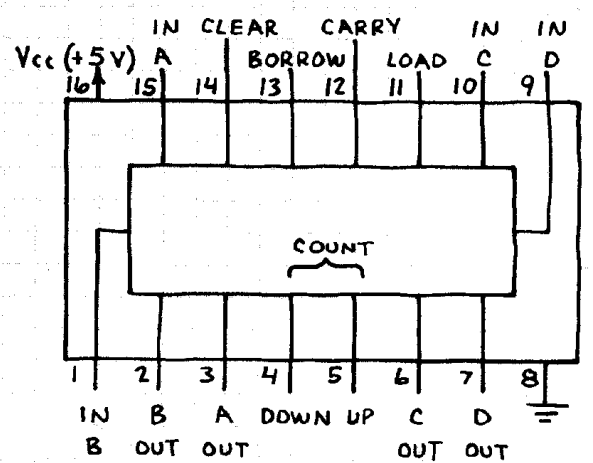


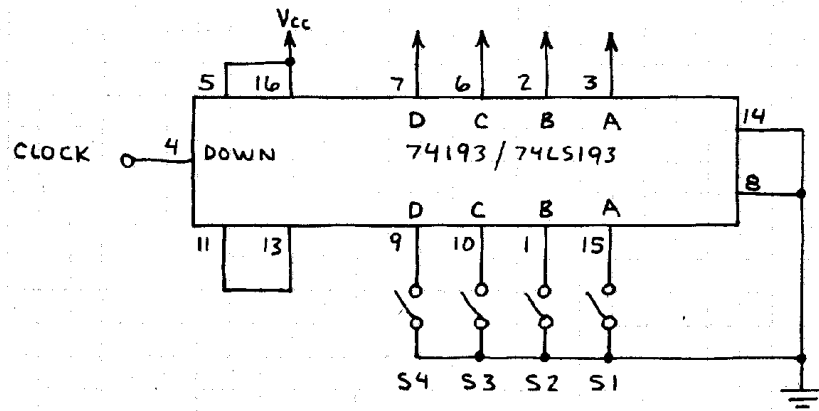
4-BIT UP-DOWN COUNTER 74193/74LS193

VERY VERSATILE 4-BIT COUNTER WITH UP-DOWN CAPABILITY. ANY 4-BIT NUMBER AT THE DCBA INPUTS IS LOADED INTO THE COUNTER WHEN THE LOAD INPUT (PIN 11) IS MADE LOW. THE COUNTER IS CLEARED TO LLLL WHEN THE CLEAR INPUT (PIN 14) IS MADE HIGH. THE BORROW AND CARRY OUTPUTS INDICATE UNDERFLOW OR OVERFLOW BY GOING LOW.



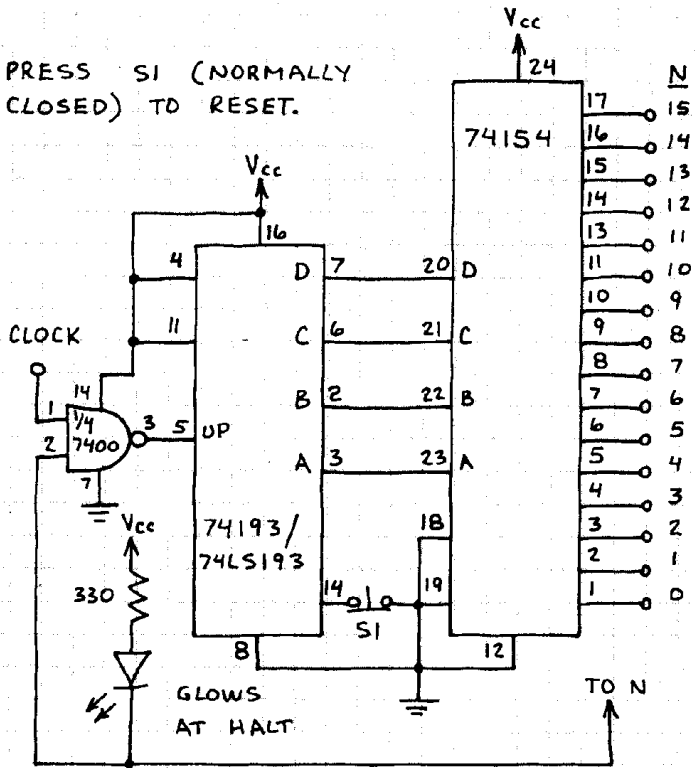
COUNT DOWN FROM N AND RECYCLE

SET DESIRED N INTO S1-S4 (CLOSED SWITCH = LOW AND OPEN SWITCH = HIGH). WHEN COUNT REACHES LLLL AND THEN UNDERFLOWS, THE BORROW PULSE LOADS N AND THE COUNT RECYCLES.

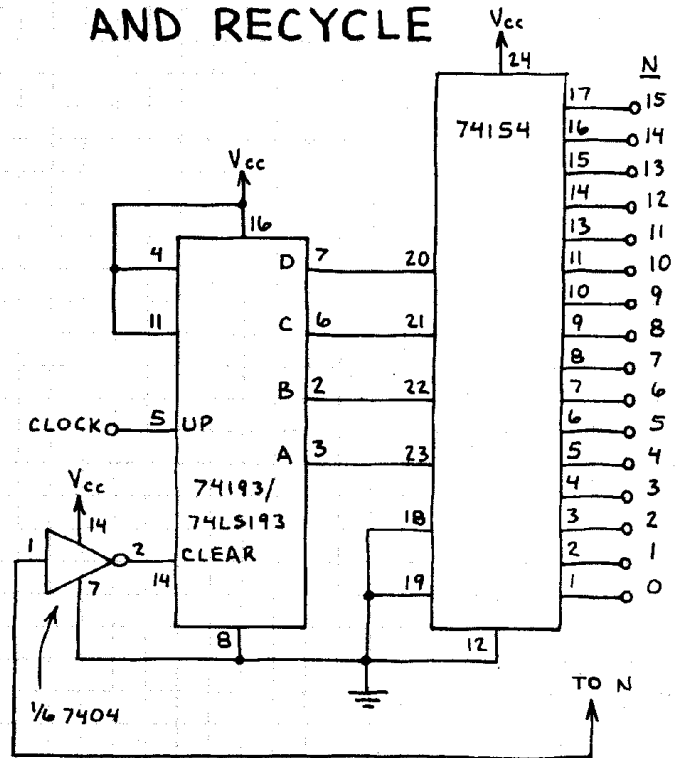


COUNT UP TO N AND HALT

PRESS S1 (NORMALLY CLOSED) TO RESET.

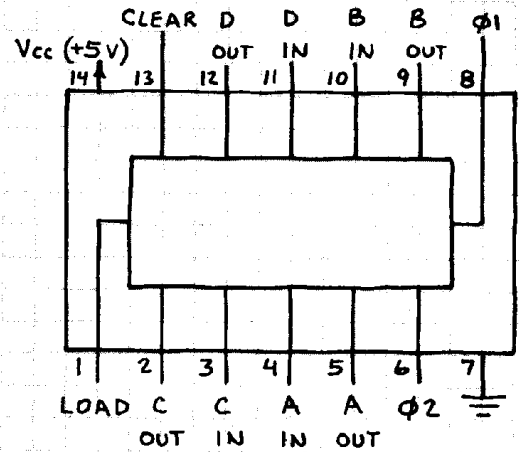


COUNT UP TO N AND RECYCLE

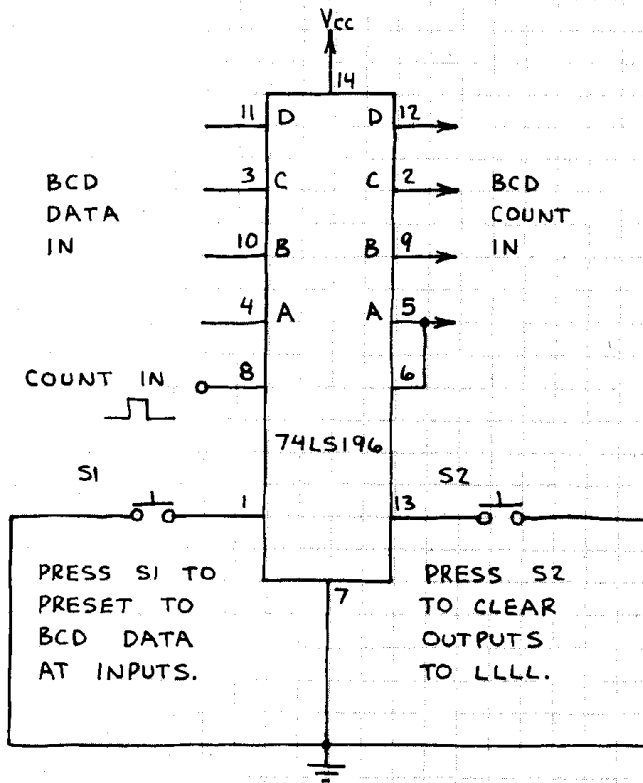


BCD (DECADE) COUNTER 74LS196

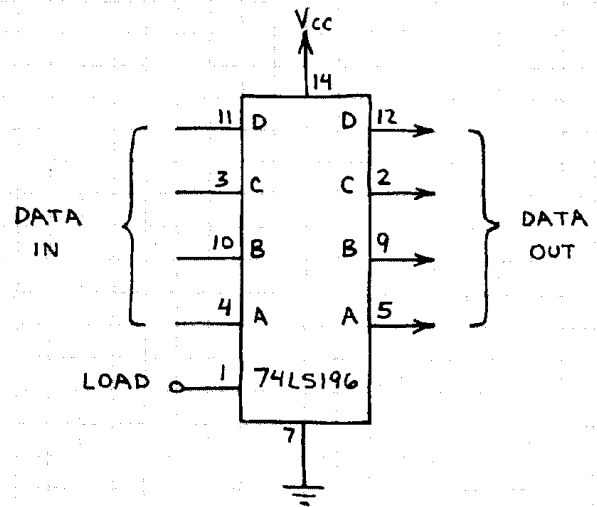
MORE SOPHISTICATED VERSION OF THE POPULAR 7490/74LS90 BCD COUNTER. INCLUDES 4-PRESET INPUTS WHICH PERMIT ANY BCD NUMBER TO BE LOADED WHEN PIN 1 IS MADE LOW. THE COUNTER IS CLEARED TO LLLL WHEN PIN 13 IS MADE LOW. ϕ INDICATES CLOCK INPUT.



DECADE COUNTER

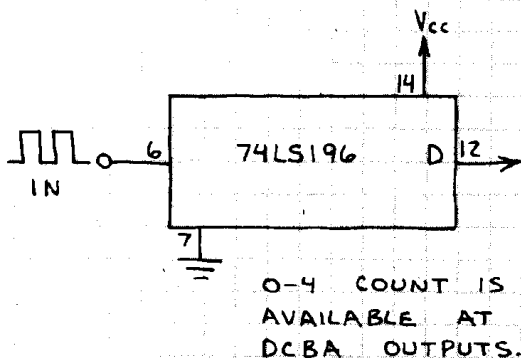


4-BIT LATCH

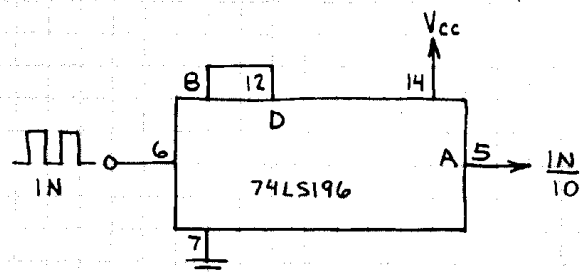


WHEN LOAD INPUT IS LOW, OUTPUTS FOLLOW INPUTS. NO CHANGE WHEN LOAD INPUT IS HIGH. NOTE THAT A PAIR OF 74LS196'S CAN BE USED IN A DECIMAL COUNTING UNIT (COUNTER PLUS REGISTER).

DIVIDE-BY-5 COUNTER

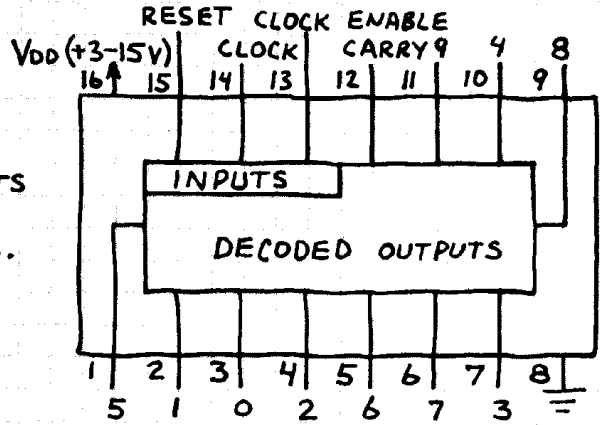


DIVIDE-BY-10 COUNTER

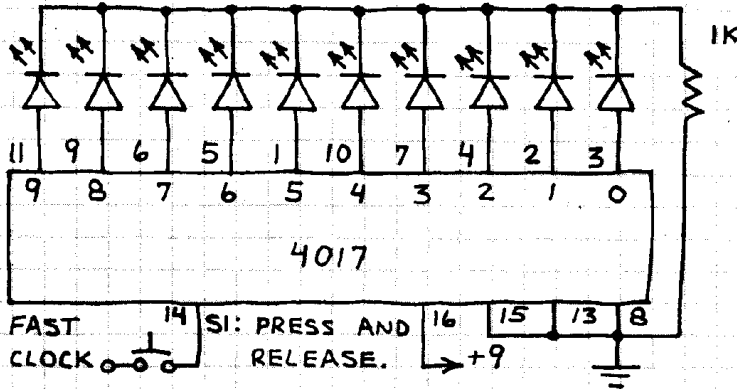


DECADE COUNTER/DECODER 4017

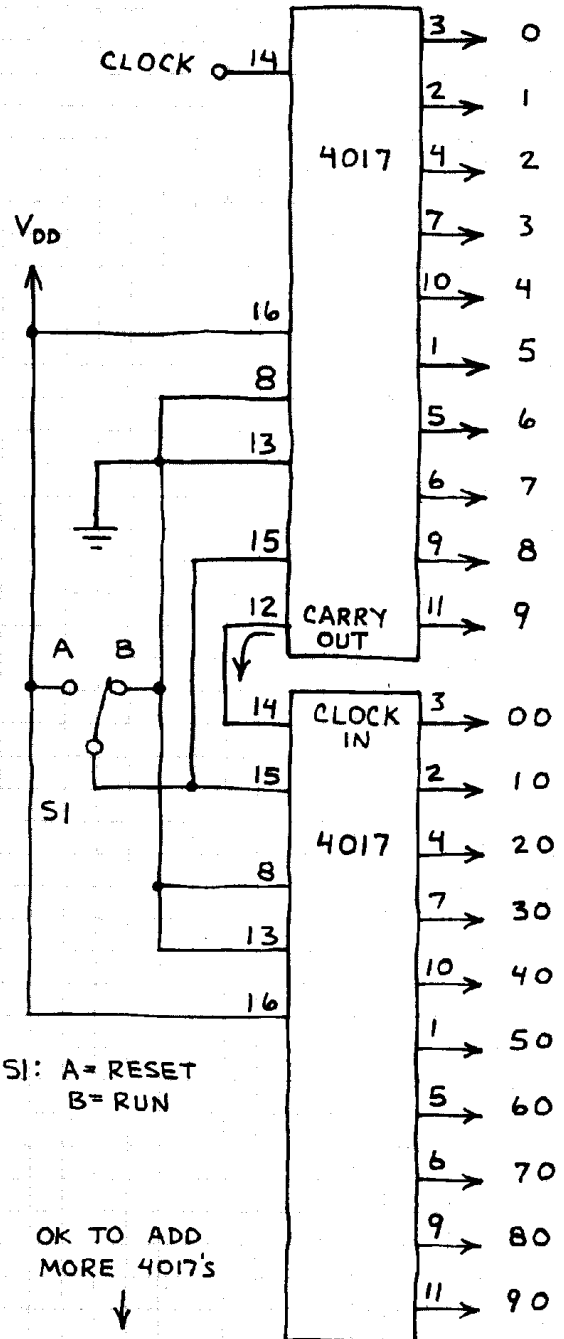
SEQUENTIALLY MAKES 1-OF-10 OUTPUTS HIGH (OTHERS STAY LOW) IN RESPONSE TO CLOCK PULSES. MANY APPLICATIONS. COUNT TAKES PLACE WHEN PINS 13 AND 15 ARE LOW.



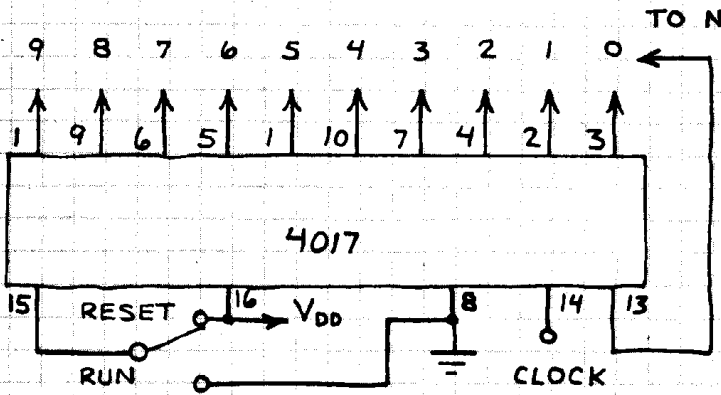
RANDOM NUMBER GENERATOR



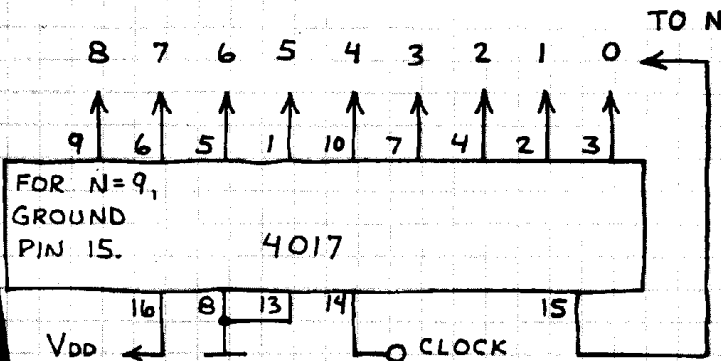
0-99 COUNTER



COUNT TO N AND HALT

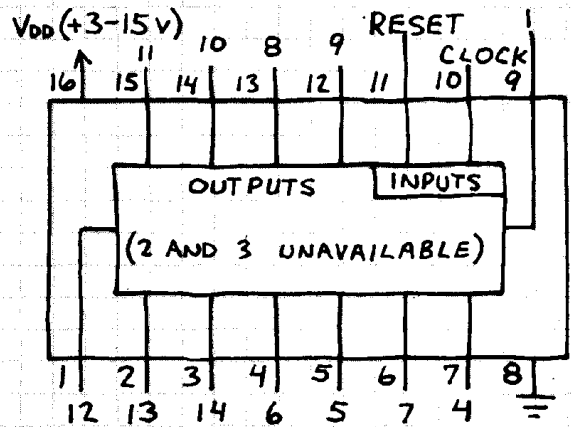


COUNT TO N AND RECYCLE



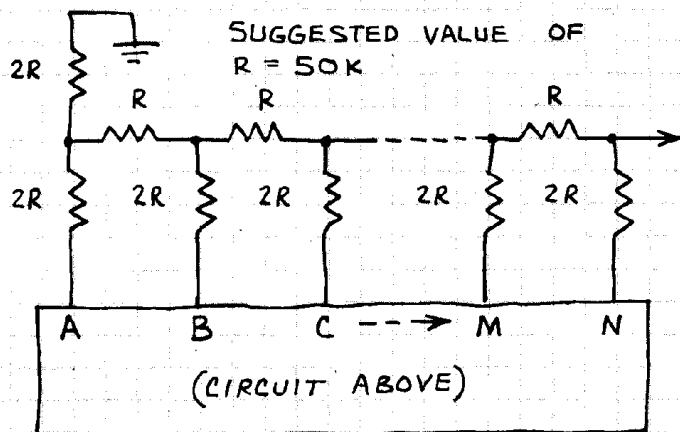
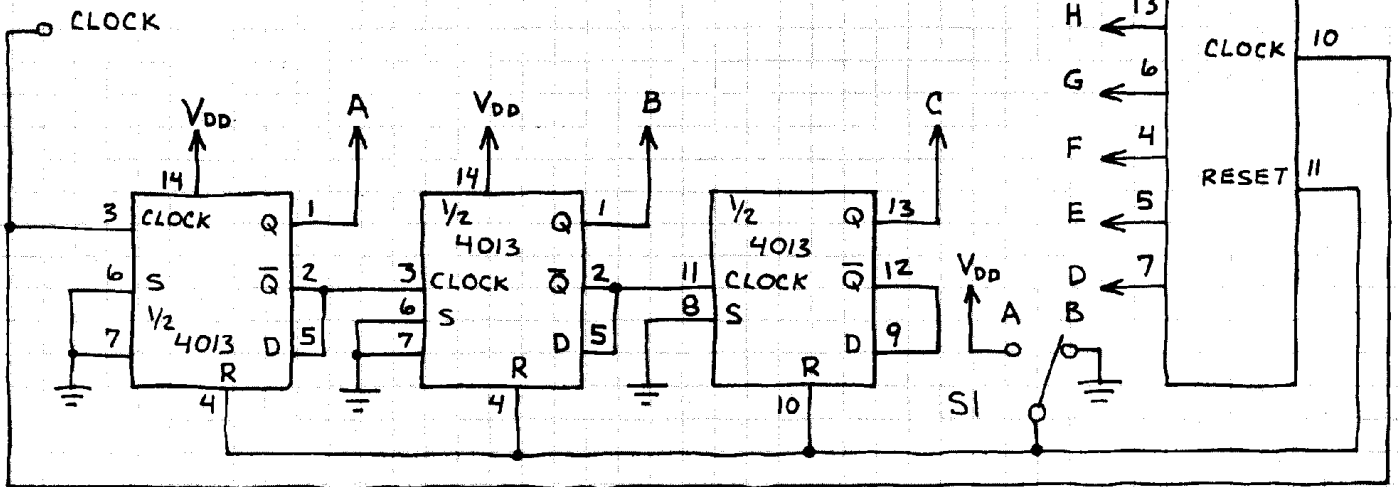
14-STAGE BINARY COUNTER 4020

A RIPPLE COUNTER WITH CARRY OUTPUT. THE 14-STAGE BINARY COUNT IS COMPLETED IN 16,384 CLOCK PULSES. THIS MAKES POSSIBLE VERY LONG DURATION TIMERS, ASSUMING THE OUTPUTS ARE DECODED. THE OUTPUTS REQUIRE A BRIEF SETTLING TIME AFTER EACH CLOCK PULSE.



14-BIT BINARY COUNTER

THE SECOND AND THIRD OUTPUTS ($\div 4$ AND $\div 8$) OF THE 4020 ARE NOT AVAILABLE. THIS CIRCUIT INCLUDES A 3-BIT COUNTER TO SUPPLY THE MISSING OUTPUTS. A IS THE LOWEST ORDER OUTPUT.



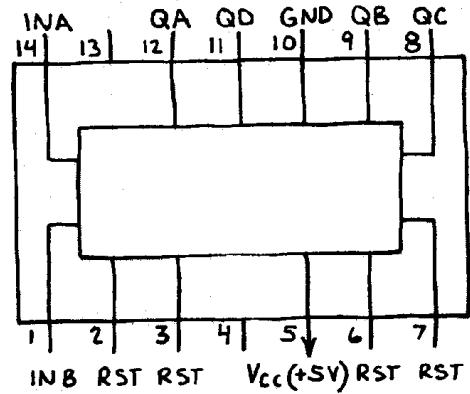
STAIRCASE GENERATOR



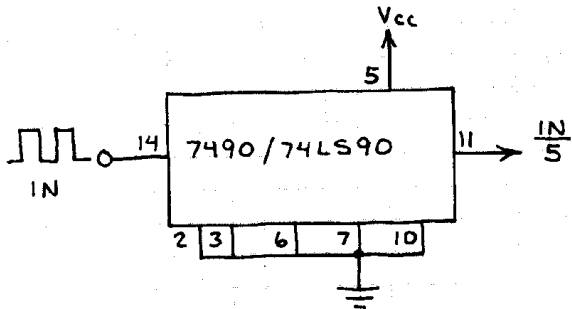
OUTPUT IS A STEPPED VOLTAGE. APPLICATIONS INCLUDE ANALOG-TO-DIGITAL CONVERSION AND WAVEFORM SYNTHESIS.

BCD (DECADE) COUNTER 7490/74LS90

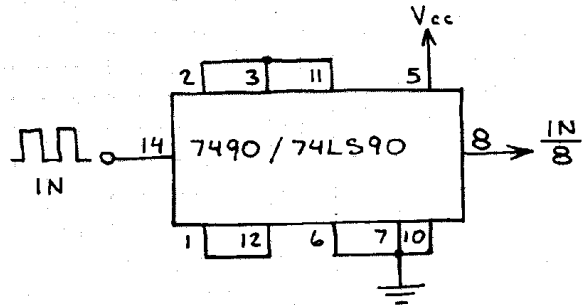
ONE OF THE MOST POPULAR DECADE COUNTERS. EASILY USED FOR DIVIDE-BY-N COUNTERS. LESS EXPENSIVE THAN MORE SOPHISTICATED COUNTERS. RST INDICATES RESET PINS. THIS CHIP IS USUALLY USED IN DECIMAL COUNTING UNITS, BUT CIRCUITS ON THIS PAGE SHOW MANY OTHER POSSIBILITIES.



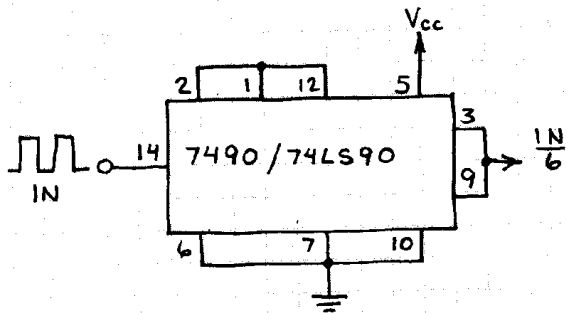
DIVIDE-BY-5 COUNTER



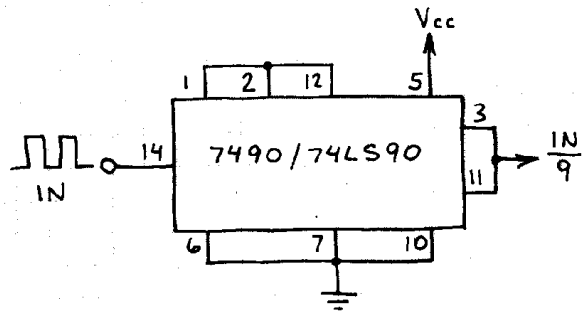
DIVIDE-BY-8 COUNTER



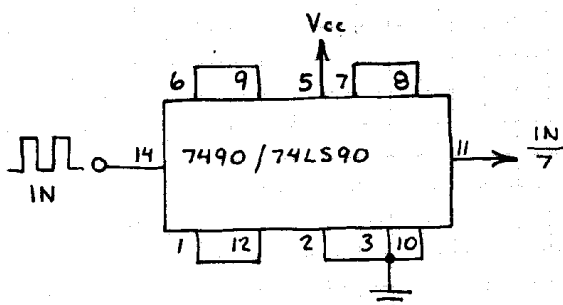
DIVIDE-BY-6 COUNTER



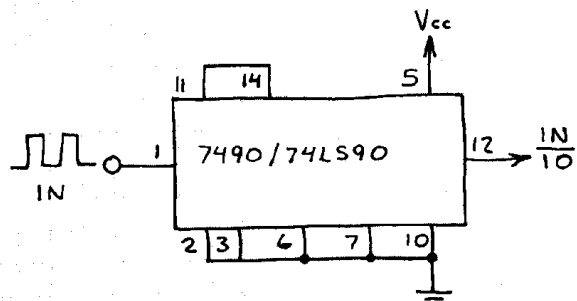
DIVIDE-BY-9 COUNTER



DIVIDE-BY-7 COUNTER

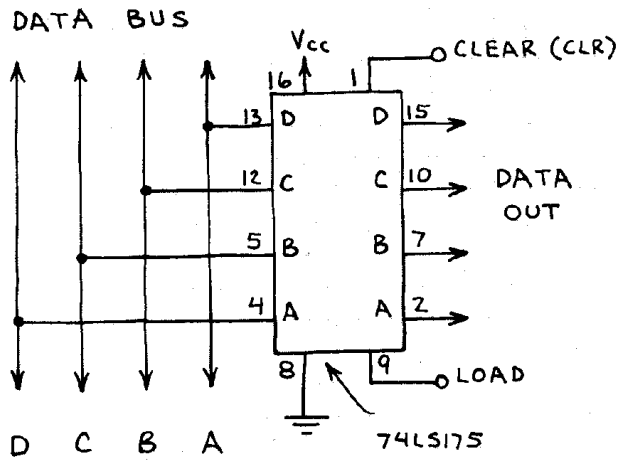
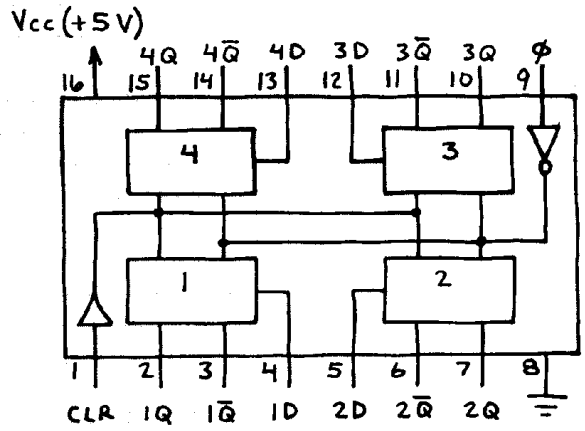


DIVIDE-BY-10 COUNTER



QUAD D FLIP-FLOP 74LS175

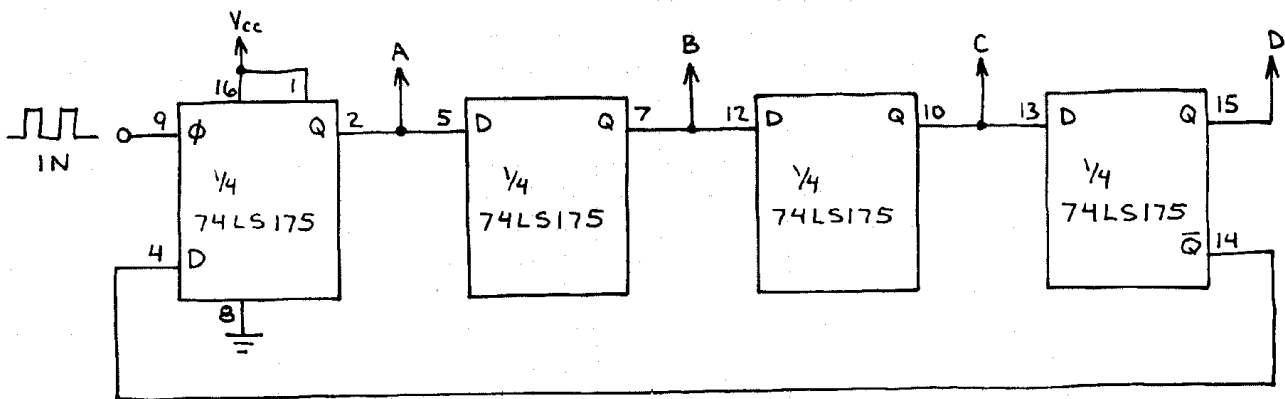
HANDY PACKAGE OF FOUR D-TYPE FLIP-FLOPS. DATA AT D-INPUTS IS LOADED WHEN CLOCK GOES HIGH. MAKING CLEAR INPUT LOW MAKES ALL Q OUTPUTS LOW AND \bar{Q} OUTPUTS HIGH.



4-BIT DATA REGISTER

DATA ON BUS IS LOADED INTO 74LS175 WHEN LOAD INPUT GOES HIGH. DATA IS THEN STORED AND MADE AVAILABLE AT OUTPUTS UNTIL NEW LOAD PULSE ARRIVES.

MODULO-8 COUNTER



SERIAL IN/OUT, PARALLEL OUT SHIFT REGISTER

