TONE DIALER WITH REDIAL

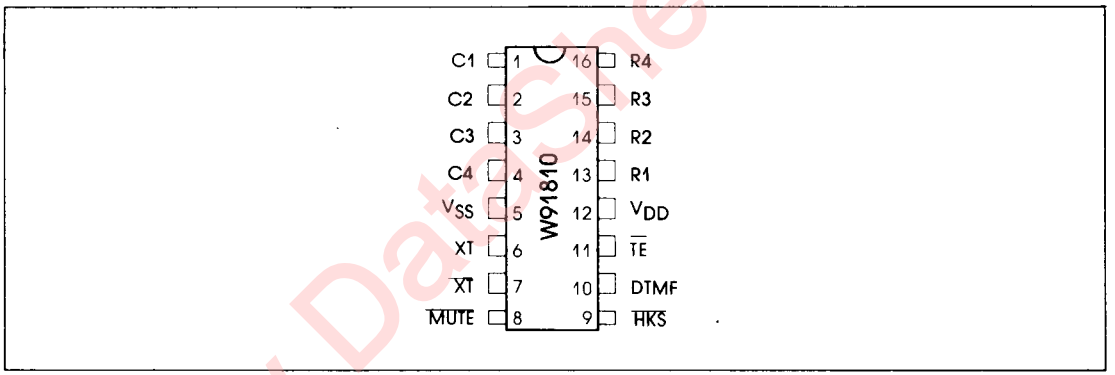
GENERAL DESCRIPTION

The W91810/A is a monolithic integrated circuit. It contains Redial memories which can perform LAST Number Dialing functions. It is fabricated in CMOS technology thus has good performance in low voltage, low power operations.

FEATURES

- 32 digits for Redial memory.
- Fully key-in & key-released debounced 4 × 4 keyboard.
- Minimum tone output duration: 100ms.; Minimum inter tone pause: 100mS.
- Power on reset on chip.
- Long mute for Redial.
- Uses 3.579545 MHz TV quartz crystal or ceramic resonator.
- 16 pins Dual-in-line plastic package.

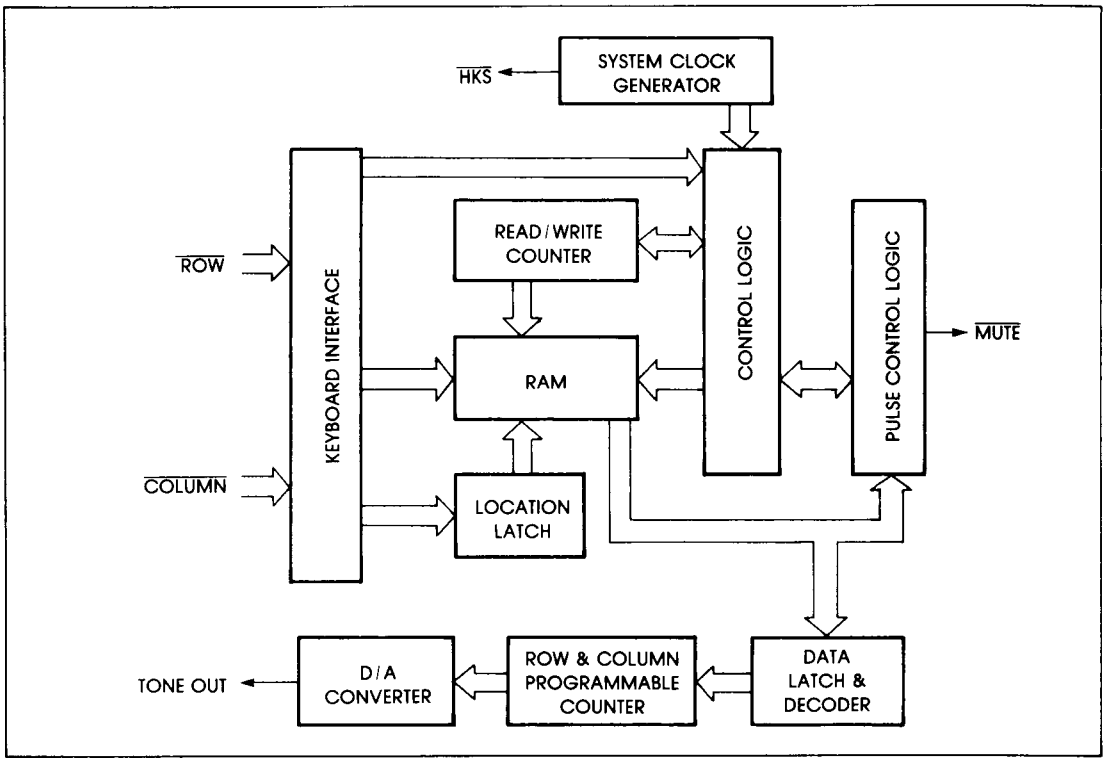
PIN CONFIGURATION



KEYBOARD FUNCTION

C1	C2	C3	C4	
1	2	3		R1
4	5	6		R2
7	8	9		R3
*	0	#	R/P	R4

BLOCK DIAGRAM



PIN/FUNCTIONAL DESCRIPTION

A. **ROW-COLUMN Inputs** (pins 1-4 & 13-16)
The keyboards input is compatible with the standard 2-of-8 keyboard, the inexpensive single contact (Form A) keyboard, and electronic input.

B. **XT, $\overline{XT}$** (Pin 6 & 7)
An built in inverter provides oscillation with an inexpensive 3.579545MHz TV color burst crystal. The oscillator ceases when a keypad input is not sensed.

C. **$\overline{MUTE}$** (Pin 8)
The $\overline{MUTE}$ is a conventional CMOS N-Channel open drain output. The output transistor is switched on during dialing sequence. Otherwise, it is switched off.

D. **$\overline{TONE\ EN}$** (Pin 11)
Pulls pin 11 to V_{SS}, it is in DTMF mode enable, otherwise DTMF disable.

E. **$\overline{HKS}$** (Pin 9)
The $\overline{HKS}$ (HOOK SWITCH) input is used to sense the state of handset in ON HOOK or OFF HOOK. In ON HOOK state, $\overline{HKS}=1$, or open the keyboard input is disabled, there is not any operation for any keyboard entry, to avoid the energy lose stored in capacitor. In OFF HOOK state, $\overline{HKS}=0$, all of the function work.
$\overline{HKS}$ pin is pulled to V_{DD} by internal resistor.

F. DTMF (Pin 10)

This pin is used to output DTMF signals. During pulse dialing, it always keep at low state regardless of keypad input. In tone mode, it will output dual or single tone. The detail timing diagram of tone mode is shown in Fig.-1(a,b).

Both high group and low group frequency waveform are synthesized by 16-level & 32-time segment.

G. V_{DD}, V_{SS} (Pin 12, 5)

These are the power input pins for the Tone dialer.

OUTPUT FREQUENCY (Hz)			% ERROR
SPECIFIED		ACTUAL	
R1	697	699	+0.28
R2	770	766	-0.52
R3	852	848	-0.47
R4	941	948	+0.74
C1	1209	1216	+0.57
C2	1336	1332	-0.30
C3	1477	1472	-0.34

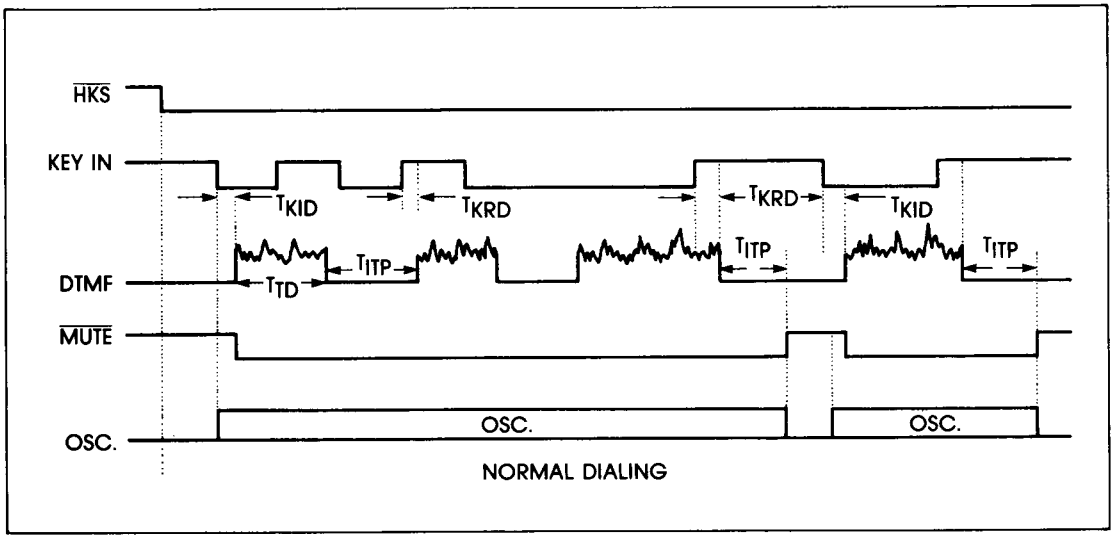


Figure 1-(a) Tone Mode Timing Diagram

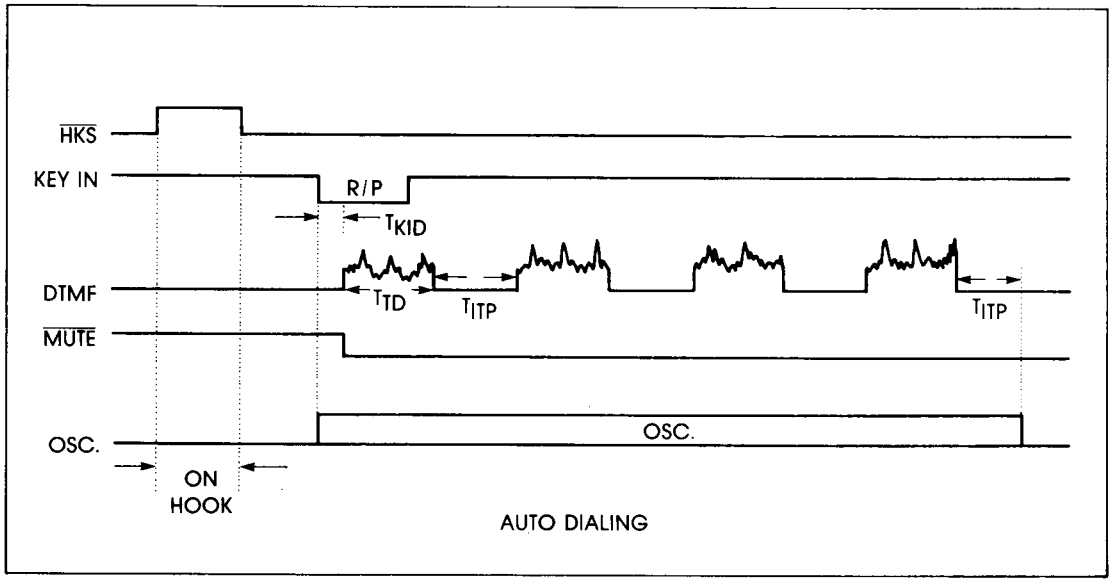


Figure 1-(b) Tone Mode Timing Diagram

KEYBOARD OPERATION

NOTE:

a. All the keyboard operations should be under OFF HOOK condition.

b. D1-Dn: 0-9, *, #.

c. The number D1, D2, ---, Dn will be dialed out in Tone mode.

A. NORMAL DIALING

OFF HOOK, D1, D2, ----, Dn

- D1, D2, ---, Dn will be dialed out.
- Dialing length is unlimit, if dialing length over 32 digits the Redial is inhibited.

B. REDIALING

- OFF-HOOK, R/P

  The R/P key can execute Redial function only in first key in after OFF HOOK, other-wise will be Pause function.

C. ACCESS PAUSE

OFF HOOK, D1, D2, R/P, D3, --, Dn,

- The Pause function is executed in Normal dialing or Redialing.
- Auto Access Pause, 2.0 or 3.6 sec. Per Pause, that selects by type number.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
DC Supply Voltage	6.0	V
Input Voltage Range	$-0.5 \sim V_{DD}+0.5$	V
Power Dissipation per Package	400	mW
Operation Temperature	$-20 \sim +70$	°C
Storage Temperature	$-55 \sim +125$	°C

D.C. CHARACTERISTICS

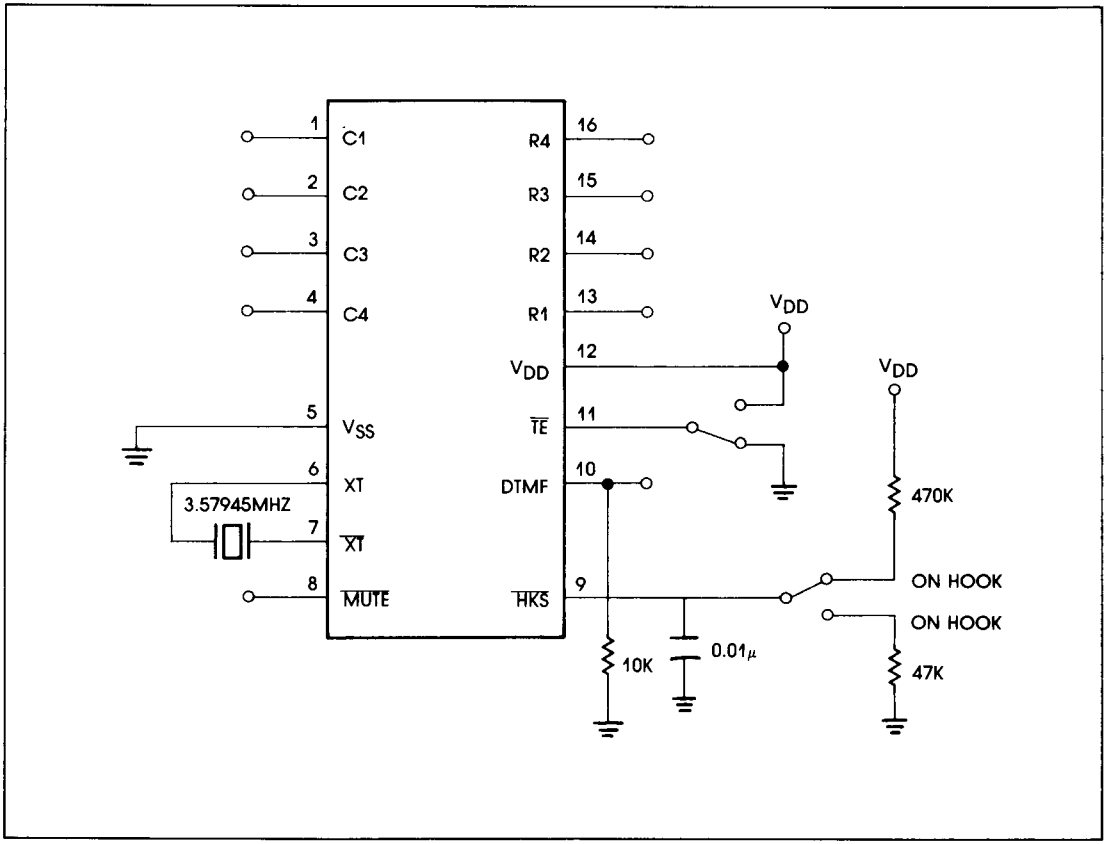
($V_{DD}-V_{SS}=2.5V$, $F_{OSC}=3.58$ MHz, $T_A=25°C$ All output unloaded)

PARAMETER	SYM.	TEST	CONDITION	MIN.	TYP.	MAX.	UNIT
OP. Voltage	V_{DD}		—	2.0	—	5.5	V
OP. Current	I_{OP}	A	Tone	—	—	1.0	mA
Standby Current	I_{SB}	A	$\overline{HKS}=0$, No load & No key entry	—	10	15	μA
Memory Retention Current	I_{MR}	B	$\overline{HKS}=1$, $V_{DD}=1.0V$	—	—	0.2	μA
Tone Output Voltage	V_{TO}	C	Row group, $R_L=10K\Omega$	130	150	170	mVrms
Pre-emphasis		D	Col/Row 2.0–5.5V	1	2	3	dB
DTMF Distortion	THD	D	$R_L=10K\Omega$ 2.0–5.5V	—	−30	−23	dB
Tone output DC level	V_{TDC}	D	2.0–5.5V	1.1	—	2.8	V
Tone output sink current	I_{TL}	F	$V_{TO}=0.5V$	0.2	—	—	mA
Mute output sink current	I_{ML}	E	$V_{MO}=0.5V$	0.5	—	—	mA
$\overline{HKS}$ pull high resistor	R_{KH}			300	—	—	KΩ

A.C. CHARACTERISTICS

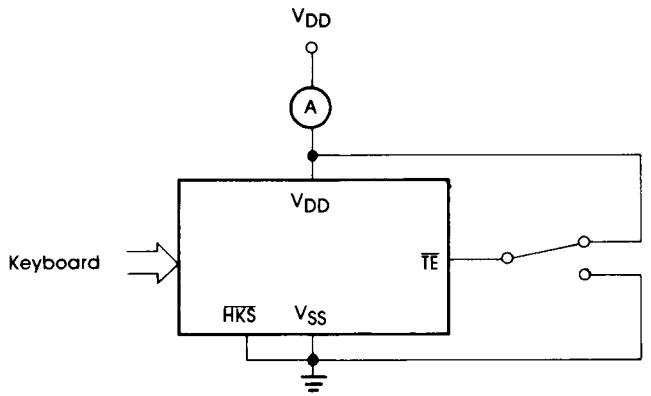
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Key in Debounce	T_{KID}		—	20	—	mS
Key Release Debounce	T_{KRD}		—	20	—	mS
Tone Output Duration	T_{TD}		—	100	—	mS
Inter Tone Pause	T_{ITP}		—	100	—	mS
Pause Time	T_P	W91810 / W91810A	—	2.0 / 3.6	—	S

GENERAL TEST CIRCUIT



TEST CIRCUIT

A



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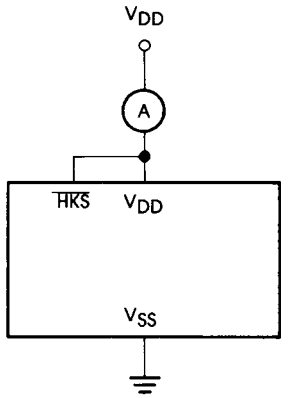
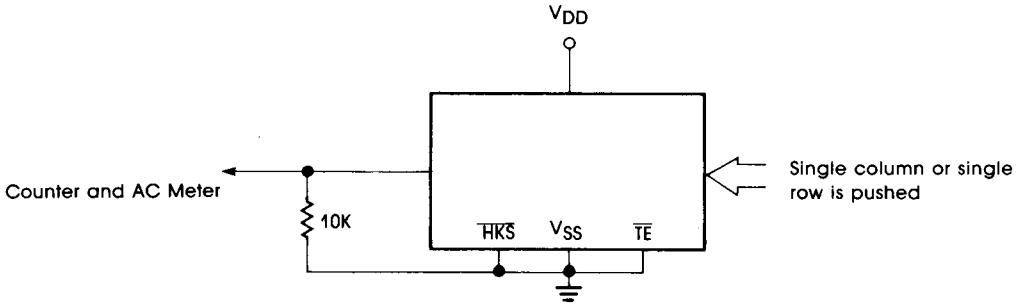
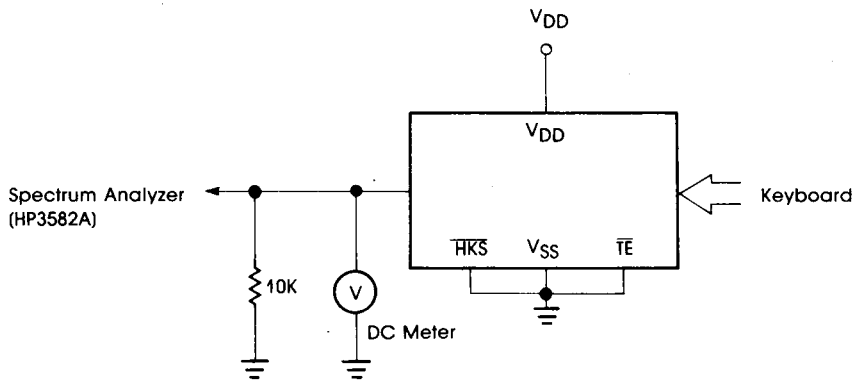


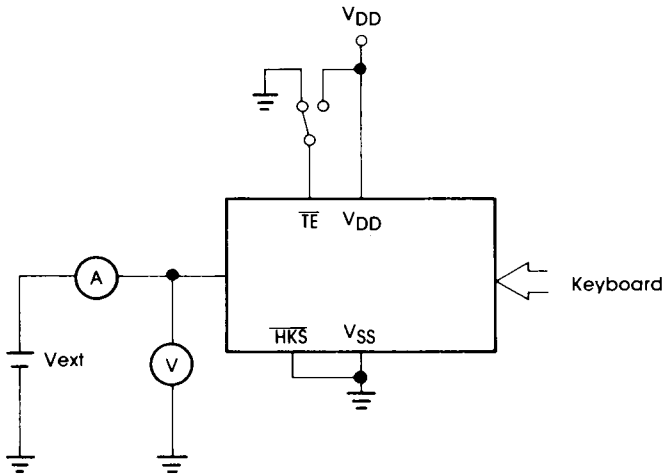
C



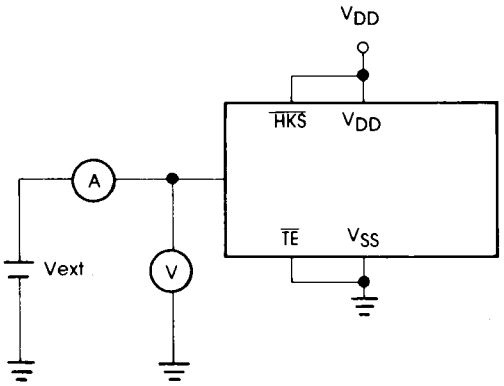
D


VDD
VDD
Spectrum Analyzer
(HP3582A)
Keyboard
HKS
VSS
TE
10K
V
DC Meter

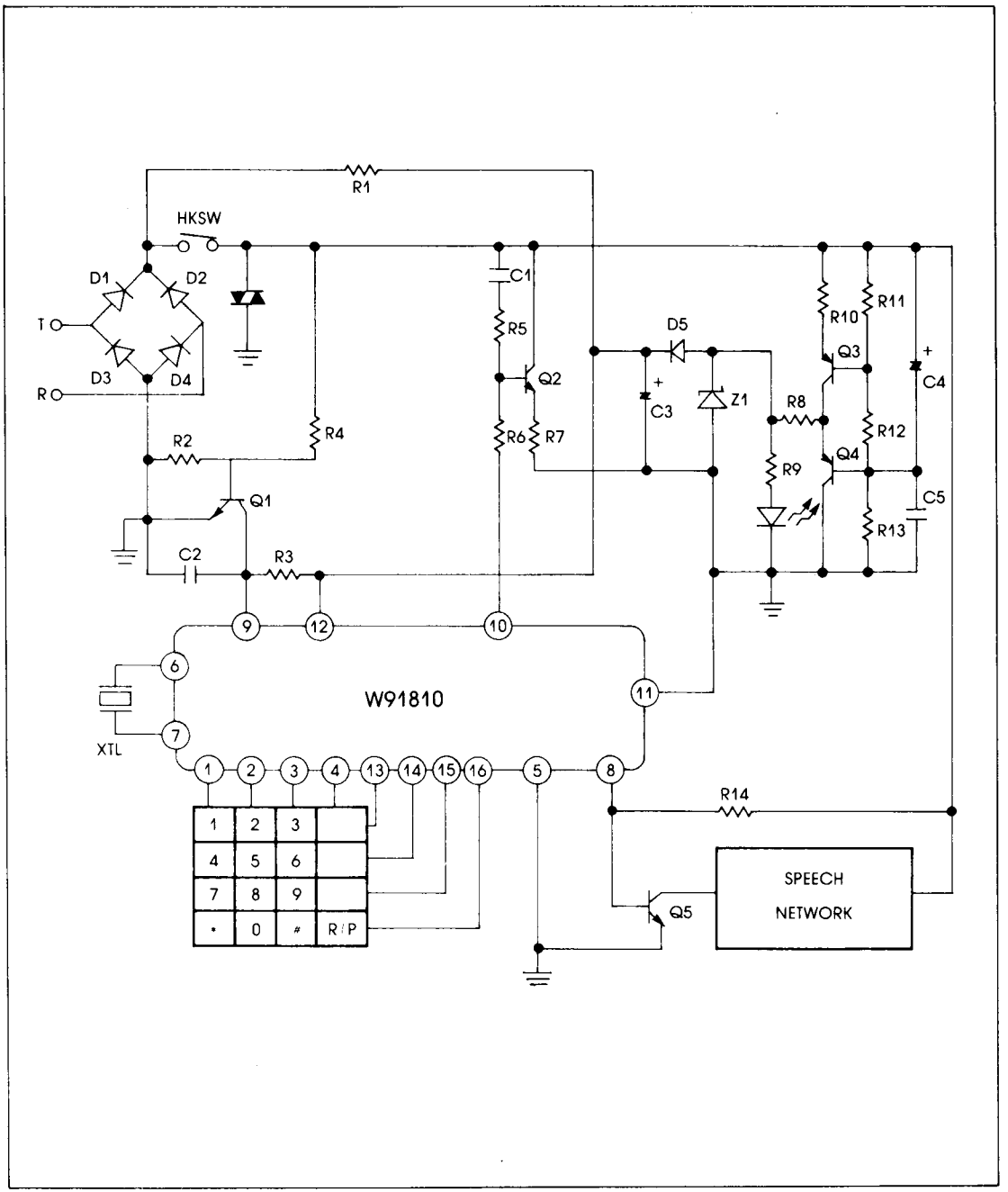
E


VDD
TE
VDD
A
Keyboard
HKS
VSS
Vext
V

F


VDD
HKS
VDD
A
TE
VSS
Vext
V

APPLICATION CIRCUIT DIAGRAM



COMPONENT SELECTION TABLE

R1	20MΩ	R13	4.7KΩ	D4	1N4002
R2	100KΩ	R14	220KΩ	D5	1N4148
R3	470KΩ	C1	0.01μF	TNR	TNR680K
R4	1MΩ	C2	0.1μF	Z1	1N4731
R5	100KΩ	C3	100μF/10V	Q1	2N9014
R6	10KΩ	C4	2.2μF/10V	Q2	2N5551
R7	68Ω	C5	0.01μF	Q3	2N4403
R8	100Ω	D1	1N4002	Q4	2N4403
R9	100Ω	D2	1N4002	Q5	MPSA13
R10	10Ω	D3	1N4002	XTL	3.57945MHz
R11	1.5KΩ				
R12	1.2KΩ				