



Design for a quieter lawn-mower

Those who curse the chorus of noisy mowers patrolling suburban lawns will be pleased to know that scientists at the CSIRO Division of Mechanical Engineering have invented a quieter rotary lawn-mower.

According to Dr Don Gibson of the Division, today's rotary mowers are generally no quieter than those of 10 years ago, despite the fact that more efficient mufflers are now being fitted. The explanation is that the engine is not now the major source of a mower's noise. Instead, it is the blades, which contribute aerodynamic noise as they whizz around inside their housing. And, for reasons discussed below, these blades make more noise than they used to.

The old mowers were primarily designed to mow grass, not catch it (although a small catcher could be clipped on the side). Modern mowers have a large integral catcher — for manoeuvrability, placed at the back. As well as cutting grass, then, the blades of the modern mower have to whirl the grass around to the back of the mower. To do this the blades are upturned on their trailing edge to create a vortex of air and the housing is highly arched to channel the air-suspended grass into the catcher. Significantly, the speed of the mower has to be

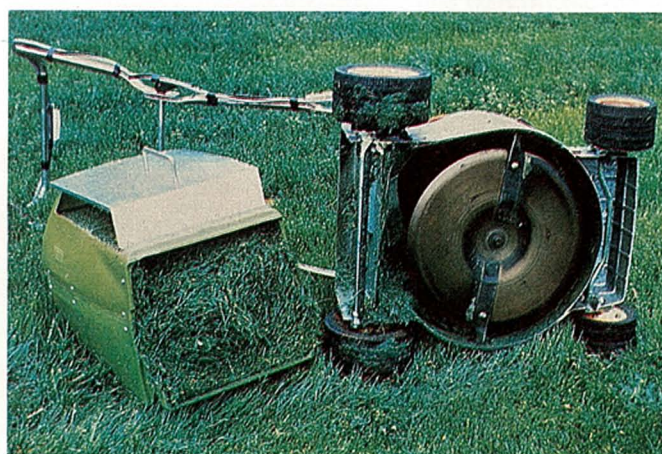
about 3500 r.p.m. to successfully achieve this action, whereas a speed of only 2500 r.p.m. is necessary if grass-cutting is the only aim.

This accounts for the higher-than-expected noise from the modern mower: its paddle-like blades create higher aerodynamic noise than the old flat ones, and their higher speed makes them noisier again.

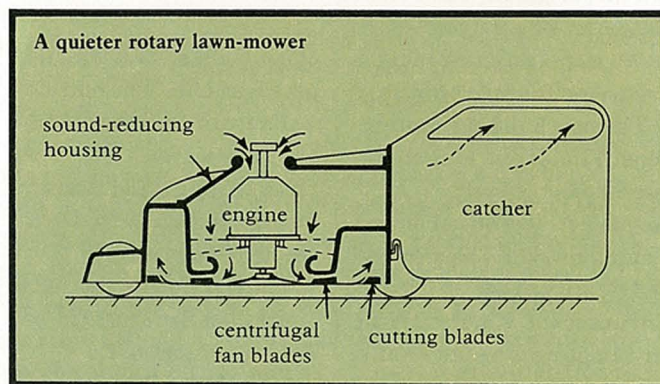
Mr Ian Shepherd and Dr Gibson arrived at a design for a quieter mower by arranging for the machine to catch grass at the slowest speed that would mow. They followed a number of by-ways in the course of reaching their object, but the successful arrangement finally devised separates the cutting function from the catching one: the one set of blades isn't called upon for both.

Their 'vortex' mower design incorporates a centrifugal fan above the flat cutting blades. This fan very effectively draws air down through holes in the top of the blade housing and swirls the air so as to entrain grass cut off by the blades; finally the air delivers the grass to the catcher. Aerodynamic noise is minimal: when the mower is driven electrically the dominant sound is that of the blades cutting the grass.

The pair measured the sound power level of a current commercial mower as 105 dBA at its operating speed of 3500 r.p.m. In comparison, the 'vortex' mower emitted 94 dBA when operating, in this



The quieter 'vortex' mower catches grass more efficiently than a conventional rotary lawn-mower.



The first set of blades cuts the grass while the second swirls air and grass into the catcher.

case at a speed of 2500 r.p.m., and it caught more grass.

There is scope for even more improvement. Since the centrifugal fan draws air in from over the engine, thereby cooling it, the engine can be enclosed by a sound-reducing housing. (Present mower engines can't be enclosed because they would run too hot; besides, as pointed out, the blades are noisier anyway.)

Legislation in Tasmania lays down that lawn-mowers sold there should emit less than 77 dBA measured 7.5 metres from the machine, a standard most present-day mowers just meet. To reduce the noise nuisance further, the hours during which one can operate a mower are also regulated, a measure since followed by several other States. The CSIRO unit easily passes the Tasmanian quietness standard.

Victa Limited, which sponsored part of the

research, is developing the mower further for the Australian market.

Reduction of aerodynamic blade noise in a rotary lawnmower. I. C. Shepherd and D. C. Gibson. *Noise Control Engineering*, 1980, 14 (in press).

Correction

In the article 'Leeuwin Current revealed' in *Ecos* 22, observations of seasonal changes in the occurrence of tropical marine animals at Rottnest Island should have been attributed to Mr B. Hutchins of the Western Australian Museum's Department of Ichthyology rather than to Mrs L. Marsh, Curator, Department of Marine Invertebrate Zoology in the Museum. We are grateful to Mrs Marsh for pointing this out, and regret the error.