

**the
book
of
noise**

R. MURRAY SCHAFER



NO STOPPING
NO STOPPING

END
QUIET
ZONE

.....HOWL!

This is a portrait of your city. Listen to it closely. Perhaps you have never really listened before. It is a fascinating and exasperating concert of sounds. Listen ...

Horns, sirens, motorcycles, trucks, jack hammers, power saws and construction machinery, helicopters and jets. Any attentive listener will conclude that these are the dominant instruments of the orchestra. These sounds are all louder than the human voice and they are getting louder. It has been estimated that our technology is raising the sound-level of the average city by a decibel per year.¹

The decibel is a unit for measuring the intensity of sound. It is used to express the relationship between the faintest sound man can hear and other sounds in the environment. It is logarithmic, so that an increase of 10 decibels means a tenfold increase in sound intensity; a 20-decibel rise a hundredfold increase, and a 30-decibel rise a thousandfold increase. The following table puts some of our environmental sounds into perspective.

Threshold of hearing	0 dB
Rustling of leaves	20 dB
Quiet whisper (3 feet)	30 dB
Quiet home	40 dB
Normal Conversation	60 dB
Average car (15 feet)	70 dB
Loud singing (3 feet)	75 dB
Average truck (15 feet)	80 dB
Subway (inside)	94 dB
Kitchen gadgetry	100 dB
Power Mower	107 dB
Pneumatic riveter	115 dB
Amplified Rock and Roll (6 feet)	120 dB
Jet plane (100 feet)	130 dB

There are some who still think the significant battles are being fought in faraway places. They do not realize that such battles are today unfashionable. The significant battles are being fought in the very hearts of our cities. In an attempt to improve or even maintain the quality of our environment it will be necessary to take a strong line against the problems brought about by the careless use of our technology. One of the significant problems is Noise Pollution. The sound of our tools and technology are the loudest sounds in our environment. They are becoming louder and they are multiplying. The modern city has become a sonic battleground. Man is losing.

1. The UNESCO Courier, July, 1967.

THE SOUNDSCAPE

Man's changing environment is a subject of vast studies today. Architects and behavioural scientists, sociologists and psychologists, together with those in many related areas are registering by their extensive interest in these studies a concern for improving the quality of man's life, not merely by providing him with improved economic prospects, but by fashioning for him a comfortable, healthy and stimulating environment for work and relaxation.

The soundscape of the world is an important part of our environment. As in other areas, we have discovered rather dramatically that we cannot go on dumping sonic sewage indiscriminately without some dangerous consequences. In one country alone 130 articles on Noise Pollution appeared in the daily press on an average day.²

Science will devote more energy to the problems of Noise. Legislators may even eventually bring about some realistic legislation on the subject. But a much larger and more emphatic public interest in the sonic environment is also necessary. It is the most necessary of all. A fascinating macrocosmic symphony is being played ceaselessly around us. It is the symphony of the world soundscape. And we are its composers.

The purpose of this booklet is to point out some of the dangers of Noise Pollution and to suggest ways we can help to reduce it.

The first way is to cultivate the habit of listening. Listen carefully with seismographic delicacy to the sounds of the environment around you. Close eyes and listen with musicians' ears (just for 5 minutes).

What was the loudest sound you heard?

What was the softest?

What was the highest?

What was the lowest?

What was the most beautiful sound you heard?

What was the most unbeautiful?

If you could, what would you change about the acoustical environment?

Listen each day and ask yourself questions about the sounds heard. Ears are precious instruments. They should be used critically. Man is the predominant maker of sounds in the modern world, the chief composer of the world soundscape and symphony. Will his composition be distinguished for its elegance and beauty or for its lousy orchestration?



2. Press clipping service of the Noise Abatement Society of Great Britain, printed in their Journal "Quiet Please", January 1962.

WHAT IS NOISE?

Noise is unwanted sound. It is accordingly distinguished from signals, which are wanted sounds. In communication engineering when a message consisting of signals is transmitted, any sounds or interferences which impair its accurate transmission and reception are referred to as **NOISE**.

Noise is any undesired sound. Noise is the wrong sound in the wrong place. This makes noise, to be sure, a relative term. The same sound heard in different settings may be either wanted or unwanted, signal or noise. A good mechanic knows from the sound of an engine when it is in good running order. He tunes an engine as a musician tunes a violin. For the mechanic the sound of a motorcycle functions as signal. But the same sound heard in the middle of sleep or during a moment of concentration will be noise. In the same way a musician's practising will be noise to those whom it disturbs.

The susceptibility of individuals to different kinds of sound will be different; moreover, as we shall see shortly, the special symbolism we tend to attach to certain sounds is most important in deciding whether they are to be regarded as signals or as noises. Thus while noise, like all sound, can be measured, we should not conclude that noise can be controlled adequately by regulations which fix arbitrary limits on certain sounds. This is only possible where such sounds constitute positive health hazards

or by unanimous consent concerning their social undesirability.

Medical studies have demonstrated that an environment in which the sound (any sound) is continually above about 85 - 90 dB (with slight variations from octave to octave) is dangerous to aural health and may result in deafness. Accordingly, many Workmen's Compensation Boards have adopted this criterion, permitting higher intensities for shorter periods of time only, in trying to regulate acoustical environments in industry. Unfortunately one cannot report that this is the case throughout Canada, because at the present time (1970) it is not.

In many cities and countries around the world public annoyance with the noise of road traffic has resulted in regulations on the intensity of sound permissible for cars, trucks and motorcycles. Police can measure the intensity level on a sound level meter and offenders are fined. In Canada the first city (1970) to have such a noise by-law is Ottawa (By-law No. 163-69).³

3. For cars the level is 83 dBA ("A" refers to a special weighting network on a sound level meter which discriminates against low-frequency sounds much as does the human ear) 88 dBA for motorcycles during the daytime and 83 dBA at night, and 90 dBA for trucks - all measured at a distance of 15 feet. The limits, all very liberal, constitute the first Canadian attempt to introduce legislation approximating that already adopted by Britain, France and parts of the U.S.A.

In some countries and cities around the world noise levels have also been established for jet aircraft during takeoffs and landings in an attempt to confront aircraft noise around airports. All flights are then monitored by computer and planes exceeding the limits set are singled out. In Canada there are no fixed limits and the first computerized monitor is just about (1970) to be installed at Toronto International Airport.

This does not mean that the annoyance factor of aircraft, cars or industry can be eliminated. It only means that some of the more outrageous or toxic sounds of the environment are beginning to receive special attention - at least in some parts of the world.

Nevertheless, sounds are still on the increase, both in numbers and in intensity. As they increase we will have to ask ourselves whether man will (or indeed can) continue to tolerate an ever-increasing sonic bombardment. Looking back at our graph we might conclude that certain important middle-weight sounds (or signals) like our own voices are in danger of being drowned by the uncontrolled sea of noise our civilization has generated.

The more discriminating we are about sounds the better signal to noise ratio we will demand in our acoustic environment. At the moment the signal to noise ratio is deteriorating.

HOW SOUNDS ARE SPREADING

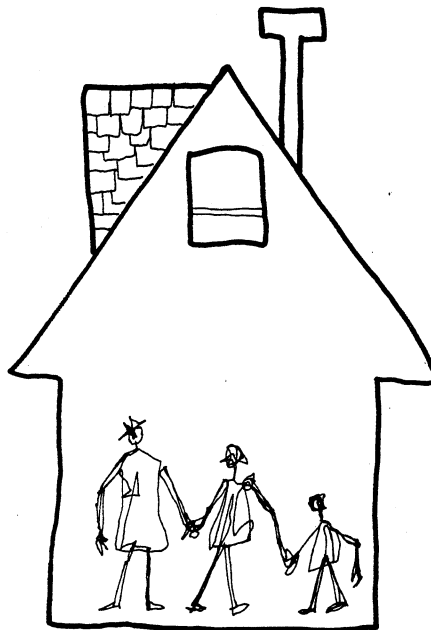
How has sound spread and noise reached pollution proportions? It would be false to assume that more people necessarily mean more noise. Parts of the world (for instance, the Orient) with much greater population densities than ours live in relative tranquility compared to the average Western community. Contrary to expectation the bazaars of the Middle East are found to be exceedingly quiet.

Let us assume two people, one in a pre-technological society and another in our own. The loudest and most frequent sound the first man makes or even hears is the sound of his own voice, whispering (30 dB) talking (60 dB) or singing (75 dB). He will make a few sounds with his simple tools: hammering, chopping, and in his spare time perhaps he will play an instrument, a flute or a zither. Often he will sit quietly making no special sounds at all.

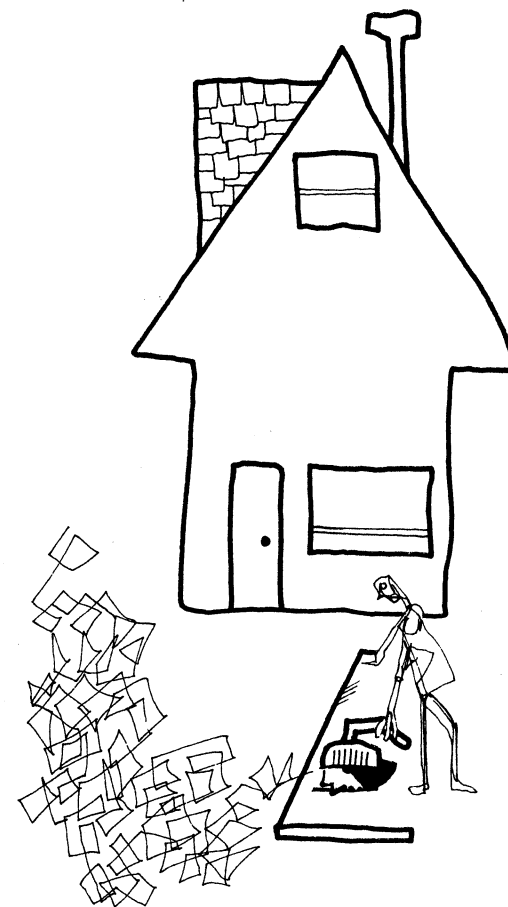
We will also make sounds with our voices. But we have an additional repletion of sonic gadgetry: power saws and tools, power mowers, a car or motorcycle, a snowmobile or midget hovercraft (most of which are louder than our voices); or if we are women, electric mix-masters, blenders and hairdryers. If we are inclined to music we have record players, radios, television sets, tape recorders and amplification devices for our musical instruments.

These are the sonic extensions which modern technology is giving to us in ever-increasing quantity, and every Western man has them, or at least the right to them and the virtual right to use them with comparative freedom.

Something like the following accordingly results. Mr. A lives quietly at home. Occasionally he shouts at his wife or children but that is about the loudest sound the A household hears.



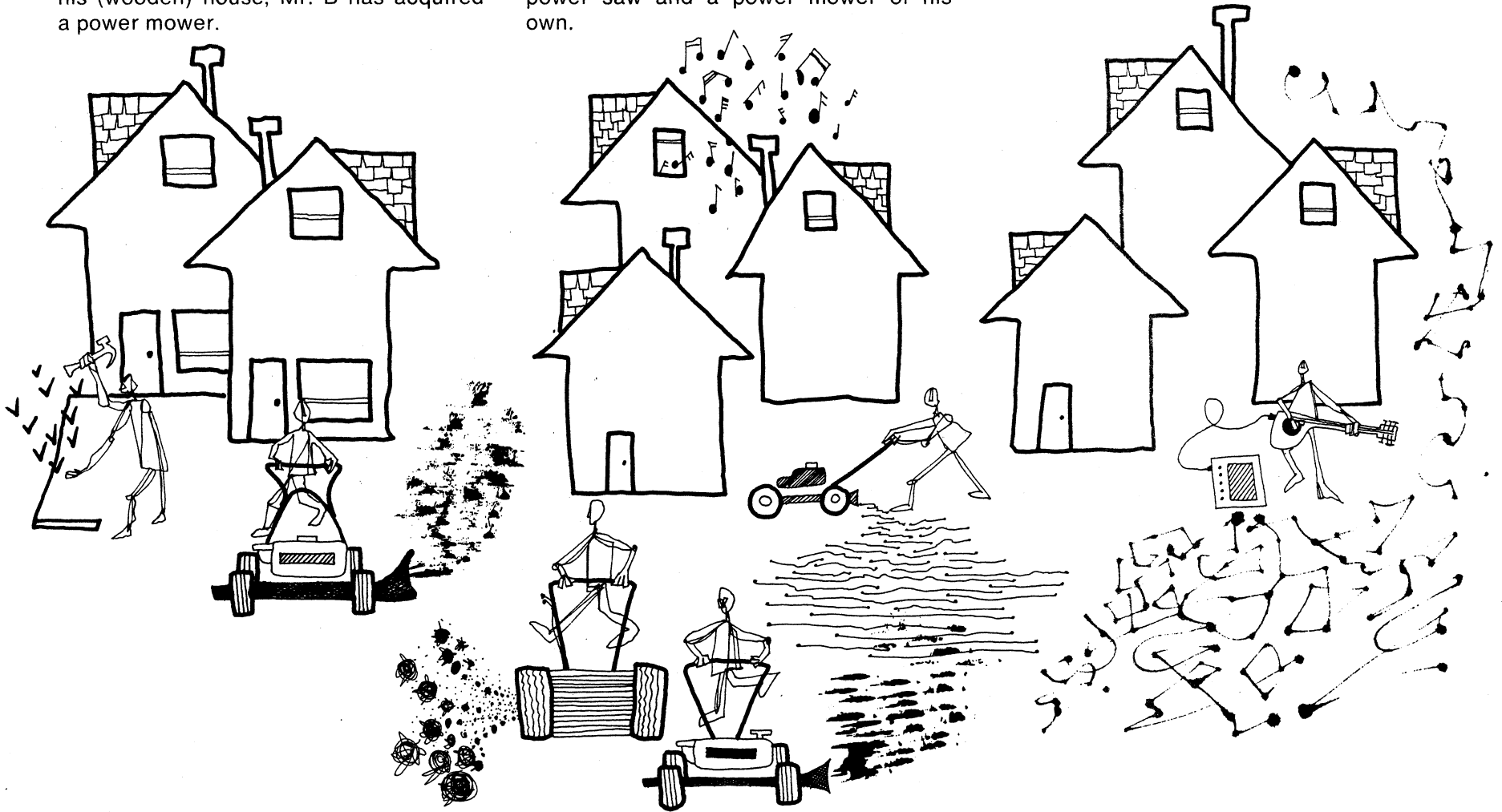
Then Mr. B. buys the lot next door and begins to build a house. It is a wooden house. He has a power saw.



By the time Mr. C buys the plot on the other side and begins construction of his (wooden) house, Mr. B has acquired a power mower.

Mr. A's economic affairs have improved. He buys a radio, a record player, a power saw and a power mower of his own.

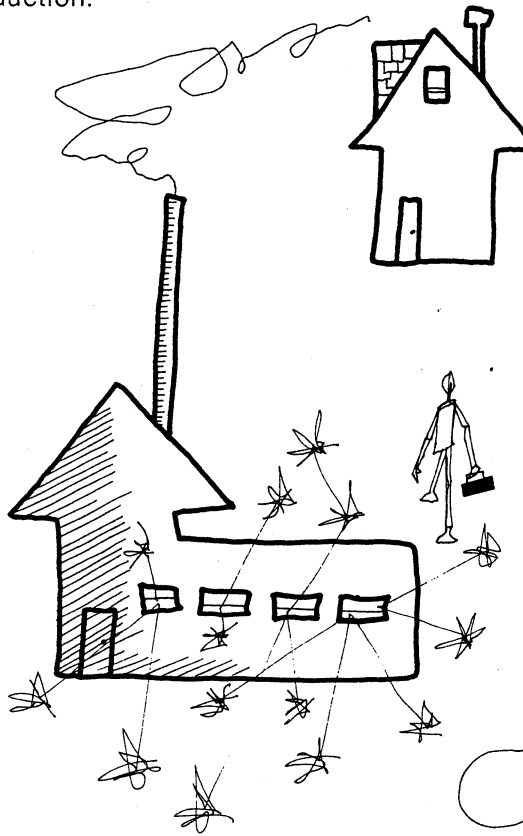
Mr. B has a teenage boy and for Christmas he buys him an amplified guitar.



Mr. C has a teenage daughter who likes to share her transistor radio with the neighbourhood.



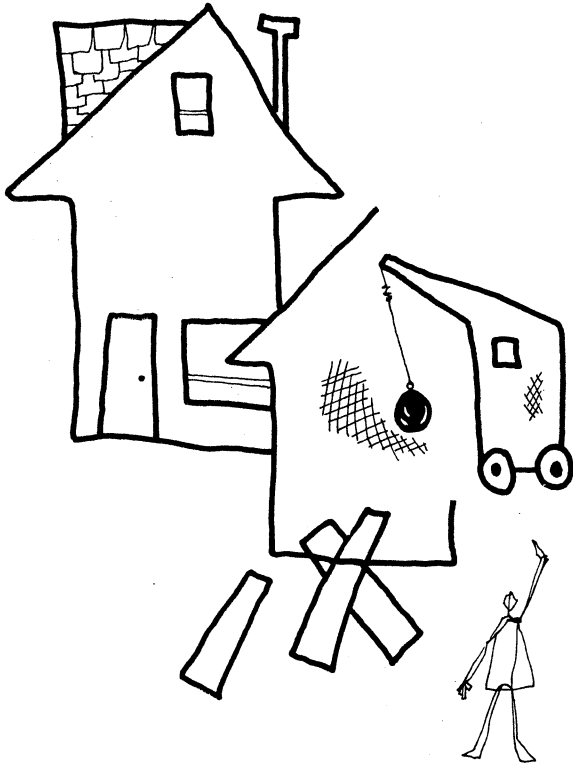
Mr. A works in a factory. Some new machinery is installed. It is not quiet but it should increase production.



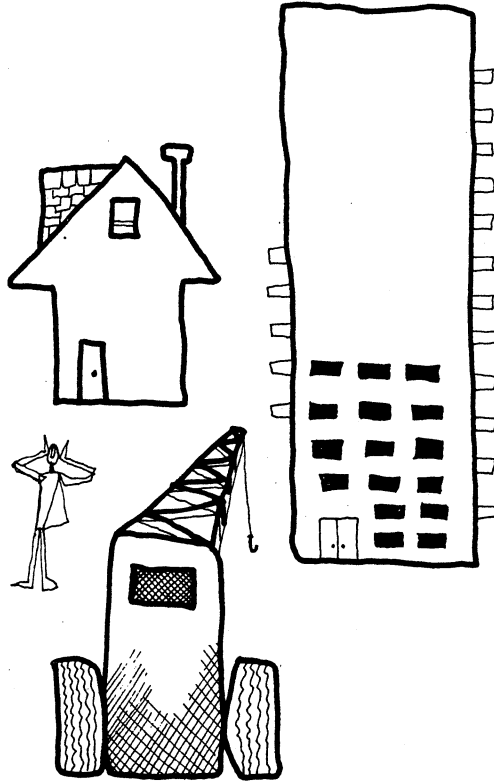
Mr. A comes home fatigued and edgy to discover that Mrs. A (thanks to the raise brought about by the increased factory production) has bought a new electric blender.



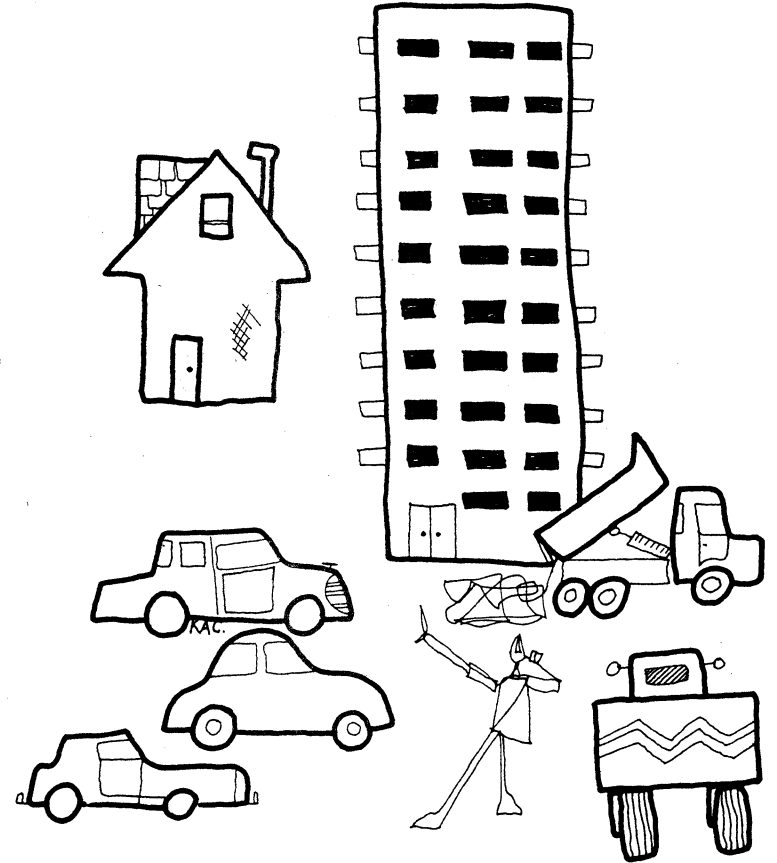
Mr. B. sells his house. A demolition crew comes and knocks it over in a day.



Construction begins on a modern high-rise apartment. Riveters, cranes and generators howl from 7 a.m. to 6 p.m. for two years (and occasionally, mysteriously, all through the night). Mrs. A has a nervous breakdown.



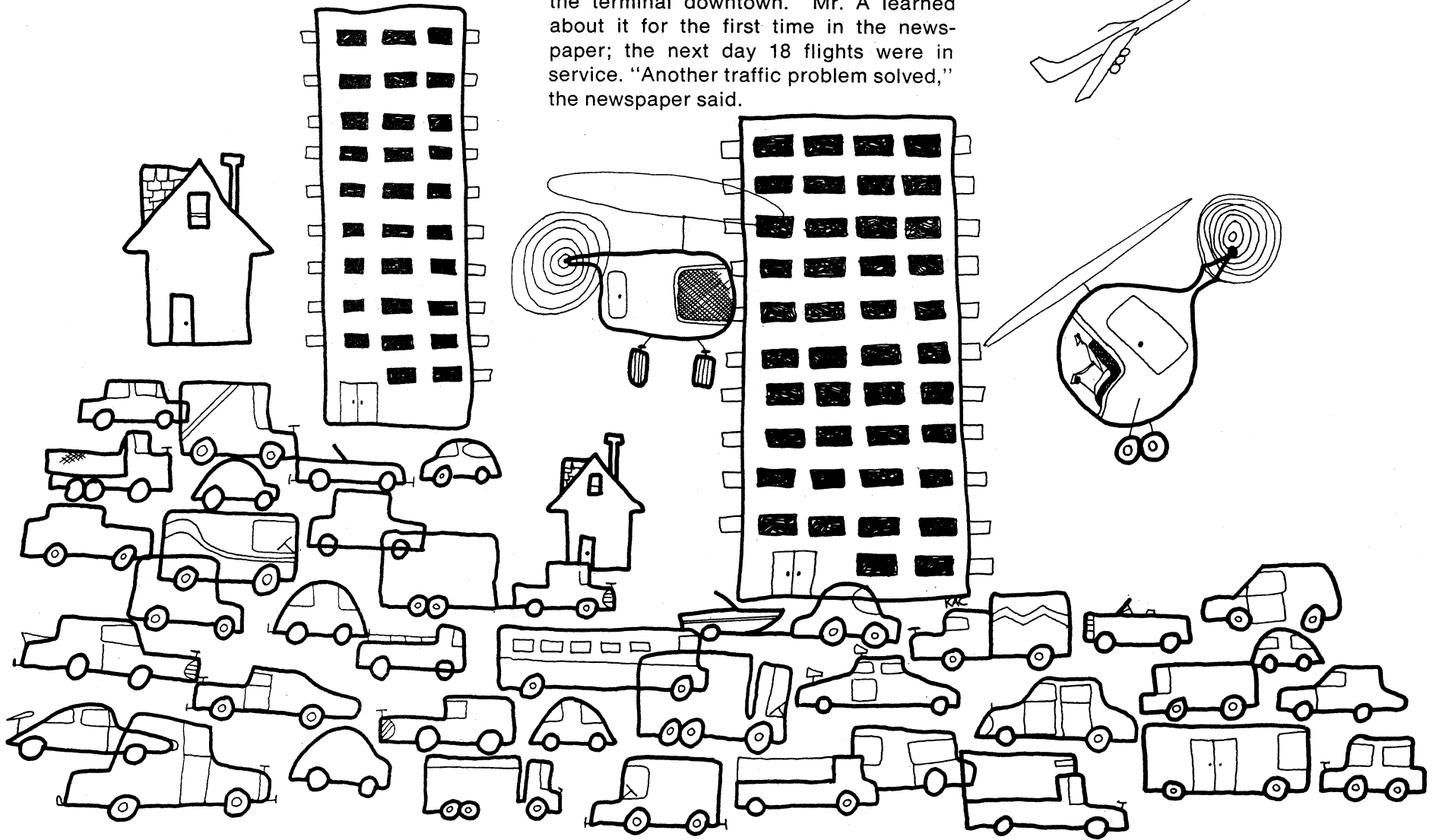
Work begins on widening the road to accommodate all the new apartment-dwellers' cars. Jack hammers, graders and dump trucks invigorate the atmosphere for six months.



The traffic, predictably, increases.

Now they have expanded the neighbourhood airport, and inaugurated a helicopter service over Mr. A's house to the terminal downtown. Mr. A learned about it for the first time in the newspaper; the next day 18 flights were in service. "Another traffic problem solved," the newspaper said.

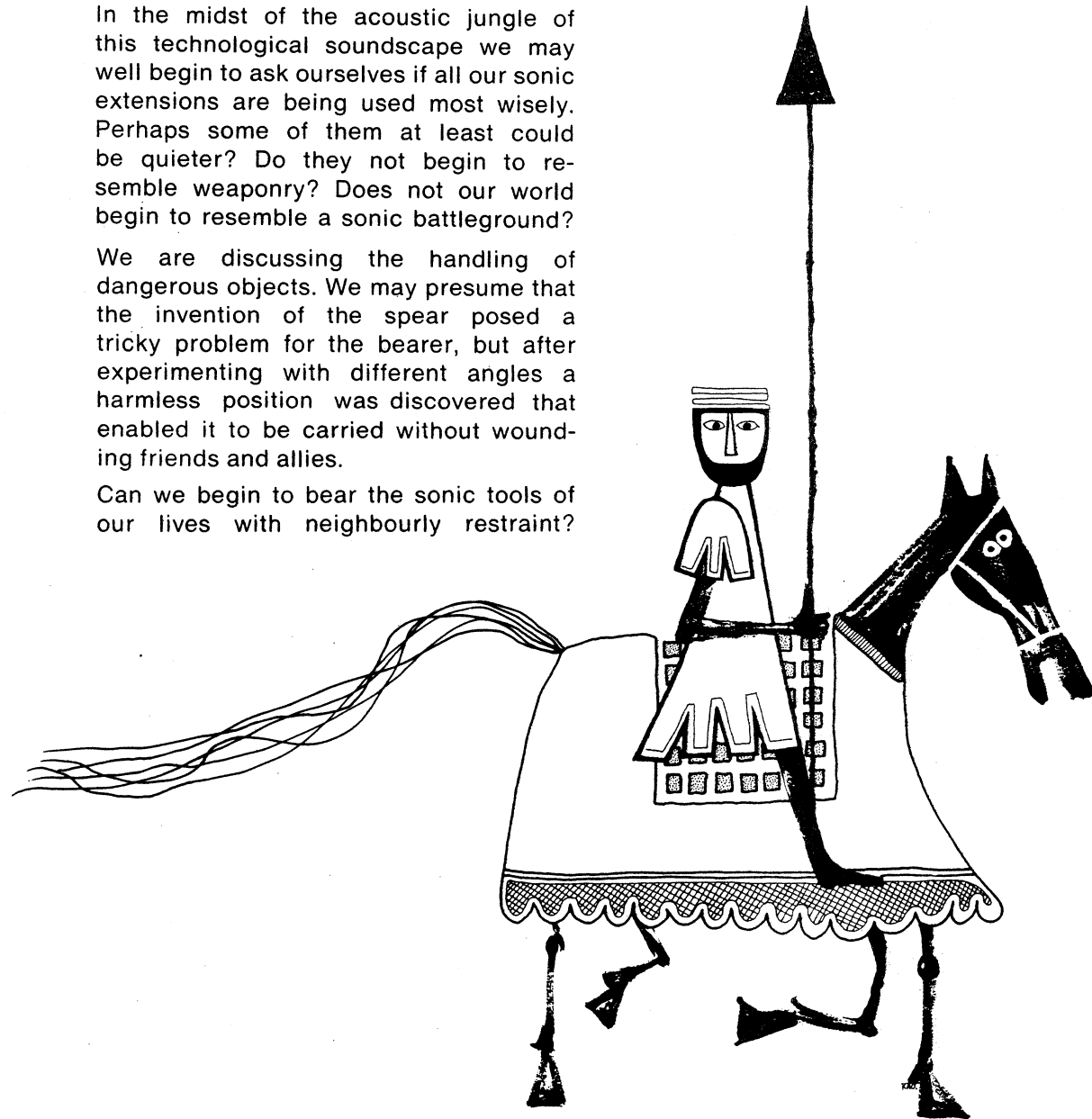
And so on



In the midst of the acoustic jungle of this technological soundscape we may well begin to ask ourselves if all our sonic extensions are being used most wisely. Perhaps some of them at least could be quieter? Do they not begin to resemble weaponry? Does not our world begin to resemble a sonic battleground?

We are discussing the handling of dangerous objects. We may presume that the invention of the spear posed a tricky problem for the bearer, but after experimenting with different angles a harmless position was discovered that enabled it to be carried without wounding friends and allies.

Can we begin to bear the sonic tools of our lives with neighbourly restraint?



NOISE: A KILLER

A MILLION DEAF WORKERS

"In the USA it is estimated that approximately 1,000,000 workers have serious hearing loss due to high noise levels in their places of work."⁴

As already mentioned, medical science has determined that sounds over 85 dB heard continuously over long periods of time pose a serious threat to hearing. The resulting disease is often referred to as "boilermakers' disease" because the earliest known victims were workers in factories where metal boilers were rivetted together. Prolonged exposure to sound beyond this level may result first in temporary threshold shift (or TTS as it is sometimes called). TTS is an elevation of the threshold of hearing so that after being subjected to a very noisy experience all sounds heard afterwards seem fainter than usual. Normal hearing returns after a few hours or days. With more exposure permanent cochlear damage may take place resulting in permanent hearing loss. When this loss occurs in the inner ear it is incurable.

The Workmen's Compensation Boards are now beginning to struggle with the problem of aural hygiene, but "the paucity of data in some countries makes it difficult to assess the total extent of occupational deafness. Thus, in Canada, the actual incidence cannot be gauged

from compensation claims because compensation is rarely granted in certain provinces unless the deafness interferes with earning capacity."⁵

This presumably means that in Canada to claim compensation a worker would have to demonstrate that his hearing had been so destroyed that he was incapable of work. Thus frequently workers are afraid to report hearing loss, and frequently it is cheaper for employers to pay a little more in assessments to the WCB and go on destroying the hearing of their employees than to do anything about an unhygienic environment.

THE DEAF TEENAGER

At least the Workmen's Compensation Boards are trying to inform workers. Who is warning the rest of the population of the possible dangers to their health? Which agency has taken it on themselves to warn our youth that over-exposure to heavily amplified music may destroy their hearing? The amplifier, we begin to realize, is a potentially lethal weapon. The evidence is now beginning

to come in and it shows that teenagers playing in bands and going to concerts at which the intensity of sound may reach levels well above 100 dB are going deaf in significant numbers. When Dr. David M. Lipscomb examined freshmen students at the University of Tennessee he discovered that the hearing of many students had deteriorated to the level of average 65-year olds. At the University of Florida teenagers were given audiograms after attending a Rock concert at which the band peaked to 120 dB and the results showed a temporary hearing impairment for each child.

WHY THE AFRICANS HEAR BETTER

Everyone's hearing tends to degenerate a little as he grows older. This happens very gradually and begins first in the high frequencies, which is the reason older people sometime complain "everyone mumbles nowadays". This gradual loss of hearing acuity due to age is called presbycusis. It has always been assumed that presbycusis is a natural result of aging, like grey hair.

This is now being challenged. A study on a tribe of Mabaan Africans in the Sudan showed very little hearing loss due to presbycusis. Africans at the age of 60 had as good or better hearing than the average North American at the age of 25. Dr. Samuel Rosen, a New York

4. UNESCO Courier, July 1967.

5. *Noise*, Alan Bell, World Health Organization, Geneva, 1966, p. 51.

otologist under whose supervision the study was made, attributed the superior hearing ability of the Africans to their noise-free environment. The loudest sounds the Mabaan heard were the sound of their own voices singing and shouting at tribal dances.⁶

OTHER EFFECTS OF NOISE ON HEALTH

Further studies undertaken by Dr. Rosen and others are beginning to show correlations between noise pollution and heart disease and other disorders. Researchers at the Max Planck Institute in West Germany have discovered that workers who work in noisy places have more emotional and marital problems than others. The National Aeronautics and Space Administration in the USA is becoming concerned about the number of people suffering from nausea, fainting and epileptic-like fits in communities where launching-pad rocket noise is most severe.

Many of the dangers of noise pollution occur in areas that are not detectable by the ear at all. Very deep sounds, below our ability to hear them (called infrasonic) can have insidious effects, yet these sounds are on the increase also.

In present and future rocket motors for space vehicles low (infrasonic) noise is becoming increasingly intense. In 1965 four eminent acoustical scientists subjected themselves to intense doses of infrasonic noise in an attempt to find human tolerance levels for this new brand of noise. "The subjective effects were alarming, and included mild nausea, giddiness, subcostal discomfort, cutaneous flushing and tingling . . . coughing, severe substernal pressure, choking respiration, salivation, pain on swallowing, hypopharyngeal discomfort and giddiness . . ." ⁷ Impairment of vision occurred in all subjects at certain frequencies. Headache and testicular aching occurred at other frequencies.

SONIC WEAPONRY

It is not surprising to learn, therefore, that the ability of certain sounds to destroy or kill is a subject of much research today. Researchers at Simon Fraser University's Pestology Centre are experimenting with ultrasonic (sound above the human hearing range) to kill rats. Elsewhere in North America giant howlers producing sounds up to 175 dB (well beyond the threshold of pain) are being experimented with to test the resiliency of metals and also, it is alleged, for military purposes in warfare. Giant howlers have already been used by police as a method of dispersing mobs.

Even a very sudden, loud noise such as gunfire, lasting only fractions of a second, may damage a person's hearing mechanism. The US army has recently discovered that more than half the 500,000 men who go through combat training each year suffer hearing losses so great that they could be ruled out of combat. For instance, 52.7% of the soldiers permanently assigned to Fort Jackson had such a poor hearing rating after listening to the sounds of their own gunfire that they should technically be removed from the job for which they were trained. Despite this the army has pursued no standard policy of providing soldiers with devices to protect their hearing.

Boilermakers' Disease is no longer merely an occupational hazard. After studying community noise students at the University of Southern California under Professor Melville Branch concluded that in 20 years at the present rate of noise increase everyone in the city of Los Angeles would be deaf.

And with this we would close the book. No more would we be able to hear the delicate sounds of birds, of water, the breathing of nature or the sounds of our own voices. And music would cease to exist on this planet.

6. Samuel Rosen et al, "Presbycusis Study of a Relatively Noise-Free Population in the Sudan", American Otological Society, Transactions, V. 50, 1962.

7. *Noise and Man*, William Burns, London, 1968, p. 251.

SOUND IMPERIALISM

It is we of Europe and America who have produced these problems. It is we who have produced the technology of outrageous sound. It is consistent with our behaviour in other aspects of life.

Territorial expansion has always been one of our aims. Just as we refuse to leave a space of our environment uncultivated, unmastered, so too have we refused to leave an acoustic space quiet, unpunctured by sound. The moon probes may be a glorious achievement but they may likewise be interpreted as an expression of the same imperialism that made Western man a world colonial power. The huge noises of our civilization are also a crude manifestation of this same imperialistic ambition. We are now in danger of erasing all acoustic refinements with an environmental soundscape that is characterized exclusively by its amplitude and brutality. In the pages of the hi-fi magazines we read of a two-inch transistor radio with a "giant sound", or a tape recorder that has "already started its own sonic boom". The ultimate schizophonia is revealed in the pages of the *Musician* (!) where ads for amplifiers stand next to ads for ear plugs.



THE MODERN CITY AS BLITZKRIEG

In 1913 the futurist Luigi Russolo wrote a manifesto in which he glorified noise.

Today noise reigns supreme over human sensibility . . .

Let's walk together through a great modern capital, with the ear more attentive than the eye, and we will vary the pleasures of our sensibilities by distinguishing among the gurglings of water, air and gas inside metallic pipes, the rumblings and rattlings of engines breathing with obvious animal spirits, the rising

and falling of pistons, the stridency of mechanical saws, the loud jumping of trolleys on their rails, the snapping of whips, the whipping of flags. We will have fun imagining our orchestration of department stores' sliding doors, the hubbub of the crowds, the different roars of railroad stations, iron foundries, textile mills, printing houses, power plants and subways. And we must not forget the very new noises of Modern Warfare.⁸

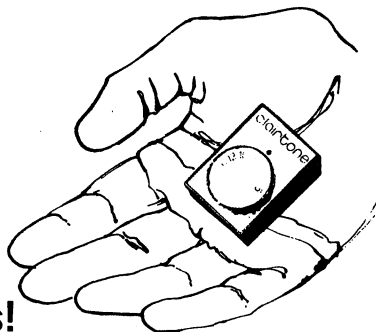
Warfare! As the machines whirl in the hearts of our cities day and night, destroying, erecting, destroying, the significant battleground of the modern world has become the neighbourhood *Blitzkrieg*. There may have been a time when we thought this demolition and reconstruction would be a temporary inconvenience only, but we now realize it is permanent and increasing. For the first time in history, Constantin Doxiadis reminds us, man is less safe in the heart of his city than outside the city gates.

There are no regulations governing the sound-levels permitted by construction or demolition equipment in any Canadian city.

World's Smallest AM Radio!

MINI HI-FI GIVES GIANT SOUND

(1-7/8X1-3/8X3/4")



Under
2 inches!

8. Luigi Russolo, *The Art of Noises*, trans. Robert Fillious, New York, 1967 pp. 7 - 8.

SOUND SYMBOLISM

Most of the sounds of our environment have symbolism. "A word or an image is symbolic when it implies something more than its obvious and immediate meaning. It has a wider 'unconscious' aspect that is never precisely defined or fully explained."⁹

A sound object is symbolic when it stirs in us emotions or thoughts beyond its actual mechanical sensations as sound. An awareness of sound symbolism will be useful in trying to decide which sounds we want to preserve in the world and which we want to suppress.

The sounds of nature are mostly pleasing to man. Consider the rustling of wind in the leaves, the arabesques of birds, the bubbling of brooks. Water in particular has a splendid symbolism. Rain, a fountain, a river, a waterfall, the sea, each makes its unique sound but they share a rich symbolism. They speak of cleansing, of purification, of refreshment and renewal.

The sea in particular has always been one of man's primary symbols in literature, myth and art. It is symbolic of eternity: its ceaseless presence. It is symbolic of change: the tides; the ebb and flow of the waves. Heraclitus said, "You never go down to the same water twice". It is symbolic of democracy: the magnificent democracy of waterdrops. It is symbolic of the law of the conservation of energy: from the sea, water evaporates, becomes rain, then brooks and rivers and

finally is returned to the sea. It is symbolic of reincarnation: water never dies. When angry it symbolizes "that state of barbaric vagueness and disorder out of which civilization has emerged and into which, unless saved by the efforts of gods and men, it is always liable to relapse"¹⁰ W.H. Auden continues: "The sea is where the decisive events, the moments of eternal choice, of temptation, fall and redemption occur". The shore is symbolic of safety; the sea is symbolic of the unknown; the tension in our hearts is made audible in the crashing of breakers.

Natural sounds have the most profound symbolism for man. They have endured the longest. They have been listened to attentively by poets and musicians.

Grey peak of the wave,
wave colour of grape's pulp,
Olive grey in the near,
far, smoke grey of the rock-slide,
Salmon-pink wings of the fish-hawk
cast grey shadows in water . . .¹¹



The image has been bitched by the power-launch and hovercraft industry. Everywhere in the modern world the sounds of nature are being replaced, or rather obscured, by much more insistent sounds. In a recent survey university students discovered that of the sounds heard in the contemporary sonic environment those of nature accounted for only 6%, while 25% were human sounds and 68% were the sounds of tools and technology.¹²

Today the hard-edged throb of motors can be heard around us almost continuously. What does the motor symbolize? Two words: power and progress. Technology has given man unprecedented power, in industry, in transportation, in war, power over nature and power over other men. We are infatuated with the motor's speed, efficiency, regularity and the extensions of personal and corporate power it has afforded us.

James Watt once observed that to most people noise and power go hand in hand. The machine which operates quietly is much less impressive than the noisy one. The increased domination of the soundscape by machine noises has up to now been sanctioned as progressive; the hum and throb of a good motor is a symbol of contemporary power and future prosperity.

But there are ominous signs. We are just beginning to realize that the fallout from unrestrained technological exploita-

9. Carl G. Jung, *Man & His Symbols*, New York, 1964, pp. 20 - 21.

10. W.H. Auden, *The Enchanted Flood*, New York, 1967, p. 6.

11. Ezra Pound, *Canto II*.

12. R.M. Schafer, *The New Soundscape*, Toronto, 1969, p. 6.

tion of the earth's resources is more frightening than first anticipated. In repeated social surveys of noise it is the sounds of traffic, of aircraft, or demolition and construction that are singled out as the most undesirable, whereas a few years ago it was still the barking of dogs or the neighbour's children. As these sounds continue to grow in volume and density we may expect the felicitous symbolism of the motor to twist unpleasantly.

We may still speak of progress, progress in enlightenment and humanitarianism. Progress in noise abatement would mean less noise, not more. After all, noise in a machine is a sign of inefficiency, an escape of energy. Technology should exist to make man's life more pleasant. When it increases pain it is worthless and worse.

In a recent survey on Community Noise, 60 per cent of those polled were not convinced that noise was a necessary consequence of progress, an old, and thankfully, dying myth.¹³

It will only be possible to discriminate against the sounds of a conscienceless technology and muffle its plangent voice when its sound-symbolism changes in the imagination of sufficient numbers of men.

Motors can be muffled. Detroit did it. About 1960 they produced a quiet automobile. Since that time they have been getting louder again.

13. *A Social Survey on Noise*, Communications Centre, Simon Fraser University, Autumn, 1969.

Have you noticed?

In a communication David Apps of General Motors writes: "... the trend toward large displacement engines and higher compression ratios makes for increased engine noise, induction, and exhaust noise . . . higher compression ratios . . . result in larger deformations of the engine-block structure and, hence, higher radiated noise levels . . . We feel, on the basis of many cars, that muffler design and performance have nicely kept pace with requirements."

What if the North American public had seen the car as the sequel to the mule instead of the stallion? i.e. simple means of locomotion vs. muscle-bound festival of force.

As the automobile becomes obsolete, its rattle is deathening.

Detroit's New Fun And Muscle Machines



This sleek, high-powered monster is American Motors' '71 Javelin AMX. "Press the accelerator, it roars," says Hillen.

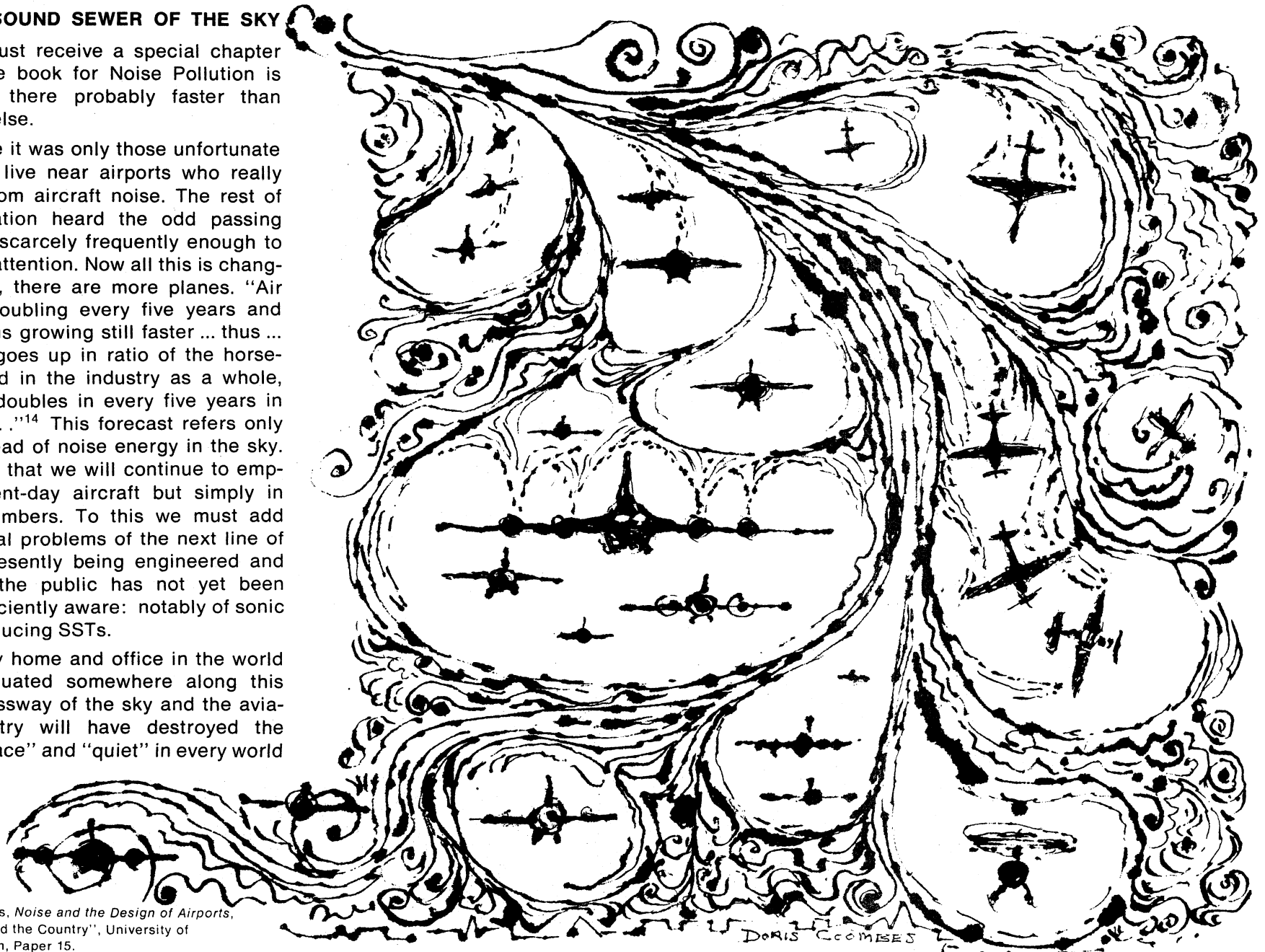
THE 1971 MUSCLE CARS

THE BIG SOUND SEWER OF THE SKY

The sky must receive a special chapter in our little book for Noise Pollution is increasing there probably faster than anywhere else.

At one time it was only those unfortunate enough to live near airports who really suffered from aircraft noise. The rest of the population heard the odd passing plane, but scarcely frequently enough to pay much attention. Now all this is changing. Firstly, there are more planes. "Air travel is doubling every five years and air freight is growing still faster ... thus ... the noise goes up in ratio of the horsepower used in the industry as a whole, that is, it doubles in every five years in aviation"¹⁴ This forecast refers only to the spread of noise energy in the sky. It assumes that we will continue to employ present-day aircraft but simply in greater numbers. To this we must add very special problems of the next line of aircraft presently being engineered and of which the public has not yet been made sufficiently aware: notably of sonic boom-producing SSTs.

Soon every home and office in the world will be situated somewhere along this new expressway of the sky and the aviation industry will have destroyed the words "peace" and "quiet" in every world language.



14. E.J. Richards, *Noise and the Design of Airports*, "Airports and the Country", University of Southampton, Paper 15.

Noise in the sky is distinguished radically from all other forms of noise in that it is not localized or contained. The plangent voice of the airplane motor beams down directly on the whole community, on roof, garden and window, on farm and suburb as well as city centre. In one city researchers showed that the drone of aircraft could be heard on the acoustic horizon in a neighbourhood miles away from an airport for over 5 hours per day. On the basis of the trending mentioned above, in slightly over 10 years complete 24-hour wrap-around aircraft drone will envelop this neighbourhood unless some checks are introduced.

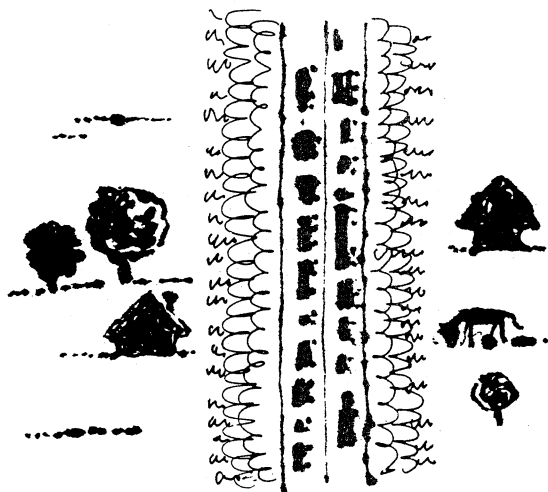
A great deal of research has taken place on aircraft noise and it is going forward more strenuously than ever today; but the problem continues to grow. While most of the research has concentrated on quietening the superscreams of jets (and has

succeeded in making the jumbo jets slightly quieter than their predecessors) the insidious howl of smaller aircraft, for instance of helicopters, has been given practically no attention. In a recent California social survey on community noise researchers deliberately avoided airport areas but were surprised to find that the sound of small aircraft still ranked highest on the list of unwanted nuisances.¹⁵

The shortcomings of our anti-noise thinking are nowhere more evident than when a society prohibits people from shouting and animals from barking but permits any number of outrageous things to happen a few hundred feet overhead. A noise conscious community may require some sounds to be muffled. From the unmuffled helicopter we have no legal protection whatever.

In Canada the sky is exclusively a federal matter. At the present time noise abatement policy for aircraft covers take-off and landing procedures under certain circumstances only. These policies were designed and are enforced by the Ministry of Transport in Ottawa. They form a slender folio. There are no regulations governing the noise of small planes and helicopters of any kind. At some of the larger airports there are certain procedures for larger aircraft. These airports (to name them) are Montreal International, Ottawa International, Toronto International and Winnipeg International. The procedures include the use of preferential runways, special climb and approach profiles for jets

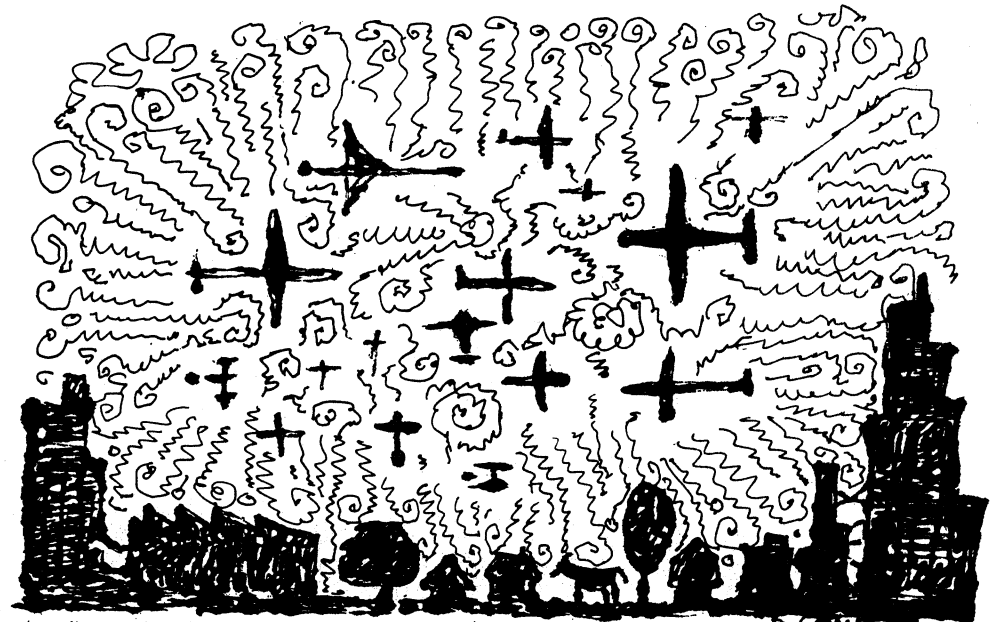
15. David Pluth, private communication.



An expressway spreads noise along a predictable channel



And



aircraft spreads noise everywhere

D. COMBES

THE SONIC BOOM

designed to reduce engine noise as much as possible consistent with the safe operation of the airplane, and *partial* curfews on flights between midnight and 7 a.m. (at *Montreal and Toronto only*).

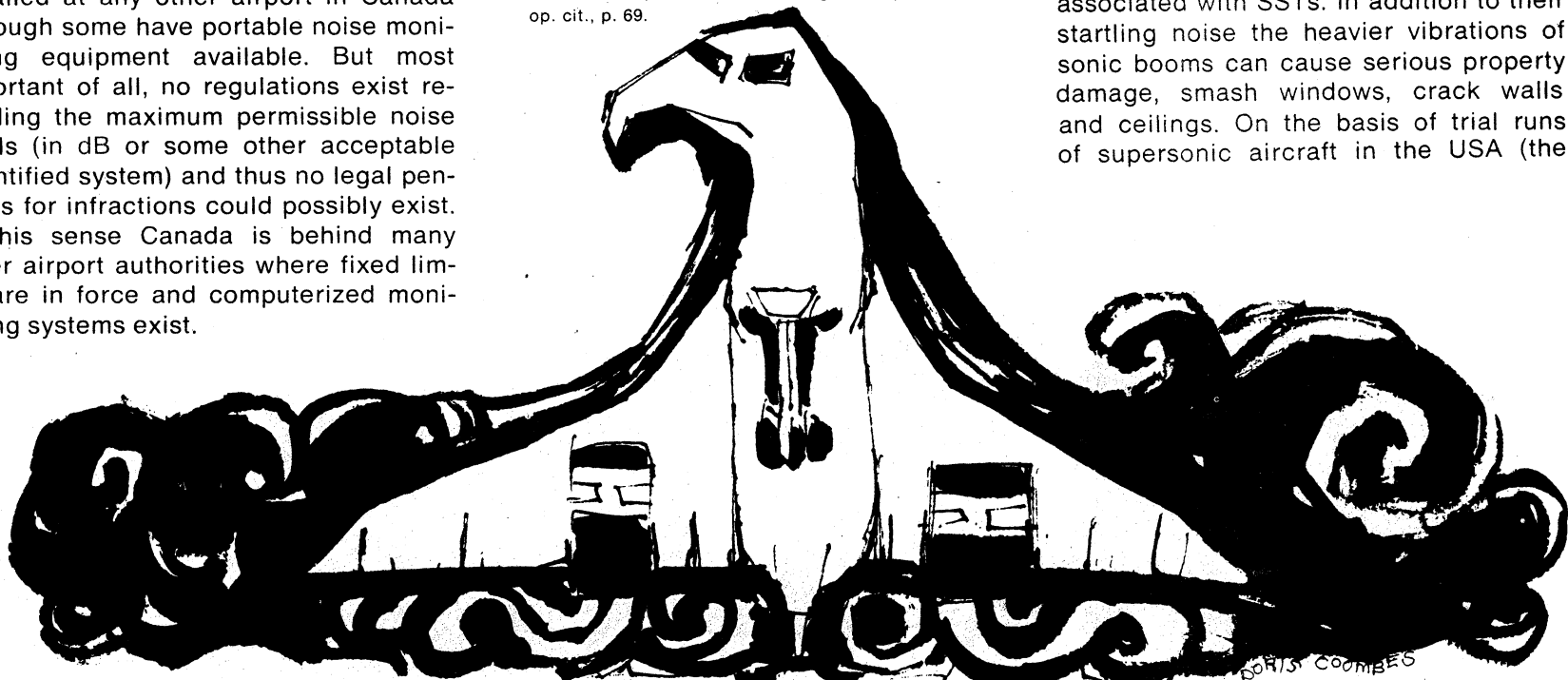
There are no noise abatement procedures or curfews at any of Canada's other airports. At Montreal International "Semi-automatic noise monitoring equipment has been installed on the approach to runways 06L, 06R, and 24L. In addition, mobile equipment is available for monitoring aircraft noise at any area around the airport" (DOT Notam 23/68). No noise monitoring equipment has been installed at any other airport in Canada although some have portable noise monitoring equipment available. But most important of all, no regulations exist regarding the maximum permissible noise levels (in dB or some other acceptable quantified system) and thus no legal penalties for infractions could possibly exist. In this sense Canada is behind many other airport authorities where fixed limits are in force and computerized monitoring systems exist.

Perhaps only after the advent of the supersonic transports will the crescendo of public protest grow strong enough to force more research into aircraft noise and more stringent regulations regarding the spread of this noise. Or will it then be too late? Not only is it anticipated that the SSTs, as they are called, will produce more noise during take-off and landing, resulting in "a growth in far afield noise accompanied by a serious worsening of the lateral noise spread in the vicinity of the airport,"¹⁶ but the most critical feature of this aircraft is that by flying faster than the speed of sound it will produce an

16. E.J. Richards, *Noise and the Design of Airports*, op. cit., p. 69.

additional thunderclap called a sonic boom. Unlike the sound of present aircraft the bang-zone of the SST boom will be about 50 miles wide *and will extend along the entire length of the aircraft flight path* - several thousands of miles. SSTs are currently being developed in France, England, Russia and the USA. What the SSTs will in effect do is to turn the whole world into an airport. Anyone wishing to know more about this debatable development is referred to the "SST and Sonic Boom Handbook" by Dr. William A. Shurcliff (see bibliography).

Contemporary engineering has not succeeded in solving the noise problems associated with SSTs. In addition to their startling noise the heavier vibrations of sonic booms can cause serious property damage, smash windows, crack walls and ceilings. On the basis of trial runs of supersonic aircraft in the USA (the

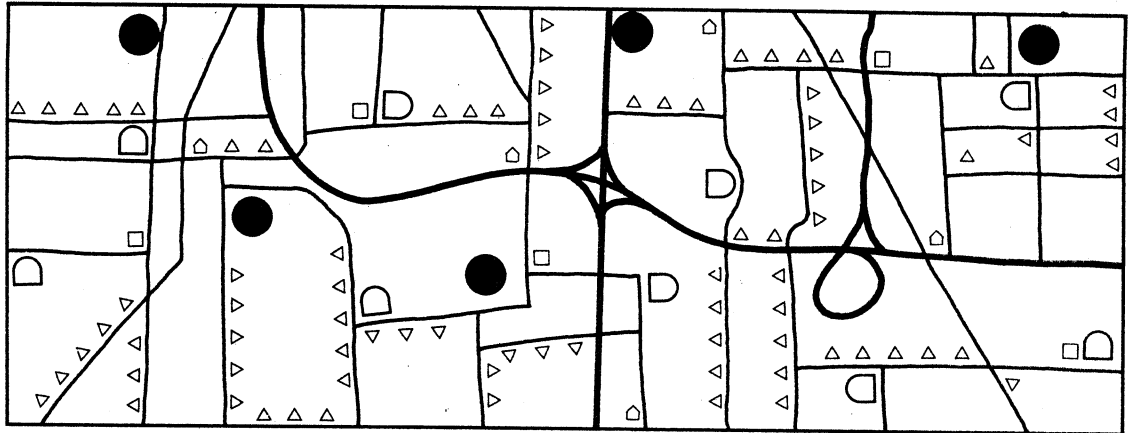


small fighter variety only) and the resulting damage suits filed it has been estimated that each supersonic flight across the country will startle up to 50,000,000 people.¹⁷ In Chicago in 1965, for instance, 49 supersonic test flights over the city resulted in 6116 complaints and 2,964 damage claims.

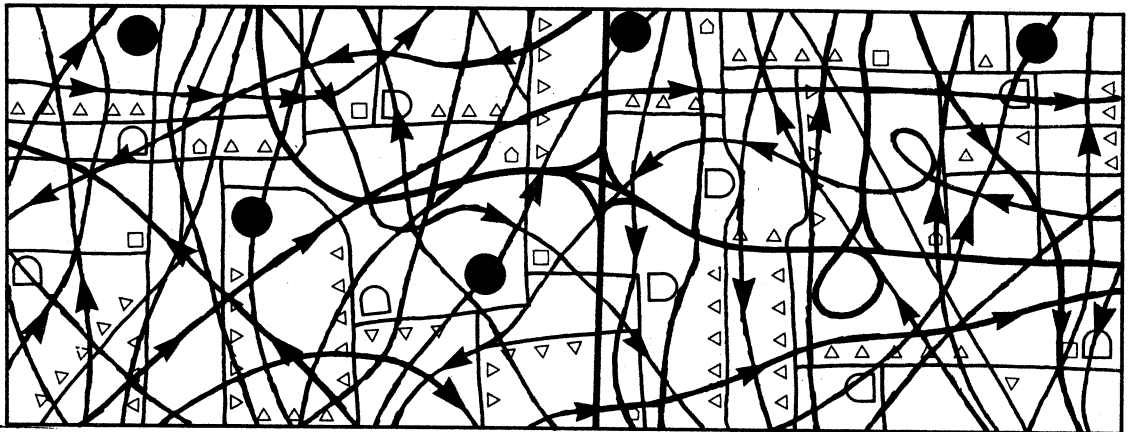
The aviation industry suggests it will fly the SSTs only over unpopulated areas. But where are these unpopulated areas? Moreover, the aircraft are going to be so costly to purchase and operate that we can expect the airlines to want to operate them whenever and wherever possible. Some countries, such as Switzerland, have banned the flight of SSTs over their territory outright.

In Canada both Air Canada and Canadian Pacific Airlines have standing orders for SSTs. The Ministry of Transport has no explicit regulations prohibiting their flight over any part of the country. The only sections dealing with this problem in the current (fifth) edition of the Air Regulations and Aeronautics Act states: "No aircraft shall be flown in such a manner as to create a hazard to other aircraft or to persons or property on the ground".

Who will interpret the word hazard? Might it be that the INTERNATIONAL AVIATION INDUSTRY is becoming so enormous that even national governments can no longer deal with it effectively?



AIRCRAFT IGNORE HOSPITALS, SCHOOLS, LIBRARIES, CHURCHES, PARKS, HOMES.



- SCHOOL
- PARK
- △ CHURCH
- LIBRARY
- △ HOUSE

17. SST and Sonic Boom Handbook.

**AIRCRAFT NOISE?
WHAT AIRCRAFT NOISE?**

Rather than assist in finding solutions to these many problems the commercial airlines have preferred to spend enormous sums of money to pretend they don't exist. For instance, Time magazine (European Edition, April 13, 1970) contained seven full-page ads by different companies celebrating the advantages of flying in identical planes to approximately the same destinations. If planes make any sounds at all, the advertising implies, they are happy sounds. Nothing to worry about. Witness:

Eastern Airlines "Whisper Jet Service"

"Fly the Friendly Skies of United"

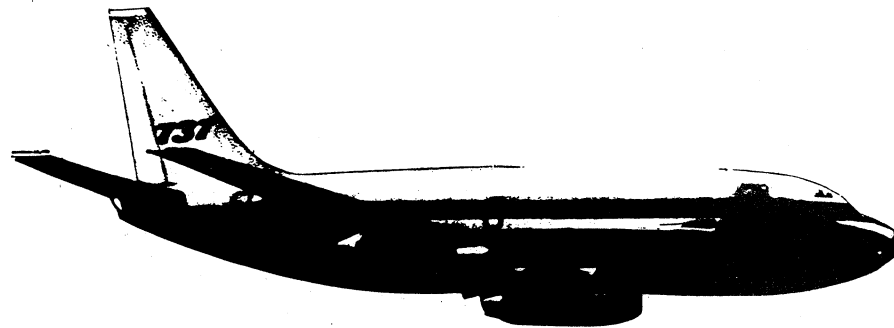
"Trident-Two is fast, smooth,
quiet and reliable" (BEA)

"Fly across the Atlantic on the
quiet" (BOAC)

"We have smart new DC-9 jets with
their engines quietly at the rear"
(Air Jamaica)

"More and more people-pleasing 737s
are bringing big-jet comfort to more
and more cities and towns" (Boeing)

Big jets as people pleasers? Question: What obligation does an airline have to people outside or beneath its aircraft? At the moment, regretfully, none. Legally none, and morally, to judge from the advertising, not much either. "You've got to make a buck," said the vice-president of one of Canada's national airlines to the author of these notes recently. Would you be satisfied with fifty cents?



**More and more
people-pleasing 737s
are bringing
big-jet comfort
to more and more
cities and towns.**

**Now you can enjoy
the roominess
of the biggest jets
on the shortest routes—
for the first time
in a short-range jet.**

**Fly the new 737
first chance you get.**

THE DEAF EAR OF THE AVIATORS

Not all the problems are macrocosmic or irremediable; some are just sloppy management. Let us look at a small case study. Vancouver is an attractive city. It is not unique to have an airport in the heart of a city but among Canadian cities it is, so to speak, a special feature, since Vancouver's in-town airport is situated next to beautiful Stanley Park, of which Vancouverites are justly proud. The map below illustrates the scene.

Seven regular seaplane companies operate out of the harbour but it is open to all craft. West Vancouver, one of Vancouver's prime residential areas also features a heliport at its gateway. From these two locations aircraft are permitted to fly in any direction over the heart of Vancouver or the residential areas of North and West Vancouver and Point Grey. Normally aircraft are required to keep to minimum altitudes but this does not apply over Vancouver since the aircraft are taking off and landing.

In 1968 the Ministry of Transport estimated there were approximately 15,000 take-offs and landings (as they are not monitored no exact check is possible) and noted that this "appears to be increasing". On three separate days in 1970 observers stationed in Stanley Park counted not less than 61 overpasses per day; that would be an annual traffic of about 23,000, a 53.3% increase in two years. (This would be in accord with the world-aviation trend to double traffic

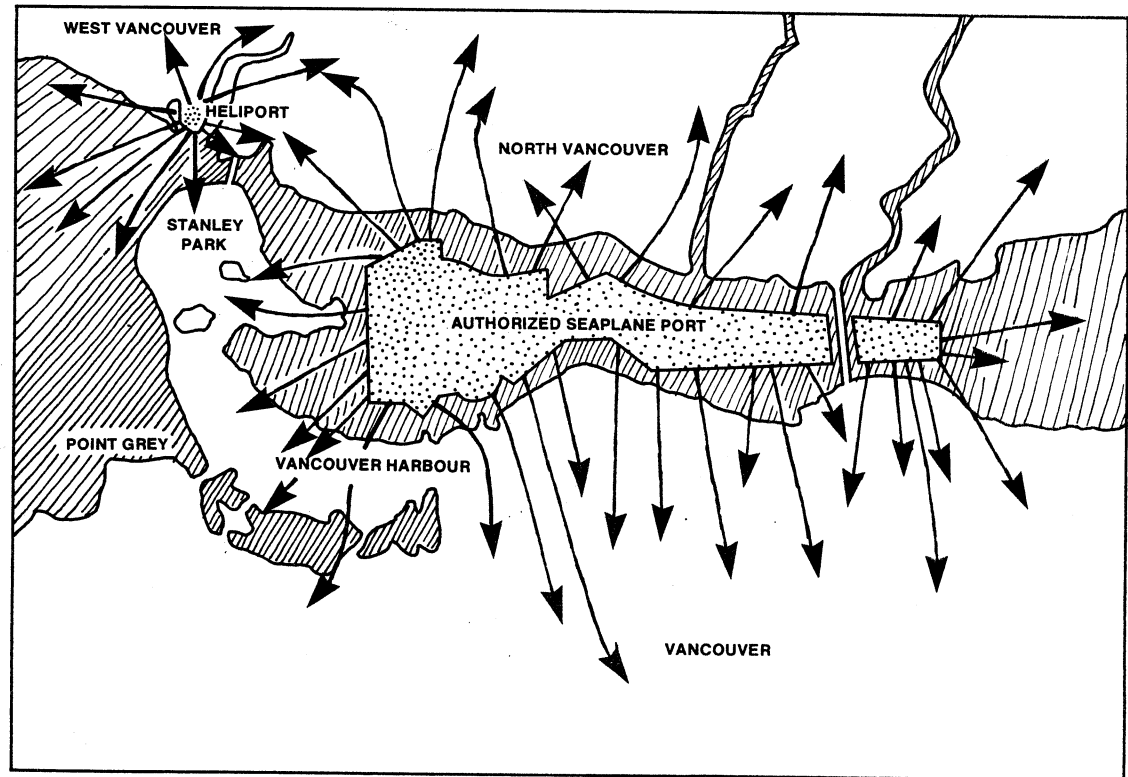
every 3-5 years). On a fourth, exceptional day (Sunday, August 2) 106 overpasses were counted during the daylight hours over Stanley Park.

How loud are they? The Ministry has itself measured them at up to 94dBA at take-off a few blocks away at a downtown bank (as a result of complaints).

If you are harassed by aircraft what do you do? The first instinct is to pick up a telephone and complain. Some university students were given the assignment: "You have been harassed

by seaplanes and helicopters. Find out all you can about their activities". In the course of their investigations, which unfortunately harassed a few officials, they were referred to 32 different telephone numbers or extensions and gathered a plethora of completely conflicting facts and figures.

Perhaps this demonstrates no more than simple human fumbling with a complex problem. Meanwhile the seaplanes and helicopters increase their grubby broadcasting over Stanley Park and contiguous areas.



PROGRESS AND RESTRAINT

Until recently man regarded Mother Earth as an inexhaustible treasurehouse of resources. Today we begin to suspect the danger of this attitude, for through carelessness and greed we are upsetting some very delicate ecological balances. Unless we can restore them the future looks menacing. A war is being waged in modern man between the forces saying "increase production, increase consumption and waste," and those saying "what about conservation and restraint, what about the future?"

Every society of the past has had some built-in philosophy of restraint, some opportunity for people to cultivate the practice of self-discipline and self-denial. Even when there was food enough, the early Christians rigorously practiced Lent, the Jews Yom Kippur, the Muslims Ramadan, not to mention the exacting exercises of self-abnegation evident in oriental religions. Man refrained from doing what he very well could do in order to gain discipline over himself. His conservationist spirit was high.

Ours is the first society in the history of the world which has rejected, even ridiculed, these practices. Ours is a society of indulgence, gratification, production, population and waste. We have produced, in John Kenneth Galbraith's words, a society of "private riches and public squalor".

Unless we regain some of that ancient ethic even at the expense of parting with our expectations and aspirations for material wealth, our private riches will be short-lived. In short, in the interests of survival *we are simply going to have to learn NOT to do certain things of which we are perfectly capable.*

Noise is a fitting symbol for a vulgar epoch; for noise is waste sound, sonic effluence, resulting from indifference to environmental quality. The bigger the rape of the environment, the noisier it becomes.

The World Health Organization defines health as follows:

"Health is a state of complete physical, mental and social well-being, and not merely an absence of disease and infirmity".

If a man lives in an environment where he can be scarred by jet screams or expressway howls, is he living a healthy life?

We know that noise threatens aural health. A relationship between noise and heart disease is now suspected by many doctors. When noise interrupts sleep, as Dr. G. J. Thiessen of the National Research Council in Ottawa has shown after several years research, it may result in fatigue, tension and anxiety, even though the cause may go unrecognized by the afflicted.



NOISE AND ANARCHY

Noise is disorderly sound, without purpose. As such it may be compared with disorderly or confused action - i.e. anarchy. It would be hasty to assume that noise is responsible for all the social turbulence of modern life even though much of that turbulence exists in the cores of cities where the noise is most intense. Here doctors speak of "multiplicatory toxology" - a detrimental combination of evils greater than the sum of its parts.

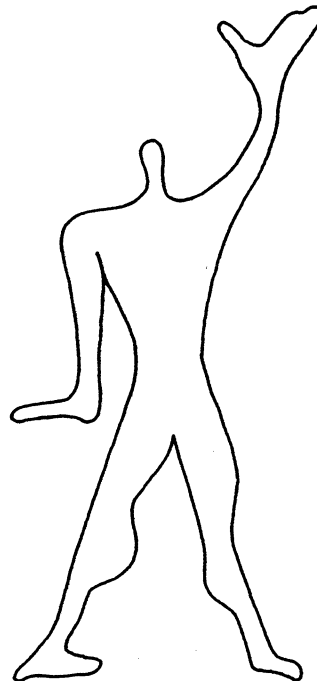
A certain university in Western Canada has been in existence for five years. During that time it has been undergoing constant further construction. The profile of this construction noise (as will be shown in a moment) has infected the entire campus for this period. Sometimes offices and classrooms have to be evacuated; usually faculty and students ignore (at least consciously) the jack hammers and bulldozers, though the bulls rarely doze.

Among Canadian universities none has been so troubled by strife, strife affecting not only students but faculty and administration as well, leading to firings, suspensions and court cases.

It will not be irrelevant to suggest an unstudied correlation between the general chaos and noise level of this campus and its social disorders.

THE BASIC MODULE: MAN

A module is a basic unit which we may use as a guide for measuring. In the human environment it is the human being who forms the basic module. When architects organize spaces for human beings to inhabit they use the human anatomy as the guiding module. The doorframe accommodates the human frame, the stair the human foot, the ceiling the human stretch. To demonstrate the binding relationship between architectural space and the human beings for whom it is created, Le Corbusier made a man with an upstretched arm his aesthetic symbol and imprinted it on all his buildings.



The basic modules for the human acoustic environment are the human ear and the human voice. We know a good deal about the behaviour and tolerances of each of these organs. Thus we may speak of acoustic ecology, the delicate balance between living organisms such as man and their acoustical environment. When environmental sound reaches such proportions that human vocal sounds are masked or overwhelmed we have created an inhuman environment. When the ear is forced to listen to sounds which may endanger it physically, we have created an inhuman environment.

It is interesting to consider that while the voice can be raised to quite a loud level (about 75 dB) at no time can it be raised beyond a level where it might endanger the ear (about 85 - 90 dB). In discriminating against low-frequency sounds the human ear conveniently filters out deep body sounds such as brainwaves and the movement of blood in our veins. Also the human hearing threshold has been set conveniently just beyond a level which would introduce a continuous recital of air molecules crashing together. The quiet efficiency of all body movements is another stroke of genius.

God was a first-rate acoustical engineer. We have been more inept.

QUIET GROVES AND TIMES

Just as man requires time for sleep to refresh and renew his life energies, so too he requires quiet periods for mental and spiritual recomposure. At one time stillness was a precious article in an unwritten code of human rights. Man held reservoirs of stillness in his life to facilitate this restoration of the spiritual metabolism. Even in the hearts of cities there were the dark, still vaults of churches and libraries, or the privacy of drawing-room and bedroom. Outside the throb of cities the countryside was accessible with its lulling whir of natural sounds. There were still times too. Sunday was the quietest day of all.

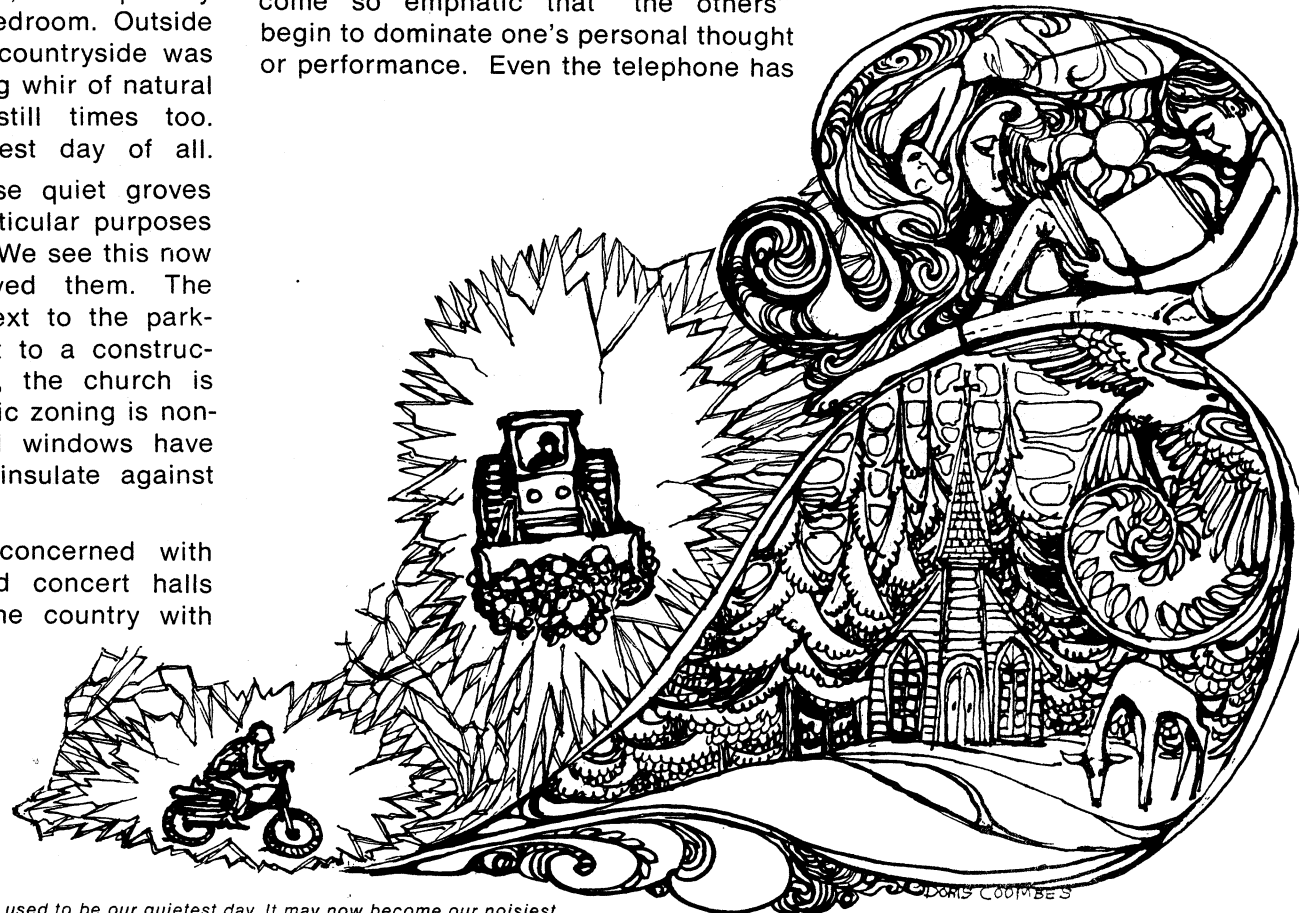
The importance of these quiet groves far transcended the particular purposes to which they were put. We see this now that we have destroyed them. The city park is situated next to the parkway, the library is next to a construction or demolition site, the church is near a heliport. Acoustic zoning is non-existent and walls and windows have long since ceased to insulate against the cacophony beyond.

Canadians are today concerned with filling the theatres and concert halls built recently across the country with

Centennial money. A greater service might be provided by leaving them empty. Empty they could serve as quiet groves, city-core houses for recovery and meditation, as noble a function as any program of acculturation.

It is pleasant to know there are others in the world. Sounds inform us of these others. A sound says, "You are not alone." But sometimes the sounds become so emphatic that "the others" begin to dominate one's personal thought or performance. Even the telephone has

abbreviated the ratiocinative abilities of Western man in a way not yet adequately understood. Never to be allowed an uninterrupted thought again. Never to be allowed the luxury of concentration on a problem or the beauty of undisturbed sleep. Pandemonium originally meant the noise raised by devils. When a noise scrapes across your consciousness, it may be angels' wings?



Sunday used to be our quietest day It may now become our noisiest

DORIS COOMBES

ACOUSTIC SPACE

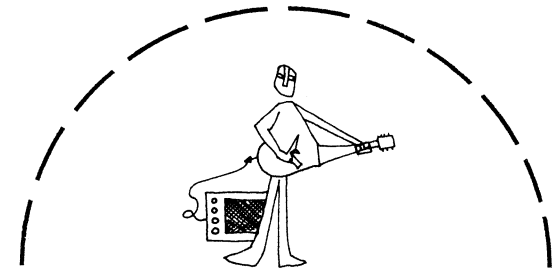
Property is measured in square feet or acres. Within his territorial limits the property-owner is permitted comparative freedom to create his own environment. When the world was quieter and sonic incursions fewer, privacy was effectively secured by walls, fences and vegetation. When physical and acoustic space were more congruent the latter required no special attention.

Today acoustic space has important environmental and legal implications not fully appreciated. The acoustic space of a sounding object is that volume of space in which the sound can be heard. The maximum acoustic space inhabited by a man will be the area over which his voice can be heard. The acoustic space of a radio or a power saw will be the volume of space in which those sound objects can be heard.

We have already discussed how sounds are spreading. Modern technology has given each individual the tools to activate more acoustic space. This development would seem to be running a collision course with the population increase and reduction of available physical space per individual. The superimposition of more and louder environmental sounds creates cross-talk and cancellation, to borrow some terminology from communications engineering.



Man shouting



Man with amplified guitar



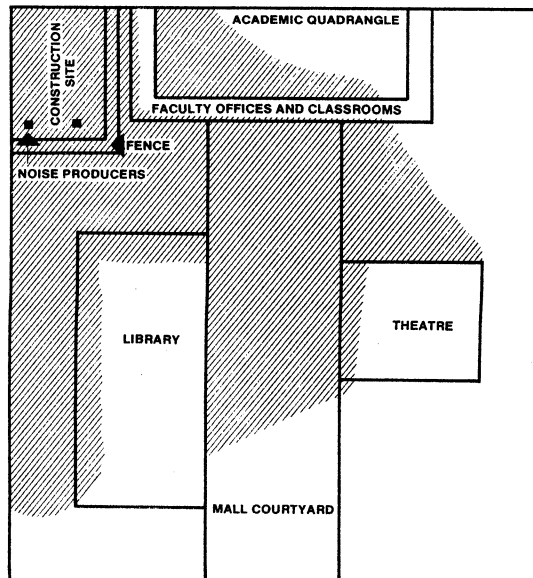
Man with jackhammer



Three men sharing the same acoustic space

Today we speak of a hi-fi in which the signal to noise ratio is most favourable, but we are slipping into lo-fi soundscapes.

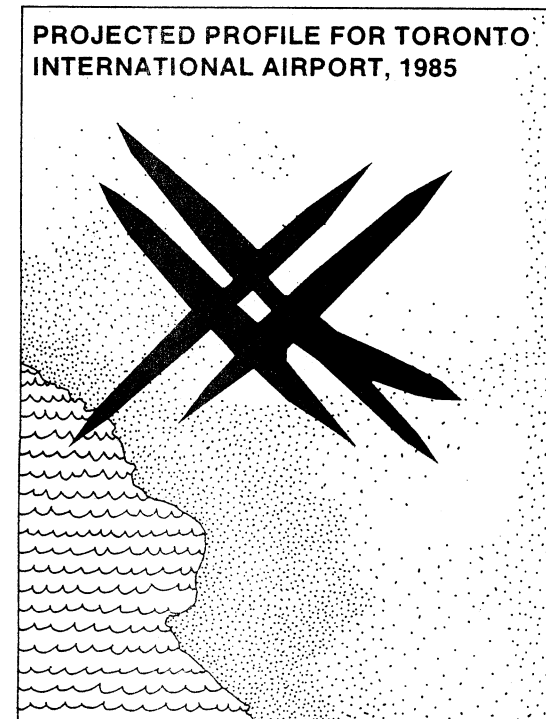
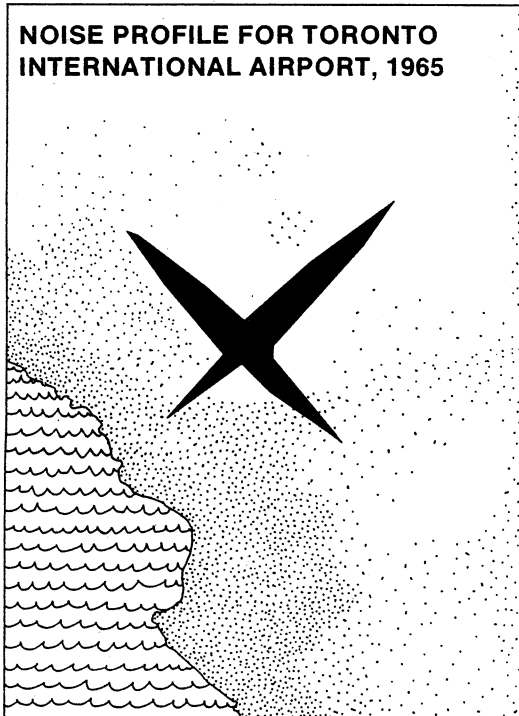
At Simon Fraser University some students set out to study the contradictions between physical and acoustic space. Work on a new wing was going on behind a construction fence. Much of the construction unattractiveness could not be seen, which is not the same as saying it could not be perceived, for its noises could be heard clearly enough. Some students drew charts to show the imperialistic spread of this construction noise over the whole campus, invading classrooms, offices and the library. To do this they walked over the campus noting the places where the construction sounds faded into the ambient sounds and thus



produced the following noise profile. Note the size of the objects producing the offending sounds. Note the physical space of the site. Note the acoustic space of the noise. What cannot be shown is the most important: the annoyance, interruptions and mental fatigue such a continuous sound holocaust may have produced in the minds of 7,000 inhabitants of the campus.

A property-owner is permitted by law to restrict entry to his private garden or bedroom. What rights does he have to resist the sonic intruder?

For instance, without expanding its physical premises an airport may show a dramatically enlarged noise profile over the years, reaching out to dominate more and more of the acoustic space of the community. Whatever problems this causes have not yet been carefully defined legally. At the moment a man may own the ground only; he has no claim on the environment an inch above it and his chances of winning a case to protect it are slender.



SOUND WALLS

Walls exist to delimit both physical and acoustic space, to isolate private areas visually and to screen out sonic interferences. Often this second function is unstressed, particularly in modern buildings. At the very time when supersounds are multiplying an inadequate national building code together with cheap craftsmanship is rendering walls more flimsy than ever before.

Confronted with this development modern man has discovered what might be called *audioanalgesia*, that is, the use of sound as a painkiller, a distraction of the senses from the real facts of existence. The use of audioanalgesia in modern life extends from its original use in the dental chair to wired background music in hotels, offices, elevators, apartments, restaurants, banks, u.s.w. Air conditioners are also instruments of audioanalgesia. Psychologists have shown that cows are more relaxed when music is played to them and that certain kinds of elementary work can be performed more effectively in the presence of certain kinds of broad-band noise. They have not shown that all men are cows or that they are all engaged in elementary mental exercises.

It is important in this respect to note that such masking sounds are not intended to be listened to consciously. Thus the Muzak corporation deliberately chooses music that is *nobody's favourite*, and subjects it to unvenomed and innocuous orchestrations (notice that there are no vocalists or solos) in order to produce a continuous presence of "pretty" designed to mask unpleasant distractions. A screen of sound is used to ensure privacy. In the same way the intense amplification of popular music does not stimulate sociability so much as it expresses the desire to experience . . . individuation . . . aloneness . . . disengagement.

Walls used to exist to isolate sounds. Today sound walls exist to isolate.



A UNESCO RESOLUTION

When groups normally concerned with the production of sounds suddenly turn to their reduction we may realize that an international saturation point has been reached. Such is the case with the following resolution, unanimously passed by the General Assembly of the International Music Council (UNESCO), Paris, October, 1969.

"We denounce unanimously the intolerable infringement of individual freedom and of the right of everyone to silence, because of the abusive use, in private and public places, of recorded or broadcast music. We ask the Executive Committee of the International Music Council to initiate a study from all angles—medical, scientific and juridical—without overlooking its artistic and educational aspects, and with a view to proposing to UNESCO, and to the proper authorities everywhere, measures calculated to put an end to this abuse."

A TOURIST IN THE SOUNDSCAPE

Making laws is always the least successful way to reform the world. Certainly our noise abatement is outdated, especially in Canada, and needs to be improved. But what needs also to be improved is the public attitude to the soundscape and to environment as a whole.

Environment is not merely what is seen or possessed. Private property encourages people to let their imagination sink at the edge of their own front lawn; the squalor beyond is not their concern. But when we speak of environment we speak of public places - shared accommodation. In this booklet we have been expressing the hope that more people may begin to listen to their environment. With increased leisure man could become a tourist of the soundscape. An exciting world awaits the listener with attentive ears.

Sometimes there are startling contradictions between the visual and sonic environments (though the tourist agencies always ignore the latter). When listeners were presented with tape recordings made at the Cenotaph in Ottawa's Confederation Square they refused to believe them, so ferocious was the traffic on the ring road around the monument. Yet this is Canada's national monument to her war victims, a sacred grove.

A good tourist inspects the whole environment critically and aesthetically. He never merely "sight-sees". He hears,

smells, tastes and touches. The perceptive tourist might keep a world sound diary, remembering affectionately the entertainment of pleasant soundscapes visited.

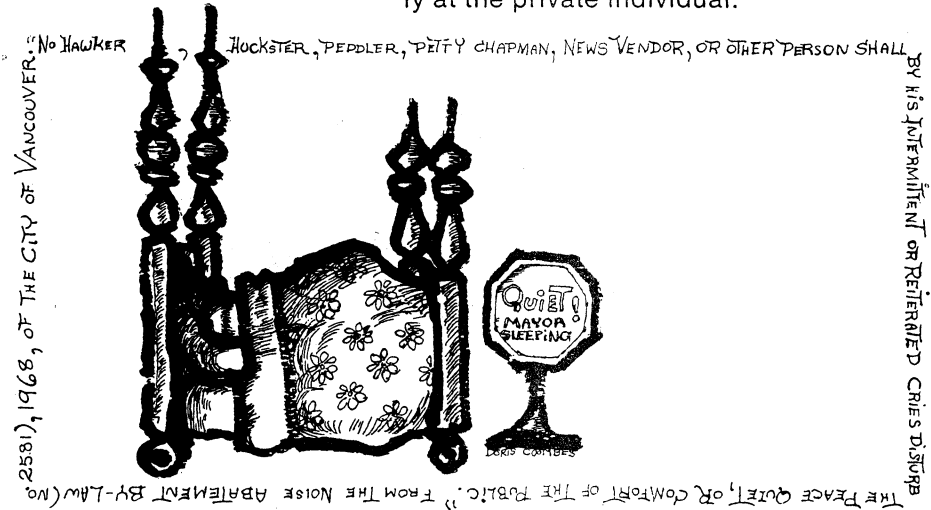
Crossing the road from the Cenotaph, one descends the steps to the Rideau Canal. Each turn in the steps brings a subtle change in sounds heard: the automobile traffic lifts away, shoes echo under the bridge, water splashes in the locks and birds return to the trees.

Overheard while walking by the Rideau Canal: "When I can hear the sounds of my own feet as I walk, I know I am in a humane environment".

NOISE ABATEMENT

We have spoken of many sounds. We have tried to suggest that in a soundscape suitable for human habitation the modules must be the human ear and the human voice. Human ears listening without danger, and human voices talking, laughing, singing without interference. We have suggested that the enemies of the human ear and voice are the heavy-weight sounds of modern technology. It will be instructive now to look at typical existing noise legislation in Canada.

Do you know your own noise abatement bylaw? A call to your municipal hall and a copy will be sent to you. Unless you live in a much more advanced community than most Canadians you will probably discover that your bylaw ignores completely the huge and toxic noises we have been discussing. It says nothing about noises made by industry, construction and demolition, expressways or aircraft. It is a bylaw aimed directly and exclusively at the private individual.



Typically:

"No person shall own, keep or harbour an animal or bird which by its cries. . . .

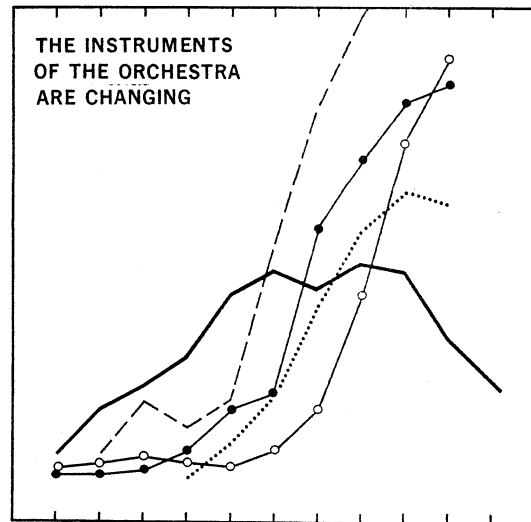
"No person shall play a musical instrument the sound of which. . . .

Etc.

West Vancouver's Noise Abatement Bylaw (No. 2141) contains some quaint eloquence:

"No hawker, huckster, pedler, petty chapman, news vendor or other person shall by his intermittent or reiterated cries disturb the peace, order, quiet, or comfort of the public".

It was passed in 1967.



- growth of power tools in Canada
- growth of motorcycles in Canada
- growth of blenders, juicers, mixers etc., in Canada
- - - growth of power lawnmowers in Canada
- decline of pianos in Canada

A TIME FOR VOICES

We are reaching the conclusion of our little study. Some of our opinions have been expressed rather vigorously but the matter is important. It was regarded as such by well over 50% of 650 Canadians recently polled on the subject. Of those familiar with existing noise abatement practices and procedures 66% were dissatisfied and 76% were in favour of more research to combat Noise Pollution even though the question was phrased in such a manner as to indicate that this would probably cost them some money.¹⁸

Our booklet has presented some facts and thoughts. It is now time for others to speak. It is a time for voices. Voices raised in concern (though, of course, not too loudly). Your voice is needed, gentle reader; here is how to raise it effectively.

Help to make known the facts concerning Noise Pollution. Discuss them frequently with neighbours, at meetings and citizens' forums. If you have a citizens' anti-pollution organization in your community, find out what it is doing about Noise Pollution. Help them. If you do not have one you might consider founding a Noise Abatement Society of your own. You are in good company (see below). Make politicians at all levels of government aware of the problem. Talk to them. Write to them. Above all, the next time a noise annoys you, *complain*.

For traffic, construction and demolition noises and community noises of all kinds call your municipal hall or write to your Mayor and Council.

For all aircraft noise call the Air Services Division of the Department of Transport (Federal Government) or write the Minister of Transport.

For industrial noise (if you fear your working environment is too noisy or you are worried that it may be affecting your hearing) call your local Workmen's Compensation Board and they will come and measure it.

18. *A Social Survey on Noise*, op. cit.

SAMA

There is another solution, a solution so elementary it needs stress. Respect quiet. Keep silent. Keep silent like the points of a compass, like the mystic, like the forest. Close eyes, sit attentively, and rediscover the merest sounds of all. It is an oriental solution ... but whoever practices it will be the true inheritor of whatever replaces the present.



SELECTED BIBLIOGRAPHY

For the sensitive Westerner who thinks it is not too late, here is a list of non-technical but authoritative literature on Noise Pollution.

UNESCO Courier, July 1967. This special issue is devoted entirely to Noise Pollution. Available in English from UNESCO Publications, Place de Fontenoy, Paris 7e, France.

NOISE: FINAL REPORT; The Committee on the Problem of Noise in Great Britain. A humane account including recommendations (many of which have now become law in Britain). Available from H.M. Stationery Office, London, 1966 and the Queen's Printer, Ottawa.

NOISE: An Occupational Hazard and Public Nuisance. Dr. Alan Bell; Public Health Papers, No. 30; World Health Organization, Geneva, 1966. Special emphasis is given to industrial noise. Available from The Queen's Printer, Ottawa.

THE NEW SOUNDSCAPE, R. Murray Schafer, Toronto, 1968. An informal analysis by a musician of the contemporary sonic environment. Available from Berandol Music Ltd., 651 Progress Avenue, Scarborough, Ontario.

SST AND SONIC BOOM HANDBOOK, Dr. William A. Shurcliff, Cambridge, Mass., 1969. This is a documented source-book on the super-sonic transport planes now being developed and the sonic booms they will create. Published in paperback by Ballantine Books, New York.

TOWARD A QUIETER CITY: A report of the Mayor's Task Force on Noise Control, New York City, 1970. Available (\$1.75 U.S.) from the New York Board of Trade, 295 Fifth Avenue, New York, N.Y., 10016, U.S.A.

ADDRESSES OF SOME NOISE ABATEMENT SOCIETIES

The International Society Against Noise, Sihlstrasse 17, Zürich, Switzerland.

The Noise Abatement Society of Great Britain, 6 Old Bond Street, London W.1., England.

Citizens for A Quiet City Inc., 136 East 57th Street, New York, N.Y., 10022, U.S.A.

Citizen's Committee Against the Sonic Boom, 19 Appleton Street, Cambridge, Mass., 02138, U.S.A.

Scientific Pollution and Environmental Control Society (SPEC), 44 West 6th Avenue, Vancouver 10, B.C.

Pollution Probe, Department of Zoology, University of Toronto, Toronto 5, Ont.

Each of these organizations has much current literature on the subject and has had much experience in effective techniques to adopt in confronting the noise problem.

NO
PARKING
SCHOOL DAYS
7^{AM} - 9^{AM}
NO
STOPPING
7^{AM} - 9^{AM}

END
QUIET
ZONE

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