

circuit ideas

Key Bounce Eliminator for Single Contact Key

Here is an inexpensive circuit which may be used to eliminate the make and break key bounce of single contact keys. It uses only two ICs—74123, a dual retriggerable monostable multivibrator and 7400, a quad 2-input NAND gate — and a few resistors and capacitors.

The circuit is shown in Fig. 1. Before explaining the circuit, let us understand what key bounce is for the benefit of those who have experienced it but did not understand.

When a single 'make contact' key is released, it is found that before making the final contact, in the transition from no contact to contact, which may be from a few tens of nanoseconds to few hundreds of nanoseconds, the key in fact makes several makes and breaks. Similar observations are made while releasing the key. In certain applications, where the operation is edge triggered, this may not be desirable at all. For instance, if this key is at clock input of a toggle flip-flop, multiple triggers instead of one may go when the key is activated, which makes the key functionally inoperative for this purpose. Thus, it becomes an absolute must to have a circuit which gives only one pulse when the key is depressed.

Fig. 2 shows the various waveforms observed in the circuit. P is the waveform when the key is depressed, showing the key bounce at make and break. B1 is in-

verted waveform of P. At the rising edge of B1 the first monostable of 74123 is triggered. 74123 is a retriggerable monostable so that it gives a pulse determined by its RC time constant from the last bounce of key. This time constant is chosen to be about 5 milliseconds so that no pulse at output results if the key is depressed for less than this period. This ensures that output pulse occurs on genuine key depression and not with spurious trigger re-setting from switching transients in power supplies of ICs.

Q1 is the waveform at output of first monostable. The dotted portion is one which may or may not occur, de-

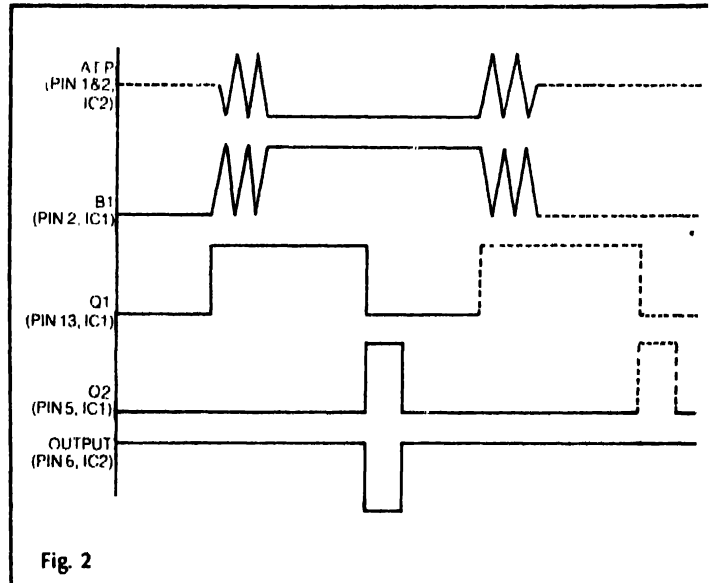


Fig. 2

pending on key bounce at break (first monostable is triggered at positive edge). The falling edge of Q1 triggers the second monostable, whose time constant can be chosen according to the pulse width required, which may be up to several tens of microseconds ($T = 1.2 RC$).

The output waveform of second monostable is shown in Q2. The dotted portion is one which occurs if there is bounce at break of key contact. The output Q2 is NANDed with B1 to give output. We see if the key was depressed for more than 5 milliseconds then NAND of Q2 and B1 gives an output pulse as shown. The dotted pulse of Q2 does not give any output pulse when NANDed with B1 which now is 0. Thus the key bounce is eliminated.

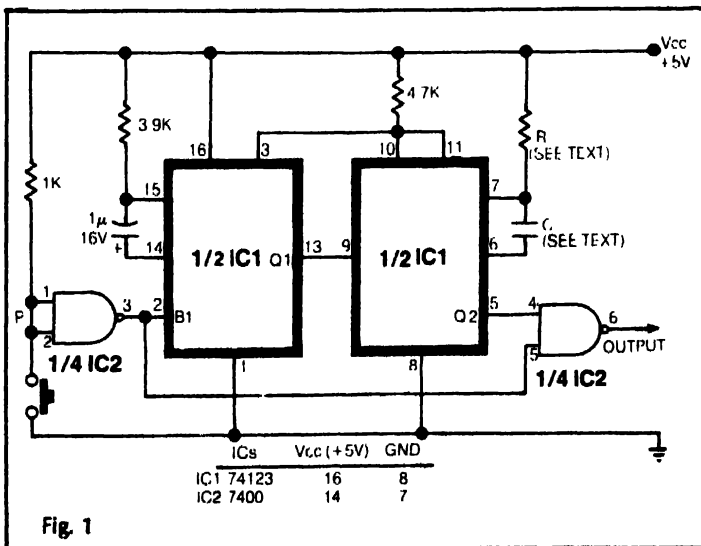


Fig. 1

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