

magnetic amplifiers

principles and applications

by PAUL MALI

*Instructor in Electrical and Mathematical Technology,
and Director of Education and Training,
Electric Boat Div., General Dynamics Corp.*



John F. Rider Publisher, Inc., NEW YORK

Copyright August 1960 by John F. Rider Publisher, Inc.

**All rights reserved. This book or any parts thereof may
not be reproduced in any form or in any language
without permission of the publisher.**

Library of Congress Catalog Number 60-12440

Printed in the United States of America

PREFACE

CUSTOMISED
61268562

This book was written because of a need to make available fundamental concepts of magnetic amplifiers. It is intended primarily for technical aides, electronic technicians, electrical draftsmen, electricians, and students, interested in a fundamental knowledge of the operation and applications of magnetic amplifiers. It also serves as a review for electrical engineers who have long been away from the electrical field. Engineers and designers are given a quick introduction to the language and circuits associated with magnetic amplifiers, before attempting the more intricate concepts and difficult circuits.

The basic principles and laws governing the operation and uses of magnetic amplifiers are presented along with application in diverse industrial systems. Extensive mathematics and detailed circuitry have been limited for a simpler and more fundamental presentation, to be easily assimilated.

The author wishes to gratefully acknowledge the efforts of David Anderson, staff assistant to the senior vice president of operations of General Dynamics Corp., New York, who has made the publishing of this book possible. Thomas Pugarelli of the State Technical Institute, Hartford, Conn., must be mentioned for recognition in submitting valuable comments and criticisms. Additionally, the author wishes to acknowledge the valuable assistance of the following people of the Electric Boat Div. of General Dynamics Corp., William Sardelli, Donald Bowers, Frank Kohanski and Dianne M. Donch.

The author wishes to thank the organizations who have granted permission to make reference to their systems in the section on applications. These are: Westinghouse Electric Corp., Minneapolis-Honeywell Regulator Co., and The Louis Allis Co.

Recognition should also be given to my wife, Mary, for her unceasing efforts in keeping two well-meaning children from making unplanned "physical" revisions of this manuscript.

PAUL MALI

*August, 1960
Groton, Conn.*

CONTENTS

Introduction	1
Magnetism	3
Electromagnetism	11
Magnetic Circuits	23
The Saturable Reactor	26
Self-Saturating Types	34
Three-Legged Core Magnetic Amplifiers	39
Compensating Magnetic Amplifiers	42
Polarized Magnetic Amplifiers	46
Amplifier Gain	50
Feedback	53
General Uses and Construction	56
Maintenance and Troubleshooting	68
System Applications	72
Glossary	96
Index	99