

MICROELECTRONIC TONE GENERATOR MH8900 SERIES

Patented in Canada, U.S.A., United Kingdom, Belgium and Italy. Patents pending in other countries.

features

- Dual Frequency Capability
- Standard Telephone Tone-Dial Frequencies:
Low Group – 697, 770, 852, 941 Hz; High Group – 1209, 1336, 1477, 1633 Hz
- Specification Ratings Exceed CCITT Recommendations
- Interface Capability with Any Tone Telephone System
- Design for Greater than 15-Year Lifetime
- Optional Internal Polarity-Guard Bridge
- Wide Operating Voltage
4.5V to 35V Without Bridge
6.1V to 37V With Bridge

description

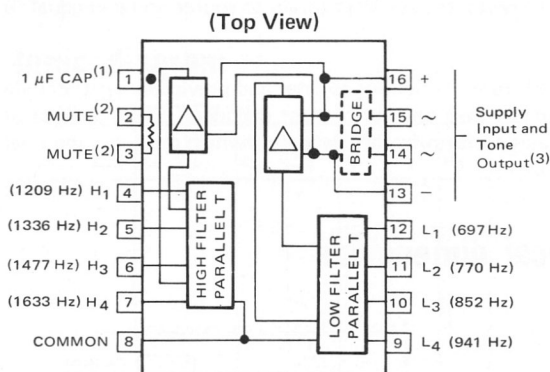
The MH8900 is a high stability, dual frequency tone generator designed primarily for use in push-button telephones and end-to-end signalling systems. In the series there are twelve unique variations for custom selection.

The tone generator is constructed in hybrid form using Silicon integrated circuits and the Tantalum thin-film process developed at Microsystems International. The circuit comprises unique, dual, high gain amplifiers with a bias and clipping network, coupled to modified parallel T filters. All capacitors and all but four resistors are fabricated using Tantalum thin-film, and with this arrangement an unusually high degree of stability and close tolerance (laser trimmed) have been achieved.

absolute maximum ratings

Terminal Voltage (Pins 13-16)	38V	Operating Temperature Range	-45°C to +65°C
Terminal Surge Voltage (2ms duration)	45V	Storage Temperature Range	-65°C to 150°C

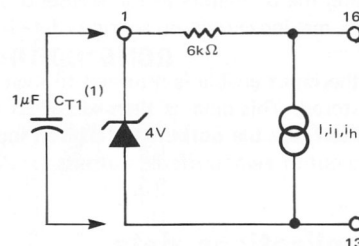
block diagram and pin configuration



NOTES:

1. Capacitor required if dc input voltage is 4.5V to 6.0V across pins 13 and 16 or 6.1V to 7.7V across pins 14 and 15; not required for higher voltage levels.
2. Resistor for muting purposes $5k\Omega \pm 20\%$ (max. current 1mA).
3. Use pins 13 and 16 (4.5V to 35V) without bridge, pins 14 and 15 (6.1V to 37V) with bridge.

equivalent circuit



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MICROELECTRONIC TONE GENERATOR MH8900 SERIES

MH8900 SERIES MICROELECTRONIC TONE GENERATOR

general specifications

Frequency Drift⁽¹⁾: < 1.5%

Group Amplitude Stability: ±25%

Total Distortion (Harmonic + Intermodulation):
< 5% (relative to level of fundamental frequencies)

Typical Rise Time to Specified Output and Frequency:

- 1) Frequency selected, power supply switched ≤ 5ms
- 2) Power applied, frequency selector switched ≤ 2ms
- 3) Power applied, frequency within same group changed ≤ 2μs

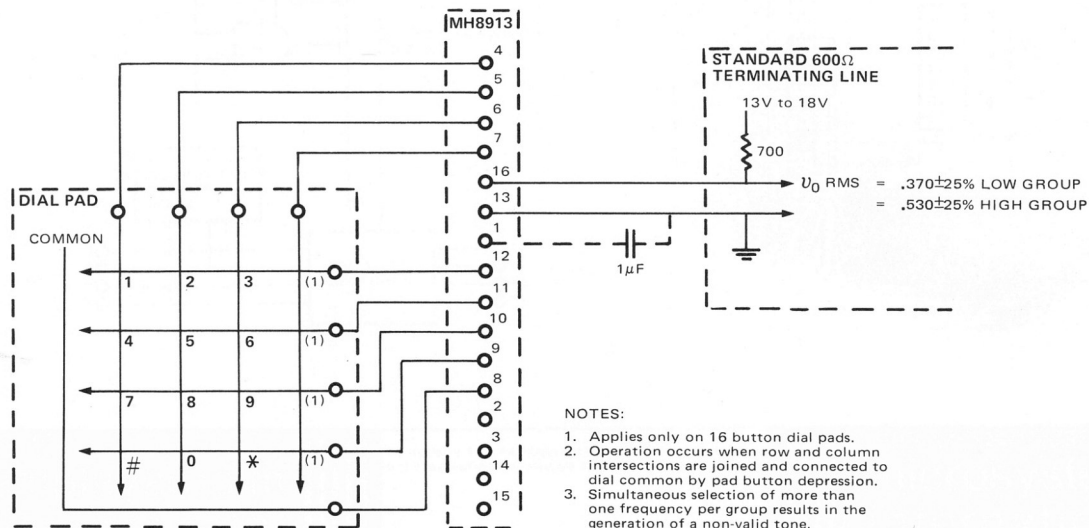
NOTE:

1. Frequency variation includes temperature coefficient of passive components, amplifier pulling, long-term drift for full life, and terminal voltage variation.

selection chart

PRODUCT CODE	DIODE BRIDGE	O/P LEVEL CURRENT (mA _{RMS} ± 25%)		O/P LEVEL ACROSS 300Ω NET LOAD (mV _{ac} ± 25%)		UNIT CURRENT DRAIN			
		LOW GROUP	HIGH GROUP	LOW GROUP	HIGH GROUP				
						4.5V	6.1V	35V	37V
MH8900	No	2.59	2.59	790	790	11.3	—	16.5	—
MH8911	No	0.64	0.92	194	271	4.8	—	10.0	—
MH8912	No	0.42	0.57	129	166	3.8	—	9.0	—
MH8913	No	1.24	1.77	370	530	7.4	—	12.5	—
MH8914	Yes	0.64	0.92	194	271	—	4.8	—	10.0
MH8915	Yes	0.42	0.57	129	166	—	3.8	—	9.0
MH8916	Yes	1.24	1.77	370	530	—	7.4	—	12.5
MH8917	No	0.81	1.03	241	302	5.3	—	10.4	—
MH8918	No	0.57	0.71	170	213	4.5	—	9.7	—
MH8919	Yes	0.81	1.03	241	302	—	5.3	—	10.4
MH8920	Yes	0.57	0.71	170	213	—	4.5	—	9.7
MH8921	Yes	2.59	2.59	790	790	—	11.3	—	16.5

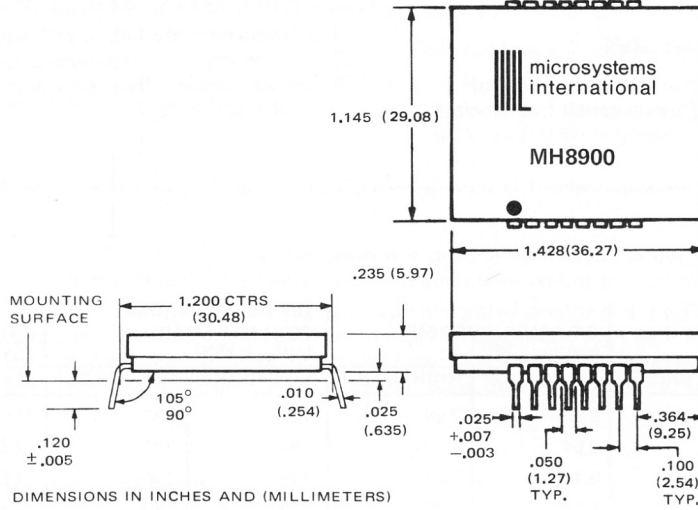
typical circuit connection diagram



technical data

MICROELECTRONIC TONE GENERATOR MH8900 SERIES

physical dimensions



technical data

ELECTRONIC KEYING OF THE MH8913 TONE GENERATOR WITH ML3045 SERIES TRANSISTOR ARRAYS

INTRODUCTION

This document describes a method of electronically switching-on the tones available from the Microsystems MH8913 tone generator.

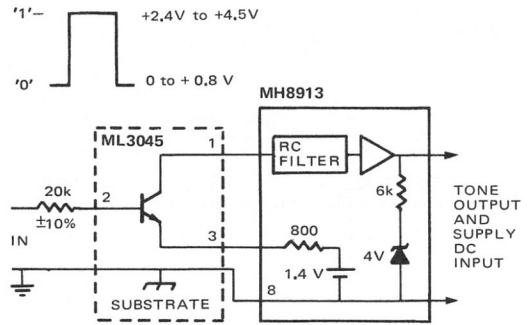
The tone generator was designed for standard telephone tone-dialing frequency generation. It is normally located on the dial pad and controlled by relatively short leads to the frequency determining contacts. Frequency selection can also be achieved by using transistor switches, which may then be controlled by positive going voltage levels. In this application the switching transistors are contained in two ML3045 series integrated circuits. Voltage levels used are suitable for TTL drive.

Any of the MH8900 series tone generators may be controlled similarly.

SWITCHING CIRCUIT DESCRIPTION

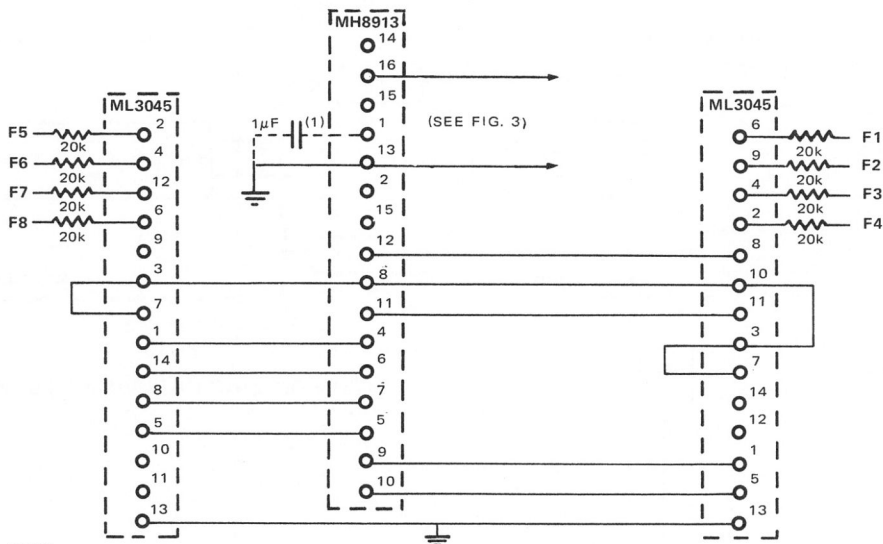
Fig. 1 and 2 show the electronic switching system used. Positive going input voltage operates a transis-

tor in each of the frequency determining paths connecting the appropriate pins to dial common (Pin 8) via the low impedance saturation resistance of the switching transistor.



NOTE
1. Only one frequency pin of one frequency group shown.

FIG. 1 SIMPLIFIED SWITCHING CIRCUIT



NOTE:
1. Capacitor required for certain voltages as specified in MH8900 series data sheet.

FIG. 2 CONNECTION DIAGRAM

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ELECTRONIC KEYING OF THE MH8913 TONE GENERATOR WITH ML3045 SERIES TRANSISTOR ARRAYS

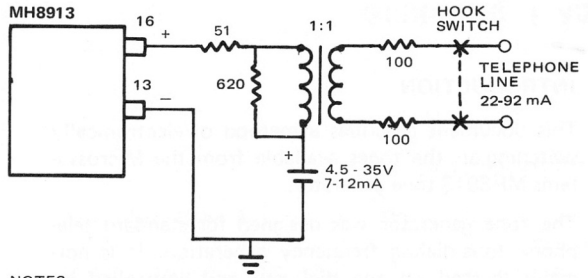
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KEYING CIRCUIT PERFORMANCE

PARAMETER	MIN.	TYP.	MAX.	UNITS
Input logic level '1'	2.4	.3	4.5 ⁽¹⁾	V
Input logic level '0'	0.0 ⁽²⁾	0.2	0.8	V
Switching device:				
V_{sat} @ $I_B = 100\mu A$	—	—	15	mV
I_{CO}	—	—	1	nA
Change in MH8913:				
frequency	—	—	-0.15	%
amplitude	—	—	+5	%

NOTES:

- V_{MAX} . Logic '1' may be exceeded where required; however, a suitable resistor network must be used to keep the switching transistor base drive $\leq 200\mu A$.
- Logic '0' MIN. voltage may be as low as -5V provided the ML3045 substrate connection is also taken to the lowest potential in the switching system.



NOTES:

- Line level low f group 315mV \pm 25%
- Line level high f group 450mV \pm 25%

FIG. 3 NORTH AMERICAN TELEPHONE SYSTEM LINE INTERFACE

applications information

INTERFACING THE MH8913 TONE GENERATOR TO TELEPHONE NETWORKS

by j. lafreniere

INTRODUCTION

The MH8900 series may be interfaced with any known telephone system, depending on choice of tone generator levels and external circuitry. Shown in Fig. 1 as an example is the MH8913 as used in the North American System.

The MH8913 tone generator may be used to replace the standard LC tone generator, resulting in advantages such as:

- Greater amplitude stability vs temperature.
- Greater frequency stability vs temperature and time.
- Lower intermodulation distortion.
- Better reliability.

Using the MH8913, the frequency switching sequence remains unchanged: operation of dial buttons (Fig. 2) selects the appropriate frequency contacts; eg. button 1 selects the $L_1 + H_1$ frequency combination. Any one button selection simultaneously activates the dial pad common switch (S1, S2, S3), resulting in the insertion of a 5k ohm muting or anti-feedback resistor in series with the receiver; the connection of power to the dial; and the disablement of the transmitter. In the case of dial-in-handset system however, S1 and the muting resistor are shorted, thus providing the desirable loud feedback tone.

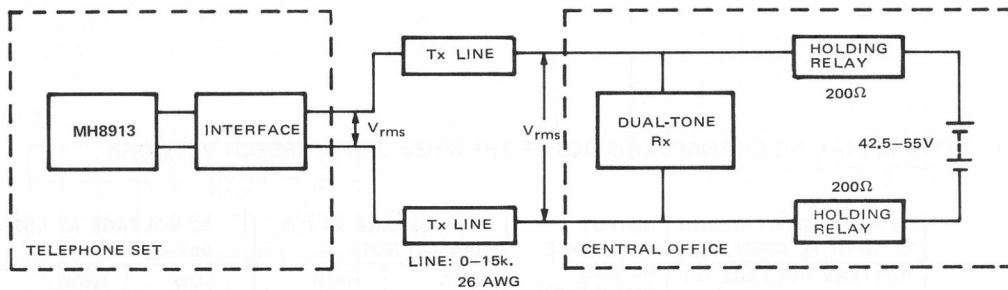


FIG. 1 NORTH AMERICAN DIALING SYSTEM

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INTERFACING THE MH8913 TONE GENERATOR TO TELEPHONE NETWORKS

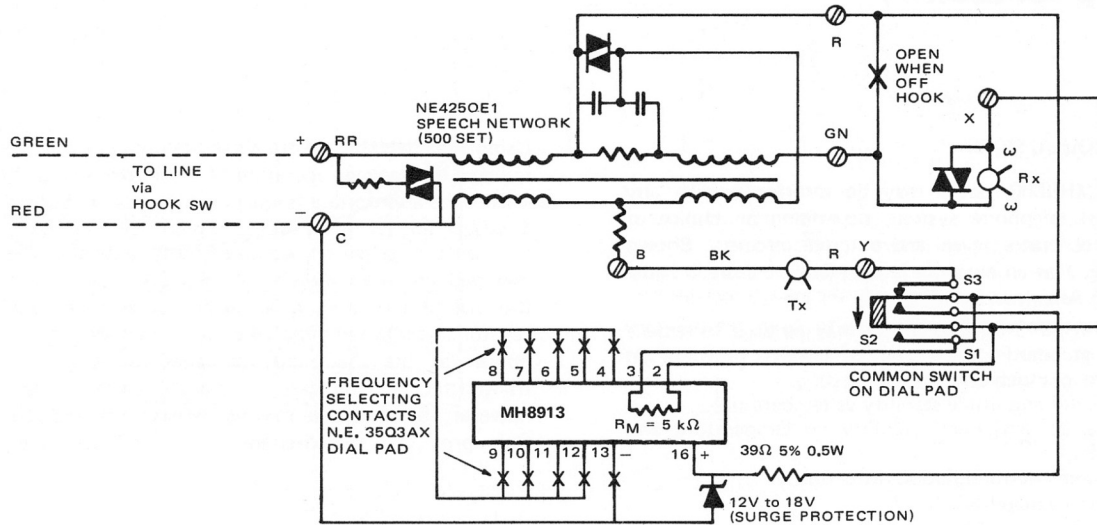


FIG. 2 NORTH AMERICAN TELEPHONE SET

TABLE 1 TYPICAL DIALING CHARACTERISTICS OF THE MH8913 WITH SPEECH NETWORK

LOOP LENGTH (Ω)	DC VOLTAGE AT 'R' AND 'C' WITH Tx OPEN (V)			OUTPUT IMPEDANCE DURING DIALING (Ω)	AC VOLTAGE AT C.O. (mV_{rms}) NOTE 1.		AC VOLTAGE AT LINE (mV_{rms}) NOTES 1, 2.	
	BATTERY VOLTAGE (V)				LOW GROUP	HIGH GROUP	LOW GROUP	HIGH GROUP
	55	48	42.5					
0	11.5	10.5	10.0	$500, \angle +25^\circ$	225	330	230	340
1300	6.3	5.9	5.4	$700, \angle +15^\circ$	200	220	540	600

NOTES:

- Battery voltage = 48 V; relay resistance = 400 Ω ; AC termination 900 Ω .
- If R_M and S_1 are replaced by a short, the ac output voltages are reduced by about 25% by the loading of the receiver.