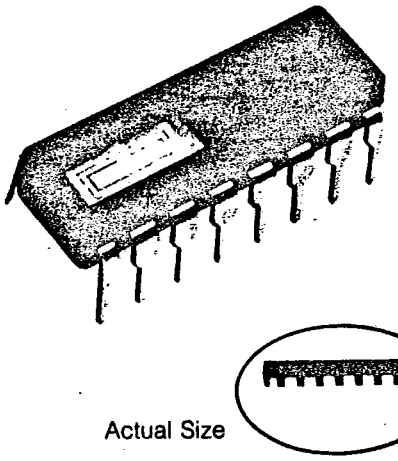
NYMPH

Technical Data

SaRonix

8640 Series
Programmable Clock Pulse Generator



Actual Size

DESCRIPTION The 8640 Series is a hybrid IC composed of C-MOS IC and a crystal oscillator packed in a conventional 16 pin DIP package.

By setting 6 program leads, the 8640 Series can generate 57 kinds of frequencies from the original frequency of the built-in crystal oscillator. This is done through a $1/1 \sim 1/12 \times 10^{-7}$ divider. Crystal oscillator providing original frequency has a wide range from 1MHz to 500KHz.

FEATURES

- Standard DIP IC package contains both IC and crystal oscillator— 16 pin DIP package
- Low power consumption— approximately 1mA
- Variety of presetting steps over wide span— 64 steps (57 of them unique)
- Wide output frequency range— 1MHz ~ 0.0042Hz
- TTL compatible— supply voltage: 5 V, capable of driving standard TTL
- Time accuracy— within 10^{-4} pulse
- Custom frequency is also available

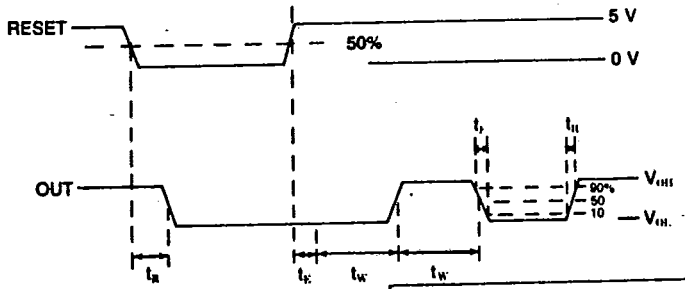
ABSOLUTE MAXIMUM RATINGS

Supply Voltage .....–0.3 to 10 V
Operating Temperature .....–10 to 70°C (14 to 158°F)
Storage Temperature .....–30 to 85°C (–22 to 185°F)

FREQUENCY CHARACTERISTICS

Frequency Tolerance .....Min. –100, max. 100 ppm
Aging .....Min. 5, max. 10 ppm/year
Voltage Coefficient .....Typical 10, max. 40 ppm/V
Turnover Temperature .....Min. 15, typical 30, max. 45°C
Temperature Coefficient .....Typical 0.03, max. 0.05 ppm/°C²

TIMING CHART



ELECTRICAL CHARACTERISTICS

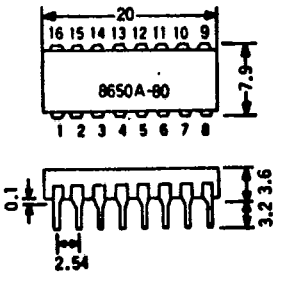
Ta = 25°C (77°F), V_{DD} = 5 V

Symbol	Item	Min.	Typical	Max.	Unit	Note
V_{DD}	Supply voltage	4.0	5.0	6.0	V	
I_{DD}	Supply current	—	0.7	1.0	mA	X'tal:600KHz OUT:60Hz
V_{IL}	Input voltage Logic:0	0.0		1.0	V	
V_{IH}	Input voltage Logic:1	V_{DD} –1.0		V_{DD}	V	
I_{IH}	Input current Reset:Hi			0.5	μA	
I_{IL}	Input current Reset:Lo	–15			μA	
I_{IH}	Input current: CTL_1 ~ CSEL, EXC, TEST:Hi			15	μA	
I_{IL}	Input current: CTL_1 ~ CSEL, EXC, TEST:Lo	–0.5			μA	
I_O	OUT PUT Current	5			mA	
t_R	Reset delay time			1.0	μsec	CL=15pF
t_h	Timing error after reset released			1.5	μsec	CL=15pF
Fin	Operating frequency for external			1	MHz	

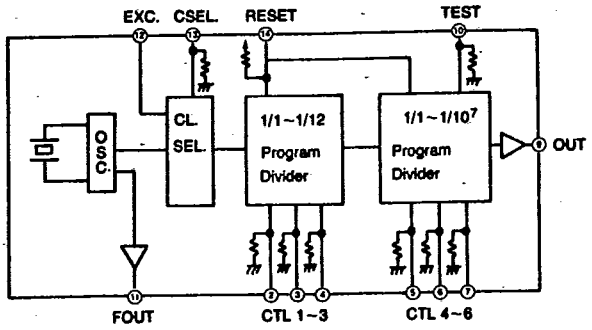
PIN ASSIGNMENT DIAGRAM

1. NC
2. CTL3
3. CTL2
4. CTL1
5. CTL6
6. CTL5
7. CTL4
8. Vss
16. VDD
15. NC
14. RESET
13. NC
12. NC
11. FOUT
10. TEST
9. OUT

NC: No connection



BLOCK DIAGRAM



TERMINAL ASSIGNMENT

- CTL1~CTL6 — Program divide ratio of original frequency. Pull-down register is built-in.

CTL1	CTL2	CTL3	Dividing ratio
0	0	0	1/1
0	0	1	1/10
0	1	0	1/2
0	1	1	1/3
1	0	0	1/4
1	0	1	1/5
1	1	0	1/6
1	1	1	1/12

CTL4	CTL5	CTL6	Dividing ratio
0	0	0	1/1
0	0	1	1/10
0	1	0	$1/10^2$
0	1	1	$1/10^3$
1	0	0	$1/10^4$
1	0	1	$1/10^5$
1	1	0	$1/10^6$
1	1	1	$1/10^7$

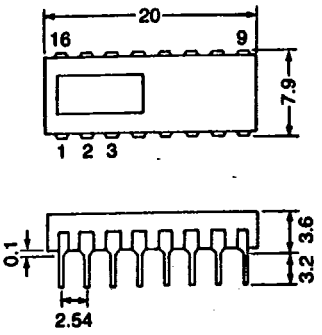
- OUT (Output) — Generate prearranged frequency with rectangular shape of pulse (Duty is 50%).
- TEST — Setting this terminal Hi multiplies prearranged output frequency by one thousand. Exception: in cases where the prearranged divide ratio is less than 1/1000.
- FOUT (Original Frequency Output) — Outputs the original frequency of internal crystal oscillator.
- EXC (External Clock Input) — Input terminal for counting the external clock instead of the frequency of internal crystal oscillator.
- CSEL (Clock Select) — Setting this terminal Hi starts its IC to count the external clock instead of the frequency of internal crystal. Pull-down resistor is built-in.
- RESET — Setting this terminal Lo, all counters are reset and output switches to Lo. Pull-down resistor is built-in.

PIN CONNECTIONS

Unit: mm

1 N.C.	16 V_{DD}
2 CTL3	15 N.C.
3 CTL2	14 RESET
4 CTL1	13 CSEL
5 CTL6	12 EXC
6 CTL5	11 FOUT
7 CTL4	10 TEST
8 V_{SS}	9 OUT

N.C.: not connected to IC chip inside.



OUTPUT FREQUENCY WITH CRYSTAL OSCILLATOR OF 600KHz (8640A)

Unit: Hz

SETTING		CTL4	0	0	0	0	1	1	1	1
		CTL5	0	0	1	1	0	0	1	1
CTL1	CTL2	CTL6 / CTL3	0	1	0	1	0	1	0	1
0	0	0	600K	60K	6 K	600	60	6	0.6	0.06
0	0	1	60K	6K	600	60	6	0.6	0.06	0.006
0	1	0	300K	30K	3 K	300	30	3	0.3	0.03
0	1	1	200K*	20K	2 K	200	20	2	0.2	0.02
1	0	0	150K	15K	1.5K	150	15	1.5	0.15	0.015
1	0	1	120K**	12K	1.2K	120	12	1.2	0.12	0.012
1	1	0	100K	10K	1 K	100	10	1	0.1	0.01
1	1	1	50K	5K	500	50	5	0.5	0.05	0.005

*1 Duty 1/3. **2 Duty 2/5

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OUTPUT FREQUENCIES OF STANDARD MODELS

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1. 8640-A

UNIT: Hz

SETTING										
		CTL4	0	0	0	0	1	1	1	1
		CTL5	0	0	1	1	0	0	1	1
CTL1	CTL2	CTL6 / CTL3	0	1	0	1	0	1	0	1
0	0	0	600K	60K	6K	600	60	6	0.6	0.06
0	0	1	60K	6K	600	60	6	0.6	0.06	0.006
0	1	0	300K	30K	3K	300	30	3	0.3	0.03
0	1	1	* 200K	20K	2K	200	20	2	0.2	0.02
1	0	0	150K	15K	1.5K	150	15	1.5	0.15	0.015
1	0	1	** 120K	12K	1.2K	120	12	1.2	0.12	0.012
1	1	0	100K	10K	1K	100	10	1	0.1	0.01
1	1	1	50K	5K	500	50	5	0.5	0.05	0.005

2. 8640-B

SETTING										
		CTL4	0	0	0	0	1	1	1	1
		CTL5	0	0	1	1	0	0	1	1
CTL1	CTL2	CTL6 / CTL3	0	1	0	1	0	1	0	1
0	0	0	1M	100K	10K	1K	100	10	1	0.1
0	0	1	100K	10K	1K	100	10	1	0.1	0.01
0	1	0	500K	50K	5K	500	50	5	0.5	0.05
0	1	1	* 333.3K	33.3K	3.3K	333.3	33.3	3.3	0.33	0.033
1	0	0	250K	25K	2.5K	250	25	2.5	0.25	0.025
1	0	1	** 200K	20K	2K	200	20	2	0.2	0.02
1	1	0	166.6K	16.6K	1.6K	166.6	16.6	1.66	0.16	0.016
1	1	1	83.3K	8.3K	833.3	83.3	8.3	0.83	0.083	0.0083

* DUTY 1/3 ** DUTY 2/5

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3. 8640-C

UNIT : Hz

SETTING		CTL4	0	0	0	0	1	1	1	1
		CTL5	0	0	1	1	0	0	1	1
CTL1	CTL2	CTL6 \ CTL3	0	1	0	1	0	1	0	1
0	0	0	768K	76.8K	7.68K	768	76.8	7.68	0.768	0.0768
0	0	1	76.8K	7.68K	768	76.8	7.68	0.768	0.0768	0.00768
0	1	0	384K	38.4K	3.84K	384	38.4	3.84	0.384	0.0384
0	1	1	256K *	25.6K	2.56K	256	25.6	2.56	0.256	0.0256
1	0	0	192K	19.2K	1.92K	192	19.2	1.92	0.192	0.0192
1	0	1	153.6K **	15.36K	1.536K	153.6	15.36	1.536	0.1536	0.01536
1	1	0	128K	12.8K	1.28K	128	12.8	1.28	0.128	0.0128
1	1	1	64K	6.4K	640	64	6.4	0.64	0.064	0.0064

* Duty 1/3 ** Duty 2/5

4. 8640-0 ------ DIVIDING IC ONLY

Pin Connections

1.	N.C.	5.	CTL6	12.	EXC	16.	VDD
2.	CTL3	6.	CTL5	11.	N.C.	15.	N.C.
3.	CTL2	7.	CTL4	10.	TEST	14.	RESET
4.	CTL1	8.	Vss	9.	OUT	13.	CSEL

5. 8640-P ------ 50,60Hz ONLY

Pin Connections

1.	N.C	5.	N.C.	12.	N.C.	16.	VDD
2.	N.C.	6.	N.C.	11.	N.C.	15.	N.C.
3.	CTL	7.	N.C.	10.	N.C.	14.	RESET
4.	N.C.	8.	Vss	9.	OUT	13.	N.C.

CTL Terminal 0: 60Hz
CTL Terminal 1: 50Hz

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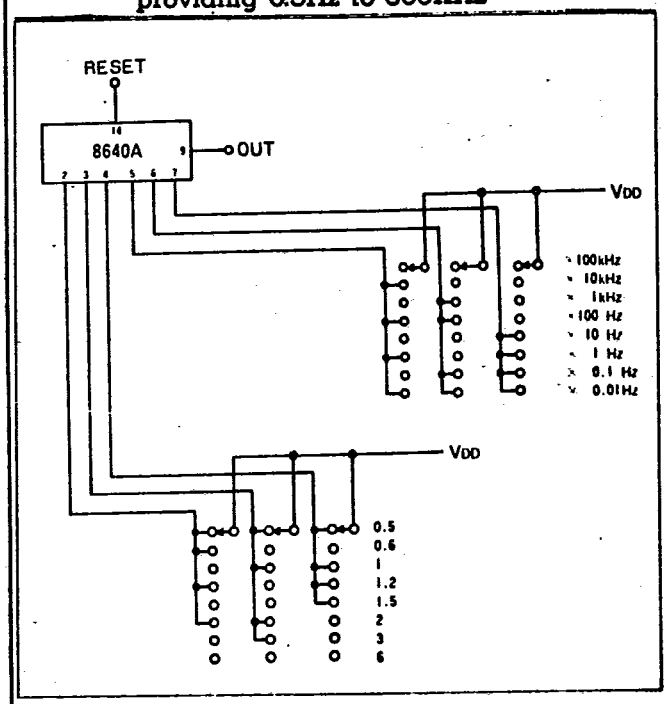
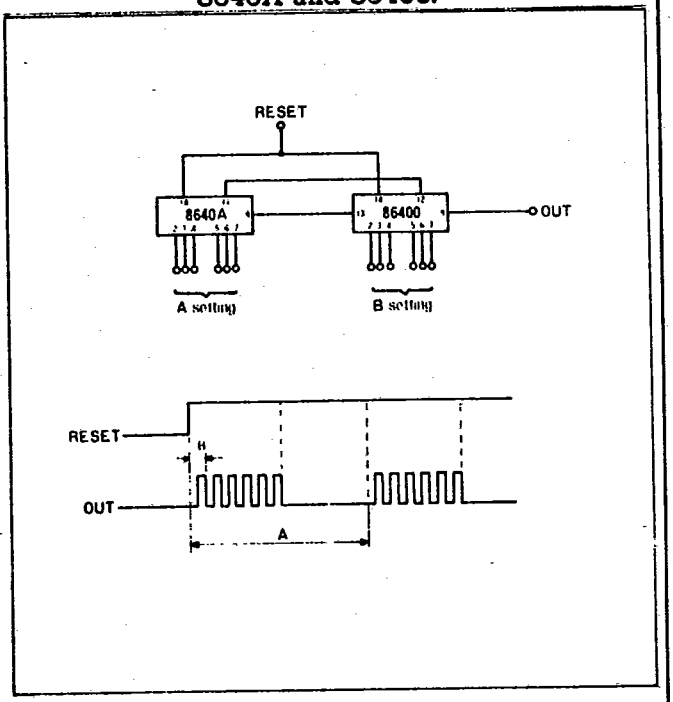
Application 1

Square pulse generator with 8640A providing 0.5Hz to 600KHz



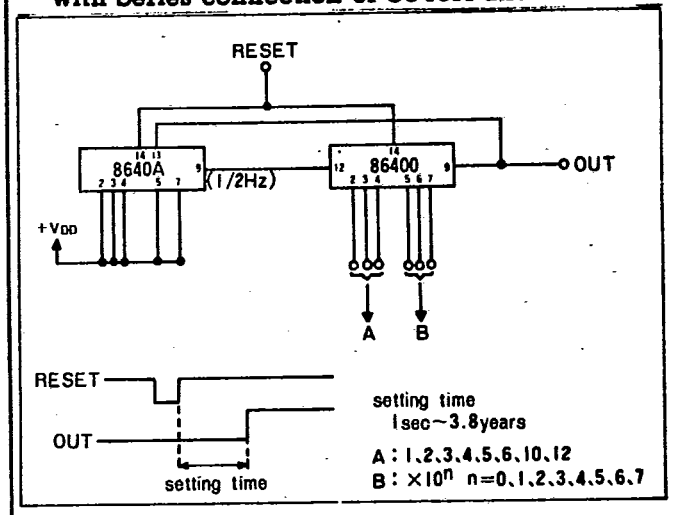
Application 2

Burst signal generator with series connection of 8640A and 86400.



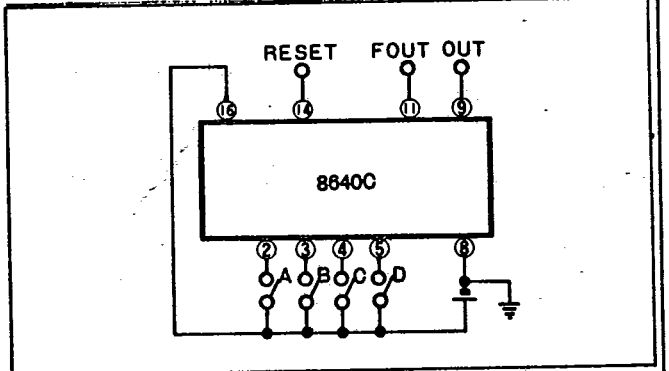
Application 3

Accurate timer of seconds level to years level with Series connection of 8640A and 86400.



Application 4

Baudrate generator with 8640C



Clock frequency(f)

Baudrate (f/16)	19.2KHz 1200bps	38.4 2400	76.8 4800	153.6 9600	768 48000
A	0	0	1	1	0
B	0	1	0	0	0
C	1	0	0	1	0
D	1	1	0	0	0

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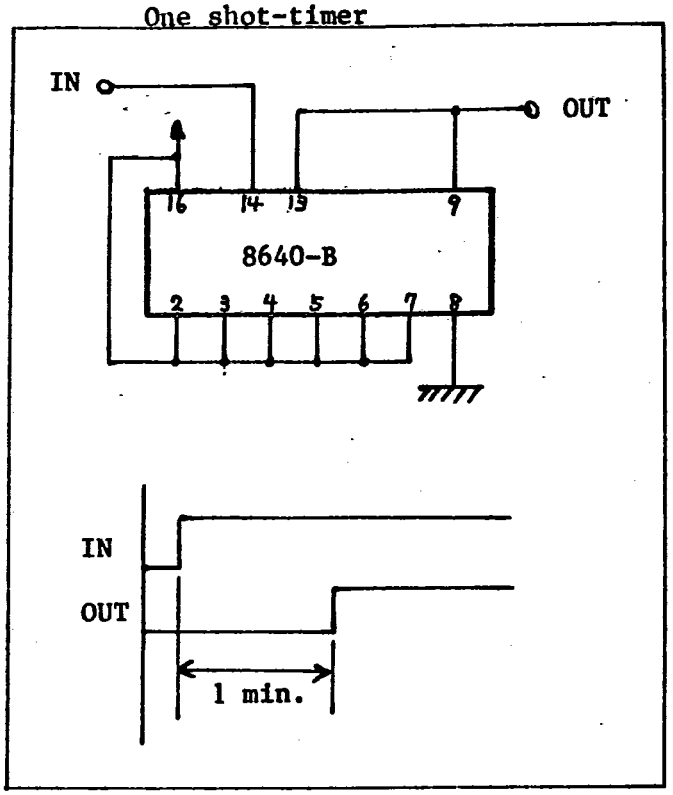
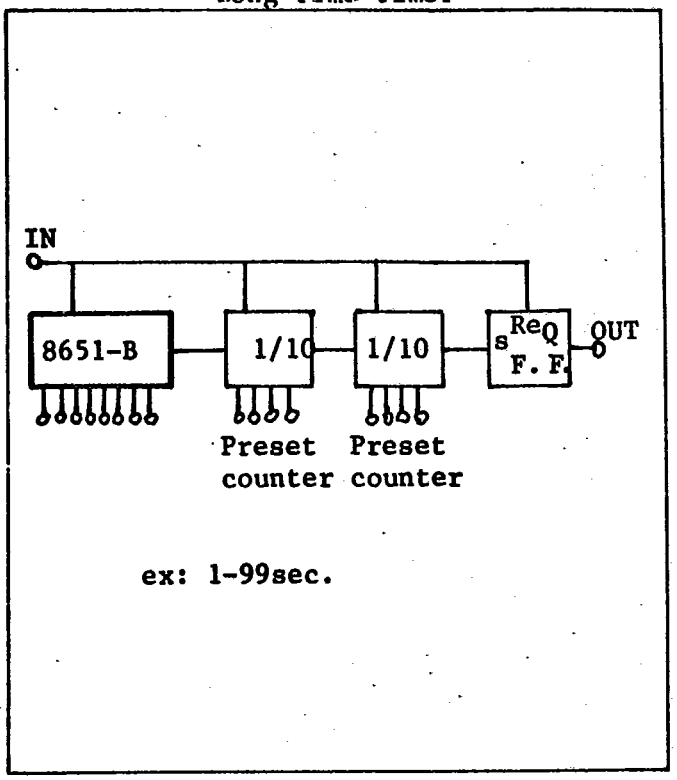
Application 5

One shot-timer



Application6

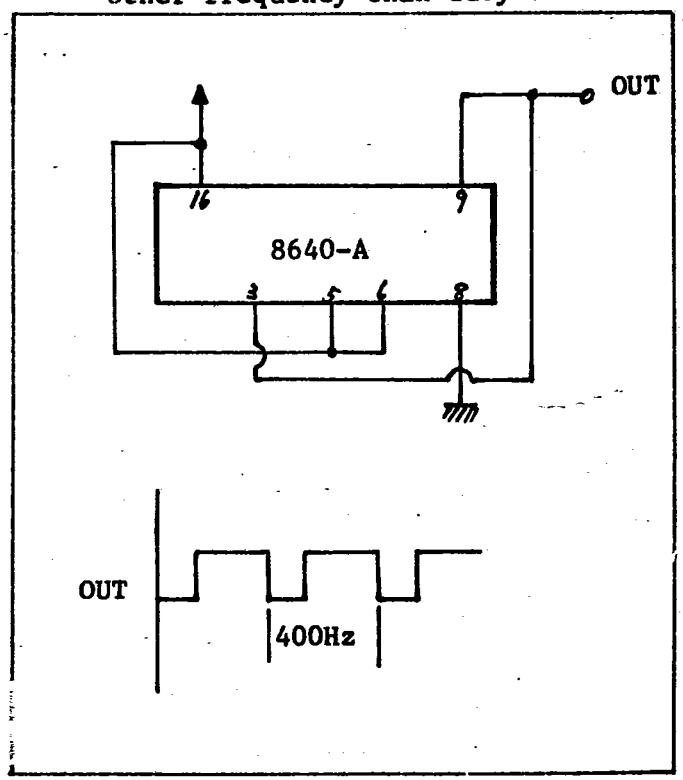
Long-time timer



ex: 1-99sec.

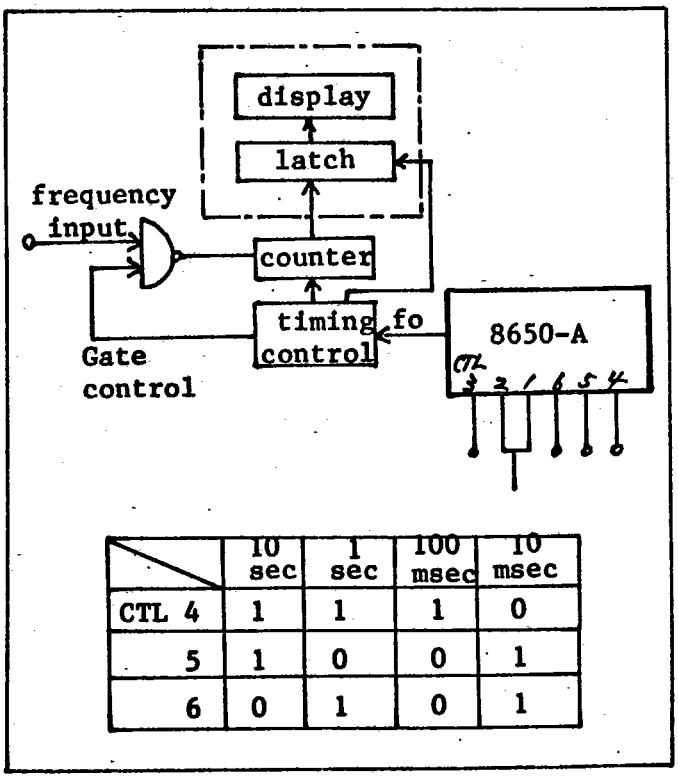
Application 7

Other frequency than duty 50%



Application 8

Low-frequency counter



	10 sec	1 sec	100 msec	10 msec
CTL 4	1	1	1	0
5	1	0	0	1
6	0	1	0	1