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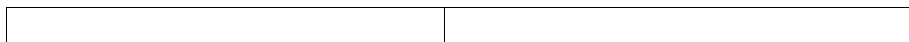
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- 1.2.2 1.2.3;
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1.4

1.4.1

1.4.2

1.4.3

1.4.4

1.4.5

1.4.6

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2

$\tau = RC -$; $U_m -$. $(t_1, \infty):$ $U = U_1 \cdot e^{-\frac{(t-t_1)}{\tau}}$	$\tau = RC -$; $U_m -$. $(t_1, \infty):$ $U = (U_1 - U_m) \cdot e^{-\frac{(t-t_1)}{\tau}}$
---	---

$e = 2,71... .$

RC-	
$RC- :$ $U(t) = \frac{I}{RC} \int (U(t) - U(t)) dt$ $U(t),$	$RC- :$ $U(t) = R \cdot C \frac{d}{dt} (U(t) - U(t))$ $U(t),$

RC-	
$U \ll U$ $\tau \rightarrow \infty$	$U \ll U$ $\tau \rightarrow 0$

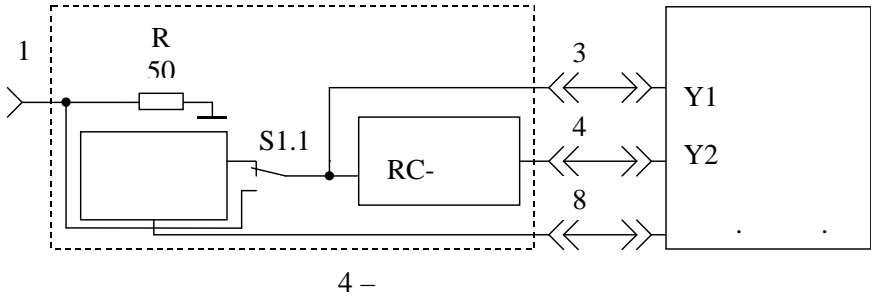
(, , U) .

$\tau .$

RC-	
$;$ $,$	$,$ $,$

2.2

.4



RC-
Electronics Workbench.

2.2.1

: S4.3, S1.3, S1.4- ; S2 S3 -
. 3;

3 -

S2		S3				
		S3.1	S3.2	S3.3	S3.4	S3.5
S2.1, R = 20	± 5%	30	29	28	26	20
S2.2, R = 40	± 5%	27	25	23	19	9
S2.3, R = 60	± 5%	24	22	18	12	4
S2.4, R = 80	± 5%	21	17	13	8	3
S2.5, R = 100	± 5%	16	14	10	6	2
S2.6, R = 120	± 5%	15	11	7	5	1

2.2.2

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3,

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X8.

1

S1.1,
(. 4)

S1.1

2.2.3

2.2.4

RC-

2.2.5

RC-

" / ." " / ."

()

$(U_i, t_i$. 2).

2.2.6

S4.1,

RC-

2.2.4 2.2.

2.2.7

RC-

. 3.

2.2.8

Electronics Workbench
R C.

RC-

2.2.9

Electronics Workbench
R C.

RC-

2.2.10

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2.2.4 – 2.2.6;
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2.2.8 2.2.9;

2.4

2.4.1

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2.4.2

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2.4.3

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2.4.4

RC-

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2.4.5

RC-

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2.4.6

RC-

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2.4.7

RC-

?

2.4.8

?

2.4.9

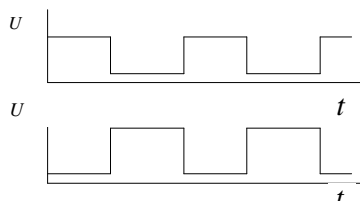
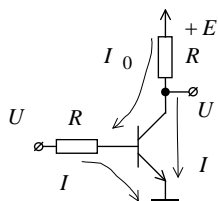
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3

3.1

.5.



5-

$$U_{out} - U_{in} = K \cdot R \cdot \left(\frac{I}{h_{21}} \right)$$

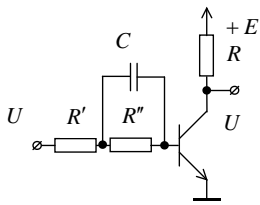
$$U_{out} + I_0 \cdot R \leq 0,4$$

:U

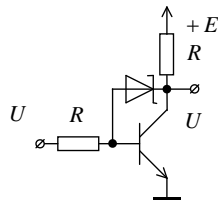
(, "1");

U — , , "0"
 (,);
 U — — ;
 I —
 (R);
 K — (, 1,3...3;
), ,
 h_{21} — ;
 I_0 — .

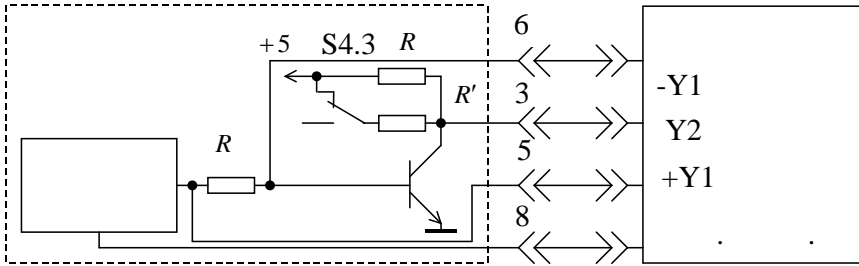
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 (. 6) : ,
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3.2



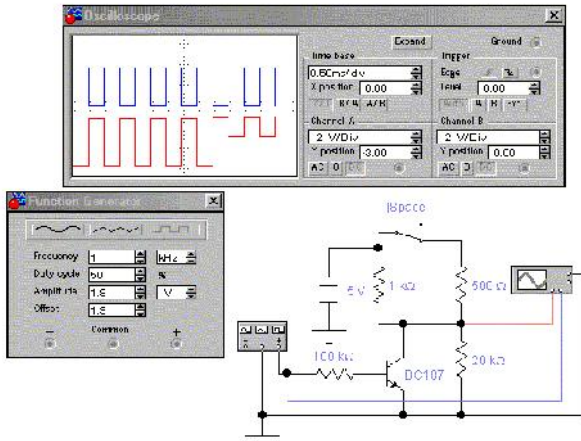
7 -

Electronics Workbench

3.2.1

Electronics Workbench

(. 8) $R = 100$,
 $R = 1$, $R' = 500$, $U = 3,7$, $U_i = 0,1$, $E = 5$,
 R ,
 (. 4).



8 -

4 –

	S3,	S2.1	S2.2	S2.3	S2.4	S2.5	S2.6
		1	2	3	4	5	6
R	,	20	40	60	80	100	120

3.2.2

EWB
S4.3.

U^0

U U^1

3.2.3

EWB
S4.3.

U^0

U U^1

3.2.4

: S4.3, S1.3 ... S1.6, S3.6, S4.1, S4.3 – ;
S2 – , .4;

3.2.5

7.

3.2.6

3.2.7

S1.5 S1.6,

3.2.8

S4.3,

3.2.7.

3.3

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3.2.2, 3.2.3;

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3.2.7 3.2.8;

3.4

- 3.4.1 ?
- 3.4.2 .
- 3.4.3 .
- 3.4.4 ?
- 3.4.5 ?
- 3.4.6 ?
- 3.4.7 ?
- 3.4.8 ?
- 3.4.9 ?

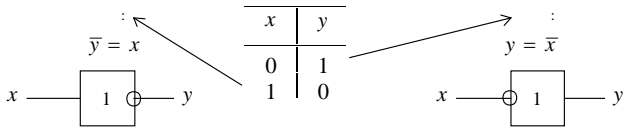
4

4

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4.1

4.1.1



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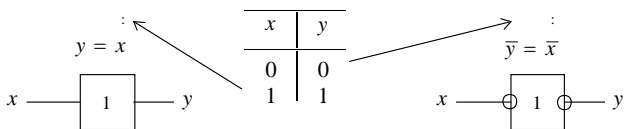
()

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“0”-

“1”-



10-

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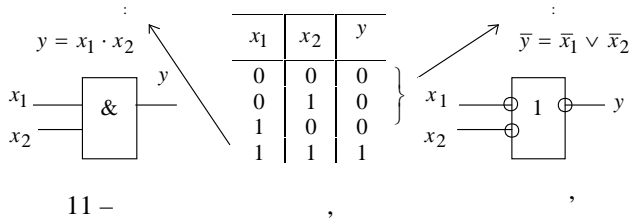
4.1.2

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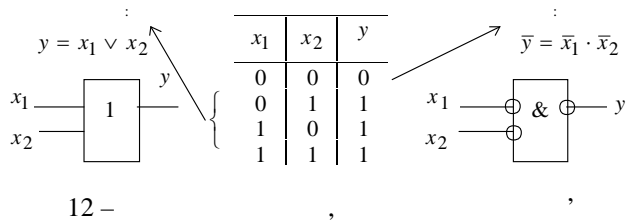
4.1.2.1

« ».



4.1.2.2

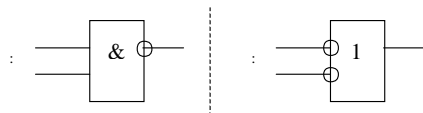
“ ”.



“+”

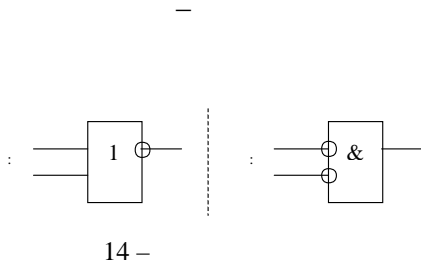
4.1.2.3

2 - .

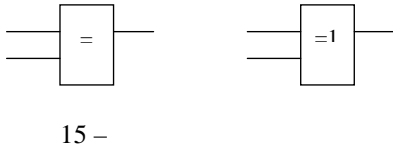


4.1.2.4

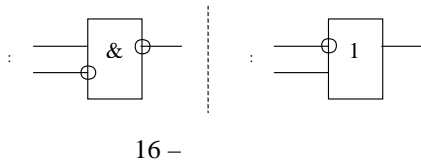
2



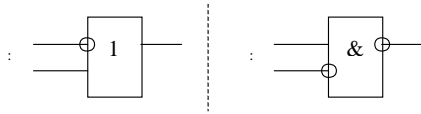
4.1.2.5



4.1.2.6

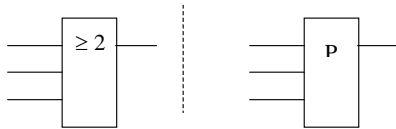


4.1.2.7



17 -

4.1.3



18 -

4.2

4.2.1

Electronics Workbench

4.2.2

Electronics Workbench

4.2.3

(. 5,

Electronics Workbench

4.2.4

5 -

x ₁	x ₂	x ₃	y,																														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
0	0	0	0	0	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	
0	0	1	0	0	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	0	1	1
0	1	0	0	0	1	1	0	1	1	0	1	1	0	0	1	1	0	1	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1
0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	1	
1	0	0	1	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	1	0	1	1	
1	0	1	1	0	0	1	0	1	1	0	0	1	1	0	0	1	0	1	1	0	0	1	1	0	0	1	1	0	1	0	1	0	0
1	1	0	1	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
1	1	1	1	0	1	1	0	0	1	0	0	0	1	0	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0
			+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
(2	-)	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+

: "1" - ; "0"- ; "+" - ; "-" -

4.3

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4.2.1...4.2.3 ;

4.2.3 ;

4.4

4.4.1

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4.4.2)?	,	(,	,	,
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4.4.4)?		(,	,	
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4.4.5)?		(,	,	
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4.4.6)?	,	,	
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4.4.7)?	,	,	
4.4.8			(,	,	
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4.4.10			(,	,	
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5.1.1

$2^n, n = 1, 2, \dots, N.$

5.1.2

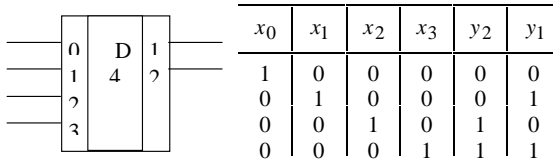
"1",

5.1.3

- X/Y.

5.1.4

(CD)



19 -

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5.1.5

(DC)

5.1.6

(

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0	D 10	0	x_8	x_4	x_2	x_1	y_0	y_1	y_2	y_3	y_4	y_5	y_6	y_7	y_8	y_9
2		1	0	0	0	0	0	1	1	1	1	1	1	1	1	1
4		2	0	0	0	1	1	0	1	1	1	1	1	1	1	1
8		3	0	0	1	0	1	1	0	1	1	1	1	1	1	1
		4	0	0	1	1	1	1	0	1	1	1	1	1	1	1
		5	0	1	0	0	1	1	1	1	0	1	1	1	1	1
		6	0	1	0	1	1	1	1	1	1	0	1	1	1	1
		7	0	1	1	0	1	1	1	1	1	1	0	1	1	1
		8	0	1	1	1	1	1	1	1	1	1	1	0	1	1
		9	1	0	0	0	1	1	1	1	1	1	1	1	0	1
		1	0	0	0	1	1	1	1	1	1	1	1	1	0	

20 -

1533 6 -

5.2

5.2.1

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Electronics Workbench

5.2.2

5.2.1.

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Electronics Workbench

6-

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
· ·	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7
:																														
'	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(- -)	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-
- -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+

:" " - ; " " - ; "+" - ;
 "-" - .

5.3

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5.2.1 5.2.2 , ; .

5.4

- 5.4.1 ?
- 5.4.2 ?
- 5.4.3 ? -
- 5.4.4 ?
- 5.4.5 ?
- 5.4.6 ?
- 5.4.7 ?
- 5.4.8 ?

6

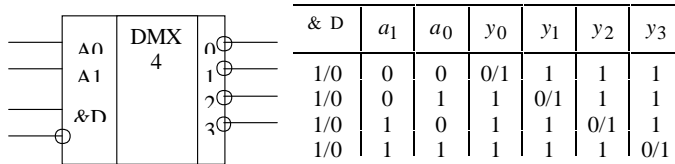
6

6.1

6.1.1

– DMX.

. 21.



21 –

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6.1.2

. 21

$$D_1 \wedge \overline{D_2}.$$

6.1.3

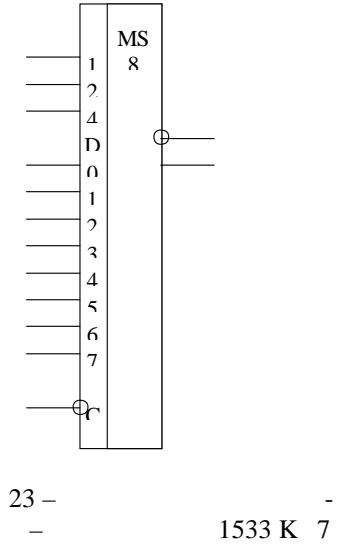
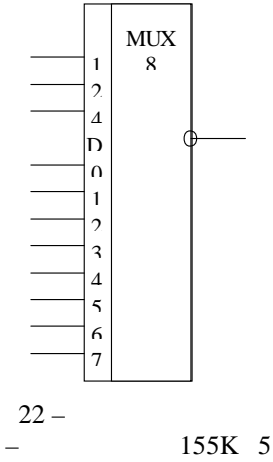
$$: y_i \wedge D.$$

D

6.1.4

. 22.

(. 23).



6.2

6.2.1

.7,

7-

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7
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'	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(-)	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-
'	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+

:" " - ; " " - ; "+" - ;

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-
) . Electronics Workbench ,

6.2.2

(.7)

, , (,
-
) . Electronics Workbench ,

6.3

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6.2.1, 0 , ; .

6.4

- 6.4.1 ?
- 6.4.2 (,)?
- 6.4.3 - (,)?
- 6.4.4 (,)?
- 6.4.5 ?

7

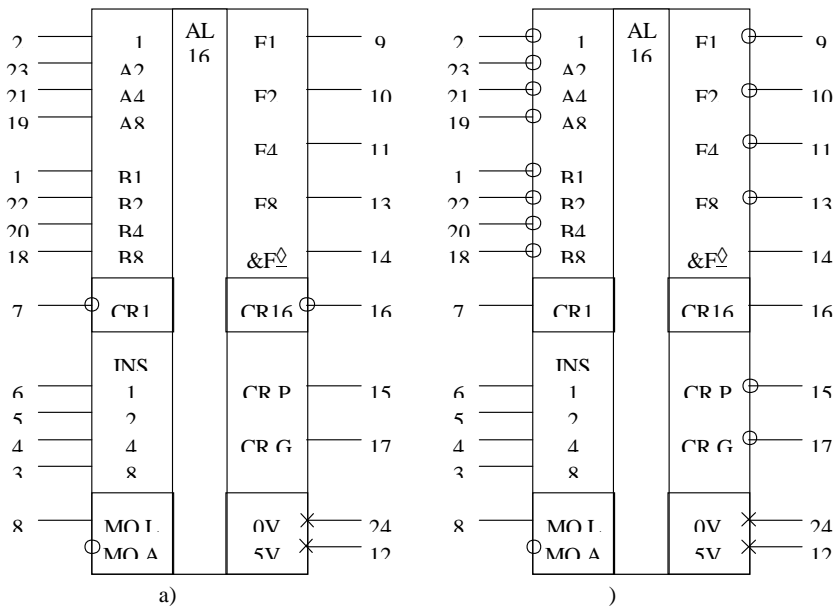
7

555 3.

7.1

7.1.1 555 3 74181 (. . 24)

.8) , 15 ((. . 24))



24 -

555 3

7.1.2

1, 2, 4, 8

() ,

1, 2, 4, 8 -

- INS1, INS2, INS4, INS8,

16

(. . 8).

CR1

0000b	\bar{A}	\bar{A}	$A + \overline{CRI}$	$1111b + A + CRI$
0001b	$A \vee \bar{B}$	$\bar{A} \wedge \bar{B}$	$(A \vee B) + \overline{CRI}$	$1111b + (A \wedge B) + CRI$
0010b	$\bar{A} \wedge B$	$\bar{A} \vee \bar{B}$	$(A \vee \bar{B}) + \overline{CRI}$	$1111b + (A \wedge \bar{B}) + CRI$
0011b	0000b	1111b	$1111b + \overline{CRI}$	$1111b + CRI$
0100b	$\overline{A \wedge B}$	$\bar{A} \vee \bar{B}$	$A + (A \wedge \bar{B}) + \overline{CRI}$	$A + (A \vee \bar{B}) + CRI$
0101b	\bar{B}	\bar{B}	$(A \vee B) + (A \wedge \bar{B}) + \overline{CRI}$	$(A \wedge B) + (A \vee \bar{B}) + CRI$
0110b	$A \oplus B$	$\bar{A} \oplus \bar{B}$	$A + \bar{B} + \overline{CRI}$	$A + \bar{B} + CRI$
0111b	$A \wedge \bar{B}$	$A \vee \bar{B}$	$1111b + (A \wedge \bar{B}) + \overline{CRI}$	$(A \vee \bar{B}) + CRI$
1000b	$\bar{A} \vee \bar{B}$	$\bar{A} \wedge B$	$A + (A \wedge B) + \overline{CRI}$	$A + (A \vee B) + CRI$
1001b	$\overline{A \oplus B}$	$A \oplus B$	$A + B + \overline{CRI}$	$A + B + CRI$
1010b	B	B	$(A \wedge B) + (A \vee \bar{B}) + \overline{CRI}$	$(A \vee B) + (A \wedge \bar{B}) + CRI$
1011b	$A \wedge B$	$A \vee B$	$1111b + (A \wedge B) + \overline{CRI}$	$(A \vee B) + CRI$
1100b	1111b	0000b	$A + A + \overline{CRI}$	$A + A + CRI$
1101b	$A \vee \bar{B}$	$A \wedge \bar{B}$	$A + (A \vee B) + \overline{CRI}$	$A + (A \wedge B) + CRI$
1110b	$A \vee B$	$A \wedge B$	$A + (A \vee \bar{B}) + \overline{CRI}$	$A + (A \wedge \bar{B}) + CRI$
1111b	A	A	$1111b + A + \overline{CRI}$	$A + CRI$

7.1.3

F1, F2, F4, F8 & F4# (, F); CR16

CR.P - , CR.G -

7.2

7.2.1

Workbench.

7.2.2

“CR,P”, “CR,G”, “&F#”, “F6”, “F4”, “F2”, “F1”,
 “1”
 , “CR16” "0" (-
).

.9.

Electronics Workbench

74181,

9 -

555 3

CR1	S1.1	0	1
AB	S2.1	0	1
A4	S2.2	0	1
A2	S2.3	0	1
A1	S2.4	0	1
B8	S3.1	0	1
B4	S3.2	0	1
B2	S3.3	0	1
B1	S3.4	0	1
INS8	S4.1	0	1
INS4	S4.2	0	1
INS2	S4.3	0	1
INS1	S4.4	0	1
MO	S4.5	0 ()	1 ()

7.2.3

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7.4

7.4.1
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7.4.2

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7.4.3

)? (, ,

7.4.4

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7.4.5

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7.4.6

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7.4.7

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8

8

8.1

8.1.1

8.1.2

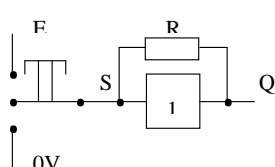
: .

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(. 25) ,

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S	Q _n
1	1()
z	Q _{n-1} ()
0	0()

25 -

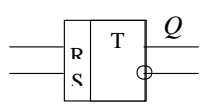
8.1.3

RS -

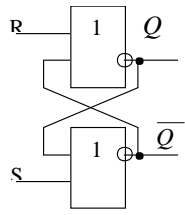
(. 26)

"1"

"1".



R	S	Q _n	Q̄ _n
0	0	Q _{n-1}	Q̄ _{n-1}
0	1	1	0
1	0	0	1
1	1	0	0



26 - RS -

8.1.4

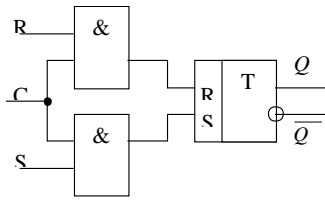
RS -

8.1.5

RS -

(. 27).

"1"-



27 -

RSC -

8.1.6

8.1.7

D -

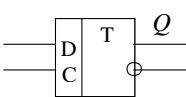
(. 28)

D

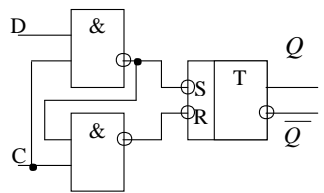
"1"

D-

"0"



C	D	Q_n	\overline{Q}_n
0	0	Q_{n-1}	\overline{Q}_{n-1}
0	1	Q_{n-1}	\overline{Q}_{n-1}
1	0	0	1
1	1	0	0



28 -

D-

8.1.8

1

8.2

12. , ,
 () . Electronics Workbench
 “0” “1”
 12 –

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
R								-	-	-						-	-	-													
S			-			-			-			-			-		-														
C																													-	-	-
D																				-	-	-	-	-	-	-	-	-	-	-	

: R – ; S – ; C –
 ; D – ; “ ” – , “ ” – ,
 “_” – .

8.3

;
 ; 8.2 ; .

8.4

- 8.4.1 (, ,)?
- 8.4.2 RS- (, ,)?
- 8.4.3 RS- (, ,)?
- 8.4.4 RS- ,

- (, ,)?
- 8.4.5 RS - (, ,)?
- 8.4.6 ?
- 8.4.7 D- (, ,)?
- 8.4.8 DC - (, ,)?

9

9

9.1

9.1.1

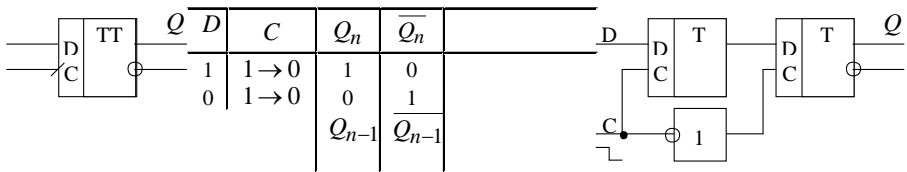
(, ($0 \rightarrow 1$ $1 \rightarrow 0$).

$0 \rightarrow 1$ - , $1 \rightarrow 0$ -

9.1.2

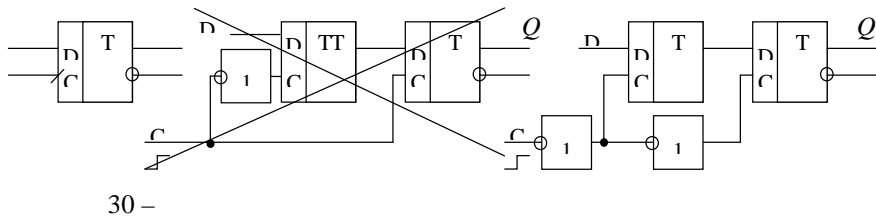
(. 29)

"1" , , . 29, , " , " .



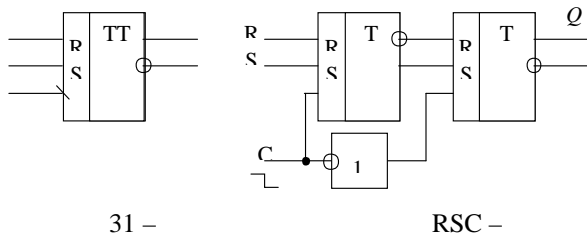
29 -

" (. 30).



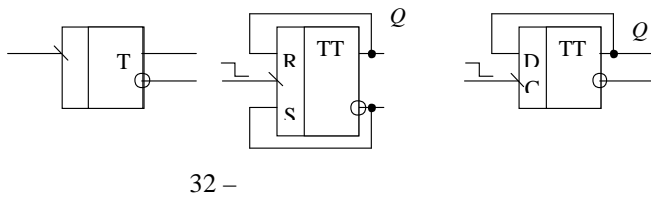
9.1.3 RSC - (. 31)

"1" "0".



9.1.4

(. . 32).



9.1.5

JK -

$0 \rightarrow 1 \quad 1 \rightarrow 0,$; " " - , " " -
 ; D - ; S - ; -
 ; J K - , " " - , " " -
 , " " - , " " - .

9.3

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9.4

9.4.1 (, ,)?

9.4.2 ?

9.4.3 RS- (, ,)?

9.4.4 (, ,)?

9.4.5 JK- (, ,)?

10

10

10.1

10.1.1

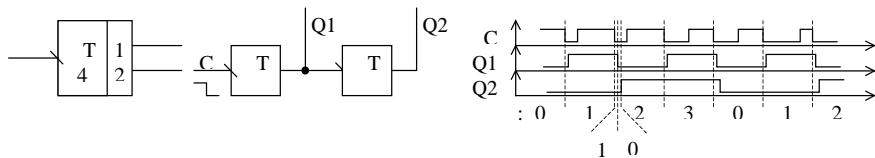
JK,

D -

10.1.2

. 34.

()



34 -

10.1.3

Q_1

Q_2

. 34

("div"),

(. . 34).

10.1.4

"1"

. 34

"0",

"2".

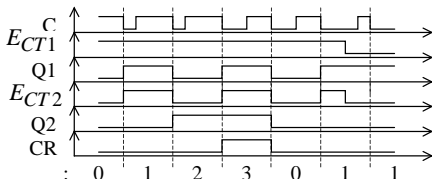
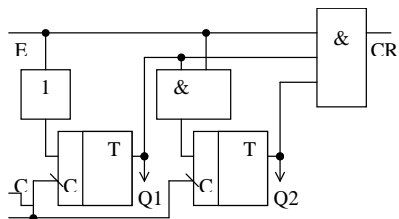
10.1.5

(JK,).

. 35.

"E"

"CR"



35 -

10.1.6

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...→0→1→2→...),

(...→2→1→0→...)

(

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. 36.

10.1.7

1533 5

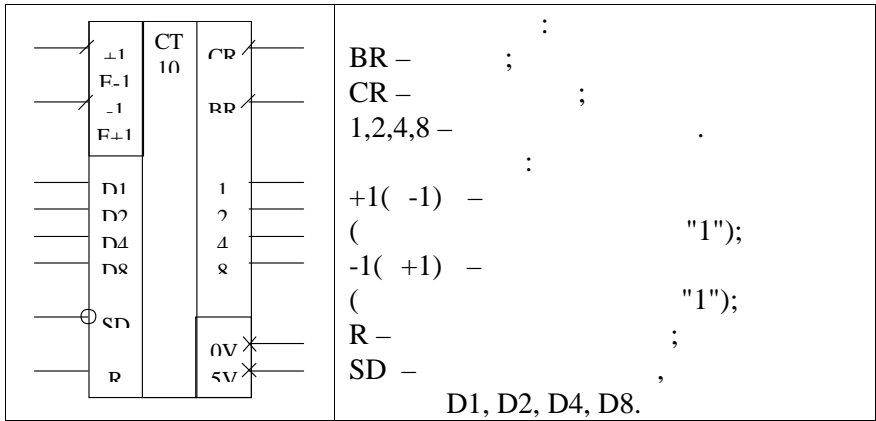
. 37.

"3"

"0", "1" "2".

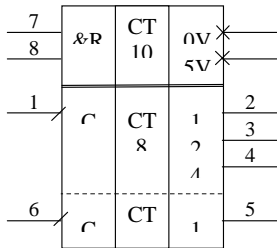
"3"

"0" ,

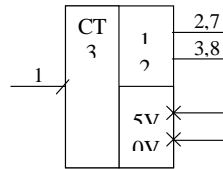


36 -

1533 6



37 -



10.1.8

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JK-

1533 6

. 38.

10.2

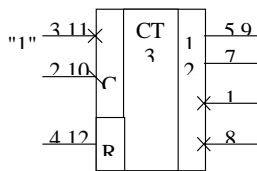
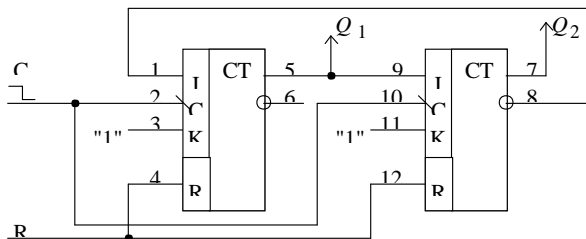
() ,

() ,

. 14.

(),
JK-
Electronics Workbench

“1” “0”



38 -

1533 6

14 -

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
	4	8	16	32	4	8	16	32	4	8	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	3	4	5	6	7	
R																															
(.)																															

: R - ; - ; " " -
 , " " - , " " - , " " - , " " -

10.3

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 10.2,

10.4

10.4.1
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10.4.2
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10.4.3
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10.4.4 (, ,)?

10.4.5 ? ?

10.4.6 ?

10.4.7 ?.

11

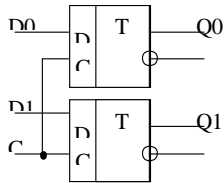
11

11.1

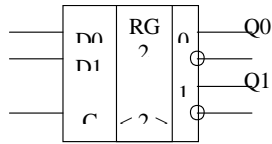
11.1.1

11.1.2

11.1.3



39 -



(1/2 1533 7)

11.1.4

3

("1", "0",
(.40) ,

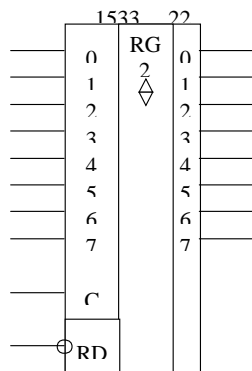
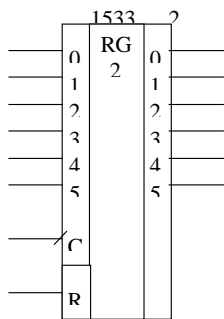
(.40).

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1533 22

"0" , \overline{RD}

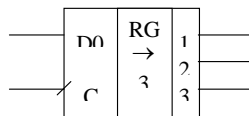
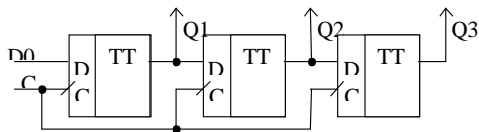
).



40 -

11.1.5

, ' D - (. 41).
 , , ,
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41 -

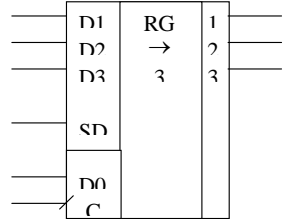
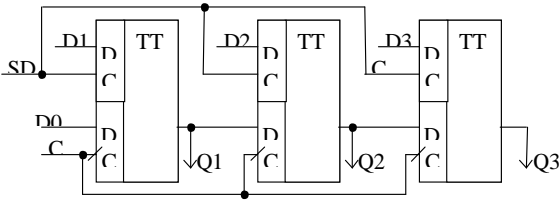
11.1.6

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11.1.7

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(. 42).



42 -

11.1.8

. 42,

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SD

11.2

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15 -

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
R					-				-						-																
	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	4	5	6	7	8	

: R - ; - ; “ ” -

“ ” _ , “ ” _ ; “ ” _ , “ ” _ ,
 “ ” _ .
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 , “1”
 “0” ,

11.3

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 ; 11.2 , ;

11.4

- 11.4.1 ?
- 11.4.2 ?
- 11.4.3 ?

1. . . - ∴ /
2. ,1991.- 326 .
3. / - ∴
,1985.- 289 .
4. ∴ ,1990. - 304 .
5. // . . - ∴ ,1983. -512 .
6. ∴ ,1993.-256 ∴ .
7. . - ∴ ,1987.- 352 .

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