# Noise and the Nation*

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## Noise on the Road

THREE reports on road transport noise have been issued by a Departmental Committee set up by the Minister of Transport, and the position is that for the first time in Great Britain a comprehensive attack has been made on the problem of road traffic noise. To this end, loudness measurements, many thousands in number, have been conducted under widely different working conditions, on the over-all noise of some 800 motor vehicles, both new and old, representing all the main types on the roads to-day. The results (at a distance of 18 feet sideways or 25 feet to the rear) mostly ranged between about 70 and 105 phons (the latter value corresponding to a noisy road drill). The Committee was led to propose simple running and racing engine tests which are associated under specified conditions with an 'over-all' noise limit of 95 phons (roughly equivalent to the noise in a tube train) for all vehicles in use on the road, and of 90 phons for new vehicles leaving the manufacturer's works.

The adoption of these noise limits, while making very moderate demands on most types of vehicles would, by ruling out the arch offenders, constitute a substantial contribution to the amenities of the road. In the meantime, the industry, which has already discovered that 'silence is saleable', has the matter well in hand, and indeed it is not unlikely that future developments will not only enable manufacturers to meet the proposed requirements with comparative ease, but may indeed enable the limits to be lowered as time goes on.

To assist the motor industry in this laudable object, the Ministry recently set up four noise-testing stations in different parts of the country. At each of these stations an N.P.L. noise meter is installed, and manufacturers are enabled to submit types of their products and so ascertain for themselves how the noise levels compare with the limits proposed.

The whole question will be further facilitated when the simplified objective noise meter, which has recently been developed by the National Physical Laboratory for the Ministry, is put on the market. Such meters, which will be checked against the Laboratory standard meter, should, when available in quantity, be of great assistance at such time as it may be decided to bring into force regulations for dealing with noise on the road.

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## The Abatement of Noise

There are two guiding principles when the question of noise abatement is being considered. One is that the degree of abatement of a noise in a particular locality need be no more than will conform to the background of noise which obtains in that locality. The other is that in a medley of noises, the loudest must be tackled first to achieve any appreciable benefit, after that the next loudest, and so on. This is illustrated by the fact that if there are two similar components and one is 10 decibels less intense than the other, the weaker one will contribute only half a phon to the over-all loudness.

The first line of attack on noise abatement, and in general much the most effective and economical, is to tackle an objectionable noise at the source, and find the best means of reducing the output as much as possible. The next step, possibly as a confession of failure, is to find a feasible method of confining or 'smothering' the noise in the place where it is generated. In either case we turn to the engineer for help, and we may anticipate that he is likely to be the more interested if he can see a potential demand from the public.

The path of a noise in its journey from source to hearer may be either *via* the intervening air or *via* a sequence of solid materials or structures. Experience has shown that the two effects require very different remedies for abatement. The study of the general problem of noise transmission is more complex than might be imagined, and some of the major difficulties are not as yet completely resolved. For the practical elucidation of the various factors involved, specially designed 'sound-proof' laboratories, such as those at the National Physical Laboratory, have proved to be necessary. Parenthetically, it may be mentioned that the N.P.L. acoustics laboratory, since its erection four years ago, has been so fully engaged in transmission and absorption work, mainly for the architectural profession and the building industry, that extensions are now in hand and should be available for use by the end of the year. Much research work on building acoustics is also being carried out for the Ministry of Health in connexion with slum clearance, and for the Architectural Acoustics Committee of the National Physical Laboratory and the Building Research Station.

To revert to the case of a non-suppressible noise, if most of the noise is transmitted by air, the best

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remedy, should circumstances render it practicable, is some sort of sound-proof enclosure, the design of which may need careful attention both as regards weight and discontinuity of structure. There is, of course, no such thing as a sound-proof material, and success in sound insulation is largely a matter of design.

Certain large-scale operations may require 'sound-proof' buildings to mask them, the doors and windows of which should be heavy and close-fitting and preferably situated on the side remote from that where the noise is liable to be regarded as a nuisance. Doors and windows, particularly high windows and skylights, may require to be doubled and, in extreme cases, it may be necessary to employ double walls mounted on independent foundations. Buildings in which noisy operations are carried on should, if possible, be put under the lee of larger buildings, which may afford advantageous shielding to the locality. In the interior of noisy buildings, it is usually beneficial to the workers to divide groups of noisy machinery, so far as may be possible, into smaller units, each in its own enclosure. Appreciable benefit may also result from lining walls and ceilings with acoustical absorbent, so preventing the noise level from building up unduly.

In the case of structure-borne noises, the remedy is discontinuity somewhere in the structure either in the form of an air gap or as resilient material, for example, under the foundations of noisy or vibrating machinery.

Modern building design and materials do not provide protection from noises, whether from inside or outside, like the more solid houses of a generation ago. The noise problem is accentuated in the case of the large blocks of flats which are being erected in all quarters, and which apparently are mainly adapted for quiet tenants who are prepared to conform in this respect to a landlord's reasonable requirements. The situation lies largely with local authorities, who should lay down building by-laws, setting forth minimum standards of acoustic insulation. The architect and builder have of necessity been driven from traditional methods of construction to meet the economic requirements and closer scientific designing of to-day. Discontinuity of structure and the use of massive and poorly conducting materials formerly provided defence against sound, but instead we now have monolithic structures which are not only thinner and lighter than the old, but also are composed of good conducting materials. The steel-framed and ferro-concrete building, cement mortar, hard bricks and plaster, to say nothing of a general ramification of central-heating, running water and other piping, have replaced the softer brickwork, lime mortar and plaster, wooden beams, joists and studding, and the localized piping of the older houses. No one pretends, of course, that we can go back to the old methods, but if we are to mitigate the noise nuisance in modern buildings, we must adopt measures which are best incorporated during the designing stage.

There is, too, another aspect which should be clearly appreciated, and that is, if sound insulation in buildings is desired, it has to be paid for. The public, at present enticed with a plethora of labour-saving devices by landlords of flats, has yet to learn that reasonable acoustic privacy is obtainable provided it is prepared to face a small proportionate increase in the rent.

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# Structure of Protein

THERE can be few problems of predominantly chemical interest which are being attacked by such a variety of methods of investigation as that of protein structure. This was well illustrated by the symposium on protein chemistry held on September 3 in Section B (Chemistry) of the British Association, in which the contributions ranged in subject from biochemistry to mathematics, each justifying its inclusion either by the addition of some significant fact to the total sum of knowledge or by the formulation of a stimulating hypothesis to account for facts which still await complete explanation.

The foundation of protein chemistry as we know it to-day has been laid by organic chemistry, which, chiefly in the hands of Emil Fischer and his pupils, has provided not only detailed information concerning the composition of proteins, but above all the unquestionable demonstration of the peptide linkage as the predominant feature of their intramolecular structure. Moreover, through the development of improvements in peptide synthesis, particularly the carbobenzoxy method, organic chemistry has provided a wealth of material which has illuminated the mode of action of proteolytic enzymes and which now promises to throw light on the physico-chemical behaviour of proteins and even perhaps on their immunological specificity. These points were brought out by Prof. C. R. Harington (London) in opening the symposium, but he was at the same time at pains to emphasize that the peptide theory in its simplest form is

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