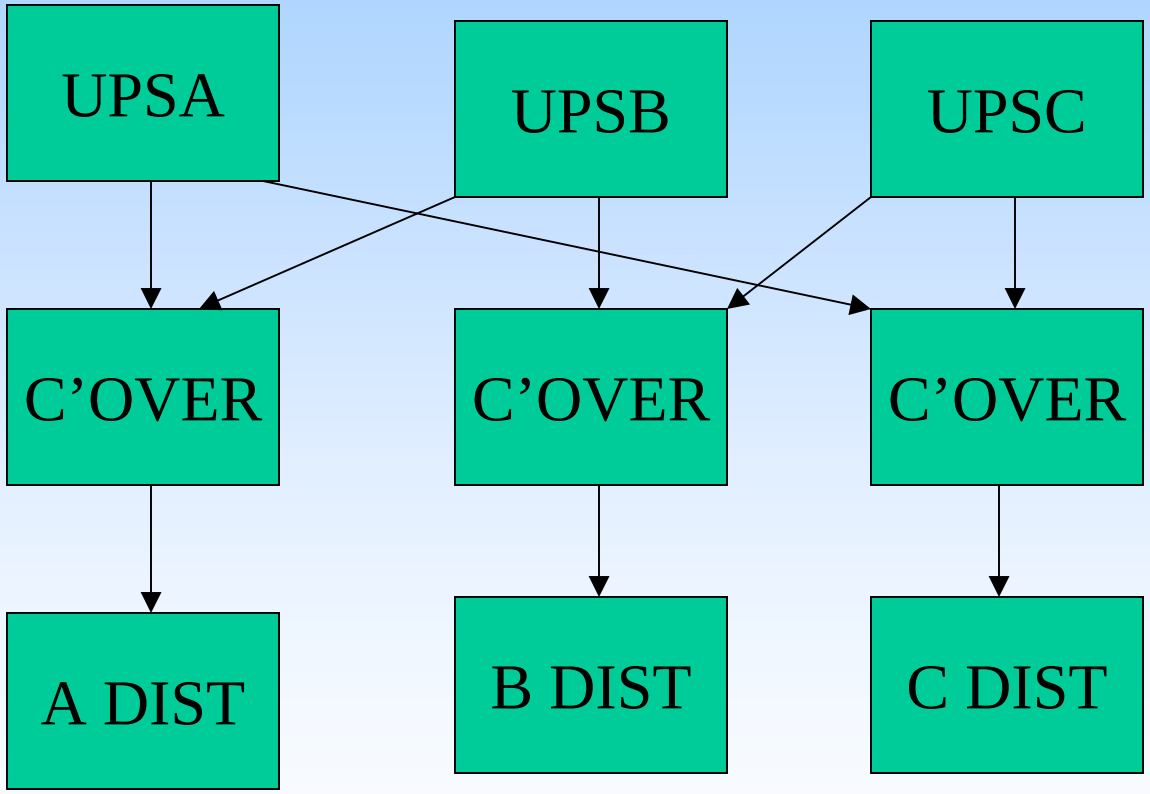

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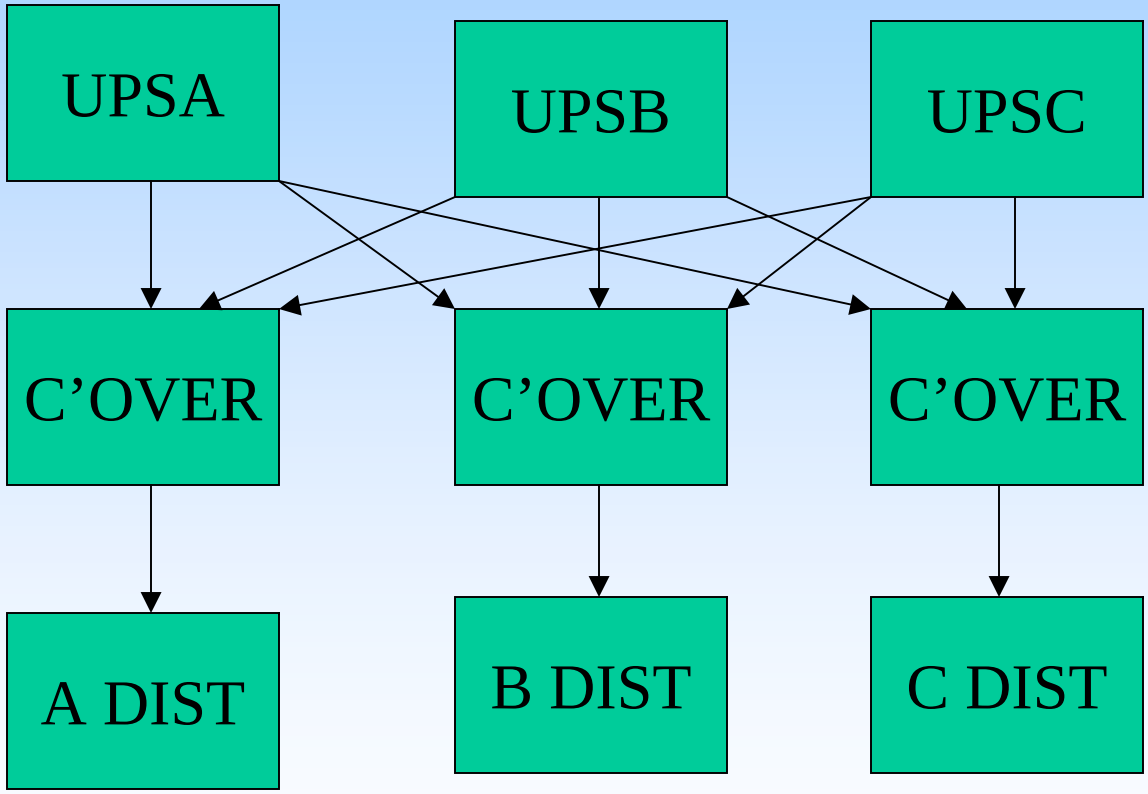
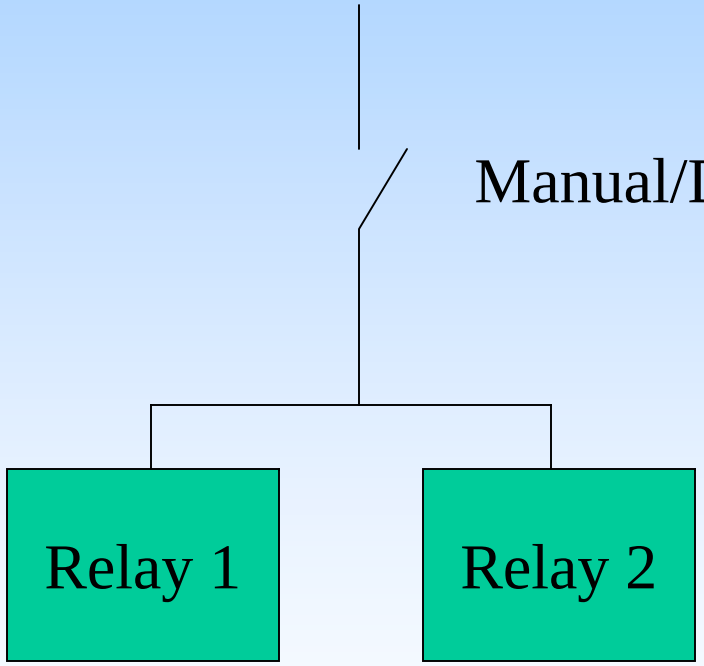


Example 4 - Top of Class 3



Half thrusters select to DP

Half thrusters select to DP

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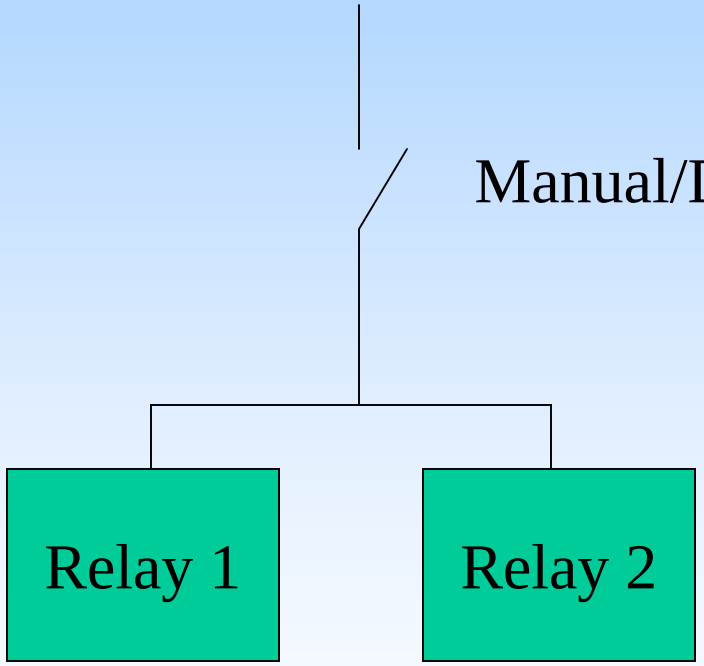
Example 4 - Top of Class 3



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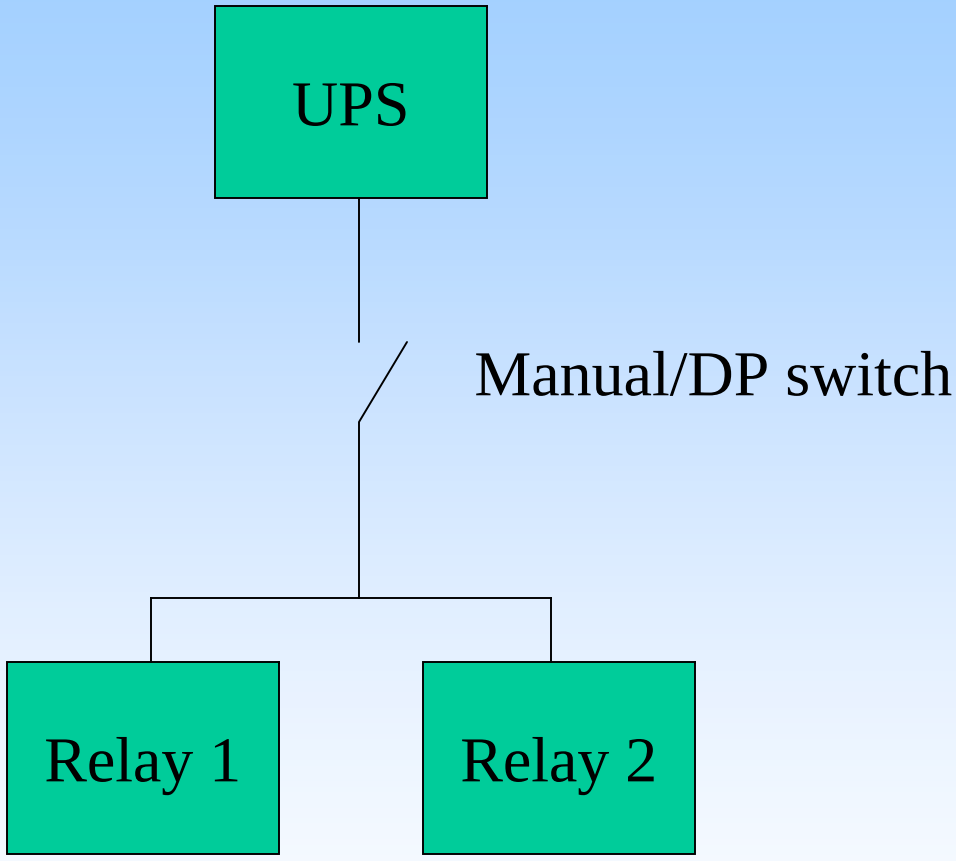

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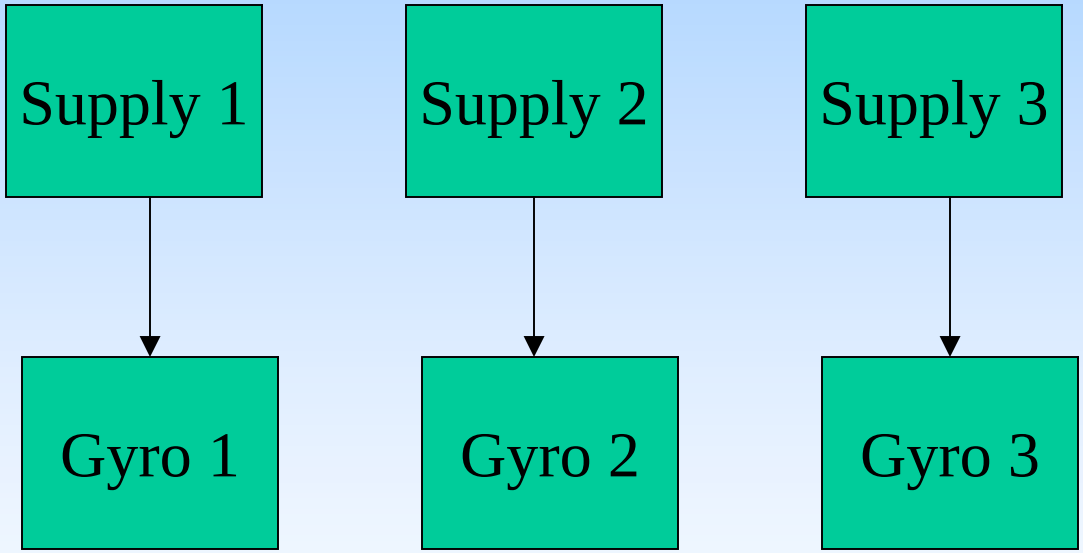
Example 5 - 'Backed up' Gyros



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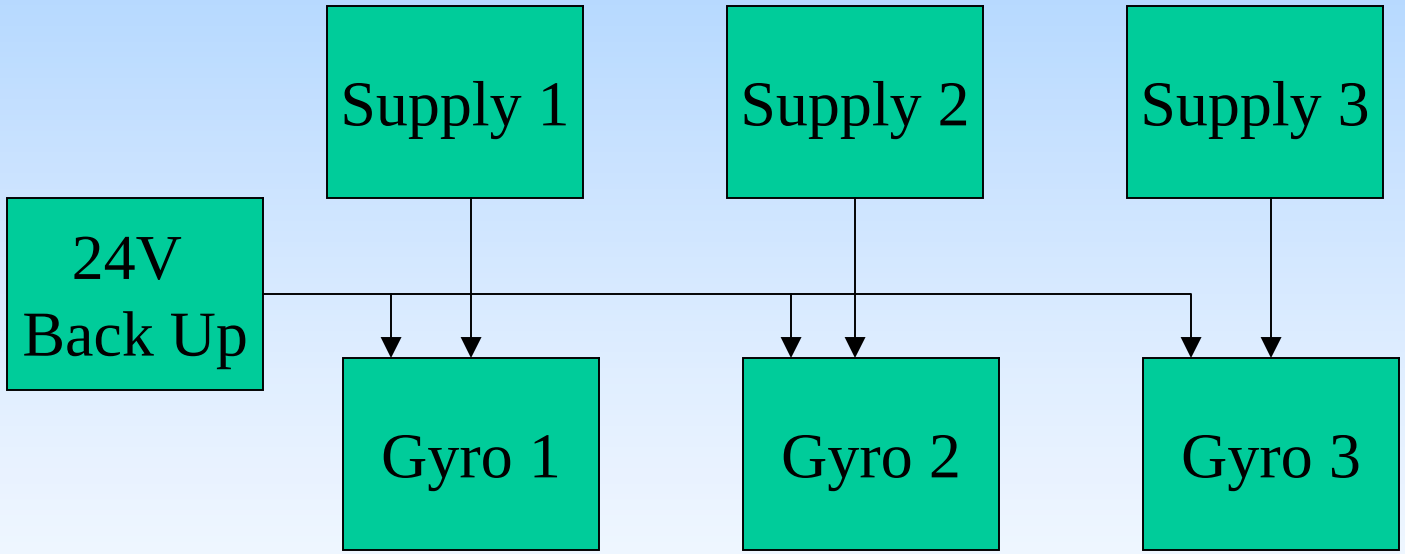

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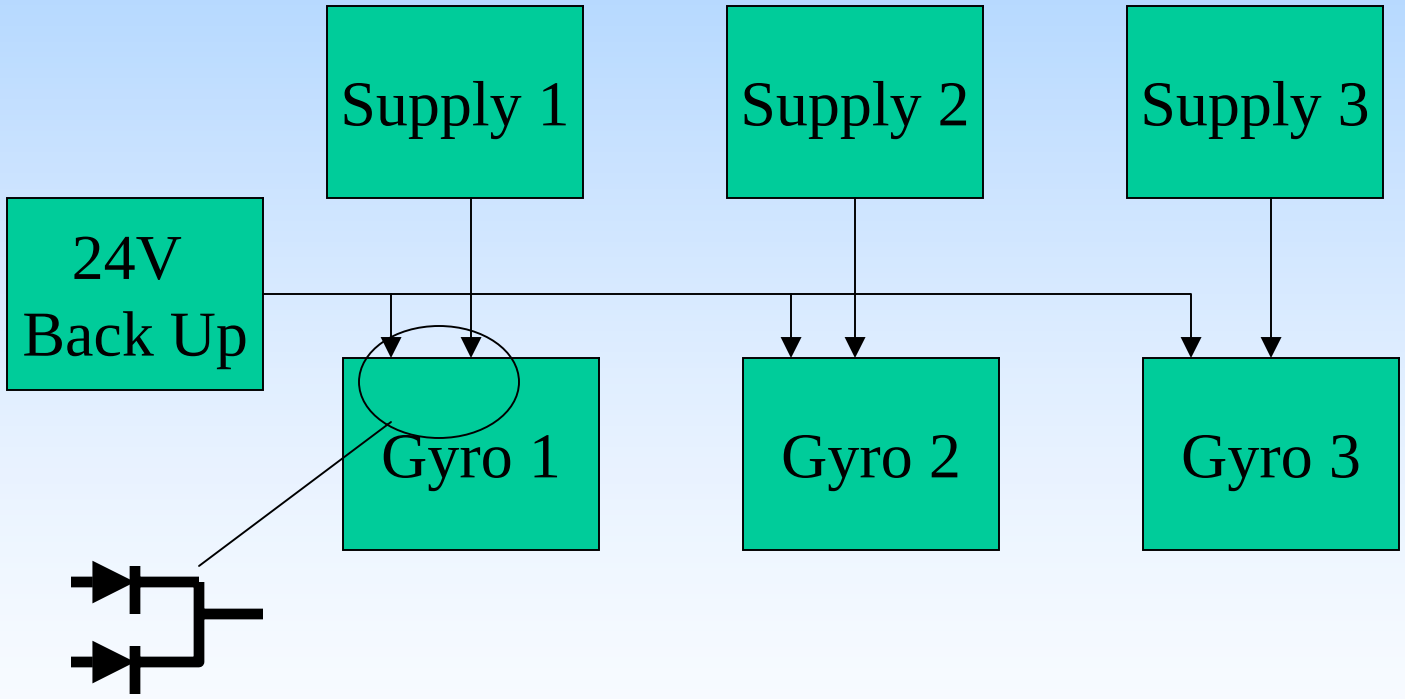

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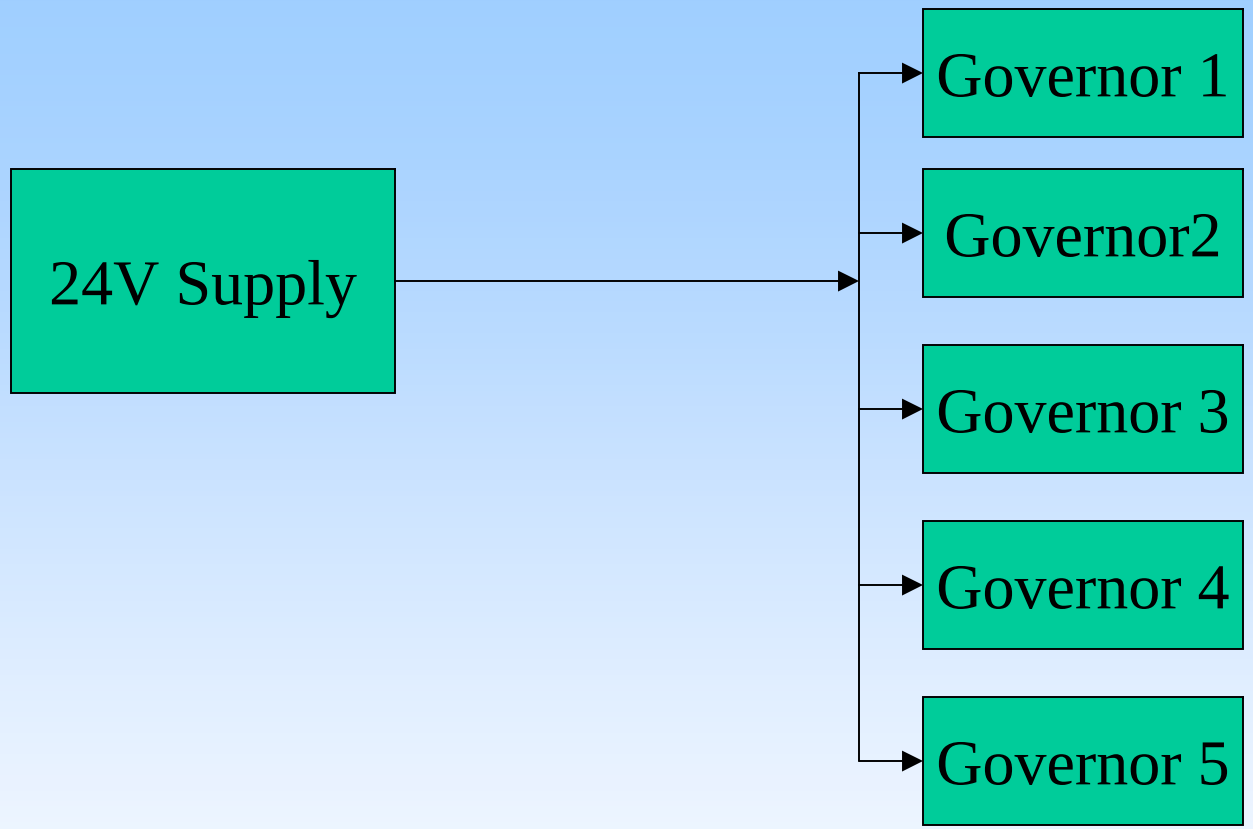
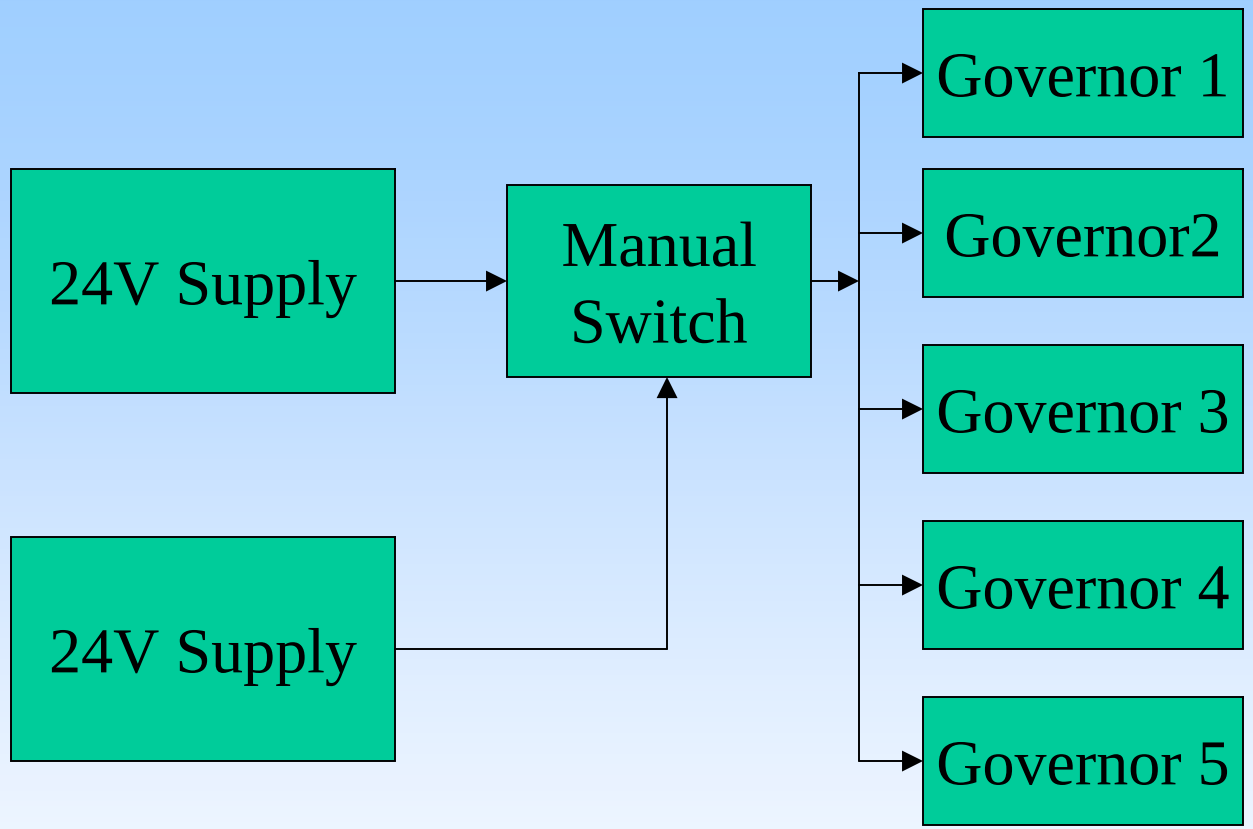
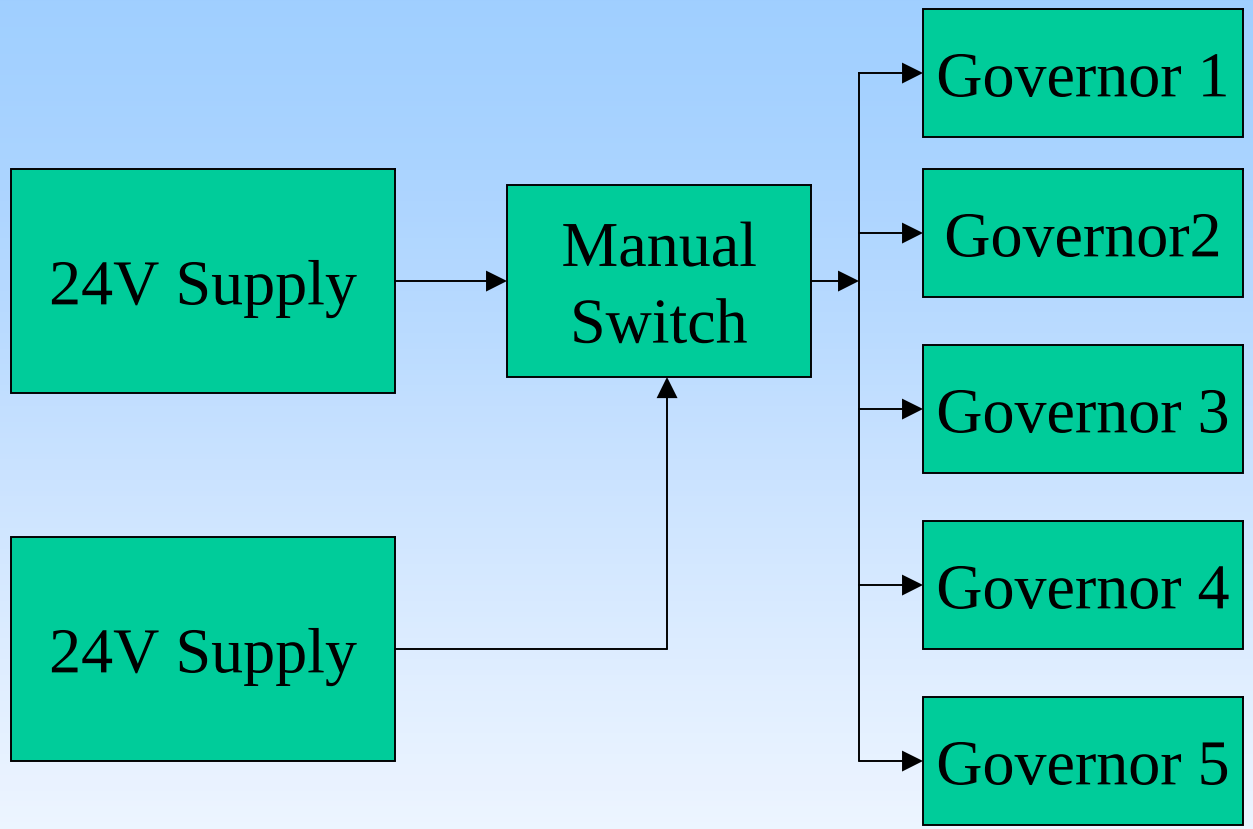
Example 6 - ‘Backed up’ 24V



Example 6 - 'Backed up' 24V



Example 6 - 'Backed up' 24V



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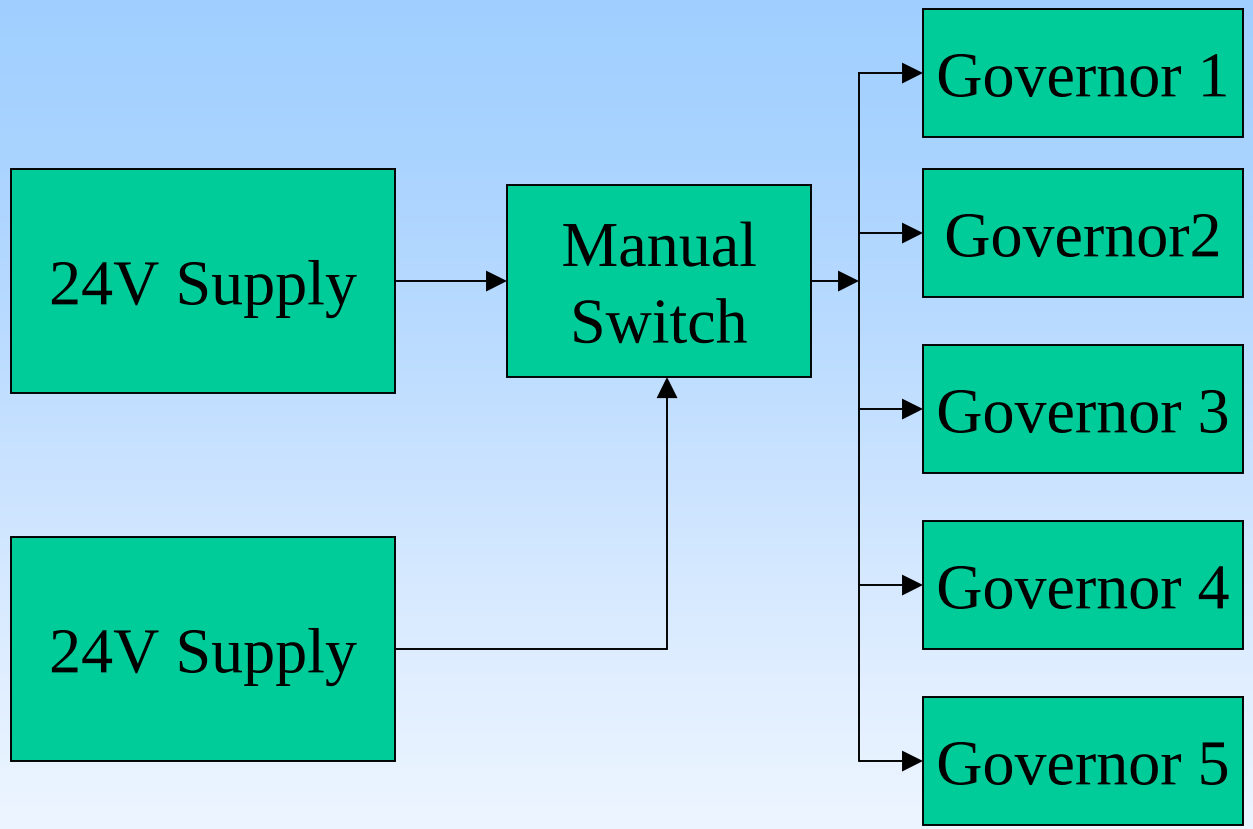
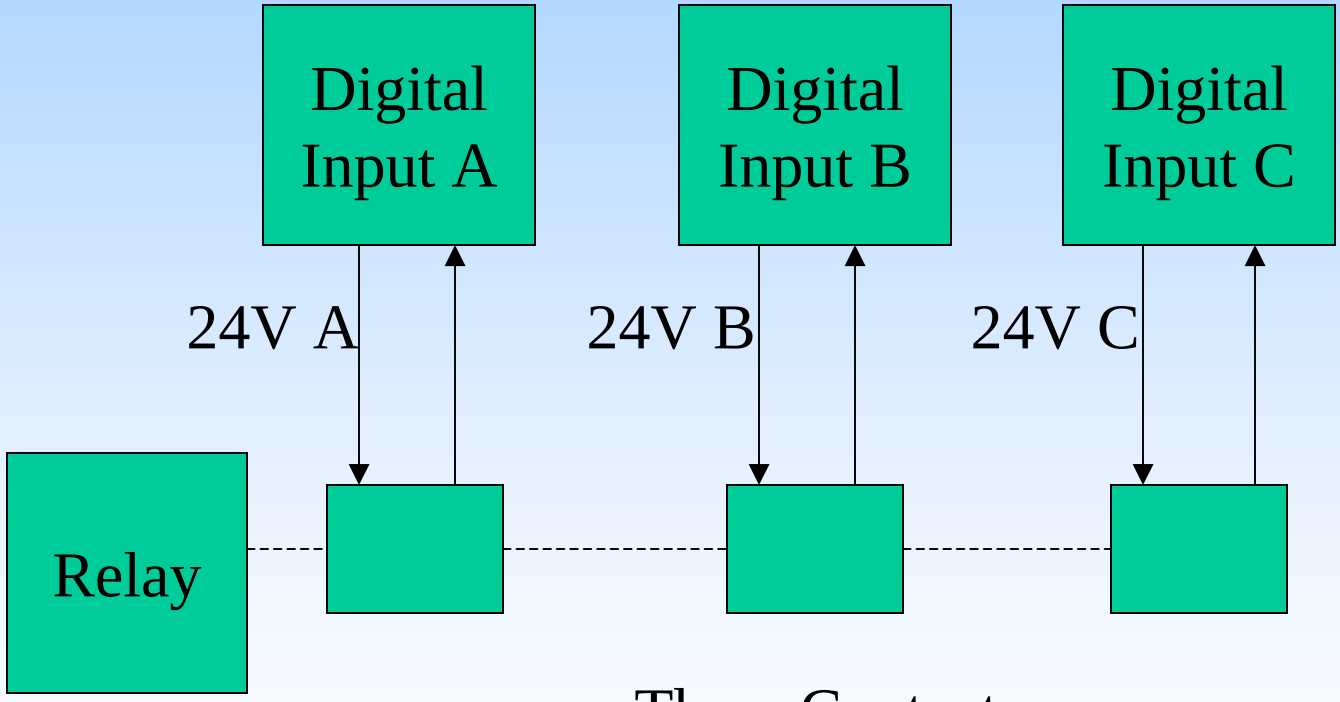


Procedure

Example 7 - Diodes Galore



Three Contacts

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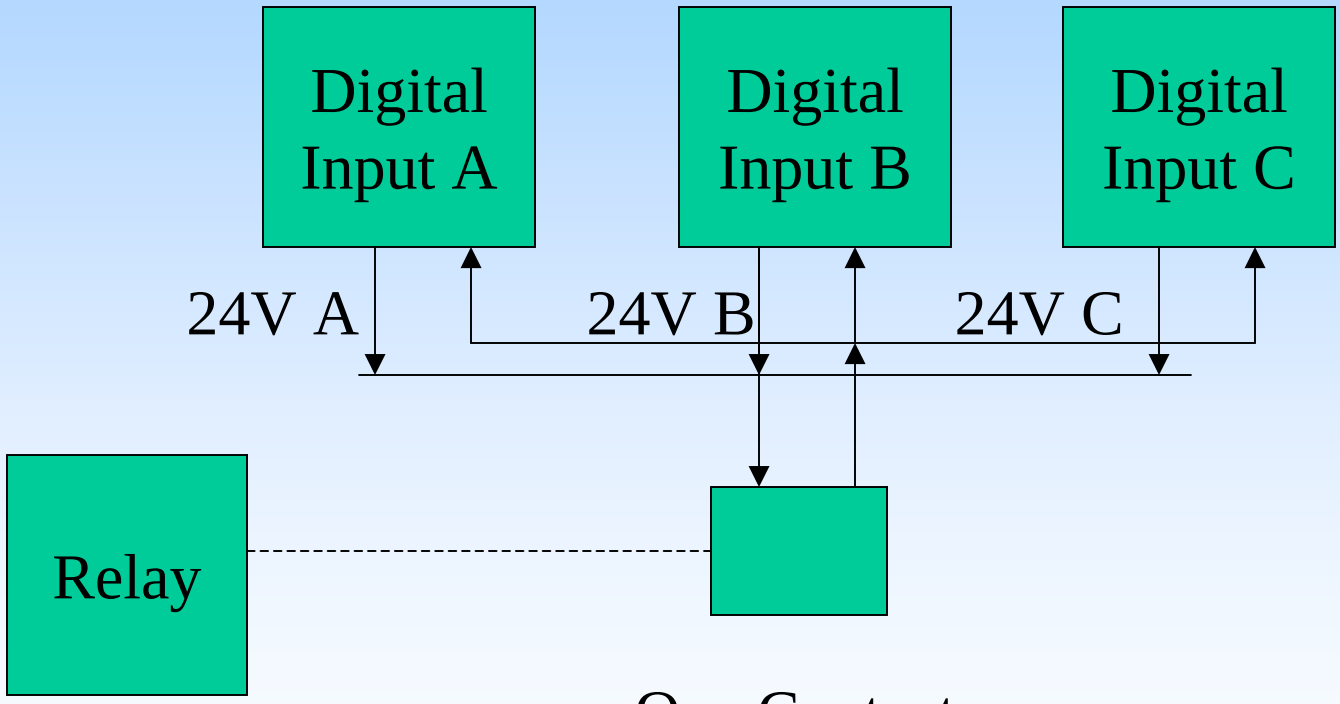

One Contact

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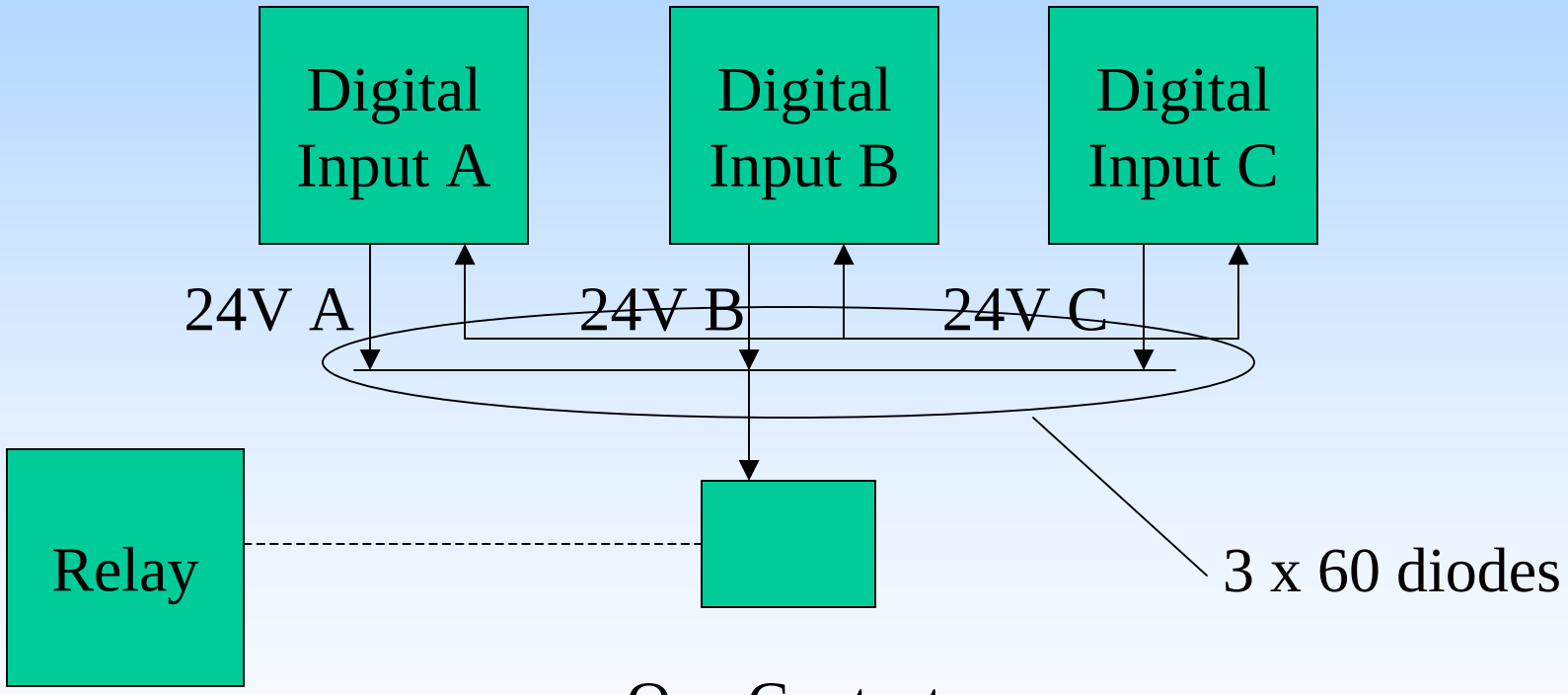

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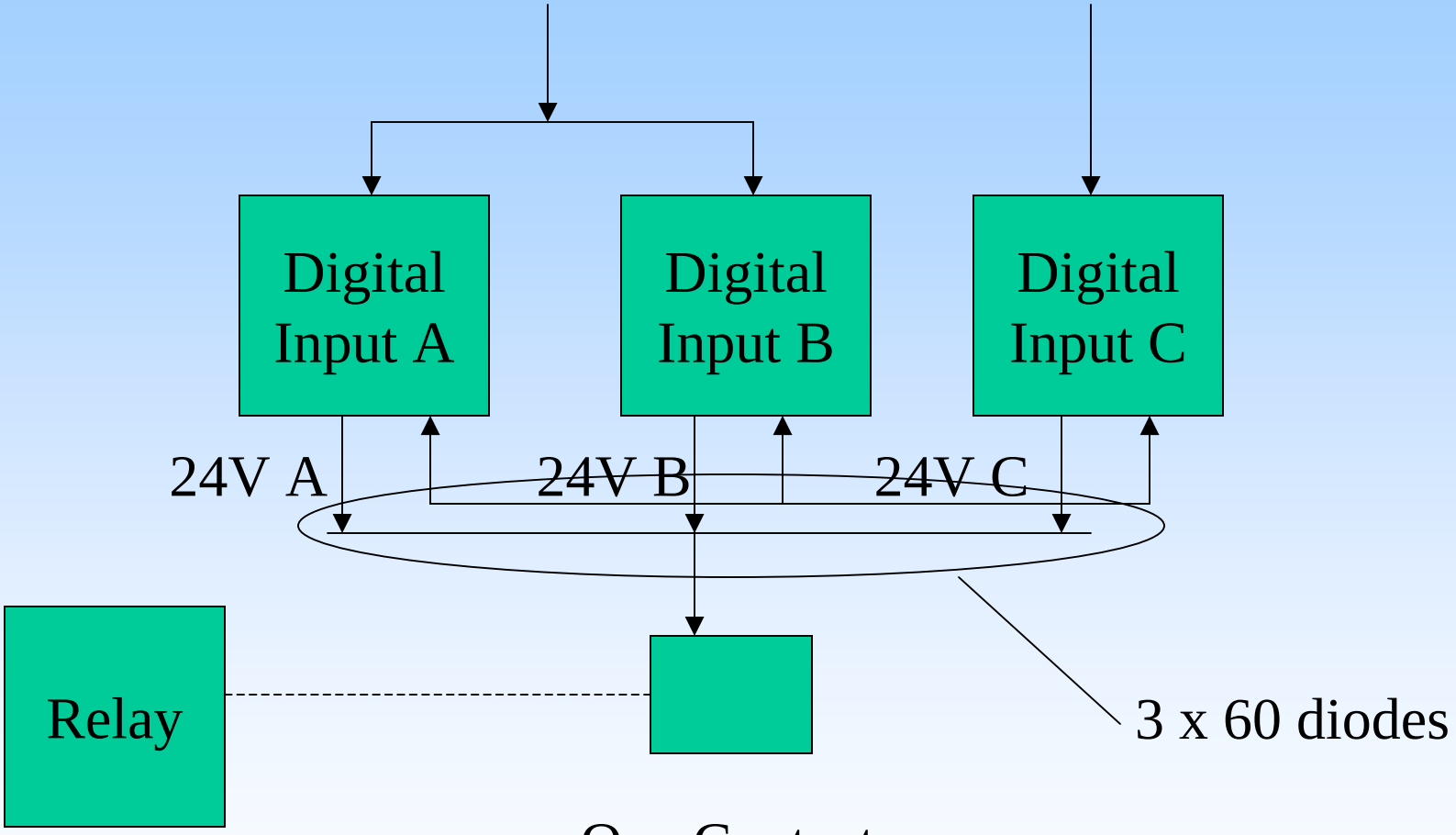
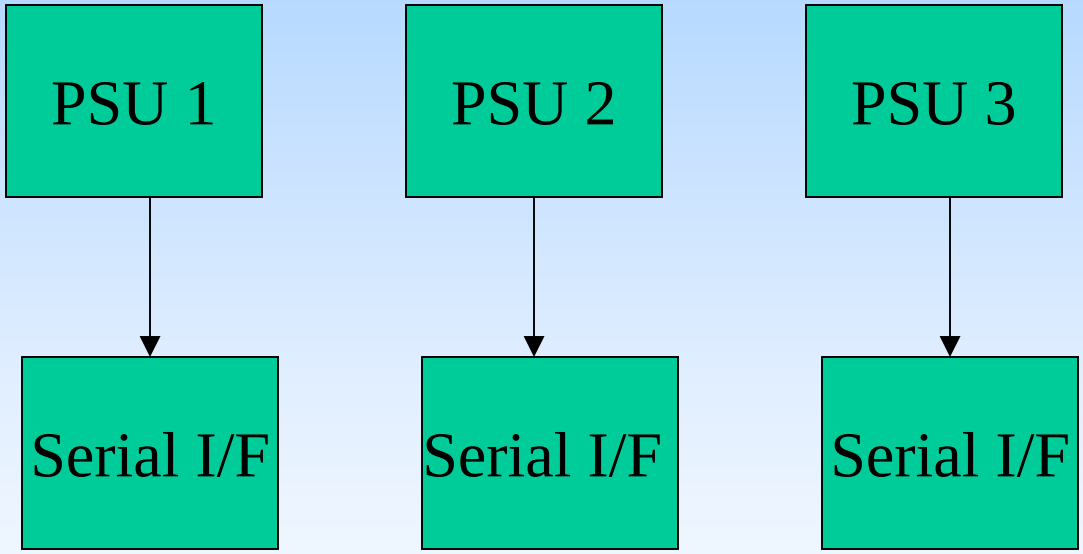
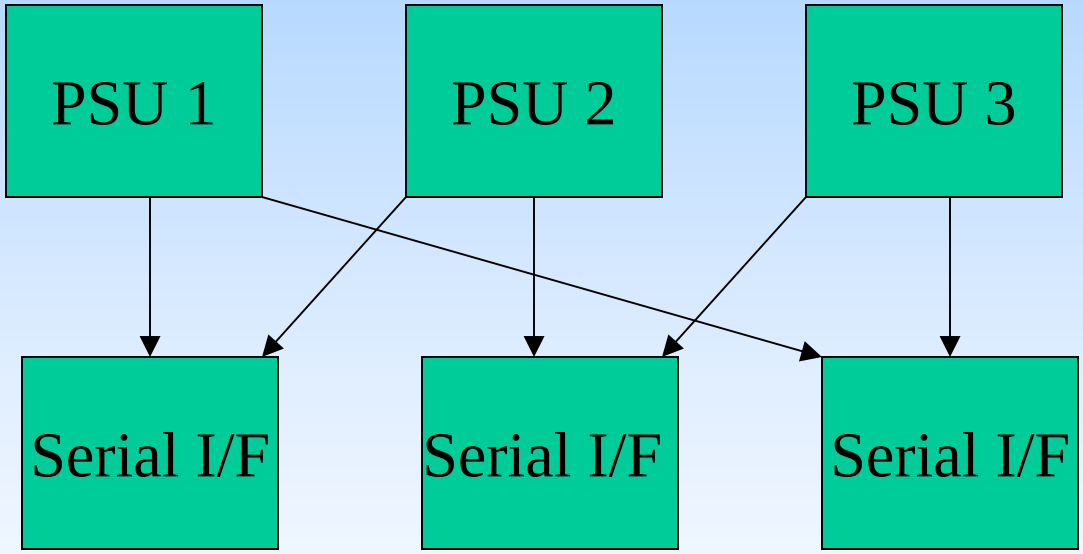


Example 8 - the heart of a DPCS



1/3 pos refs and sensors each per UPS

Example 8 - the heart of a DPCS



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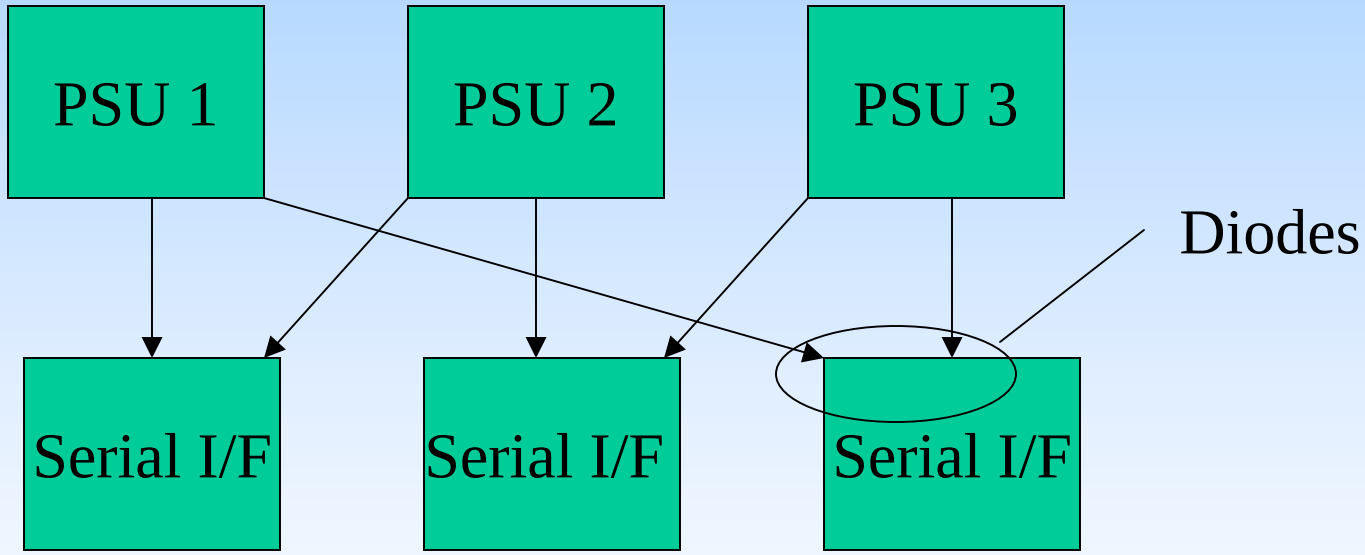

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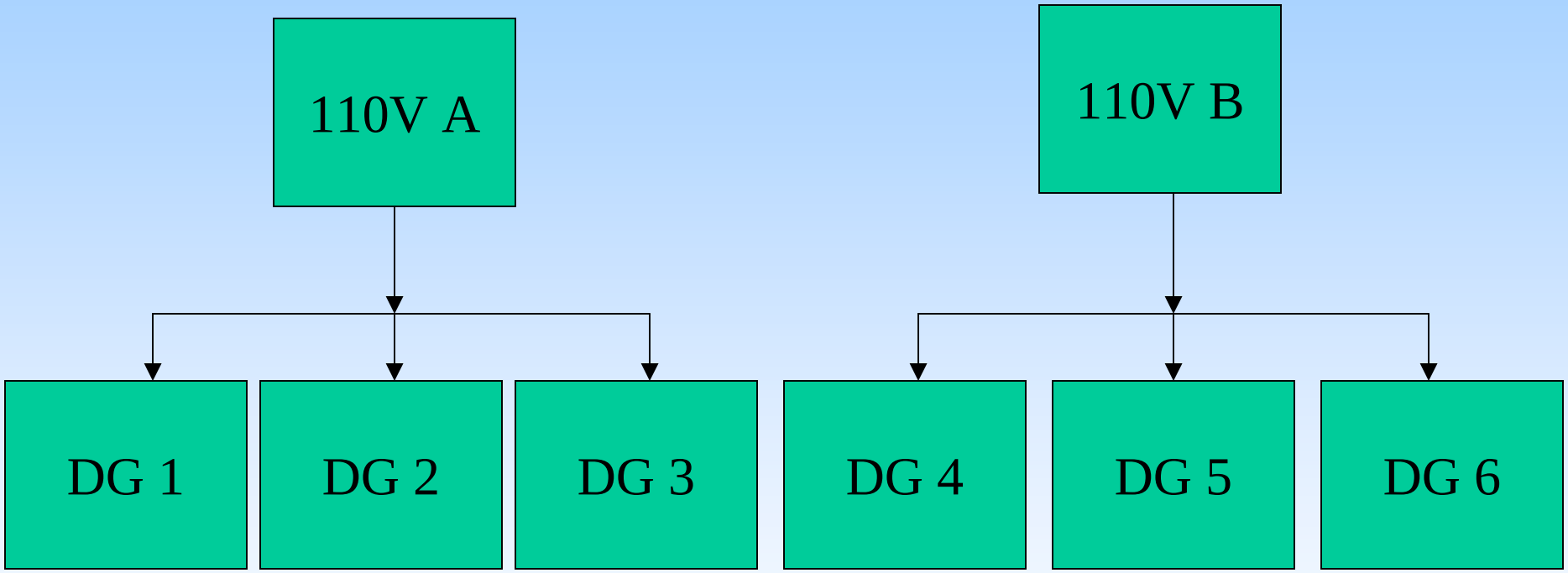
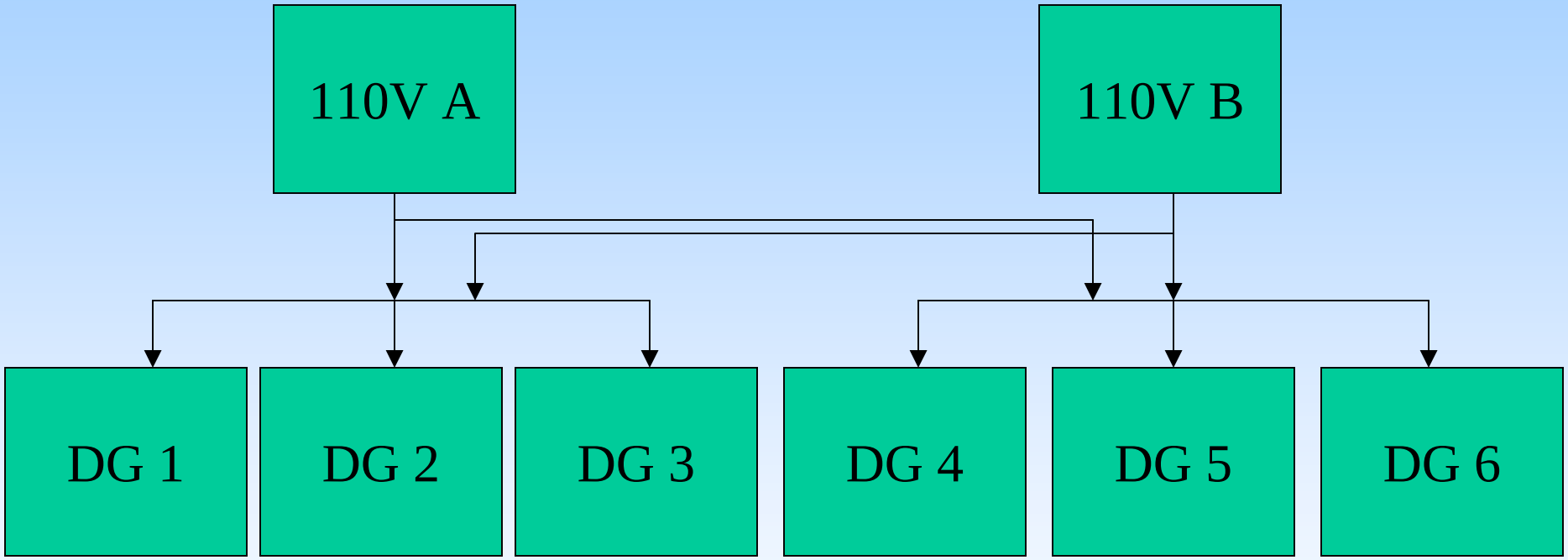
Example 9 – 110V Diodes



Control and protection supplies

Example 9 – 110V Diodes



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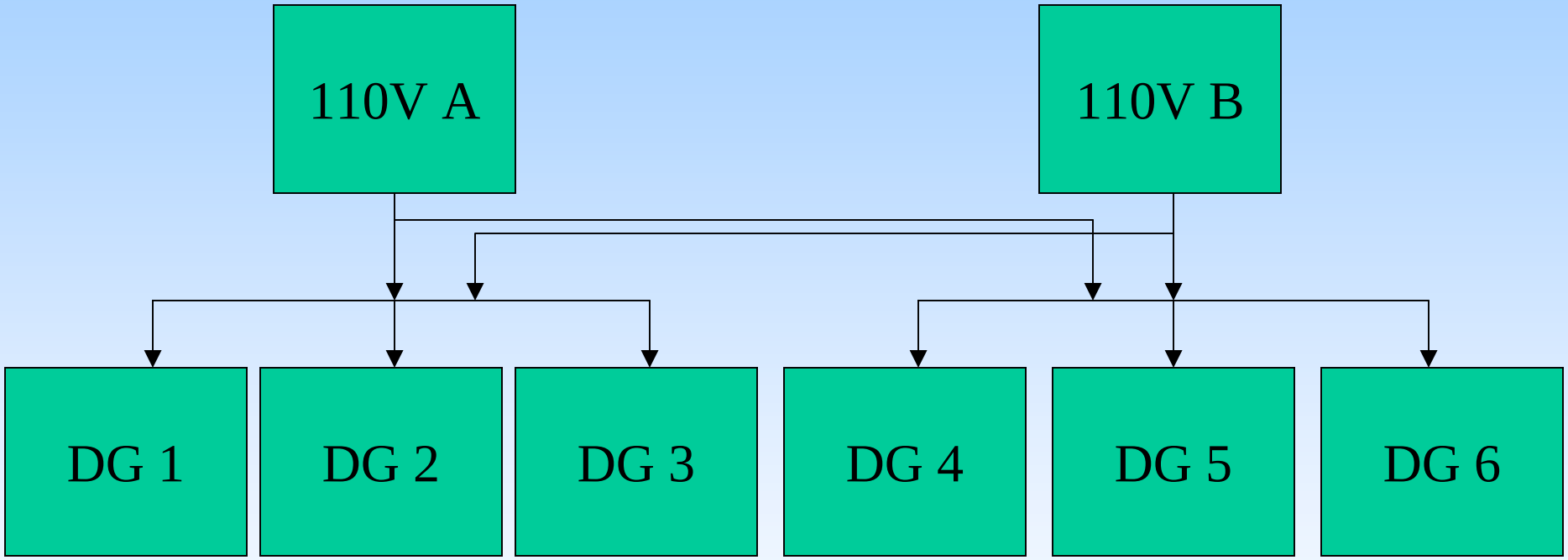

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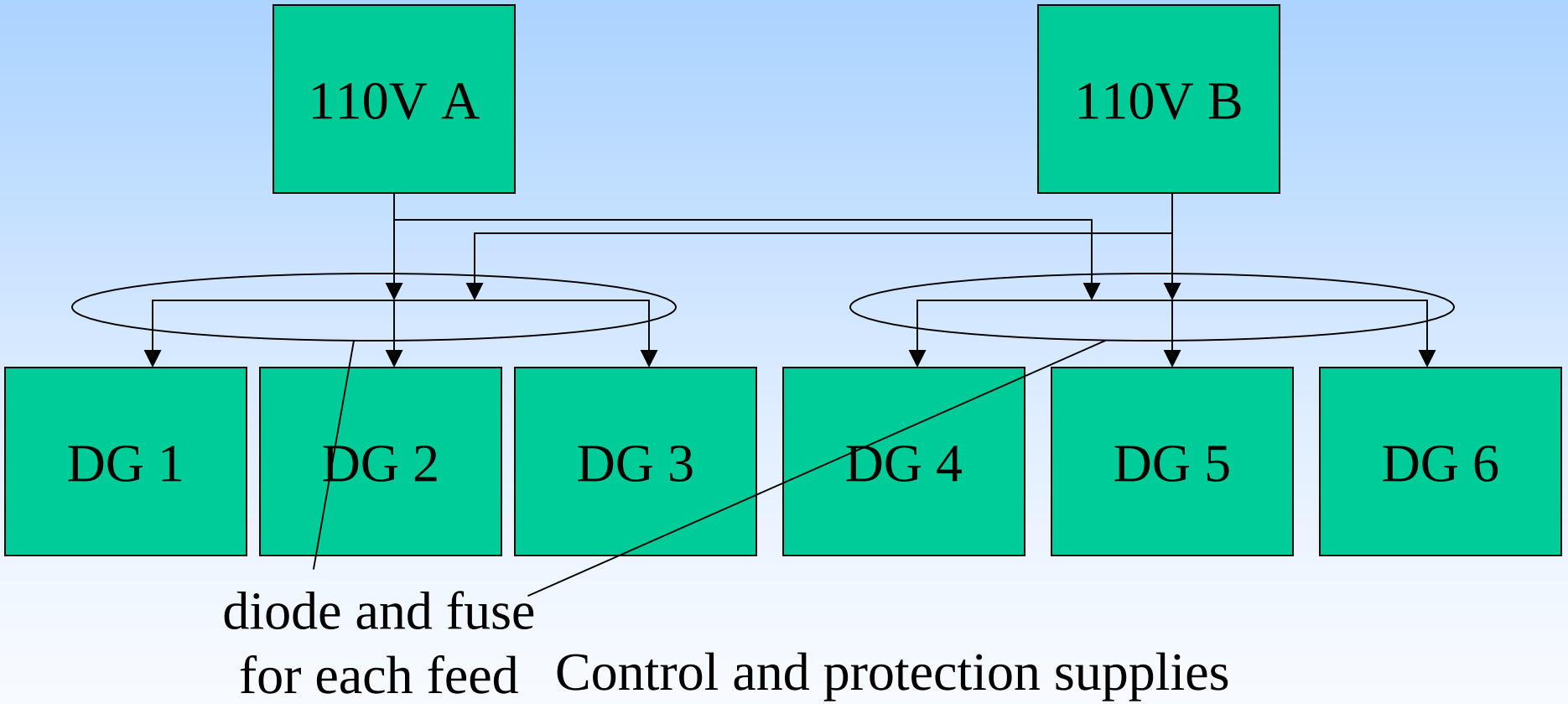

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- Reconnect thrusters onto healthy side of power distribution
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- No one understands how it works

Conclusions and Recommendations

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- *Would only know that there were none last time it was tested.*

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FAILURE IS AN OPTION

Doug Phillips

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