

## BAB V

### KESIMPULAN

Kesimpulan yang dapat diambil dari pembuatan sistem adalah:

1. Pengujian rangkaian logika dengan cara memberikan stimulus data digital dari komputer ke input rangkaian bersangkutan dapat dilakukan dengan memanfaatkan fasilitas yang tersedia pada PC XT/AT atau kompatibelnya.
2. Karena untuk berhubungan dengan sistem di luar IBM PC digunakan *card Printer Adapter* yang terdapat pada IBM PC XT/AT atau kompatibelnya, maka sistem tidak lagi membutuhkan pembuatan *card* khusus yang harus diselipkan ke dalam slot ekspansi IBM PC.
3. Untuk menghubungkan komputer ke alat (perangkat keras) yang dibuat, digunakan sistem transmisi secara paralel dengan menggunakan 16 kawat yang dihubungkan ke konektor DB-25P pada *printer adapter*.
4. Karena proses pengujian rangkaian logika dilakukan oleh komputer, maka hasilnya dapat diperoleh lebih cepat dibandingkan sistem manual, terutama bila pengujian dilakukan terhadap banyak komponen/rangkaian logika.
5. Dalam sistem ini, perangkat lunak mempunyai peranan yang sangat penting, karena perangkat lunak mengatur bagaimana sistem bekerja. Tanpa perangkat lunak, sistem tidak dapat digunakan.

6. Sistem yang dibuat memungkinkan pengujian terhadap rangkaian kombinasional maupun rangkaian sekuensial. Dalam pengujian terhadap rangkaian kombinasional, sistem bisa menunjukkan baik/buruknya rangkaian logika serta memperlihatkan tabel kebenaran ataupun diagram pewaktuan. Sedang dalam pengujian terhadap rangkaian sekuensial, sistem bisa memperlihatkan diagram pewaktuan untuk membantu pemakai menganalisis rangkaian bersangkutan.
7. Banyaknya IC atau rangkaian logika yang dapat diuji baik/buruknya oleh komputer dapat ditambah dengan memperbanyak *record* yang dimasukkan ke dalam *database* di *disk*.

Sistem ini masih dapat dikembangkan lebih lanjut, antara lain:

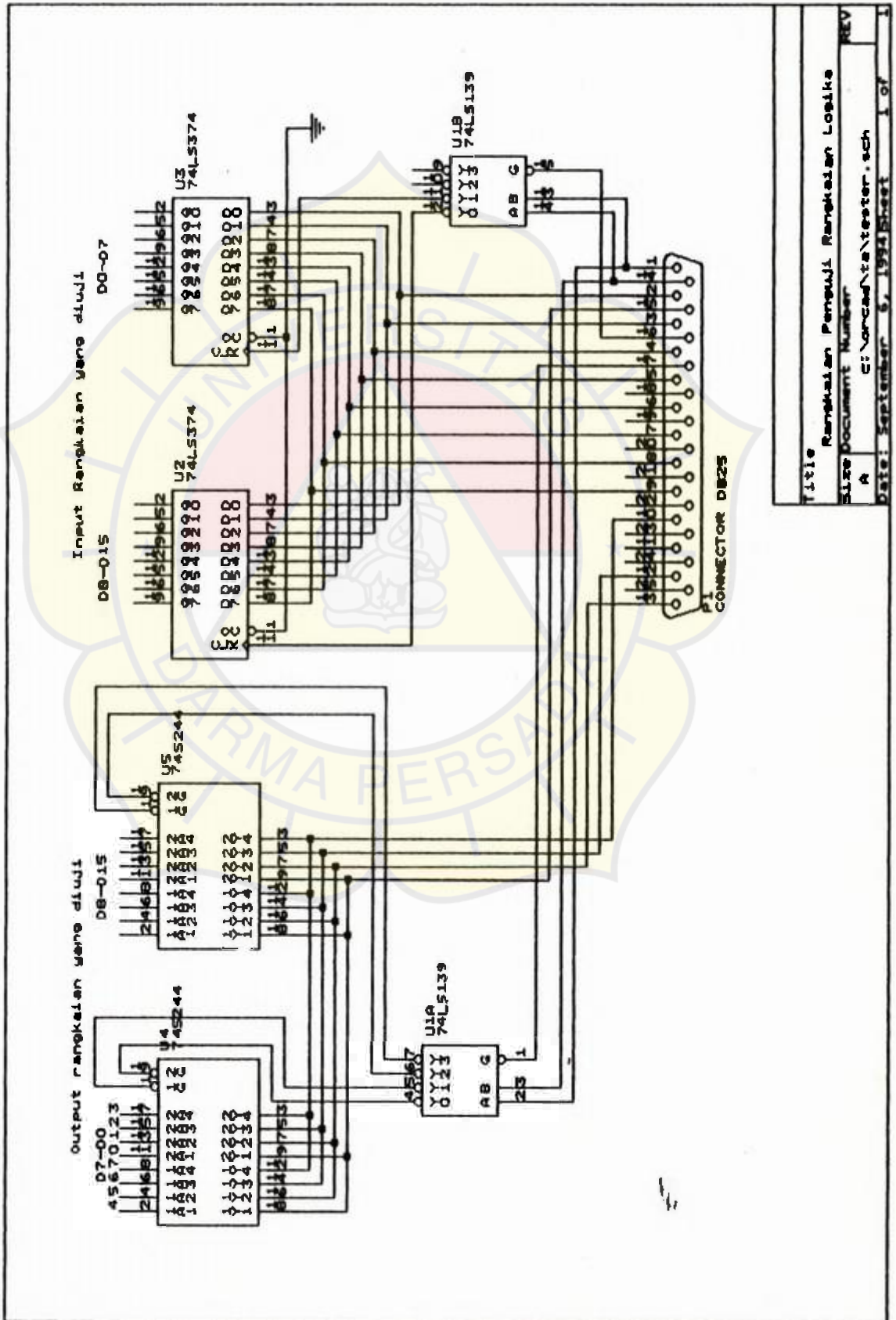
1. Banyaknya saluran input/output ke/dari rangkaian logika dapat ditambah sesuai keperluan dengan memodifikasi dan menyempurnakan perangkat lunak yang ada, karena perangkat keras yang dibuat memungkinkan saluran input/output sampai 16 buah.
2. Objek pengujian dapat diperbanyak, bukan hanya terhadap IC TTL, tetapi juga untuk rangkaian dengan komponen keluarga logika lainnya, seperti CMOS.
2. Untuk mempermudah penggunaan sistem serta meningkatkan kemampuannya, maka perangkat lunak yang tersedia dapat dikembangkan dengan memperbanyak petunjuk penggunaan ataupun menambah fasilitas yang belum tersedia.

## DAFTAR PUSTAKA

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# Lampiran 1

## SKEMA RANGKAIAN PERANTARA



Title Rangkaian Penguji Rangkaian Logika  
Size Document Number REV  
A C:\arcad\nta\tester.sch  
Date: September 6, 1994 Sheet 1 of 1

## Lampiran 2

### DAFTAR KOMPONEN

Komponen-komponen yang digunakan dalam pembuatan perangkat keras adalah:

1. IC 74LS139 (1 buah)
2. IC 74LS244 (1 buah)
3. IC 74LS374 (1 buah)
4. Konektor DB-25P (2 *male* dan 1 *female*)
5. Soket IC (5 buah)
6. Lampu Led untuk indikator pada kotak modul (16 buah)
7. Konektor/*Jack* dan pasangannya (17 pasang)
8. Kabel-kabel penghubung

## Lampiran 3

### DATA KOMPONEN

Specialized Products

Decoders/Demu

Logic Products

**FEATURES**

- Demultiplexing capability
- Two independent 1-of-4 decoders
- Multifunction capability
- Replaces 9321 and 93L21 for higher performance

**DESCRIPTION**

The 74LS139 is a high-speed, dual 1-of-4 decoder/demultiplexer. This device has two independent decoders, each accepting two binary-weighted inputs (A<sub>1</sub>, A<sub>0</sub>) and providing four mutually exclusive active-LOW outputs (O<sub>3</sub>-O<sub>0</sub>). Each decoder has an active-LOW Enable (E). When E is HIGH, every output is forced HIGH. The Enable can be used as the Data input for a 1-of-4 demultiplexer application.

## 74LS139, S139

### Decoders/Demultiplexers

Dual 1-of-4 Decoder/Demultiplexer  
Product Specification

TYPE	TYPICAL PROPAGATION DELAY (ENABLE AT 2 LOGIC LEVELS)	TYPICAL SUPPLY CURRENT (TOTAL)
74LS139	11ns	6mA
74S139	47ns	6mA

**ORDERING CODE**

PACKAGES	COMMERCIAL RANGE V <sub>CC</sub> = 5V ± 5%; T <sub>A</sub> = 0°C to +70°C
Plastic DIP	74LS139N, 74ALS139N
Plastic SO	74LS139D, 74ALS139D

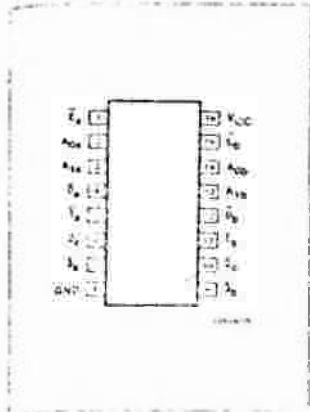
**NOTE**  
For information regarding device-related microprocessor applications, see the Sup. MIC + Micro. subject's User Manual.

**INPUT AND OUTPUT LOADING AND FAN-OUT TABLE**

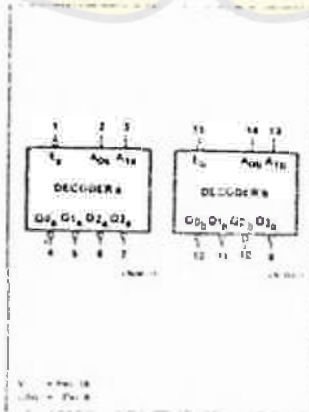
PINS	DESCRIPTION	74S	74LS
All	Inputs	15Std	11Std
All	Outputs	10Std	10LStd

**NOTE**  
A 74S unit can drive 10 74LS inputs, and a 74LS unit can drive 10 74S inputs, and 10 74LS outputs.

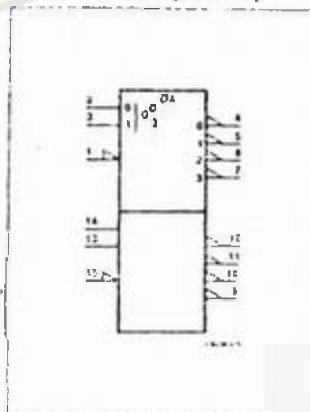
**PIN CONFIGURATION**



**LOGIC SYMBOL**

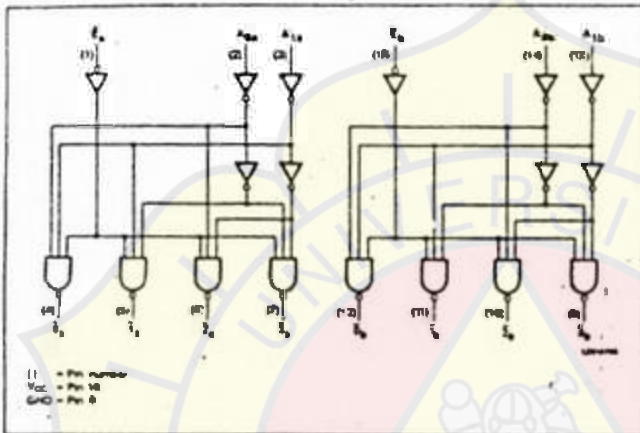


**LOGIC SYMBOL (E E/E/EC)**



74LS139, S139

LOGIC DIAGRAM



FUNCTION TABLE

E	INPUTS		OUTPUTS			
	A <sub>0</sub>	A <sub>1</sub>	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>
H	X	X	H	H	L	L
L	L	L	L	H	H	H
L	H	L	H	L	H	H
L	L	H	H	H	L	H
L	H	H	H	H	H	L

H = HIGH voltage level  
L = LOW voltage level

ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER	74LS	74S	UNIT
V <sub>CC</sub> Supply voltage	7.0	7.0	V
V <sub>IN</sub> Input voltage	-0.5 to +7.0	-0.5 to +5.5	V
I <sub>IN</sub> Input current	-30 to +1	-30 to +5	mA
V <sub>OUT</sub> Voltage applied to output in HIGH output state	-0.5 to +V <sub>CC</sub>	-0.5 to +V <sub>CC</sub>	V
T <sub>a</sub> Operating free-air temperature range	0 to 70		°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER	74LS			74S			UNIT
	Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub> Supply voltage	4.75	5.0	5.25	4.75	5.0	5.25	V
V <sub>IN</sub> HIGH-level input voltage	2.0			2.0			V
V <sub>IL</sub> LOW-level input voltage			+0.8			+0.8	V
I <sub>IN</sub> Input clamp current			-18			-18	mA
I <sub>OH</sub> HIGH-level output current			-400			-1000	mA
I <sub>OL</sub> LOW-level output current			8			20	mA
T <sub>a</sub> Operating free-air temperature	0		70	0		70	°C

# 74LS373, 74LS374, S373, S374

## Latches/Flip-Flops

Logic Products

373 Octal Transparent Latch With 3-State Outputs

374 Octal D Flip-Flop With 3-State Outputs

Product Specification

### FEATURES

- 8-bit transparent latch — 373
- 8-bit positive, edge-triggered register — 374
- 3-State output buffers
- Common 3-State Output Enable
- Independent register and 3-State Buffer operation

### DESCRIPTION

The 373 is an octal transparent latch with eight 3-state output buffers. The two sections of the device are controlled independently by Latch Enable (E) and Output Enable (OE) control gates.

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (10 V <sub>CC</sub> )
74LS373	7ns	24mA
74LS374	10ns	18mA
74LS373, 74LS374	19ns	27mA
74LS373, 74LS374	8ns	17.6mA

### ORDERING CODE

PACKAGES	COMMERCIAL RANGE V <sub>CC</sub> = 5V ± 5%, T <sub>A</sub> = 0°C to +70°C
Plastic DIP	N74LS373N, N74LS374N, N74LS373AN, N74LS374AN
Plastic SO-16	N74LS373D, N74LS374D, N74LS373AD, N74LS374AD

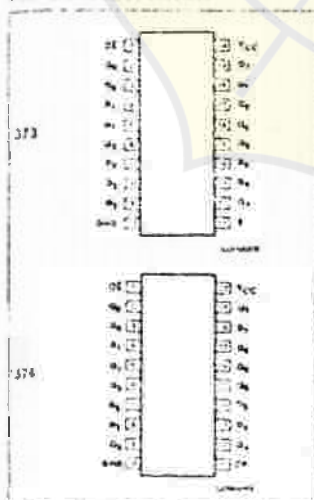
NOTE: For a complete ordering guide, see the applicable device data sheet. For the complete Military Products Data Manual.

### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

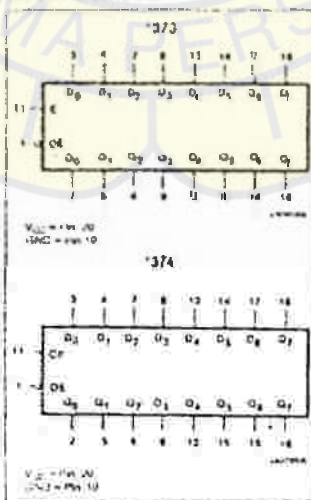
PINS	DESCRIPTION	74S	74LS
All	Inputs	15	15
All	Outputs	10	10

NOTE: Values are based on 50pF load capacitance and 0mA I<sub>OL</sub> and 15mA I<sub>OH</sub> and based on 1.5mA I<sub>OL</sub> and 0mA I<sub>OH</sub>.

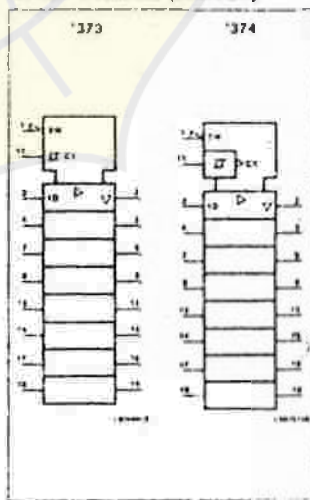
### PIN CONFIGURATION



### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/EC)





## Latches/Flip-Flops

## 74LS373, 74LS374, S373, S374

The data on the D inputs is transferred to the latch outputs when the Latch Enable (E) input is HIGH. The latch remains transparent to the data as long as E is HIGH, and stores the data present one set-up time before the HIGH-to-LOW enable transition. The enable gate has hysteresis built in to help minimize problems that signal ground noise can cause on the latching operation.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors. The active LOW Output Enable (OE) controls all eight 3-State buffers independent of the latch

operation. When OE is LOW, the latched or transparent data appears at the outputs. When OE is HIGH, the outputs are in the HIGH impedance "off" state, which means they will neither drive nor load the bus.

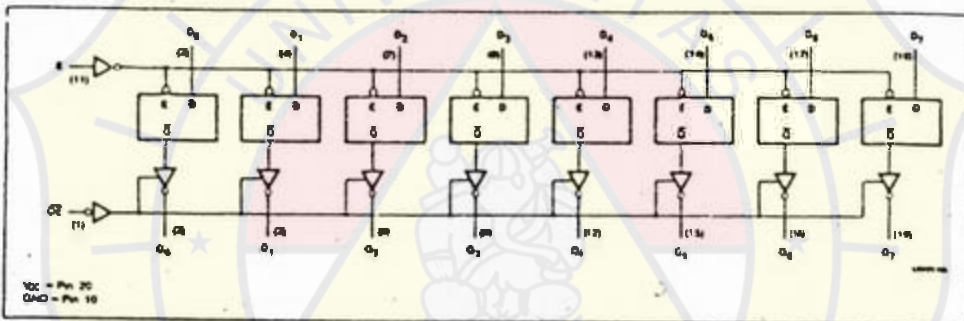
The '374 is an 8-bit edge-triggered register coupled to eight 3-State output buffers. The two sections of the device are controlled independently by the Clock (CP) and Output Enable (OE) control gates.

The register is fully edge-triggered. The state of each D input, one set-up time before the LOW-to-HIGH clock transition, is transferred

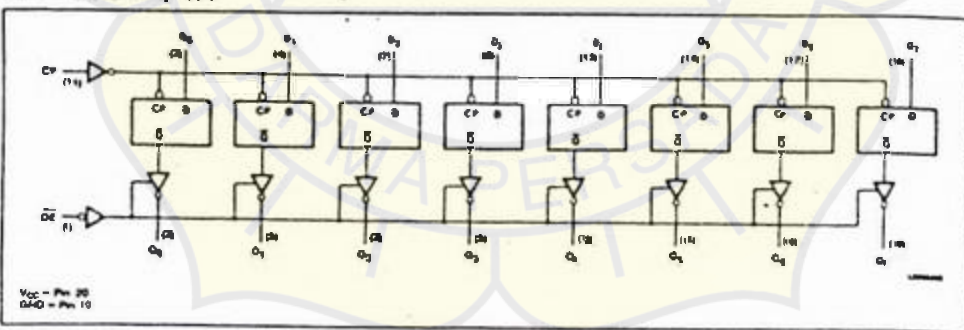
to the corresponding flip-flop's Q output. The clock buffer has hysteresis built in to help minimize problems that signal ground noise can cause on the clocking operation.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors. The active LOW Output Enable (OE) controls all eight 3-State buffers independent of the register operation. When OE is LOW, the data in the register appears at the outputs. When OE is HIGH the outputs are in the HIGH impedance "off" state, which means they will neither drive nor load the bus.

LOGIC DIAGRAM, '373

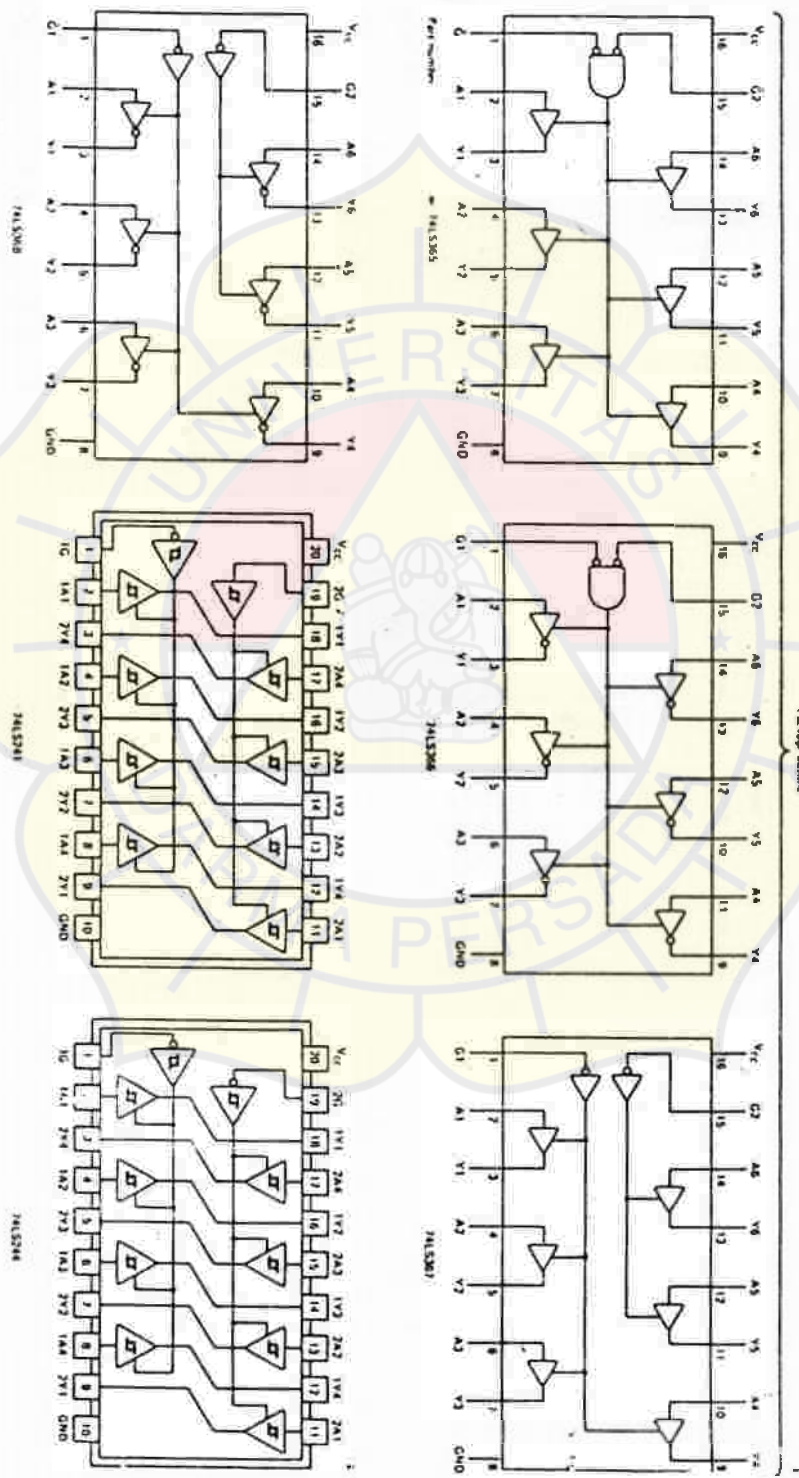


LOGIC DIAGRAM, '374



MODE SELECT—FUNCTION TABLE '373

OPERATING MODES	INPUTS			INTERNAL REGISTER	OUTPUTS
	OE	E	D <sub>n</sub>		Q <sub>0</sub> - Q <sub>7</sub>
Enable and read register	L	H	L	L	L
	L	H	H	H	H
Latch and read register	L	L	L	L	L
	L	L	H	H	H
Latch register and disable outputs	H	L	L	L	(Z)
	H	L	H	H	(Z)



**TYPES SN54LS240, SN54LS241, SN54LS244,  
SN74LS240, SN74LS241, SN74LS244  
BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS**

recommended operating conditions

PARAMETER	SN54LS*			SN74LS*			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, $V_{CC}$ (see Note 1)	4.5	5	5.5	4.75	5	5.25	V
High-level output current, $I_{OH}$			-12			-15	mA
Low-level output current, $I_{OL}$			12			24	mA
Operating free-air temperature, $T_A$	-55		125	0		70	°C

NOTE 1: Voltage values are with respect to network ground terminal.

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

PARAMETER	TEST CONDITIONS†	SN54LS*			SN74LS*			UNIT	
		MIN	TYP‡	MAX	MIN	TYP‡	MAX		
$V_{IH}$	High-level input voltage	2			2			V	
$V_{IL}$	Low-level input voltage			0.7			0.8	V	
$V_{IK}$	Input clamp voltage			-1.5			-1.5	V	
	Hysteresis ( $V_T - -V_{T-}$ )							V	
$V_{OH}$	High-level output voltage	$V_{CC} = \text{MIN},$ $V_{IH} = 2V,$ $V_{IL} = V_{IL \text{ max}},$ $I_{OH} = -3 \text{ mA}$	2.4	3.4		2.4	3.4	V	
		$V_{CC} = \text{MIN},$ $V_{IH} = 2V,$ $V_{IL} = 0.5V,$ $I_{OH} = \text{MAX}$	2			2			
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN},$ $V_{IH} = 2V,$ $V_{IL} = V_{IL \text{ max}}$			0.4		0.4	V	
		$I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$					0.5		
$I_{OZH}$	Off-state output current, high-level voltage applied	$V_{CC} = \text{MAX},$ $V_{IH} = 2V,$ $V_L = V_{L \text{ max}}$			20		20	µA	
$I_{OZL}$	Off-state output current, low-level voltage applied				-20		-20		
$I_i$	Input current at maximum input voltage	$V_{CC} = \text{MAX},$ $V_i = 7V$			0.1		0.1	µA	
$I_{iH}$	High-level input current, any input	$V_{CC} = \text{MAX},$ $V_i = 2.7V$			20		20	µA	
$I_{iL}$	Low-level input current	$V_{CC} = \text{MAX},$ $V_i = 0.4V$			-0.2		-0.2	µA	
$I_{OS}$	Short-circuit output current†	$V_{CC} = \text{MAX}$	-40		-225		-40	-225	mA
$I_{CC}$	Supply current	Outputs high	$V_{CC} = \text{MAX}$	All	17	27	17	27	µA
		Outputs low		'LS240	28	44	28	44	
		All outputs disabled		'LS241, 'LS244	27	46	27	46	
				'LS240	29	50	29	50	
				'LS241, 'LS244	32	54	32	54	

† For conditions see page MIN A3, Min the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V = 5V, T_A = 25^\circ C$ .

\* Test more than one output should be limited at a time, duration of the short-circuit should not exceed 100ms.

switching characteristics,  $V_{CC} = 5V, T_A = 25^\circ C$

PARAMETER	TEST CONDITIONS	'LS240			'LS241, 'LS244			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}$	Propagation delay time, low-to-high-level output		9	14		12	18	ns
$t_{PHL}$	Propagation delay time, high-to-low-level output		17	18		12	18	ns
$t_{PZL}$	Output enable time to low level		20	30		20	30	ns
$t_{PZH}$	Output enable time to high level		15	23		15	23	ns
$t_{PLZ}$	Output disable time from low level		15	25		15	25	ns
$t_{PHZ}$	Output disable time from high level		10	18		10	18	ns

NOTE 2: Load circuit and driver waveforms shown on page 3-11.

## Lampiran 4

### LISTING PROGRAM

```

*****PROTOTYPE FUNGSI***** /
/*siapkan menu*/
void layar_utama(void);
void layar_menu(void);
int menu(int);
void sorot(char *awal, char *item, char *ket,
           int pos_y,unsigned char status);
/*-----*/
/*Fungsi Untuk kirim/terima data melalui Port Printer*/
unsigned *autoinout(unsigned *datinout);
/*-----*/

void addlib(void); /*Fungsi isi pustaka IC*/
void viewlib(void);/*Fungsi lihat pustaka IC*/
void ICTest (unsigned *datinout);/*Fungsi uji IC*/
void test_view(char nama[]); /*Perlihatkan hasil uji*/
/*-----*/

/*Fungsi-fungsi untuk buat tabel kebenaran*/
void truthtable (unsigned *datinout);
void truthlayer(void);
/*-----*/

/*Fungsi untuk membuat diagram pewaktuan*/
void manual(void);
unsigned *maninout(unsigned *input,unsigned *datinout);
void tdscreen(void);
void win1(void);
void win2(void);
void timediag(unsigned char namaSyl[17][5],
              unsigned int matrix[17][17]);
void graf(int vari);
/*-----*/

/*Fungsi-fungsi tambahan/pembantu*/
void simpan (void);/**fungsi menyimpan gambar**/
void bacakey(void);/**baca tombol**/
void dir(void);/**melihat file**/
void ambil(void);/*ambil gambar dari file*/
int ambilPesan(void); /**proses jawaban**/
void cursor (int hidup);/**sembunyi/tidak cursor**/
void keterangan(char comment[]);/**buat keterangan**/
void info (char *info1,char *info2,char *info3,

```

```

        char *info4, char *info5, char *info6);
void salah(int x, int y); /*respon thd kesalahan*/
int kban (char *pesan1, char *pesan2,
        char *pesan3, int jenis); /*kotak tanya-jawab*/
void kotak(char garis, int xup, int yup,
        int xdown, int ydown); /*buat kotak*/
/*-----*/

/**DAFTAR FILE HEADER**/
#include <dos.h>
#include <stdio.h>
#include <conio.h>
#include <math.h>

/**DAFTAR DEFINE**/
#define SINGLE 0x00
#define DOUBLE 0x01
#define PORTD 0x378
#define PORTI 0x379
#define PORTK 0x37A
#define F7 (256+65)
#define F8 (256+66)
#define F9 (256+67)
#define F10 (256+68)

/*****DEKLARASI GLOBAL*****/
struct ic_test
{
    char nic[6];
    unsigned mas;
    unsigned kel;
};

typedef struct ic_test sic;

sic uji, disk_ic;
char layar[80*25*2];
char pesan[6];
int eskep=0;

struct semua
{
    int jml_uji;
    int bit_in;
    int bit_out;
} all;

```

```

/*****PROGRAM UTAMA*****/

```

```

main()
{
  char pilih;
  char koment[]={""Tekan Enter untuk melihat menu"};
  int respon=0;
  unsigned *datinout=NULL;
  clrscr();
  layar_utama();/*panggil layar buka*/
  getch();
  do{
    cursor (0);
    layar_menu();
    do{
      /*Label untuk layar kosong*/
      keterangan(koment);
      pilih=getch();
    }while (pilih!=13);

    respon=menu(respon); /*panggil rutin pilih menu*/

    switch(respon)
    {
      case 0: datinout=(unsigned*)(autoinout(datinout));break;
      case 1: if (datinout==NULL)
        {
          sound(500);delay(500);nosound();
          info ("Lakukan Dulu", "Proses Input/Output",
            "Pada Menu Auto In/Out",
            "Kembalilah Setelah Selesai", "see you....",
            "");sleep(4);
          break;}
          ICtest (datinout);break;
      case 2: viewlib();break;
      case 3: addlib();break;
      case 4: if (datinout==NULL)
        {
          sound(500);delay(500);nosound();
          info ("Lakukan Dulu", "Proses Input/Output",
            "Pada Menu Auto In/Out",
            "Kembalilah Setelah Selesai",
            "See you....","");sleep(4);
          break;}
          truthable(datinout);break;
      case 5: manual();break;
      case 6: {textattr(BLACK+LIGHTGRAY);clrscr();
        system("");break;}
      case 7: {eskep=0;ambil();break;}
      case 8:
        {
          respon=7+kbam(" Ingin Keluar dari",
            "", "Sistem Penguji Rangkaian Logika?(Y/T)",0);
          window(1,1,80,25);

```

```

        textbackground(BLACK);textcolor(LIGHTGRAY);
        clrscr();break;
    }
    default:break;
}
}while(respon!=8);
}
/*-----*/

```

**/\*\*RUTIN YANG BERHUBUNGAN DENGAN \*\*\*/  
**/\*\*PEMBUATAN DAN PEMILIHAN MEN\*\*\*/****

```

void layar_utama(void)
{
    char *judul1[]={"SISTEM PENGUJI RANGKAIAN LOGIKA"};
    char *judul2[]={"DENGAN MENGGUNAKAN PC XT/AT"};
    char *judul3[]={"Designed in Jakarta, 1994"};
    char *judul4[]={"Hit Any Key to Continue..."};
    window(0,0,80,5);
    textbackground(BLUE);
    clrscr();
    textcolor(LIGHTRED);
    gotoxy(floor((80-strlen(*judul1))/2),2);
    cprintf("%s",*judul1);
    gotoxy(floor((80-strlen(*judul2))/2),3);
    cprintf("%s",*judul2);
    gotoxy(floor((80-strlen(*judul3))/2),4);
    cprintf("%s",*judul3);
    textcolor (CYAN);
    textbackground(MAGENTA);
    kotak (SINGLE,1,1,80,5);
    window(1,6,80,25);
    textbackground(WHITE);
    clrscr();

    info ("TUGAS AKHIR","Oleh:",
        "Darmananda Djaie",
        "NIM : 89210001",
        "Pembimbing:","Dr. Henry Kartarahardja, Dipl.Inf");
    window (1,1,80,25);
    textbackground (LIGHTGRAY);textcolor (BLACK);
    gotoxy(floor((80-strlen(*judul4))/2),22);
    cprintf("%s",*judul4);
}

void layar_menu(void)
{
    window(1,1,80,25);
    textbackground(BLUE);
    clrscr();
    textcolor(WHITE);
    kotak(DOUBLE,1,2,80,24);
}

```

```

window(1,1,80,1);
textbackground(LIGHTGRAY);
clrscr();
textcolor(RED);
gotoxy(1,1);cputs("PENGUJI RANGKAIAN LOGIKA");
gotoxy(70,1);cputs("May 1994");
gettext(1,1,80,25,layar);
}

```

```

int menu(int pos)

```

```

{
int x;
char tombol;
unsigned char loop=1;
int max_item=9;
char item[10][21]={"uto In/Out      ",
                  "ji_Rangk. Logika",
                  "ihat Pustaka RL ",
                  "si Pustaka RL   ",
                  "ruth Table     ",
                  "iagram Pewaktuan",
                  "S shell        ",
                  "uat Gambar     ",
                  "eluar Program  "};

int pos_y[]={1,2,3,4,5,6,7,8,9};
char awal[][2]={"A","U","L","I","T","D","O","M","K"};
char ket[][70]={"Input/Output melalui Printer Adapter ",
               "Mengetes baik/buruknya IC",
               "Melihat daftar IC yang dapat dites",
               "Menambah library IC yang dapat dites",
               "Melihat truthtabel dari komponen/rangkaian digital",
               "Memberikan stimulus secara manual serta membuat diagram pewaktu",
               "Ke sistem (dos prompt) tanpa keluar dari program",
               "Ambil Gambar dari file di disk dan tampilkan ke layar",
               "Keluar Program"};

```

```

/*Menbuat kotak Menu*/
window(2,1,23,13);textcolor(RED);
kotak(SINGLE,1,2,21,12);

```

```

/*Menuliskan menu*/
window(3,3,21,11);clrscr();
for (x=0;x<max_item;++x)
{
if(x==pos)
{ textattr(15);gotoxy(2,pos_y[x]);
  cprintf(awal[x]);gotoxy(3,pos_y[x]);cprintf(item[x]);}
else
{textattr(112);textcolor(RED);gotoxy(2,pos_y[x]);
  cprintf(awal[x]);gotoxy(3,pos_y[x]);}
}

```



```

    textcolor(BLACK);cprintf(item[x]); }
}
keterangan(ket[0]);
window(3,3,17,11);
do
{
    tombol=toupper(getch());
    switch (tombol)
    {
        case 13:          /*enter*/
            loop=0;break;
        case 72:          /*panah atas*/
            sorot(awal[pos],item[pos],ket[pos],pos_y[pos],0);
            (pos==0)? pos=max_item-1: --pos;;
            sorot(awal[pos],item[pos],ket[pos],pos_y[pos],1);
            break;
        case 80:          /*panah bawah*/
            sorot(awal[pos],item[pos],ket[pos],pos_y[pos],0);
            (pos==max_item-1)? pos=0: ++pos;;
            sorot(awal[pos],item[pos],ket[pos],pos_y[pos],1);
            break;
        case 'A': pos=0; loop=0;break;
        case 'U': pos=1; loop=0;break;
        case 'L': pos=2; loop=0;break;
        case 'I': pos=3; loop=0;break;
        case 'T': pos=4; loop=0;break;
        case 'D': pos=5; loop=0;break;
        case 'O': pos=6; loop=0;break;
        case 'M': pos=7; loop=0;break;
        case 'K': pos=8; loop=0;break;
        default:break;
    }
}while (loop);
window(1,1,80,25);
puttext(1,1,80,25,layar);
return(pos);
}

void sorot(char *awal,char *item,char *ket,
            int pos_y,unsigned char status)
{
    window(3,3,21,11);
    if(status==1)
    { textattr(15);gotoxy(2,pos_y);
      cprintf(awal);gotoxy(3,pos_y);cprintf(item);
      keterangan(ket);}
    else
    {textattr(112);textcolor(RED);gotoxy(2,pos_y);
      cprintf(awal);gotoxy(3,pos_y);textcolor(BLACK);
      cprintf(item);}
}
/*-----*/

```

```

/*****SUB-ROUTINE PENAMBAHAN L I B RA R**** */

```

```

void addlib(void)

```

```

{
FILE *p_data;
char jawab;
if((p_data=fopen("dataic.dat","ab"))==NULL)
{printf("data tidak bisa dibuat");exit(1);}
cursor (1);
window(3,3,32,13);
textattr(63);
kotak(DOUBLE,1,1,29,10);
window(4,4,30,11);
eskep=0;
do
{
clrscr();
gotoxy(1,1);
cputs("Nama IC : "); /**input field nama IC**/
ambilPesan();if (eskep==1) break;
strcpy(disk_ic.nic,pesan);
gotoxy(1,2);
cputs("Masukan : "); /**input field masukan**/
ambilPesan();if (eskep==1) break;
disk_ic.mas=atoi(pesan);
gotoxy(1,3);
cputs("Keluaran: "); /**input field keluaran**/
ambilPesan();if (eskep==1) break;
disk_ic.kel=atoi(pesan);
fwrite(&disk_ic,sizeof(disk_ic),1,p_data);
gotoxy (1,5);
cputs("\nIngin mengulang lagi?(Y/T)");jawab=getche();
}while (jawab=='Y' || jawab=='y');
fclose(p_data);
}
/*-----*/

```

```

/*****F U N G S I MEMBACA PUSTAKA RANGK.LOGIKA**** */

```

```

void viewlib(void)

```

```

{
FILE *p_data;
char tekan;
int y=2;char page;

window(3,3,32,25);textcolor(MAGENTA);
kotak(DOUBLE,1,1,28,21);
textbackground(LIGHTGRAY);textcolor(BLUE);
window(4,4,29,22);
clrscr();
gotoxy(1,1);
textcolor (RED);
cputs("NAMA IC INPUT OUTPUT");

```

```

if((p_data=fopen("dataic.dat","rb"))==NULL)
{printf("data tidak bisa dibaca");exit(1);}
while(fread(&disk_ic,sizeof(disk_ic),1,p_data)==1)
{
    textcolor(YELLOW);
    gotoxy(1,y);cputs(disk_ic.nic);
    gotoxy(13,y);cprintf("%d",disk_ic.mas);
    gotoxy(23,y);cprintf("%d",disk_ic.kel); y++;
    if(y==17){bacakey();window(4,5,29,22);clrscr();y=2;};
}
fclose(p_data);
bacakey();
}
/*-----*/

```

/\*\*\*\*\*\*FUNGSI IN/OUT OTOMATIS DARI PRINTER AD AP T B\*\*\*/

```

unsigned *autoinout (unsigned *datinout)
{
    register int i;unsigned jml_uji=1;
    int OK,isolir=0xFFFF,bit_in=0,bit_out;
    char ans;
    unsigned int kar;
    unsigned char nibble0,nibble1,byte0,byte1;
    union
    {
        unsigned word;
        char byte[2];
    }data;
    eskep=0;
    keterangan("EDITOR INPUT/OUTPUT OTOMATIS");
    while (eskep==0)
    {
        bit_in=kban("Masukkan Banyaknya Bit Input",
                    "Maksimal 8 bit",
                    "Jumlah Input : ",8);
        if (eskep==1) break;

        bit_out=kban("Masukkan Banyaknya Bit Output",
                    "Maksimum 8 bit",
                    "Jumlah Output: ",8);
        if (eskep==1) break;

        isolir<<=bit_out;isolir=~isolir;

        jml_uji<<=bit_in;
        all.jml_uji=jml_uji;
        all.bit_in=bit_in;
        all.bit_out=bit_out;

        free (datinout);
        if ((datinout=(unsigned *) malloc

```

```

    (all.jml_uji*sizeof(int))==NULL)
{
    info("PERINGATAN:", "", ""
    "MEMORI TIDAK CUKUP!!", "Cobalah Kurangi Jumlah Input",
    "", "Selamat Mencoba!"); getch(); exit (1);}

cursor (1);
OK=kbam("Pasang Rangkaian/IC yang akan diuji",
    "ke Rangkaian Kontrol",
    "Semuanya sudah siap(Y/T)?", 0);
if (OK!=1) return(NULL);

for (i=0;i<jml_uji;i++)
{
    data.word=i;

    outportb(PORTK,0x01); /*siap kirim LSB*/
    outportb(PORTD,data.byte[0]);/*Letakkan 8 bit bawah*/

    outportb(PORTK,0x03); /*siap kirim HSB*/
    outportb(PORTD,data.byte[1]); /*8 bit berikut*/

    outportb(PORTK,0x0F); /*siap terima 4 bit pertama*/
    nibble0=inportb(PORTI);
    nibble0>>=3;
    nibble0&=0x0F;

    outportb(PORTK,0x0E); /*siap terima 4 bit ke dua*/
    nibble1=inportb(PORTI);
    nibble1<<=1;
    nibble1&=0xF0;

    byte0=nibble0;nibble1;

    outportb(PORTK,0x0D); /*siap terima 4 bit ke 3*/
    nibble0=inportb(PORTI);
    nibble0>>=3;
    nibble0&=0x0F;

    outportb(PORTK,0x0C); /*siap terima 4 bit ke 4*/
    nibble1=inportb(PORTI);
    nibble1<<=1;nibble1&=0xF0;

    bytel=nibble0;nibble1;

    data.byte[0]=byte0;
    data.byte[1]=bytel;
    data.word&=isolir;
    *(datinout+i)=data.word;
}
return (datinout);
}
}

```

```

/*****SUB-ROUTINE PENGETESAN IC*****/
void ICtest (unsigned *datinout)
{
FILE *p_data;
int buruk;
long int offset_byte;
register int i;int sama,banding,hasil_baca=1,rec=1,
int mas=0,baris=1;
char nama_ic[6];
cursor (1);
if ((p_data=fopen("c:\\tc\\dataic.dat","rb+"))==NULL)
{ printf("\n File tidak bisa dibuka");exit (1);}
window(3,4,75,21);textbackground(BLUE);textcolor(YELLOW);
clrscr(); gotoxy(4,2);cputs("Nama IC: ");
ambilPesan};
strcpy(nama_ic,pesan);
cursor (0);
test_view(nama_ic);
while (mas<all.jml_uji)
{
offset_byte=(rec-1)*sizeof(disk_ic);
fseek(p_data,offset_byte,SEEK_SET);
hasil_baca=fread(&disk_ic,sizeof(disk_ic),1,p_data);
if (hasil_baca==0)
{keterangan (" Data Pembanding Tidak Ditemukan!");
getch();exit(1);}
banding=strcmp(nama_ic,disk_ic.nic);
if(banding!=0) {rec+=1;continue;}
else
{
uji.mas=mas;
uji.kel=*(datinout+mas);
if (uji.mas!=disk_ic.mas)
{rec+=1;continue;}
else
{
gotoxy(1,baris);
cprintf("cek %d.",mas+1);
if (uji.kel==disk_ic.kel)
{buruk=0; cprintf("....\xFB");}
else {
buruk=1;
sound(100);delay(1000);nosound();
textcolor (RED);cprintf("....x");
}
delay(500);
mas+=1;
}
}
rec+=1;baris++;if (baris==17) baris=1;
}
fclose(p_data);
if (buruk==0)

```

```

keterangan("Rangkaian yang diuji BERFUNGSI
dengan baik");
else
    keterangan("Rangkaian yang diuji TIDAK BERFUNGSI
                dengan baik"); getch();}
void test_view(char nama[])
{
    window (4,3,22,3);textbackground (RED);textcolor (WHITE);
    clrscr(); cputs("Pengujian IC: ");cputs(nama);
    window(4,4,23,23);textattr(63);
    kotak(SINGLE,1,1,19,20);window(5,5,21,22);clrscr();
}
/*-----*/

/*****MEMBUAT TRUTHTABLE*****/

void truthtable(unsigned *datinout)
{
    int pos_x,pos_y=1,kolom=23,x=0,y,data[16],isolir;
    int bit[256][16];
    unsigned int kar;
    truthlayer{};
    eskep=0;

    while(eskep==0){
        for (x=0;x<all.jml_uji;x++) /*jumlah baris tabel*/
        {
            isolir=1;
            /*cetak 1 data input bit perbit*/

            if (x>0 && x%15==0)
                {bacakey();window(16,7,40,22);
                textbackground(CYAN);textcolor(WHITE);
                clrscr();window(43,7,65,22);clrscr();
                pos_y=1;}
            window(16,7,40,22);/**jendela data biner input**/
            for (y=0;y<all.bit_in;y++)
                {
                    data[x]=x;
                    bit[x][y]=data[x]&isolir;
                    bit[x][y]=(bit[x][y]==0)? 0:1;
                    pos_x=kolom-(3*y);
                    gotoxy(pos_x,pos_y);cprintf("%d",bit[x][y]);
                    isolir<<=1;
                }
            /**cetak bit output**/
            window(43,7,65,22);/**jendela data biner output**/
            isolir=1;
            for (y=0;y<all.bit_out;y++)/*Banyaknya bit output*/
                {
                    data[x]=*(datinout+x);
                    bit[x][y]=data[x]&isolir;

```

```

        bit[x][y]=(bit[x][y]==0)? 0:1;
        pos_x=kolom-(3*y);
        gotoxy(pos_x-1,pos_y);cprintf("%d",bit[x][y]);
        isolir<<=1;
    }
    pos_y++;
}
gettext(1,1,80,25,layar);
bacakey();
}

}

/*Buat layar tabel kebenaran*/
void truthlayer(void)
{
    register int i;
    window(14,3,70,23);textattr(79);
    kotak(DOUBLE,1,1,54,21);
    cursor(0);
    gotoxy(floor((70-14-15)/2),1);cputs("Tabel Kebenaran");
    window(15,4,66,22);textbackground(CYAN);textcolor(WHITE);
    clrscr();
    gotoxy(11,1);cputs("INPUT");gotoxy(37,1);cputs("OUTPUT");
    for(i=1;i<9;i++)
    {
        gotoxy(27-(3*i),2);cprintf("X%d",i-1);
        gotoxy(53-(3*i),2);cprintf("Y%d",i-1);
    }

    /**buat tabel**/
    for (i=1;i<20;i++)
    {
        gotoxy(floor((70-16)/2),i);cprintf("\xB3");/*vertikal*/
    }
    for (i=1;i<53;i++){ gotoxy(i,3);cprintf("\xC4");}/*-*/
    gotoxy(floor((69-14)/2),3);cprintf("\xC5");/*+*/
}
/*-----*/

/**SUDJ- ROUTINE BUAT DIAGRAM PEWAKTUAN*****/

/*EDITOR*/
void manual(void)
{
    /*deklarasi/inisialisasi variabel lokal*/
    unsigned *datinout=NULL;
    unsigned char nm_syl[17][5];
    char jns_syl;
    unsigned int in,arrinout[17][17],isolir=1,data[17];

```

```

register int i,j;int byk_syl,bitin,bitout,byk_in,left,
int wordin;
unsigned *pwordin=NULL;
eskep=0;
while(eskep!=1){
    textbackground(BLUE);textcolor (WHITE);clrscr();
    kotak(DOUBLE,1,4,80,25);
    window(1,2,80,2);textbackground(CYAN);clrscr();
    gotoxy(32,1);textcolor (RED);cputs("STIMULUS EDITOR");
    window(2,4,79,22);
    textbackground(BLUE);textcolor (WHITE);

    /*input banyak sinyal uji yang dikehendaki*/
    byksyl:
    gotoxy(1,1);
    cputs("Banyak Sinyal (2-16)      : ");
    salah:
    ambilPesan();if (eskep==1) break;
    byk_syl=atoi(pesan);
    if (byk_syl<=1 || byk_syl>16)
        {
            salah(1,1);goto byksyl;
        }

    /*input banyak sinyal input yang akan dikirim*/
    gotoxy(1,2);
    bitinput:
    cputs("Banyak Sinyal Input (1-8): ");
    ambilPesan();if (eskep==1) break;
    bitin=atoi(pesan);
    if (bitin<=0 || bitin>8 || bitin>=byk_syl)
        {salah(1,2);goto bitinput;}

    /*input jumlah variasi stimulus yang dikirim*/
    bykinp:
    gotoxy(1,3);cputs("Banyak Input (1-30)      : ");
    ambilPesan();
    byk_in=atoi(pesan); if (eskep==1) break;
    all.bit_in=bitin;
    if (byk_in<=0 ||byk_in>30) {salah(1,3);goto bykinp;}

    /*pemberian nilai variabel*/
    bitout=byk_syl-bitin;
    all.bit_out=bitout;
    all.jml_uji=byk_in;

    /*****INPUT EDITOR****/
    /**Array input**/
    /**Baris menunjukkan banyak sinyal input input**/
    /**Kolom menunjukkan word input**/
    for (i=0;i<bitin;i++)
        {
            clrscr();

```



```

gotoxy(1,1);
textcolor(CYAN);cputs("INPUT EDITOR");
textcolor(WHITE);
gotoxy(1,2);cprintf("Nama Sinyal Input ke %d: ",i+1);
ambilPesan(); if (eskep==1) break;
strcpy(nm_syl[i],pesan);
for (j=0;j<byk_in;j++)
{
    /**masuk ke array input**/
    masuk:
    gotoxy(3,3+j);cprintf("Input ke %d (0/1) :";j+1);
    ambilPesan();
    in=atoi(pesan);
    if (in!=0 && in!=1) {salah(3,3+j);goto masuk;}
    arrinout[i][j]=in;    /**array in/out**/
}
}
if (eskep==1) break;

/**OUTPUT EDITOR**/

clrscr();
textcolor(CYAN);cputs("OUTPUT EDITOR");
textcolor(WHITE);

/*inputkan nama sinyal output*/
for (i=bitin;i<byk_syl;i++)
{
    gotoxy(1,(2+i)-bitin);
    cprintf("Nama Sinyal Output ke %d: ",i-bitin+1);
    ambilPesan();if (eskep==1) break;
    strcpy(nm_syl[i],pesan);
}
if (eskep==1) break;

/**konversi bit-bit sinyal ke word input**/
for (i=0;i<byk_in;i++)
{
    wordin=0;
    left=0;
    for (j=bitin-1;j'>=0;j--)
    {
        /*ke bawah --> bit mengecil (mis. bit 4, bit 3 dst)*/
        wordin|=(arrinout[j][i]<<left);
        left++;
    }
    *(pwordin+i)=wordin;
}

free (datinout);/**bebaskan memori heap **/

```

```

/**Pergi ke rutin input/output untuk input manual**/
datinout= (unsigned*) (maninout(pwordin,datinout));

/**proses hasil rutin inout**/
if (datinout!=NULL)
{
  /**Konversi Word Output ke karakter biner**/
  /**Masukkan ke array in/out**/
  for (j=0;j<byk_in;j++)
  {
    isolir=1;
    for (i=byk_syl-1;i>=bitin;i--)
    {
      data[j]=*(datinout+j);
      arrinout[i][j]=data[j]&isolir;
      arrinout[i][j]=(arrinout[i][j]==0)? 0:1;
      isolir<<=1;
    }
  }

  tdscreen(); /*Siapkan layar time diagram*/

  /**Rubah Array IN/OUT ke diagram pewaktu**/
  timeddiag(nm_syl,arrinout);
}
else break;
keterangan("");
getttext(1,1,80,25,layar);
bacaakey(); /**Cek tombol tekan**/
}
}

/**Sub-routine untuk input/output manual*****/
unsigned *maninout(unsigned *input,unsigned *datinout)
{
  register int i,j;
  int OK,isolir=0xFFFF,bit_in,bit_out;
  char ans;
  unsigned char nibble0,nibble1,byte0,byte1;
  union
  {
    unsigned word;
    char byte[2];
  }data;

  isolir<<=all.bit_out;isolir=~isolir;
  free (datinout);
  if((datinout=(unsigned*)
      malloc (all.jml_uji*sizeof(int)))==NULL) exit (1);

```

```

clrscr();
OK=kbam("Pasang Rangkaian/IC yang akan diuji",
        "ke Rangkaian Kontrol",
        "Semuanya sudah siap(Y/T)?",0);
if (OK!=1) return(NULL);

for (i=0;i<all.jml_uji;i++)
{
    data.word=input[i];
    outportb(PORTK,0x01);    /*siap kirim LSB*/
    outportb(PORTD,data.byte[0]);/* 8 bit bawah di latch*/
    outportb(PORTK,0x03);    /*siap kirim HSB*/
    outportb(PORTD,data.byte[1]); /*8 bit berikut*/
    outportb(PORTK,0x0F);    /*siap terima 4 bit pertama*/
    nibble0=inportb(PORTI);
    nibble0>>=3;
    nibble0&=0x0F;
    outportb(PORTK,0x0E);    /*siap terima 4 bit kedua*/
    nibble1=inportb(PORTI);
    nibble1<<=1;
    nibble1&=0xF0;
    byte0=nibble0;nibble1;
    outportb(PORTK,0x0D);    /*siap terima 4 bit ketiga*/
    nibble0=inportb(PORTI);
    nibble0>>=3;
    nibble0&=0x0F;
    outportb(PORTK,0x0C);    /*siap terima 4 bit terakhir*/
    nibble1=inportb(PORTI);
    nibble1<<=1;nibble1&=0xF0;
    byte1=nibble0;nibble1;
    data.byte[0]=byte0;
    data.byte[1]=byte1;
    data.word&=isolir;
    *(datinout+i)=data.word;
}
return (datinout);
}

void tdscreen(void)
{
    register int i;
    window(1,1,80,1);textattr(63);clrscr();
    gotoxy(22,1);cputs("DIAGRAM PEWAKTUAN HASIL PENGUJIAN");
    window(1,2,80,24);textbackground(RED);textcolor(WHITE);
    clrscr();
    kotak(SINGLE,1,1,79,23);
    /*cetak garis batas win1 dan win2*/
    gotoxy(20,1);
    cprintf("\xC2"); /*cetak B */
    for (i=2;i<23;i++)
    {
        gotoxy(20,i);
        cprintf("\xC5"); /*cetak E*/
    }
}

```

```

}
gotoxy(20,23);
cprintf("\xC1");/*cetak A */
}

void win1(void)
{
window(2,3,19,23);
}
void win2()
{
window(21,3,78,23);
}

/**Menggambar diagram pewaktu**/
void timeddiag(unsigned char namaSyl[17][5],
               unsigned int matrix[17][17])
{
int i;
register int j;
int byk_syl;
int pos_y=0;
byk_syl=all.bit_in+all.bit_out;

/**Cetak Nama Sinyal ke win1**/
for (i=0;i<byk_syl;i++)
{
if (i>0 && i%7==0)
{bacakey();pos_y=0;
win1();
textbackground(RED);textcolor(WHITE);
clrscr();
win2();clrscr();}
win1();
gotoxy(15,(2+3*pos_y));cputs(namaSyl[i]);
win2();
gotoxy(1,(2+3*pos_y));
for (j=0;j<all.jml_uji;j++)
{
if (j==0)
{
if (matrix[i][j]==0) graf(0);
else graf(1);
}
else
{
if (matrix[i][j]==0)
{
if (matrix[i][j]==matrix[i][j-1]) graf(2);
else graf(3);
}
else
{

```

```

        if (matrix[i][j]==matrix[i][j-1]) graf(4);
        else graf(5);
    }
}
    }
    pos_y++;
}
}

```

/\*\*Menggambar logik \*\*/

void graf(int vari)

```

{
register int i;
int posx, posy;
int panjang;
cursor(0);
panjang=floor(58/all.jml_uji);
switch(vari)
{
case 0:          /**Awalnya logik 0**/
{
for (i=1;i<=panjang;i++)
cputs("\xC4"); break;
}
case 1:          /**Awalnya Logik 1**/
{
posx=wherex();posy=wherey();
gotoxy(posx,posy-1);
for (i=1;i<=panjang;i++) cputs("\xC4");
break;
}
case 2:          /**Dari logik 0 ke logik 0**/
{
for(i=1;i<=panjang;i++) cputs("\xC4");
break;
}
case 3:          /**Dari satu ke nol**/
{
cputs("\xBF");
posx=wherex();posy=wherey();
gotoxy(posx-1,posy+1);
cputs("\xC0");
for (i=1;i<=panjang-1;i++) cputs("\xC4");
break;
}
case 4:          /**Bertahan pada logik 1**/
{
for (i=1;i<=panjang;i++) cputs("\xC4");
break;
}
case 5:          /**Dari Logik 0 ke logik 1**/
{
cputs("\xD9");

```

```

    posx=wherex();posy=wherey();
    gotoxy(posx-1,posy-1);cputs("\xDA");
    for (i=1;i<=panjang-1;i++) cputs("\xC4");
    break;
}
default:break;
}
}
/*-----end time diagram-----*/

/*****FUNGSI PENDUKUNG *****/
void salah(int x, int y)
{
    sound(1000);delay(500);nosound();gotoxy(x,y);clreol();
}

void cursor (int hidup)
{
    union REGS inregs,outregs;
    inregs.h.ah=0x01;
    if (hidup==0)
    {
        inregs.h.ch=0x20;
        inregs.h.cl=0x20;
    }
    else{
        inregs.h.ch=0x06;
        inregs.h.cl=0x07;
    }
    int86(0x10,&inregs,&outregs);
}

void info (char *info1,char *info2,char *info3,char *info4,
           char *info5,char *info6)
{
    window(18,9,64,20);
    textbackground (RED);textcolor (WHITE);
    kotak(DOUBLE,1,1,45,11);
    window(18,10,61,18);
    clrscr();
    gotoxy(floor((64-18)-strlen(info1))/2,1);
    printf("%s",info1);
    gotoxy(floor((64-18)-strlen(info2))/2,3);
    printf("%s",info2);
    gotoxy(floor((64-18)-strlen(info3))/2,4);
    printf("%s",info3);
    gotoxy(floor((64-18)-strlen(info4))/2,5);
    printf("%s",info4);
    gotoxy(floor((64-18)-strlen(info5))/2,7);
    printf("%s",info5);
    gotoxy(floor((64-18)-strlen(info6))/2,8);
    printf("%s",info6);
}

```

```

void kotak(char garis,int xup,int yup,
           int xdown, int ydown)
{
    int i;
    char hori,ver,upleft,downleft,upright,downright;

    if (garis==SINGLE)
    {
        hori=0xC4;
        ver=0xB3;
        upleft=0xDA;
        upright=0xBF;
        downleft=0xC0;
        downright=0xD9;
    }
    else
    {
        hori=0xCD;
        ver=0xBA;
        upleft=0xC9;
        upright=0xBB;
        downleft=0xC8;
        downright=0xBC;
    }

    /*garis atas dan bawah*/
    for (i=xup;i<xdown;i++)
    {
        gotoxy(i,yup);
        cprintf("%c",hori);
        gotoxy(i,ydown);
        cprintf("%c",hori);
    }

    /*Garis sudut*/
    gotoxy(xup,yup);
    cprintf("%c",upleft);
    gotoxy(xdown,yup);
    cprintf("%c",upright);
    /*garis samping*/
    for (i=yup+1;i<ydown;i++)
    {
        gotoxy(xup,i); /*samping kiri*/
        cprintf("%c",ver);
        gotoxy(xdown,i); /*samping kanan*/
        cprintf("%c",ver);
    }

    /*garis sudut bawah*/
    gotoxy(xup,ydown);cprintf("%c",downleft);
    gotoxy(xdown,ydown);cprintf("%c",downright);
}

```

```

void simpan (void)
{
    int fgbr;
    char buffer_gbr[16384];
    char nm_file[10];
    char ekstens[5]={" .dar"};
    eskep=0;
    keterangan("");getttext(1,1,80,25,layar);
    while(eskep==0){
        keterangan("Nama File:  ");
        ambilPesan;if (eskep==1) break;
        strcpy(nm_file,pesan);
        strcat(nm_file,ekstens);
        puttext(1,1,80,25,layar);
        movedata(0xB800,0000,FP_SEG(buffer_gbr),
                FP_OFF(buffer_gbr),16384);
        fgbr=_creat(nm_file,0);
        _write(fgbr,buffer_gbr,16384);
        _close(fgbr);eskep=1;
    }
}

int kban (char *pesan1, char *pesan2,
          char *pesan3, int jenis)
{
    int jawab;
    unsigned char ans[6];
    eskep=0;
    do{
        window(18,8,66,16);textbackground(MAGENTA);
        textcolor(WHITE);
        cursor (1);
        kotak(SINGLE,1,1,49,8);
        window(19,9,65,14);textbackground (MAGENTA);
        textcolor (WHITE);clrscr();
        gotoxy(floor(49-strlen(pesan1))/2,2);
        printf("%s",pesan1);
        gotoxy(floor(49-strlen(pesan2))/2,3);
        printf("%s",pesan2);
        gotoxy(floor(49-strlen(pesan3))/2,4);
        printf("%s",pesan3);
        ambilPesan;if (eskep==1) break;
        strcpy(ans,pesan);
        if (j enis!=0)
            {
                jawab=atoi(ans);
                if (jawab<=0||jawab>8)
                    {
                        keterangan("JAWABAN ANDA SALAH. ULANGI!!");
                        sound(3400);delay(1000);nosound();
                    }
            }
        else

```



```

    {
        jawab=(ans[0]=='y' ||ans[0]=='Y')? 1:0;break;
    }

    }while (jawab<=0||jawab>8);
return(jawab);
}

void bacakey(void)
{
    unsigned int kar,i;
    int tombol[5]={1,18,33,51};
    int ketera[5]={3,20,35,54};
    unsigned char pilihan[5][15]={"-Ambil_Gambar",
    "-Lihat_File","-Simpan_Gambar","-Lanjut/Keluar"};
    do
    {
        window(1,25,80,25);
        textbackground(LIGHTGRAY);clrscr();
        for (i=0;i<=3;i++)
        {
            gotoxy(tombol[i],1);textcolor(RED);
            cprintf("F%d",i+7);gotoxy(ketera[i],1);
            textcolor(BLACK);cputs(pilihan[i]);
        }
        kar=getch();
        if (kar==0)
        kar=256+getch();
        switch(kar) /*pilih tombol tekan*/
        {case F9: simpan();break;
        case F8: dir();break;
        case F7: ambil();
        default: break;}
    }while (kar!=F10);eskep=1;
}

void dir(void)
{
    gettext(1,1,80,25,layar);
    window(1,1,80,25);
    textbackground(BLACK);textcolor(LIGHTGRAY);clrscr();
    system("Echo Tekan EXIT bila ingin kembali ke
    Logic Circuit Tester...");
    system("pause");
    system("dir *.dar");
    system("");
    puttext(1,1,80,25,layar);
}

void ambil(void)
{
    unsigned int kar;
    int fgbr;

```

```

char nm_file[10];
char buffer_gbr[16384];
char ekstens[5]={" .dar"};
eskep=0;

do{
    keterangan("Nama File:  ");
    ambilPesan();if (eskep==1) break;
    strcpy(nm_file,pesan);
    strcat(nm_file,ekstens);
    fgbr=_open(nm_file,1);
    _read(fgbr,buffer_gbr,16384);
    _close(fgbr);
    movedata(FP_SEG(buffer_gbr),FP_OFF(buffer_gbr),
        0xB800,0000,16384);
    kar=getch();
}while (kar!=27&&kar!=13);
}

int ambilPesan(void)
{
    char ch;
    int jum=0;
    do
    {
        ch=getch();
        if (ch!=13&&ch!=27)/*not escape and enter*/ ★
        {
            if (ch==8){ /*backspace?*/
                if(jum>0) {
                    putchar(ch);putch('^'),putch(ch);jum=jum-1;}}
            else
                { pesan[jum]=ch;pesan[jum+1]=NULL;jum++;putch(ch);}
        }
        if(ch==27){jum=0;eskep=1;break;}
    }
    while(ch!=13);
}
/***** *****end program***** */

```

## DATA PRIBADI PENULIS

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