ELECTRIC VOTING MACHINE

Submitted in partial fulfillment of the requirement of the degree of Bachelor Technology

In ELECTRICAL ENGINEERING

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APPROVAL SHEET

This project report entitled "Electric Voting Machine" by Sourav Biswas (16501620019), Sounak Sarkar (16501619005), Subham Dutta (16501619009), Debdeep Mitra (16501619003), Laxmipriya Roy (16501619012), Sandipan Ghosh (16501620024) is approved for the degree of Bachelor of Technology in Electrical Engineering.

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Principal

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Date:____________________________

Place: ___________________________

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or wordshave been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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<u>CERTIFICATE</u>

It is certified that the work contained in the project title “Electric Voting Machine” by Sourav Biswas (16501620019), Sounak Sarkar (16501619005), Subham Dutta (16501619009), Debdeep Mitra (16501619003), Laxmipriya Roy (16501619012), and Sandipan Ghosh (16501620024).

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We are taking this opportunity to acknowledge our erudition and express our gratitude in a short length to all our teachers in the process of completion of this project.

At first we would like to express our gratitude to Assistant Prof. RASMIPRAVA BARIK for upmost guidance.

We also wish to express our gratitude to the teachers of CIEM, whom rendered their help during the period of our project.

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CONTENTS

CONTENTS

1. INTRODUCTION

EVM stands for Electronics Voting Machine. It's a lot different from the traditional ballot paper system both in terms of mechanism and performance. Its USP is its simple user interface. Even a person who never got a chance to go to schools can use it without much difficulty. The front panel shows all the candidates standing for the election along with their party symbols. There is a button corresponding to each of the candidates. To cast a vote just press the button beside to the candidate. A successful vote is indicated by a green light and a short beep.

An electronic voting machine (EVM) is a type of voting system that uses electronic technology to facilitate and record the casting and counting of votes in an election. The machine usually consists of a keypad or touchscreen for voters to input their choices, a ballot printer to create a paper trail, and a central tabulating system to store and count the votes.

There is a dedicated counter for each of the candidate, which is placed inside. With each vote the counter corresponding to the candidate increases and is displayed through a LCD screen. This arrangement is kept under lock. After the election's over the polling officer can open the lock and view the votes and declare the result.

2. OBJECTIVE

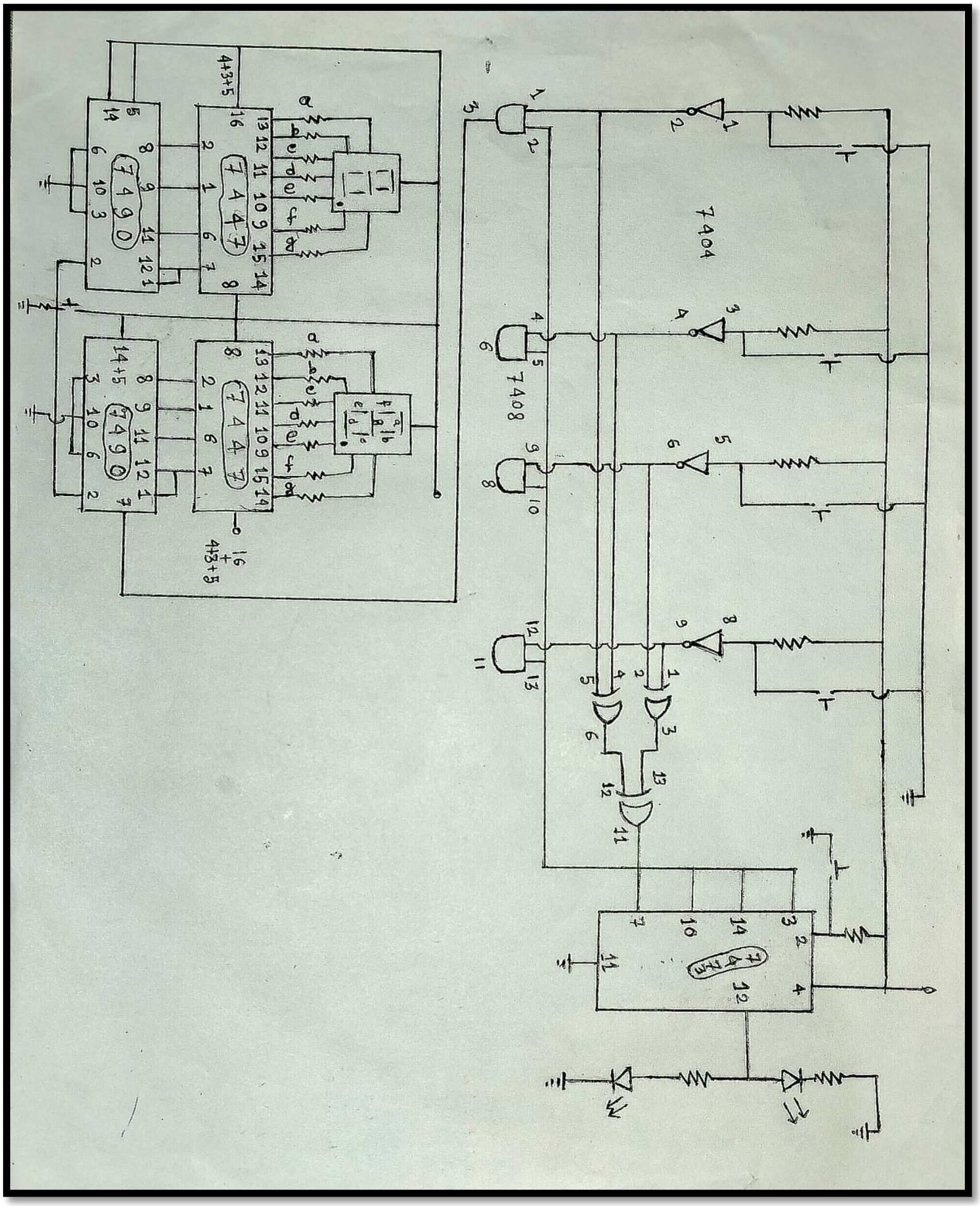
To study the Electronic Voting Machine (EVM) in such a way that it works properly and create a believer in people's mind that an EVM can't be hacked by people easily and it gives the appropriate result of the election.

Electronic voting machine has now days become an effective tool for voting.

- It ensures flawless voting and thus has become more widespread.
- It ensures people about their vote being secured.
- It avoids any kind of malpractice and invalid votes. Also, such kind of system becomes more economical as consequent expenditure incurred on manpower is saved.
- It is also convenient on the part of voter, as he has to just press one key whichever belongs to his candidates.
- EVM are the total combination of mechanical, electromechanical, or electronic equipment (including software, firmware, and documentation required to program control, and support equipment), that is used to define ballots, to cast and count votes, to report or display election results, and to maintain and produce any audit trail information.

To test the system during its development and maintenance; to maintain records of system errors or defects, to determine specific changes made after initial certification, and to make available any materials to the voter (such as notices, instructions, forms, or paper ballots). EVM has different levels of usability, security, efficiency and accuracy.

3. Circuit Diagram :



4. CIRCUIT DESCRIPTION

- SWITCH s1 to s4 are the four push –to-on type non locking switches. One for each candidate. vote casting is done by just pressing a corresponding switch.
- LED1 glows to indicate to the voter that his vote has been cast (recording).
- XORGATE (IC7486) prevents the votes can be cast two buttons are pressed simulta-neously.
- IC7473 locks self once a vote has been cast and thus prevents multiple votes by a person. It simultaneously lights LED2 at polling officer's table. Pin 13 of IC7473 goes 'low' as soon as a 'valid' vote recorded.
- This in turn blocks all AND gate to avoid further counting of votes till the officer in charge reset the system through switch S7 at his table.
- Resetting of S7 should be done only when the voter has come out of the both after casting his vote.
- The counting of votes is carried out by the counters wired using IC 7490.Only 'unit' and 'tens' positions are shown.
- Depending on the number of voters expected the hundredth and the thousandth positions can also be wired.
- The votes corresponding to S1-S4 are counted by counters C1-C4, respectively.
- Switch S6 must be keep under a lock and key arrangement.
- It should be reset before the voting starts and should not be disturbed there after till the voting is over and the results have been declare.
- Counters will store the digits as far as supply continues without failure.
- So on interrupted +5V supply derived from a battery is advisable.
- This machine can be used in school , college election.

5. COMPONENT LIST

- **IC (INTERGRATER CIRCUIT): -**
  1. IC 7404.
  2. IC 7486.
  3. IC 7408.
  4. IC 7473.
  5. IC 7447.
  6. IC 7490.

- **SWITCH: -**

  S1 - S6 PUSH –TO-ON NON BLOKING SWITCHES.

- **RESISTOR: -**

  R1 - R4 , R7 -2.2KΏ.
  R5, R6, R8:- 220Ώ.
  R9 – R22 :- 270Ώ.

- **LED(LIGHT EMITTING DIODE):-**

  RED LED.
  GREEN LED.

- **DISPLAY:-**

  FND 507 SEVEN SEGMENT DISPLAY.

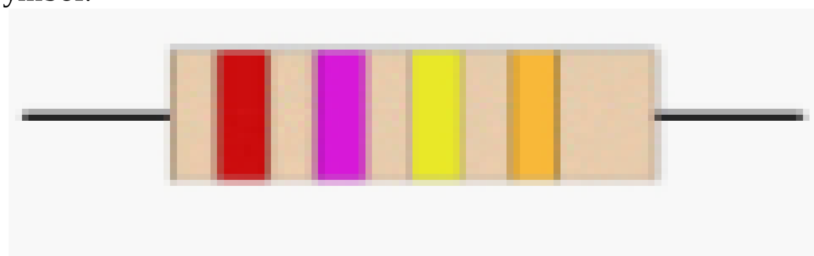
6. <u>RESISTOR</u>

6.1 FUNCTION: -

Resistors restrict the flow of electric current, for example a resistor is placed I in series with a light-emitting diode (LED) to limit the current passing through the LED

Example:

Symbol:-



A Resistor as a passive component introduces Resistance i.e., Opposition to flow of current in a circuit. Resistors are used in electronic circuits for setting biases, Voltage division, Controlling Gain, fixed time constants, matching and Loading circuit, Heat generation and related Applications.

R= PI/A

Where, R is Resistance in ohm(Ω).

L (LENGTH) of conductor in cm.

A is Area of Cross-section of Conductor cm*cm.

P is Specific Resistivity of the materials in cm.

Thus, Resistance Depends upon Physical dimension of the Resistor and Resistively of the conducting material used.

6.2 Connecting and soldering: -

Resistors may be connected either way round. They are not damaged by heat when soldering.

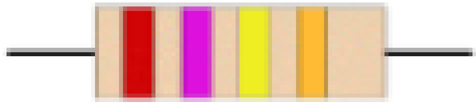
6.3 Resistor values– The resistor color code: -

Resistance is measured in ohms, the symbol for ohm is an omegaΩ. 1Ω is quite small so resistor values are often given in kΩ and MΩ. 1 kΩ = 1000Ω.

Resistor values are normally shown using colored bands. Each color represents a number as shown in the table. Most resistors have 4 bands:

- The first band gives the first digit.
- The second band gives the second digit
- The third band indicates the number of zeros.
- The fourth band is used to shows the tolerance (precision) of the resistor.

Color	Value
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9



Band 3	Divide by
Gold	10
Silver	100

6.3.1 220 Ω RESISTOR: - Typically 220 ohm ,1/4 watt resistor can be used with various circuit. The color band of the resistor is Red, Brown, Gold.

- Type: Carbon film resistor
- Tolerance: 5 %
- Size: 1/4 watt
- Value: 220 Ω

6.3.2 270 Ω RESISTOR:- This resistor has red (2), violet (7), yellow (4 zeros) and gold bands. So, its value is 270Ω = 270 Ω. On Symbol the Ω is usually omitted and the value is written 270.

Typically, 270 Ω,1/4watt resistor can be used with various circuit. The colour band is Red, Purple, Brown, Gold.

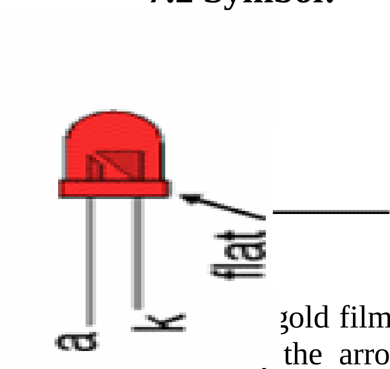
- Type: Carbon film resistor
- Tolerance: 5 %
- Size:1/4 watt
- Value:270Ω

7. LED (LIGHT EMITTING DIODE)

7.1 Principle: -

When PN junction is forward biased, electron in N- region combine with the holes in P- region. Free electrons are in the conduction band and holes are in the valence band. Thus electrons go to the valence band from the conduction band that is electrons go to the lower energy level from higher energy level. So, when recombination of electrons and holes occurs, energy is radiated in the from of heat and light.

7.2 Symbol: -



7.3 Construction: -

N-type epitaxial layer is grown on the sub-strate. P-region is formed over it by diffusion pro-cess. Recombination of the charge carrier take place in P- type material such that the light is not ob-
gold film is kept is below N- layer so that the light emitted is
the arrows point to the outward side that the light is emitted.

7.4 Working:

LED is forward biased to bring it into action. Minimum of 10 mA to 25 mA. Due to the forward bias, electrons from N-type material go from the conduction band recombination with the holes in the valence band of P- type material. So, the energy of the form of light is radiated.

7.5 Advantages: -

- Efficiency: LEDs produce more light per watt than incandescent bulbs.
- Color: LEDs can emit light of an intended color filers that traditional methods re-quire. This is more efficient and can lower initial costs.
- Size: LEDs can be very small and are easily populated onto printed circuit boards.
- On/off time: LEDs light up very quickly. a typical red indicator LED will achieve full brightness in microseconds. LEDs used in communications devices can have even faster response times.

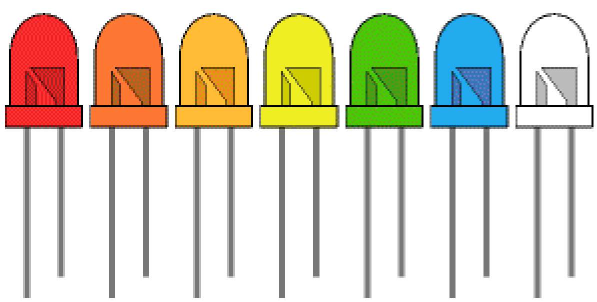
- Cycling: LEDs are ideal for use in applications that are subject to frequent on-off cycling, unlike fluorescent lamps that burn out more quickly when cycled frequently, or hid lamps that required a long time before restarting.
-
- Dimming: LEDs can very easily be dimmed either by pulse- width modulation or lowering the forward current.
- Cool light: in contrast to most light sources , LEDs radiate very little heat in the form of IR that can cause damage to sensitive objects or fabrics. Wasted energy is dispersed as heat through the base of the LED.
- Slow failure: LEDs mostly fail by dimming over time, rather than the abrupt burn- out of incandescent bulbs.
- Lifetime: LEDs can have a relatively long useful life . one report estimates 35,000 to 50,000 hours of useful life, thought time to complete failure may be longer.
- Shock resistance: LEDs, being solid state component, are difficult to damage with external shock, unlike fluorescent and incandescent bulbs which are fragile.
- Focus: the solid package of the LED can be defined to focus its light. Incandescent and fluorescent sources often require an external reflector to collect light and direct it in a usable manner.
- Toxicity: LEDs do not contain mercury, unlike fluorescent lamps.

7.6 Disadvantages

- High initial price: LEDs are currently more expensive, price per lumen, on an initial capital cost basis, than most conventional lighting technologies.
- Temperature dependence: LED performance largely depends on the ambient temperature of operating environment. Overdriving the LED in high ambient temperature may result in overheating of the LED package, eventually leading to device failure.
- Voltage sensitivity: LEDs must be supplied with the voltage above the threshold and a current below the rating . this can involve series resistors or current –regulated power supplies.
- Light quality: most cool- white LEDs have spectra that differ significantly from a black body radiator like the sun or an incandescent light.
- Area light source: LEDs do not approximate a “point source” of light, but rather a Lambertian distribution . so LEDs are difficult to use in applications requiring a spherical light filed.

7.7 Application:

- Visual signal application where the light goes more or less directly form the LED to the human eye, to convey a message or meaning.
- Lamination where LED light is reflected from object to give visual response of these objects.
- Finally LED also used to generate light for measuring and interacting with processes that do not involve visual system.
- As pilot indicator.
- In opto isolators.
- In large numerical display.

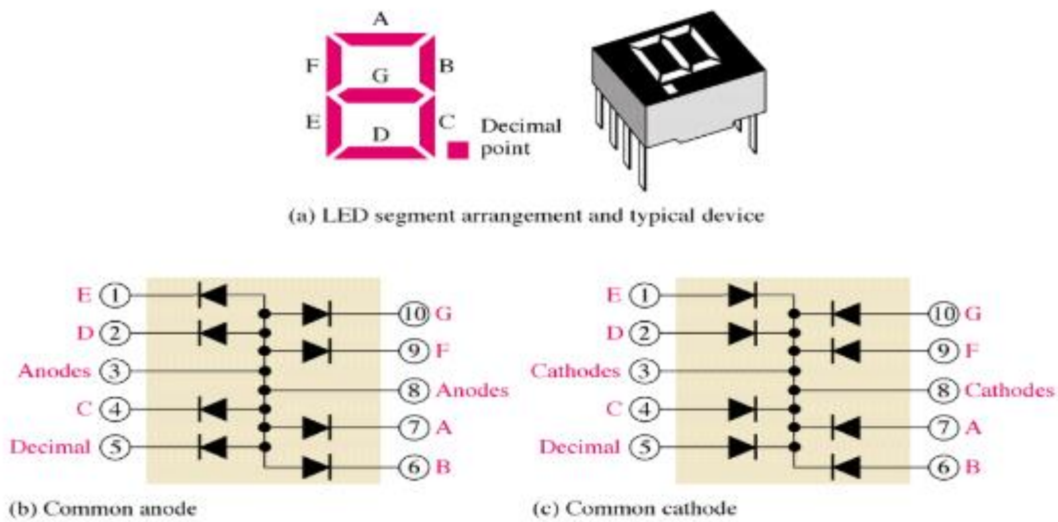


7.8 LED TYPES: -

COLOUR	WAVELENGTH (nm)	VOLTAGES(v)	MATERIALS
RED	610<ג<760	1.63<v<2.03	GaAsP, AlGaInP, GaP
GREEN	500<ג<570	1.9<v<4.0	InGaN, Gap, AlGaInP

8. SEVEN SEGMENT

FIGURE 3-32 The 7-segment LED display.

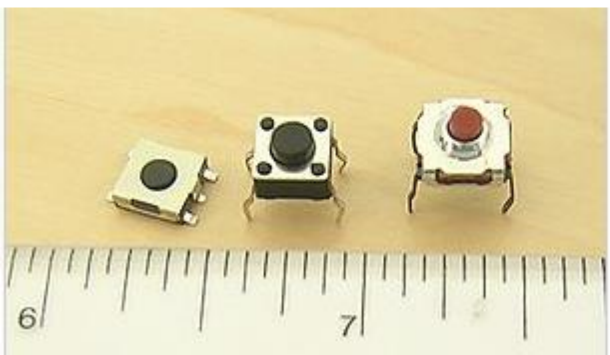


A seven-segment display (abbreviation: "7-segment display"), less commonly known as a seven - segment indicator, is a form of electronic Display device for displaying decimal numerals that is an alternative to the more complex dot-matrix displays. Seven-segment displays are widely used in digital clocks electronic meters, and other electronic devices for displaying numerical information.

In a simple LED package, each LED is typically connected with one terminal to its own pin on the outside of the package and the other LED terminal connected in common with all other LEDs in the device and brought out to a shared pin. This shared pin will then make up all of the cathodes (negative terminals) OR all of the anodes (positive terminals) of the LEDs in the device; and so, will be either a "Common Cathode" or "Common Anode" device depending how it is constructed

9. SWITCHES

This looks like a momentary action push switch. when switch press than switch is in on condition. Push – to – on switch returns to its normally open position when you release the button, push –to- on switch return to its normally closed position when you release the button.



a. Features of switch

- Contacts (e.g.; single pole, double throw)
- Ratings (maximum voltage and current)
- Method of operation (toggle, slide, key etc.)

b. Switch contact ratings:

Switch contact are rated with a maximum voltage and current, and there may be different rating for AC and DC. The ac values are higher because the current falls to zero many times each second and an arc is less likely to form across the switch contacts.

For low voltage electronics project the voltage rating will not matter, but you may need to check the current rating . the maximum current is less for inductive loads because they cause more sparking at the contacts when switched off.

10. +5v POWER SUPPLY

a. POWER SUPPLY DESIGN:

Power supply is the first and the most important part of our project. For our project we require +5V regulated power supply with maximum current rating 500mA

Following basic building blocks are required to generate regulated power supply.

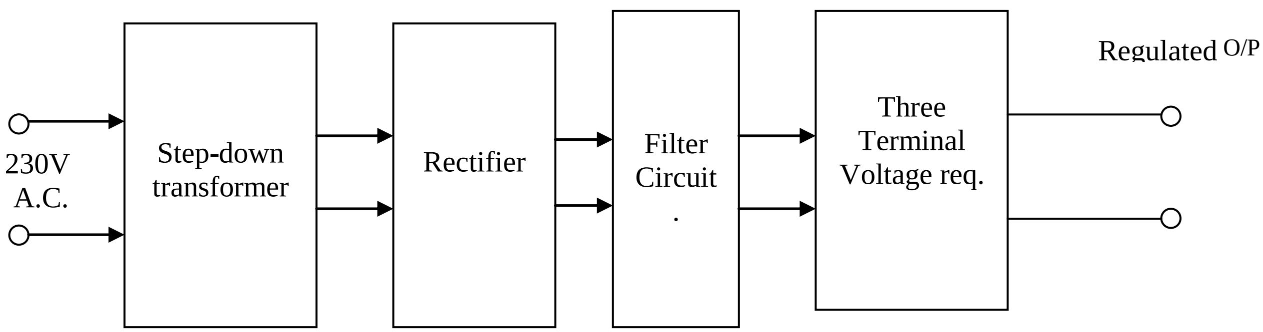


Figure 3.1: Circuit Diagram of Power supply design

11. IC DATASHEET

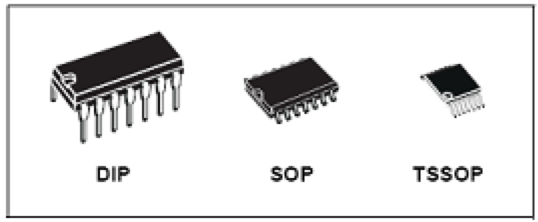
11.1 IC 7404:

- HIGH SPEED:
  t_{PD} = 8ns (TYP.) at V_{CC} = 6V
- LOW POWER DISSIPATION:
  I_{CC} = 1µA(MAX.) at T_A=25°C
- HIGH NOISE IMMUNITY:
  $V_{NIH} = V_{NIL}$ = 28 % V_{CC} (MIN.)
- SYMMETRICAL OUTPUT IMPEDANCE:
  $|I_{OH}| = I_{OL}$ = 4mA (MIN) at V_{CC} = 4.5V
- BALANCED PROPAGATION DELAYS:
  $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
  V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 04

DESCRIPTION

The M74HC04 is an high speed CMOS HEX INVERTER fabricated with silicon gate C^2MOS technology.

The internal circuit is composed of 3 stages including buffer output, which enables high noise immunity and stable output.

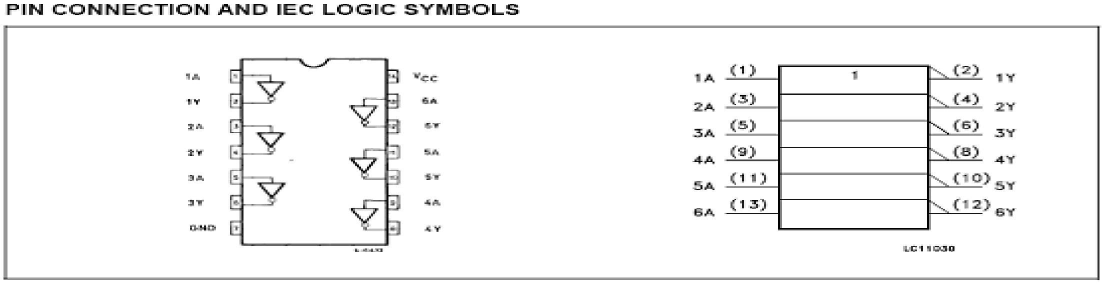


ORDER CODES

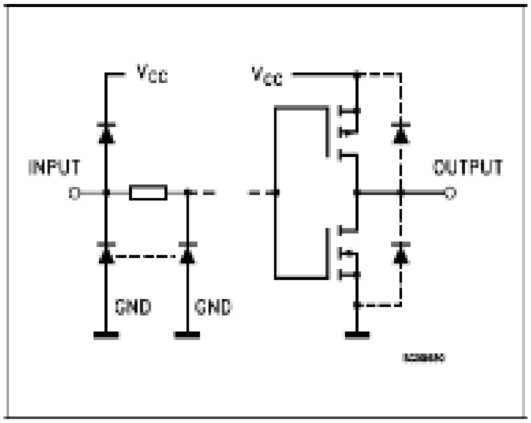
PACKAGE	TUBE	T & R
DIP	M74HC04B1R	
SOP	M74HC04M1R	M74HC04RM13TR
TSSOP		M74HC04TTR

All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 3, 5, 9, 11, 13	1A to 6A	Data Inputs
2, 4, 6, 8, 10, 12	1Y to 6Y	Data Outputs
7	GND	Ground (0V)
14	V_{CC}	Positive Supply Voltage

TRUTH TABLE

A	Y
L	H
H	L

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7	V
V_I	DC Input Voltage	-0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Current	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	500(*)	mW
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature (10 sec)	300	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied
(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Value	Unit
V_{CC}	Supply Voltage		2 to 6	V
V_I	Input Voltage		0 to V_{CC}	V
V_O	Output Voltage		0 to V_{CC}	V
T_{op}	Operating Temperature		-55 to 125	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 2.0V	0 to 1000	ns
		V_{CC} = 4.5V	0 to 500	ns
		V_{CC} = 6.0V	0 to 400	ns

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0		1.5			1.5		1.5		V
		4.5		3.15			3.15		3.15		
		6.0		4.2			4.2		4.2		
V_{IL}	Low Level Input Voltage	2.0				0.5		0.5		0.5	V
		4.5				1.35		1.35		1.35	
		6.0				1.8		1.8		1.8	
V_{OH}	High Level Output Voltage	2.0	I_O=-20 μA	1.9	2.0		1.9		1.9		V
		4.5	I_O=-20 μA	4.4	4.5		4.4		4.4		
		6.0	I_O=-20 μA	5.9	6.0		5.9		5.9		
		4.5	I_O=-4.0 mA	4.18	4.31		4.13		4.10		
		6.0	I_O=-5.2 mA	5.68	5.8		5.63		5.60		
V_{OL}	Low Level Output Voltage	2.0	I_O=20 μA		0.0	0.1		0.1		0.1	V
		4.5	I_O=20 μA		0.0	0.1		0.1		0.1	
		6.0	I_O=20 μA		0.0	0.1		0.1		0.1	
		4.5	I_O=4.0 mA		0.17	0.26		0.33		0.40	
		6.0	I_O=5.2 mA		0.18	0.26		0.33		0.40	
I_I	Input Leakage Current	6.0	V_I = V_{CC} or GND			± 0.1		± 1		± 1	μA
I_{CC}	Quiescent Supply Current	6.0	V_I = V_{CC} or GND			1		10		20	μA

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_r = t_f = 6ns)

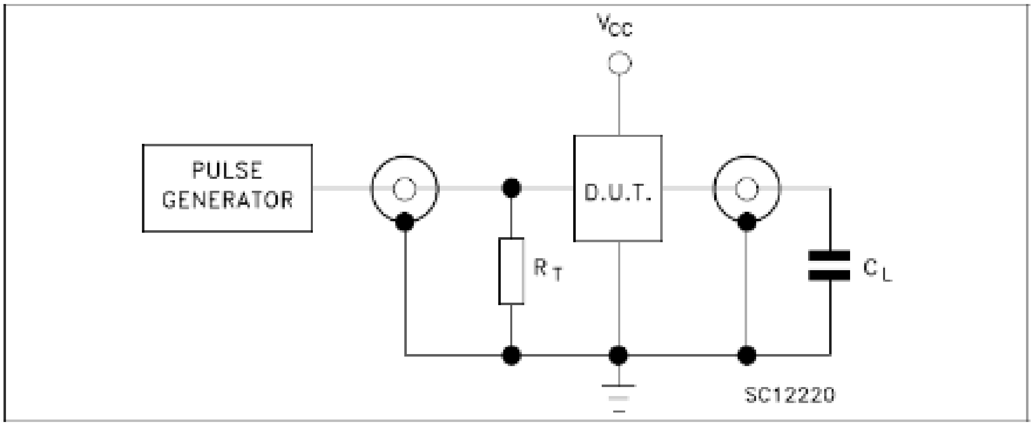
Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{THL}	Output Transition Time	2.0			38	75		95		110	ns
		4.5			8	15		19		22	
		6.0			6	13		16		19	
t_{PLH} t_{PHL}	Propagation Delay Time	2.0			45	95		120		145	ns
		4.5			9	19		24		29	
		6.0			8	16		20		25	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
C_{IN}	Input Capacitance	5.0			5	10		10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0			22						pF

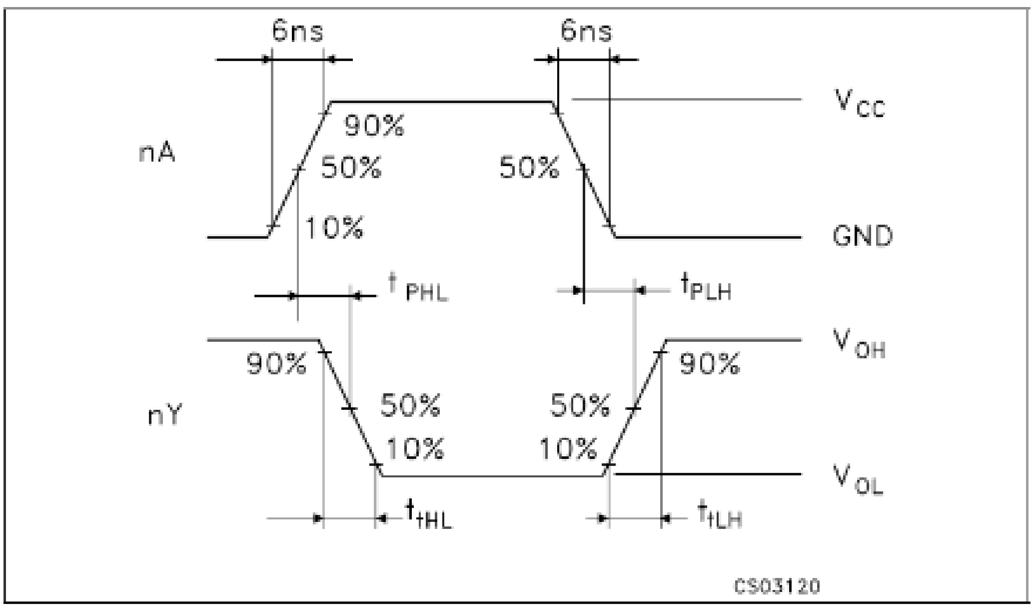
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/8$ (per Gate)

TEST CIRCUIT



C_L = 50pF or equivalent (includes jig and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM : PROPAGATION DELAY TIMES (f=1MHz; 50% duty cycle)



IC 7404 is a NOT gate, also called an inverter has only one input and, of Course, only one output. NOT GATE Logic-Rules: The output is the inverse of the input, in other words if the input is HIGH then the output is LOW and if the input is LOW the output is HIGH.

11.2 IC7486:

MM74HC86

Quad 2-Input Exclusive OR Gate

General Description

The MM74HC86 EXCLUSIVE OR gate utilizes advanced silicon-gate CMOS technology to achieve operating speeds similar to equivalent LS-TTL gates while maintaining the low power consumption and high noise immunity characteristic of standard CMOS integrated circuits. These gates are fully buffered and have a fanout of 10 LS-TTL loads. The 74HC logic family is functionally as well as pin out compatible with the standard 74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

Features

- Typical propagation delay: 9 ns
- Wide operating voltage range: 2–6V
- Low input current: 1 µA maximum
- Low quiescent current: 20 µA maximum (74 Series)
- Output drive capability: 10 LS-TTL loads

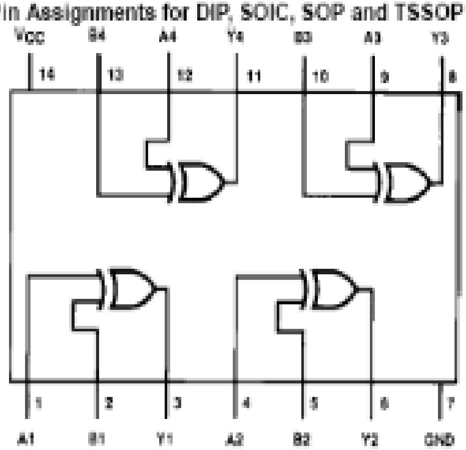
Ordering Code:

Order Number	Package Number	Package Description
MM74HC86M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HC86MX_NL	M14A	Pb-Free 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HC86SJ	M14D	Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
MM74HC86MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HC86N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
MM74HC86NX_NL	N14A	Pb-Free 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Connection Diagram

Pin Assignments for DIP, SOIC, SOP and TSSOP



Top View

Truth Table

Inputs		Outputs
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

$Y = A \oplus B = \bar{A}B + A\bar{B}$

QUAD 2-INPUT EXCLUSIVE OR GATE (XOR) :-

FEATURES

- Output capability: standard
- I_{CC} category: SSI

GENERAL DESCRIPTION

The 74HC/HCT86 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT86 provide the EXCLUSIVE–OR function.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f$ = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t_{PHL}/t_{PLH}	propagation delay nA, nB to nY	C_L = 15 pF; V_{CC} = 5 V	11	14	ns
C_I	input capacitance		3.5	3.5	pF
C_{PD}	power dissipation capacitance per gate	notes 1 and 2	30	30	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz

f_o = output frequency in MHz

$\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs

C_L = output load capacitance in pF

V_{CC} = supply voltage in V

2. For HC the condition is V_I = GND to V_{CC}

For HCT the condition is V_I = GND to V_{CC} – 1.5 V

PIN DESCRIPTION

PIN NO.	SYMBOL	NAME AND FUNCTION
1, 4, 9, 12	1A to 4A	data inputs
2, 5, 10, 13	1B to 4B	data inputs
3, 6, 8, 11	1Y to 4Y	data outputs
7	GND	ground (0 V)
14	V_{CC}	positive supply voltage

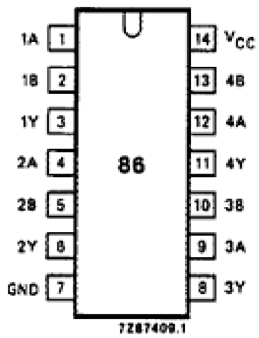


Fig.1 Pin configuration.

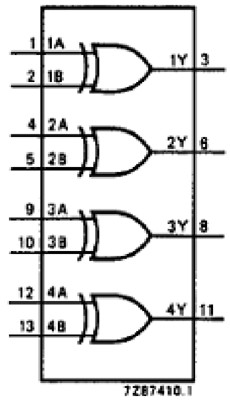


Fig.2 Logic symbol.

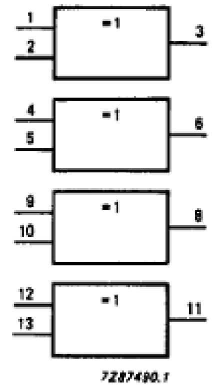


Fig.3 IEC logic symbol.

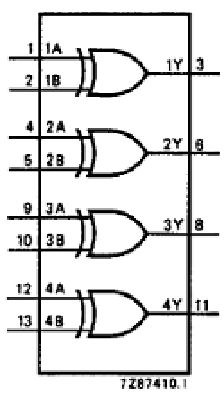


Fig.4 Functional diagram.

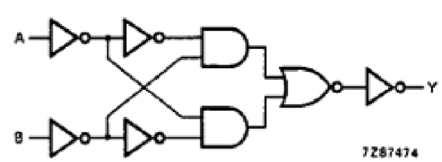


Fig.5 Logic diagram (one gate).

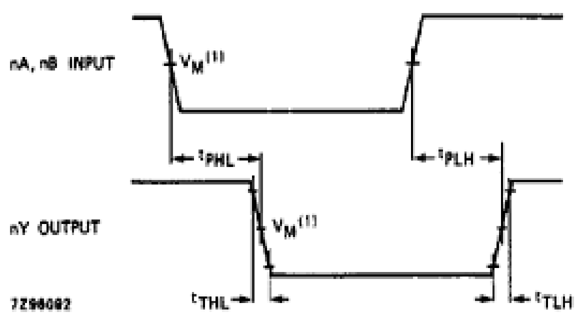
FUNCTION TABLE

INPUTS		OUTPUTS
nA	nB	nY
L	L	L
L	H	H
H	L	H
H	H	L

Notes

1. H = HIGH voltage level
   L = LOW voltage level

AC WAVEFORMS



(1) HC : V_M = 50%; V_I = GND to V_{CC}.
HCT: V_M = 1.3 V; V_I = GND to 3 V.

Fig.6 Waveforms showing the input (nA, nB) to output (nY) propagation delays and the output transition times.

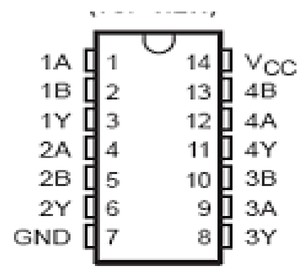
11.3 IC 7408:

IC 7408 is an AND gates has two or more input but only one output .It is also called an all or nothing gate. AND GATE Logic Rules: The output assumes the logic HIGH state, only when each of its input is at Logic HIGH state.

description

These devices contain four independent 2-input positive-AND gates. They perform the Boolean functions $Y = A \bullet B$ or $Y = \overline{\overline{A} + \overline{B}}$ in positive logic.

The SN54ALS08 and SN54AS08 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS08 and SN74AS08 are characterized for operation from 0°C to 70°C.

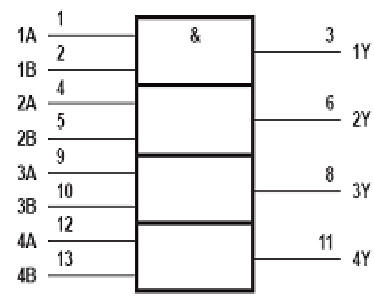


TOP VIEW OF IC 7408

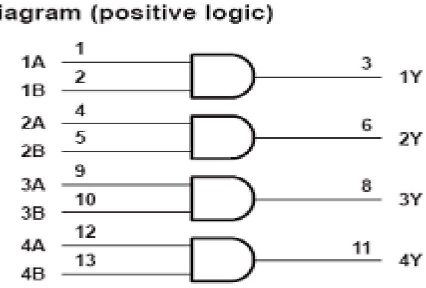
FUNCTION TABLE
(each gate)

INPUTS		OUTPUT
A	B	Y
H	H	H
L	X	L
X	L	L

logic symbol†



logic diagram (positive logic)

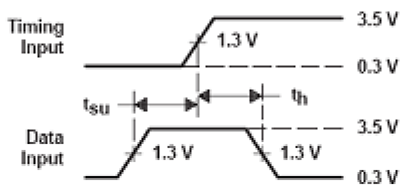


Absolute maximum rating over operating free-air temperature range:-

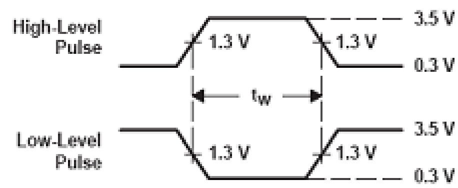
Supply voltage, VCC – 7V

Input voltage, Vi – 7V

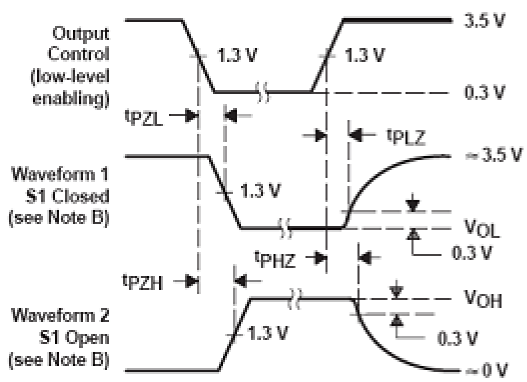
Load circuit wave form:-



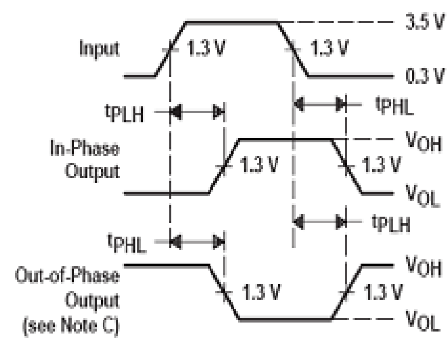
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES

11.4 IC 7473:

Features

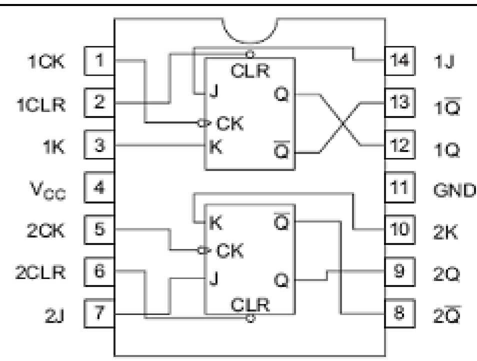
- Ordering Information

Part Name	Package Type	Package Code (Previous Code)	Package Abbreviation	Taping Abbreviation (Quantity)
HD74LS73AP	DILP-14 pin	PRDP0014AB-B (DP-14AV)	P	—
HD74LS73ARPEL	SOP-14 pin (JEDEC)	PRSP0014DE-A (FP-14DNV)	RP	EL (2,500 pcs/reel)

Function Table

Inputs				Outputs	
Clear	Clock	J	K	Q	$\overline{Q}$
L	X	X	X	L	H
H	↓	L	L	Q_0	$\overline{Q_0}$
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	Toggle	
H	H	X	X	Q_0	$\overline{Q_0}$

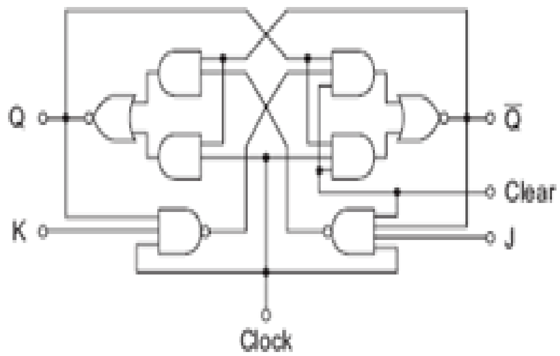
Pin Arrangement



(Top view)

H= high level, L= low level
X= irrelevant, ↓= transition high to low
Q0= steady – state input condition
Q0 bar=compliment of Q0

BLOCK DIAGRAM:-



Absolute Maximum Ratings

Item	Symbol	Ratings	Unit
Supply voltage	V_{CC}	7	V
Input voltage	V_{IN}	7	V
Power dissipation	P_T	400	mW
Storage temperature	Tstg	–65 to +150	°C

Note: Voltage value, unless otherwise noted, are with respect to network ground terminal.

Electrical Characteristics

(Ta = –20 to +75 °C)

Item		Symbol	min.	typ.*	max.	Unit	Condition
Input voltage		V_{IH}	2.0	—	—	V	
		V_{IL}	—	—	0.8	V	
Output voltage		V_{OH}	2.7	—	—	V	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = –400 μA
		V_{OL}	—	—	0.5	V	I_{OL} = 8 mA; V_{CC} = 4.75 V, V_{IH} = 2 V, V_{IL} = 0.8 V
			—	—	0.4		I_{OL} = 4 mA
Input current	J, K	I_{IH}	—	—	20	μA	V_{CC} = 5.25 V, V_I = 2.7 V
	Clear		—	—	60		
	Clock		—	—	80		
	J, K	I_{IL}	—	—	–0.4	mA	V_{CC} = 5.25 V, V_I = 0.4 V
	Clear		—	—	–0.8		
	Clock		—	—	–0.8		
	J, K	I_I	—	—	0.1	mA	V_{CC} = 5.25 V, V_I = 7 V
	Clear		—	—	0.3		
	Clock		—	—	0.4		
Short-circuit output current		I_{OS}	–20	—	–100	mA	V_{CC} = 5.25 V
Supply current**		I_{CC}	—	4	6	mA	V_{CC} = 5.25 V
Input clamp voltage		V_{IK}	—	—	–1.5	V	V_{CC} = 4.75 V, I_{IN} = –18 mA

Notes: * V_{CC} = 5 V, Ta = 25°C

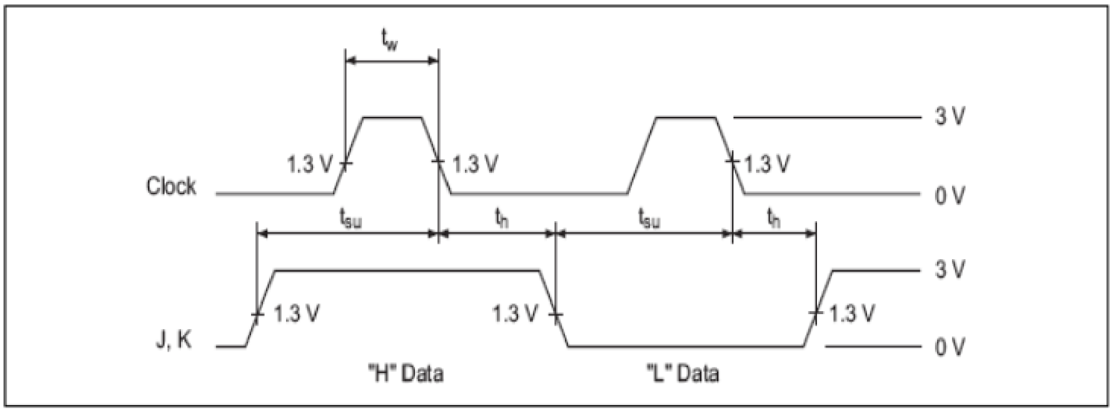
** With all outputs open, I_{CC} is measured with the Q and $\overline{Q}$ outputs high in turn. At time of measurement, the clock input is founded.

Switching Characteristics

(V_{CC} = 5 V, Ta = 25°C)

Item	Symbol	Inputs	Outputs	min.	typ.	max.	Unit	Condition
Maximum clock frequency	f_{max}			30	45	—	MHz	C_L = 15 pF, R_L = 2 kΩ
Propagation delay time	t_{PLH}	Clear Clock	Q, $\overline{Q}$	—	15	20	ns	
	t_{PHL}			—	15	20	ns	

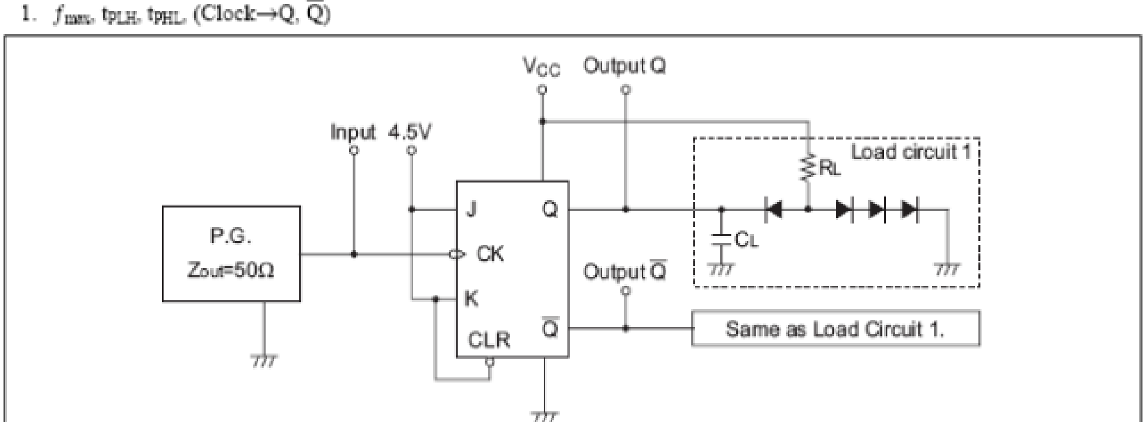
Timing Definition



Testing Method

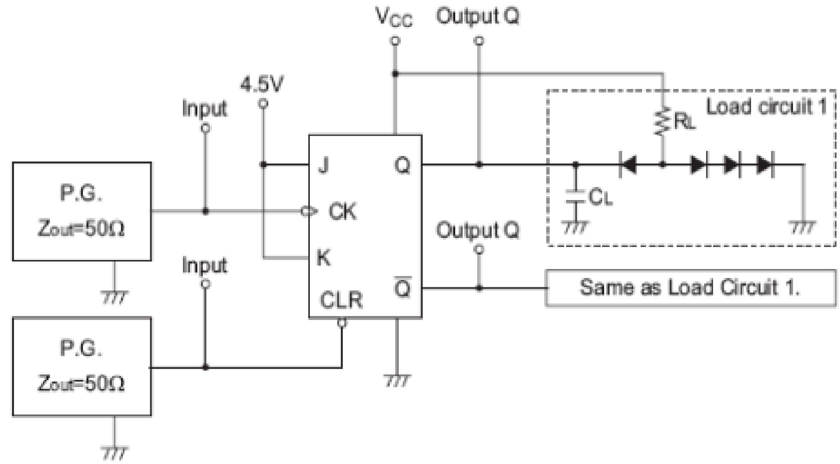
Test Circuit

1. f_{max}, t_{PLH}, t_{PHL}, (Clock→Q, $\overline{Q}$)



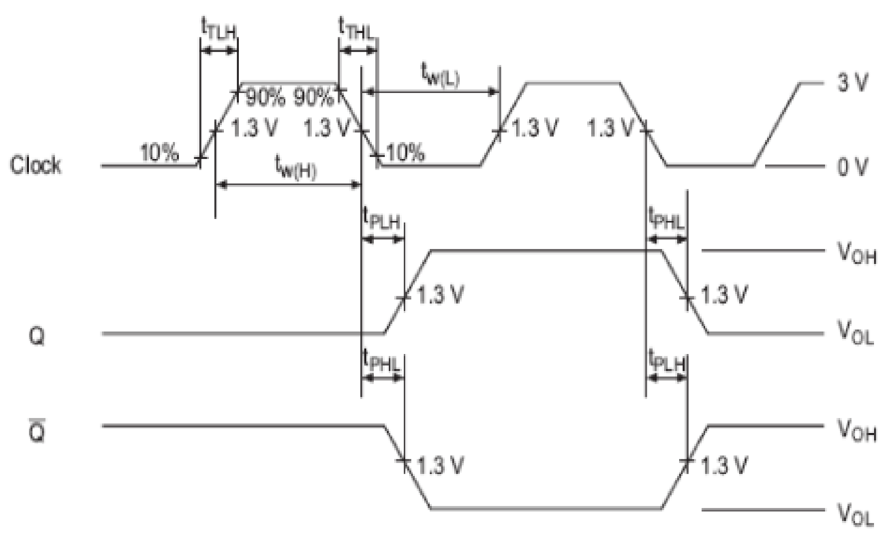
Notes:
1. Test is put into the each flip-flop.
2. C_L includes probe and jig capacitance.
3. All diodes are 1S2074(H).

2. t_{PHL} (Clear→Q), t_{PLH} (Clear→$\overline{Q}$)



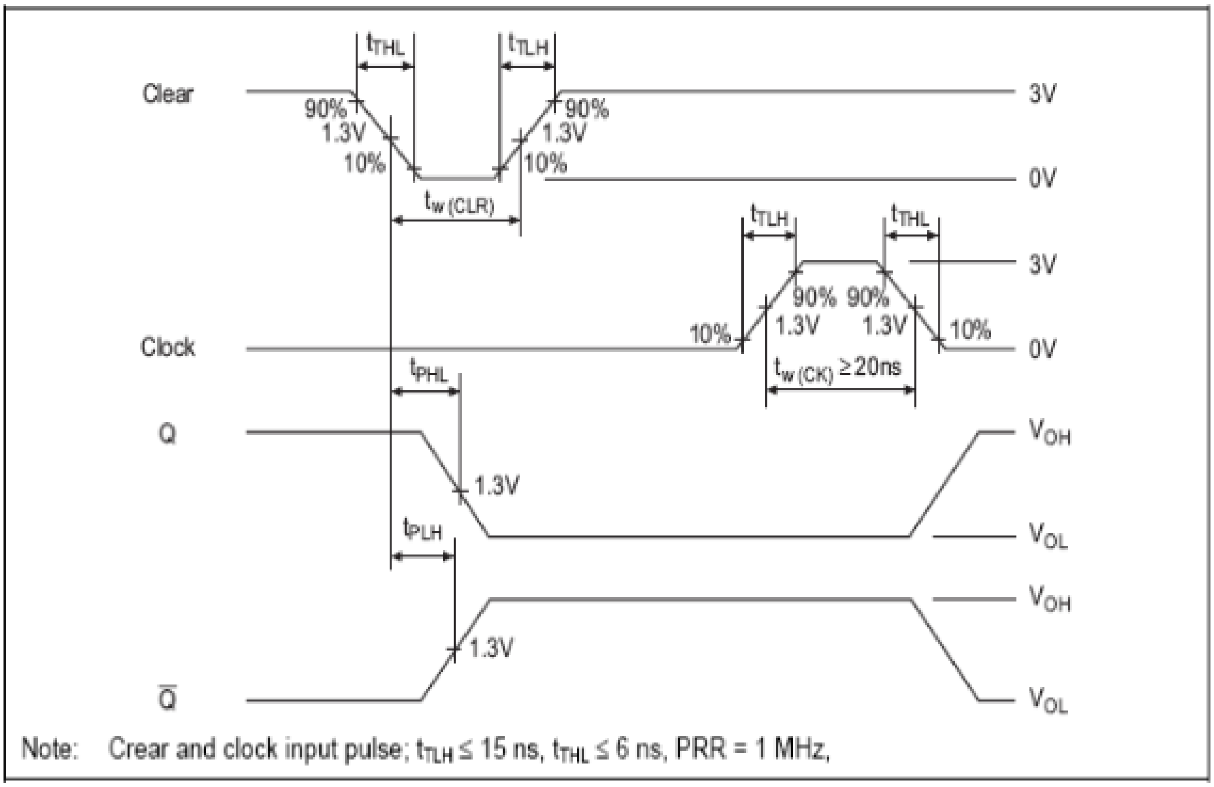
Notes:
1. Test is put into the each flip-flop.
2. C_L includes probe and jig capacitance.
3. All diodes are 1S2074(H).

Waveforms 1



Note: Clock input pulse; $t_{TLH} \leq 15$ ns, $t_{THL} \leq 6$ ns, PRR = 1 MHz, duty cycle = 50% and for f_{max}, $t_{TLH} = t_{THL} \leq 2.5$ ns

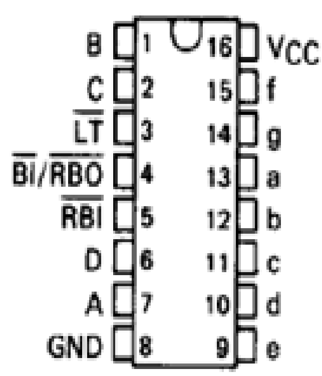
Waveforms 2



11.5 IC 7447:

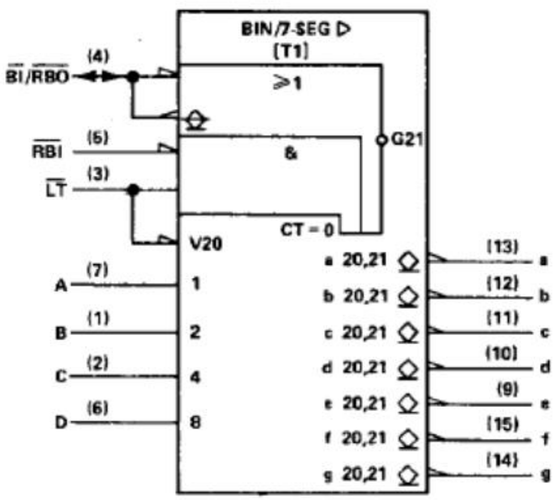
TOP VIEW OF IC 7447

- **Low-Voltage Version of SN54LS47/SN74LS47**
- **Open-Collector Outputs Drive Indicators Directly**
- **Lamp-Test Provision**
- **Leading/Trailing Zero Suppression**
- **Lamp Intensity Modulation Capability**



DESCRIPTION

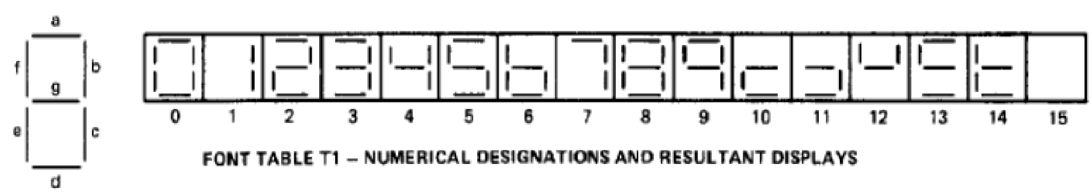
logic symbol†



The 'LS347 feature active-low outputs designed for driving common-anode VLEDs or incandescent indicators directly. These circuits also have full ripple-blanking input/output controls and a lamp test input. Segment identification and resultant displays are shown on the next page. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions.

The 'LS347 incorporate automatic leading and/or trailing-edge zero-blanking control ($\overline{RBI}$ and $\overline{RBO}$). Lamp test ($\overline{LT}$) may be performed at any time when the $\overline{BI}/\overline{RBO}$ node is at a high level. These devices also contain an overriding blanking input ($\overline{BI}$) which can be used to control the lamp intensity by pulsing or to inhibit the outputs. Inputs and outputs are entirely compatible for use with TTL logic outputs.

TYPE	DRIVER OUTPUTS				TYPICAL POWER DISSIPATION
	ACTIVE LEVEL	OUTPUT CONFIGURATION	SINK CURRENT	MAX VOLTAGE	
SN54LS347	low	open-collector	12 mA	7 V	35 mW
SN74LS347	low	open-collector	24 mA	7 V	35 mW



FONT TABLE T1 – NUMERICAL DESIGNATIONS AND RESULTANT DISPLAYS

SEGMENT IDENTIFICATION

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS†		SN54LS347			SN74LS347			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = MIN, I_I = – 18 mA				– 1.5			– 1.5	V
V_{OH}	$\overline{BI}/\overline{RBO}$	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX, I_{OH} = – 50 μA		2.4	4.2		2.4	4.2		V
V_{OL}	$\overline{BI}/\overline{RBO}$	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX	I_{OL} = 1.6 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 3.2 mA					0.35	0.5	
$I_{O(off)}$	a thru g	V_{CC} = MAX, V_{IH} = 2 V, V_{IL} = MAX, $V_{O(off)}$ = 7 V				0.25			0.25	mA
$V_{O(on)}$	a thru g	V_{CC} = MAX V_{IH} = 2 V, V_{IL} = MAX	$I_{O(on)}$ = 12 mA		0.25	0.4		0.25	0.4	V
			$I_{O(on)}$ = 24 mA					0.35	0.5	
I_I		V_{CC} = MAX, V_I = 7 V				0.1			0.1	mA
I_{IH}		V_{CC} = MAX, V_I = 2.7 V				20			20	μA
I_{IL}	Any input except $\overline{BI}/\overline{RBO}$	V_{CC} = MAX, V_I = 0.4 V				– 0.4			– 0.4	mA
	$\overline{BI}/\overline{RBO}$					– 1.2			– 1.2	
I_{OS}	$\overline{BI}/\overline{RBO}$	V_{CC} = MAX		– 0.3		– 2	– 0.3		– 2	mA
I_{CC}		V_{CC} = MAX, See Note 2			7	13		7	13	mA

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{off}	Turn-off time from A input	R_L = 665 Ω, C_L = 15 pF, See Note 3			100	ns
t_{on}	Turn-on time from A input				100	
t_{off}	Turn-off time from $\overline{RBI}$ input				100	ns
t_{on}	Turn-on time from $\overline{RBI}$ input				100	

11.6 IC 7490:

DECADE COUNTER; DIVIDE-BY-TWELVE COUNTER; 4-BIT BINARY COUNTER

The SN54/74LS90, SN54/74LS92 and SN54/74LS93 are high-speed 4-bit ripple type counters partitioned into two sections. Each counter has a divide-by-two section and either a divide-by-five (LS90), divide-by-six (LS92) or divide-by-eight (LS93) section which are triggered by a HIGH-to-LOW transition on the clock inputs. Each section can be used separately or tied together (Q to CP) to form BCD, bi-quinary, modulo-12, or modulo-16 counters. All of the counters have a 2-input gated Master Reset (Clear), and the LS90 also has a 2-input gated Master Set (Preset 9).

- Low Power Consumption . . . Typically 45 mW
- High Count Rates . . . Typically 42 MHz
- Choice of Counting Modes . . . BCD, Bi-Quinary, Divide-by-Twelve, Binary
- Input Clamp Diodes Limit High Speed Termination Effects

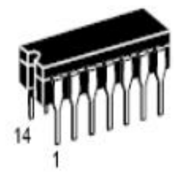
PIN NAMES

		LOADING (Note a)	
		HIGH	LOW
$\overline{CP}_0$	Clock (Active LOW going edge) Input to ÷2 Section	0.5 U.L.	1.5 U.L.
$\overline{CP}_1$	Clock (Active LOW going edge) Input to ÷5 Section (LS90), ÷6 Section (LS92)	0.5 U.L.	2.0 U.L.
$\overline{CP}_1$	Clock (Active LOW going edge) Input to ÷8 Section (LS93)	0.5 U.L.	1.0 U.L.
MR_1, MR_2	Master Reset (Clear) Inputs	0.5 U.L.	0.25 U.L.
MS_1, MS_2	Master Set (Preset-9, LS90) Inputs	0.5 U.L.	0.25 U.L.
Q_0	Output from ÷2 Section (Notes b & c)	10 U.L.	5 (2.5) U.L.
Q_1, Q_2, Q_3	Outputs from ÷5 (LS90), ÷6 (LS92), ÷8 (LS93) Sections (Note b)	10 U.L.	5 (2.5) U.L.

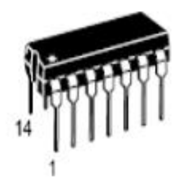
NOTES:
a. 1 TTL Unit Load (U.L.) = 40 µA HIGH/1.6 mA LOW.
b. The Output LOW drive factor is 2.5 U.L. for Military, (54) and 5 U.L. for commercial (74) Temperature Ranges.
c. The Q_0 Outputs are guaranteed to drive the full fan-out plus the $\overline{CP}_1$ input of the device.
d. To insure proper operation the rise (t_r) and fall time (t_f) of the clock must be less than 100 ns.

DECADE COUNTER; DIVIDE-BY-TWELVE COUNTER; 4-BIT BINARY COUNTER

LOW POWER SCHOTTKY



J SUFFIX
CERAMIC
CASE 632-08



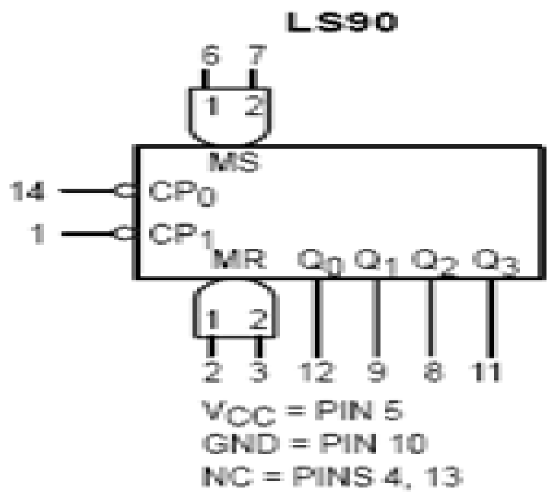
N SUFFIX
PLASTIC
CASE 646-06

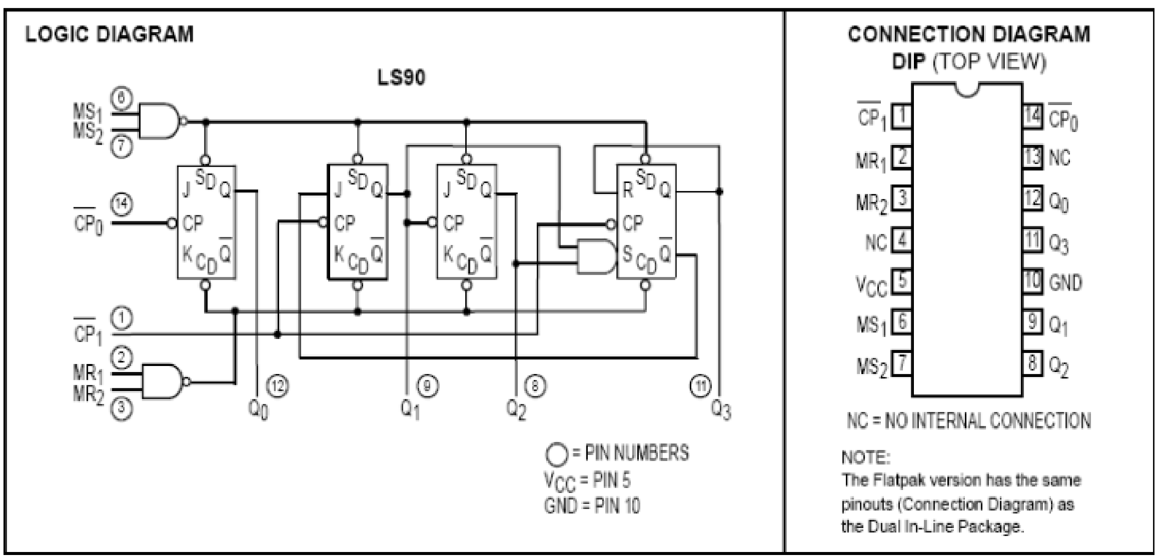
D SUFFIX
SOIC
CASE 751A-02

ORDERING INFORMATION

SN54LSXXJ	Ceramic
SN74LSXXN	Plastic
SN74LSXXD	SOIC

LOGIC SYMBOL





SN 74LS90

FUNCTIONAL DESCRIPTION

The LS90, LS92, and LS93 are 4-bit ripple type Decade, Divide-By-Twelve, and Binary Counters respectively. Each device consists of four master/slave flip-flops which are internally connected to provide a divide-by-two section and a divide-by-five (LS90), divide-by-six (LS92), or divide-by-eight (LS93) section. Each section has a separate clock input which initiates state changes of the counter on the HIGH-to-LOW clock transition. State changes of the Q outputs do not occur simultaneously because of internal ripple delays. Therefore, decoded output signals are subject to decoding spikes and should not be used for clocks or strobes. The Q_0 output of each device is designed and specified to drive the rated fan-out plus the CP_1 input of the device.

A gated AND asynchronous Master Reset ($MR_1 \bullet MR_2$) is provided on all counters which overrides and clocks and resets (clears) all the flip-flops. A gated AND asynchronous Master Set ($MS_1 \bullet MS_2$) is provided on the LS90 which overrides the clocks and the MR inputs and sets the outputs to nine (HLLH).

Since the output from the divide-by-two section is not internally connected to the succeeding stages, the devices may be operated in various counting modes.

LS90

A. BCD Decade (8421) Counter — The $\overline{CP_1}$ input must be externally connected to the Q_0 output. The $\overline{CP_0}$ input receives the incoming count and a BCD count sequence is produced.

B. Symmetrical Bi-quinary Divide-By-Ten Counter — The Q_3 output must be externally connected to the $\overline{CP_0}$ input. The input count is then applied to the $\overline{CP_1}$ input and a divide-by-ten square wave is obtained at output Q_0.

C. Divide-By-Two and Divide-By-Five Counter — No external interconnections are required. The first flip-flop is used as a binary element for the divide-by-two function ($\overline{CP_0}$ as the input and Q_0 as the output). The $\overline{CP_1}$ input is used to obtain binary divide-by-five operation at the Q_3 output.

LS90
BCD COUNT SEQUENCE

COUNT	OUTPUT			
	Q_0	Q_1	Q_2	Q_3
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H

NOTE: Output Q_0 is connected to Input $\overline{CP_1}$ for BCD count.

LS90
MODE SELECTION

RESET/SET INPUTS				OUTPUTS			
MR_1	MR_2	MS_1	MS_2	Q_0	Q_1	Q_2	Q_3
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
L	X	L	X	Count			
X	L	X	L	Count			
L	X	X	L	Count			
X	L	L	X	Count			

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T_A	Operating Ambient Temperature Range	54 74	–55 0	25 25	125 70	°C
I_{OH}	Output Current — High	54, 74			–0.4	mA
I_{OL}	Output Current — Low	54 74			4.0 8.0	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits Min	Typ	Max	Unit	Test Conditions	
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V_{IL}	Input LOW Voltage	54			0.7	V	Guaranteed Input LOW Voltage for All Inputs	
		74			0.8			
V_{IK}	Input Clamp Diode Voltage			–0.65	–1.5	V	V_{CC} = MIN, I_{IN} = –18 mA	
V_{OH}	Output HIGH Voltage	54	2.5	3.5		V	V_{CC} = MIN, I_{OH} = MAX, V_{IN} = V_{IH} or V_{IL} per Truth Table	
		74	2.7	3.5		V		
V_{OL}	Output LOW Voltage	54, 74		0.25	0.4	V	I_{OL} = 4.0 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
		74		0.35	0.5	V	I_{OL} = 8.0 mA	
I_{IH}	Input HIGH Current				20	µA	V_{CC} = MAX, V_{IN} = 2.7 V	
					0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current MS, MR $\overline{CP_0}$ $\overline{CP_1}$ (LS90, LS92) $\overline{CP_1}$ (LS93)				 –0.4 –2.4 –3.2 –1.6	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
I_{OS}	Short Circuit Current (Note 1)		–20		–100	mA	V_{CC} = MAX	
I_{CC}	Power Supply Current				15	mA	V_{CC} = MAX	

RECOVERY TIME: - It is defined as the minimum time required between the end of the reset pulse and the clock transition from HIGH-to-LOW in order to recognize and transfer HIGH data to the Q output.

AC SETUP REQUIREMENTS ($T_A = 25°C$, $V_{CC} = 5.0$ V)

Symbol	Parameter	Limits						Unit
		LS90		LS92		LS93		
		Min	Max	Min	Max	Min	Max	
t_W	$\overline{CP}_0$ Pulse Width	15		15		15		ns
t_W	$\overline{CP}_1$ Pulse Width	30		30		30		ns
t_W	MS Pulse Width	15						ns
t_W	MR Pulse Width	15		15		15		ns
t_{rec}	Recovery Time MR to $\overline{CP}$	25		25		25		ns

AC CHARACTERISTICS ($T_A = 25°C$, $V_{CC} = 5.0$ V, $C_L = 15$ pF)

Symbol	Parameter	Limits									Unit
		LS90			LS92			LS93			
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{MAX}	$\overline{CP}_0$ Input Clock Frequency	32			32			32			MHz
f_{MAX}	$\overline{CP}_1$ Input Clock Frequency	16			16			16			MHz
t_{PLH} t_{PHL}	Propagation Delay, $\overline{CP}_0$ Input to Q_0 Output		10 12	16 18		10 12	16 18		10 12	16 18	ns
t_{PLH} t_{PHL}	$\overline{CP}_0$ Input to Q_3 Output		32 34	48 50		32 34	48 50		46 46	70 70	ns
t_{PLH} t_{PHL}	$\overline{CP}_1$ Input to Q_1 Output		10 14	16 21		10 14	16 21		10 14	16 21	ns
t_{PLH} t_{PHL}	$\overline{CP}_1$ Input to Q_2 Output		21 23	32 35		10 14	16 21		21 23	32 35	ns
t_{PLH} t_{PHL}	$\overline{CP}_1$ Input to Q_3 Output		21 23	32 35		21 23	32 35		34 34	51 51	ns
t_{PLH}	MS Input to Q_0 and Q_3 Outputs		20	30							ns
t_{PHL}	MS Input to Q_1 and Q_2 Outputs		26	40							ns
t_{PHL}	MR Input to Any Output		26	40		26	40		26	40	ns

12. WAVE FORM:-

AC WAVEFORMS

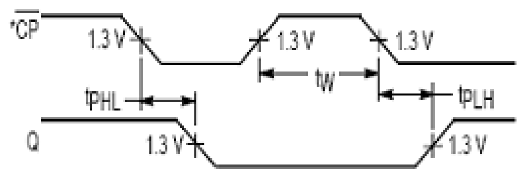


Figure 1

*The number of Clock Pulses required between the t_{PHL} and t_{PLH} measurements can be determined from the appropriate Truth Tables.

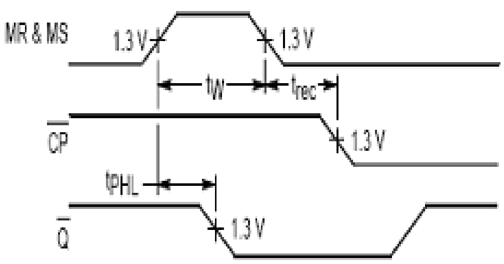


Figure 2

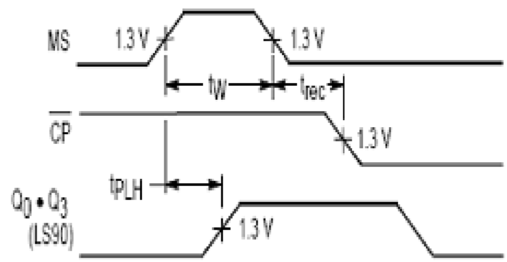


Figure 3

13. MOUNTING OF THE COMPONENT:-

1. After etching the component, the components are mounted on the printed circuit board. All components are mounted on the holes.
2. Small resistors are mounted flat or horizontal and pushed through the correct Mounting holes.
3. Recheck the color and symbol numbers where it mounts on the PCB.
4. First mounted IC socket in printed circuit board. Then it soldering and after soldering IC mounted in IC socket.
5. Place the resistor in their position.
6. Switches is mounted in printed circuit board and then soldering it.
7. Small LED are mounted in the correct mounting holes. And then soldering.
9. Seven segment display is mounted in correct holes and then soldering i

14. SOLDERING:-

14.1 Soldering iron: -

The iron consists of an insulating handle connected via a metal shank to the bit. The function of bit is to:

1. Store and deliver molten solder and flux.
2. Store heat and pass it to the compounds.
3. Remove extra solder from joints.

Soldering bit is made of copper because it has good heat capacity and thermal. Conductivity. Some iron has thermostatic control to keep the temperature of bit constant, various wattage such as 10 W, 25 W, 35 W, 60W and 100W are available.

14.2 Soldering flux: -

Flux is a medium used to improve the degree of wetting. The desirable Properties of flux are:

1. It should provide a liquid cover for the material and avoid air gap to the soldering temperature.
2. It should dissolve any oxide on metal surface.
3. It should be easily displaced from the metal by molten soldering operation.
4. Residue should be removable after soldering operation.

The flux consists of Zinc Chloride or olive oil with active such as glycol acid, Ammonium chloride and organic acids. By adding activates, flow and activity is increased without affecting corrosion.

14.3 Solder: -

The three grades of solder generally used for soldering are 40/60, 50/50, 60/40 etc of tin and lead respectively. The 60/40 w solder has high cost but it melts at lowest temperature, flow more freely, takes less time to harden and generally makes it easier to do good soldering job. Solder is generally available in the form of wire. Flux is also incorporated in solder wire itself. In such case no extra flux is necessary.

14.4 Soldering with Iron: -

The surface to be soldered must be cleaned and fluxed. the soldering iron is switched on and allowed to attain soldering temperature. the solder in the form of wire is applied near the component and heated with iron. The surface to the solder is fitted, iron is removed and joints are cooled without any disturbance.
The following are the advantage of soldering:
1. A good soldering provides a good permanent resistance path.
2. Makes good electrical link between PCB and leads of component.
3. Retain the required strength with temperature variation.

15. ADVANTAGES :-

1. Simple user interface.
2. Less cost
3. Quick results
4. Fair elections
5. Tamperproof

16. DISADVANTAGES :-

1. Limited no. of candidates.

2. More candidates mean implies complicated circuit.

17. APPLICATIONS :-

1. It is used in general elections for choosing candidates to represent people at various stages.
2. It can be used in school, college student union elections.
3. It can be used to find the general opinion of people on various issues.
4. Anywhere where majority opinion is to be found out.

18. CONCLUSION:-

In conclusion, electronic voting machines (EVMs) have become a popular choice for many countries looking to modernize their election systems. EVMs offer numerous benefits, such as faster and more accurate vote counting and increased accessibility for voters with disabilities. However, they also raise valid concerns about security, privacy, and transparency, as well as the potential for technical malfunctions or hacking.

To address these concerns, it is essential that EVMs are designed and implemented with robust security measures, including encryption, tamper-proof seals, and regular audits. Additionally, transparency in the EVM design and implementation process is crucial, as is the need for public education and awareness about how EVMs work and the safeguards in place to protect the integrity of the voting process.

Overall, while electronic voting machines are not without their challenges, they have the potential to improve the efficiency and accuracy of elections, making them an important tool in the democratic process.

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