

# Contents

	<b>Preface</b>	<b>xi</b>
	<b>Acknowledgments</b>	<b>xiii</b>
	<b>About the Author</b>	<b>xv</b>
<b>part one</b>	<b>An Overview of Computer Troubleshooting</b>	
<b>chapter one</b>	<b>How Microcomputers Work</b>	<b>3</b>
	Chapter Overview	3
	What is a Microcomputer?	3
	The Normal Operation of a Microcomputer	5
	Safety and Cautions to be Observed During Computer Repair	10
	Chapter Summary	12
	Review Questions	12
<b>chapter two</b>	<b>A Computer Problem or Not?</b>	<b>13</b>
	Chapter Overview	13
	External Power Problems	13
	Diskette Problems	17
	Is It a Hardware or a Software Problem?	19
	Representative ROM Diagnostic Error Codes	20
	Chapter Summary	22
	Review Questions	23
<b>part two</b>	<b>Troubleshooting Computer Hardware Problems</b>	<b>25</b>
<b>chapter three</b>	<b>Common Computer Problems</b>	<b>27</b>
	Chapter Overview	27
	Complete Failures	27
	Tampered Equipment	27
	Intermittents	28
	Application of Voltage in the Wrong Place	29
	Transients	30
	Overheated Parts Failures	31

	Multiple Problems	32
	The Tough Problems	32
	Chapter Summary	33
	Review Questions	34
<b>chapter four</b>	<b>Troubleshooting to the Unit &amp; Board Level</b>	<b>35</b>
	Chapter Overview	35
	Check the Simple Things First	35
	Troubleshooting to the Unit Level	36
	To Repair or Not To Repair?	50
	Using the Diskette Diagnostics Programs to Localize Problems	50
	Chapter Summary	53
	Review Questions	54
<b>chapter five</b>	<b>Troubleshooting the Computer Power Supply &amp; Cooling Fan</b>	<b>55</b>
	Chapter Overview	55
	Danger: High Voltage!	55
	General DC Troubleshooting	56
	Timely Shortcuts	59
	Analyzing Fuse Failures	61
	Power Supply Circuits	65
	The Overloaded Power Supply (Shorted)	68
	The Inoperative Power Supply (No Output Voltages)	70
	Troubleshooting the DC Voltage Regulator	70
	Troubleshooting Fan and Cooling Problems	72
	Chapter Summary	73
	Review Questions	73
<b>chapter six</b>	<b>Digital Troubleshooting Instruments and Techniques</b>	<b>75</b>
	Chapter Overview	75
	Preparation	75
	The Digital Schematic Diagram	76
	First Checks	77
	Introduction to Digital Troubleshooting Instruments	79
	Digital Troubleshooting Principles	92
	Chapter Summary	104
	Review Questions	104
<b>chapter seven</b>	<b>Installing &amp; Troubleshooting Option Card Problems</b>	<b>106</b>
	Chapter Overview	106
	Why Use Option Cards?	106
	Installing Option Cards	107

	Troubleshooting Option Card Problems	124
	Chapter Summary	142
	Review Questions	142
<b>chapter eight</b>	<b>Troubleshooting the System Board</b>	<b>143</b>
	Chapter Overview	143
	Block Diagram of the System Board	143
	The Expansion Slots	158
	Replacing the System Board	163
	Chapter Summary	166
	Review Questions	166
<b>chapter nine</b>	<b>Troubleshooting the Keyboard</b>	<b>167</b>
	Chapter Overview	167
	The Keyboard Cable	167
	Using a Keyboard Diagnostics Program	169
	Kinds of Keyboards in Common Use	169
	Getting at the Key Mechanisms	171
	Chapter Summary	173
	Review Questions	173
<b>part three</b>	<b>Making Repairs and Changes</b>	<b>175</b>
<b>chapter ten</b>	<b>After the Defective Part is Identified</b>	<b>177</b>
	Chapter Overview	177
	Working on the Printed Circuit Board	177
	Necessary Paperwork	186
	Ordering Parts to Replace Those Used From Stock	187
	Packing for Shipments	188
	Preventive Maintenance of Computers	188
	Chapter Summary	189
	Review Questions	189
<b>chapter eleven</b>	<b>Troubleshooting and Repairing Floppy Diskette Drives</b>	<b>190</b>
	Chapter Overview	190
	FDD Hardware Overview	190
	Testing Drive Alignment While Operating the Microcomputer	204
	The Classic Symptoms of a Malfunctioning Floppy Diskette Drive	205
	Aligning a Floppy Diskette Drive	206
	Installing a New Diskette Drive	221
	Chapter Summary	223
	Review Questions	223

<b>chapter twelve</b>	<b>Repairing Computer Monitors</b>	<b>224</b>
	Chapter Overview	224
	A Monitor Overview	224
	Typical Monitor Problems and Symptoms	231
	Video Problems	233
	Special Troubleshooting Theory for Monitor Circuitry	236
	Chapter Summary	239
	Review Questions	241
<b>chapter thirteen</b>	<b>Repairing Printers</b>	<b>242</b>
	Chapter Overview	242
	Why a Printer?	242
	Printer Electronics	250
	The Mechanics of Printers	259
	Printer Testing	265
	Printing Preventive Maintenance	266
	Chapter Summary	266
	Review Questions	266
<b>chapter fourteen</b>	<b>Installing Memory Chips or a Co-Processor</b>	<b>268</b>
	Chapter Overview	268
	Working Inside the Computer	268
	Installing Memory Expansion on the System Board	271
	Installing an 8087 Math Co-Processor	276
	Chapter Summary	276
	Review Questions	276
<b>part four</b>	<b>Troubleshooting Computer Software Problems</b>	<b>277</b>
<b>chapter fifteen</b>	<b>Troubleshooting Computer Software Problems</b>	<b>279</b>
	Chapter Overview	279
	Random Access Memory: The Heart of a Computer	279
	Using Applications Software that Worked Well Until the Problem Arose	281
	Using New Applications Software	282
	Data Loss Problems	285
	Chapter Summary	287
	Review Questions	287

<b>appendix A</b>	<b>Interface Cabling Conventions</b>	<b>289</b>
	The RS-232C Serial Data Standard	289
	Modem Cables	291
	Monitor Adapter Cables	291
	Printer Cables	292
	IEEE-488 Cable Connections	294
<b>appendix B</b>	<b>Basic Problems for Troubleshooting Microcomputers</b>	<b>299</b>
	Basic Programs for Disk Drive Alignment on IBM and Compatible Computers	299
<b>appendix C</b>	<b>An Explanation of the ASCII Chart</b>	

### **Glossary**

### **Index**

## **NOTICE TO THE READER**

Publisher does not warrant or guarantee any of the products described herein or perform any independent analysis in connection with any of the product information contained herein. Publisher does not assume, and expressly disclaims, any obligation to obtain and include information other than that provided to it by the manufacturer.

The reader is expressly warned to consider and adopt all safety precautions that might be indicated by the activities described herein and to avoid all potential hazards. By following the instructions contained herein, the reader willingly assumes all risks in connection with such instructions.

The publisher makes no representations or warranties of any kind, including but not limited to, the warranties of fitness for particular purpose or merchantability, nor are any such representations implied with respect to the material set forth herein, and the publisher takes no responsibility with respect to such material. The publisher shall not be liable for any special, consequential or exemplary damages resulting, in whole or in part, from the readers' use of, or reliance upon, this material.