

Table Of Contents



Section I Getting Started	9
1 Experimenting with Electronics	11
Resistors	11
Capacitors	14
Diodes	17
Transistors	19
Integrated Circuits	19
How and Where to Buy Electronic Parts	21
Reading Circuit Diagrams	22
Tools and Test Equipment	23
Constructing Electronic Circuits	28
Soldering	30
Section II Analog Integrated Circuits	33
2 The LM380 Power Amplifier	35
LM380 Microphone Amplifier	36
LM380 Intercom	37
Phase-Shift Oscillator	37
3 Applications for Quad Op Amps	43
A Basic Pulse Generator	45
A More Versatile Pulse Generator	47
Touch Switch	49
4 The LM339 Quad Comparator	50
VCO Circuits	50
Limit Comparators	52
5 Percussive Instrument Synthesizer	58
The Notch Filter	59
6 Active Filters	64
A Practical Bandpass Circuit	66
A Simple Triangle-Wave Generator	66

7	The 556 Dual Timer	71
	Tone-Burst Generator 71	
	Dual-Action Timer Circuit 74	
	Extra-Long Time Delay Circuit 74	
8	A Programmable Timer/Counter	78
	The Free-Running Mode 78	
	Waveform Generator 81	
9	Pulse Modulation & Phase-Locked Loops	83
	PFM Transmitter 84	
	PFM Receiver 86	
10	The 567 Tone Decoder	88
	Experimenter's Circuit 90	
	Changing the Frequency Response 90	
	A Secret Lock and Other Applications 94	
Section III Digital Integrated Circuits		97
11	The TTL NAND Gate	99
	One-Shot 102	
	Flip-Flop 103	
	Astable Multivibrator 104	
12	The Multiplexer	107
	A Simple 1 of 2 Multiplexer 107	
	Advanced Multiplexers 110	
	The 74150 1 of 16 Multiplexer 110	
	Universal Logic Gate 112	
	Adding a Data Select Input 112	
	Multiplexer Pattern Generator 116	
	Hexadecimal Keyboard Encoder 116	
13	The Demultiplexer	121
	Simple 1 of 2 Demultiplexer 121	
	Using Demultiplexers as Decoders 122	
	Advanced Demultiplexers 123	
	The 74154 Demultiplexer/Decoder 124	
	A Demonstration Demultiplexer 124	
	Binary to Hexadecimal Decoder 126	
	Digital Sequencer 128	
	Programmable Sequencer 129	
14	The Schmitt Trigger	130
	7404 Schmitt Trigger 130	
	The 7413 Dual Schmitt Trigger 132	
	Schmitt Trigger Oscillator 134	
	Schmitt Trigger Threshold Buffer 136	
	Other Applications 136	
15	The Monostable Multivibrator	137
	A One-Shot Demonstration Circuit 139	
	The 555 One-Shot 140	
	One-Shot Sound Effects Generator 140	

16	The Flip-Flop	144
	A Basic Flip-Flop 144	
	Ultra-Simple Flip-Flop 146	
	The 7473 Dual J-K Flip-Flop 146	
	A Divide by Four Counter 148	
	7490 Decade Counter 150	
17	The Decade Counter	152
	Binary-Coded Decimal 152	
	The 7490 Decade Counter 153	
	The 7447 Seven Segment Decoder 153	
	The 7475 Four-Bit Latch 156	
	7490 Divide-By-N Circuits 158	
18	TTL Sequence Generator	159
	A Ten-Step Sequencer 159	
	Working with Different Outputs 160	
	Burglar Deceiver 160	
19	Programmable Read-Only Memories	166
	Programmable Diode ROM's 167	
	Diode PROM Character Generator 171	
20	Read/Write Memories (RAM's), Part 1	175
	The 7489 RAM 175	
	RAM Demonstration Circuit 176	
	Automated RAM Demonstrator 178	
21	Read/Write Memories (RAM's), Part 2	183
	RAM Demonstration Circuit 183	
22	Three-State Logic	190
	Three-State Buffer Demonstrator 193	
	Three-State Multiplexer 193	
	Three-State Bus Demonstrator 195	
	Going Further 196	
23	Getting Acquainted With CMOS	197
	CMOS Astable Multivibrator 200	
	CMOS Divide-by-10 Counter/Decoder 204	
Section IV Analog/Digital Converters		205
24	Digital To Analog Converters, Part 1	207
	D/A Conversion 207	
	D/A Conversion Demonstrator 208	
25	Digital to Analog Converters, Part 2	215
	A Simple Binary Input Circuit 215	
	The D/A Converter 217	
26	Analog to Digital Converters, Part 1	223
	Types of A/D Converters 224	

27	Analog to Digital Converters, Part 2	232
	Parallel A/D Converter with BCD Output	232
	Single-Digit Voltmeter	236
	Moving-Dot Readout	238
	Solid-State Oscilloscope	240
Section V Optoelectronics		243
28	The Neon Glow Lamp	245
	Glow Lamp Circuits	248
29	The Photoresistor	252
	Simple Light Meter	254
	Advanced Light Meter	256
	Analog/Digital Converter	256
	Light-Activated Relay	257
30	The Light-Activated SCR	258
	LASCR Test Rig	258
	Relaxation Oscillator	258
	Light Meter	259
	Slave Flash	260
31	The Optoisolator	265
	Simple Couplers	265
	Negative-Resistance Circuit	267
	Relaxation Oscillator	268
32	Using LED's as Light Detectors	271
	Experimenting with LED's	271
	A Practical LED-LED Transceiver	274
33	Laser Diodes	277
	Driving Laser Diodes	278
Section VI Power Supplies		281
34	IC Voltage Regulators	283
	5-Volt TTL Supply	284
	Variable-Voltage Supply	285
	Other IC Voltage Regulators	285
35	High-Voltage DC/DC Converters	288
	Neon Lamp Relaxation Oscillator	290
	UJT DC/DC Converter	292
36	The Voltage Multiplier	293
	Typical Voltage Multipliers	293
	Op Amp Voltage Multiplier	298
	CMOS Voltage Multiplier	298
37	The Silicon Solar Cell	301
	Building Practical Solar Cell Arrays	303
	Practical Chargers	306
	Index	307