

Thompson Consulting, Inc.

Overview

9 Jacob Gates Road
Harvard, MA 01451
Phone: (978) 456-7722
Fax: (240) 414-2655
www.thompsonrd.com
info@thompsonrd.com

Background of Principal

- BSEE ('85), MS ('92), and PhD ('97) from MIT
- Full-time Polaroid 1987-1993; Polaroid consultant to 2002
- Doctoral work done in the Laboratory for Electromagnetic and Electronic Systems (L.E.E.S.) at MIT in electrodynamic Maglev
- Consultant in analog, magnetics, power electronics, electromagnetics, magnetic braking and failure analysis
- Adjunct Professor at Worcester Polytechnic Institute, Worcester MA since 1998 teaching graduate courses in analog design, power electronics, electromechanics and power distribution. Also have taught electric motors for University of Wisconsin
- Industry design seminars

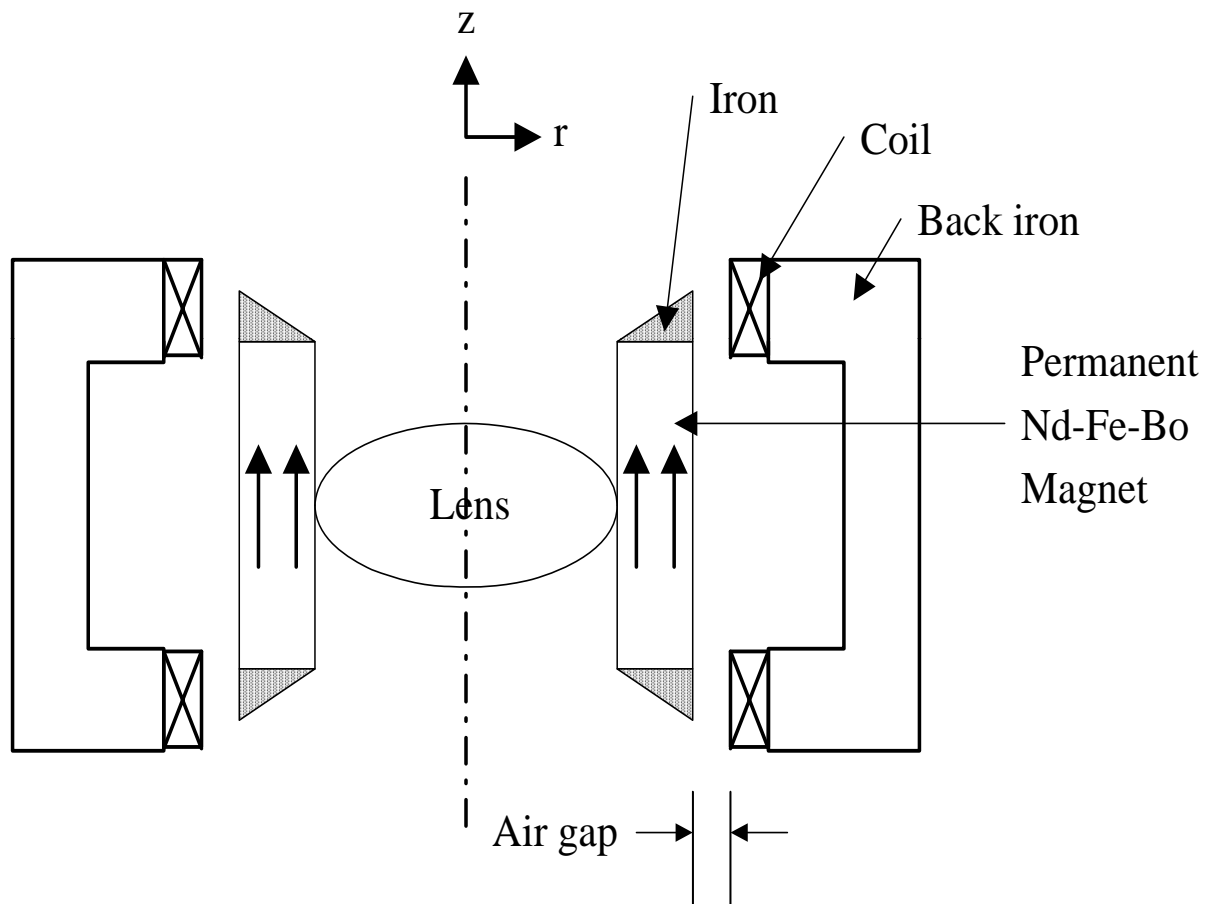
Core Technology Areas

- Advanced analog circuit design
- Custom power electronics
- Custom electromagnetic, electrodynamic and permanent magnet systems
- Magnetic suspensions and Maglev

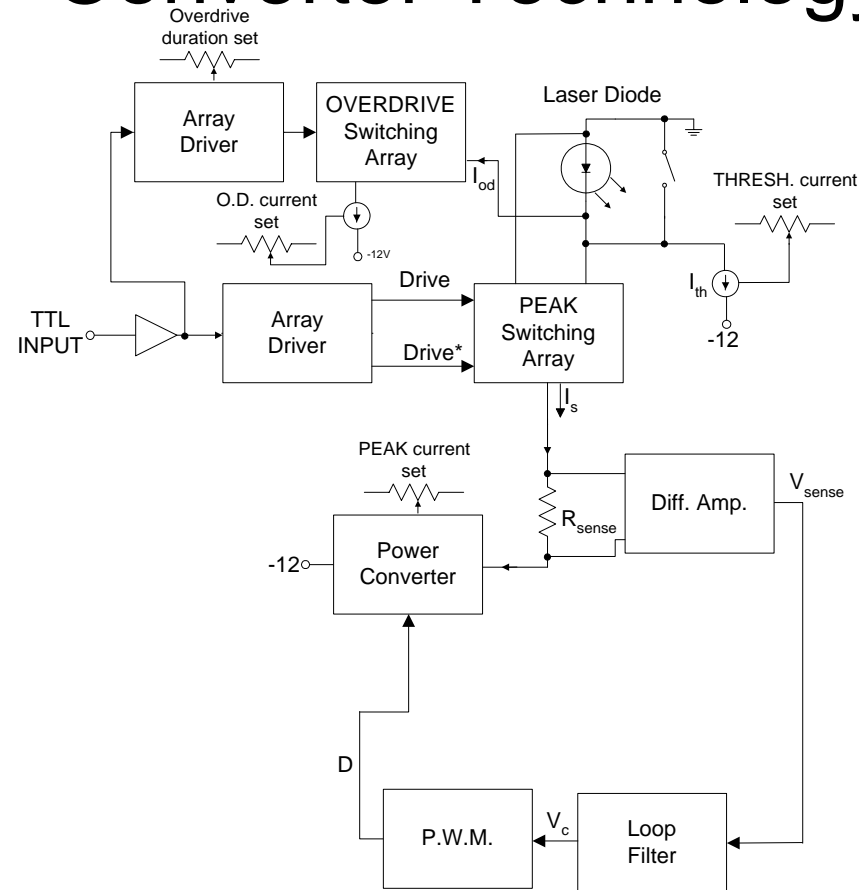
Capabilities

- Capabilities:
 - Analog design and simulation (Multisim, PSPICE)
 - Power electronics design and simulation (PSIM)
 - Custom magnetics design and simulation (FEMM, Infolytica)
- Prototyping
- EMI design and testing

Lens Actuator



High Power Laser Diode Driver Based on Power Converter Technology

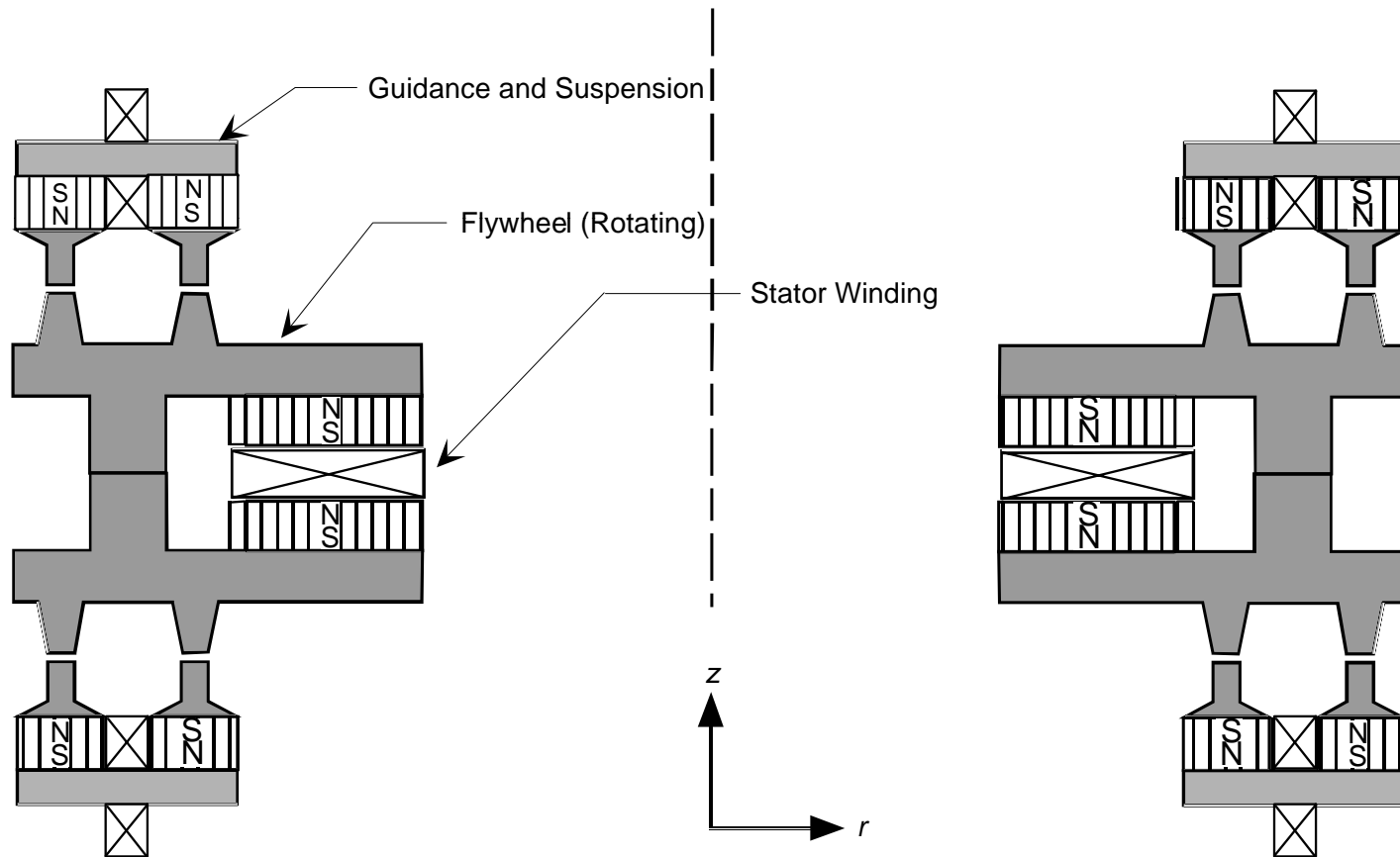


See:

1. B. Santarelli and M. Thompson, U.S. Patent #5,123,023, "Laser Driver with Plural Feedback Loops," issued June 16, 1992
2. M. Thompson, U.S. Patent #5,444,728, "Laser Driver Circuit," issued August 22, 1995
3. W. T. Plummer, M. Thompson, D. S. Goodman and P. P. Clark, U.S. Patent #6,061,372, "Two-Level Semiconductor Laser Driver," issued May 9, 2000
4. Marc T. Thompson and Martin F. Schlecht, "Laser Diode Driver Based on Power Converter Technology," *IEEE Transactions on Power Electronics*, vol. 12, no. 1, Jan. 1997, pp. 46-52

Magnetically-Levitated Flywheel Energy Storage System

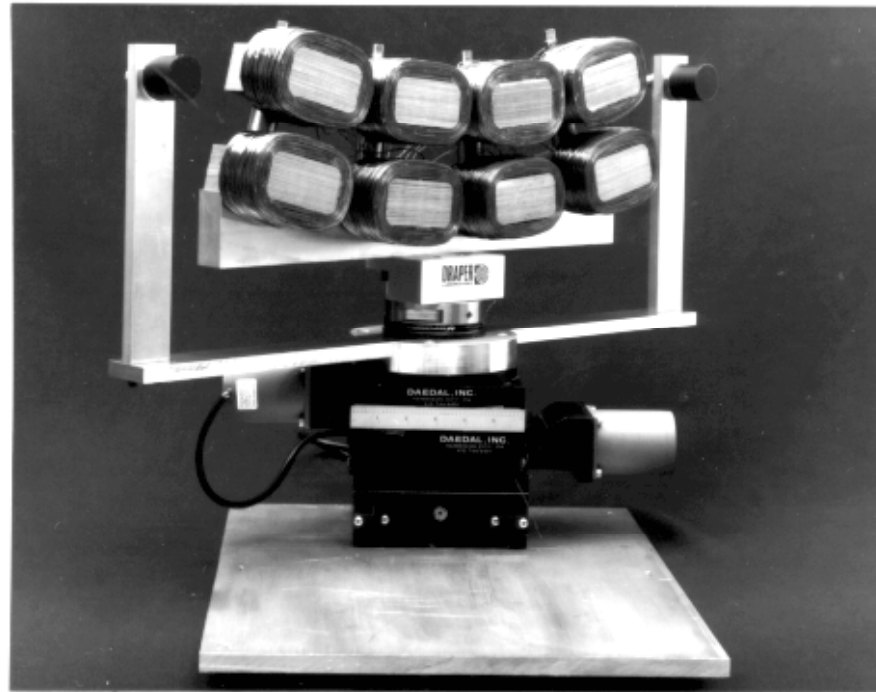
- For NASA; $P = 100\text{W}$, energy storage = 100 W-hrs



Maglev Work

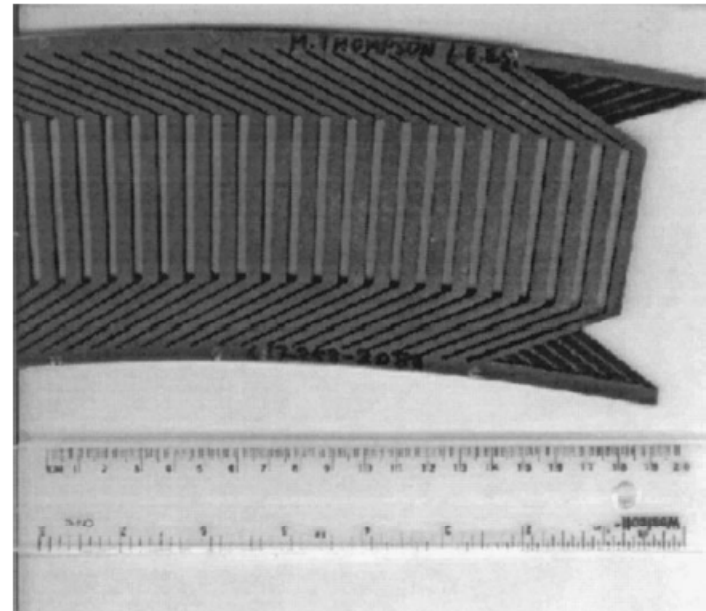
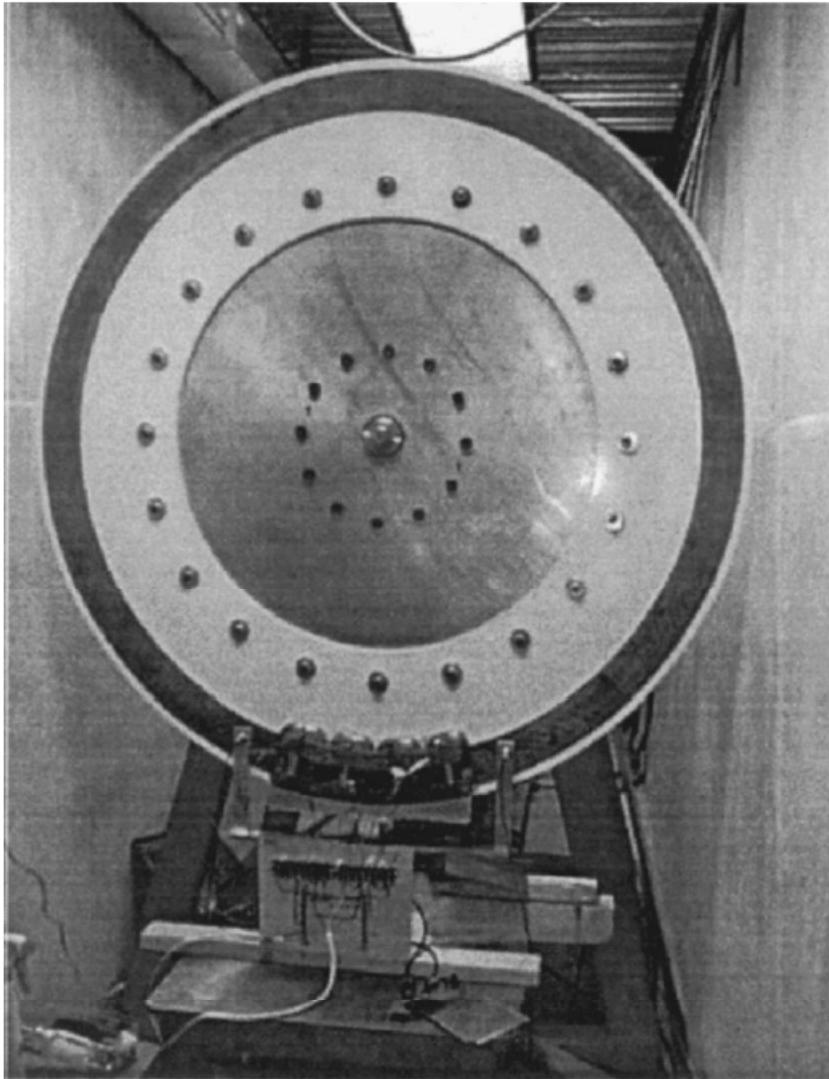
- Contract monitor for U.S. Department of Transportation since 2001 on “Urban Maglev” projects
- Have done comparative study of worldwide Maglev systems for a major U.S. company

MIT Maglev Suspension Magnet



M. T. Thompson, R. D. Thornton and A. Kondoleon, "Flux-canceling electrodynamic maglev suspension: Part I. Test fixture design and modeling," *IEEE Transactions on Magnetics*, vol. 35, no. 3, May 1999 pp. 1956-1963

MIT Maglev Test Fixture



M. T. Thompson, R. D. Thornton and A. Kondoleon,
"Flux-canceling electrodynamic maglev suspension:
Part I. Test fixture design and modeling," *IEEE
Transactions on Magnetics*, vol. 35, no. 3, May 1999
pp. 1956-1963

Permanent Magnet Brakes

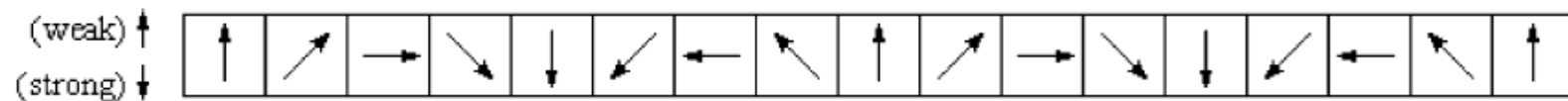
- For roller coasters
- Braking force $> 10,000$ Newtons per meter of brake



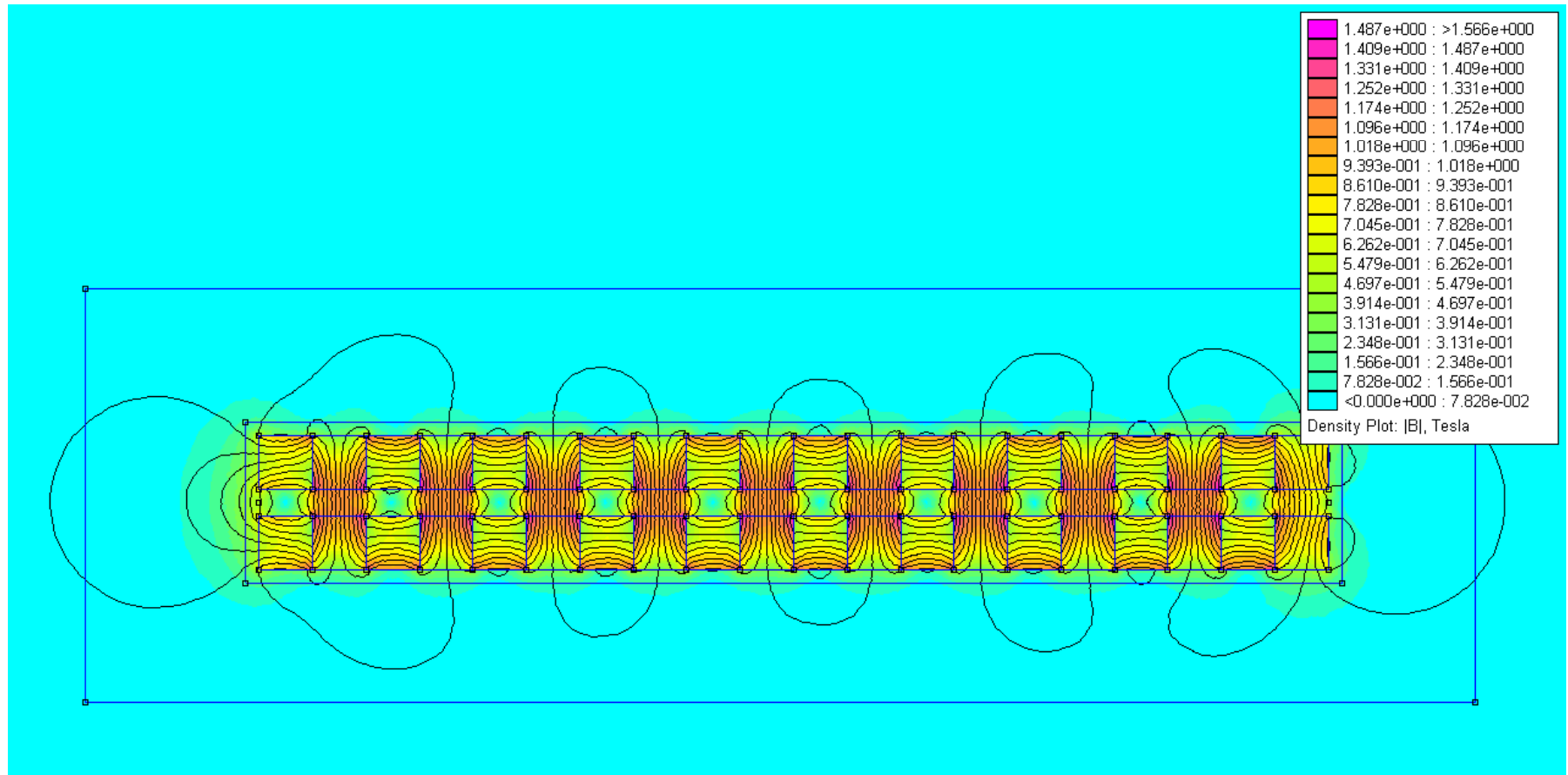
Reference: <http://www.magnetarcorp.com>

Halbach Permanent Magnet Array

- Special PM arrangement allows strong side (bottom) and weak side (top) fields
- Applicable to magnetic suspensions (Maglev), linear motors, and induction brakes



Halbach Permanent Magnet Array



Variac Failure Analysis



Photovoltaics

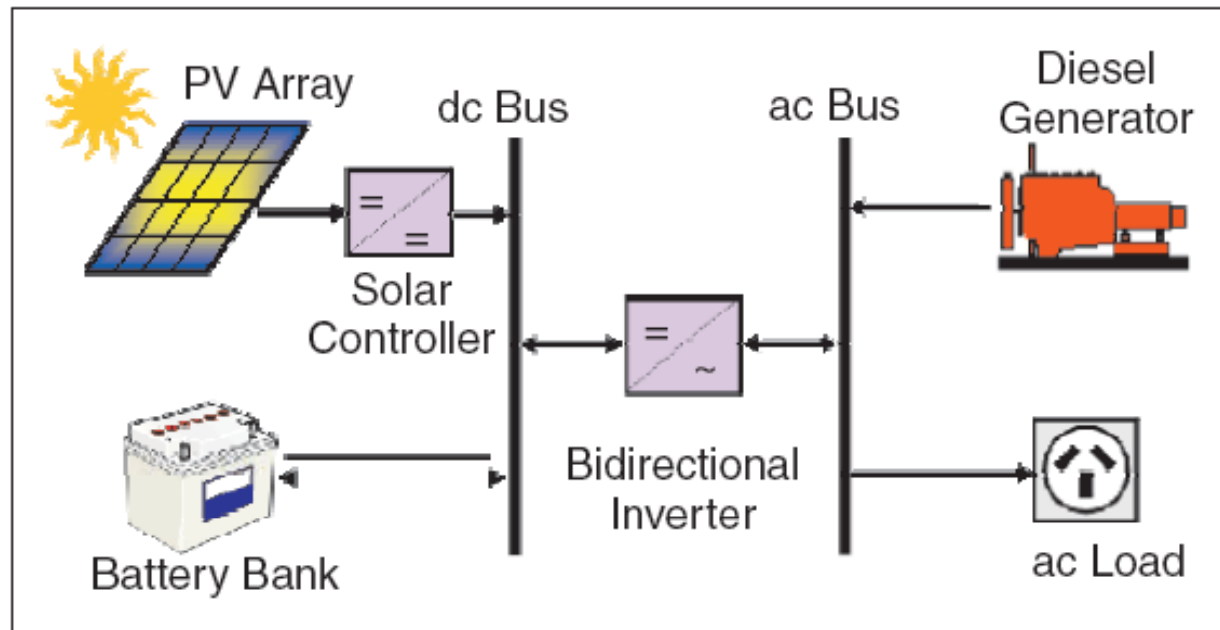
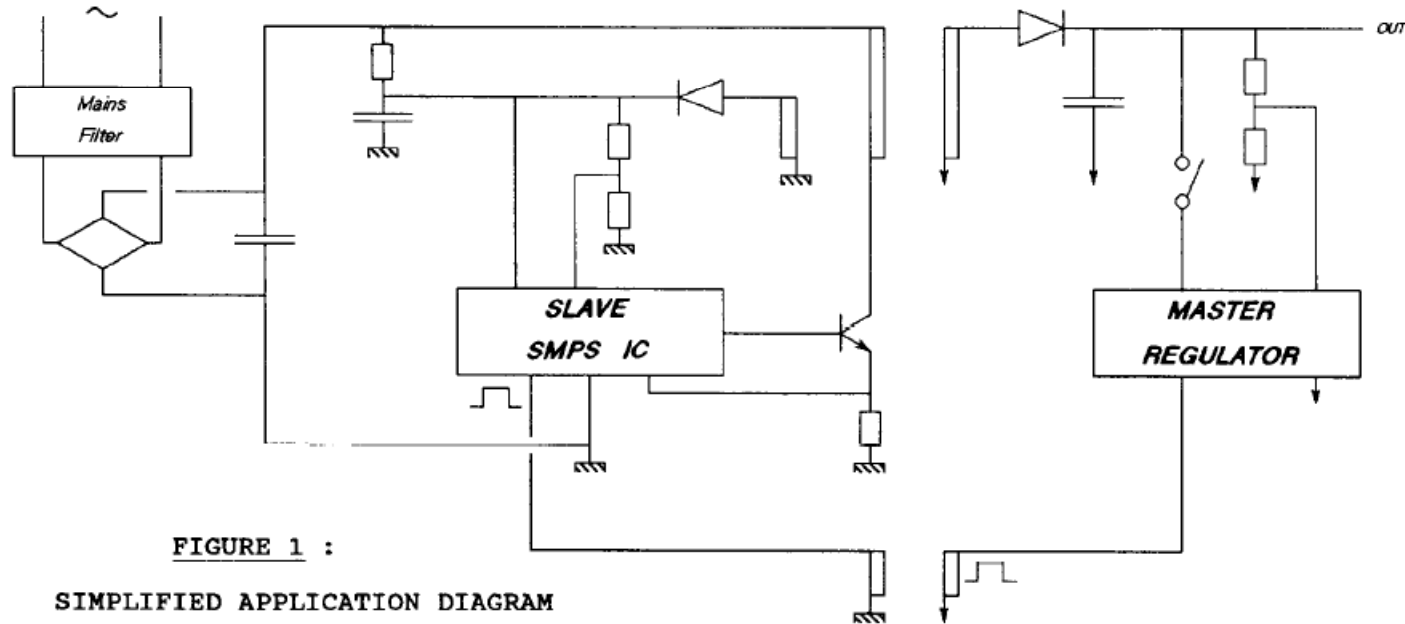


Fig. 1. Typical hybrid system layout.

S. Druyea, S. Islam and W. Lawrance, "A battery management system for stand-alone photovoltaic energy systems," *IEEE Industry Applications Magazine*, vol. 7, no. 3, May-June 2001, pp. 67-72

Offline Flyback Power Supply



P. Maige, "A universal power supply integrated circuit for TV and monitor applications," *IEEE Transactions on Consumer Electronics*, vol. 36, no. 1, Feb. 1990, pp. 10-17

Transcutaneous Energy Transmission

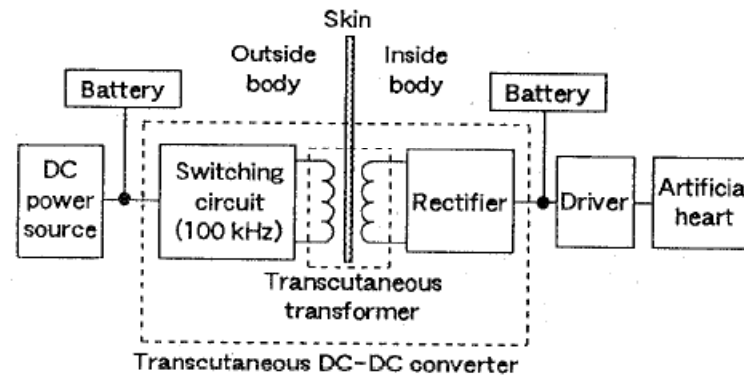


Fig. 1. Transcutaneous energy transmission system for an implantable artificial heart.

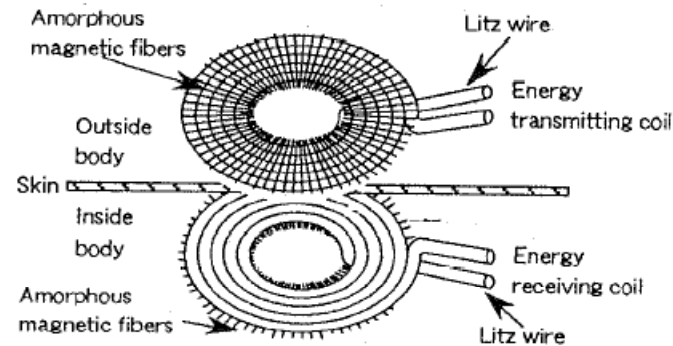
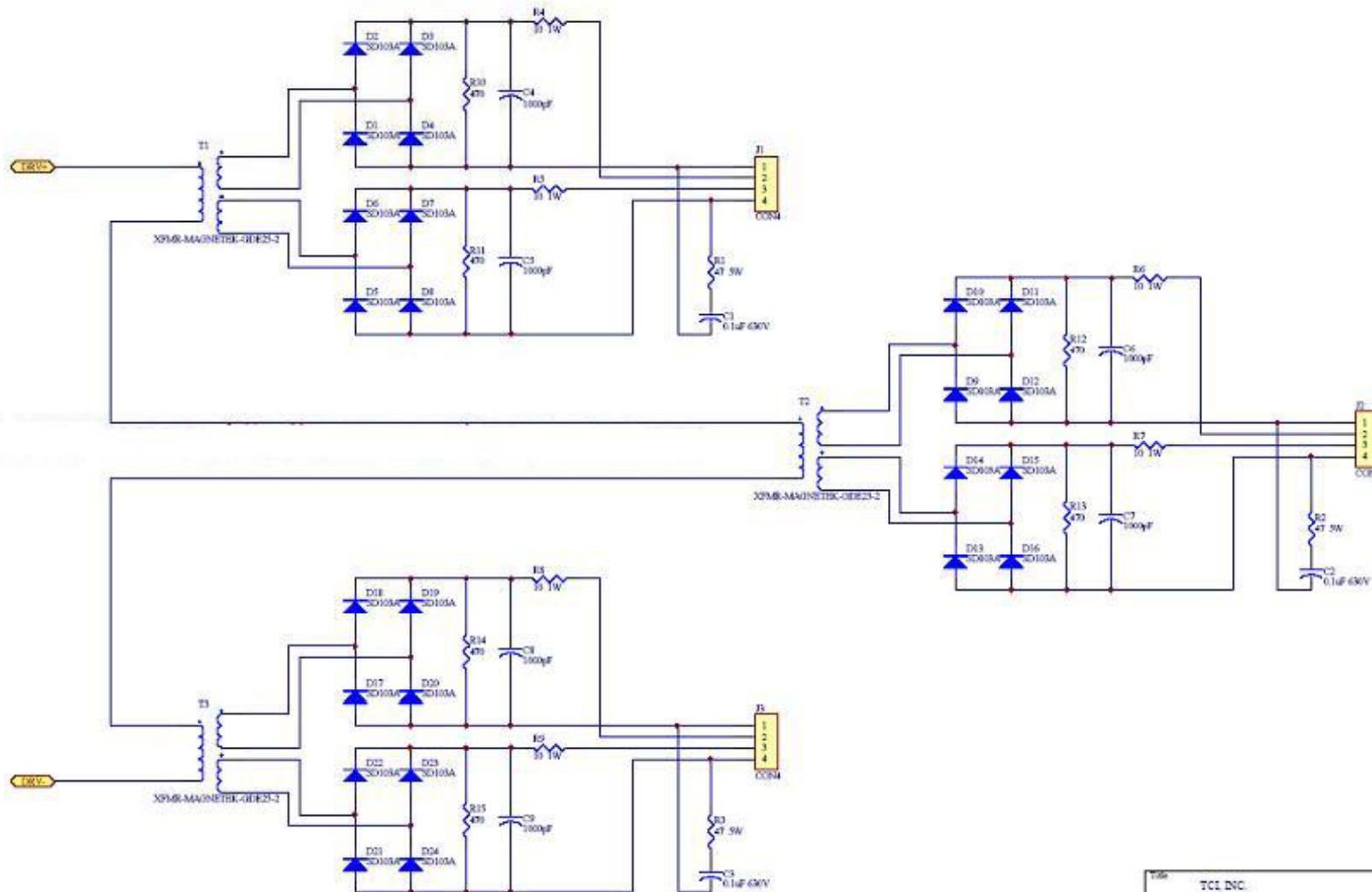


Fig. 2. Transcutaneous transformer.

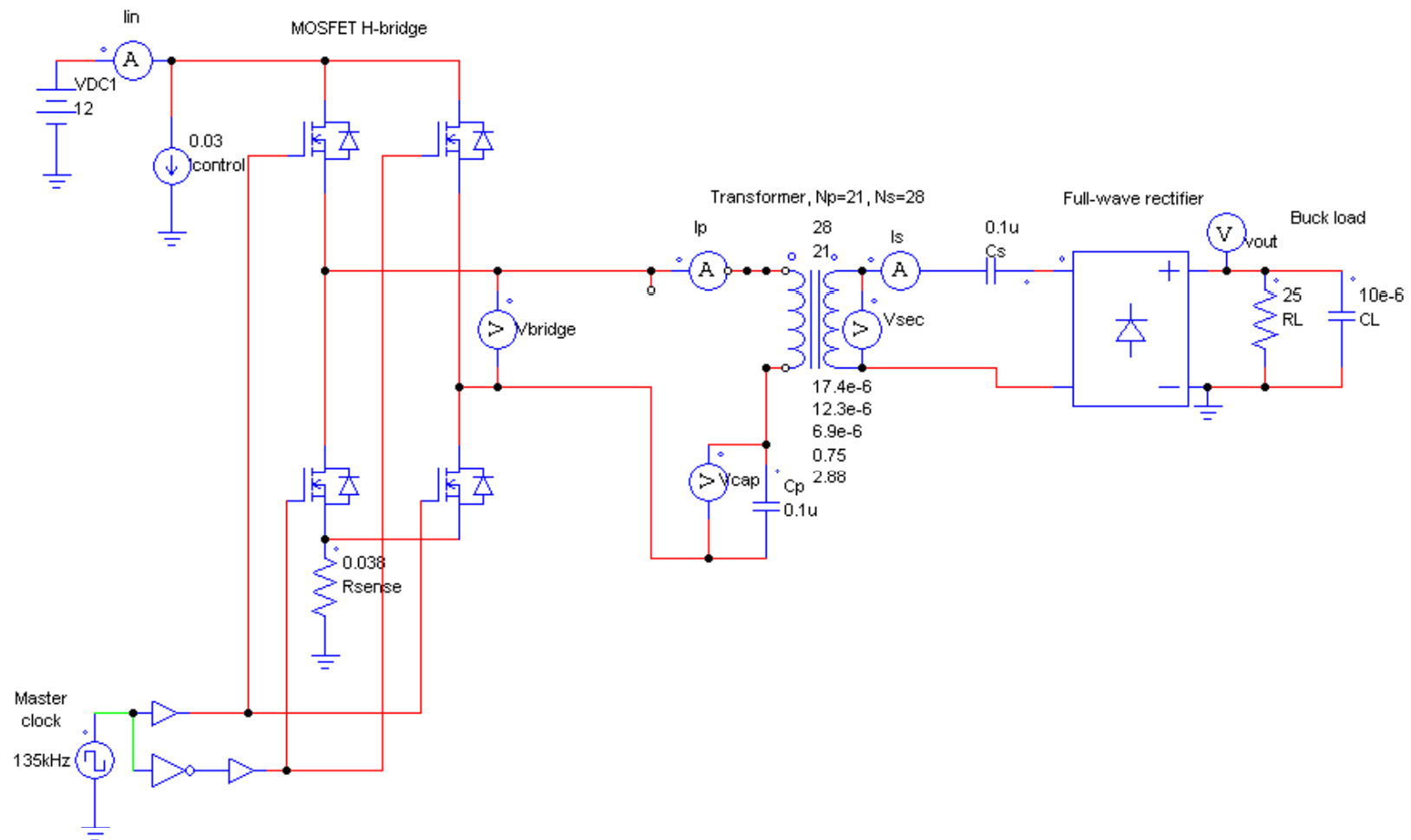
H. Matsuki, Y. Yamakata, N. Chubachi, S.-I. Nitta and H. Hashimoto, "Transcutaneous DC-DC converter for totally implantable artificial heart using synchronous rectifier," *IEEE Transactions on Magnetics*, vol. 32, no. 5, Sept. 1996, pp. 5118 - 5120

50 KW Inverter Switch

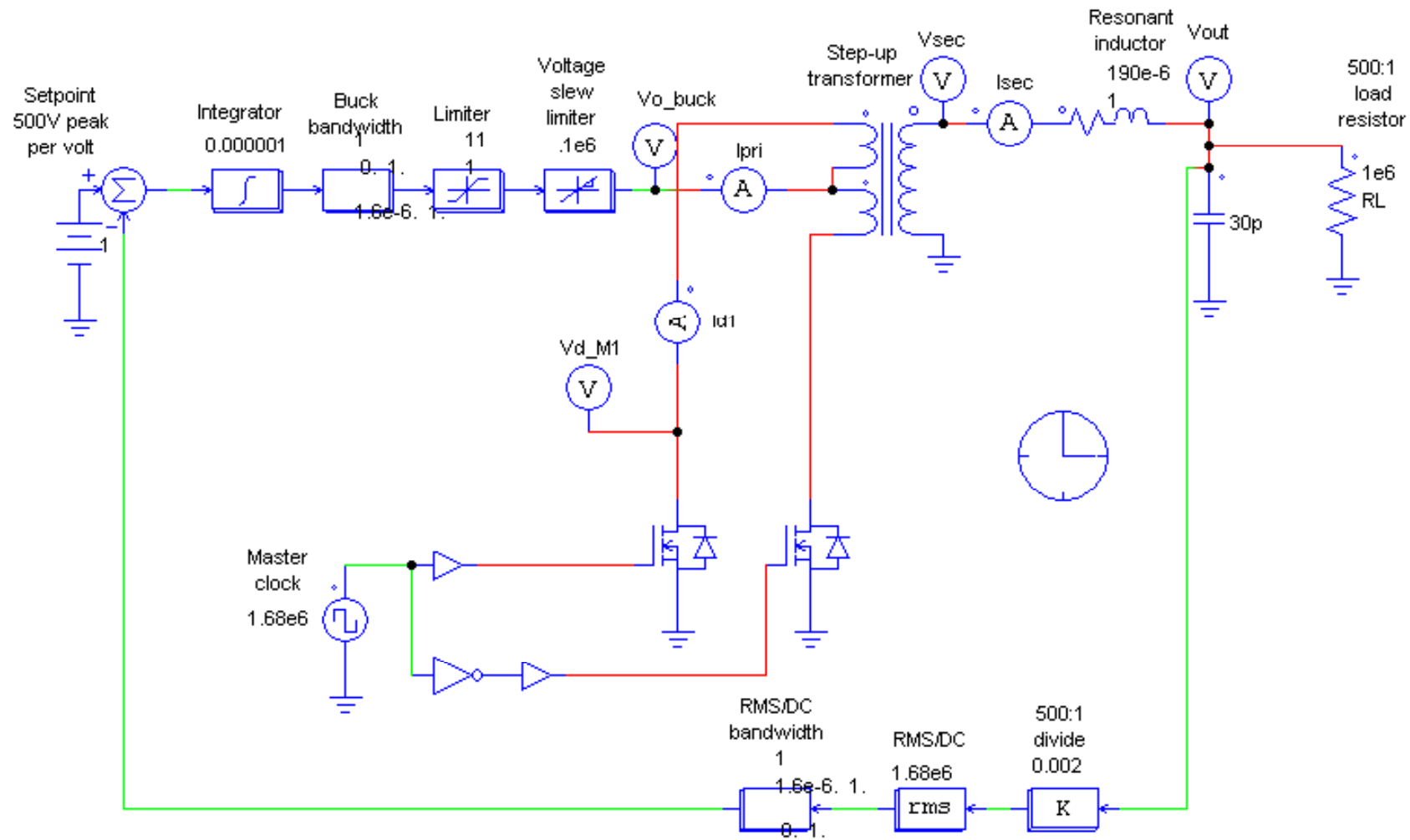


TCL INC.		
Rev	Number	Revision
B	INVERTER SWITCH	A

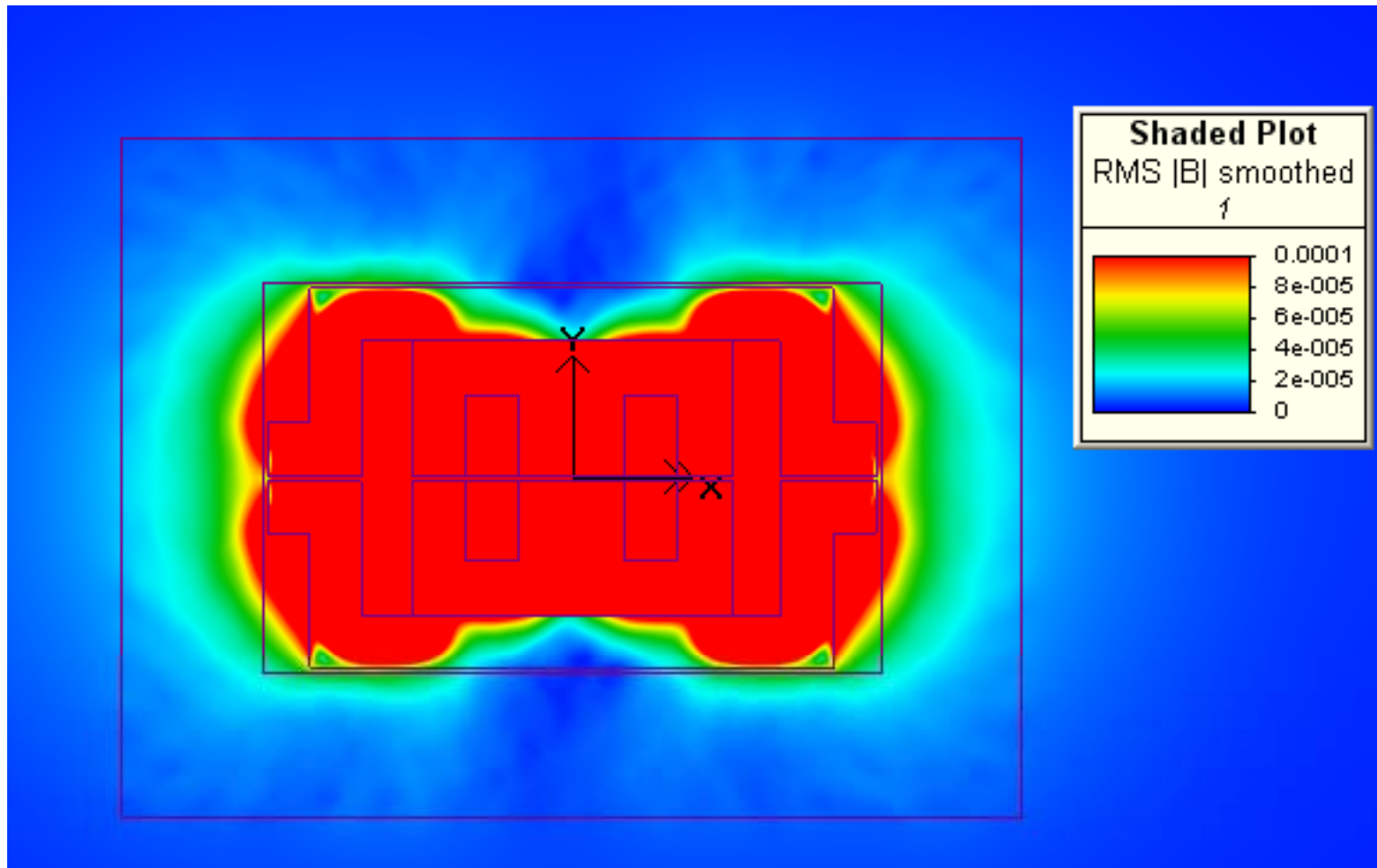
Non-Contact Battery Charger



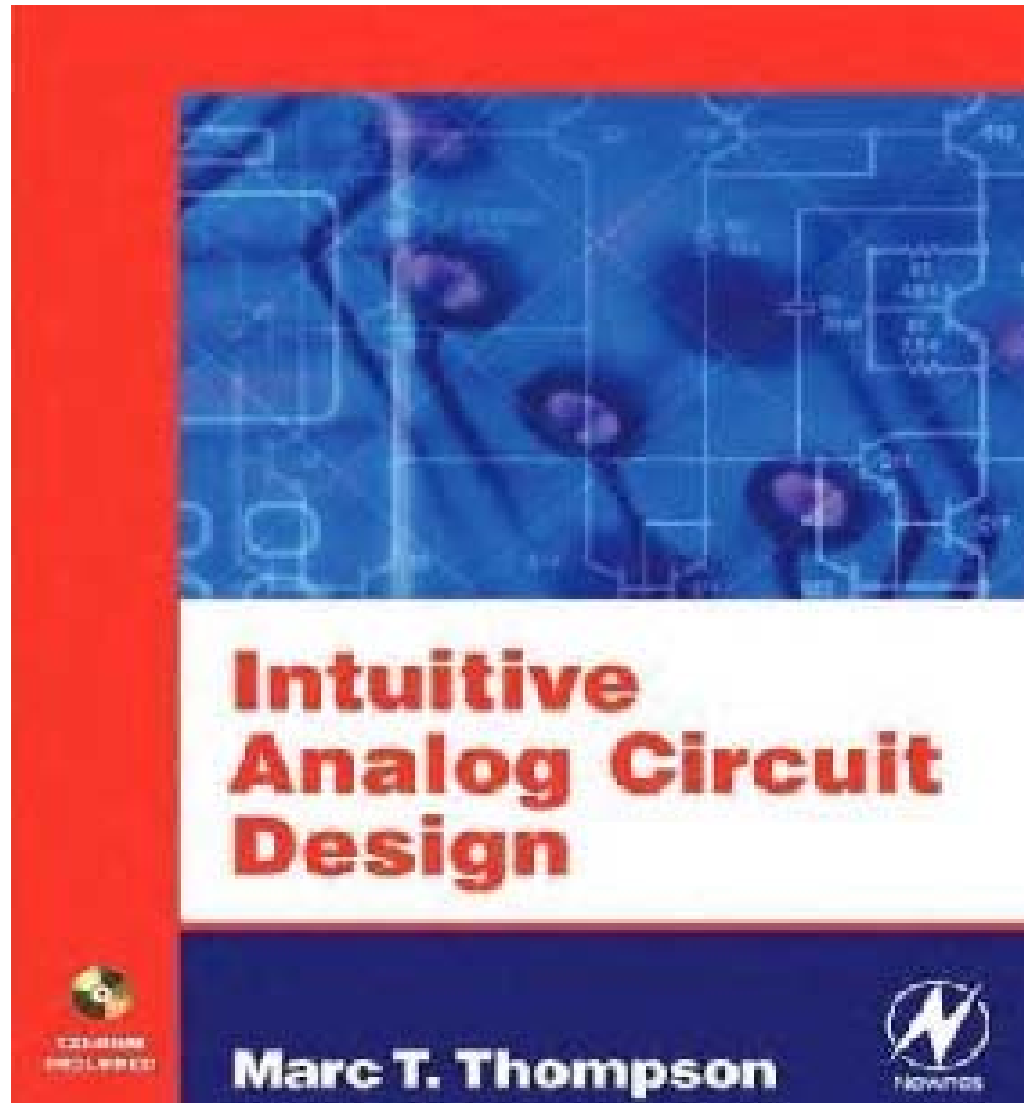
High Voltage RF Supply



60 Hz Transformer Shielding Study

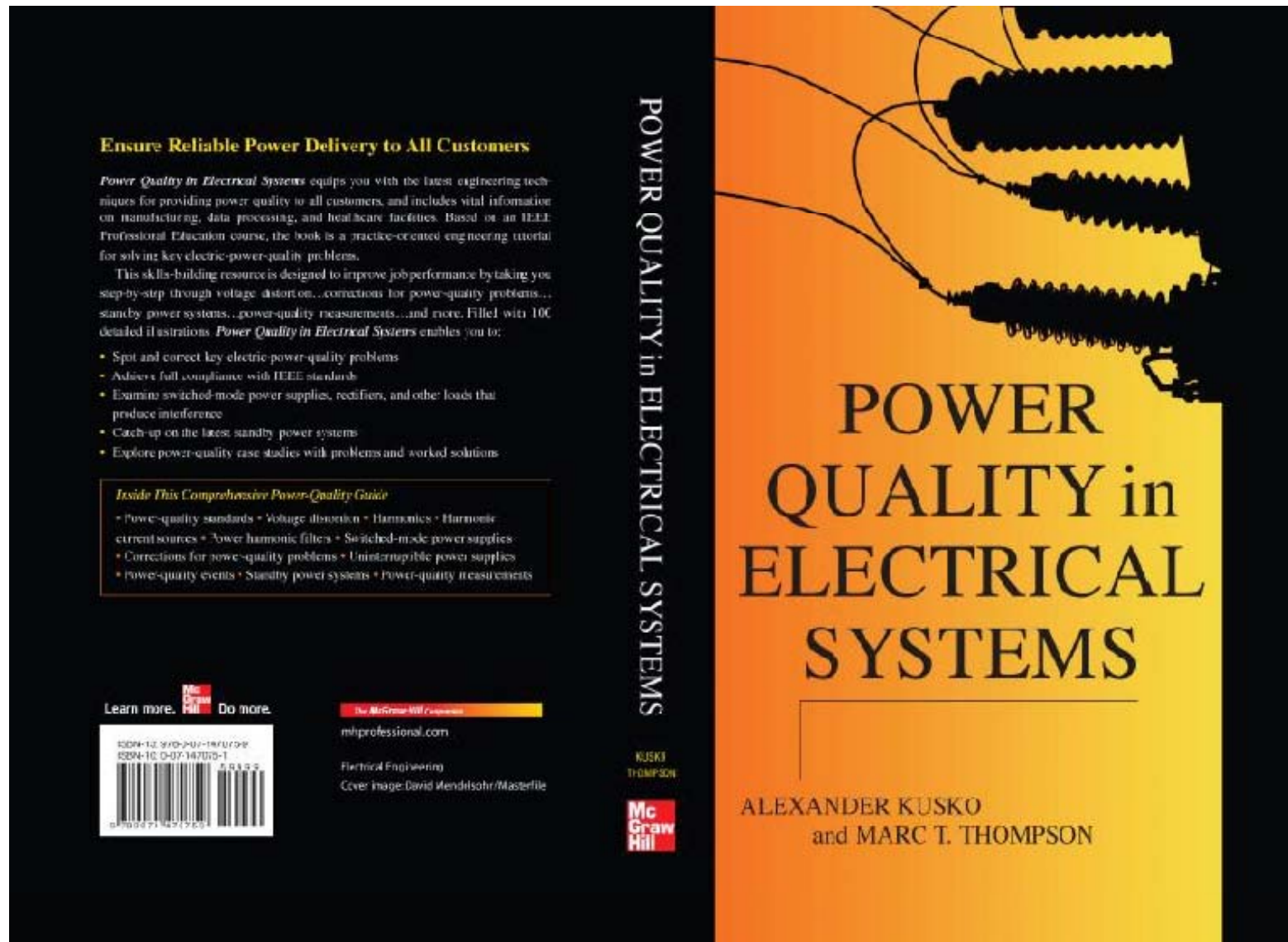


“Intuitive Analog Circuit Design”

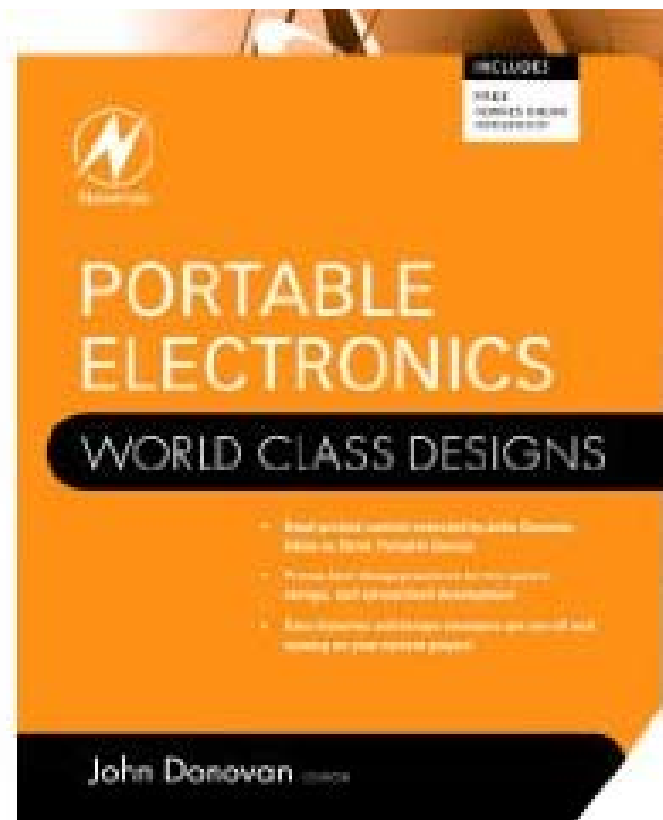
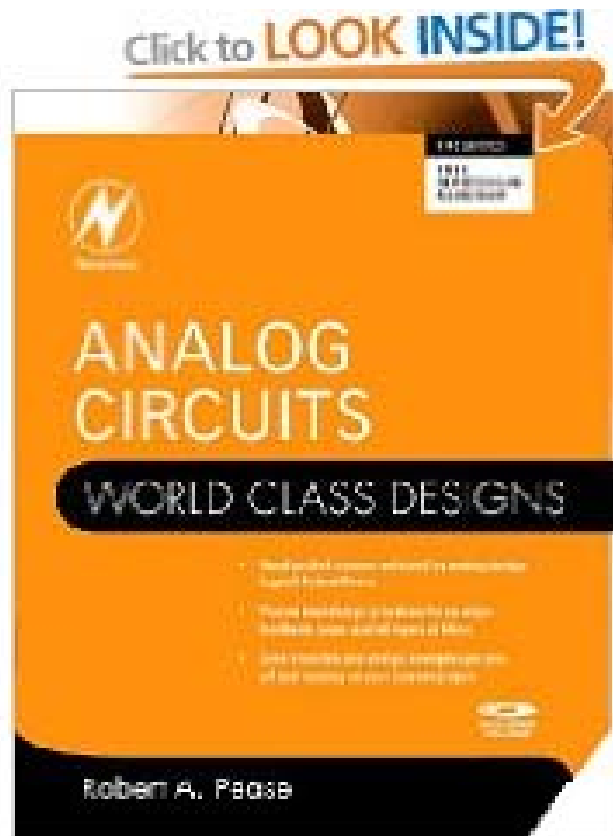


Thompson Consulting, Inc. Overview

“Power Quality in Electrical Systems”



Contributions to Other Texts



Patents

PAT. NO.

1	<u>7,076,304 Transcutaneous power supply</u>
2	<u>6,918,469 Curvilinear eddy current braking apparatus</u>
3	<u>6,533,083 Eddy current braking apparatus</u>
4	<u>6,523,650 Permanent magnet eddy brake with flux-steering poles</u>
5	<u>6,061,372 Two-level semiconductor laser driver</u>
6	<u>5,444,728 Laser driver circuit</u>
7	<u>5,123,023 Laser driver with plural feedback loops</u>

Details available at: <http://www.thompsonrd.com/patents.htm>

Office/Lab Facility

- Harvard, Massachusetts (30 miles NW of Boston/Cambridge)

