



# ULTRA-BLISTER WASHING MACHINE

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## Abstract

This particular paper deals about the proposed design of a smart washing machine. Its the most efficient portable machine which can be easily taken anywhere. It sounds good to hear that ultra-blister washing machine consumes 80 times less electric power than a normal traditional washing machine. Ultrasonic transducer plays an vital role in converting electrical energy into high frequency ultrasonic waves. Unlike other washing machines it is not only used for washing clothes, it can wash utensils as well.

**Key Words:** Ultrasonicwaves, cavitation and transducer.

## 1 Introduction

In the next generation Washing Machine- called ULTRA-BLISTER from the name it enlightes that ultrasonic waves are being used and creates bubbles which are known as blisters. Generally, the favourite clothes have been hopelessly spoiled when they are rinsed

in the washing machine along with the heavy clothes. It also frustrates us when the colour gets faded [5]. Washing will be more painful especially in case of removing strains from delicate clothes like silk, cashmere and lace without damaging them. In order to overcome all these kinds of problems this ultra-blister washing machine is proposed which cleans the clothes with the power of ultrasonic technology. Its design resembles the size of a smart phone which can be perfectly portable to fit in any bathroom, travel luggage, pockets, wallets and handbags.



Fig.1. Imaginary representation of ultra-blister

## 2 Description:

Ultra-blister washing machine comprises of the outer protective shield, ultrasonic transducer, cables and power supply .As shown in the fig.1 the outer visible section is the outer protective shield. It is made with high density plastic material which serves as most efficient protective part. It is highly water resistant and wont allow the water to get in contact with the internal parts. Inside the shield transducers are placed. Transducers are the special instruments which convert one form of the energy into another. Ultrasonic transducer is used in ultra-blister washing machine.



Fig.2.Ultrasonic Transducer

Fig.2 shows the structure of ultrasonic transducer. The ultrasonic transducers are the devices which usually convert electrical energy into ultrasonic vibration. These transducers are classified on the basis of the medium into which the waves are generated [1]. Some of them are gas-driven transducers, pneumatic transducers, liquid -driven transducers [2]. All these transducers mentioned here are limited to low ultrasonic frequencies which has more industrial applications. There are some other types of ultrasonic transducer such as piezoelectric and magneto strictive transducers. In ultrablistar, base type ultrasonic transducers are used which allows the machine to be simple and compact. Input to the washing machine is given through the cable which is connected to the outer frame. Either Single phase or 3 phase AC supply can be given to the ultrablistar to operate it in an efficient way.

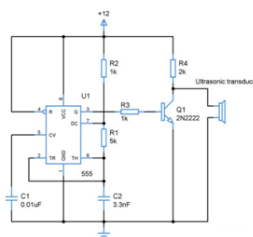


Fig.3. circuit diagram of ultrasonic transducer

Ultrasonic waves are defined as the sound waves whose frequency is greater than 20 KHz which is not audible to the normal human ears. This ultrasonic possess wide variety of applications from industries to detect flaws in machineries to medical field for treating and detecting ailments. In fact some animals like Bats, dolphin etc use these waves to interact with the external environment. The circuit shown in fig.3 demonstrates constructing a simple 40 KHz ultrasonic transmitter built around timer IC 555 [3][4].

The IC 555 was wired to work as an astable multivibrator which forms the oscillator part of the above circuit. This IC U1 was configured to produce a continuous serial square wave pulses of 40KHZ. And the output frequency was governed by the equation  $F = 1.44 / ((R2 + 2R1)C2)$ . In the above circuit the components R1, R2 and C2 was selected to give 40KHZ square wave as output. Apply input signal will cause them to oscillate and in turn produces

high frequency sound waves. Also some components adapt other methods to produce ultrasonic waves.

The transistor 2N2222 was used to drive the transducer. The 555 oscillator can be replaced with oscillators built around crystals for long sustained oscillations.

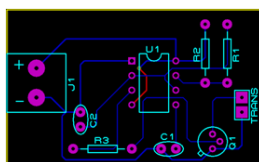


Fig.4.PCB design of ultrasonic transducer

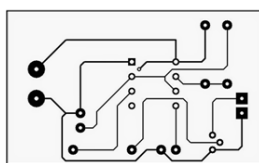


Fig.5. bottom view

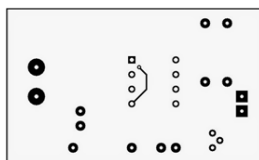


Fig.6. top view

Fig.4 depicts the printed circuit board of ultrasonic transducer which will be easy for stimulated study. Connections can be easily understood from the PCB design. Fig.5 and Fig.6 shows the bottom and top view of the PCB design.

### 3 Working of Ultra Blister:

Its amazingly simple process unlike normal washing machine where the clothes are placed inside the machine but in the ultra-blister its placed along with the clothes in any water sink. Working of ultra-blister will be simple as one need to place the clothes in any sink or water proof container and then to add water, adequate detergent and place the device.

Switch on the power button and enjoy the free time. An indicating light shows that the ultra-blister has started its working. It takes at the maximum time of 30 minutes to wash the clothes gently. Then the clothes can be taken off from the sink and can be rinsed and hanged out for drying. After drying they look like new even after many washings also. This is how our ultra-blister works. The actual internal working process is described as below.

The heart of the device is a powerful Transducer which creates and releases the ultrasonic waves that are wide band and progressive. It generates a millions of small bubbles in the water. The process of formation of vapour cavities, liquid free zones which means bubbles that are consequence of forces acting upon the liquid is called CAVITATION [6] is shown in fig.7. These high-pressured bubbles mix with the detergent and clothes without any external movement. These tiny bubbles grow to the maximum size and then implode releasing energy. As this implosion takes place near to the surface of fragments [7] and the generated pressure wave carries the fragments away from the surface which is shown in the fig.4.

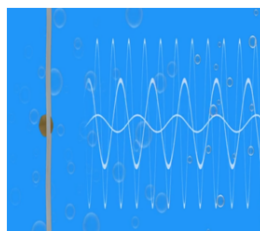


Fig.7. Movement of bubbles (Cavitation)

The energy released by the implosion can penetrate deep in to the clothes and produces uniform cleaning effect on even the most complex components.

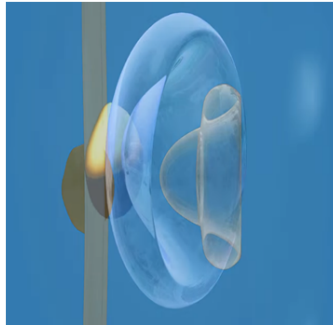


Fig.8. The pressured bubble hits the fragment or dirt

#### 4 Differences between Ultra-blister and normal washing machine:

| NORMAL WASHING MACHINE                                   | ULTRA-BLISTER MACHINE                               |
|----------------------------------------------------------|-----------------------------------------------------|
| It uses maximum electrical energy.                       | It uses 80 times less energy than normal machine.   |
| Colour may be faded.                                     | There is no fading of colours.                      |
| It's complex in structure.                               | It's small in size.                                 |
| Difficult to move to other places.                       | It's easily portable.                               |
| It consumes minimum of one hour to complete its process. | Less time consumption.                              |
| It occupies more space.                                  | It occupies less space, can fit even in the pocket. |

#### 5 Conclusion

At first glance it may look like a bar of soap, a smart phone but actually it's a portable ultrasonic washing machine named Ultra-blister. Generally there will be fear to wash costly clothes or more delicate clothes along with the normal clothes. In that case one commonly goes with laundry stores and pays more money there or we work for hand-washing those clothes. Ultra-blister is mainly invented to eliminate the hand-washing and fear of washing the delicate clothes. It's more portable so that while on our journey times and for the sports people or for the people who like to go on ad-

venturous places, one can take along with them not only to them everyone can make use of it to reduce the washing problems normally they faced with conventional washing machine. Its operation is amazingly simple, ultra-blister is kept in a sink along with clothes and water and detergent. The transducer in the device produce ultrasonic waves(of frequency greater than 20khz) which will move with high pressure and remove the dirt in the garments. There will be no fading of colours, no whirling, no rubbing, no stretching. All favourite clothes will be thoroughly and safely cleaned with the ultrasonic technology. The clothes will be ultra- fresh. The bacteria may also be removed with this process.

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