MICROPROCESSOR APPLICATIONS MANUAL

MOTOROLA
Semiconductor Products Inc.

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CONTRIBUTORS

Alvin W. Moore — **Karl E. Fronheiser**
Vinay Khanna — **John M. DeLaune**
Gary G. Sawyer — **Mark E. Eidson**
Thomas C. Daly — **James F. Vittera**

McGRAW-HILL BOOK COMPANY

New York St. Louis San Francisco Auckland Düsseldorf Johannesburg Kuala Lumpur London Mexico Montreal New Delhi Panama Paris São Paulo Singapore Sydney Tokyo Toronto

MOTOROLA SERIES IN SOLID-STATE ELECTRONICS

THE ENGINEERING STAFF, MOTOROLA INC., SEMICONDUCTOR PRODUCTS DIVISION: Analysis and Design of Integrated Circuits
THE ENGINEERING STAFF, MOTOROLA INC., SEMICONDUCTOR PRODUCTS DIVISION: Integrated Circuits: Design Principles and Fabrication
HAMILTON AND HOWARD: Basic Integrated Circuit Engineering
COMPUTER APLICATIONS GROUP, MOTOROLA INC., SEMICONDUCTOR PRODUCTS DIVISION: Microprocessor Applications Manual

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Library of Congress Cataloging in Publication Data

Motorola Semiconductor Products Inc.
Microprocessor applications manual.

(Motorola series in solid-state electronics)
Includes index.
1. Microprocessors. I. Title.
QA76.5.M66 001.6'4 75-28444
ISBN 0-07-043527-8

PREFACE

General purpose Microprocessing Units (MPUs), architecturally descended from the minicomputer and implemented as integrated circuit semiconductor products, are an exciting reality for today's electronics business. The current availability of several general purpose MPUs in production quantities (and the accompanying competitive prices) have generated widespread interest among potential users. The electronics industry trade press (magazines, newspapers, etc.) has responded with enthusiasm and there has been a flurry of editorials and articles covering the subject. The media has given extensive coverage to market potential, comparative descriptions of the various devices available, and, to a lesser extent, "how to use them" articles. In the applications area, they are hampered by two considerations: (1) their format requires that they concisely present only the salient features without burying their readers in a mountain of detail; (2) much of the interesting work is proprietary in nature and, thus, cannot be publicized.

The semiconductor manufacturers have also added to the information gap by taking a "business as usual" attitude toward their new products; in many cases, they have been slow to realize that they are now providing a significant subsystem and must provide more information than their classical data sheets and application notes.

This book was written in the attempt to partially close this information gap by providing detailed applications information for a representative general purpose microprocessing unit. If it is assumed, as it was here, that the reader is not necessarily familiar with MPUs, the description of even a simple system is burdened by a considerable body of information concerning the MPU itself. In addition to the system considerations, such topics as architecture, instruction set, addressing modes, interrupt structure, etc., must be covered. For this reason, only the Motorola MC6800 and its family of associated parts are dealt with here. However, the system design considerations and hardware/software discussions are generally applicable to designs based on other MPUs.

The book's primary audience was intended to be practicing system/circuit designers with some previous experience in developing electronic equipment using bipolar digital integrated circuits. While no particular computer/MPU experience is assumed, a basic understanding of classical computer architecture and some experience with assembly language programming will be of value. An attempt was made to treat each topic in sufficient detail to be useful to a general technical audience.

Chapter 1 describes the architecture of the M6800 system and provides a brief description of the elements required for a rational microcomputer system. In addition, the addressing modes and instruction set of the MC6800 MPU are introduced and discussed.

Chapter 2 is a collection of various programming techniques with emphasis on arithmetic operations and peripheral control routines. This chapter introduces a practice that is followed throughout the remainder of the book: Programming examples that are reproduced as assembly listings (computer print-outs from the host computer's terminal) have been "debugged" and can be used as is if they fit the reader's requirements.

Detailed descriptions of the M6800 interrupt structure and Input/Output (I/O) devices used with

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