

---

# Index

---

- 0817 ADC 12
- 4202 stepping motor controller 44
- 8088 microprocessor 3, 10, 12, 66ff
  - address wires 66, 67
  - auxiliary wires 66, 67
  - data wires 66, 67
  - flag register 108
  - instructions Appendix H
  - registers 68, 69
- 8251 UART 116ff, Appendix J
- 8253 timer 99ff, Appendix I
- 8255 PPI 4, 38ff, 49, 50, 79, 113
- 8259 OCW (Operation Command Word) 114, 115
- 8259 interrupt controller 109ff
  
- ADC instruction 102
- ADC (Analog to Digital Converter) 4, 12, 13, 15ff, Appendix D
  - dynamic range 16
  - Nyquist frequency 17
  - resolution 16
  - sample speed 102
  - sampling rate 17, 18
- ADCEOC (End of Conversion) 91
- ADCInline program 78
- ADCTEST.PAS 14
- ADD instruction 102
  - address, offset 69
    - segment 69
  - address wires 10
  - amplifier 4, 60, 61
    - gain 60, 61
  - analog voltage 12
  - AND instruction 84, 85, 88, 89
  - And statement 84, 85
  - apparatus description Appendix A
  - arrays 25
  - ASCII 116ff
  - assembly language 4
  - assembly language program 70ff
  - Assign statement 26
  
- BellIRQ program 112
- bibliography Appendix K
  
- binary numbers 48ff
- BinaryCount program 50
- BIOS (Basic Input and Output System) 110, 123ff
- BIOS functions 124
- Boolean algebra 84
- BOOT disk Appendix B
- branching instructions 87ff
- buss 66, 67
  
- cadmium sulfide photoresistor 97, 98
- CALCCOS.PAS 6
- CALL instruction 89ff
- CLI instruction 101
- CLK signal 66, 67
- Close statement 26
- COM1 119
- COMMAND.COM 6
- Compile program 7
- computer 1ff
  - APPLE II 2
  - IBM-PC 2, 3
- conduction 64, 65
- convection 64, 65
- copper
  - specific heat 63
  - thermal conductivity 63
- COS.DAT 9
- CPU (Central Processing Unit) 10, 66ff
  
- DAC (Digital to Analog Converter) 4, 79–80, 83, 84
- damping constant 23
- data arrays 25
- data communication 4
  - parallel 121ff
- data errors 35ff
- data modeling 32ff
- data smoothing 37
- data wires 10
- DEBUG program 4, 70ff
- DEC instruction 83, 87
- Delay( ) statement 43, 44
- digital output 38
- digital signal processing 36ff

- digital voltage 12
- DOS (Disk Operating System) 6, 123ff
- DOS functions 125
- double precision subtraction 103
- drag coefficients 95
- drag force 93ff
  
- EEPROM 125
- EndOfInterrupt (EOI) 111
- EOC (End of Conversion) 91
- EOF( ) statement 27
- EPROM 125
- equipment description Appendix A
- error in data 35ff
- error measure in modeling 32
  
- FindLocation program 75
- finite impulse heat flow equation Appendix G
- first-order transducer 22ff
- Flag register 108
- FORMAT.COM 7
- Fourier 17
  
- GetIntVec procedure 111
- glycerine 4
- glycerine column 97ff
- GraphExample program 61
- graphing 9
- graphing programs Appendix B
  
- heat capacity 54ff
- heat flow,
  - characteristic time 56ff
  - data analysis 62, 63
  - least squares 64
  - numerical integration 57, 58
- heat flow equation 54ff, Appendix F
  - finite impulse Appendix G
- hexadecimal numbers 48ff
- HEXFET (Field Effect Transistor) 4, 39ff, 58, 59
- high-pass filter, digital 37
- hysteresis 41, 42
  
- IEEE-488 121ff
- impulse of heat 54ff
- IN instruction 88
- indexed addressing 80ff
- IndexPas program 80
- Inline( ) statement 4, 76ff
- instruction,
  - ADC 102
  - ADD 102
  - AND 84, 85, 88, 89
  - CALL 89ff
  - CLI 101
  - DEC 83, 87
  - IN 88
  - INT 110ff
  - INT 20 73
  - IRET 111
  - JMP 87
  - JNZ 83, 87
  - MOV 73
  - NOT 86, 87
  - OR 85, 86
  - OUT 73
  - POP 109
  - PUSH 109
  - RET 90
  - SBB 103
  - STI 101
  - SUB 103
  - XOR 86
- INT 20 instruction 73
- INT instruction 110ff
- internal clock 52, 53
- interrupt code, timer 110
- Interrupt Request (INTR) 108ff
- Interrupt Service Routine (ISR) 109
- interrupt, software (INT) 110ff
- Interrupt statement 111
- Interrupt vectors Appendix C
- interruptions 4, 108ff
- INTR 108ff
- IP (Instruction Pointer) 89
- IRET instruction 111
- IRQ3 115
- IRQ4 119
- ISR (Interrupt Service Routine) 109
  
- JMP instruction 87
- JNZ instruction 83, 87
  
- laboratory materials Appendix A
- laboratory sources Appendix A
- lag time 24
- least squares data modeling 30ff
- LED (Light Emitting Diodes) 49, 50, 97
- linearized plot 30
- Lissajous figures 83, 84
- LM339 voltage comparator 98
- logarithmic scale 29ff
- low-pass filter, digital 37
  
- machine language program 70ff
- masking 88
- Mem[ ] statement 39
- Memory map 109, Appendix C
- MOV instruction 73
  
- negative numbers 51
- NOT instruction 86, 87
- Not statement 86, 87

## Index

245

- number systems 48ff
- numerical integration 57, 58
- Nyquist frequency 17
- offset address 39, 69
- Ofs( ) statement 75
- OR instruction 85, 86
- Or statement 85, 86
- oscilloscope 13
- OUT instruction 73
- parallel data communication 121ff
- Pascal, Turbo 2
- photocells 4
- photoresistor 97, 98
- plotting scales 29ff
- POP instruction 109
- Port[ ] statement 12, 39
- positioner 47, 48
- potentiometer 13, 14, 15
- power 21, 22, 54ff
- PRINT command 9
- Print Screen 7
- procedure, see also program
  - GetIntVec 111
  - REarray 27
  - SetIntVec 111
  - WRarray 25
- program, see also procedure
  - ADCInline 78
  - ADCTest 14
  - BellIRQ 112
  - BinaryCount 50
  - CalcCos 6
  - FindLocation 75
  - GraphExample 61
  - IndexPas 80
  - SquareWave 38, 43
  - SqWave.bin 71–4
  - Test HEXFET 40
  - TestRead 28
  - TestWRarray 26
  - TruncErr 47
  - WriteCos 8
- programming languages 126
- protoboard 13
- PUSH instruction 109
- radiation 64, 65
- RAM (Random Access Memory) 10, 125, Appendix C
- REARRAY.PAS 27
- registers, 8088 68, 69
- Reset statement 27
- residuals 32
- resistance 19ff
- response time 22
- RET instruction 90
- Rewrite statement 26
- Reynolds number 94ff
- ROM (Read Only Memory) 10, 11, 125, Appendix C
- RS-232 116
- Run program 7
- SBB instruction 103
- Schmidt trigger circuit 98
- second-order transducer 22, 23
- Seg( ) statement 75
- Segment address 39, 69
- semiconductor 19
- sensors 126
- serial data communication 116ff
- Serial Interrupt program 119
- SetIntVec procedure 111
- smoothing data 37
- specific heat 21, 22, 54ff
- SquareWave program 38, 43
- SqWave.bin 71–4
- stack pointer 90
- stack 89ff
- statement,
  - And 84, 85
  - Assign 26
  - Close 26
  - Delay( ) 43, 44
  - EOF( ) 27
  - Inline 4
  - Inline( ) 76ff
  - Interrupt 111
  - Mem[ ] 39
  - Not 86, 87
  - Ofs( ) 75
  - Or 85, 86
  - Port[ ] 12, 39
  - Reset 27
  - Rewrite 26
  - Seg( ) 75
  - TimeOfDay 4
  - Xor 86
- stepping motors 44ff
- STI instruction 101
- Stokes' law for viscous resistance 93ff
- stopwatch 53
- SUB instruction 103
- subroutines 89ff
- SYSTEM START disk 6
- SYSTEM START disk configuration Appendix B
- temperature controller 41, 42
- temperature correction for viscosity 106
- terminal velocity 96
- Terminate-but-Stay-Resident 113

- TestHEXFET program 40
- TestRead program 28
- TestWarray program 26
- thermal conductivity 54ff
- thermal diffusion 4, 54ff
- thermistor GB32J2 4, 12ff, 19ff, 63
- thermometer 5, 20ff
- TimeOfDay counter 52, 53, 70, 99
- TimeOfDay statement 4
- Timer interrupt code 110
- Timer 0 100ff
- timing loops 43
- transducers 126
- truncation errors 46, 47
- TruncErr program 47
- Turbo Pascal 2, 3, 6
- turbulence 93
- TYPE command 9
  
- UART 116ff, Appendix J
  
- VCO (Voltage Controlled Oscillator) 16, 17
  
- velocity gradient 92
- viscometer 104ff
- viscosity 4, 92ff
  - of mixtures 106
  - temperature correction 106
  - wall correction 105
- viscous drag 93
- voltage amplifier 60, 61
- voltage divider 24
- voltage comparator 98
  
- wall correction for viscosity 105
- WRARRAY.PAS 25
- WRITECOS.PAS 8
  
- XOR instruction 86
- Xor statement 86
- XSQ.DAT 26
- X-Y plotter 4, 83, 84
  
- zero flag 87
- zero-order transducer 15
- ZF flag 87