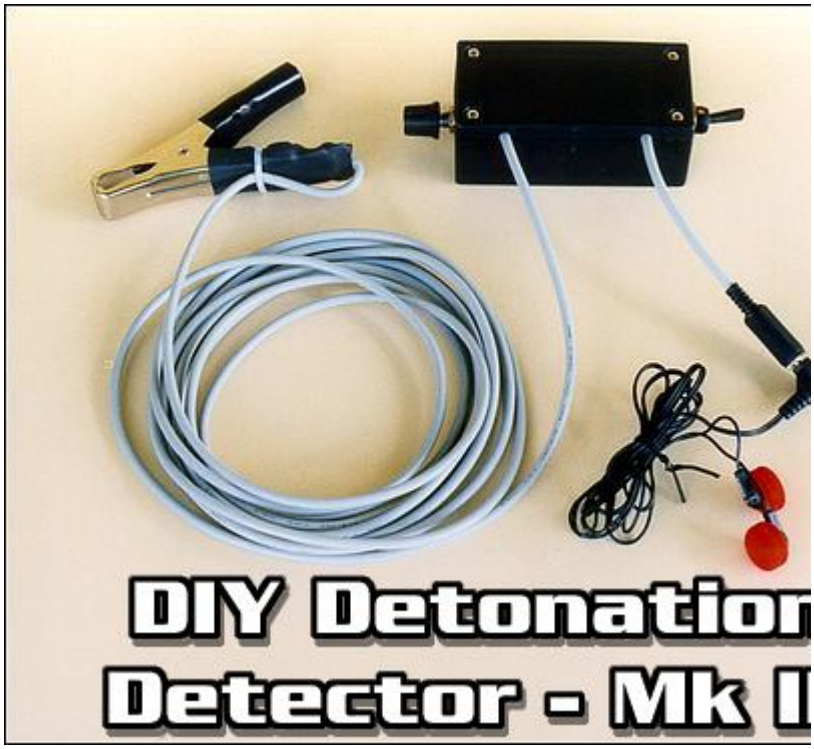

Issue: 176 **Section: Technical Features**

DIY Detonation Detector - Mk II

A new and brilliant DIY detonation detector.

by Julian Edgar

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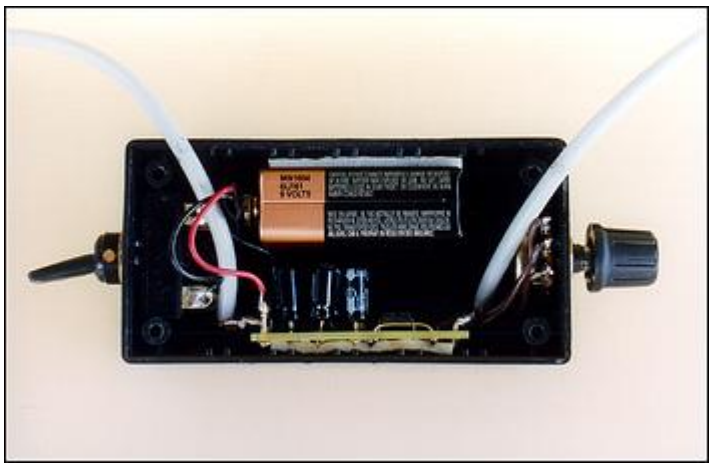
Way back in October 1999, AutoSpeed ran an article on building your own detonation detector. For reasons which we'd given in a previous article ["DIY Detonation Detection - Part 1"] - reasons which are still just as valid today - the

best DIY detonation detector is an audio system that allows the engine tuner to listen to the noises that the engine is making. The detector that we then gave instructions on building was based on a commercial product available from Dick Smith Electronics called the Whisper 2000. This unit - pictured here after modification - was a type of hearing aid dressed up to look like a Walkman. With some minor mods (involving relocating its microphone to a clip clamped to the engine) it worked very well as a detonation detector - however, not long after that article was written, Dick Smith dropped the product from their shelves.

And ever since, we've been receiving requests for an alternative.



So here it is - our new Mark II.

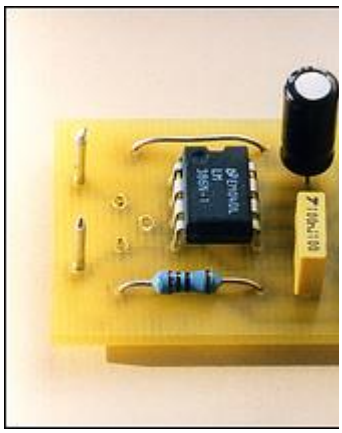
Unfortunately it is fidd design, because no off as its basis. However, with soldering and ele shouldn't have any diffi

And this design does over the old one. Firs 'bud' style earphones headphones. Most prof earphones in this a usually combine them with noise-reducing earmuffs worn over the top of the earphones. T noise reaching the ears is through the earphones and so is from the engine-mounted microp

The other advantage is that the new design has both less distortion and better sensitivity.

In fact, while you can turn down the volume so that even loud noises are only a whisper, at t can hear sounds that you simply never normally would be able to. We'll give you an exampl the sump plug and turning up the sensitivity, you can actually hear the oil flowing back to has been switched off!

The Parts



The basis of the system is the 0.5W Amplifier Module from Dick Smith Electronics (cat no K5604), which costs AUS$8.25. (Note that this same kit is also available from Jaycar Electronics - cat no KC-5152 at only AUS$6.70).

In addition to the kit, you will need these parts, which should be easily available worldwide:

- Piezo transducer (eg Dick Smith L7021, Jaycar AB3440)
- Good quality bud-style earphones
- 10K potentiometer and knob
- 3 metre length of twin-core shielded microphone cable
- In-line stereo socket to suit the earphone plug
- On/off switch
- 9V battery clip and 9V battery
- Box

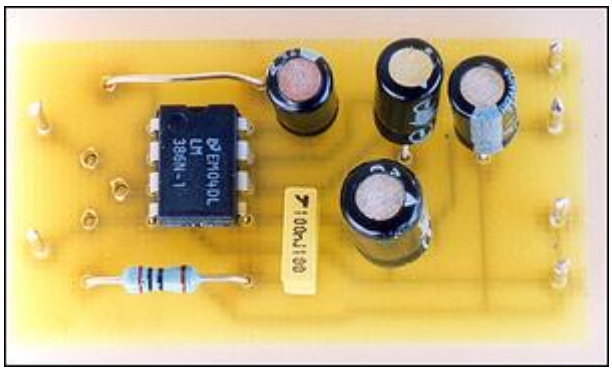
This lot should come in under AUS$30, and even if you run a sturdier metal box rather than item, it will still be well under $40.

Making It

The first step is to assemble the PC board of the amplifier kit.

Use a multimeter to measure the resistance of the two resistors so that you know which very sure that you get the polarity of the three round capacitors the right way around (the ne a line of 'minus' symbols down the body), and put the chip in with the correct orientation (th is which).

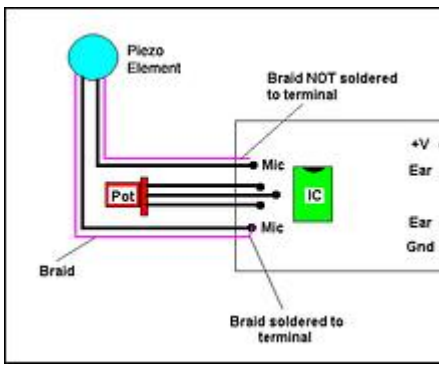
Note that there are two changes to the supplied assembly instructions - leave out the 1 kilo it with a wire link. This increases the gain of the amplifier. The other change is to leave out a bigger external pot instead.



So once you have done this, the

The next step is to solder the wir into place, with the black wire fro the normally open switch termir switch going to the Ground PCB the battery clip going straight t This is the power on/off switch.

Solder some insulated wires to th where the trimpot was supposed other ends of these to the new pot that you purchased. The centre wire from the PCB spot goes to the centre terminal on the new pot, with the other wires going either way around. This pot is the volume control.



Next you'll need to connect the approaches - the more elegant v the box that the earphones plug inline plug, which is what we although the stereo earphones (right channel, left channel, earphones in mono. This means the top of the plug (the tip and fi get connected together, with the the other wire.

But there's something missing, the microphone? Well in fact with we trialled a number of different microphones before picki best results overall. As the parts list shows, this is a piezo transducer. Not that it's **not** the instead as the Jaycar catalog states, "This is an electro-acoustic transducer which contai transform AC voltages to sound pressure waves. It will also generate an AC voltage a stimulated with a sound pressure wave." It's the latter function that we use it for here.

The transducer is glued facedown inside the arm of a battery clip, as shown here. The cable ties hold it firmly in place as the glue dries.

The assembly can then be covered in heatshrink, with an extra tie used as here to give the cord even more security.

The twin-core microphone cable each has a conductor soldered to the two terminals on the transducer, while back at the PCB these are connected (either way around) to the input and the ground. The braided copper sheath can be soldered to the ground terminal at the PCB, while at the transducer end the braid can be cut off short - and not soldered to anything. The braid acts as a shield, stopping electrical noise getting into the system.

Using It

Using the device is very simple. You simply clip to the microphone to whatever you are interested in listening to. Noises are transmitted through the metalwork directly to the clip and microphone, making the instrument extremely sensitive. To detect detonation, the clip is best placed directly on the block, in the type of place that the factory knock sensors are positioned - no surprise there! Adjust the volume control to give a comfortable loudness level, and sit back and listen. Over the clatter of pistons, valve gear, explosions and gearbox whines, detonation sounds like a sharp "splat!, splat!".

Note that you'll be hearing lots of noises other than detonation - don't expect just to hear detonation isolated from everything else. It's simply not that easy. Instead, use your bra discarding the normal sounds and waiting for something that's abnormal.

Depending on the location of the microphone clip, additionally gearbox noises, injector cli turbo whistling - the whole lot can be individually identified and problems isolated.

Note that it's best to listen from the passenger seat while someone else drives the car - th hear emergency vehicles and concentrate on driving, not listening to strange sounds.