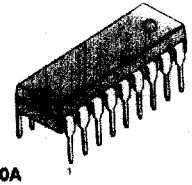
ONE TOUCH REDIAL T/P SWITCHABLE DIALER WITH HANDS-FREE & HOLD FUNCTION

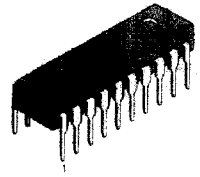
INTRODUCTION

The KS58008 is a tone/pulse switchable dialer which has hands-free and hold control logic. The 32 digit can be saved for redialing.
One touch redial is possible without on-hooking operation and flash time can be selected by using the key matrix.
The KS58008 also provides handfree dialing and hold function.

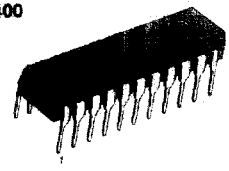
18-DIP-300A



20-DIP-300A



22-DIP-400



FEATURES

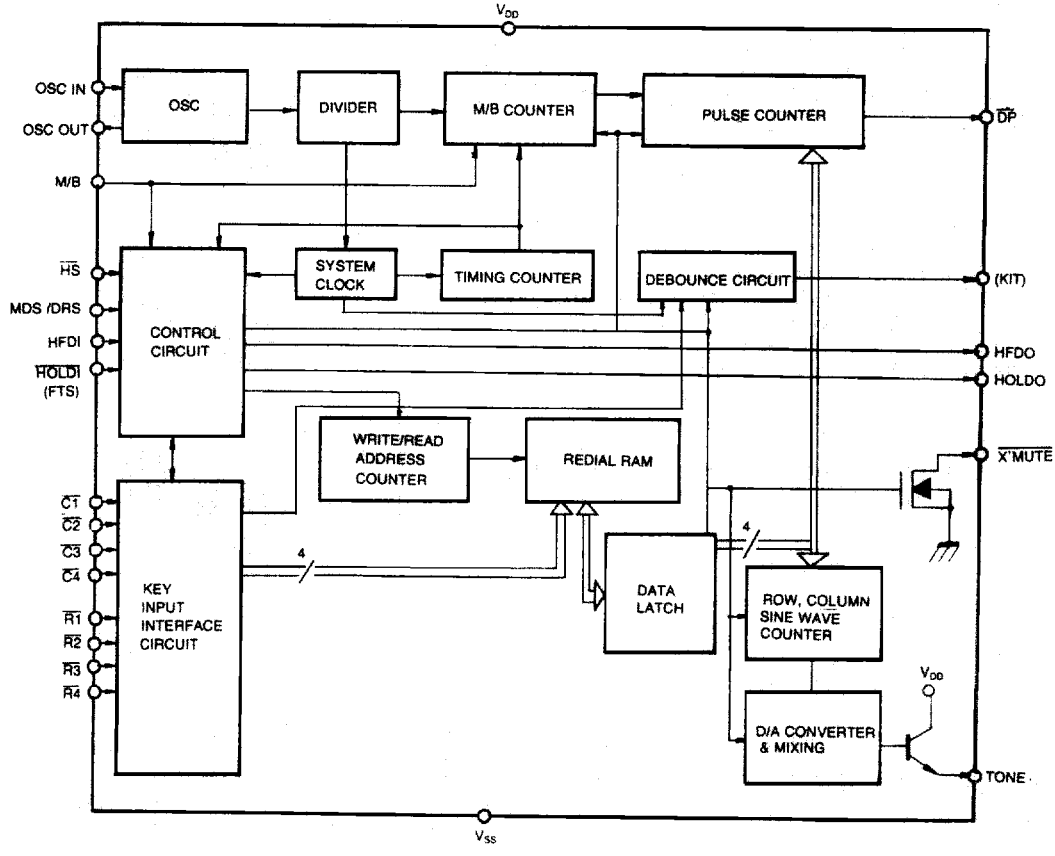
- 32 digit memory buffer for redialing
- Tone/Pulse switchable (Touch T/* key or slide switch)
- One touch redial operation
- Flash time selectable (83,288,617ms)
- Pulse rate selectable (10pps, 20pps)
- Make/Break ratio selectable (40:60, 33:66)
- Hands-free control function
- Hold control function
- Uses inexpensive TV crystal or ceramic resonator (3.579545MHz)
- Two key single tone operation in normal mode

ORDERING INFORMATION

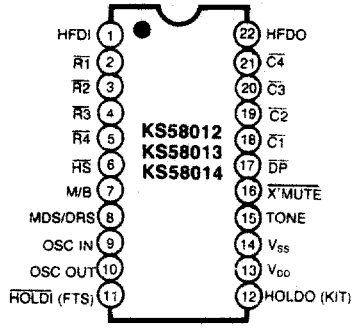
Devic	Package	Function					M/B, PPS
		HFO	HOLD	KIT	F1	F2	
KS58008	18-DIP-300A	X	X	X	83ms	617ms	Selectable
KS58010	20-DIP-300A	O	X	X	83ms	617ms	"
KS58012	22-DIP-400	O	O	X	83ms	617ms	"
KS58013	22-DIP-400	O	O	X	83ms	288ms	"
KS58014	22-DIP-400	O	X	O	83ms	Selectable	"

* HFD : HANDS-FREE DIALING FUNCTION
* HOLD : HOLD FUNCTION FOR MELODY OUTPUT
* KIT : KEY-IN TONE FUNCTION (PULSE & TONE MODE)
* F1, F2 : FLASH TIME SELECT

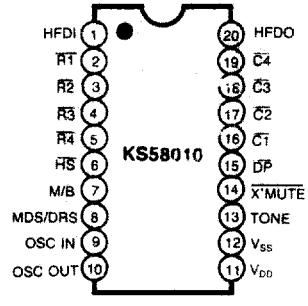
BLOCK DIAGRAM



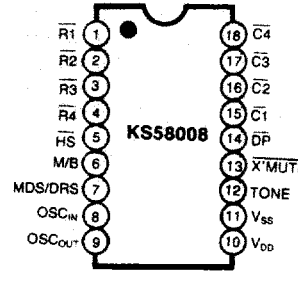
PIN CONFIGURATION



(22 DIP)
Fig. 2



(20DIP)
Fig. 3



(18DIP)
Fig. 4

ARRANGEMENT OF KEY BOARD

1	2	3	F1
4	5	6	F2
7	8	9	P
T/*	0	#	RD

* KEYBOARD DESCRIPTION
F1 : FLASH (TOUCH KEY HOOKING, 83 msec)
F2 : FLASH (288 msec, 617 msec, Flash time selection)
T/* : T KEY IN PULSE MODE, DATA KEY IN TONE MODE
P : PAUSE KEY
RD : ONE TOUCH REDIAL KEY

SELECTION FUNCTION

PIN	CONNECTION	FUNCTION
MDS/DRS	V_{DD}	PULSE MODE/20 pps
	OPEN	PULSE MODE/10 pps
	V_{SS}	TONE MODE
FTS (KS58014)	V_{DD}	617 msec
	V_{SS}	288 msec
M/B	V_{DD}	1 : 2 (M : B)
	V_{SS}	2 : 3 (M : B)

PIN DESCRIPTION

Pin No	Symbol	Description
1	HFDI	Hands-free dialing input Toggle input structure When this pin goes high, the hands-free output state is toggled on
2 - 5	$\overline{R1}$ - $\overline{R4}$	Row key input High at standby
6	$\overline{HS}$	V_{DD} = On Hook, V_{SS} = Off Hook
7	M/B	V_{DD} = 1 : 2, V_{SS} = 2 : 3 (M/B Ratio)
8	MDS/ DRS	V_{DD} = Pulse Mode (20 pps) Open = Pulse Mode (10 pps) V_{SS} = Tone Mode
9	OSC IN	Oscillator input
10	OSC OUT	Oscillator output
11	$\overline{HOLDI}$	Hold input Toggle input structure When this pin goes low, The HOLDO state is toggled on
(11)	FTS	Flash time select pin (KS58014 only) V_{DD} = 617ms, V_{SS} = 288ms
12	HOLDO	Hold output (High = Hold Mode Enable)
(12)	KIT	Key-in tone output, Pulse mode only (KS58014 only)
13	V_{DD}	(+) Power
14	V_{SS}	(−) Power
15	TONE	Tone output (DTMF)
16	$\overline{XMUTE}$	$\overline{XMUTE}$ output. Low at the HOLDO = High
17	$\overline{DP}$	Dial Pulse output
18 - 21	$\overline{C1}$ - $\overline{C4}$	Column Key input. Low at the stand by
22	HFDO	Hands-free dialing output (High = HFD Enable)

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{DD}	- 0.3 ~ 7.0	V
Input Voltage	V_I	- 0.3 ~ V_{DD} + 0.3	V
Output Voltage	V_O	- 0.3 ~ V_{DD} + 0.3	V
Power Dissipation	P_D	500	mW
Operating Temperature	T_{OPR}	- 20 ~ + 70	℃
Storage Temperature	T_{STG}	- 55 ~ + 150	℃

ELECTRICAL CHARACTERISTICS

(V_{DD} = 3.5V, V_{SS} = 0V, f_{osc} = 3.579545MHz, Ta = 25℃, unless otherwise noted)

Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit
Operating Voltage	V_{DD}	–		2.0	–	6.0	V
Memory Retention Voltage	V_{MR}	–		1.0	–	–	V
Memory Retention Current	I_{MR}	$\overline{HS}$ = V_{DD} = 1.0V		–	0.03	0.05	uA
Operating Current	$I_{DD\ (PULSE)}$	Pulse Mode, all outputs unloaded		–	0.1	0.5	mA
	$I_{DD\ (TONE)}$	Tone Mode, all outputs unloaded		–	0.4	1.0	mA
Standby Current	I_{SB}	$\overline{HS}$ = V_{SS}, all outputs unloaded		–	15	50	uA
Output Sink Current	$I_{O\ (SINK)}$	$\overline{XMUTE}$ V_{OL} = 0.4V		1.0	3.0	–	mA
Output Current	I_{OH}	V_{OH} = 3.0V	KIT, HFDO	1.0	3.0	–	mA
	I_{OL}	V_{OL} = 0.4V	HOLDO	1.0	3.0	–	mA
Input Voltage	V_{IH}	$\overline{R1}$ - $\overline{R5}$, $\overline{C1}$ - $\overline{C4}$, M/B, FTS		0.8V_{DD}	–	V_{DD}	V
	V_{IL}	$\overline{HS}$, MDS/DRS		V_{SS}	–	0.2V_{DD}	V
Input Current	I_{I1}	V_{IN} = V_{SS}		–	–	50	uA
	I_{I2}	V_{IN} = V_{SS}, V_{DD} = 2.5V		–	–	30	uA
Valid Key Entry Time	t_{KD}	–		–	23	–	mS
Pause Time	t_{PA}	–		–	2.47 (3.7)	–	sec

ELECTRICAL CHARACTERISTICS

(V_{DD} = 3.5V, V_{SS} = 0V, f_{osc} = 3.579545MHz, Ta = 25℃, unless otherwise noted)

Characteristic	Symbol	Test Conditions		Min	Typ	Max	Unit
Pulse Interdigit Pause Time	t_{PIDP1}	MDS/DRS = V_{DD} (20 pps)		—	617	—	mS
	t_{PIDP2}	MDS/DRS = Open (10 pps)		—	824	—	mS
Tone Interdigit Pause Time	t_{TIDP}	MDS/DRS = V_{SS}		—	103	—	mS
Tone Duration	t_{TD}	MDS/DRS = V_{SS}		—	103	—	mS
Key In Tone Duration	t_{KIT}	—		—	18	—	mS
Key In Tone Frequency	f_{KIT}	—		—	1.75	—	KHz
Make/Break Time	$t_{M/B}$	MDS/DRS = OPEN (10pps)	M/B = V_{DD}	—	34.33 /68.66	—	mS
			M/B = V_{SS}	—	41.19 /61.79	—	mS
		MDS/DRS = V_{DD} (20pps)	M/B = V_{DD}	-	17.16 /34.33	—	mS
			M/B = V_{SS}	—	20.59 /30.89	—	mS
Pulse to Tone Auto Access Pause Time	t_{PTPA}	—		—	2.47 (3.7)	—	sec
Pre-Digit Pause Time	t_{PDPA}	M/B = 1 : 2		—	17.2	—	mS
		M/B = 2 : 3		—	17.2	—	mS
Pause to Mute Overlap time	t_{PMO}	—		—	1.7	—	mS
Coulumn to Row Tone Ratio	dB_{CR}	Tone Mode		1	2	3	dB
Row Tone Level	$V_{OH\ (TONE)}$	R_L = 5.0Kohm		-14	—	-11	dBV
	$V_{OL\ (TONE)}$	V_{DD} = 2.5V, R_L = 5.0Kohm		-16	—	-12	dBV
Tone Distortion	THD_{TONE}	—		—	—	7	%
Pull-Down Resistor Current	$I_{CC\ (PULL)}$	HFDI = V_{DD}		—	10	80	uA
FLASH Time	t_{FL}	F2	Selectable	—	617	—	mS
				—	288	—	mS
		F1	All Type	—	83	—	mS

APPLICATION INFORMATION
KEY DESCRIPTION

- **1, 2, 3, 4, 5, 6, 7, 8, 9, 0**

  These are tone/pulse dialing signal keys.

- T/*

  Pulse Mode : Pulse to Tone switching key
  Tone Mode : Data key

- #

  This is a dialing data signal key in tone mode only

- RD : Redial

  This key will be allowed as normal redial key if it is the first key-in after off hook.
  But after normal data output executed, this key will be allowed as one touch redial key function that executes dialing data automatically after one touch RD flashtime.

- P : Pause

  This key is a data key.
  While this pause data is executed, any key is ignorged.

- F1, F2 (Flash Key)

  If this key is pressed, $\overline{DP}$ and $\overline{X'MUTE}$ will be forced to low during the flash time.
  During the flash time, any key is ignored.

- HFDI

  Hands-free dialing input.
  If this key goes to high level, hands-free dialing output will be toggled on.

- $\overline{HOLDI}$

  HOLD input for melody part.
  It this key goes to low level, HOLD output will be toggled on.

TRUTH TABLE OF H.F.D & HOLD FUNCTION

NO	CURRENT STATE			INPUT	NEXT STATE		
	HOOK STATE	HFDO	HOLDO		HFDO	HOLDO	DIALING?
1	---	L	L	HFDI =	H	L	YES
2	ON HOOK	H	L	HFDI =	L	L	NO
3	OFF HOOK	H	L	HFDI =	L	L	YES
4	ON HOOK	H	H	HFDI =	L	H	NO
5	---	L	H	HFDI =	H	L	YES
6	OFF HOOK	H	H	HFDI =	H	H	NO
7	ON HOOK	X	X	OFF HOOK	L	L	YES
8	OFF HOOK	X	X	ON HOOK	P	P	P
9	ON HOOK	L	L	HOLDI =	L	L	NO
10	ON HOOK	L	H	HOLDI =	L	H	NO
11	ON HOOK	H	L	HOLDI =	H	H	NO
12	ON HOOK	H	H	HOLDI =	H	L	YES
13	OFF HOOK	X	L	HOLDI =	P	H	NO
14	OFF HOOK	X	H	HOLDI =	P	L	YES
15	OFF HOOK	L	X	HFDI =	H	L	YES

* COMMENT : --- : ON or OFF HOOK
X : DON'T CARE
P : PREVIOUS STATE

OPERATION DESCRIPTION

• SYMBOL DEFINITION

T/p = TONE MODE
t/P = PULSE MODE
Dp = PULSE DATA : 0, 1, 2, ... 8, 9 KEYS
Dt = TONE DATA : 0, 1, 2 , ... 8, 9, *, # KEYS
RD = RD KEY FOR REDIAL OR ONE TOUCH REDIAL
P = P KEY FOR PAUSE
F = FLASH KEY (TOUCH KEY HOOKING)
Conv = CONVERSATION MODE
↑ = V_{SS} to V_{DD} SWITCHING ↓ = V_{DD} to V_{SS} SWITCHING F = FLOATING

• NORMAL DIALING

a. PULSE MODE
OFF HOOK, t/P : Dp 1, Dp 2, ... Dpn ; Conv ; ON HOOK
b. TONE MODE
OFF HOOK, t/P : Dt 1, Dt 2, ... Dtn ; Conv ; ON HOOK
c. PULSE TO TONE MODE SWITCHING BY T/* KEY
OFF HOOK, t/P : Dp 1, Dp 2, ... Dpn, T/*, Dt 1, Dt 2, ... Dtm ; Conv ; ON HOOK
d. PULSE TO TONE MODE SWITCHING BY MDS/DRS SWITCH
OFF HOOK, t/P : Dp 1, Dp 2, ... Dpn, MDS/DRS DT 1, DT 2, ... Dtm ; Conv ; ON HOOK

• REDIALING

OFF HOOK : RD ; Conv ; ON HOOK
NOTE : If the dialing digits exceed 32 digits, the redialing operation will be inhibited.
OFF HOOK : DI, D2, ... Dn ; the line is busy ; RD ; Conv ; ON HOOK (one touch RD)

• REDIALING + NORMAL DIALING

OFF HOOK : RD, DI, D2, D3, ... Dn ; Conv ; ON HOOK
The normal dial is possible after the end of redial operation

• HAND FREE DIAL & HOLD FUNCTION

a. If HFDO is high state, all operations are available despite ON HOOK.
b. The HOLDO is high state, key input is inhibited and only melody is enable.

TONE GENERATION

* KS58008 is designed 14 level, 28 segment. The COLUMN TONE is pre-emphasized 2dB than the ROW TONE.
* In order to single tone generation, push the same COLUMN or ROW key more than 2 keys at the sametime.

TONE FREQUENCIES

INPUT	SPECIFIED	ACTUAL	% ERROR
ROW 1	697	699.1	+ 0.31
ROW 2	770	766.2	- 0.49
ROW 3	852	845.4	- 0.54
ROW 4	941	948.0	+ 0.74
COLUMN 1	1209	1215.9	+ 0.57
COLUMN 2	1336	1331.7	- 0.33
COLUMN 3	1477	1471.9	- 0.35

• STATE DIAGRAM OF HANDS-FREE DIALING & HOLD FUNCTION

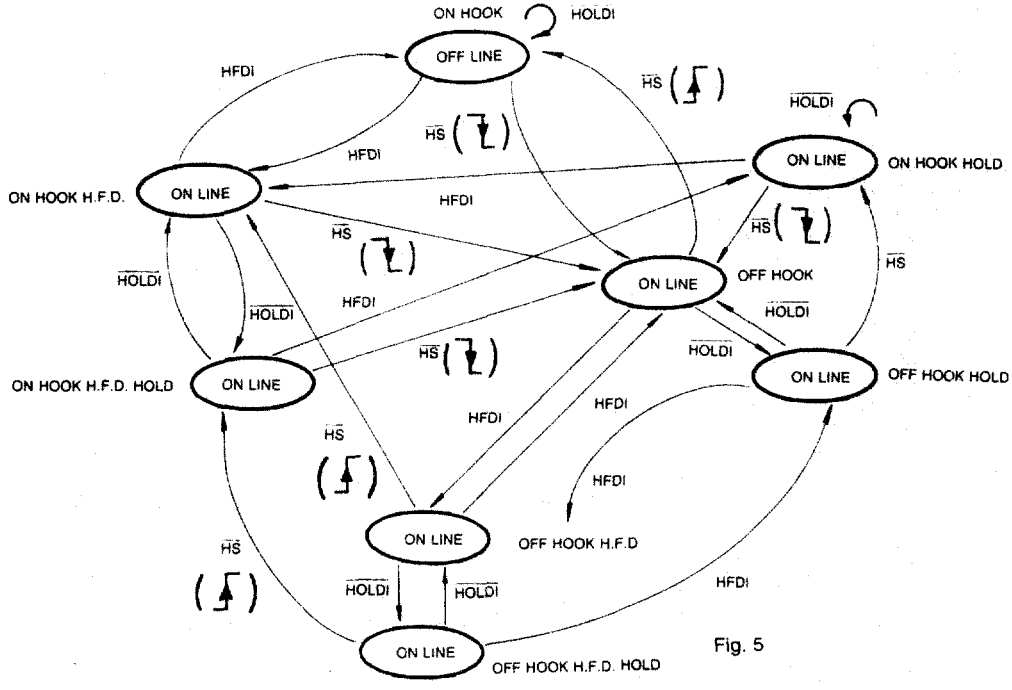


Fig. 5

(HANDS-FREE DIALING & HOLD FUNCTION) **(HANDS-FREE DIALING ONLY)**

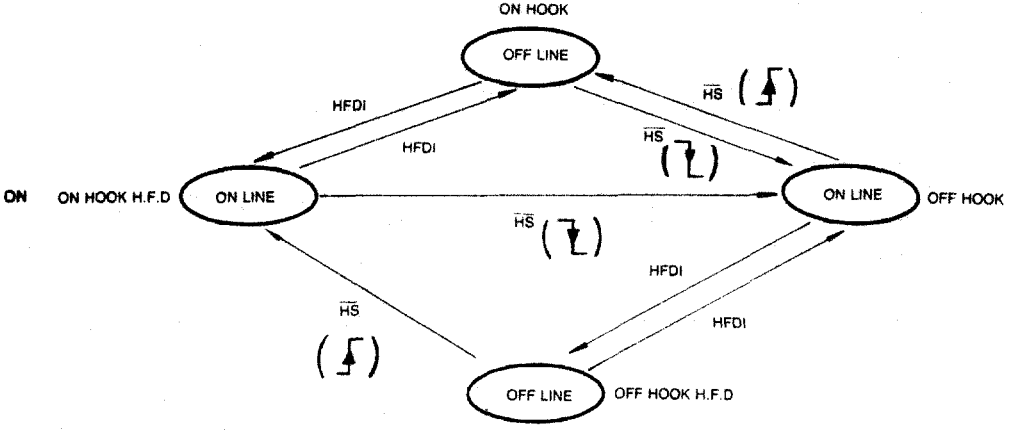


Fig . 6

TIMING DIAGRAM

PULSE MODE

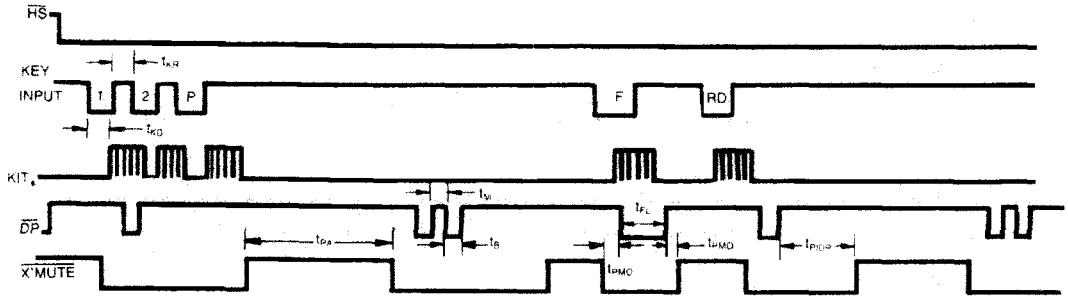
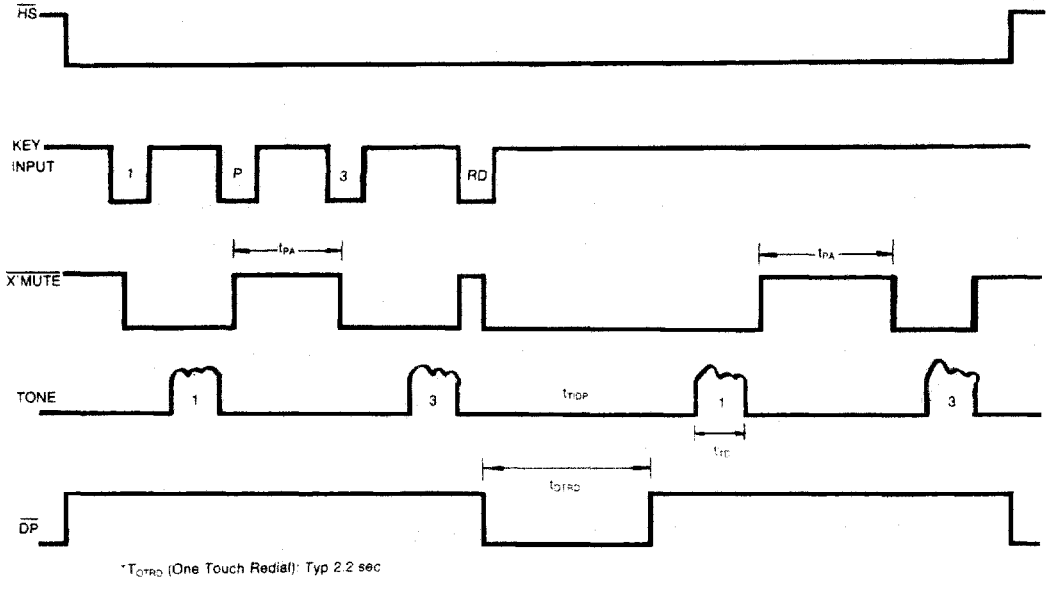


Fig. 7

TONE MODE



*T_{OTRD} (One Touch Redial): Typ 2.2 sec

Fig. 8

PULSE TO TONE DIALING

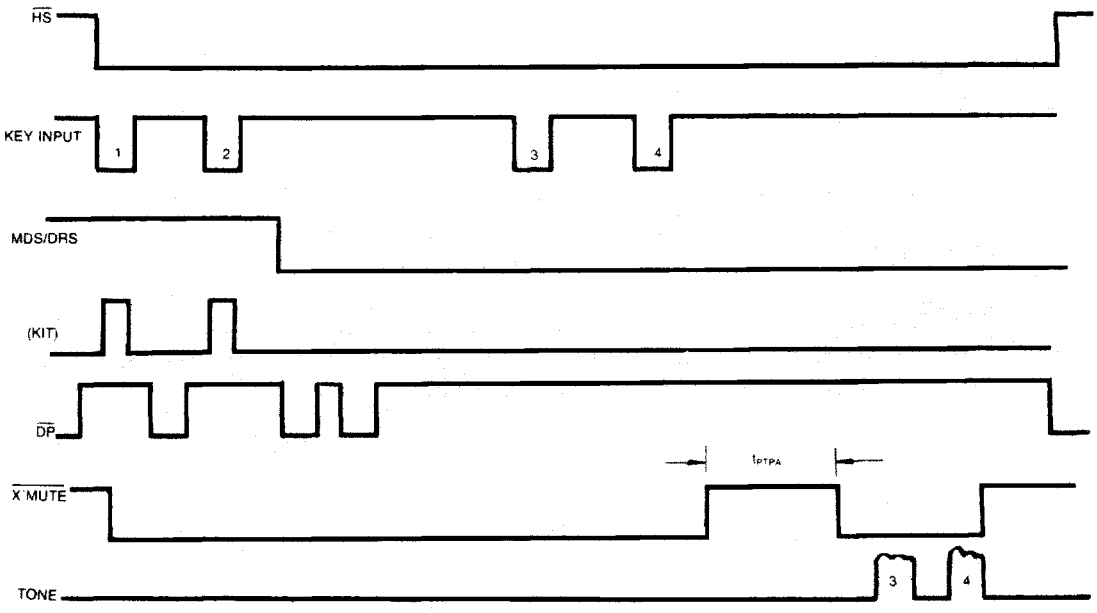


Fig. 9

HANDS-FREE DIALING & HOLD FUNCHION

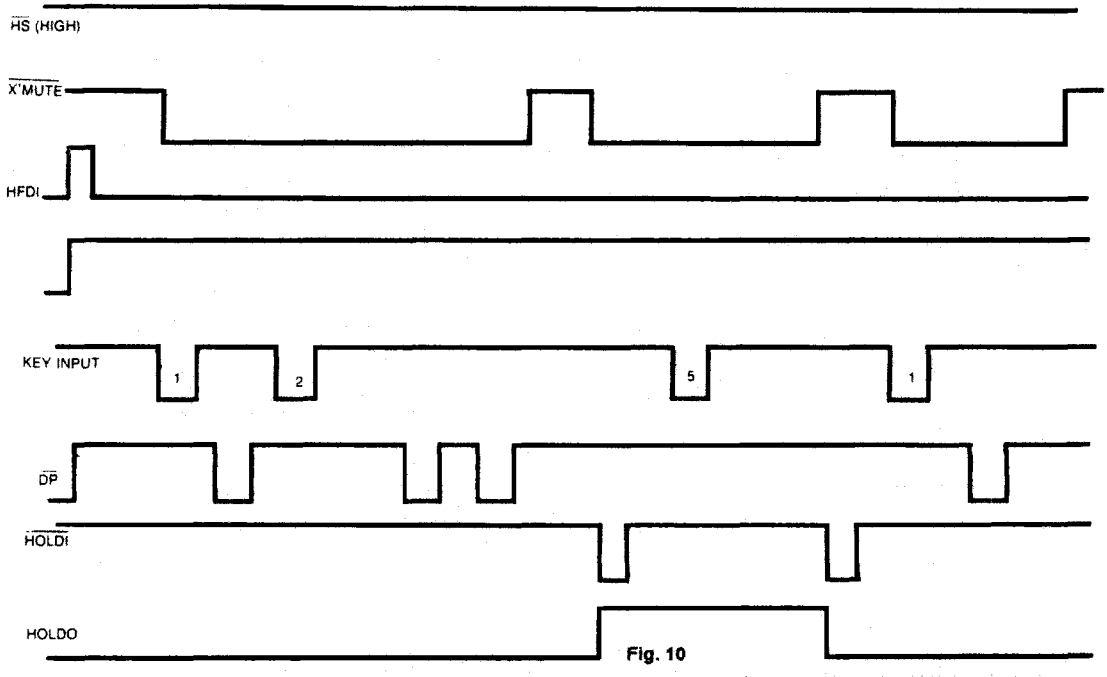


Fig. 10

APPLICATION CIRCUIT