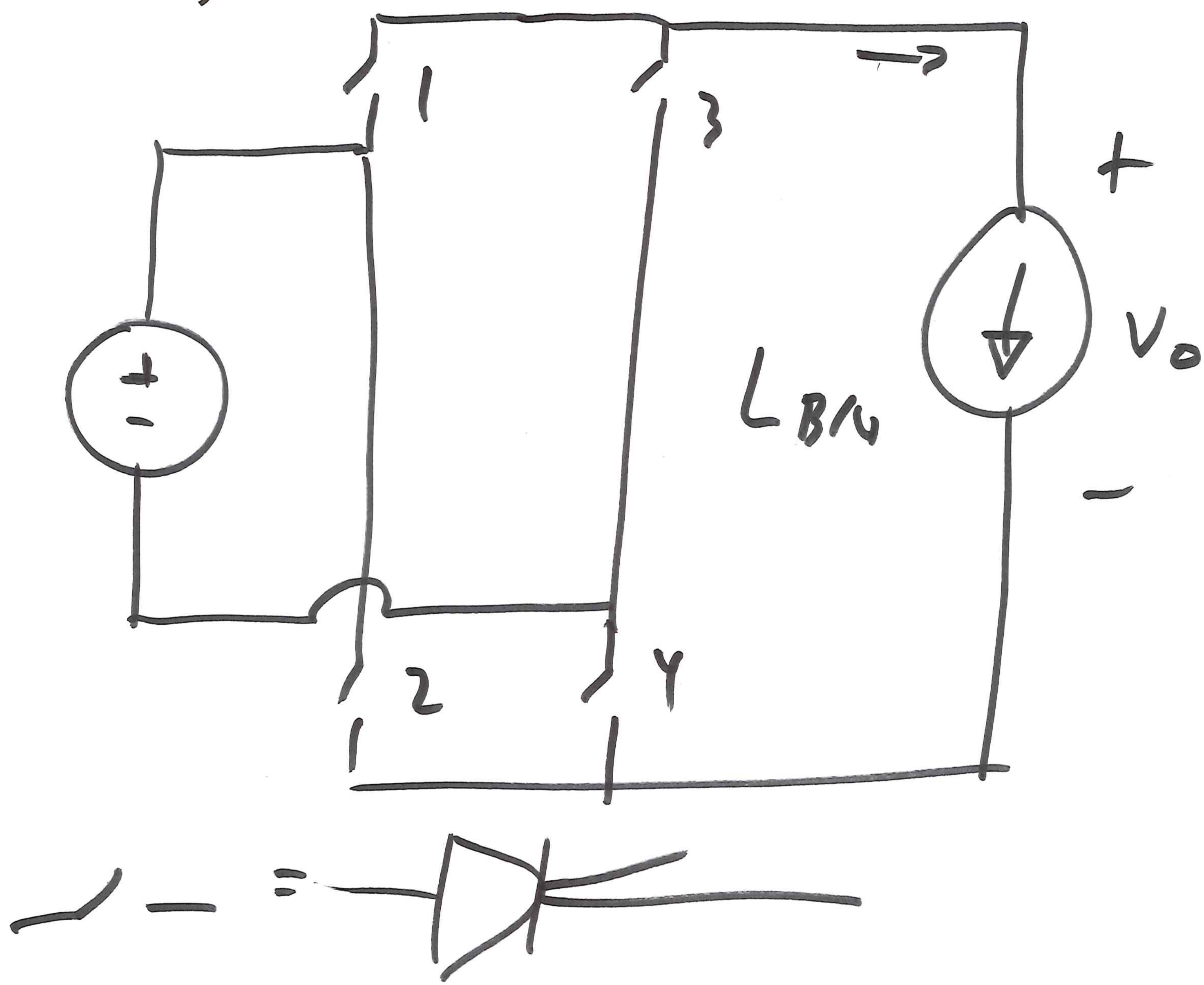
ECE 404-TD / 504-TD

ST: T&D APPLICATIONS OF VOLTAGE SOURCE CONVERTERS

SESSION no. 14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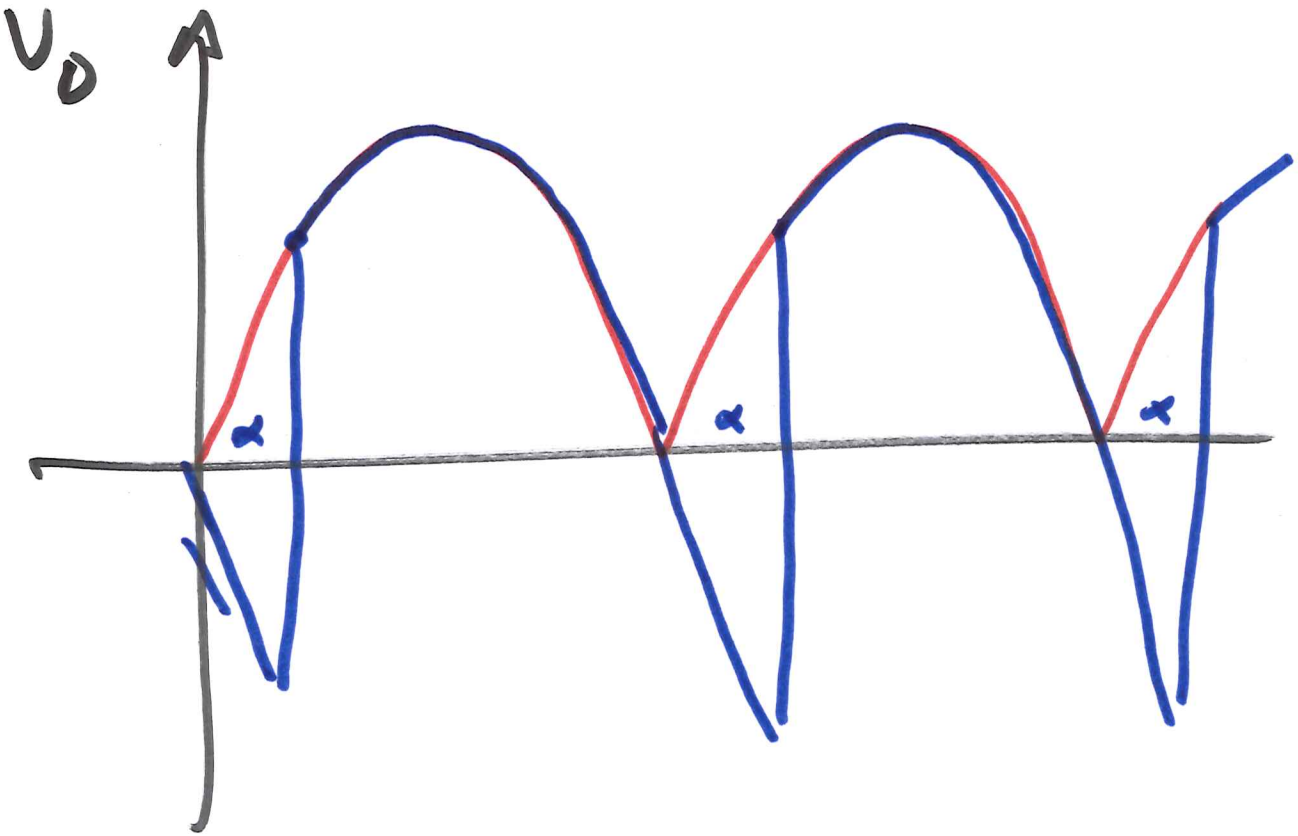

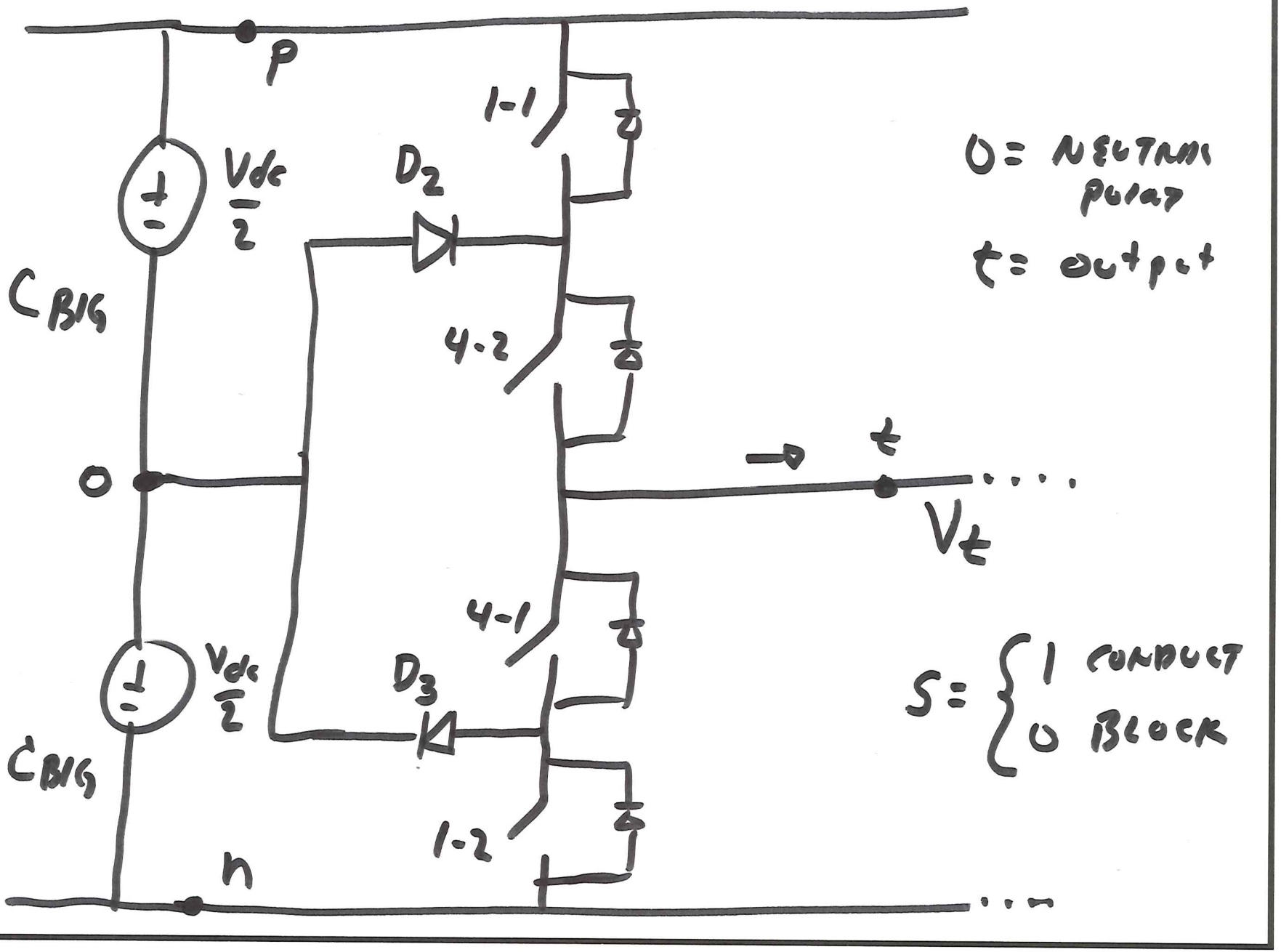
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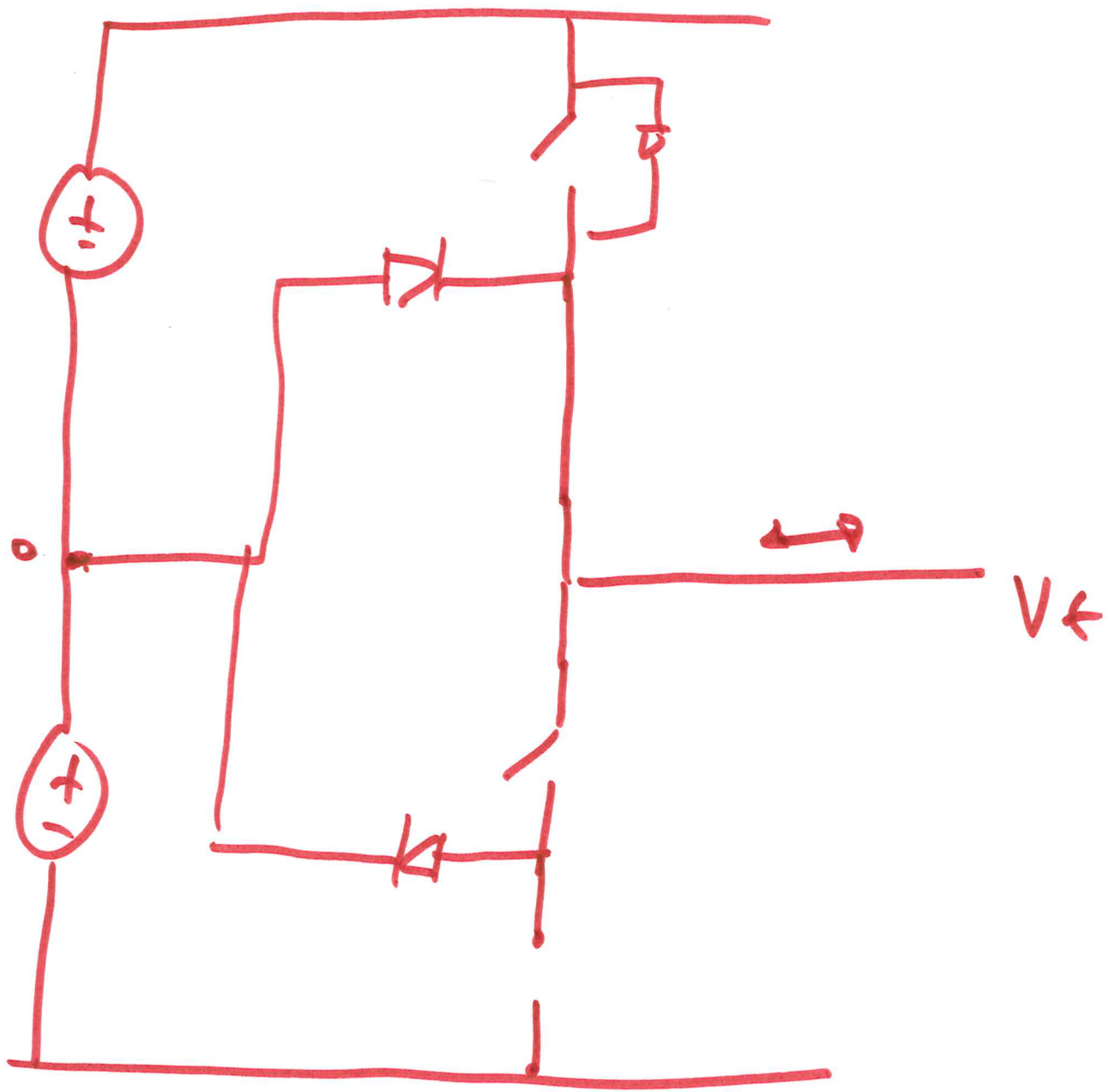
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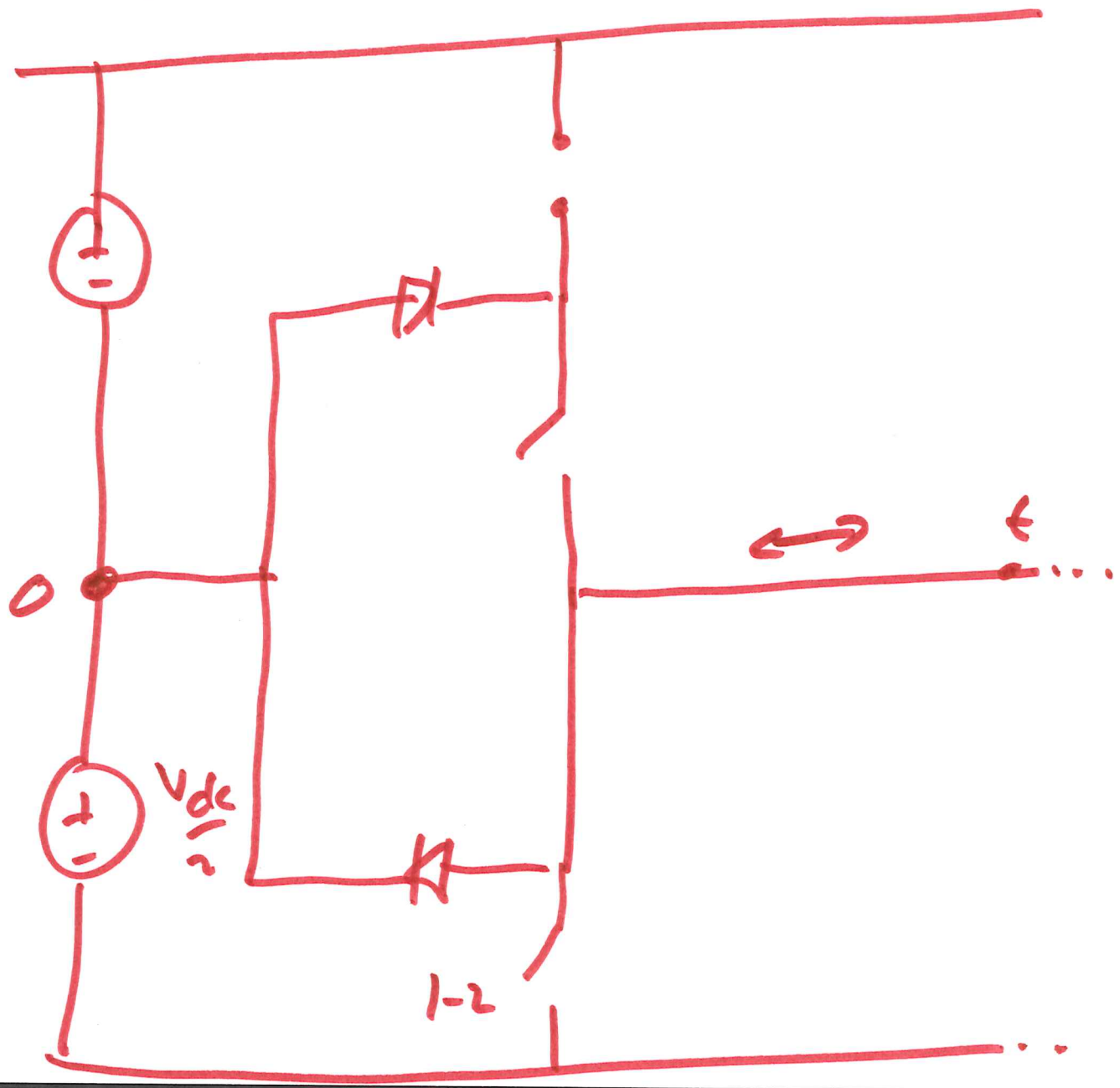
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"The world is but a canvas to the imagination." ~ Henry David Thoreau

The strength of our country has always been the creative, inventive spirit of the people. The Invent Idaho program provides an opportunity for students' innovative ideas to shine. On **March 8**, 2013, you are invited to judge the Invent Idaho State Finals invention competition as we celebrate our 24th year. Returning judges are valued for their expertise, while new judges, who will receive training in the judging process, are important for their fresh insights. I hope that you will choose to participate as a judge in the rewarding, stimulating, and challenging Invent Idaho program. Visit www.inventidaho.com for further program information.

Please mark you calendars now:

Invent Idaho State Finals
Friday, March 8, 2013
University of Idaho Student Union Grand Ballroom
709 Deakin St. Moscow
5:00-9:00 PM

Dinner will be served. Please **email your confirmation to bethbr@inventidaho.com or call 208-772-4312 to reserve your judging position today!**

Invent Idaho touches hundreds of students' lives every year, but let me take a moment to share with you the significant impact the Invent Idaho program had on one special little boy's life in 2012. Carson Magee found out last year that he had Type I diabetes—a devastating revelation, especially for a nine-year-old boy. Yet Carson chose to make the best of a difficult situation by entering the Invent Idaho competition with his invention called "Swipe and Wipe", which is an improvement on the way diabetics give themselves injections. Little did Carson and his family know where this invention would take him! Because of the media coverage for his Best of Show win at the Invent Idaho State competition, Carson was selected to appear on the Nickelodeon Television Show "Figure It Out". In addition, Carson was selected as the Juvenile Diabetes Research Foundation's Ambassador and poster child for 2012.

Invent Idaho is changing lives!

Creatively yours,
Beth Brubaker, Invent Idaho Co-Founder

"Creativity is contagious. Pass it on." ~ Albert Einstein

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ECE 404 / 504

T & D Applications of Voltage Sourced Converters

Lesson 14

vlab.uidaho.edu

-Multilevel converter

Issues:

1. Power quality: we still pay attention to harmonics, regardless of size of converter
2. Switching losses: we switch more slowly in large converters to keep up with our ability to pull the heat out of the switches.
3. Electromagnetic compatibility (EMC): switching large voltages quickly gives us a HUGE dv/dt.
4. Higher voltage is often necessary for larger converters.

Think about putting switches in series. This would, if it could be done, give us greater voltage capability.

Simultaneous switch transitions?

Equal voltage sharing? Static AND dynamic.

Neutral point clamped converter. Chapter 6.

Multilevel converters...

Invented in 1975 by Baker at MIT. In 1980, Nabae, Takahashi, and Akagi invented the Neutral Point Clamped Converter. In 1983, Stefanovic developed the general theory of multilevel converter operation and control. In 1992, Meynard and Foch developed the "flying capacitor" topology. In the same year, the NPC inventors added interphase reactors, giving the converter characteristics and capabilities of cycloconverters. A lot of the advances recently have been in size of the converters and in balancing the energy storage.

Aside: cycloconverter is an AC/AC direct converter.

Multilevel converters have become more practical:

1. Higher rated switching devices: voltage, current, and speed.
2. Faster and more capable processing of signals and computations.

The switches operate in pairs.

Reference: Dr. Corzine, MUST; Wrote a document describing the theory. Google search: Corzine multilevel converter. First thing that comes up...80 page document