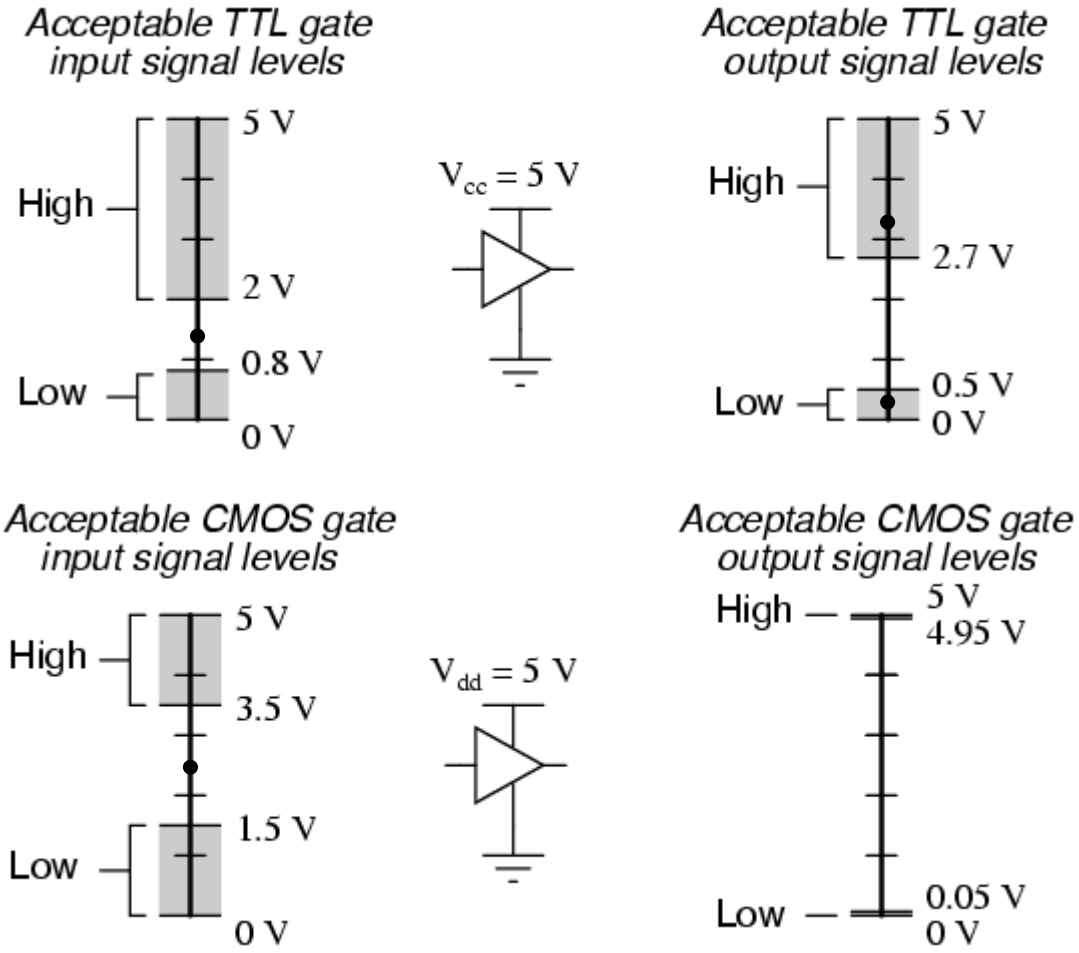
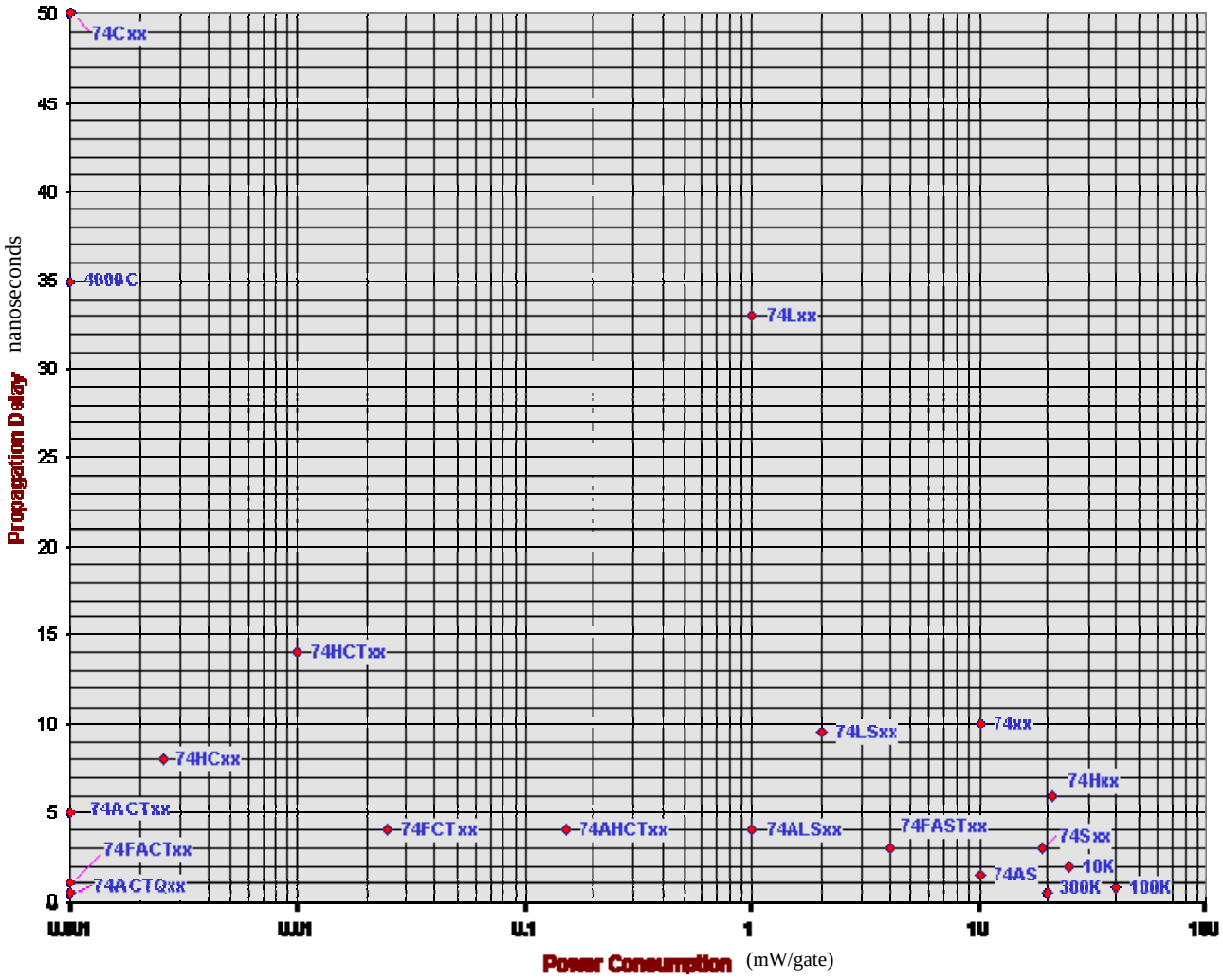
5 V TTL and CMOS Input and Output Voltage Levels



(Figures from: http://www.allaboutcircuits.com/vol_4/chpt_3/10.html, visited 19APR2007)

Comments

- Noise Immunity
  - CMOS _____ than TTL
- Be careful mixing CMOS and TTL logic in the same circuit:
  - TTL → CMOS: you will need to pull up TTL high
  - CMOS → TTL: you may need a buffer to handle extra sinking current when CMOS output goes low

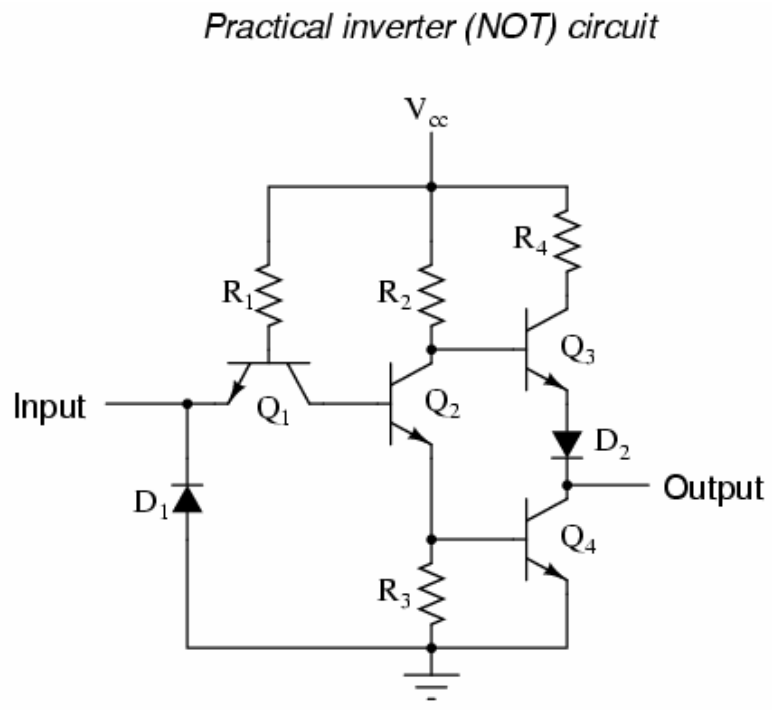


(Figure and table from: http://www.interfacebus.com/Speed-Power_Chart.html, visited 15APR04)

Device Families:

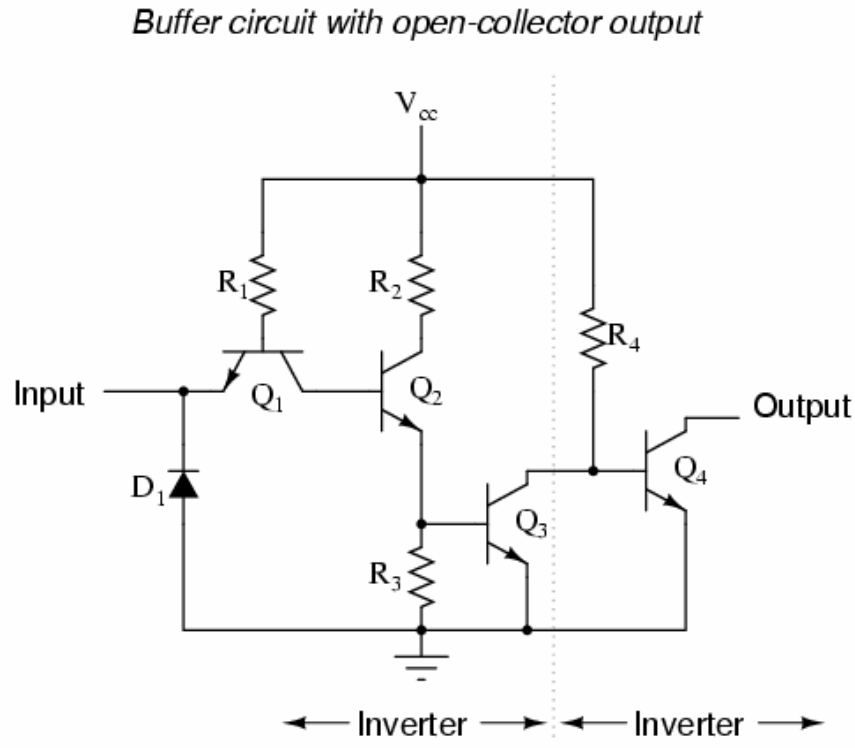
TTL (74xx)	True TTL
74L	Low power
74S	Schottky
74H	High speed
74LS	Low power - Schottky
74AS	Advanced - Schottky
74ALS	Advanced - Low power - Schottky
74F(AST)	Fast - (Advanced - Schottky)
74C	CMOS.....check Vcc levels
74HC (U)	High speed - CMOS (Unbuffered output)
74HCT	High speed - CMOS - TTL inputs
74AHC	Advanced - High speed - CMOS
74AHCT	Advanced - High speed - CMOS - TTL inputs
74FCT (-A)	Fast - CMOS - TTL inputs (speed variations)
74FCT (-T, -AT)	Fast - CMOS - TTL inputs (speed variations)
74AC	Advanced - CMOS
74ACT	Advanced - CMOS - TTL inputs
74FACT	AC, ACT (Q) series
74ACQ	Advanced - CMOS - Quiet outputs
74ACTQ	Advanced - CMOS - TTL inputs - Quiet outputs

TTL Inverter (Totem Pole Output)



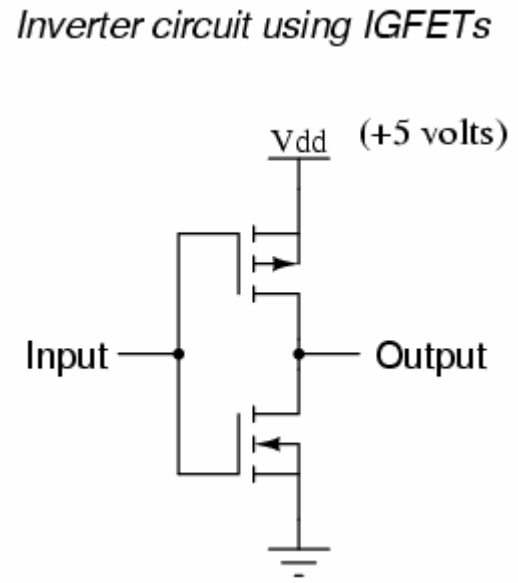
(source: http://sub.allaboutcircuits.com/images/04073.png)

TTL Buffer (Open-Collector Output)

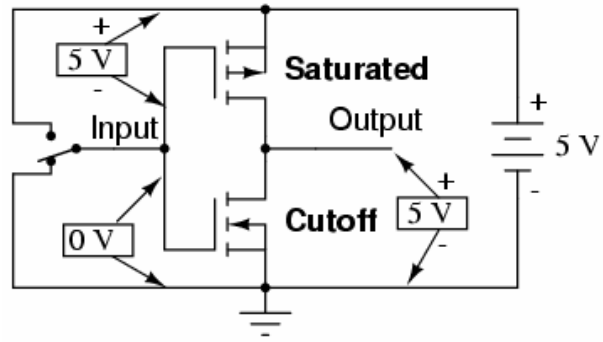


(source: http://sub.allaboutcircuits.com/images/04089.png)

CMOS Inverter



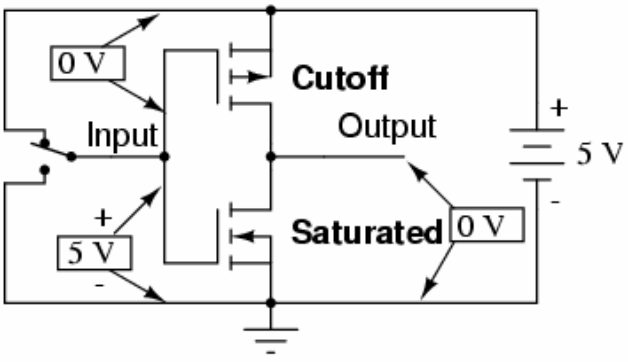
(source: http://sub.allaboutcircuits.com/images/04132.png)



Input = "low" (0)

Output = "high" (1)

(source: http://sub.allaboutcircuits.com/images/04133.png)



Input = "high" (1)

Output = "low" (0)

(source: http://sub.allaboutcircuits.com/images/04134.png)