

## INDEX

This index directly covers only *class notes*. It reaches Labs and Worked Examples indirectly: topics treated in labs and worked examples are discussed in the class notes for the same day. So, to find the lab that treats the bipolar current source, for example, you would follow the index to Class 4, then look to Lab 4. There you would find the current source circuit that you build in the lab.

- A**
- A (“open-loop gain”) ..... 208
  - AB (“loop gain”) ..... 219
  - absolute addressing ..... 465
  - AC amplifier ..... 193
  - access time ..... 379
  - acquisition time (S & H) ..... 249
  - “active low” ..... 288
  - active pullup ..... 292, 320
  - active rectifier ..... 188
  - address ..... 434
    - decoding ..... 459
  - addressing modes ..... 462
    - immediate ..... 463
    - absolute ..... 465
    - indirect ..... 466
    - moving pointer ..... 499
  - aliasing ..... 408
  - amplitude resolution ..... 402
  - analog switch ..... 245
  - assertion-level symbols ..... 288
  - autovector (interrupt) ..... 538
- B**
- B (“fraction fed back”) ..... 208
  - balancing resistive paths ..... 191
  - BG\* (busgrant\*)
    - (68008 signal) ..... 438
  - bias current (op amp) ..... 190
  - biasing ..... 86
  - binary ..... 283
    - digit (“bit”) ..... 285
    - number ..... 285
  - binary search ..... 411, 413
  - bit ..... 285
  - bit test ..... 482
  - BJT ..... 148
  - BNC cable ..... 62
  - Bode plot ..... 40
  - Boolean algebra ..... 287
  - BRANCH (68008 instruction) ..... 457
- C**
- bus ..... 375
  - Butterworth low-pass ..... 44
  - C**
  - CALL operation ..... 480, 498
  - capacitance (FET: stray) ..... 245
    - meter ..... 350
  - capacitor ..... 32
  - cascading (counters) ..... 346
  - cascode ..... 129
  - ceramic capacitor ..... 32
  - charge injection ..... 249
  - clear ..... 329
    - sync vs async ..... 329
  - CMOS
    - analog switch ..... 246
    - digital gate ..... 290
  - combinational logic ..... 287
  - common-emitter amplifier ..... 88
  - common-mode gain ..... 126
  - comparator
    - analog ..... 210
    - digital ..... 435
  - complex plane ..... 42
  - conditional branch ..... 482
  - conductances ..... 3
  - counters
    - generally ..... 330
    - ripple ..... 330, 344
    - synchronous ..... 330
  - “crowbar” overvoltage protection ..... 271
  - current amplifier ..... 85
  - current hogging ..... 245
  - current limit
    - voltage regulator ..... 268
    - op amp ..... 194
  - current mirror ..... 103
  - current source ..... 33, 87
    - bipolar transistor ..... 87
    - FET ..... 145
    - op amp ..... 171
  - current-to-voltage converter .. 172
- D**
- dB: (decibels)
    - 3dB point ..... 39
    - 6dB/octave slope ..... 43
  - DBF (instruction) ..... 500
  - decoder ..... 460
    - I/O decoder ..... 461
  - deMorgan’s theorem ..... 287
  - depletion mode ..... 141
  - differential amplifier ..... 124
  - differential gain ..... 126
  - differentiator ..... 32, 35
    - op amp version ..... 187
  - digital (vs analog) ..... 283
  - diode
    - circuits ..... 65ff
    - I vs V curve ..... 65
  - direct memory access (DMA) ..... 435
  - distortion ..... 104
  - droop
    - generally ..... 7
    - sample & hold ..... 248
  - dropout voltage ..... 269
  - DS\* (data strobe\*) (68008 signal) ..... 434
  - DTACK\* (data transfer acknowledge) ..... 438
  - dual-slope A/D ..... 411, 412
  - dynamic RAM ..... 378
  - dynamic resistance ..... 7, 67
  - DVM ..... 8
- E**
- Ebers-Moll equation ..... 109
  - Early effect ..... 109
  - edge trigger ..... 327
    - vs level-sensitive ..... 328
  - emitter follower ..... 88
  - emitter resistor as feedback ... 105
  - encode ..... 435
  - enhancement mode ..... 141

## INDEX – 2

EPROM ..... 378  
 error size:  
   A-D conversion ..... 407  
 exceptions (68000) ..... 536

**F**

555 oscillator ..... 214  
 feedback  
   – emitter resistor as ..... 105  
 FET ..... 141  
 field effect transistor ..... 141  
 filters ..... 32, 38  
 finite state machine: see “state machine”  
 flags ..... 481  
 function codes ..... 438  
 “flash” A/D ..... 412  
 flip-flop ..... 325  
 floating input (logic gate) ..... 292  
 follower  
   – emitter follower . . . 85, 87  
   – as rose-colored lens ..... 85  
   – FET source follower . 146  
   – op amp ..... 171  
 Fourier  
   – analysis ..... 63  
   – analyzer ..... 64  
   – components of  
     square wave ..... 64  
 frequency compensation ..... 220  
 frequency domain ..... 39  
 frequency multiplier ..... 418  
 full-wave bridge rectifier ..... 65  
 fuse rating ..... 69

**G**

$g_m$  ..... 148  
 $1/g_m$  ..... 150  
 Golden Rules (op amp) ..... 168  
 ground ..... 10  
 grounded-emitter amplifier ... 104

**H**

hexadecimal display ..... 348  
 high-pass ..... 39  
 half-wave rectifier ..... 66  
 hold (sample & hold) ..... 248  
 “hold step” ..... 249  
 hysteresis ..... 212

## INDEX

**I**

IBM PC ..... 434  
 $I_{DSS}$  ..... 144  
*illegal exception* ..... 536  
 immediate addressing ..... 463  
 impedance ..... 5  
   – “looking” in a  
     specified direction ... 87  
 indirect addressing:  
   see *addressing*  
 inductor ..... 37  
 input port ..... 435  
 instruction register ..... 457  
 integrator ..... 32, 35  
   – op amp version ..... 185  
 interrupt ..... 488, 535  
   – mask ..... 539  
 intrinsic emitter resistance  
 ( $r_e$ ) ..... 101  
 inverting amplifier (op amp) ... 169

**J**

“jam” clear ..... 329  
 JFET (junction FET) ..... 142  
 J-K flip-flop ..... 330

**K**

Karnaugh map ..... 323  
 Kirchhoff’s Laws ..... 2  
 keypad: explanation ..... 372  
 keypad buffer ..... 461

**L**

latch ..... 325  
 LC ..... 43  
   – resonant circuit ..... 64  
 load function (counter) ..... 346  
 loading (generally) ..... 5  
 log plot ..... 39  
 loop gain ( $AB$ ) ..... 219  
 low-pass ..... 39

**M**

masking ..... 483  
 master-slave flip-flop ..... 327  
 memory ..... 377  
 memory vs I/O ..... 434

## 613

meter movement ..... 9  
 Miller effect ..... 127  
 minimizing logic ..... 322  
 MOSFET ..... 142  
 mylar capacitor ..... 32

**N**

NAND ..... 287  
   – NAND latch ..... 325  
 negative feedback ..... 166  
 negative impedance converter  
 (NIC) ..... 212  
 n-channel FETs ..... 143  
 noise immunity ..... 284  
 noise margin ..... 291  
 non-inverting amplifier (op  
 amp) ..... 169  
 NMI: non-maskable  
   interrupt ..... 539  
 non-volatile memory ..... 378  
 NOR ..... 287  
 NOT ..... 287  
 Nyquist sampling rate ..... 407

**O**

offset current ..... 192  
 offset voltage ..... 189  
 Ohm’s law ..... 1  
 ohms per volt ..... 9  
 one-shot ..... 331  
 open-loop circuits ..... 168  
 open collector output ..... 292, 321  
 open-loop gain ( $A$ ) ..... 208  
 oscillators ..... 32  
 output impedance ..... 5  
   – of current source ..... 112  
 output current limit  
   – voltage regulator ..... 268  
   – op amp ..... 194

**P**

parallel circuits ..... 2  
 passband ..... 44  
 passive pullup ..... 292  
 PC (two senses!)  
   – IBM PC ..... 434  
   – program counter ..... 457  
 phase detectors ..... 416  
 phase-locked loop ..... 416  
   – stability ..... 419

- phase shift..... 40  
 phasor diagrams..... 41  
 polling..... 488  
 ports ( $\mu$ computer)..... 435  
 positive feedback..... 210  
 prefetch..... 457  
 primary (transformer)..... 69  
 printed circuit..... 565  
 priority among  
   interrupts..... 539  
 probe compensation..... 63  
 program counter..... 457  
 programmable counter..... 347  
 PROM..... 378  
 PUSH (CPU operation)..... 480  
 push-pull..... 88
- R**  
 RAM..... 378  
 ramp..... 33  
 RC oscillator  
   – op amp  
     “relaxation osc.”..... 212  
   – IC version: ‘555’..... 214  
 $r_e$ ..... 101  
   – deriving..... 113  
 reactance..... 37  
 rectifier..... 65  
 relaxation oscillator..... 212  
 reset..... 329  
 resistance..... 3  
 return address..... 480  
 ripple (power supply)..... 68  
 ripple counter..... 330, 344  
 roll-off of gain (op amp)..... 194  
 ROM..... 378  
 $R_{ON}$  (FET)..... 245  
 rms voltage..... 68  
 roll-off..... 43  
 R-2R ladder..... 410  
 R/W\* (68008 signal)..... 434
- S**  
 sample  
   – sample & hold... 247, 248  
 sampling rate..... 407
- saturation  
   – for FET..... 145  
   – for bipolar trans. .... 245  
 Schmitt trigger..... 212  
 scope probe..... 62  
 secondary (transformer)..... 69  
 secondary breakdown..... 245  
 sequential circuits..... 325  
 series circuit..... 2  
 setup time..... 344  
 shift register..... 331  
 signed condition  
   (branch instruction)..... 486  
 68008..... 434  
 slew rate..... 194  
 slow-blow..... 70  
 solder breadboard..... 564  
 stack..... 479  
   – pointer..... 479  
 state machine..... 331, 380  
 status register..... 537  
 stiff (voltage source)..... 7  
 “stopwatch”..... 349  
 subroutine..... 480  
 successive approximation..... 413  
 summing circuit (op amp)..... 171  
 sweep (function generator)..... 64  
 switch  
   – FET vs bipolar..... 245  
   – bounce..... 326  
 switching delays  
   – analog switch..... 249  
 switching regulator..... 272  
 synchronous  
   – circuits generally..... 343  
   – counters..... 330, 345
- T**  
 T resistor configuration..... 186  
 temperature compensation..... 107  
 temperature effects..... 106  
 thermal shutdown..... 270  
 three-state output..... 292, 320  
 threshold  
   – in Schmitt trigger..... 212  
   – in logic gate..... 291  
 time-constant..... 35  
 time domain..... 39
- timeout..... 436  
 times-ten rule of thumb..... 61  
 trace..... 537  
 tracking A/D..... 413  
 trade magazines..... 565  
 transconductance (bipolar  
 transistor)..... 106  
   – FET..... 148  
 transistor (bipolar):  
   first, simple views..... 83  
 transparent latch..... 327  
 trap..... 536  
 triangle waveform..... 34  
 tri-state (trademark of NSC)..... 292  
 TTL..... 290  
 two’s complement..... 285
- U**  
 universal gate..... 287
- V**  
 vector (for 6800x  
   ‘exceptions’)..... 540, 541  
 $V_{GS}$ ..... 144  
 voltage regulators  
   – generally..... 267  
   – linear..... 272  
   – switching..... 272  
   – three-terminal..... 270  
 VOM..... 8  
 VPA\* (68000 signal)..... 538  
 $V_{pinchoff}$ ..... 148
- W**  
 Wien bridge oscillator..... 215  
 Wilson mirror..... 111  
 wire-wrap..... 565  
 word-sized output..... 462  
 worst-case analysis..... 40
- Z**  
 $Z_{in}$ ,  $Z_{out}$ ..... 40  
 zener diode..... 66