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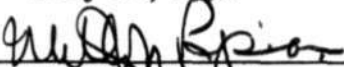
Division 6 - Lincoln Laboratory  
Massachusetts Institute of Technology  
Lexington 73, Massachusetts

SUBJECT: DOCUMENTS ON MAGNETIC CORE WORK

To: Group 63 Staff

From: Joan M. Sullivan

Date: July 16, 1956

Approved:   
William N. Papian

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Abstract: A partial list of Reports, Theses, Engineering Notes, Articles, and Memoranda on various aspects of the magnetic-core activity is presented.

	Title	Date	Author
<u>Reports</u>			
6R-187	Digital Information Storage in Three Dimensions Using Magnetic Cores	5-16-50	J. W. Forrester
6R-192	A Coincident-Current Magnetic Memory Unit (S.M. Thesis)	9-8-50	W. N. Papian
6R-211	A Magnetic Matrix Switch and Its Incorporation Into a Coincident-Current Memory (S.M. Thesis)	6-6-52	K. H. Olsen
6R-216	The 16-by-16 Metallic-Core Memory Array Model I	9-25-52	B. Widrow
6R-217	Design of Low-Power Pulse Transformers Using Ferrite Cores (S.M. Thesis)	8-29-52	R. D. Robinson
6R-234	Switch for Register Selection in a Magnetic Core Memory (S.M. Thesis)	5-24-54	J. I. Raffel
6R-235	Multi-Coordinate Selection Systems for Magnetic-Core Storage (S.M. Thesis)	8-23-54	R. S. DiNolfo

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	<u>Title</u>	<u>Date</u>	<u>Author</u>
<u>Reports</u>	(continued)		
6R-236	Magnetostriction in Ferrites Possess- ing a Square Hysteresis Loop (S.M. Thesis)	1-17-55	P. K. Baltzer

	Title	Date	Author
<u>Theses</u>	(not in report form)		
	A Magnetic Flip-Flop	5-16-52	R. J. Pfaff
	An Investigation of Magnetic Core Stepping Registers for Digital Computers	8-22-52	R. C. Sims
	Rectangular Hysteresis Loop Materials in a Nondestructive Read System	5-25-53	W. I. Frank
	An RF Readout System for a Coincident-Current Magnetic-Core Memory	5-25-53	B. Widrow
	High-Speed Magnetic Pulse Control Circuits for Computer Applications	5-25-53	H. K. Rising
	Magnetic Amplifiers with High Carrier Frequency	5-25-53	A. L. Pugh, III
	A Study of Single-Pulse Ferrite-Core Stepping Registers	8-31-53	J. B. Ricketts, Jr.
	Temperature Behavior of Ferrites	1-18-54	L. F. Silva
	A Differential Thermal Analysis Study of Synthesized Magnesium Ferrite, Manganese Ferrite, and Magnesium-Manganese Ferrite	1-18-54	R. A. Maglio
	A Carry-Matrix Counter	5-24-54	G. Lampke
	Transformer Drive for a Coincident-Current Magnetic Memory	8-23-54	E. K. Gates
	Magnetic Drum Writing Circuits Using Magnetic Cores	8-23-54	H. Henegar
	The Incorporation of a Magnetic Matrix Switch into a Multiplanar Coincident-Current Magnetic Memory	8-23-54	A. Hughes
	A Magnetic-Core Memory with External Selection	1-17-55	S. Bradspies

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	Title	Date	Author
<u>Theses</u>	(continued)		
	A Transistorized Amplifier-Discriminator for Core Memory Output	5-23-55	F. W. Sarles, Jr.
	A Transistor Selection System for A Magnetic-Core Memory	1-56	G. A. Davidson
	The Application of Transistors to Multiposition Selection Switches	5-24-56	P. G. Griffith
	A Magnetic-Core Test Storage	6-19-56	J. N. Ackley

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	Title	Date	Author
<u>Engineering Notes</u>			
6E-406	Preliminary Tests on the Four-Core Magnetic Memory Array	6-18-51	W. N. Papian
6E-413	Selection Systems for Magnetic-Core Storage	8-7-51	R. R. Everett
6E-422	Rectangular-Loop Magnetic Core Materials	9-4-51	W. N. Papian
6E-438	Binary Counting with Magnetic Cores	12-6-51	D. A. Buck
6E-454-1	Nondestructive Sensing of Magnetic Cores	3-24-53	D. A. Buck
6E-464	A Squareness Ratio for Coincident-Current Memory Cores	7-16-52	D. R. Brown
6E-470	Paper on Ferromagnetic and Ferroelectric Memory Devices	8-6-52	W. N. Papian
6E-472	The Mirror: A Proposed Simplified Symbol for Magnetic Circuits	8-14-52	R. P. Mayer
6E-475	A Magnetic-Core Gate and Its Application in a Stepping Register	10-30-52	G. R. Briggs
6E-477	Magnetic and Dielectric Amplifiers	8-28-52	D. A. Buck
6E-488	Delta <sub>ns</sub> in Ceramic Array #1	10-14-52	E. A. Guditz
6E-491	Hysteresis Loop Characteristics of MF-1118 for Different Temperatures	10-16-52	C. Morrison
6E-495	Test Procedure for Ferrite Pulse Transformers, I	11-5-52	E. K. Gates
6E-496	Instructions and Specifications for the Manufacture of 3:1 and 1:1, 0.1 Microsecond Pulse Transformers on Ferrite-Ring Cores	11-3-52	R. E. Hunt
6E-500	Switch Core Analysis I	11-4-52	A. Katz E. A. Guditz
6E-512	A Method for Acceptance Testing of Ferrite Core Production Lots	12-4-52	P. K. Baltzer

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<u>Engineering Notes</u> (continued)			
6E-518	New Metallic Cores from Magnetic Metals	1-2-53	A. D. Hughes
6E-519	General Ceramics Materials MF-1348B and MF-1359B	1-5-53	B. Smulowicz
6E-523	Core Drivers--Model V and VI	2-10-53	H. Boyd
6E-529	Matrix Driving with Unidirectional Pulses	2-25-53	D. A. Buck
6E-530	Magnetic Materials for High-Speed Pulse Circuits	2-27-53	D. R. Brown
6E-531	Driving Current Margins on Memory Test Setup I	3-6-53	S. Fine
6E-532	Nucleation of Domains of Reverse Magnetization & Switching Characteristics of Magnetic Materials	3-9-53	J. B. Goodenough N. Menyuk
6E-533	Effect of Current Pulse Duration on the Pulse Response of MTC Memory Cores	3-10-53	P. K. Baltzer
6E-539	An Approach to a Rationale in Ferrite Synthesis: Evaluation of Magnetic Moments	4-28-53	L. Gold
6E-540	A Fast-Core Tube Register	4-27-53	K. H. Olsen R. Pfaff
6E-544	Circuit for Measuring Switch Time, Rise Time, etc., (Switch-Time Comparator)	5-11-53	B. Gurley
6E-545	Dependence of Coercivity and Stress Hysteresis on Nucleation of Domains of Reverse Magnetization	5-14-53	J. B. Goodenough
6E-548	Preliminary Report--Temperature Effects in MTC-type Ferrite Cores	6-26-53	J. D. Childress
6E-559	A Free Energy Model for the Hysteresis Loop	6-16-53	A. L. Loeb

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	<u>Title</u>	<u>Date</u>	<u>Author</u>
	<u>Engineering Notes (continued)</u>		
6E-563	Specifications for a Ferrite Memory Core	6-30-53	D. R. Brown

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Note: This series discontinued under date of July 28, 1954.

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<u>Memoranda</u>			
6M-1371	Magnetic Core Activity	1-15-52	W. N. Papian
6M-1381	Magnetic-Core Memory Matrix Analysis (Effect of Driver Impedance)	1-24-52	D. A. Buck
6M-1490	Procedure for Receiving Magnetic Cores	5-16-52	D. R. Brown
6M-1529	Conference on Magnetic Core Switching Phenomena	6-16-52	A. Katz
6M-1582	High-Speed Magnetic Pulse Control Circuits for Computers (Thesis Proposal)	8-6-52	H. K. Rising
6M-1650	The Effect of Size of Metal Cores on Pulse and Hysteresis Measurements	9-25-52	R. F. Jenney
6M-1664	Conference on Thin Evaporated Metal Films	10-6-52	A. L. Loeb
6M-1676	Polishing Specimens of Ferrites	10-14-52	F. E. Vinal
6M-1681	Uniformity Tests on Ferrite Cores	10-21-52	J. H. McCusker
6M-1741	Metallographic Studies of Ferrites	12-4-52	D. R. Brown
6M-1767	An RF Readout System for a Coincident- Current Magnetic-Core Memory (Thesis Proposal)	12-19-52	B. Widrow
6M-1785	Testing of Magnetic Cores	1-7-53	A. D. Hughes
6M-1806	Pulse Tests of the RCA Victor Ferrite, XF-96	1-22-53	B. Smulowicz
6M-1811	Coordinate Conversion with Memory-Core Matrix	1-27-53	D. McCann
6M-1830	MF-1326-B, F-291, Life Test No. 1-- Initial Tests	2-6-53	J. R. Freeman
6M-1883	Magnetic-Core Matrix Switch Adder	3-9-53	C. J. Schultz
6M-1893	Hysteresis Test Results from Five New Glenco Ferroelectric Materials	3-10-53	C. D. Morrison



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6M-1929	AD HOC Conference on $\text{FeNi}_3$	3-25-53	D. A. Buck J. B. Goodenough A. L. Loeb N. Menyuk
6M-1943	Testing Cores for WWII	3-30-53	J. McCusker
6M-1957	Procedure for Preparing and Strip- ping Wires for MTC Memory Planes	4-6-53	E. A. Guditz
6M-1987	First Note on Pulse Transformers for Memory Drivers	5-27-53	F. Durgin E. K. Gates
6M-1989	MF-1326-B, F-291, Life Test No. 2	4-21-53	J. R. Freeman
6M-2110	A Linear Selection Magnetic Memory Using an Anti-Coincident Current Switch	5-8-53	K. H. Olsen
6M-2160	Energy Dissipation in Square-Loop Ferromagnetic Materials with Specific Application to Switch Cores	5-12-53	N. Menyuk
6M-2162	WWI Address Selection Systems, P.B. No. 61	5-6-53	J. L. Mitchell
6M-2167	First-Order Cancellation Residue in Rectangular Memory Arrays	5-15-53	D. A. Buck
6M-2186	Two Methods of Reducing Delta Noise	5-22-53	S. Fine
6M-2195	Further Work on Nondestructive Read System	5-27-53	W. I. Frank
6M-2197	Read-Out and Digit Plane Driving Systems, P.B. No. 62	5-28-53	W. J. Canty S. Fine
6M-2219	Testing of Individual Cores in MTC Memory Planes	6-16-53	A. D. Hughes
6M-2225	The Construction of Memory Planes for the MTC Memory	6-10-53	E. A. Guditz
6M-2240	A Magnetic Core Test Storage	6-15-53	K. Olsen

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6M-2248	Tests of Some Magnetic-Matrix Switch Operating Modes	6-17-53	J. L. Mitchell R. S. DiNolfo
6M-2254	Sensing the Slope of Magnetic Memory Output	6-19-53	K. H. Olsen
6M-2275	Equation of Motion for a Cylindrical $180^\circ$ Domain Wall	7-30-53	P. K. Baltzer
6M-2291	Proposal for Reducing the Number of Tubes Used in Driving a Magnetic Matrix Switch	7-9-53	J. I. Raffel
6M-2314	Readout-Noise Reduction in a Magnetic-Core Memory	7-23-53	S. Fine
6M-2316	Proposed Sense Winding for a 64 x 64 Memory Plane	7-23-53	W. J. Canty
6M-2319	Procedure for Handling Cores During Testing Program	7-23-53	W. J. Schallerer
6M-2348	Switch-Core Design and Power Loss	8-7-53	J. I. Raffel
6M-2351	Sensing Winding Geometry	8-6-53	J. I. Raffel S. Bradspies
6M-2383	Testing the Magnetic-Core Memory System in a Computer	9-18-53	B. Widrow
6M-2384	A Large Planar Switch for Register Selection in a Magnetic-Core Memory (Thesis Proposal)	8-31-53	J. I. Raffel
6M-2412	An Analytical Review of Néel's Molecular Field Theory of Ferri- and Ferromagnetism	9-16-53	A. L. Loeb
6M-2420	Interpretation of Memory-Core Specifications	9-22-53	D. R. Brown
6M-2442	Ferrite Synthesis	9-15-53	F. E. Vinal
6M-2473	B-H Loop Squareness in the Magnesium-Manganese Ferrites	10-22-53	J. B. Goodenough

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6M-2474	A Theory of Ionic Ordering, Tetragonal-Phase Formation, Magnetic Exchange, and Lamellar Precipitation Due to Covalent Forces in Spinel	5-7-54	J. B. Goodenough A. L. Loeb
6M-2514	The Incorporation of a Magnetic Matrix Switch into a Multiplanar Coincident-Current Magnetic Memory (Thesis Proposal)	11-12-53	A. D. Hughes
6M-2568-1	Pulse Response of Ferrite Memory Cores	9-20-54	J. R. Freeman
6M-2598	Transformer Drive for a Coincident-Current Magnetic Memory (Thesis Proposal)	1-5-54	E. K. Gates
6M-2602	Stress Effects in Ferrites and Generalization of Switching Coefficient for Non-Square Materials	1-6-54	N. Menyuk
6M-2634	Multi-Coordinate Selection Systems for Magnetic-Core Storage	1-19-54	R. S. DiNolfo
6M-2649	Graphical Summary of Core Data in the MgO-Fe <sub>2</sub> O <sub>3</sub> -MnO System	1-25-54	J. B. Goodenough
6M-2674	A Comparison Between Square-Loop Metals and Ferrites for High-Speed Pulsed Operation	2-4-54	D. R. Brown D. A. Buck N. Menyuk
6M-2692	Ferrite Synthesis, II	2-11-54	F. E. Vinal
6M-2736	Core Memory Using External Bit Selection	3-18-54	J. I. Raffel
6M-2755	Core Drivers--Model V and Model VI Applications, Limitations, and Modifications	5-1-54	J. D. Childress
6M-2762	A Magnetic-Core Memory with External Selection (Thesis Proposal)	4-6-54	S. Bradspies

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6M-2803	Magnetic-Core Shift Register Evaluator	5-3-54	C. J. Schultz
6M-2804	Effects of Tape Thickness and Temperature on Flux Reversal of 4-79 Molybdenum Permalloy	5-3-54	N. Menyuk
6M-2839	One One or the Other	5-28-54	R. P. Mayer W. N. Papian
6M-2840	Test Results on the DCL Memory Plane	5-28-54	E. A. Guditz
6M-2873	Basis for Release of Ferrite Memory Core Specifications	6-17-54	D. R. Brown
6M-2880	Evaluation of Ferrocube Cores	6-28-54	P. A. Fergus
6M-2919	Sensing Winding Geometry and Information Patterns	7-22-54	J. I. Raffel
6M-2943	X-Ray Equipment for Magnetic Research	7-29-54	D. Tuomi F. E. Vinal
6M-2945	Current Calibrator (Chopper Model)	8-10-54	J. D. Childress
6M-2969	Tentative Cathode Estimates for 256 <sup>2</sup> x 33 and 128 <sup>2</sup> x 33 Core Memories	8-6-54	W. J. Canty J. L. Mitchell
6M-3005	Bondeze Magnetic Wire for Memory Plane Construction	8-27-54	A. Bowen E. A. Guditz
6M-3035	An Investigation of Some Parameters which Influence the Magnetic Characteristics of Ferrites	9-20-54	P. K. Baltzer
6M-3059	Thoughts on Incremental Permeability	9-17-54	J. B. Goodenough
6M-3097	Description of Memory Test Setup IV	10-11-54	E. A. Guditz
6M-3107	High-Speed Core Driver	10-21-54	S. Bradspies
6M-3185	A Theory of Pervoskite-Type Manganites (La,M(II), MnO <sub>3</sub> )	11-30-54	J. B. Goodenough

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6M-3215	Conference on Ferrimagnetism	11-12-54	J. B. Goodenough P. K. Baltzer F. E. Vinal
6M-3252	Paramagnetic Behavior of Ferrites Containing two Kinds of Magnetic Ions	1-17-55	N. Menyuk
6M-3316	Transistor Circuits for Driving Coincident-Current Memories	1-21-55	K. H. Olsen
6M-3390	Memory Plane Margins: DCL-2-720 Cores vs S-1 Cores	2-21-55	J. L. Mitchell
6M-3417	A Transistorized Amplifier Discriminator for Core Memory Output Sensing (Thesis Proposal)	3-7-55	F. W. Sarles, Jr.
6M-3505	Experiments on a Three-Core Cell for High-Speed Memoires	-----	J. I. Raffel S. Bradspies
6M-3526	X-Y Tests on Memory Plane Units	4-11-55	J. W. Schallerer
6M-3530	Improved Memory Cores Produced in Lincoln Laboratory	4-13-55	F. E. Vinal
6M-3654	Procedure for Stripping Wires for 64 x 64 Memory Plane Modules	6-7-55	E. A. Guditz
6M-3699	Specifications for 64 <sup>2</sup> Memory Plane Module Frame	6-20-55	E. A. Guditz L. B. Smith
6M-3717	A Transistor Selection System for a Magnetic-Core Memory (Thesis Proposal)	6-27-55	G. A. Davidson
6M-3805	Mod. III Current Calibrator	8-9-55	R. A. Pacl
6M-3820	EMAR: An Experimental Memory Address Register	8-10-55	W. A. Clark
6M-3856	Pulse Transformer Amplifier	9-7-55	M. M. Cerier
6M-4064	Remarks on Domain Patterns Recently Found in BiMn and SiFe Alloys	12-27-55	J. B. Goodenough
6M-4089	Geometry of Magnetic Memory Elements	1-18-56	J. D. Childress

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6M-4137	Memory Core Heating by Switching at High Frequencies	1-31-56	J. D. Childress
6M-4153	The Noise Problem in the Coincident-Current Memory Matrix	2-13-56	J. D. Childress
6M-4218	A Sequential-Access Three-Microsecond Core Memory	3-8-56	R. L. Best T. H. Meisling
6M-4298	Proposed Research Program on Thin Film	4-17-56	A. L. Loeb
6M-4328	The Influence of Chemistry on B-H Loop Shape, Coercivity, and Flux-Reversal Time in Ferrites	5-16-56	J. B. Goodenough
6M-4362	Magnetization Reversal in Thin Films	6-4-56	D. O. Smith

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Collections

Group 63 Seminar on Magnetism Memoranda covering the Introduction and Lectures I to LV and Appendices I to VII have been released for the academic year 1952-1953.

A. L. Loeb  
N. Menyuk

Memorandum covering Lecture I of Vol. 2 has been released. Seminar was discontinued after Lecture I of Vol. 2.

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Articles

Forrester, Jay W., "Digital Information Storage in Three Dimensions Using Magnetic Cores," Journal of Applied Physics, Vol. 22, pp. 44-48, January 1951.

Papian, William N., "A Coincident-Current Magnetic Memory Cell for the Storage of Digital Information," Proceedings of the Institute of Radio Engineers, Vol. 40, No. 4, April 1952.

Goodenough, John B., "A Theory of the Deviation from Close Packing in Hexagonal Metal Crystals," Physical Review, Vol. 89, No. 1, pp 282-294, January 1, 1953.

Brown, David R., and Albers-Schoenberg, Ernest, "Ferrites Speed Digital Computers," Electronics, April 1953.

Menyuk, Norman, "Magnetization Reversal of Square-Loop Polycrystalline Materials by Domain Growth," Physical Review, Vol. 91, pp. 434, July 15, 1953.

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Buck, Dudley A., "Nondestructive Sensing of Magnetic Cores," Communications and Electronics (bi-monthly), January 1954.

Goodenough, John B., "A Theory of Domain Creation and Coercive Force in Polycrystalline Ferromagnetics," Physical Review, Vol. 95, No. 4, pp. 917-932, August 15, 1954.

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Widrow, Bernard, "Radio-Frequency Nondestructive Readout for Magnetic-Core Memories," Proceedings of the Institute of Radio Engineers, Professional Group on Electronic Computers, Vol. EC-3, No. 4, December 1954.

Menyuk, Norman and Goodenough, John B., "Magnetic Materials for Digital-Computer Components I. A Theory of Flux Reversal in Polycrystalline Ferromagnetics," Journal of Applied Physics, Vol. 26, No. 1, pp. 8-18, January 1955.



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Raffel, Jack I. and Bradspies, Sydney, "Experiments on a 3-Core Cell for High Speed Memories," Convention Record of the Institute of Radio Engineers, April 1955.

Goodenough, John B. and Loeb, Arthur L., "Theory of Ionic Ordering, Crystal Distortion and Magnetic Exchange Due to Covalent Forces in Spinels," Physical Review, Vol. 98, No. 2, pp 391-408, April 15, 1955.

Menyuk, Norman, "Magnetic Materials for Digital-Computer Components II. Magnetic Characteristics of Ultra-Thin Molybdenum-Permalloy Cores," Journal of Applied Physics, Vol. 26, p. 692, June 1955.

Childress, James D., "The Noise Problem in the Coincident-Current Memory Matrix," Proceedings of the Conference on Magnetism and Magnetic Materials, American Institute of Electrical Engineers, October 1955.

Smith, Donald O., (abstract on) "A Vibrating-Coil Magnetometer and its Application to the Study of the Curie Point of Magnetite," Proceedings of the Conference on Magnetism and Magnetic Materials, American Institute of Electrical Engineers, October 1955.

Goodenough, John B., "The Role of Covalence in Oxides Containing Manganese," Conference on Magnetism and Magnetic Materials, American Institute of Electrical Engineers, October 1955.

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Smith, Donald O., "Development of the Vibrating-Coil Magnetometer and Its Application to Magnetite," Technical Report 102, Laboratory for Insulation Research, MIT, November 1955.

Guditz, Elis A., and Smith, Lloyd B., "An Improved Technique for the Assembly of Core Memory Planes," Electronics, February 1956.

Goodenough, John B., "Interpretation of Domain Patterns Recently Found in BiMn and SiFe Alloys," Physical Review, Vol. 102, No. 2, pp. 356-365, April 15, 1956.

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Articles (continued)

Smith, Donald O., "Development of a Vibrating-Coil Magnetometer," The Review of Scientific Instruments, Vol. 27, No. 5, pp. 261-268, May 1956.

Smith, Donald O., "Magnetization of a Magnetite Single Crystal Near the Curie Point," Physical Review, Vol. 102, p. 959, May 15, 1956.

Taylor, Norman H., "Magnetic-Core Storage Development," presented in England in April 1956, to be published later in Proceedings of Electrical Engineers.

Goodenough, John B., "The Influence of Chemistry on B-H Loop Shape, Coercivity, and Flux-Reversal Time in Ferrites," to be published in England.

Goodenough, John B., "The Origin of Losses in Magnetic Materials," to be presented at October meeting of the American Institute of Electrical Engineers, Boston, Massachusetts, and later published in the Conference Proceedings.

Goodenough, John B., and Loeb, Arthur L., "Semicovalence and Anisotropy in Magnetic Oxides," to be presented at October meeting of the American Institute of Electrical Engineers, Boston, Massachusetts, and later published in the Conference Proceedings.

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Author Joan M. Sullivan  
Joan M. Sullivan