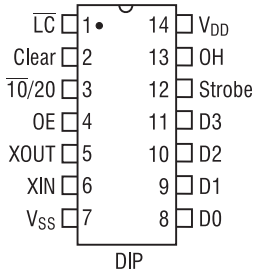
M-959
Dial Pulse Counter and Hook Status Monitor

Features
- Time-guarded dial pulse counting
- 10 or 20 PPS dialing speeds pin selectable
- Tri-state data outputs
- Valid data output strobe
- Data strobe control for use in interrupt-driven environments
- Independent hook status monitoring
- Low-power CMOS construction

Pin Diagram



Description

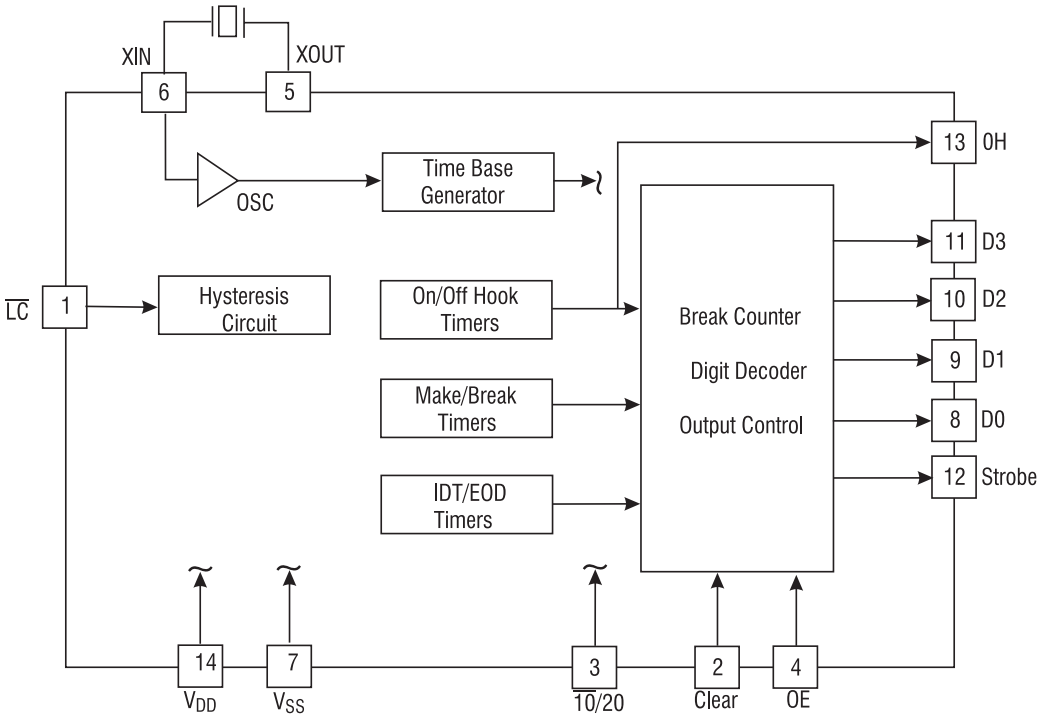
The M-959 is a low-power dial pulse counter and hook status monitor. Contained in a 14-pin package, the M-959 requires no external components except a single 3.579 MHz television color burst crystal.

The M-959 is typically connected to a loop current sensing circuit, which is connected in series with the voice pair (Tip and Ring) of a telephone line. The M-959 receives pulses from the loop current sense circuit and translates them into logic level outputs indicating hook status and decoded dialed digits. Logic inputs to the M-959 select dialed digit speeds and control Data and Strobe outputs supporting bus interrupt driven implementations.

Ordering Information

Part #	Description
M-959	14-pin plastic DIP

Block Diagram



Absolute Maximum Ratings

DC Supply Voltage	6.0 V
Any Input Voltage Relative to V_{DD}	+0.3 V
Any Input Voltage Relative to V_{SS}	-0.3 V
Operating Temperature Range	-40˚C to +85˚C
Storage Temperature Range	-55˚C to + 125˚C

* Exceeding these ratings may permanently damage the M-959.

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and effect its reliability.

Specifications

V_{DD} - V_{SS} = 2.5 through 6.0 V unless otherwise noted.

	Parameter	Conditions	Min	Typ	Max	Units	Notes
Signal Timing	Break Recognition	10 PPS	45	–	85	ms	
		20 PPS	30	–	40	ms	
	Spurious Break Rejection	–	0	–	10	ms	
	Make Recognition	10 PPS	30	–	65	ms	
		20 PPS	15	–	24	ms	
	Interdigit Time (IDT)	10 PPS	285	300	315	ms	
		20 PPS	142.5	150	157.5	ms	
	Off-hook Delay	–	95	100	105	ms	
	On-hook Delay	–	285	300	315	ms	
	LC Hysteresis	–	1	1.5	2	ms	
	EOD (End of Digit) Recognition	10 PPS	95	100	105	ms	
		20 PPS	47.5	50	52.5	ms	
	STROBE Active	10 PPS	190	200	210	ms	
		20 PPS	95	100	105	ms	
	Data Change Before	–	1.0	1.5	2.0	ms	
Logic Input Requirements	Input Voltages	Logic 0	0.0	2.25	1.5	V	1, 2
		Logic 1	3.5	2.75	5.0	V	1,3
	Input Current		–	–	± 30	µA	
	Pull Up/Down Resistance	–	–	–	2.0	mA	
Logic Output Characteristics	Output Voltages	Logic 0	0.0		0.5	V	1, 4
		Logic 1	4.5		5.0	V	1, 3
	Output Currents	Vout = 2.5V	-2.1	-4.2	–	mA	1
		Vout = 4.6V	-0.44	-0.88	–	mA	1
		Vout = 0.4V	0.44	0.88	–	mA	1
	Tri-State Leakage	–	–	–	± 1.0	µA	
Power Requirement	Supply Current	–	–	–	2.0	mA	

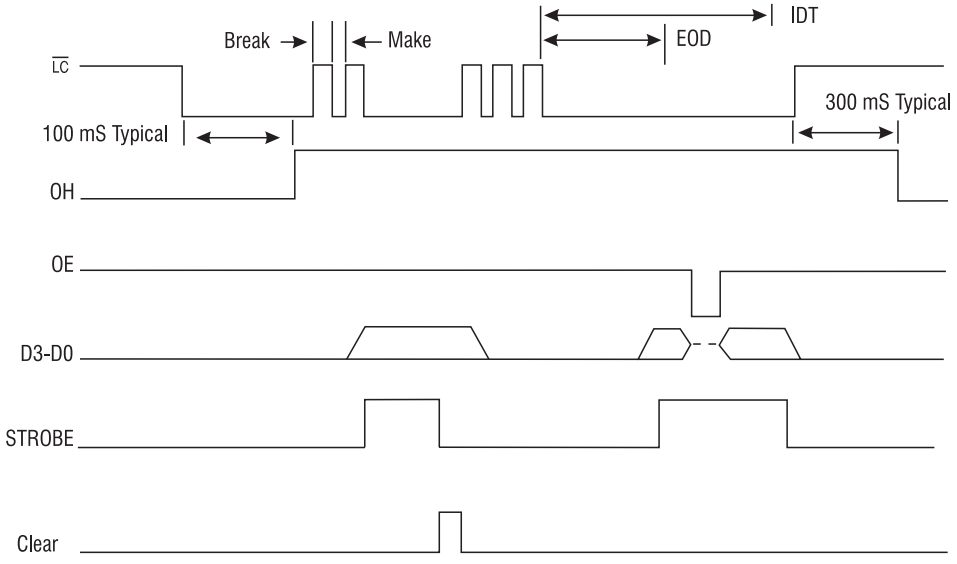
Notes:

1. V_{DD} - V_{SS} = 5.0V
2. Maximimum is 30% of V_{DD} - V_{SS}
3. Minimum is 70% of V_{DD} - V_{SS}
4. No load.
5. Typical column for reference only.

Pin Functions

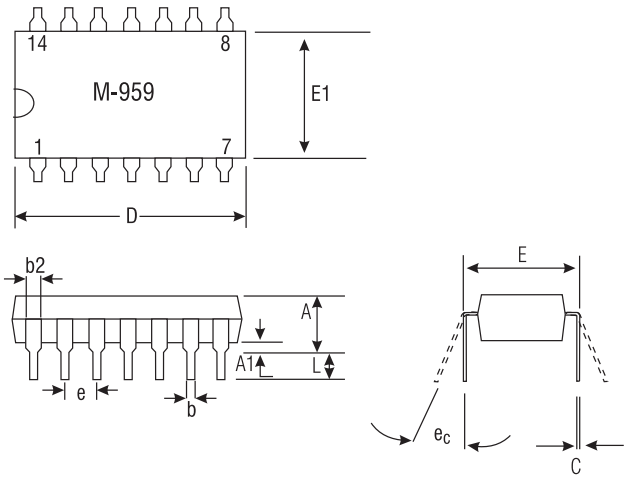
Pin	Function
$\overline{LC}$	Loop Current Input. Signal from phone line to be monitored for dial pulse signaling and hook status. Active low, internally pulled high.
OH	Off-hook Output. Hook status of phone line. Active (off-hook) high.
$\overline{10}$/20	Pulse Speed Input. Low for 10 pulse per second, high for 20 pulse per second. Internally pulled low.
D3-D0	Data Outputs. Binary decoded rotary dialed digit. Active during valid digit time (strobe high), low at any other time.
	Digit Dialed D3 D2 D1 D0
	1 0 0 0 1
	2 0 0 1 0
	3 0 0 1 1
	4 0 1 0 0
	5 0 1 0 1
	6 0 1 1 0
	7 0 1 1 1
	8 1 0 0 0
	9 1 0 0 1
	0 1 0 1 0
OE	Output Enable Input. Active high, a log low tri-states D3 through D0 outputs. Internally pulled high.
XIN	Crystal Oscillator Input
XOUT	Crystal Oscillator Output.
Clear	Strobe Control Input. Momentary high during digit valid time resets STROBE latch output low until next valid digit is received. Internally pulled low.
Strobe	Digit Valid Output. Indicates valid digit data present on D3 through D0. Active high.

Timing Diagram



Mechanical Dimensions

14-Pin DIP



Tolerances				
	Inches		Metric (mm)	
	Min	Max	Min	Max
A		.210		5.33
A1	.015		.38	
b	.014	.022	.36	.56
b2	.045	.070	1.14	1.78
C	.008	.014	.20	.36
D	.735	.775	18.67	19.70
E	.300	.325	7.62	8.26
E1	.240	.280	6.10	7.1
e	100 BSC		2.54 BSC	
ec	0˚	15˚	0˚	15˚
L	.115	.150	2.92	3.81

Drawing not to scale.
Does not reflect actual part marking.

Dimensions
mm
(inches)

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