

## TONE DIALER WITH REDIAL

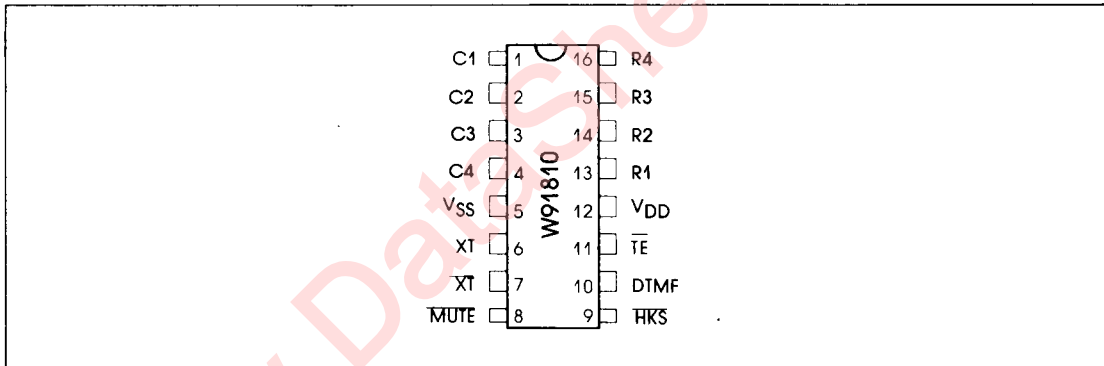
### GENERAL DESCRIPTION

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.

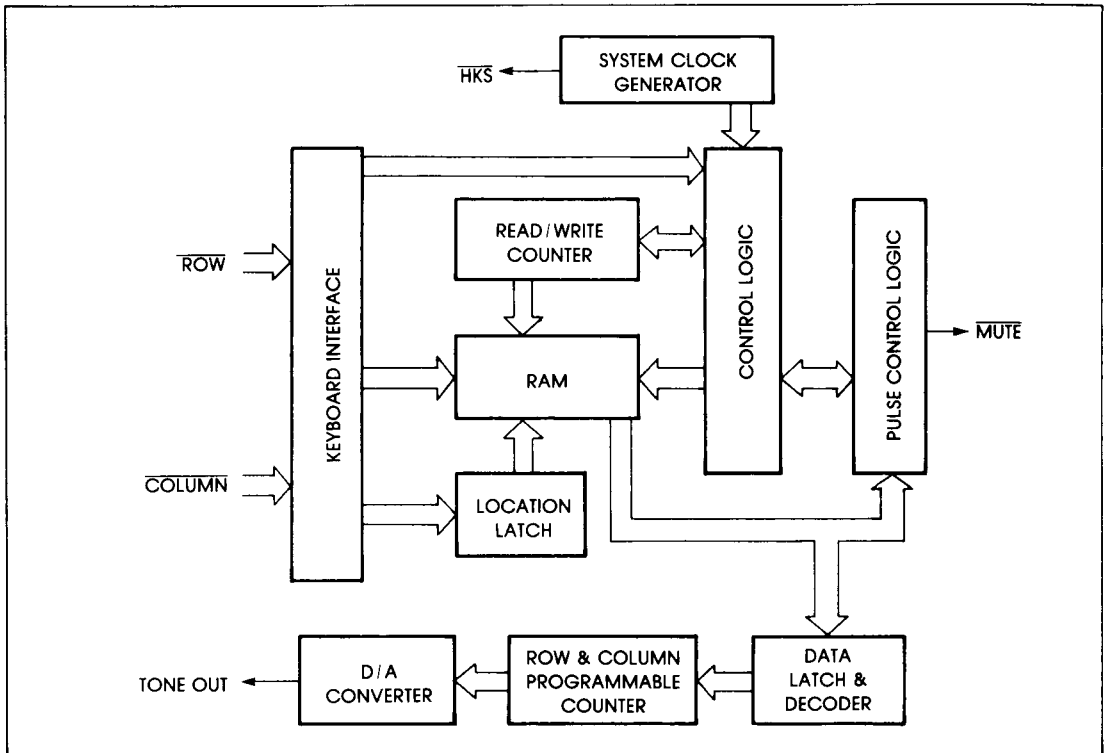
### PIN CONFIGURATION



### 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 keyboard 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. VDD, VSS (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

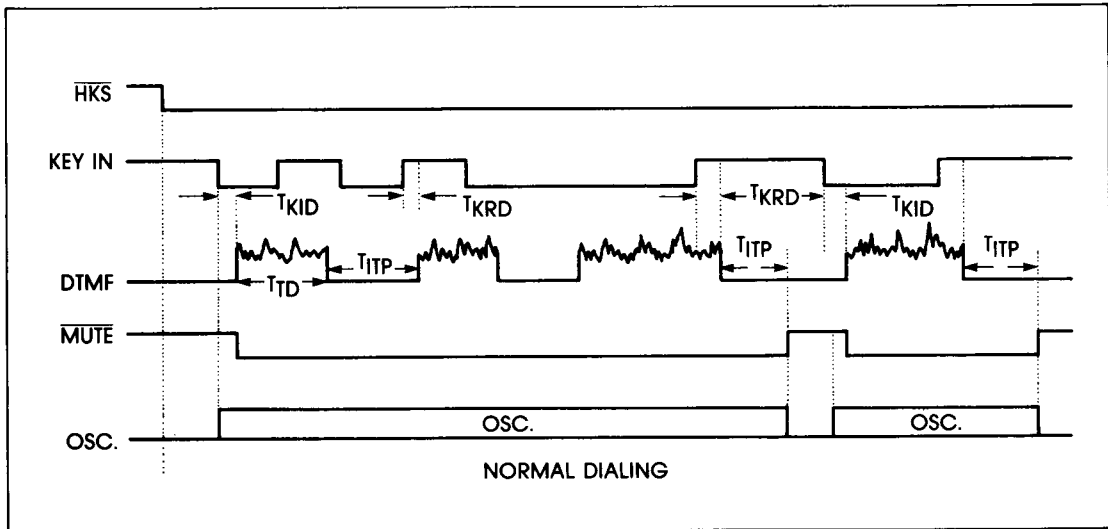


Figure 1-(a) Tone Mode Timing Diagram

TONE DIALER

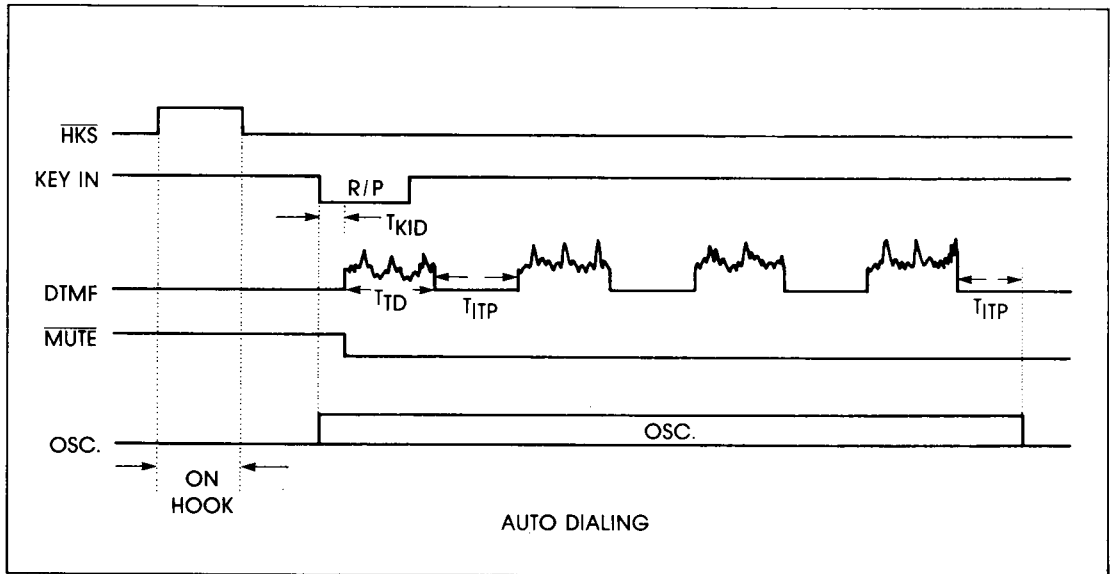


Figure 1-(b) Tone Mode Timing Diagram

## KEYBOARD OPERATION

### NOTE:

- All the keyboard operations should be under OFF HOOK condition.
- D1-Dn: 0-9, \*, #.
- 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 unlimited, 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, otherwise 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 ~ $V_{DD} + 0.5$	V
Power Dissipation per Package	400	mW
Operation Temperature	-20 ~ +70	°C
Storage Temperature	-55 ~ +125	°C

**D.C. CHARACTERISTICS**

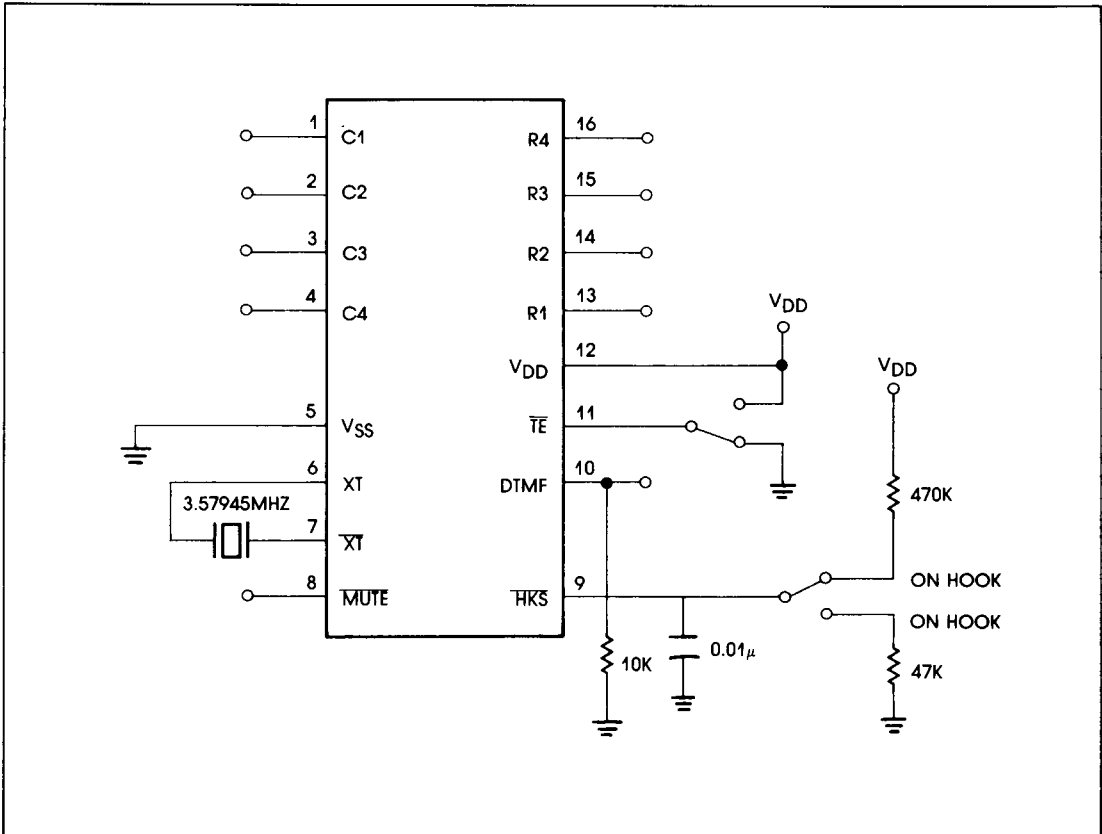
( $V_{DD} - V_{SS} = 2.5V$ ,  $F_{OSC} = 3.58$  MHz,  $T_A = 25^\circ C$  All output unloaded)

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	$\overline{HK\overline{S}} = 0$ , No load & No key entry	—	10	15	$\mu A$
Memory Retention Current	$I_{MR}$	B	$\overline{HK\overline{S}} = 1$ , $V_{DD} = 1.0V$	—	—	0.2	$\mu A$
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
$\overline{HK\overline{S}}$ pull high resistor	$R_{KH}$			300	—	—	$K\Omega$

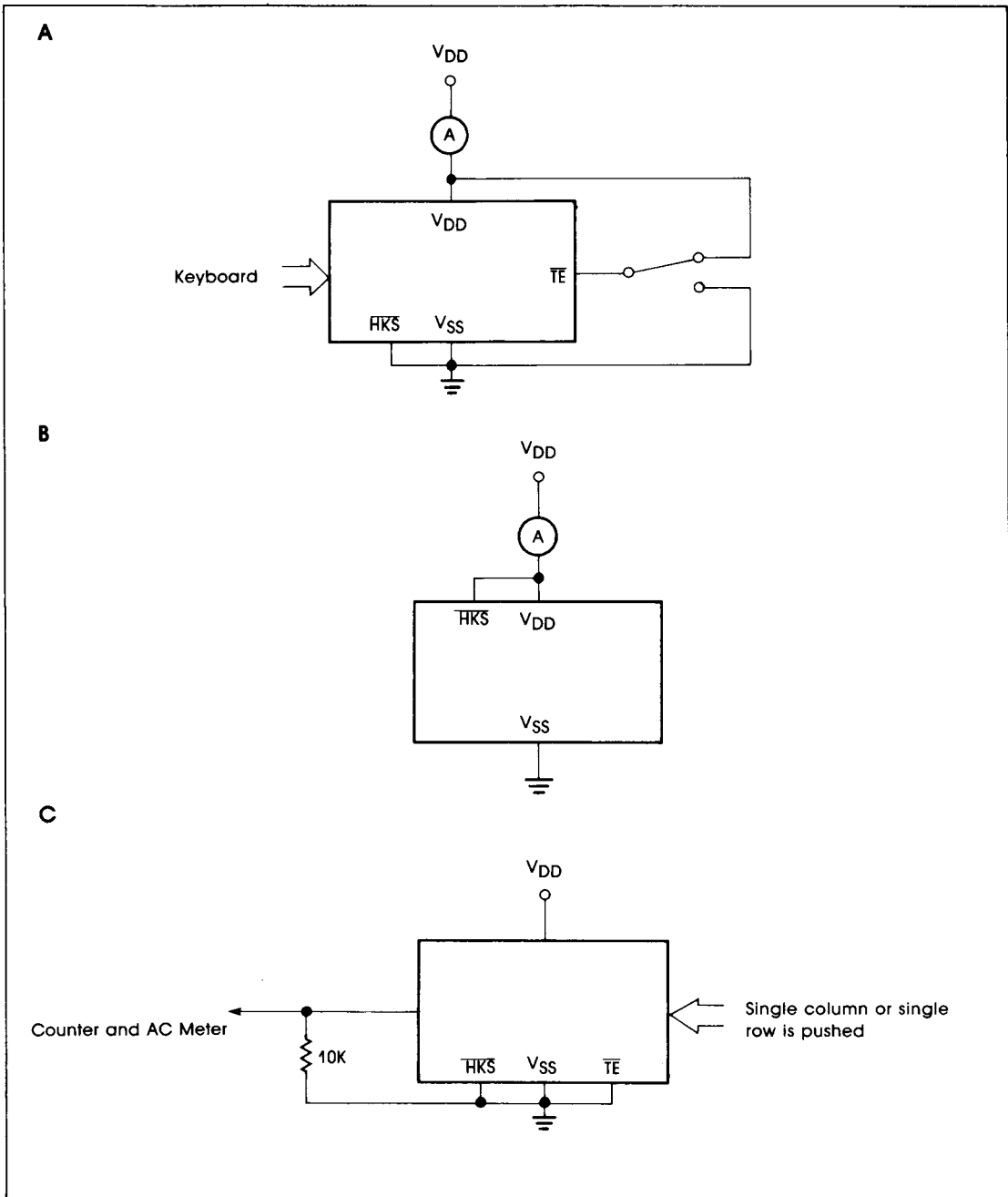
### A.C. CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Key in Debounce	T <sub>KID</sub>		—	20	—	mS
Key Release Debounce	T <sub>KRD</sub>		—	20	—	mS
Tone Output Duration	T <sub>TD</sub>		—	100	—	mS
Inter Tone Pause	T <sub>ITP</sub>		—	100	—	mS
Pause Time	T <sub>p</sub>	W91810	—	2.0	—	S
		W91810A	—	3.6	—	S

### GENERAL TEST CIRCUIT

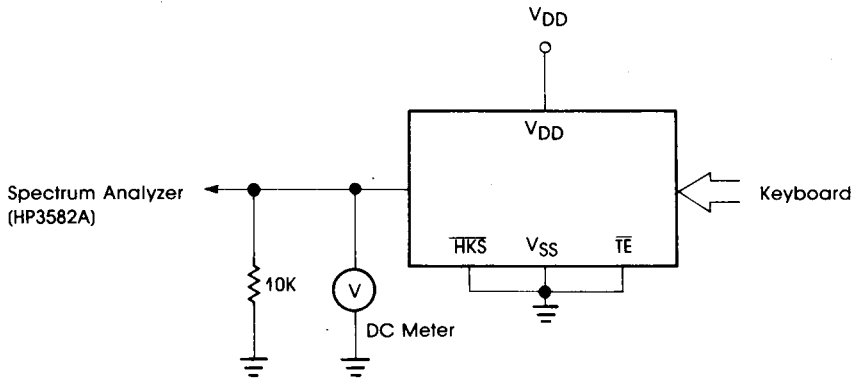


TEST CIRCUIT

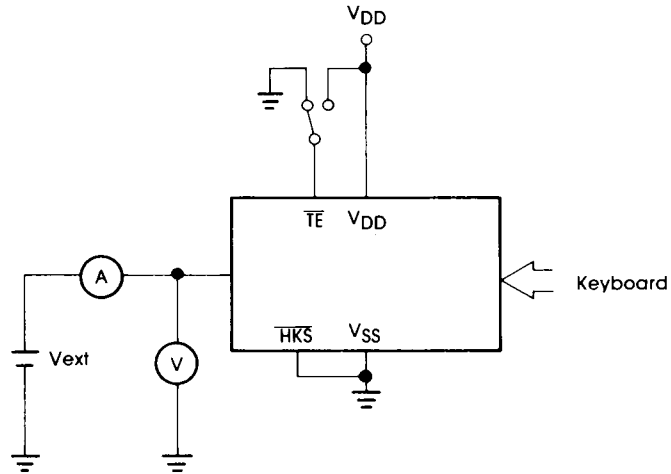



  
TONE
   
DIALER

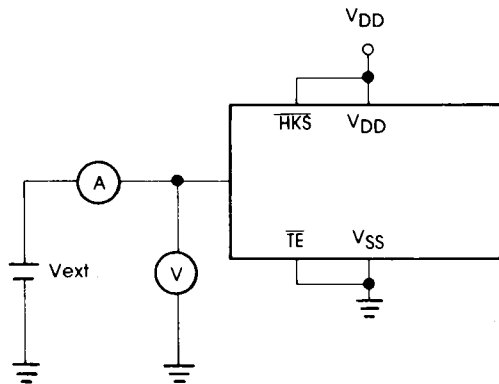
D



E

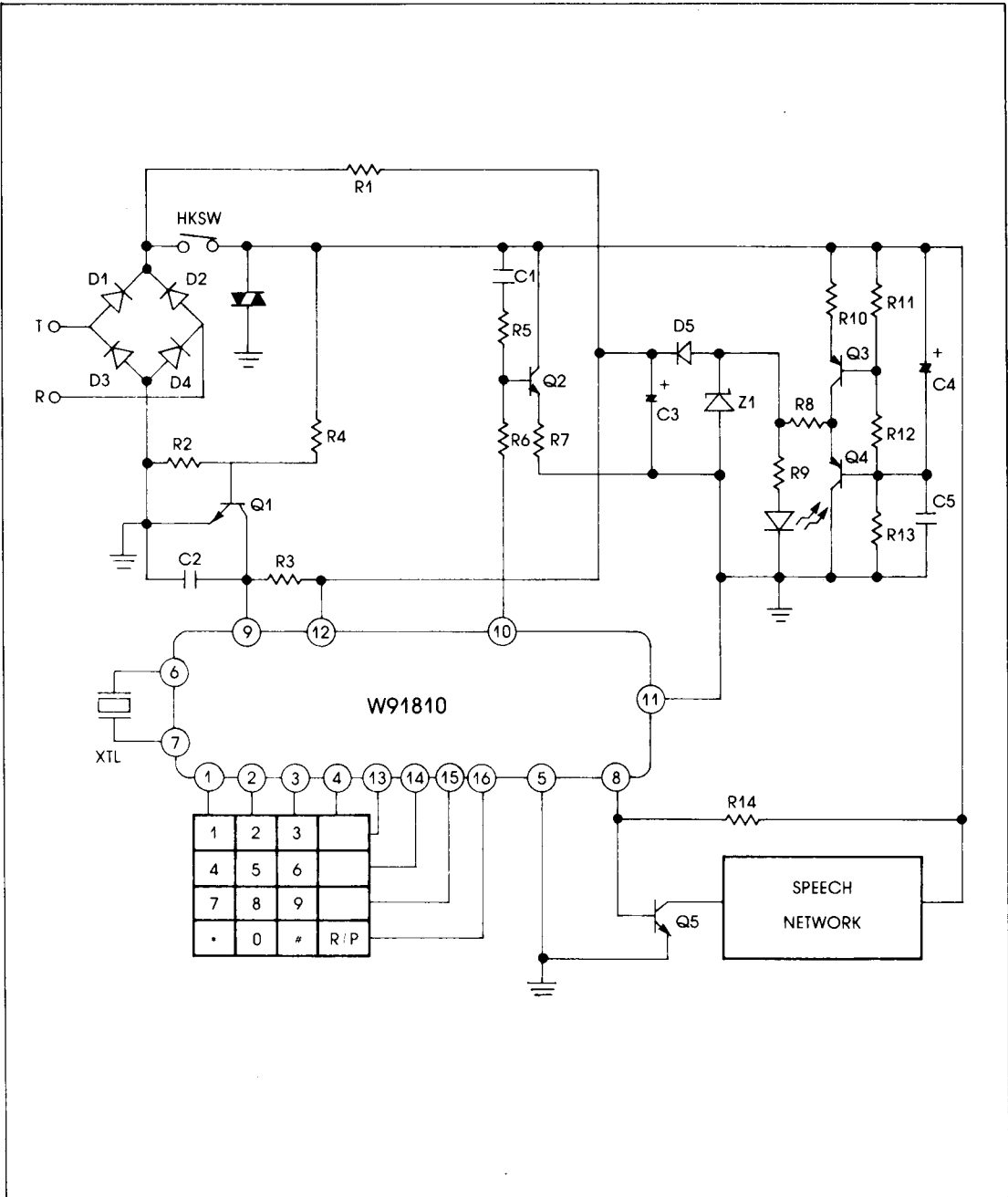


F





APPLICATION CIRCUIT DIAGRAM




  
TONE
   
DIALER

**COMPONENT SELECTION TABLE**

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