

ARMDRAULIC INSTRUCTIONAL ROBOT

VOLUME III - LABORATORY EXERCISES MODEL EHA-1052/1052A

This manual is intended for use with the model EHA-1052 and EHA-1052A robots.

Where necessary the text differentiates between the two models. Unless there is a contrary note you may assume that "EHA-1052" refers to both robots.

Sections 1,2 and 3 require only the ARMDRAULIC robot and standard laboratory accessories.

Sections 4, 5, 6, 7, 8 and 9 require an external computer. The work is written around an Apple IIe. However, interfaces are available for several other computers and the instructional exercises can be easily rewritten accordingly.

Tutorial support to this manual is provided by ARMDRAULIC Vol I. Instructor's notes are provided in ARMDRAULIC Vol. IV.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of FEEDBACK INCORPORATED.

THE HEALTH AND SAFETY ACT 1974

We are required under the Health and Safety at Work Act 1974, to make available to users of this equipment certain information regarding its safe use.

The equipment, when used in normal or prescribed applications within the parameters set for its mechanical and electrical performance, should not cause any danger or hazard to health and safety if normal engineering practices are observed and they are used in accordance with the instructions supplied.

If, in specific cases, circumstances exist in which a potential hazard may be brought about by careless or improper use, these will be pointed out and the necessary precautions emphasized.

While we attempt to give the fullest possible user information in our handbooks, if there is any doubt whatsoever about any aspect relating to the proper use of this equipment the user should contact the Product Safety Officer at Feedback.

Component replacement

Although this Feedback manual was believed to be correct at the time of printing, components supplied may differ slightly from those described.

We endeavor to improve our equipment continually by incorporating the latest developments and components, even up to the time of dispatch. If it is practicable we include such new or revised information in the manual.

Whenever possible, replacement components should be similar to those originally supplied. These may be ordered direct from Feedback or its agents by quoting the following information:

1. Equipment type
2. Equipment serial number
3. Component reference
4. Component value

Standard components can often be replaced by alternatives available locally.

ARM DRAULIC LABORATORY MANUAL

VOLUME III

CONTENTS

- CHAPTER I - Installation
- CHAPTER II - Using the Teach Pendant
- CHAPTER III - Experiments without External Computer
 - 3.01 Manipulation
 - 3.02 Degrees of Freedom & Axes of Motion
 - 3.03 Total Work Envelope
 - 3.04 Programming & Editing with the Teach Pendant
 - 3.05 Effects of Hydraulic System Pressure on System Operation
 - 3.06 Charging & discharging the accumulator
 - 3.07 Manual Calibration of Position Detectors
 - 3.08 Resolution, Accuracy and Repeatability
 - 3.09 Kinematic Model of Robot Arm
 - 3.10 Measuring Cycle Times of Robot Operation
 - 3.11 Measuring Gripping Forces

CHAPTER IV - Connection to External Computers

- 4.01 RS232 Serial Communication
- 4.02 MICA 8 Bit Parallel Communication

CHAPTER V - Computer Control

- 5.01 Programming the MICA parallel interface card.
- 5.02 BASIC Programming Through the Parrallel Interface
- 5.03 Single Axis Closed Loop Control with BASIC
- 5.04 Closed Loop Control of Multiple Axes
- 5.05 Point-to-Point Position Sequencing & Storage
- 5.06 Familiarization with EHA1052A Serial Commands
- 5.07 BASIC Programming Through the Serial Interface
- 5.08 Uploading and Downloading

CHAPTER VI - Calibration Program

CHAPTER VII - Display Program

CHAPTER VIII - Speech Synthesis & Recognition

CHAPTER IX - Structured Programming

APPENDICES -

- A. Glossary
- B. Initialization Routines
- C. Use of Break-Out-Board Model