

BAB V

PENUTUP

5.1. Kesimpulan

Berdasarkan perancangan sistem dan hasil pengujian yang dilakukan, maka dalam pembuatan tugas akhir ini dapat disimpulkan beberapa hal, yaitu :

1. Dengan adanya instruksi PWM pada PLC LG MASTER K120S dapat dengan mudah dalam mengatur kecepatan motor dc dengan metode PWM
2. Dengan mengatur nilai *off duty cycle* maka akan dihasilkan nilai tegangan pada Motor DC. Semakin besar nilai tegangan pada Motor DC maka akan semakin cepat putaran motor.
3. Pembacaan pulsa yang dihasilkan optocoupler dapat terbaca dan dihitung kecepataannya dengan baik oleh instruksi *High Speed Counter* dengan mengatur nilai parameter yang dimasukan.
4. Penggunaan simulasi CimonD pada penelitian ini sangat berguna untuk melihat hasil output yang dihasilkan sehingga dapat dimonitoring pada simulasi ini sesuai dengan kondisi sistem tersebut.

5.2. Saran

Untuk pengembangannya, maka dapat disarankan beberapa hal berikut :

1. Perlu dilakukan penghitungan dengan menggunakan algoritma - algoritma seperti logika Fuzzy dan PID untuk mengatur kecepatan motor agar lebih halus pada kondisi awal
2. Menggunakan Motor DC dengan kondisi yang baik sehingga dapat dihasilkan kecepatan yang stabil.



DAFTAR PUSTAKA

Petruzella, Frank D.. *Elektronika Industri.*, Yogyakarta : penerbit Andi 2007.

USER MANUAL LG Programable Logic Controller MASTER K120S series, LG

Industrial Systems. www.lgis.com

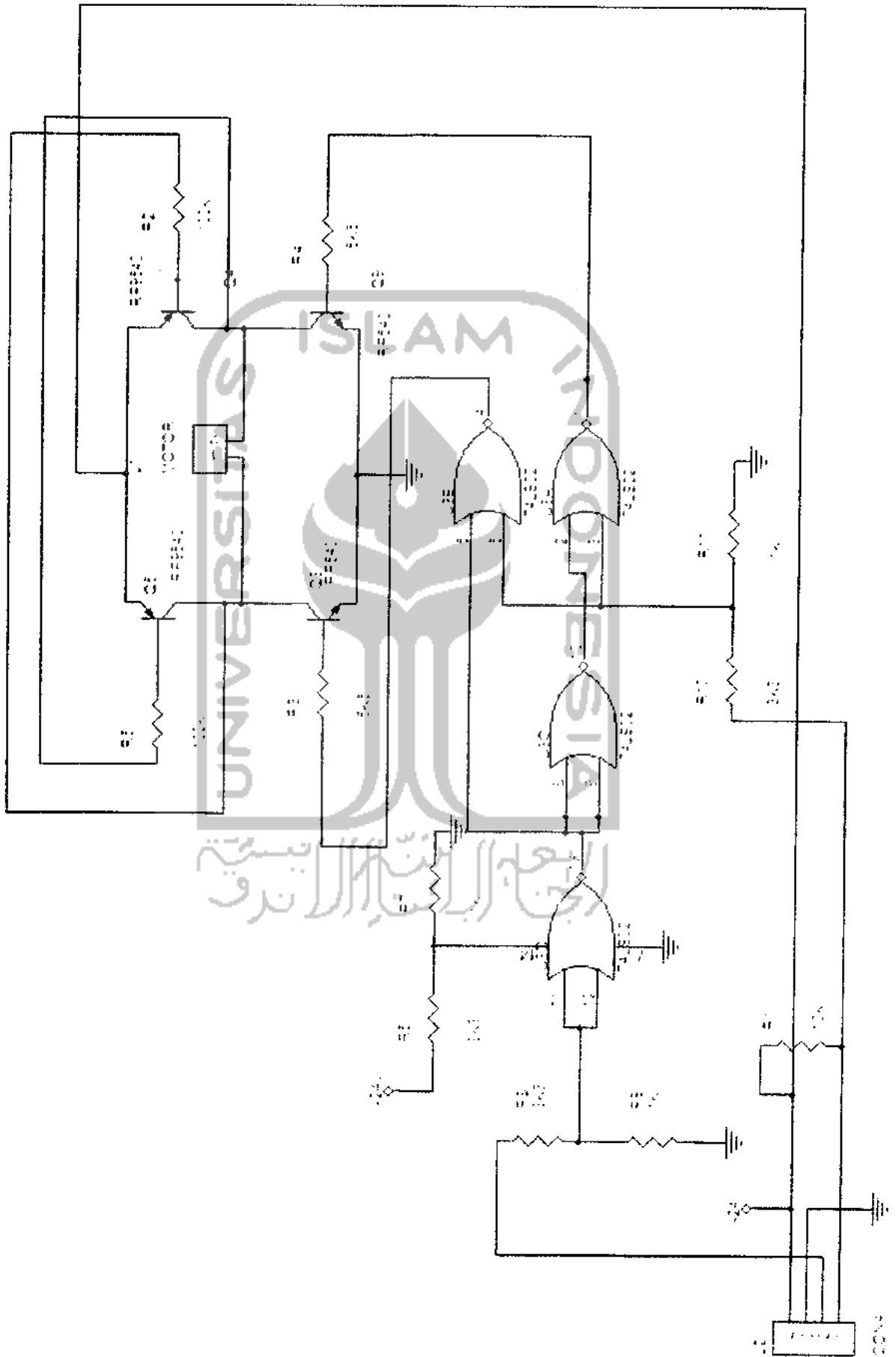
Modul Pelatihan PLC LG MASTER K120S

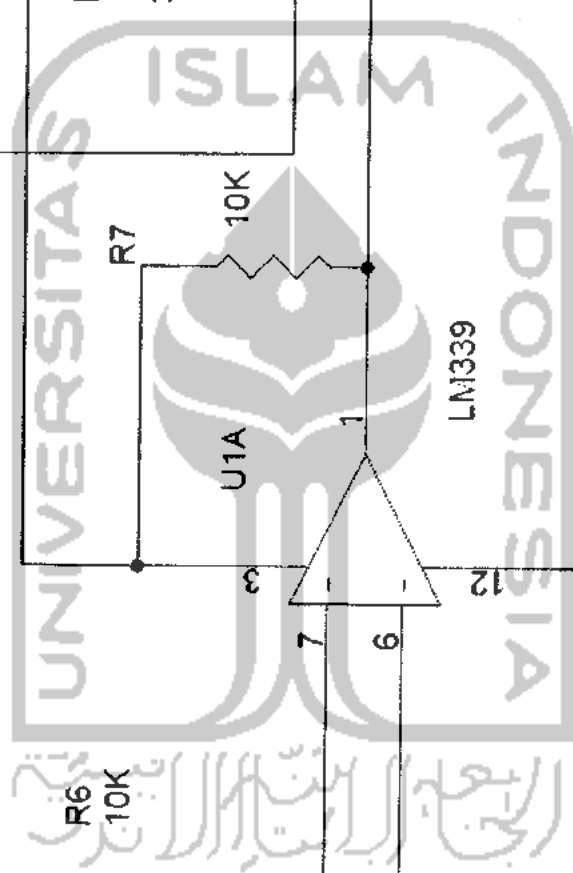
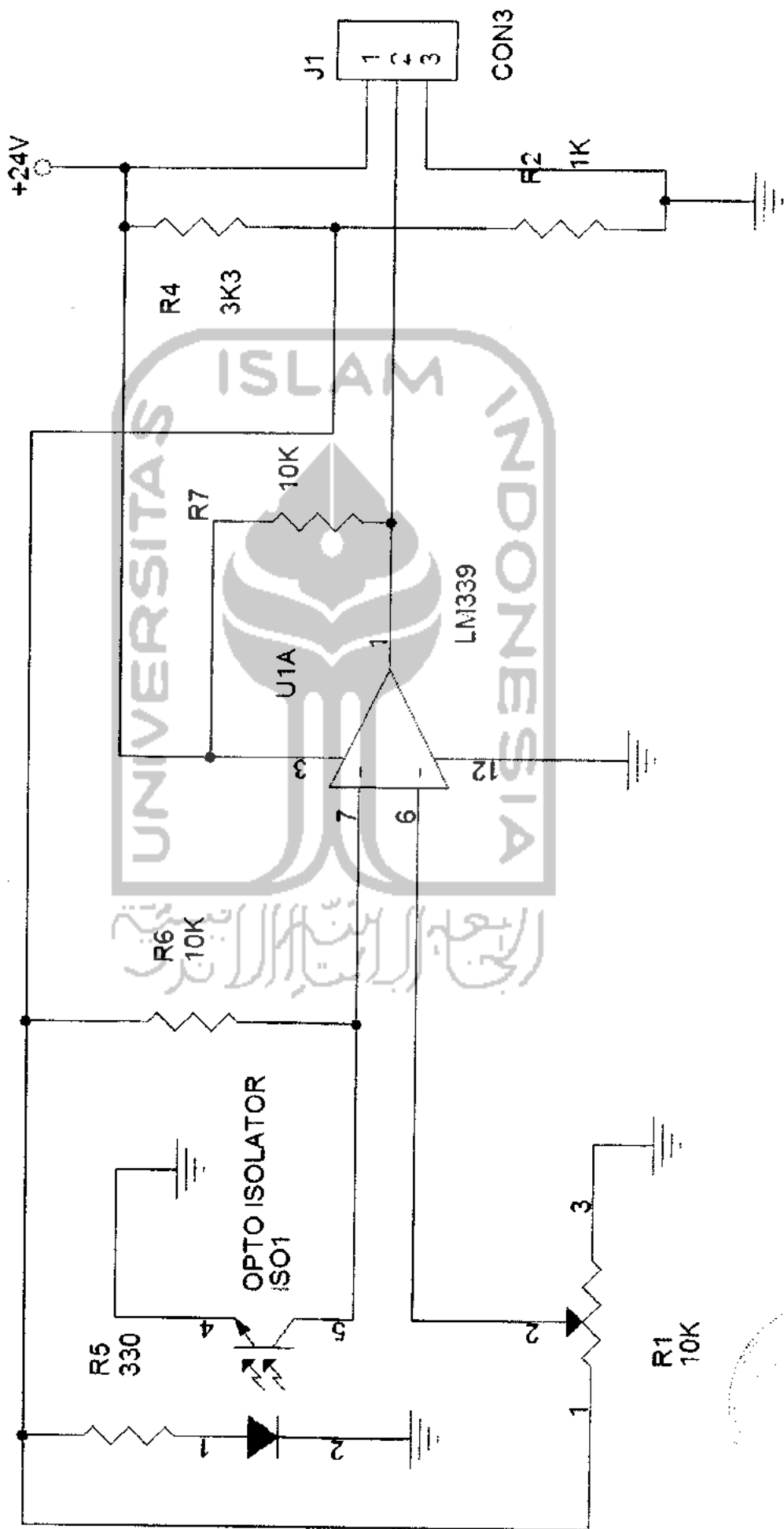
Drs. Suminto, MA. *Mesin Arus Searah*, Andi Offset Yogyakarta, 1991

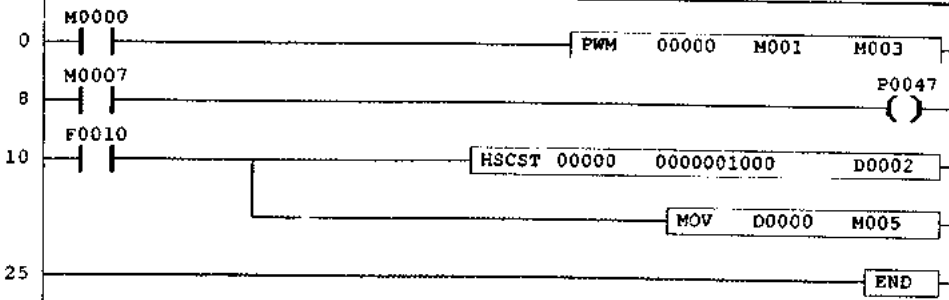




الجامعة الإسلامية
للمطالع والدراسات







Specifications

Item	Specifications				Remark
	K7M-DR20U	K7M-DR30U	K7M-DR40U	K7M-DR60U	
	K7M-DRT20U	K7M-DRT30U	K7M-DRT40U	K7M-DRT60U	
CPU operation method	Cyclic execution of stored program, Time-driven interrupt, Interrupt task operation				
I/O control method	Scan synchronized batch processing method (refresh method), Direct method by command				
Program language	Ladder Diagram, Instruction List				
Numbers of instruction	Basic	30			
	Application	277			
Processing speed	Basic command: 0.1 μ s/step				
Program capacity	10kstep				
I/O Points	20 points	30 points	40 points	60 points	
Memory device	P	P000~P63F			I/O relay
	M	M000~M191F			Aux. relay
	K	K000~K31F			Keep relay
	L	L000~L63F			Link relay
	F	F000~F63F			Special relay
	T	100ms: T000~T191			Timer
		10ms: T192~T250			
		1 μ s: T251~T255			
C	C000~C250			Counter	
S	S0000~S9999 (100 \times 100 steps)			Step relay	
D	D0000~D4999			Data register	
Operation mode	RUN, STOP, PAUSE				
Self-diagnostic functions	Detect errors of scan time, Memory, I/O, Power supply				
Data backup method	Set by parameter				
Max. extension stage	3 (except RTC/Memory pack)				
Built-in functions	PID Control function		Control by command Auto-tuning, PWM output Forced output, Set scan time anti-windup Delta MV function, SV-Lamp function		
	Net I/F Function		MASTERK dedicated protocol support Modbus protocol support RS-232C 1 port User-defined protocol support RS-485 1 port No protocol support		
	High speed counter	Capacity	1 Phase: 100kHz 20ch / 20kHz 20ch 2 Phase: 50kHz 10ch / 10kHz 10ch		
		Mode	It has 4 different counter functions • 1 phase, up-down by program • 1 phase, up-down by B-phase input • 2 phase, up-down by 1 phase • 2 phase, up-down by phase difference		
Additional function		• Internal/External preset function • Latch counter function • Comparator output function • RPM function			

*) RTC/Memory module must be connected to the last extension terminal.

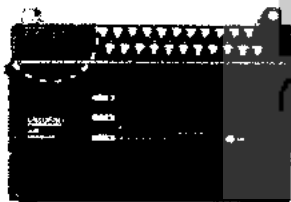
Specification

Item	Specifications				Remark	
	K7M-DR20U	K7M-DR30U	K7M-DR40U	K7M-DR60U		
	K7M-DRT20U	K7M-DRT30U	K7M-DRT40U	K7M-DRT60U		
Built-in functions	Sitioning function	Basic function	No. of axis: 2 axes Control method: PTP/Speed Control unit: Pulse Positioning data: 20 data per each axis (Step No. 1~20) Operation mode: End, Keep, Cont Control method: Single, Repeated, Operation			DRT Type only
		Positioning	Positioning method: Absolute method/Incremental method Address range: -2,147,483,648 ~ 2,147,483,647 Speed: Max. 100kpps (Speed: 5 ~ 100,000pps) Acceleration/Deceleration processing (Operation pattern: Trapezoidal method)			
		Return to origin	Origin detection when approximate origin turns off Origin detection after deceleration when approximate origin turns on			
		Jog	Speed setting range: 5 ~ 100,000pps (High/Low)			
	Pulse catch	Pulse width: 10µs 2 points (P0000~P0001) / 50µs 6 points (P0002~P0007)				
	External interrupt	8 points: 10µs 2 points (F0000~F0001) / 50µs 6 points (P0002~P0007)				
	Input filter	0, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000µs set by user				
Weight (g)	520	540	660	850		

CPU Operation mode



[Mode key]



Mode key position	Operation mode
RUN	Local RUN
STOP	Local STOP
STOP → PAU/REM	Remote STOP
PAU/REM → RUN	Local RUN
RUN → PAU/REM	Local PAUSE
PAU/REM → STOP	Local STOP

• PLC operates continuously when changed from Remote RUN to Local RUN.
 Remote RUN/Remote STOP control is available in KGLWIN.

RUN Mode (Local RUN/Remote RUN): operating mode; initialization of data area is executed when the first scan starts.

STOP Mode (Local STOP/Remote STOP): program is not operated; program transferring in KGLWIN is available only in Remote STOP mode.

PAU (PAUSE): program operation is temporarily stopped; if it returns to RUN mode, the operation will continue from the state before it stopped.

REM (Remote): changeable mode to Remote RUN/STOP in KGLWIN.



FX2N-120S Series

CPU Specifications (Economic type)

Specifications

Item	Specifications				Remark	
	K7M-DR10UE	K7M-DR14UE	K7M-DR20UE	K7M-DR30UE		
CPU operation method	Cyclic execution of stored program, Time-driven interrupt, Interrupt task operation					
I/O control method	Scan synchronized batch processing method (refresh method), Direct method by command					
Program language	Ladder Diagram, Instruction List					
Numbers of instruction	Basic	30				
	Application	265				
Processing speed	Basic command: 0.4 μ s/step					
Program capacity	2kstep					
I/O points	10 points	14 points	20 points	30 points		
Memory device	P	P000~P63F			I/O relay	
	M	M000~M191F			Aux relay	
	K	K000~K31F			Keep relay	
	L	L000~L63F			Link relay	
	F	F000~F63F			Special relay	
	T	100ms:	T000~T191			Timer
		10ms:	T192~T250			
		1ms:	T251~T255			
C	C000~C255			Counter		
S	S00.00~S99.99 (100 \times 100 Steps)			Step relay		
D	D0000~D4999			Data register		
Operation mode	RUN, STOP, PAUSE					
Self-diagnostic function	Detect errors of scan time, Memory, I/O, Power supply					
Data backup method	Set by parameter					
Max. extension stage	2 (except RTC/Memory pack)					
Built-in analog timer	2 points		None			
Input filter	0, 2, 5, 10, 20, 50, 100, 200, 500, 100ms set by user					
Interrupt	4 points (P0~P3), 50 μ s					
Pulse catch	4 points (P0~P3), 50 μ s					
Built-in function	Cnet I/F	Built-in RS-485		Built-in RS-232C		
		MASTERK dedicated protocol (LG protocol)				
		Modbus protocol				
		User-defined protocol				
		No protocol support				
Weight (g)	520	540	600	850		

Specifications

Type	Item	Specifications	Remark
Digital I/O module	G7E-DR10A	DC 24V input 6 points / Relay output 4 points	
	G7E-DR20A	DC 24V input 12 points / Relay output 8 points	
	G7E-TR10A	TR input 10 points	
	G7E-DC08A	DC 24V input 8 points	
	G7E-RY08A	Relay output 8 points	
Cnet interface module	G7L-CUFB	RS-232C 1Ch	
	G7L-CUEC	RS-422 1Ch	
RTC module	G7E-RTCA	RTC module	
Memory module	G/M-M256B	Memory module	

* Special function modules are available after October, 2003.

LM139/LM239/LM339/LM2901/LM3302 Low Power Low Offset Voltage Quad Comparators

General Description

The LM139 series consists of four independent precision voltage comparators with an offset voltage specification as low as 2 mV max for all four comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; MOS clock timers; multivibrators and high voltage digital logic gates. The LM139 series was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, they will directly interface with MOS logic—where the low power drain of the LM339 is a distinct advantage over standard comparators.

Advantages

- High precision comparators
- Reduced V_{OS} drift over temperature

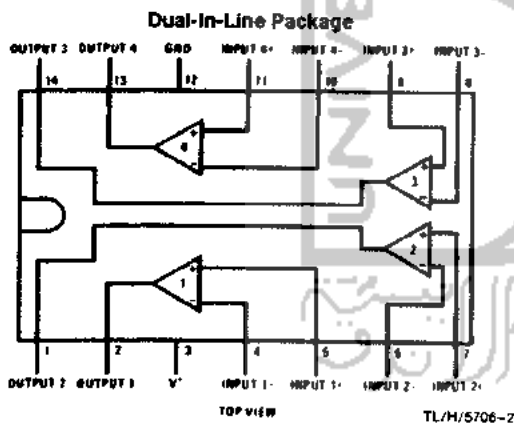
- Eliminates need for dual supplies
- Allows sensing near GND
- Compatible with all forms of logic
- Power drain suitable for battery operation

Features

- Wide supply voltage range
LM139 series, 2 V_{DC} to 36 V_{DC} or ±1 V_{DC} to ±18 V_{DC}
LM139A series, LM2901, LM3302 2 V_{DC} to 28 V_{DC} or ±1 V_{DC} to ±14 V_{DC}
- Very low supply current drain (0.8 mA) — independent of supply voltage
- Low input biasing current 25 nA
- Low input offset current ±5 nA and offset voltage ±3 mV
- Input common-mode voltage range includes GND
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage 250 mV at 4 mA
- Output voltage compatible with TTL, DTL, ECL, MOS and CMOS logic systems

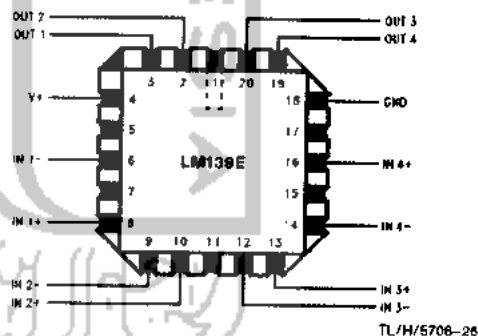
LM139/LM239/LM339/LM2901/LM3302
Low Power Low Offset Voltage Quad Comparators

Connection Diagrams

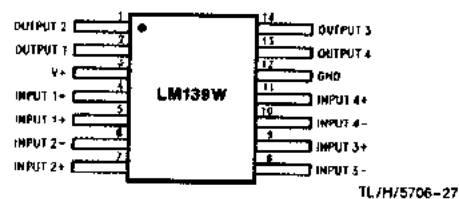


- Order Number LM139J, LM139J/883*, LM139AJ, LM139AJ/883**, LM239J, LM239AJ, LM339J, See NS Package Number J14A
- Order Number LM339AM, LM339M or LM2901M See NS Package Number M14A
- Order Number LM339N, LM339AN, LM2901N or LM3302N See NS Package Number N14A

* Available per JMB6510/11201
** Available per SMD # 5962-8873901



Order Number LM139AE/883 or LM139E/883
See NS Package Number E20A



Order Number LM139AW/883 or LM139W/883*
See NS Package Number W14B

Electrical Characteristics ($V^+ = 5 V_{DC}$, $T_A = 25^\circ C$, unless otherwise stated) (Continued)

Parameter	Conditions	LM139A		LM239A, LM339A		LM139		LM239, LM339		LM2901		LM3302		Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Saturation Voltage	$V_{IN(-)} = 1 V_{DC}$, $V_{IN(+)} = 0$, $I_{SINK} \leq 4 \text{ mA}$	250	400	250	400	250	400	250	400	250	400	250	500	mV _{DC}
Output Leakage Current	$V_{IN(+)} = 1 V_{DC}$, $V_{IN(-)} = 0$, $V_O = 5 V_{DC}$	0.1		0.1		0.1		0.1		0.1		0.1		nA _{DC}

Electrical Characteristics ($V^+ = 5.0 V_{DC}$, Note 4)

Parameter	Conditions	LM139A		LM239A, LM339A		LM139		LM239, LM339		LM2901		LM3302		Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	(Note 9)	4.0		4.0		9.0		9.0		9.0		15		mV _{DC}
Input Offset Current	$I_{IN(+)} - I_{IN(-)}$, $V_{CM} = 0V$	100		150		100		150		50		200		nA _{DC}
Input Bias Current	$I_{IN(+)}$ or $I_{IN(-)}$ with Output in Linear Range, $V_{CM} = 0V$ (Note 5)	300		400		300		400		200		500		nA _{DC}
Input Common-Mode Voltage Range	$V^+ = 30 V_{DC}$ (LM3302, $V^+ = 28 V_{DC}$) (Note 6)	0	$V^+ - 2.0$	0	$V^+ - 2.0$	0	$V^+ - 2.0$	0	$V^+ - 2.0$	0	$V^+ - 2.0$	0	$V^+ - 2.0$	V _{DC}
Saturation Voltage	$V_{IN(-)} = 1 V_{DC}$, $V_{IN(+)} = 0$, $I_{SINK} \leq 4 \text{ mA}$	700		700		700		700		400		700		mV _{DC}
Output Leakage Current	$V_{IN(+)} = 1 V_{DC}$, $V_{IN(-)} = 0$, $V_O = 30 V_{DC}$ (LM3302, $V_O = 28 V_{DC}$)	1.0		1.0		1.0		1.0		1.0		1.0		μA_{DC}
Differential Input Voltage	Keep all V_{IN} 's $\geq 0 V_{DC}$ (or V^- if used), (Note 8)	36		36		36		36		36		36		V _{DC}

Note 1: For operating at high temperatures, the LM339/LM339A, LM2901, LM3302 must be derated based on a 125°C maximum junction temperature and a thermal resistance of 95°C/W which applies for the device soldered in a printed circuit board, operating in a still air ambient. The LM239 and LM139 must be derated based on a 150°C maximum junction temperature. The low bias dissipation and the "ON-OFF" characteristic of the outputs keeps the chip dissipation very small ($P_D \leq 100 \text{ mW}$), provided the output transistors are allowed to saturate.

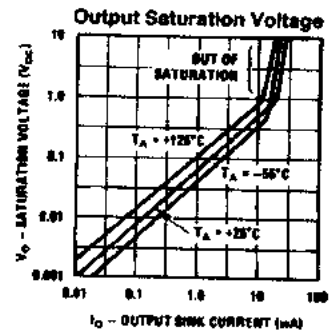
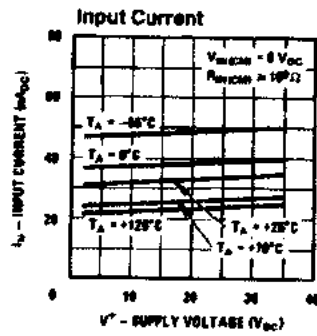
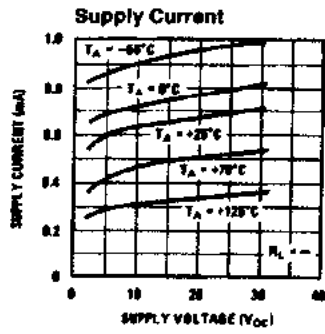
Note 2: Short circuits from the output to V^+ can cause excessive heating and eventual destruction. When considering short circuits to ground, the maximum output current is approximately 20 mA independent of the magnitude of V^+ .
Note 3: This input current will only exist when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistors becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also lateral NPN parasitic transistor action on the IC chip. This transistor action can cause the output voltages of the comparators to go to the V^+ voltage level (or to ground for a large overdrive) for the time duration that an input is driven negative. This is not destructive and normal output states will re-establish when the input voltage, which was negative, again returns to a value greater than $-0.3 V_{DC}$ (at 25°C).
Note 4: These specifications are limited to $-55^\circ C \leq T_A \leq +125^\circ C$, for the LM139/LM139A. With the LM239/LM239A, all temperature specifications are limited to $-25^\circ C \leq T_A \leq +85^\circ C$. The LM339/LM339A temperature specifications are limited to $0^\circ C \leq T_A \leq +70^\circ C$, and the LM2901, LM3302 temperature range is $-40^\circ C \leq T_A \leq +85^\circ C$.

Note 5: The direction of the input current is out of the IC due to the PNP input stage. This current is essentially constant, independent of the state of the output so no loading change exists on the reference or input lines.
Note 6: The input common-mode voltage or either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is $V^+ - 1.5V$ at 25°C, but either or both inputs can go to $+40 V_{DC}$ without damage (25V for LM3302), independent of the magnitude of V^+ .

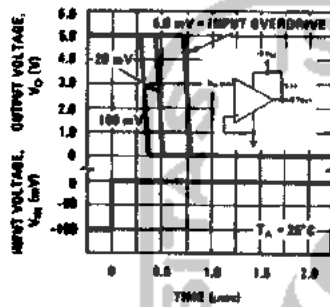
Note 7: The response time specified is a 100 mV input step with 5 mV overdrive. For larger overdrive signals 300 ns can be obtained, see typical performance characteristics section.
Note 8: Positive excursions of input voltage may exceed the power supply level. As long as the other voltage remains within the common-mode range, the comparator will provide a proper output state. The low input voltage state must not be less than $-0.3 V_{DC}$ (or $0.3 V_{DC}$ below the magnitude of the negative power supply, if used) (at 25°C).

Note 9: At output switch point, $V_O \approx 1.4 V_{DC}$, $R_S = 0\Omega$ with V^+ from 5 V_{DC} to 30 V_{DC}; and over the full input common-mode range (0 V_{DC} to $V^+ - 1.5 V_{DC}$), at 25°C. For LM3302, V^+ from 5 V_{DC} to 28 V_{DC}.
Note 10: Refer to RETS139AX for LM139A military specifications and to RETS139X for LM139 military specifications.

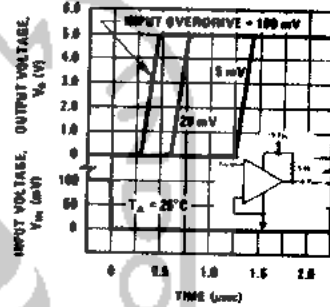
Typical Performance Characteristics LM139/LM239/LM339, LM139A/LM239A/LM339A, LM3302



Response Time for Various Input Overdrives—Negative Transition

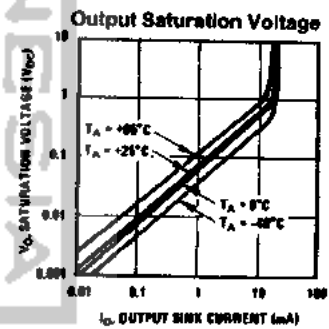
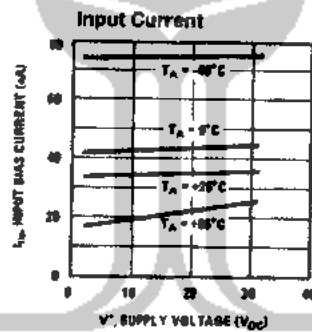
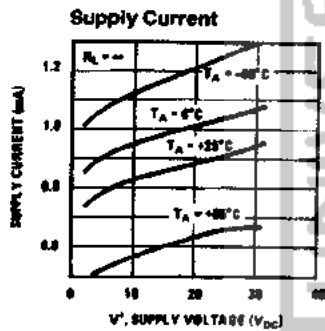


Response Time for Various Input Overdrives—Positive Transition

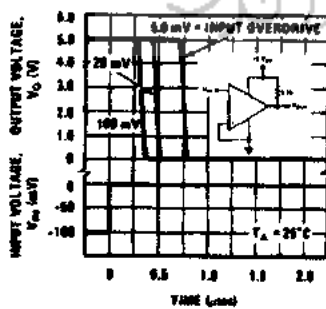


TL/H/5706-6

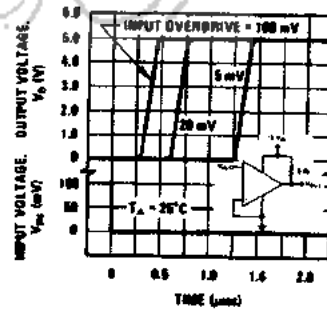
Typical Performance Characteristics LM2901



Response Time for Various Input Overdrives—Negative Transition



Response Time for Various Input Overdrives—Positive Transition



TL/H/5706-7

DM74LS02 Quad 2-Input NOR Gate

General Description

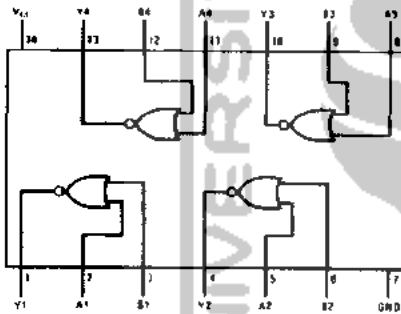
This device contains four independent gates each of which performs the logic NOR function.

Ordering Code:

Order Number	Package Number	Package Description
DM74LS02M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
DM74LS02SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
DM74LS02N	N14A	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.

Connection Diagram



Function Table

$$Y = A + B$$

Inputs		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

H = HIGH Logic Level
L = LOW Logic Level

DM74LS02 Quad 2-Input NOR Gate