

**HB**

**229**

**CS FOR HOUSE BILL NO. 229(JUD)**

**IN THE LEGISLATURE OF THE STATE OF ALASKA**

**NINETEENTH LEGISLATURE - SECOND SESSION**

**BY THE HOUSE JUDICIARY COMMITTEE**

**Offered:  
Referred:**

**Sponsor(s): REPRESENTATIVES ROKEBERG, Toohey, Bunde**

**A BILL**

**FOR AN ACT ENTITLED**

**1 "An Act prohibiting certain amplified sounds from automobiles; and providing for  
2 an effective date."**

**3 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:**

**4 \* Section 1. AS 28.35 is amended by adding a new section to read:**

**5 Sec. 28.35.185. PROHIBITED SOUND SYSTEMS. (a) A person may not  
6 operate or permit operation of a sound amplification system in a motor vehicle when  
7 the motor vehicle is operated on or is parked next to a highway, vehicular way, or  
8 other public area if the sound amplification system is audible from a distance of 50 or  
9 more feet. This subsection does not apply to**

**10 (1) a person operating a sound amplification system to request  
11 emergency assistance or to warn of a hazardous condition;**

**12 (2) an emergency or police motor vehicle; or**

**13 (3) a motor vehicle engaged in advertising otherwise permitted by law.**

**14 (b) A person who violates this section is guilty of an infraction and may be**

1           punished as provided under AS 28.40.050(c) and (d).

2   \* Sec. 2. This Act takes effect July 1, 1996.

1996 LEGISLATIVE SESSION

Revision Date: 1/18/96 Dept. Affected: Public Safety  
 Title: Prohibit loud vehicle sound systems DPS Statewide Support  
 Component: Commissioner's Office  
 Sponsor: Representative Toohy  
 Requestor: (H) State Affairs COMPONENT SERIAL NO. 0523

EXPENDITURES/REVENUES: (Thousands of Dollars) (inflation not included)

OPERATING	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-
CAPITAL EXPENDITURES	-0-	-0-	-0-	-0-	-0-	-0-
CHANGE IN REVENUES ( )	-0-	-0-	-0-	-0-	-0-	-0-
Code Revenue						

FUNDING: (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

Estimate of current year (FY 96) impact: \$ \_\_\_\_\_

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary )

No fiscal impact is anticipated to the Department of Public Safety

Prepared By: Sandy Perry-Provost, Special Assistant to the Commissioner Phone: 465-4322  
 Division: Commissioner's Office Date: 1/18/96  
 Approved by Commissioner: *Ronald L. Ote* Date: 1/18/96  
 Agency: Ronald L. Ote, Dept. of Public Safety

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CSHB 229 (ver. C)  
Amendment proposed by Rep. Bettye Davis  
House Judiciary Committee  
January 31, 1996

AMENDMENT 1

Page 1, Lines 9-14 are amended as follows:

more feet [or the system disturbs the peace and tranquillity of another person]. This subsection does not apply to

(1) a person operating a sound amplification system to request emergency assistance or to warn of a hazardous condition; or

(2) an emergency or police motor vehicle.]; or

(3) a motor vehicle engaged in advertising otherwise permitted by law.]

CSHB 229 (ver. C)  
Amendment proposed by Rep. Bettye Davis  
House Judiciary Committee  
January 31, 1996

**AMENDMENT 2**

Page 2, Line 3 is amended as follows:

\* Sec. 2. This Act takes effect July 1, 1996[5].

CS FOR HOUSE BILL NO. 229( )  
IN THE LEGISLATURE OF THE STATE OF ALASKA  
NINETEENTH LEGISLATURE - FIRST SESSION

BY

Offered:  
Referred:

Sponsor(s): REPRESENTATIVES ROKEBERG, Toohy, Bunde

A BILL

FOR AN ACT ENTITLED

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2 an effective date."

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10 subsection does not apply to

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- 13 (2) an emergency or police motor vehicle; or
- 14 (3) a motor vehicle engaged in advertising otherwise permitted by law.

2

punished as provided under AS 28.40.050(c) and (d).

3

• Sec. 2. This Act takes effect July 1, 1995.

ALASKA STATE LEGISLATURE  
House of Representatives

COMMITTEE ASSIGNMENTS

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LABOR & COMMERCE VICE CHAIR  
ADMINISTRATIVE REGULATION REVIEW VICE CHAIR  
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ECONOMIC DEVELOPMENT MEMBER



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PHONE (907) 258-8191

SESSION  
STATE CAPITOL  
JUNEAU AK 99801 1182  
PHONE (907) 465-4968  
FAX (907) 465-2040

Representative Norman Rokeberg

MEMORANDUM

TO: Representative Brian Porter, Chair  
House Judiciary Committee

FROM: Representative Norman Rokeberg *NJR*

DATE: April 26, 1995

SUBJECT: Committee Hearing Request for HB 229 - "An Act prohibiting certain amplified sounds from automobiles; and providing for an effective date."

---

I respectfully request that a committee hearing be scheduled for HB 229. HB 229 is patterned after the original California vehicle noise statute. In addition Georgia has had an amplified, vehicle, noise statute on the books since 1981. Other states have variations of vehicle noise statutes and several are included in the bill packet.

Attached is a CS for HB 229 and a committee packet. The Department of Public Safety has agreed to be available for questions. Thank you for your consideration in this matter. If you have any questions please contact myself or my staff person, Shirley Armstrong at 465-4968.

# ALASKA STATE LEGISLATURE

## House of Representatives

COMMITTEE ASSIGNMENTS

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JASON K. SUMMERS, VICE CHAIR  
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INTERIM  
218 WEST 4TH AVENUE, SUITE 200  
ANCHORAGE, AK 99501  
PHONE: (907) 258-8191

SESSION  
STATE CAPITOL  
JUNEAU, AK 99801-1142  
PHONE: (907) 465-4168  
FAX: (907) 465-2040

### Representative Norman Rokeberg

#### SPONSOR STATEMENT

#### **HB 229 - "An Act prohibiting certain amplified sounds from automobiles; and providing for an effective date."**

HB 229 is a bill that gives law enforcement a number of tools to enforce the peace and tranquillity of our neighborhoods. The primary purpose is to limit amount of amplified noise that can be transmitted outside of a vehicle.

Secondly, it reduces the driving hazards of emergency vehicles traversing through traffic by drivers who are unable to hear emergency vehicle warning signals.

Thirdly, residents will not be subjected to loud amplified sounds by vehicles cruising the streets in their neighborhoods.

Fourthly, it allows law enforcement the opportunity to caution and interview violators to make sure no additional laws are being broken.

Lastly, elderly individuals and others will no longer be frightened by groups of people who use loud music to intimate.

There is no question HB 229 is a neighborhood friendly bill that will alleviate unwanted noise and provides individuals with a means of recourse. Violation of this provision is an infraction, up to a \$300.00 fine, but is not considered a criminal offense and does not add points against a person's driving record.

STATE OF ALASKA  
1995 LEGISLATIVE SESSION

AL NOTE

BILL NO: HB 229

Revision Date: \_\_\_\_\_ Dept. Affected: Public Safety  
 Title: Prohibit loud vehicle sound systems DPS Statewide Support  
 Component: Commissioner's Office  
 Sponsor: Representative Toobey  
 Requestor: (H) State Affairs COMPONENT SERIAL NO. 0523

EXPENDITURES/REVENUES: (Thousands of Dollars) (inflation not included)

OPERATING	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01
PERSONAL SERVICES						
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CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-
CAPITAL EXPENDITURES	-0-	-0-	-0-	-0-	-0-	-0-
CHANGE IN REVENUES ( ) Revenue Code	-0-	-0-	-0-	-0-	-0-	-0-

FUNDING: (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

Estimate of current year (FY 95) impact: \$ \_\_\_\_\_

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary.)

No fiscal impact is anticipated to the Department of Public Safety

Prepared By: Lee Ann Lucas, Special Assistant to the Commissioner Phone: 465-4322  
 Division: Commissioner's Office Date: 3/30/95  
 Approved by Commissioner: *Ronald L. Ore* Date: 3/30/95  
 Agency: Ronald L. Ore, Dept. of Public Safety

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y of it to any government, agency, person or circumstance shall be affected by it. If the compact is held contrary to the constitution by any party state, the compact shall remain in full force and effect as to the remaining states and in full force and effect as to the state designated as to all severable matters. (§ 18 ch 60 SLA 1986)

## Chapter 40. General Provisions.

Section	Section
Penalties for violations of law, regulations, and municipal ordinances	100 Definitions for title 110 Short title

**c. 28.40.050. Penalties for violations of law, regulations, municipal ordinances.** (a) It is a misdemeanor for a person to violate a provision of this title unless the violation is by this title or a law declared to be a felony or an infraction.

A person convicted of a misdemeanor for a violation of a provision of this title for which another penalty is not specifically provided is punishable by a fine of not more than \$500, or by imprisonment for more than 90 days, or by both. In addition, the privilege to drive or registration of vehicles may be suspended or revoked.

Unless otherwise specified by law a person convicted of a violation of a regulation adopted under this title, or a municipal ordinance relating to vehicles or traffic when the municipal ordinance does not correspond to a provision of this title, is guilty of an infraction and is punishable by a fine not to exceed \$300.

An infraction, as provided for in (c) of this section, is not considered a criminal offense and may not result in imprisonment, nor is it imposed for the commission of an infraction considered a penal or criminal punishment; nor may the commission of a single infraction result in the loss of a driver's license or privilege to drive in this state or as may result from the accumulation of points under AS 221 — 28.15.261, or the registration of vehicles; nor does a person convicted with an infraction have a right to trial by jury or to court-appointed counsel.

*[Repealed, § 5 ch 85 SLA 1987.]* (§ 50-1-8 ACIA 1949, am § 12 ch 1 SLA 1976; am §§ 22, 23 ch 144 SLA 1977; am § 6 ch 85 SLA 1984)

Author's notes. — Formerly AS 28.40.050.  
(b) Renumbered in 1984

### NOTES TO DECISIONS

This section governs the penalties for violations of this title, and creates categories of traffic offenses: felonies, misdemeanors and infractions. State v. Clayton, 584 P.2d 1111 (Alaska 1978).  
Violations of AS 28.35.050(a) are pun-

ishable under this section. *Drahosh v. State*, 442 P.2d 44 (Alaska 1968).

**Prerequisite to suspension of license or privilege to drive.** — A driver's license or privilege to drive cannot properly be suspended unless the driver was in fact licensed or otherwise actually privileged to drive a motor vehicle within the state. *Roberts v. State*, 700 P.2d 816 (Alaska Ct. App. 1985).

**Generic penalty provision.** — Subsection (b) is not a penalty provision dealing specifically with the offense of driving while license suspended; rather it is a generic penalty provision, broadly applicable to violations of all Title 28 provisions for which the specific penalties are given. *Roberts v. State*, 700 P.2d 816 (Alaska Ct. App. 1985).

**Meaning of "law" in subsection (c).** — The term "law," as used in subsection (c) of this section, refers to statutory enactments of the Alaska legislature and cannot be read to include the provisions of municipal ordinances. *Anderson v. Municipality of Anchorage*, 646 P.2d 205 (Alaska Ct. App. 1982).

**Nature of "correspondence" between ordinance and statute required by subsection (c).** — The requirement of correspondence stated in subsection (c) of this section calls for a level of similarity between a municipal ordinance and a provision of AS 28 that would make the ordinance a functional equivalent of its statutory counterpart. *Anderson v. Municipality of Anchorage*, 645 P.2d 205 (Alaska Ct. App. 1982).

**The legislature's purpose in enacting subsection (d) was to eliminate the criminal stigma from minor traffic offenses while keeping the enforcement of such offenses within the criminal system's procedures.** *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**A prosecution for a traffic infraction is a quasi-criminal proceeding to which certain criminal procedures including the issuance of warrants are applicable.** *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**Although the language in subsection (d) with regard to an infraction not being considered a criminal offense nor a fine therefor a criminal punishment indicates that the legislature did not intend to make other traffic offenses criminal offenses, it**

does not follow that the legislature by labeling infractions "noncriminal" meant that they are civil in nature and thus that criminal procedures are not available for the enforcement of infractions. *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**Notwithstanding the legislative labeling of a traffic infraction a noncriminal offense by this section, it retains many criminal terms, such as "convicted," "violation," "guilty," "punishable by a fine."** *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**An infraction is not an offense for double jeopardy purposes.** *Carlson v. State*, 676 P.2d 603 (Alaska Ct. App. 1984).

**Jury trial.** — AS 28.10.106(a) (now repealed) and the other registration statutes in pari materia do not specify a violation of the registration statutes as an infraction, and thus under this section, such a violation is a misdemeanor punishable by up to 90 days' imprisonment, and entitled a defendant to a jury trial, denial of which constitutes prejudicial error, requiring a new trial. *Eppery v. State*, 648 P.2d 609 (Alaska Ct. App. 1982).

**Traditional use of criminal process not affected.** — In the absence of express contrary declaration, the legislature did not intend by the enactment of subsection (d) to affect the traditional use of the criminal process for enforcement of traffic infractions. *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**This section makes no changes in the traditional mode of proceeding in criminal matters with the exception of its declaration that a person cited with an infraction does not have a right to trial by jury or to court appointed counsel. The action is brought in the name of the state; it is commenced by the filing of a complaint by a law enforcement official; it is prosecuted by the district attorney. The exceptions appear to merely codify existing constitutional law.** *State v. Clayton*, 584 P.2d 1111 (Alaska 1978).

**Applied in** *Manderson v. State*, 656 P.2d 1320 (Alaska Ct. App. 1983).

**Stated in** *Francis v. Municipality of Anchorage*, 641 P.2d 228 (Alaska Ct. App. 1982).

**Cited in** *Lowry v. State*, 666 P.2d 780 (Alaska Ct. App. 1982).

AUG 14 1995

3386 Checkmate Drive  
Anchorage, Alaska 99508

August 16, 1995

Representative Brian Porter  
State Legislator  
716 W. 4th Ave., Suite 360  
Anchorage, Alaska 99501

Honorable Brian Porter:

We support the provisions of House Bill 229 from the 1995 Alaska Legislature which prohibits certain amplified sounds from automobiles to get a hearing early January 1996. We encourage you to move it quickly through the session and passed into State law.

Loud, amplified sounds-and their subsequent vibrations-coming from automobiles is both a disturbance and a safety hazard!

There is plenty of support out there for this bill!!

Sincerely,

  
William M. Dotson, Jr.

  
Penelope A. Wells

✓ Copy to: Representative Norman Rokeberg  
Sponsor of House Bill 229

To: Representative Brian Porter  
State Legislator  
716 W. 4th Ave., suite 360  
Anchorage, Ak. 99501

Honorable Brian Porter:

We, the undersigned, support the provisions of House Bill 229 from the 1995 Alaska State Legislature which prohibits certain amplified sounds from automobiles to get a hearing early January 1996. We encourage you to move this bill quickly through the session and passed into State law.

Loud, overbearing amplified sounds coming from automobiles is both a disturbance and a safety hazard!

Sincerely,

Heidi Berglund     JEFFERY J. Dowd  
2508 Forest Park Dr #3     2228 ALDER DR.  
Anch, AK 99517     Anchorage AK 99508

✓ Copy: Representative Norman Rokeberg  
Sponsor of House Bill 229

# Fairbanks Daily News Miner

11 July 1995

## City noise proposal starts quietly

By MICHAEL DREW  
Staff Writer

Fairbanks City Council members took their first step Monday night toward quieting the boom of loud car audio systems, allowing an ordinance restricting their use to move on to a public hearing.

The ordinance, introduced by Councilman Randall Wallace, states that sound from portable and automotive systems should be kept to within 50 feet of its source. Wallace said the ordinance is a response to complaints made to council mem-

bers about the Fairbanks Police De-

partment. City attorney Herb Kuss said he drafted the ordinance after what other cities, including Anchorage and San Diego, Calif., have done to control the sound. He said he compiled parts of other ordinances to fit the needs of Fairbanks.

"We're giving the Public Safety Department power to discipline citizens from unwanted noise," Kuss said.

Under the ordinance, no one can be a first-time offender \$50. A second offense, received within six months of the first, can bring a \$500

fine. A third complaint within a year of the first can bring a \$1,000 fine and confiscation of the sound system.

Kuss said the ordinance only covers noise from automobiles, not from home stereos or portables being used on private property. He said the city's disturbing-the-peace ordinance governs the use of sound systems on private property.

Public Safety Director Mike Peltie said police have received a lot of calls from people complaining about loud car and truck stereo systems. There is little police can do to

prevent it, he said.

"This gives us a tool to cut the noise from a loud stereo if we hear it within 50 feet," Peltie said. "Before, people weren't stationary and basically laughed at police when told to turn the music down."

Peltie said his officers would enforce the ordinance upon receiving complaints or hearing the sound themselves. Kuss, however, said police may be "hard-pressed" to issue the citation if they didn't hear the sound themselves.

By Michael Johnson, a car stereo in  
See NOISE, Page B-2

## NOISE: City looks at proposal to quiet car stereos

Continued from Page B-1  
staller at Hoitt's Installation Center, said that whatever happens, the ordinance won't make a difference.

"The people who are not courteous won't be terribly concerned about a new ordinance," Johnson said. "They look at it as one more rule to break."

People sometimes spend \$7,

000 to \$8,000 for a top-quality, high-decibel sound system, Johnson said. Most Hoitt's customers with loud systems lower the volume when driving through residential neighborhoods, he said.

"We recommend to people that they don't play their stereos any louder than 100 decibels while inside the vehicle."

Johnson said. "Any louder can cause permanent ear damage."

No testimony was taken Monday night, and council members did not discuss it. However, the ordinance will be up for a second reading and public hearing at the council's next regular meeting July 24.

Kuss said the proposal could be amended in the next two

weeks to allow certain commercial vehicles that don't disturb the peace to continue to operate as they have.

In other action, the council approved a land swap with the Fairbanks North Star Borough. The borough will give the city three parcels of land in parts of the city. In exchange the borough will get three lots.

**1977 EDITION**

*Fourth Edition*

**SANITARIAN'S HANDBOOK**  
**Theory and Administrative Practice**  
**for**  
**Environmental Health**

By

**Ben Freedman, M.D., M.P.H.**

Public Health Consultant,

Professor of Public Health Administration,  
School of Public Health and Tropical Medicine  
Tulane University

*Please note  
3 types of  
noise pollution*

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Table 3 summarizes the reference and equivalent methods.

Pollutant	Measurement principle or method	Reference method	Equivalent methods
TSP	High volume sampler manual method	High volume sampler	None possible
SO <sub>2</sub>	Pararosaniline manual method	Pararosaniline	Manual or continuous
CO	Nondispersive infrared	*	Manual or continuous
O <sub>3</sub>	Chemiluminescence	*	Manual or continuous
NO <sub>x</sub>	Chemiluminescence	*	Manual or continuous

From EPA's Role in Ambient Air Quality Monitoring, A. J. Hoffman et al.  
 \* None specified. Manufacturer must submit data documenting that the analyzer meets performance specifications.

Table 4 identifies the number of stations monitoring each pollutant according to the method or principle being used. Most air monitoring is being conducted with reference methods or principles. These are the sole members of the "approved" category at present. Other methods that are not reference methods but are considered reasonable candidates for passing equivalency tests are listed as "unapproved." The last category, "unacceptable," includes those methods or measurement principles that are generally acknowledged to be inaccurate and obsolete.

Table 4. Pollutant method station summary, 1974.

Pollutant	Method or principle*	No. of stations	Percent of total	Approved	Unapproved	Unacceptable
TSP	High volume (FRM) <sup>†</sup>	3683	100	X		
CO	NDIR (FRM)	316	96	X		
	Coulometric	2	n <sup>‡</sup>			X
	Flame ionization	10	4		X	
	Total	328				
SO <sub>2</sub>	Colorimetric	122	6		X	
	Conductometric	33	4		X	
	Coulometric	223	10		X	
	Flame photometric	59	3		X	
	Sequential conductometric	6	n		X	
	Pararosaniline (FRM)	1648	77	X		
	Total	2151	100			
NO <sub>x</sub>	Colorimetric	139	11		X	
	Coulometric	5	1		X	
	Chemiluminescence (FRM)	49	4	X		
	Saltzman bubbler	5	1			X
	Sodium arsenite (office)	294	24		X	
	Sodium arsenite (fric)	730	59		X	
	TEA				X	
	TGS				X	
Total	1220	100				
O <sub>3</sub>	Alkaline KI	10	3			X
	Coulometric	34	9		X	
	Neutral KI	71	19		X	
	Phenolphthalein	1	n			X
	Alkaline KI bubbler	18	5			X
Ferrous oxidation	20	5			X	
O <sub>3</sub>	Chemiluminescence (FRM)	225	59	X		
	Coulometric	1	n		X	
	Ultraviolet				X	
Total	160	100				

From EPA's Role in Ambient Air Quality Monitoring, A. J. Hoffman et al.  
 †FRM Federal reference method or principle. n<sup>‡</sup> = negligible. ‡Proposed measurement principle to replace Jacobs-Hochheiser procedure.

For several years, chlorofluorocarbons (CFC's) have been known to be environmental pollutants. Both CCl<sub>2</sub>F<sub>2</sub> and CCl<sub>3</sub>F have been detected at concentrations varying from background levels of 50 to 100 parts per trillion (ppt). These pollutants are suspected of destroying O<sub>3</sub> (ozone) in the stratosphere allowing greater amounts of ultraviolet reaching the earth, thus increasing the incidence of skin cancer. These chemicals are used as aerosol propellants, refrigerants, solvents, and foaming agents. See table 5. Control use of these chemicals will have to be initiated.

Table 5. Applications of FCC's in the United States in 1972

Compound	Aero-sol propellants (x10 <sup>6</sup> kg)	Refrigerants (x10 <sup>6</sup> kg)		Solvents (x10 <sup>6</sup> kg)	Foaming agent (x10 <sup>6</sup> kg)	Total (x10 <sup>6</sup> kg)
		Prefabricated units	Large commercial units			
CCl <sub>3</sub> F	111		4		21	136
CCl <sub>2</sub> F <sub>2</sub>	119	31	29		20	199
CHClF <sub>2</sub>		21	15			36
CClF <sub>2</sub> CFCl <sub>2</sub>				23		23
CClF <sub>2</sub> CClF <sub>2</sub>	9					9
Total	239	52	48	23	41	403
Percentage of total	59	13	12	6	10	100

From Chlorofluorocarbon Sources of Environmental Contamination, P. J. Howard & A. Hanchett.

The 3 types of noise pollution—transportation noises, occupational noises, and community noises—continue to increase and will double in the next decade. Human hearing ranges from approximately zero decibels of sound to about 140 db, at which point pain and permanent ear damage occurs. Conversation proceeds at about 40-50 db. Some permanent hearing loss results from prolonged exposure to sound exceeding about 90 db. A jet plane flying at 1,000 feet bombards a large area with sounds exceeding 100 db. A car going 65 mph subjects a person standing 25 feet away to 80 db. Noise near a busy highway averages 64 db. Inside the home, a garbage disposal grinds away at 80 db, and a food blender at 88 db. "Although the number (of persons in U. S.) exposed to potentially hazardous noise cannot be accurately assessed.... a total of 40 million people might be reasonable."<sup>6</sup>

"Man may soon enter an era of energy pollution of the environment comparable, in public health and ecological implications, to the chemical pollution of today."<sup>7</sup> There are two important health hazards associated with high voltage transmission lines: (1) air pollution resulting from chemical reactions that take place in the corona discharge, and (2) electromagnetic effects, particularly the strong electric field that exists in the vicinity of these lines. It has been shown that people exposed to intense electric fields 500 and 750 kilovolts, over long periods of times without protective measures will result in "shattering the dynamic state of the central nervous system, heart and blood-vessel system, and changing blood structure. Young men complained of reduced sexual potency."<sup>8</sup> As a result, the Soviets set up rules for exposure as follows:

<sup>5</sup> Chlorofluorocarbon Sources of Environmental Contamination, P. H. Howard, A. Hanchett, Science, Vol. 189, pp. 217-219, July 18, 1975.

<sup>6</sup> Noise: The Unseen Pollutant, R. H. Giluly, Science News, Vol. 101, No. 12, pp. 189-191, March 18, 1972.

<sup>7</sup> Pollution by Electrical Transmission, L. B. Young, H. P. Young, Bulletin of The Atomic Scientists, pp. 34-38, December 1974.

<sup>8</sup> Influence of the Electric Field in 500 and 750 Kilovolt Switchyards on Maintenance Staff and Means for its Protection, V. P. Korobayev, Y. A. Morozov, M. D. Skolarov, Y. A. Yakub, Report available from U. S. Dept. of Interior, Engineering and Research Center, Washington, D. C.

*Repres Norm Rokberg  
Rm 110*

# ENVIRONMENTAL ENGINEERING AND SANITATION

THIRD EDITION

JOSEPH A. SALVATO, P.E.

Assistant Commissioner, Division of Sanitary Engineering (Retired)  
New York State Department of Health, Albany, N.Y.  
Sanitary and Public Health Engineer



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almost all sound contains multiple frequencies. The relationship is not simple because of the interference effects of the sound waves.<sup>36</sup> For example, increasing sound pressure level by 3 dB is equivalent to increasing the intensity by a factor of two. Increasing sound pressure level by 10 dB is equivalent to increasing the intensity by a factor of 10, and increasing the sound pressure level by 20 dB is equivalent to increasing the intensity by a factor of 100. Expressed in another way, whereas 10 decibels is 10 times more intense than one decibel, 20 decibels is 100 times ( $10 \times 10$ ) more intense, and 30 decibels 1000 times ( $10 \times 10 \times 10$ ) more intense.

**Loudness** Loudness or amplitude of sound is sound level or sound pressure level as perceived by an observer. The apparent loudness varies with the sound pressure and frequency (pitch) of the sound. This is illustrated in Figure 6-14. It is specified in sones or phons. For a pure tone, each time the sound pressure level increases by 10 dB the loudness doubles (sones increase by a factor of two). Sound levels of the same intensity may not sound the same since the ear does not respond the same to all types of sound.

A 1000-Hz pure tone, 40 dB above the listener's hearing threshold (0 dB), produces a loudness of one *son*, which is a unit of loudness.<sup>37,38</sup> This loudness of one sone is equal to 40 phons. Loudness levels are usually expressed in phons. For practical purposes, each doubling of the sones increases the phons by 10, that is, 1 sone = 40 phons; 2 sones = 50 phons; 4 sones = 60 phons. Also for pure tones, a 10-dB increase in sound level would be perceived as a 10-phon increase in loudness by a person with good hearing in the frequency range of 600 to 2000 Hz.

Take for example a human listener with normal hearing who hears a 100-Hz pure tone with a sound pressure level (SPL) of 90 dB. What loudness does the listener perceive?

From Figure 6-14, a SPL of 40 dB at approximately 100 Hz equals a loudness of 10 phons. Since a 50 dB increase in SPL is equivalent to a 50 phons increase in loudness, the tone's loudness is 60 phons or 4 sones.

**Noys** Noys is a measure of the perceived noise level (PNL) in dB in relation to the noisiness or acceptability of a sound level. Although similar to loudness, the ratings by observers when tested were different.

Procedures for the calculation of loudness and noisiness are given in standard texts.<sup>39</sup>

### Effects of Noise—A Health Hazard

Noise pollution is an environmental and workplace problem. Excessive noise can cause permanent or temporary loss of hearing. Loud sounds affect the circu-

<sup>36</sup>M. I. Davis, *Air Resources Management Primer*, ASCE, New York, August 1973.

<sup>37</sup>*The Industrial Environment . . . Its Evaluation and Control*, "Sound and Noise," by Charles D. Jaffe, PHS Pub 614, GPO, Washington, D.C., 1958, p. B-20, 2.

<sup>38</sup>*Environmental Health Criteria 12, Noise*, WHO, 1980, pp. 24-25.

<sup>39</sup>Arnold P. G. Peterson and Erwin E. Gross, Jr., *Handbook of Noise Measurement*, General Radio Company, Concord, Mass., 1974, pp. 23-35.

Figure 6-14  
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relationship is not simple. For example, increasing the intensity of sound by 10 dB is equivalent to increasing the sound pressure by a factor of 100. Excessively intense than one and 30 decibels 1000

level of sound pressure varies with the sound pressure level as illustrated in Figure 6-14. Doubling the sound pressure level (by a factor of two) is perceived as a 10-phon increase since the ear does

not hear a 10-phon increase until the sound pressure level is 10 dB above the hearing threshold (0 dB), or 10 phons.<sup>38</sup> This loudness level is usually expressed in phons. Doubling the phons by 10, 10 phons = 60 phons. Also, a sound perceived as a 10-phon increase in the frequency range of

100 Hz who hears a 100-Hz sound. What loudness does the

100 Hz equals a loudness equivalent to a 50 phons in 100 Hz.

PNL) in dB in relation to sound pressure level, which is similar to loudness,

ess are given in standard

problem. Excessive noise and sounds affect the circu-

ork, August 1973. "Sound and Noise," by Charles D.

Measurement, General Radio

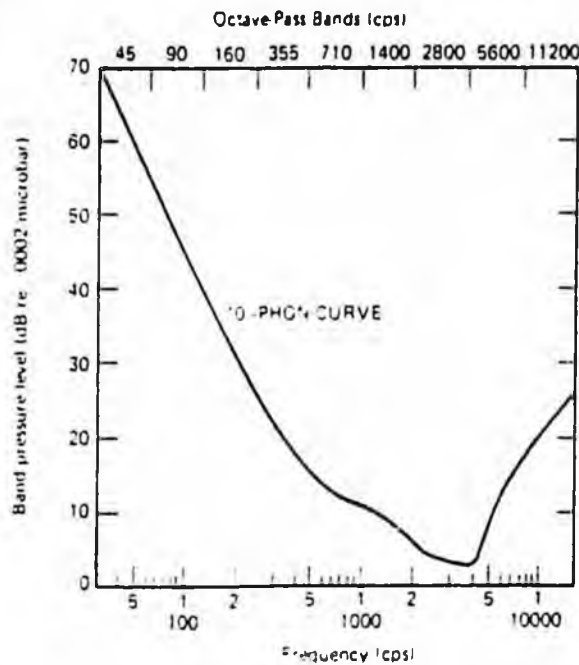


Figure 6-14 Equal loudness contour. (Source: *Toward a Quieter City*, A report of the Mayor's Task Force on Noise Control, New York City, 1970.)

latory and nervous systems, although the effects are difficult to assess. It interferes with speech, radio, and TV listening; disturbs sleep and relaxation; affects performance as reduced work precision and increased reaction time; causes annoyance, irritation, and public nuisance. Sonic boom can cause physical damage to structures. With the WHO definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," then excessive noise is clearly a health problem. David G. Hawkins, assistant USEPA administrator reported that

A recent poll conducted by the U.S. Bureau of the Census showed that noise is considered to be the most undesirable neighborhood condition—more irritating than crime and deteriorating housing.<sup>40</sup>

Criteria for hearing protection and conservation have been established primarily for the worker. The major factors related to hearing loss are intensity (sound pressure levels in dB), frequency content, time duration of exposure, and repeated impact (a single pressure peak incident). In measuring the potential harm of high-level noise, frequency distribution as well as intensity must be considered. Continuous exposure to high-level noise is more harmful than intermittent or occasional exposure. High- and middle-frequency sounds at high levels generally are more harmful than low-frequency sounds at the same levels. Greater harm is done with increased time of exposure.

<sup>40</sup>E. P. A., "Battling Noise Pollution, Tells of Extent of Damage to Ears," *United Press International*, *New York Times*, November 11, 1979.

Individuals react differently to noise depending on age, sex, and socioeconomic background. The relation of noise to productivity or performance is contradictory and not well established.

For workers, a sound level over 85 dBA calls for study of the cause. A level above 90 dBA should be considered unsafe for daily exposure over a period of months and calls for noise reduction or personal ear protection if this is practical. A level of 120 dBA causes discomfort; levels of 120 to 140 dBA pain and possibly nausea and dizziness.

A USEPA report identified a 24-hr exposure level of 70 dBA as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Levels of 55 dBA outdoors and 45 dBA indoors are identified as preventing annoyance and not interfering with spoken conversation and other activities such as sleeping, working, and recreation.<sup>41</sup> Some common sound levels and human responses are noted in Figure 6-15.

Other effects of noise are reduced property values; increased compensation benefits and possible accidents, inefficiency, and absenteeism; and increased building construction costs.

### Sources of Noise

Transportation, industrial, urban, and commercial activities are the major sources of noise, plus the contributions made by household appliances and equipment. The major sources of transportation noise are motor vehicles including buses and trucks, aircraft, motorcycles, and snowmobiles.

Industrial, urban, and commercial noises emanate from factories, equipment serving commercial establishments, and construction activities. Construction equipment sources are power tools, air compressors, earthmovers, dump trucks, diesel cranes, pneumatic drills, and chain saws; also garbage collection trucks. Compactor trucks manufactured after October 1, 1980 may not exceed a noise level of 79 decibels and may not exceed 76 decibels after July 1, 1982 measured on the A-weighted scale, seven meters from the front, side, and rear of the vehicle while empty and operating.

Residential noise is associated with dishwashers, garbage disposal units, air conditioners, power lawn mowers, and home music amplifier units.

### Measurement of Noise

Noise measurement equipment selection is dependent upon the task to be performed. For an initial survey, a sound level meter is adequate for a rapid evaluation and identification of potential problem areas. To study and also determine the characteristics of a noise problem area, a sound level meter, fre-

<sup>41</sup>Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, USEPA Report 550/9-74-004, March 1974.

Carrier Deck,  
Jet Operation

Jet Takeoff (200 ft)  
Discotheque  
Auto Horn (3 ft)  
Riveting Machine  
Jet Takeoff (2,000 ft)  
Garbage Truck  
New York Subway Station  
Heavy Truck (50 ft)  
Pneumatic Drill (50 ft)  
Alarm Clock

Freight Train (50 ft)  
Freeway Traffic (50 ft)

Air-Conditioning Unit  
(20 ft)  
Light Auto Traffic (100 ft)

Living Room  
Bedroom  
Soft Whisper (15 ft)  
Broadcasting Studio

Figure 6-15 Sound level  
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Sound Level Meter  
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Protect Public Health and Welfare  
-004, March 1974.

	Noise Level	Response	Conversational Relationships
	150		
Corner Deck, Jet Operation	140	Painfully loud	
	130	Limit Amplified Speech	
Jet Takeoff (200 ft)	130	Maximum Vocal Effect	
Discotheque			
Auto Horn (3 ft)			
Riveting Machine	110		
Jet Takeoff (2,000 ft)			
Garbage Truck	100		Shouting in Ear
New York Subway Station		Very Annoying	
Heavy Truck (50 ft)	90	Hearing Damage (8 hr)	Shouting at 2 ft
Pneumatic Drill (50 ft)			
Alarm Clock	80	Annoying	Very Loud Conversation 2 ft
Freight Train (50 ft)			
Freeway Traffic (50 ft)	70	Telephone Use Difficult	Loud Conversation, 2 ft— Possible contribution to hearing impairment begins
Air-Conditioning Unit (20 ft)	60	Intrusive	Loud Conversation, 4 ft
Light Auto Traffic (100 ft)	50	Quiet	Normal Conversation, 12 ft
Living Room			
Bedroom	40		
Soft Whisper (15 ft)	30	Very Quiet	
Broadcasting Studio	20		
	10	Just Audible	
	0	Threshold of Hearing	

Figure 6-15 Sound levels and human response. (Source: *Sound Levels and Human Responses*, Office of Planning Management, USEPA, July 1973.)

quency analyzer, and recorder are needed to determine sound pressure dis-  
tribution with frequency and time. More sophisticated equipment would be  
needed for research or solution of special noise problems.

**Sound Level Meter** A sound level meter is used to measure the sound pressure  
level; it is the basic instrument for noise measurement.

Meters are available to cover the range of 20 to 180 dB. The specifications  
usually refer to the American National Standards Institute (ANSI) and par-  
ticularly to the "American National Standard Specification for Sound Level  
Meters," ANSI S1.4-1971. Three weighting networks, A, B, and C, are pro-  
vided to give a number which best approximates the total loudness level for  
a particular situation, with consideration of the sound frequency, intensity, and  
impact levels. There are three types of meters. Type I is highest quality; Type III

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a supplement to the ap-  
s include properly fitted  
al around the ear. They

Its Evaluation and Control,  
W. Washington, D.C., 1967.

should meet established criteria for comfort, tension, sound attenuation, simplicity, durability, and so on. To be effective however, the worker must cooperate by wearing the protective device where needed. Dry cotton plugs do not provide significant sound attenuation.

### Control of Transport Noise

Noise from various forms of transport and its transmission into the home may be reduced:<sup>44</sup>

1. At the source, i.e., by controlling the *emission* of noise.
2. By means of town and country planning and traffic engineering, i.e., by controlling the *transmission* of noise.
3. In the home, i.e., by controlling the *reception* of noise by the occupants.

Some specific measures to reduce the effect of highway noise include:

1. Enclosure of highways going through residential areas.
2. Wider rights-of-way, i.e., separation or buffer zone between the source and the receptor.
3. Walls designed to deflect or absorb noise.
4. Changes in highway alignment and grade to avoid sensitive areas; minimizing stop-and-go traffic, and shifting to low gears.
5. Setting lower speed limits for certain sections of a highway.
6. Adjacent barriers, nonresidential buildings in sound transmission path, earth embankments or berms, elevation or depression of highways. It is reported however that barriers provide little attenuation of low frequency sounds and that a thick band of deciduous trees 200 to 300 ft in width is relatively ineffective in cutting down traffic noises, reducing them only on the order of 4 or 5 dB.<sup>45</sup> Separation distance is most effective in reducing noise from highways.
7. Establishing alternate truck routes.
8. Building codes requiring building insulation to limit interior transmission of noise. Additional measures are masonry walls, elimination of windows, use of double windows or glazing, sound-proofing of ceilings, thick carpeting, over-stuffed furniture, and heavy drapes.

### Noise Reduction

#### Sound Absorption

The amount of sound energy a material can absorb (soak up) is a function of its absorption coefficient ( $\alpha$ ) at a specified frequency. The sound absorption coefficient is the fractional part of the energy of an incident sound wave that is absorbed by a material. A material with an absorption coefficient of 0.8 will absorb 80 percent of the incident sound energy. A material that absorbs all incident energy, such as an open window, has an absorption coefficient of one. The sound absorption of a surface is measured in sabins. A surface hav-

<sup>44</sup>Health Hazards of the Human Environment, WHO, 1972, p. 265.

<sup>45</sup>J. E. Heer, Jr., D. J. Hagerty, and J. L. Pavoni, "Noise in the Urban Environment," *Pub. Works*, October 1971, pp. 60-64.



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Table 6-14 Permissible Noise Levels in Plants\*

Duration per Day (hours)	Sound Level at Slow Response (dBA)	
	Existing	Proposed
110	87	82
8	90	85
6	92	87
4	95	90
3	97	
2	100	95
1 1/2	102	
1	105	100
1/2	110	
1/4 or less	115	

Source: *Guidelines To The Department of Labor's Occupational Noise Standards for Federal Supply Contracts*, U.S. Dept. of Labor, Washington, D.C., December 4, 1970.

Note: Workers must not be exposed to sound levels above 115 dBA. Impact noise lasting less than one second should not exceed 140 dB (unweighted).

\*Occupational Safety and Health Act of 1970 extends Walsh-Healey Public Contracts Act of May 1969 to contractors with federal contracts of \$10,000 or more.

The upper limit of a daily dose which will not produce disabling loss of hearing in more than 20 percent of the exposed population.

The Department of Housing and Urban Development (HUD) has criteria for the sound insulation characteristics of walls and floors in row houses, nursing homes, and multifamily housing units. These criteria must be met by housing of this type in order to qualify for HUD mortgage insurance.

The National Bureau of Standards and the National Science Foundation are concerned with research in noise control and abatement in factories, homes, offices, and commercial work areas.

Table 6-15 Design Noise Level—Land Use Relationships

Design Noise Level (dBA)	Description of Land Use Category
50 (Exterior)	Areas such as amphitheatres, certain parks or open spaces in which local officials agree serenity and quiet are of extraordinary significance.
70 (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, recreation areas.
75 (Exterior)	Developed land, properties or activities not included in above two categories.
55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: U.S. Dept. of Transportation Policy Procedure Memorandum 90-2 Appendix B, Transmittal 279, February 8, 1973.

Table Sound Levels

Sound Level (dBA)
40 to 45
35 to 40
55 to 60
55
30 to 40
40
45
40 to 45
50
30 to 45
35 to 45

Table 6-16 Noise Levels for Sleeping Quarters in New Structures

Exterior	Interior
Does not exceed 45 dBA for more than 30 min per 24 hours (Acceptable)	Not greater than 55 dBA for more than an accumulation of 60 min in any 24-hour day
Does not exceed 65 dBA for more than 8 hours per 24 hours (Normally Acceptable)	Not greater than 45 dBA for more than 30 min during nighttime sleeping hours 11 p.m. to 7 a.m., and Not greater than 45 dBA for more than an accumulation of 8 hours in any 24-hour day

Source: HUD Circular 1390, amended Sept. 1, 1971

Note: Not greater than 30 dBA preferred for bedrooms

The USEPA has issued noise control regulations for interstate trucks, for interstate railroad carriers, for new medium and heavy-duty trucks, and for new air compressors. USEPA and DOT regulations establish a maximum noise level of 90 dBA for interstate trucks and buses over 10,000 pounds in speed zones over 35 mph and 86 dBA at 35 mph or less, measured 50 ft from the center line of the lane of travel. For new trucks less than 10,000 pounds, the USEPA has proposed 83, 80, and 75 dBA after January 1977, 1981, and 1983 respectively.

The USEPA program for certain noise-emitting and noise-reducing products requires a noise rating giving the number of decibels (dBA) a product emits and a noise reduction rating.

HUD noise levels for new sleeping quarters are given in Table 6-16.

### State and Local Regulations

New York State enacted a state highway anti-noise law in 1965 and California followed in 1967. Chicago put into effect a comprehensive noise control program in July 1971. Regulations require reduced noise levels after 1979 for vehicles, construction machinery, home powered equipment, and the like manufactured equipment. St. Louis County has a noise code which limits noise in residential areas to 55 dBA and in industrial areas to 80 dBA. New Jersey enacted comprehensive noise legislation January 1972. Most states in the snow belt have established a maximum noise level for snowmobiles of 78 dBA at 50 feet. Some 12,000 states and municipalities have noise control legislation but enforcement has been weak and spotty.

Local regulations which are consistent with federal and state laws and which are enforced locally are encouraged as being more practical for enforcement

Model noise control development of a local Maximum acceptable 6-13, 6-15, and 6-16 for industrial plants and factories are given in Table 7

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- control ordinances

# the INDUSTRIAL ENVIRONMENT — its EVALUATION & CONTROL

*Please note  
page 318 + 325  
+ Table 25-4  
Page 327*

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
Public Health Service  
Center for Disease Control  
National Institute for Occupational Safety and Health  
1973

✕ Exposure to excessive noise causes an irreversible sensorineural hearing loss. Damage to the hair cells is of critical importance in the pathophysiology of noise-induced hearing loss. Invariably, degeneration of the spiral ganglion cells and the peripheral nerve fibers accompany severe injury to the hair cells.

Sensorineural hearing loss may be attributed to various causes, including presbycusis, viruses (e.g., mumps), some congenital defects, and drug toxicity (e.g., streptomycin).

#### Mixed Hearing Loss

Mixed hearing loss occurs when there are components and characteristics of both conductive and sensorineural hearing loss in the same ear.

#### Central Hearing Loss

A central hearing loss implies difficulty in a person's ability to interpret what he hears. The abnormality is localized in the brain between the auditory nuclei and the cortex.

#### Psychogenic Hearing Loss

A psychogenic hearing loss indicates a "non-organic" basis for an individual's threshold elevation. Two conditions in which such a loss may occur are malingering and hysteria.

### AUDIOMETRY

The pure tone audiometer is the fundamental tool used in industry to evaluate a person's hearing sensitivity. It produces tones which vary in frequency usually from 250 Hz to 8,000 Hz at octave or half-octave intervals. The intensity output from the audiometer can vary from zero dB to 110 dB, and is often marked "hearing loss" or "hearing level" on the audiometer.

Zero dB or zero reference level on the audiometer is the average normal hearing for different pure tones and varies according to the "standard" to which the audiometer is calibrated. Zero reference levels have been obtained by testing the hearing sensitivity of young healthy adults and averaging that sound intensity at specific frequencies at which they were just perceptible. It is to be differentiated from the 0.0002 microbar references for the sound pressure level measurements. If a person has a 40 dB hearing loss at 4,000 Hz, it means that for the individual to perceive a tone the intensity of that tone must be raised to 40 dB above the "standard."

The audiogram serves to record the results of the hearing tests. A graphic description of the faintest sound audible is obtained by plotting the intensity against the frequency. Examples of audiograms which indicate conductive and sensorineural losses are shown in Fig. 24-8. In conductive hearing losses, the low frequencies show most of the threshold elevation, whereas the high frequencies are most often involved with the sensorineural losses.

The recording of an audiogram is deceptively simple, yet for valid test results, one must have a properly calibrated audiometer, an acceptable test environment to eliminate interfering sounds, and a qualified audiometrician. When a marked hearing loss is encountered, bone conduction audiometry and more sophisticated hearing tests are often helpful in diagnosing the site and cause of

the hearing loss.<sup>9</sup> For more details concerning appropriate American National Standard Institute (ANSI) standards and the objectives of a good audiometry program, refer to the preferred reading list.

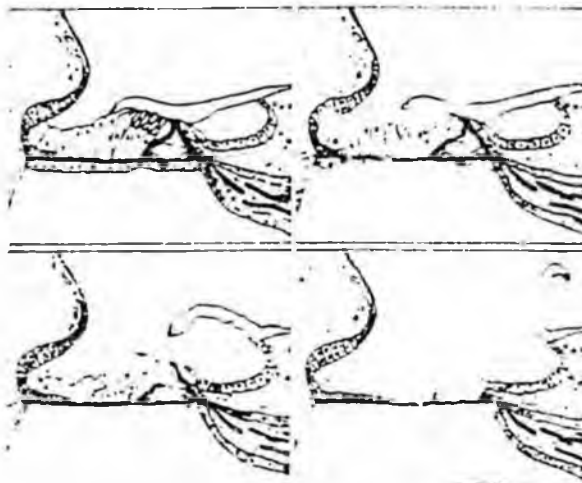
### EFFECTS OF EXCESSIVE NOISE EXPOSURE

Since the ear does not have an overload switch or a circuit breaker, it has no option but to receive all the sound that strikes the eardrum. In industry, excessive noise constitutes a major health hazard. Such exposure can cause both auditory and extra-auditory effects.

#### Auditory Effects

Noise induced hearing loss (NIHL) can happen unnoticed over a period of years. At first, excessive exposure to harmful noise causes auditory fatigue or a temporary threshold shift (TTS). This shift refers to the difference in one's hearing sensitivity measured before and after exposure to sound. It is called "temporary" since there is a return of the individual's pre-exposure hearing level after a period of hours away from the intense sound.

However, repeated insults of excessive noise can transform this TTS into a permanent threshold shift (PTS). In fact, studies substantiate that the hearing sensitivity of factory workers in heavy industry is poorer than that of the general population. Fig. 24-9 depicts the stages of destruction



Lawrence M.: Auditory problems in occupational medicine. Arch Environ Health 3:2888, Copyright 1961. American Medical Association, Chicago, Ill.

Figure 24-9. Stages of Destruction of the Organ of Corti. (A) The normal organ of Corti. (B) A stage of hair cell degeneration following the first subtle changes within the cytoplasm of the cells. The internal hair cell remains intact. (C) Both inner and outer hair cells are gone, and the supporting structures are degenerating. (D) In the final stages, the entire organ of Corti is dislodged, leaving a denuded basilar membrane, which may become covered with a simple layer of epithelial cells. (Arch. Environ. Health)

of the organ of Corti in a laboratory test animal that was overstimulated by loud continuous noise.

Many factors influence the course of NIHL. The overall "decibel level" of the noise exposure is obviously important. If a noise exposure does not cause auditory fatigue, then such exposure is not considered harmful to one's hearing sensitivity.

Another consideration is the "frequency spectrum" of the noise. Noise exposure which has most of its sound energy in the high frequency bands is more harmful to a worker's hearing sensitivity than low-frequency noises.

Another factor is the daily "time distribution" of the noise exposure. In general, noise which is intermittent in character is less harmful to hearing than steady state noise exposure. As the "total work duration" (years of employment) of a worker to hazardous noise is increased, so too does the incidence and magnitude of his NIHL. However, no report of "total" hearing loss has been attributed to excessive noise exposure alone.

Finally, the "susceptibility" of the worker to hazardous noise must be considered, since not every individual will suffer identical hearing impairment if exposed to the same noise intensity over the same time period. A small percentage of workers will be highly susceptible or, on the other hand, refractory to the degrading effects of noise.

The hearing loss from "acoustic trauma" should be differentiated from the insidious, irreversible sensorineural NIHL that results after months or years of exposure to excessive noise conditions. Acoustic trauma refers to the loss of hearing secondary to head or ear trauma, or after exposure to a sudden, intense noise such as that of firearms or explosions. A conductive type of hearing loss results when the trauma causes a perforated eardrum or disruption of the middle ear ossicles. The trauma can cause a sensorineural loss, but not infrequently, the hearing loss is temporary in nature. Besides causing hearing loss, hazardous noise levels can mask speech, be a source of annoyance, and occasionally degrade a worker's job performance.

#### Extra-Auditory Effects

The extra-auditory effects of noise result in physiologic changes other than hearing. We are familiar with the reflex-like startle response of an individual to a loud, unexpected sound. Less commonly noted are the cardiovascular, neurologic, endocrine and biochemical changes secondary to intense noise exposure. Subjective complaints of nausea, malaise, and headache have been reported in workers exposed to ultrasonic noise levels. Vasoconstriction, hyperreflexia, fluctuations in hormonal secretions, disturbances in equilibrium and visual functions have been demonstrated in laboratory and field studies. These changes have been for the most part transient in character, and it remains to be clarified whether such noise exposure has long lasting ill effects on the organism.

## SUMMARY

The important function of the hearing mechanism is to convert the mechanical energy of sound pressure waves into an electrochemical response. Excessive noise exposure can tax the physiologic limits of the hearing mechanism and cause an irreversible, sensorineural hearing loss. Noise is just one of many causes of hearing loss, so that a relevant medical history and a detailed history of a worker's previous employment will eliminate many false conclusions concerning the cause of a worker's loss of hearing.

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sure. Its reading is interpreted according to the theory that noise exposures producing little temporary hearing loss are not likely to produce much permanent hearing loss even after many repetitions.

### ACCEPTABILITY CRITERIA

Criteria for the acceptability of noise are dictated by the effects which are to be avoided. The most important of these is hearing damage resulting from prolonged exposure to excessive noise. Another undesirable effect is speech interference or interruption of communications by noise. Annoyance is a third undesirable effect of noise more difficult to assess. There are also certain non-auditory effects of noise we are just beginning to recognize, which are discussed later in this chapter.

#### Hearing Damage

The damaging effect of noise on hearing depends on (1) the level and spectrum of the noise, (2) duration of exposure, (3) how many times it occurs per day, (4) over how many years daily exposure is repeated, (5) the effects on hearing regarded as damage and (6) individual susceptibility to this type of injury. All of these factors must be considered in establishing limits of acceptable exposures to dangerous noise.

*Noise Evaluation.* Early in the study of the effects of noise on hearing, it was learned that noise frequency as well as intensity influenced the effect produced. High frequency noise was found to be more damaging than low frequency noise of the same sound pressure level. Therefore, noise spectra were evaluated with standard octave band analyzers which were the only portable spectrum analyzers then available.

As knowledge of noise effects grew, some investigators began to feel that octave band analysis was a needlessly complicated evaluation of noise which could be replaced with the A-weighted sound level measured using a standard sound level meter. It seemed that the A-weighting network made the meter less sensitive to low frequency sounds to about the same extent that the ear is less susceptible to injury by these low frequency sounds.

In these studies, the damage to be avoided was impairment of ability to understand "everyday speech" as defined by the medical profession. This medico-legal definition allows some observable change in hearing thresholds not sufficient to affect ability to understand everyday speech significantly.

*Steady Noise.* All day exposure to steady noise has been investigated to determine the level at which hearing damage begins after many years of redundant exposure. Such studies are the basis for the curves in Figure 25-6 which indicate the risk of hearing impairment associated with exposure to a steady noise level at work.<sup>4</sup> Each curve indicates on the vertical scale the percentage of workers that showed impaired hearing as defined by the medical profession after working continuously in the noise levels shown on the horizontal scale.

To interpret the Figure, note that the upper

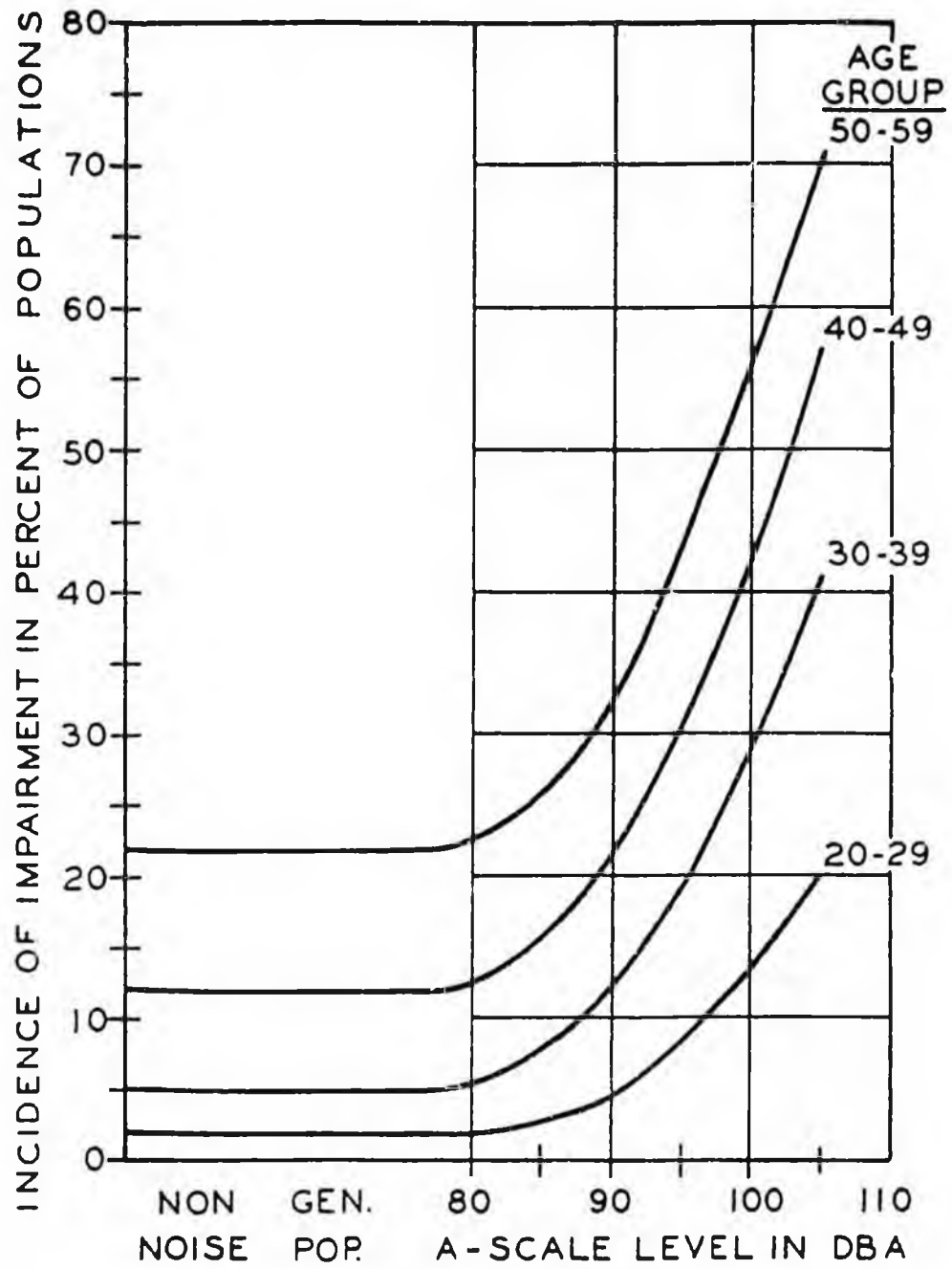
curve shows that in a group of 100 men aged 50 to 59 years, which has been exposed to 90 dBA at work for 33 years, 33 men should show evidence of impaired hearing. However, note that the lower flat portion of the same curve indicates that the general population and others not exposed to dangerous noise at work exhibit 22 cases of impaired hearing out of every hundred. Therefore, near-lifetime exposure to 90 dBA at work seems to produce about 11 more cases of impaired hearing per hundred surviving than would otherwise have occurred. As the data generating the curves of Figure 25-6 are not so consistent as the precise lines would indicate, this difference of 11 percentage points is about the smallest that can be considered significant. For lower age groups exposed for shorter periods, the increase in prevalence of impaired hearing is much less pronounced. The curves of Figure 25-6 suggest 90 dBA as one limit for steady exposure to continuous noise, a limit that has become rather widely accepted. Future standards may lower this limit.

*Intermittent Noise.* Most occupational noises are intermittent rather than continuous. Interrupting harmful noise allows the ear to rest and recover which reduces the likelihood of permanent damage.<sup>5</sup> Such intermittent exposures have not been studied much because of the great complexities of exposure description. As a result, theories are relied upon to set limits for intermittent noise.

The theory most generally accepted postulates that the hazard of noise exposure increases in proportion to the average temporary hearing loss which the exposure would produce in a group of normal ears. This theory arises out of the observation that those noise exposures that ultimately produce permanent hearing loss also produce temporary hearing loss in normal ears. Conversely, those noise exposures that do not produce permanent hearing loss do not produce temporary hearing loss in normal ears. While the true relation between temporary and permanent hearing loss has not been established, it is logical to assume that those noise exposures that do not cause much temporary loss will not cause much permanent loss either. Any temporary threshold shift (TTS) that disappears before the next exposure to noise commences is considered acceptable.

On the basis of this assumption, results of TTS studies have been used to define safe limits for all day exposures to steady noise. These limits agree with those established by permanent threshold shift studies.

TTS studies have also indicated that intermittent noise is much less harmful than steady noise. The laws describing growth of TTS during exposure and recovery afterwards have been used to calculate exposures producing acceptably small amounts of TTS.<sup>10</sup> Combinations of sound level, duration of exposure and degree of repetition that are considered acceptable for personnel exposures at work are shown in Table 25-3.<sup>11</sup> This method for appraising noise exposures was derived from the report describing hazardous exposure to intermittent and steady-state noise prepared by the National Academy of Science-National Research



Guidelines for noise exposure control. Sound and Vibration 4:21, 1970.

Figure 25-6. Prevalence of Impaired Hearing and Sound Levels at Work.

Council, Committee on Hearing, Bio-acoustics and Bio-mechanics, generally referred to as CHABA.<sup>12</sup> Maintaining exposures within the limits CHABA recommended will allow few additional cases of impaired hearing to occur.<sup>13</sup>

TABLE 25-3.

Maximum Permissible Sound Levels for Intermittent Noise When Occurrences Are Evenly Spaced Throughout the Day

Total noise duration per day (8 hours)	Number of times noise occurs per day						
	1	3	7	15	35	75	160 up
8 h.	89	89	89	89	89	89	89
6	90	92	95	97	97	94	93
4	91	94	98	101	103	101	99
2	93	98	102	105	108	113	117
1	96	102	106	109	114	125	125 (1 1/2 h)
24 h.	100	105	109	114	125		
15	104	109	115	124			
8	108	114	125				A-weighted
4	113	125					sound levels,
2	123						dB A

Reproduced with permission from "Sound and Vibration" Bay Village, Ohio (4:16, 1970).

To use Table 25-3, select the column headed by the number of times the noise occurs per day, read down to the average sound level of the noise and locate directly to the left in the first column the total duration of the noise permitted for any 24 hour period. It is presumed that the noise bursts are evenly spaced throughout the work day so that an opportunity for rest and recovery between noise bursts exists. It is permissible to interpolate in the Table if necessary.

Table 25-3 shows that intermittency is as important as duration and level. For example, it shows that a continuous noise level of 91 dBA can be tolerated for 4 hours; 101 dBA can be tolerated also for 4 hours if it is presented in 15 evenly spaced bursts lasting 16 minutes each. Thus, the interruption of the higher noise reduces the effect on hearing to that which would be produced by a steady noise of equal duration 10 decibels lower. So you might say that the interruptions are equivalent to a 10 decibel noise reduction.

**Impulsive Noise.** Exposure limits for impulse noise are based on studies of the average TTS caused in normal ears by exposure to various impulses. Limits that will cause little TTS and, therefore, little expected permanent damage have been set.<sup>14</sup> These limits are complicated to apply and, as a result, have not been widely used.

However, an approximate method of determining whether these limits are likely to be exceeded can be carried out with the sound level meter using

the C-weighting and "fast" meter response. To do so, set controls so that zero on the meter scale corresponds to a level of 130 dB. If the impulse does not cause the meter needle to jump above 125 dB (minus 5 on the meter scale), then it probably is not excessive.<sup>15</sup>

**ACGIH TLV for Noise.** The noise exposure limits expressed in Table 25-3 are inconvenient to use in practice. So, a simplification of the table was adopted in 1970 by the ACGIH as a threshold limit value (TLV) for noise.<sup>16</sup> It is shown in Table 25-4. The simplification embodies the presumption that practically all noise exposures are interrupted at least a few times a day by meals or rest periods, machinery stoppages, etc. The limits of Table 25-4 correspond very closely to those of Table 25-3 for noises that occur three to seven times per day. Since these exposure limits do not take proper account of intermittency, they do not provide a true evaluation of hearing damage potential of the noise exposure. They are too liberal for absolutely continuous noise and too conservative for noise that is interrupted very frequently.

If an exposure consists of two or more noise levels, the combined effect must be considered. To do so, it is necessary to compute the ratio of the duration of each level to the duration allowed by Table 25-4. The sum of these ratios for all noise levels involved in the exposure must not exceed unity if the exposure is to be acceptable. Noise levels below 90 dBA are not considered in these calculations. The graph in Figure 25-7 is convenient for calculation of exposures involving several levels.

For impulsive sounds, ACGIH proposed a limit of 140 dB peak which is quite conservative compared to the recommendations of Coles et al.<sup>17</sup>

TABLE 25-4

Threshold Limit Values for Non-impulsive Noise Adopted by the American Conference of Governmental Industrial Hygienists

Duration per day, hours	Permissible sound level, dBA
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
3/4	107
1/2	110
1/4	115 max.

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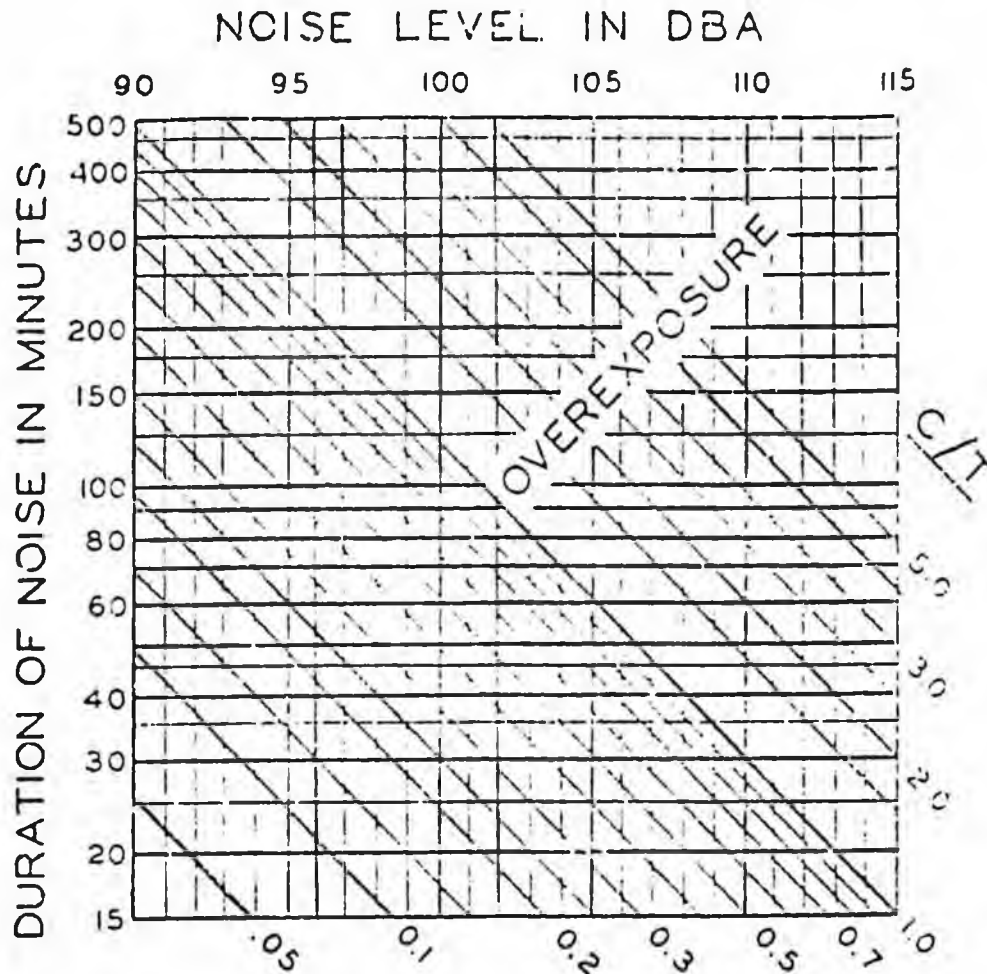


Figure 25-7. Graphical Presentation of ACGIH TLV for Noise. To use the graph, locate the point corresponding to the noise level and duration; then read off the exposure ratio C T from the diagonal lines interpolating if necessary.

The ACGIH TLV for noise was accepted by the U.S. Department of Labor for promulgation under the provisions of the Occupational Safety and Health Act of 1970. It is being adopted also by many states for enforcement as part of their occupational health regulations.

*Non-occupational Exposures.* All that has been said up to now about hearing damage applies to the noise exposures at work. Medical evaluation of hearing handicap from occupational noise exposure disregards changes in hearing that do not affect ability to understand everyday speech significantly.

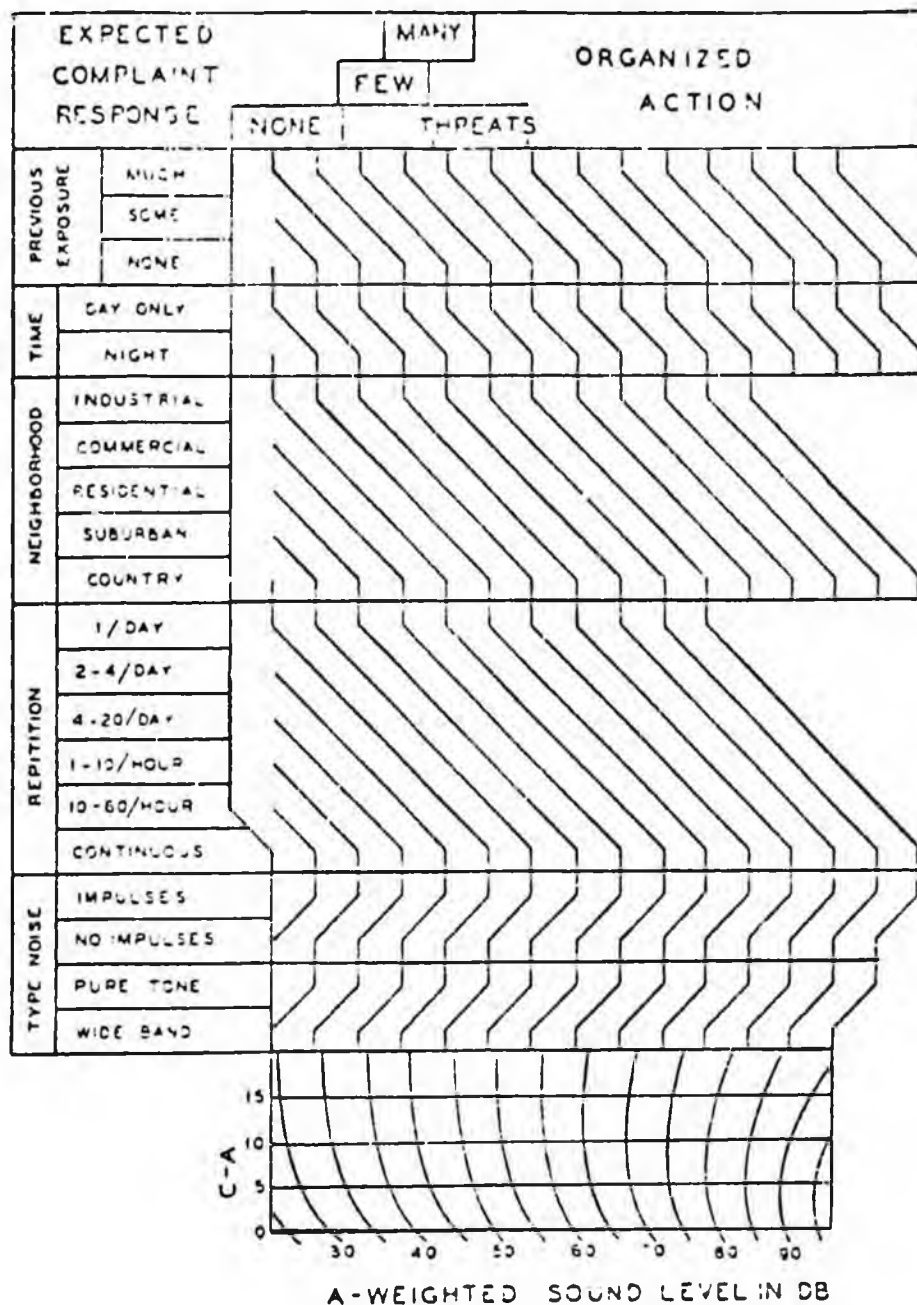
When it comes to the non-occupational exposures in transportation vehicles public places, etc., none of these mitigating influences exist. Yet levels equalling those in industry are often encountered and there is a tendency to apply industrial standards when appraising the hazard. Stricter standards of safety should be imposed for non-occupational exposures so that no change in hear-

ing whatsoever can occur. Dr. Cohen has recommended limits 15 dB below the limits shown in Table 25-4.<sup>14</sup>

#### Speech Interference

Noise can mask or "blot out" speech sounds reducing the intelligibility of messages. Laboratory studies of these effects have appraised the disruptive potential of the noise by its "speech interference level" which is the average sound pressure level of 500, 1000, and 2000 Hz octave bands.<sup>15</sup> The distances at which difficult messages can be conveyed reliably are shown in Table 25-5 as a function of speech interference level. Simple, redundant messages normally used at work can be understood at greater distances.

The speech interference level is closely related to the A-weighted sound level. It is lower by 7 decibels for most common noises. Using this conversion, the speech interference effects of various noises may be estimated from A-weighted sound levels using Table 25-5.



Betsford J. H.: Using sound levels to gauge human response to noise. *Sound and Vibration* 3:16, 1969.

**Figure 25-8. Chart for Estimating Community Complaint Reaction to Noise.**  
 To use the chart, locate in the curved grid at the bottom the point corresponding to the sound levels of the noise under consideration (C-A is the difference between the C- and A- weighted sound levels). From this point, project directly upward into the first of the six correction sections bounded by the horizontal lines. When entering a correction section, follow the lane entered until reaching a position opposite the condition listed at the left which applies to the neighborhood noise under consideration, and then proceed vertically, disregarding lanes, until the next section is reached. In this way, work up through the lanes of the correction sections until reaching the top where the community reaction to be expected is shown.



### Annoyance

Annoyance by noise is a highly subjective phenomenon which is very difficult to relate to the sound that causes it. Noises become more annoying as they get louder than the background noise on which they are superimposed. Noises that are unsteady or contain tones are most annoying as are those that convey unpleasant meaning.

Indoors, noise is likely to become annoying when the A-weighted sound level exceeds 30 dBA in auditoria or conference rooms, 40 dBA in private offices and homes, or 50 dBA in large offices or drafting rooms. Outdoors, a noise can be expected to prove annoying if it exceeds the background level by 10 dBA or more.

A procedure for rating the annoyance potential of a noise in the community is given in Figure 25-8. It provides a method for estimating community complaint reaction to a given noise condition.

TABLE 25-5  
Maximum Speech Interference Levels  
for Reliable Communication at Various Distances  
and Vocal Efforts.

Distance, feet	Vocal Effort			
	Normal	Raised	Loud	Shout
0.5	76	82	88	94
1	70	76	82	88
2	64	70	76	82
4	58	64	70	76
8	52	58	64	70
16	46	52	58	64
32	40	46	52	68

*Reproduced with permission of General Radio Company, West Concord, Mass., from "Handbook of Noise Measurement," 1967*

### Non-Auditory Effects

Audible noise produces other effects which are just beginning to be examined. Laboratory studies have shown that noise reduces efficiency on some tasks, can upset the sense of balance, and can cause blood vessels to constrict, raising blood pressure and reducing the volume of blood flow. It causes the pupils of the eyes to dilate. Even when we are sleeping, noise can cause changes in electro-encephalograms and blood circulation without waking us. Noise can also cause fatigue, nervousness, irritability, hypertension and add to the overall stress of living. There is no convincing evidence so far that any of these effects become permanent and thus are deleterious to health.

Very intense noise below 1000 Hz can be felt as well as heard. Airborne vibrations can stimulate mechano-receptors throughout the body, including touch and pressure receptors and the vestibular organs. The respiratory system is affected by sounds in the 40 to 60 Hz range because of the resonance characteristics of the chest.

Sounds too high in frequency to be heard by the normal ear produce no significant effect when

they reach the body by air pathways. However, transmission of ultrasound into the body through fluid or solid media is more efficient and can produce cavitation of the tissue as well as deep burns.

Intense sound below the audible frequency range can cause resonant vibration of the eye balls and other organs of the body. Dizziness and nausea can result. Levels of 130 dB or more are required to cause these effects, and are not often encountered in industry.

### SURVEY TECHNIQUES

One should become thoroughly familiar with operation of noise measuring instruments through study of operating instructions before attempting to make noise surveys. Set up the equipment and check its operation before embarking. At intervals during the survey, batteries should be checked as well as overall instrument calibration.

When transporting instruments, they should be protected from vibration and shock as much as practical. Instruments should also be protected from extremes of temperature. Overheating, such as might occur in the trunk of a car parked in the sunshine, can damage circuit components. Allowing the instrument to become very cold in a car parked overnight in the winter will result in condensation of water vapor in the instrument when it is used in a heated space the next morning. Water condensed from the air can cause electrical leakage resulting in low readings.

When conducting surveys, it is important to be assured that the meter indication is due to noise and not to other influences. One way of doing so is to listen to the meter output with a pair of headphones to learn whether the sound heard is the noise being measured.

Wind blowing across the microphone causes a rushing sound that is registered on the meter. Use of a wind screen can minimize this effect. Electric and magnetic fields can also cause needle deflections. This interference may occur around welding on large assemblies and becomes apparent when the meter needle does not move in step with the loudness of the noise heard. These electromagnetic effects can be reduced by reorienting the meter until minimum coupling with the electrical fields is obtained as indicated by minimum meter reading. One particularly troublesome location where electrical interference is observed is around electric furnaces. Here, the electrical interference and the noise are coincident so that it is easy to confuse these spurious signals with noise.

When taking readings, one should obtain representative data. The microphone should be moved about to determine that standing waves are not present. If they are, a spatial average should be obtained.

### Exposure Surveys

When conducting exposure surveys of various kinds, the most important consideration is to measure levels that are typical of those at the auditor's location. It is not necessary, in fact it is undesirable, to measure sound right at the ear since diffraction around the head can alter the sound field. It is better to measure at some loca-

# Municipal and Rural SANITATION

VICTOR M. EHLERS, C.E.

*Director, Division of Sanitary Engineering  
Texas State Department of Health*

ERNEST W. STEEL, C.E.

*Professor of Sanitary Engineering  
University of Texas*

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cold weather by normal porosity and around modern trend is to use vent in preference to the A.P.H.A. "Suggested lighting unit shall contain first occupant thereof, one for every additional on the basis of total

windows from industrial not always subject to s. Such possibilities, re factors which should

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structed sky. If there ecreased window area y angles<sup>1</sup> from 90 to 82 to 78 degrees to 17 ost to the ceiling for d a line from the lowest

both ventilation and lighting, an increase in area required by local conditions should be obtained by increasing their width.

Placing windows as high as possible gives the greatest sky angle in all parts of the room and thus secures the greatest lighting effectiveness. Windows extending to less than 30 inches from the floor tend to cause glare and obstruct furniture placement without increasing illumination to any extent. Inside walls should have reflection factors of at least 50 per cent and ceilings, 70 per cent. A mat (dull) finish paint should be used because glossy paints produce glare. Venetian blinds and window shades are useful to prevent glare, the former being especially valuable in allowing reflection to inner parts of the room.

Direct sunlight is desirable, for at least part of the day, for all dwellings, especially in winter. Sunlight, particularly its ultraviolet rays, is recognized as being of value to the body. The amount which enters a dwelling depends upon the sky angles of the windows and the orientation of the buildings. For dwellings in rows a desirable orientation is to face 20 to 30° east or west of south. This allows sunshine to penetrate the yard on both sides of the structure. Casements which open substantially throughout their area are more desirable than double-hung windows for admitting ultraviolet rays of sunlight. Ordinary window glass eliminates most of the ultraviolet rays.

*Artificial Illumination.* Where electricity is available, and this is desirable for lighting in order to avoid fires, sufficient illumination should be arranged so that all areas in the room may be covered by adequate light without glare, with at least three convenient outlets in the living room and two in other rooms. For accurate illumination with regard to foot-candle requirements, it is suggested that the I.E.S. standards be followed. For the control of glare, all bulbs should be shielded from view by suitable reflectors, globes, and shades to prevent excessive brightness against the background of the luminaire. Ceiling fixtures of the semi-indirect type, and floor lamps of the direct-indirect type go well together for local and general illumination. Shades of table and floor lamps should be of such thickness and color that their surfaces are not a source of glare.

**15-4. Protection against Excessive Noise.** Effects of excessive noise are given in Art. 19-18. Noises should be excluded from dwellings to the extent that the noise level does not exceed 50 decibels (Art. 19-19); 30 decibels should be the upper limit in sleeping rooms.<sup>1</sup> Housing sites should be chosen away from such sources of noise as factories, highways, railways, and athletic fields. Motor horns and radios should be con-

<sup>1</sup> These figures are based upon European practice and call for further examination under American conditions, where the greater numbers of radios and automobiles produce higher noise levels.

trolled. Small enclosed courts should be avoided in housing developments since noise may be reflected from the building walls.

Noises which are transmitted by the air in a multifamily dwelling can be reduced about 50 decibels by party walls equivalent to an 8-inch brick wall. Apartment doors opening into public passageways should be fitted to exclude noise.

Noises which are transmitted by the structure, such as footsteps or furniture moving, can be reduced about 15 decibels by proper construction. Airborne noise can also be reduced. Two thicknesses of wood flooring on standard joists with a lath and plaster ceiling effect a reduction of 10 to 15 decibels. If the laths or ceiling boards are fastened to the joists with spring clips and the floor is laid so as to allow some "play" between the subfloor and the joists, a reduction of well above 15 decibels may be obtained. Concrete floors are effective against air-borne but not against structure-borne noise. All plumbing, steam pipes, and valves should be correctly designed so that steam "hammer" and "singing" in valves do not occur. Refrigerating and heating equipment, pumps, and blowers should be so installed that vibrations are not transmitted to the structure. Plumbing stacks and water riser pipes should preferably not be located in living-room or bedroom walls.

**15-5. Provision of Adequate Exercise and Play Space for Children.** Playground and recreation space is considered to be essential to the physical and mental well-being of children and adults. It should be considered by all who are concerned with the construction of homes. This is primarily a problem of neighborhood and city planning and must be considered from the standpoints of the types of recreation to be provided, including indoor recreation, the amount and location of existing recreation facilities, the availability of trained recreation leaders, etc. In any case play spaces for very young children should be provided within each large group or block of buildings. Athletic fields within half a mile are desirable for adolescents.

**15-6. Water Supply.** The source of water for a single dwelling or a housing project should, wherever possible, be a city supply which is controlled as to quality by health authorities. If a well or some other individual supply must be used, methods of construction and protection should be as described in Chap. 5. Within the building the water supply should be protected from contamination by cross connections, or fixtures which have inlets at insufficient distances above the highest possible water level in the fixture. Where defects are found to exist, corrections should be made. Routine inspections of large projects should include checking on alterations which may be made from time to time.

**15-7. Excreta Disposal.** Water-carried sewerage should be available for all dwellings as the best means of preventing the spread of disease by flies or in other ways. A separate toilet should be available for each

family, and it should be free of the danger of flooding. Bathrooms should have floors and walls which are waterproof. Each room should be provided with a house drainage system. The house or storm water in the dwelling is of such a nature that a hazard may be met. The branch serving the branch serving the apartment fixtures may be operated pump. Such pumps should have automatic start with

Isolated dwelling system as described in Chap. 3.

**15-8. Prevention of Flies and Pests.** Flies, and other pests, and should not be allowed. They should be applied. They are ornaments. The presence of them is not used (Chap. 9). See also flies and mosquitoes.

Where the population is large, or bedbugs, treatment is available. Methods are available. They have invaded dwellings. In Arts. 19-11 and 12.

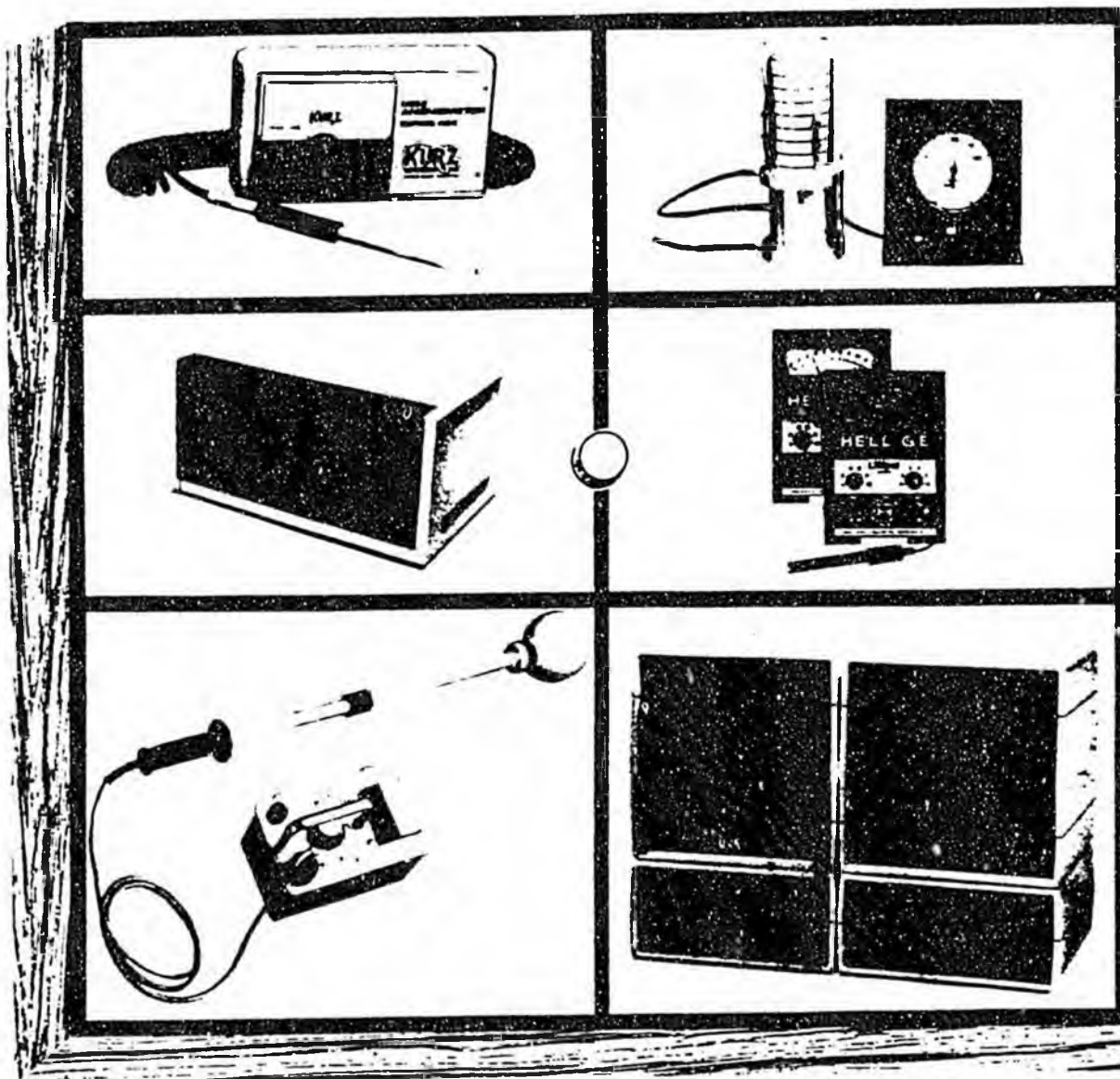
**15-9. Food Storage.** Food storage is economical. It is described in Chap. 12, certain. It is a food poisoning or a food poisoning. It is preserved food. It is at 50°F or less. It is in a mechanical or in a mechanical. It is required for an urban housewife and the

**15-10. Provision of Space.** Space in institutions and in institutions. The distance between them is less than 50 square feet. It is likely to occur. It is clear space between

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# Environmental Health

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# Sound Levels in Emergency Medical Service

John A. Rasmussen, MS, EMT-P

John M. McLean, MPH, RS

Roger S. Stasiak, Ph.D., RS

## Abstract

*Sound levels in an emergency medical service vehicle were measured during the summer of 1981. Excessive levels were found in the driver's compartment with the siren operating. Personnel measured showed low frequency hearing loss in the same range as the siren's operating frequencies.*

Emergency Medical Services (EMS) personnel are frequently exposed to high intensity sound levels while working in their profession. Studies have been reported in other occupations(4,5) to determine the effects of noise on the workers. These studies have ranged from qualitative to quantitative statistical analyses. None has concentrated on emergency medical services.

Kotsis found that sound levels in a diesel pumper exceeded 105 dBA while the lowest reading in a rescue unit was 93 dBA(5). Kam studied truck drivers and compared their hearing loss in each ear to exposure while the truck was in operation(4).

Reishel et al.(8) have recently performed large sample (n = 750) audiometric testing showing a positively accelerated hearing loss with age in firefighters.

Due to the multiple types of vehicles, manufacturers and styles of sirens, no single study can apply to all vehicles. The single most intense source of noise in the EMS vehicle is the siren; therefore, this study was limited to that single source.

## Theory

Increasing numbers of people are becoming concerned with the problem of noise in everyday life. This includes communities(1) as well as industry and in virtually all settings in which noise is a noticeable entity(7). Sound at one time can be welcome and at another time be totally unwanted. It is already known that certain sounds can stress humans psychologically and physiologically(6). The growing interest is probably due to the much increased coverage of hearing loss when under workman's compensation laws and the implementation of federal and state laws for noise exposure.

The key to the health and welfare aspect of noise is the wide range of the human hearing mechanism. The human ear is capable of detecting sound from a threshold level to sound levels 10<sup>7</sup> times as intense without pain. The hair cells of the ear are unregenerative; that is, they cannot be physiologically restored(9). It is not our intent to provide a total history or theory of the unwanted aspects of sound, but only to establish that noise may be a problem, and if so, it can affect the ability to communicate and to understand speech.

In determining compliance, the sound level regulation is a function of both sound level and daily exposure time. If the results of the measurements show an excessive combination of sound levels and exposure times, then a noise problem exists(3). Threshold limit values (TLV) refer to both

sound level and exposure time. These are based on conditions that nearly all workers are exposed without adverse effects on their ability to hear and understand normal speech. The application of the TLV will not protect all employees from the adverse effects of noise exposure because of individual susceptibility(2). There is no standard program that applies to all situations.

## Method

This study was conducted using a Classic II vehicle by Modulance™ on a Ford™ chassis (Type III ambulance). The siren on this vehicle is a Southern VP™ Model SA400 with two one-hundred watt speakers in a Code 3™ light bar. The speakers are located six inches above the cab roof, 30 inches from the respective sides and the speaker cone eight inches in front of the patient compartment.

In performing measurements the driver's and passenger's windows were closed, but the door between the cab and patient compartment was open as in the normal operation of the vehicle when in service. The vehicle engine was motionless idling and producing no measurable background. A Bael and Kjar Type 2209 Pulse Precision Sound Level meter with a Type 1613 Octave Filter Set and a Type 4133 microphone, calibrated in accordance with the manufacturer's instructions was used. It was held to approximate the orientation of either the patient's, attendant's or driver's auditory canal (thus the microphone on the meter

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John A. Rasmussen, MS, EMT-P, Assistant Professor, Department of Emergency Medical Care, Eastern Kentucky University, Richmond, Kentucky 40475; John M. McLean, MPH, RS, Assistant Professor, Department of Environmental Health Science, Eastern Kentucky University; Roger S. Stasiak, Ph.D., RS, Associate Professor, Environmental Health Science Program, Animal and Dairy Science Department, University of Georgia, Athens, Georgia.

the vehicle). The measurements were taken with the meter in the slow response mode and the maximum dB reading in each octave band was recorded. The measurements were reported 5 times. The values reported in this study represent the average of those five. In addition, dBA measurements were taken for each mode and position. The vehicle was parked on an empty driving range, thereby eliminating any echo effect.

During their annual physical examinations, the employees of the Madison County, Ky., Ambulance Service receive routine hearing threshold tests. The results of five of the

and were used as measurements for this study. These measurements were made by an employee of the Madison County Health Department.

### Results

The average of five measurements taken for each item are reported in Table 1. These readings were taken in the three common modes of the siren in both the patient compartment and the driver's cab. Table 2 shows the hearing threshold data for the five ambulance service employees. These data were taken by outside investigators; therefore, no control was made on the method used to obtain them.

compare noise levels in the patient compartment with the driver's cab. Figure 4 graphically compares the hearing thresholds in the ambulance service employees.

### Discussion

The sound levels recorded in the patient compartment are within the required Occupational Safety and Health Administration (OSHA) limit of 85 dBA; therefore, it can be assumed that patients and attendants are not exposed to excessive noise levels. Personnel and patients in the patient compartment should not suffer any permanent damage due to the sound produced by the siren. The dBA measurements in the vehicle cab, however, exceeded that eight hour exposure limit.

The Madison County Ambulance personnel work a 24/48 hour work shift (24 hours on duty and 48 hours off duty). This hour pattern is commonly used by ambulance services. The threshold limit must be altered to fit this unique work situation. Applying the unique work situation formula

$$\left[ \text{Reduction Factor} = \left( \frac{8}{\text{hrs}} \times \frac{24\text{-hrs}}{16} \right) \right]$$

TLV<sub>8hrs</sub>) to the threshold limit for 8 hours yields no permissible time for excursion above the 85 dBA limit. Therefore, it would seem that all personnel in this work situation would be exposed to excessive noise every time the vehicle siren is sounded.

The frequency response curve in the patient compartment (Figures 1, 2, 3) for the siren closely resembles the frequency range published in the manufacturer's specifications (Table 3). The greatest intensity measured is

Table 1  
Maximum dB Reading\* by Octave Band Centers compared with Position and Siren Mode

Octave Bands Centers (Hz)	Position Mode	Patient			Driver		
		Wail	Yelp	Hi-Lo	Wail	Yelp	Hi-Lo
16000		43	30	33	92	93	92
8000		44	37	40	91	92	91
4000		55	54	51	91	92	90
2000		72	68	65	91	93	90
1000		85	81	64	92	92	91
500		92	90	76	92	92	91
250		55	58	56	91	92	95
125		61	63	61	90	92	94
dBA		83	82	76	92	92	95

\* Meter in slow response position

Table 2  
Hearing thresholds for selected employees by Octave Band Centers (Thresholds measured in dB)

Octave Band Centers	EMPLOYEE									
	A		B		C		D		E	
	L ear	R ear	L ear	R ear	L ear	R ear	L ear	R ear	L ear	R ear
8000	12	12	22	20	70	70	35	55	15	15
6000	15	15	12	12	70	70	—	—	15	15
4000	15	15	12	12	40	40	40	40	15	15
2000	20	20	15	15	30	30	25	25	10	15
1000	30	30	20	20	25	25	25	25	20	15
500	40	40	30	30	25	25	25	25	25	25
Age	37		35		55		54		30	
Symbol	△		●		×		□		○	

Table 3  
Siren Specifications

MODE	FREQUENCY RANGE
Wail	600 - 1350 Hz
Yelp	600 - 1350 Hz
Hi-Lo	450 & 650 Hz

at 500 and 1000 Hz. The response curve in the driver's compartment is essentially equal at all frequencies. The dBA scale is logarithmic; thus, an increase of 1 dB is equal to 10 times the energy at the lower level. The dBA of 95 (Hi-Lo mode) in the driver's compartment is equal to 10 times the energy in the patient compartment (dBA of 76).

Figure 1  
Sound Level vs. Octave Band Centers (Wall Siren Mode)

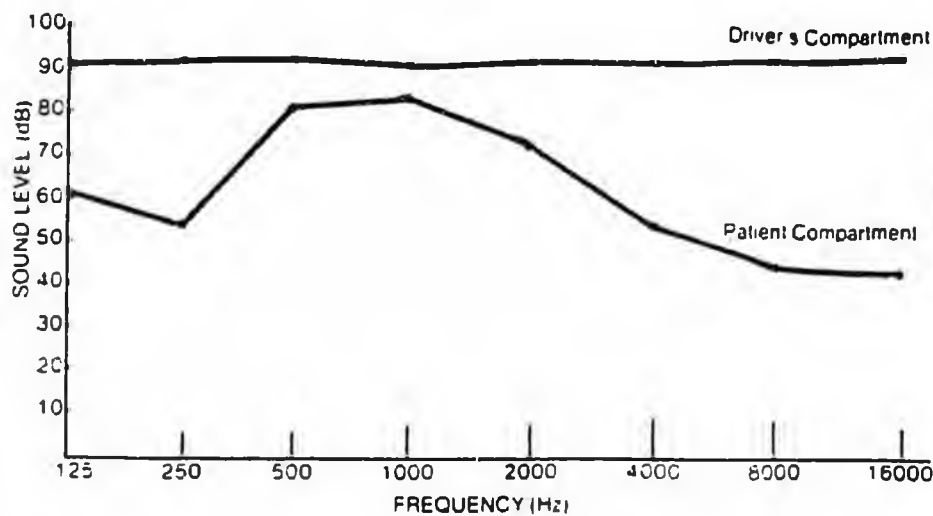


Figure 2  
Sound Level vs. Octave Band Centers (Yelp Siren Mode)

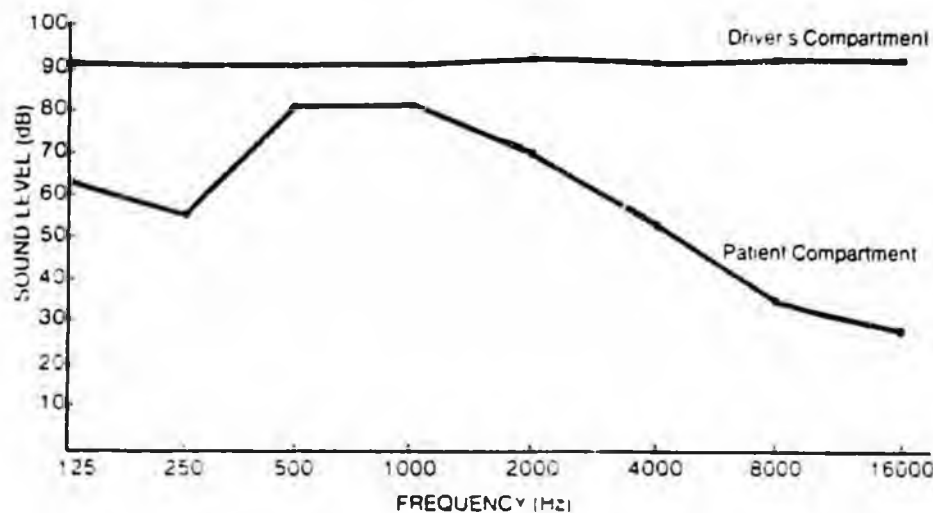
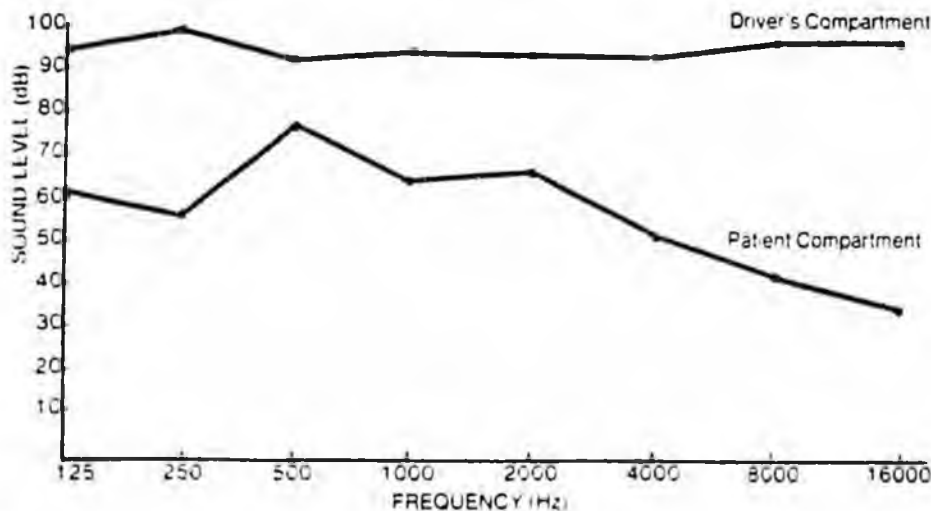


Figure 3  
Sound Level vs. Octave Band Centers (Hi-Lo Siren Mode)



Comparing the frequencies produced by the siren and the hearing thresholds observed in the personnel, there is a qualitative correlation between low frequency hearing loss and the frequencies of output from the siren. The only intense low frequency sound in the history of the personnel is the siren of an emergency vehicle.

#### Conclusion

The sound (noise) levels produced by the siren in the patient's compartment of this vehicle are within the 85 dBA level established by OSHA. The levels in the driver's compartment exceed even levels permissible as excursions. There appears to be some correlation between the hearing threshold loss of personnel and the frequencies of exposure observed on an emergency medical service vehicle. The measured hearing loss is at the frequencies of maximum sound energy produced by the siren; thus, personnel in the driver's compartment should wear protective equipment to prevent permanent hearing loss.

#### Acknowledgements

The authors thank Madison County (KY) Ambulance Service for the use of the vehicle and the crew (Ms. Pat Wilson, EMT-P, and Randy Isaacs, EMT) for their cooperation. Mary Ellis is also thanked for her aid in compiling data at the test site. Eastern Kentucky University provided funding for this project.

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2. American Conference of Governmental Industrial Hygienists (1981). *Threshold Limit Values for Chemical Substances in Workroom Air* Adopted by ACGIH, Cincinnati, OH, pp. 81-83.
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8. Reischl, U., T.G. Hanks and P. Reischl (1981). "Occupation Related Firefighter Hearing Loss." *Amer. Ind. Hyg. Assoc. J.*, Sept.: 656-662.
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# Anchorage Ordinance

TABLE 3	
RECREATIONAL VEHICLE NOISE EMISSION STANDARDS	
Vehicle Type	Sound Level Limit (dBA)
Snowmobile	76
Motorcycle	76
Any other vehicle	76

(Adapted from GAAB 16.85, am AO 78-48).

## 15.70.095 Motor vehicles-Electronically amplified sound system.

- A. Notwithstanding any other provisions of the Anchorage Municipal Code, with the exception of Ch. 15.70, no person operating in or in control of a parked or moving motor vehicle shall operate, or permit the operation of an electronically amplified sound system in or on the motor vehicle so as to produce sound that is clearly audible more than 50 feet (15 meters) from the motor vehicle or in violation of the provisions in section 15.70.060 (a) or (c).
- B. If this section is determined to be in conflict with any other section of the Anchorage Municipal Code, with the exception of Ch. 15.70, this section shall take precedence.
- C. Penalties. Any person violating the provisions of this section shall pay a civil penalty of \$100 for the first violation or date of violation, \$300 for the second violation within six months of the first violation, and \$1,000 and forfeiture of the sound system or components of the sound system up to \$1,000 in value, for the third violation within one year of the first violation. The civil penalties for violations will be assessed through the Administrative Hearings Officer as provided for in AMC Ch. 14.20.
- D. Enforcement - Powers of Arrest or Citation. Any authorized police officer shall issue a citation for any violation under this article, except they may arrest for instances when the alleged violator refuses to provide the officer with such person's name and address and any proof thereof as may be reasonably available to the alleged violator. (AO No. 94-77(S), §3, 5-31-94).

15.70.100 Hazardous noise emission standards.

- A. Except as otherwise provided in subsection B, the director shall order an immediate halt to any sound that exposes, where such sound levels are received, any person to continuous sound levels in excess of those shown in Table 4 or to impulsive sound levels in excess of those shown in Table 5. As soon as reasonably possible following issuance of such an order, the municipal attorney shall apply to the Superior Court, Third Judicial District, Anchorage, Alaska, or other court having jurisdiction for an injunction to replace the order.
- B. No order pursuant to subsection A shall be issued if the only persons exposed to sound levels in excess of those listed in Tables 4 and 5 are exposed as a result of trespass, invitation upon private property by the person causing or permitting the sound, or employment by a contractor or the person causing or permitting the sound. In determining continuous sound levels shown in Table 4, equal energy time-intensity trade off shall be used if the sound level varies, and the energy equivalent over 24 hours shall be found.

TABLE 4	
HAZARDOUS CONTINUOUS NOISE EMISSION LEVELS	
Sound Level Limit (dBA)	Duration
90	24 hours
93	12 hours
96	6 hours
99	3 hours
102	1½ hours
105	45 minutes
108	22 minutes

TABLE 5	
HAZARDOUS IMPULSIVE NOISE EMISSION LEVELS	
Sound Level Limit (dBA)	Number of Impulses per 24-Hour Period
145	1
135	10
125	100

(Adapted from GAAB 16.85, am AO 78-48).

Introduced By: Council Member Wallace  
Date: July 10, 1995

ORDINANCE NO. 5238, As Amended

AN ORDINANCE TO AMEND F.G.C. CHAPTER VI, PUBLIC WRONGS AND OFFENSES, ARTICLE II, OFFENSES AGAINST PUBLIC PEACE AND ORDER, BY REENACTING SECTION 6.208 RELATING TO THE USE OF ELECTRONICALLY AMPLIFIED SOUND SYSTEMS IN MOTOR VEHICLES; AND SETTING AN EFFECTIVE DATE.

BE IT ENACTED BY THE CITY COUNCIL OF THE CITY OF FAIRBANKS as follows:

Section 1. That F.G.C. Chapter VI, Public Wrongs and Offenses, Article II, Offenses Against Public Peace and Order, be and hereby is amended by reenacting Sec. 6.208 (previously reserved) as follows:

**Sec. 6.208. Use of electronically amplified sound systems in motor vehicles.**

(a) No person operating in or control of a parked or moving motor vehicle shall operate, or permit the operation of an electronically amplified sound system in or on the motor vehicle so as to produce sound that is clearly audible more than fifty (50) feet from the motor vehicle.

(b) Any person violating the provisions of this section shall pay a civil penalty of \$50 for the first violation or date of violation, \$300 for the second violation within six months of the first violation, and \$1,000 for the third violation within one year of the first violation.

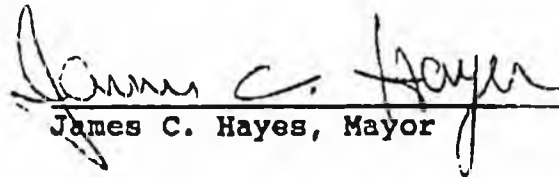
(c) Any authorized police officer may issue a citation for any violation under this article, except they may arrest for instances when the alleged violator refuses to provide the officer with such person's name and address and any proof thereof as may be reasonably available to the alleged violator.

(d) Exemptions. The following sound or noise is not prohibited by this section:

5238

- (1) Noise of safety signals, warning devices and emergency pressure relief valves when used for their warning of emergency purposes;
- (2) Noise produced by any authorized emergency vehicle when responding to an emergency call or when otherwise authorized by law or ordinance to activate its sirens or other warning devices;
- (3) Noises produced by vehicles for the purpose of advertising commercial or political messages.

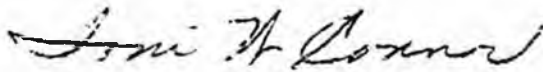
Section 2. That the effective date of this ordinance shall be the 29th day of July, 1995.


  
James C. Hayes, Mayor

AYES:  
NAYS:  
ABSTAIN:  
ADOPTED: 7-24-95

ATTEST:

APPROVED AS TO FORM:

  
Toni W. Connor, City Clerk

  
Herbert P. Kuss, City Attorney



City of Fairbanks

856 7th Avenue  
Fairbanks, Alaska 99701  
(907) 459-6500



TELECOPIER COVER LETTER

DATE: 4-24-95

SUBJECT: Disturbing The PENCE Ordinance

TO: Shirley Armstrong

FIRM: Representative ROXBERG'S OFFICE

TELECOPY NUMBER: 465-2040

FROM: Fairbanks Police Dept

We are transmitting 6 pages(s)(including cover letter)

IF YOU DO NOT RECEIVE ALL THE PAGE(S), PLEASE CALL AS SOON AS POSSIBLE.  
THANK YOU.

TELEPHONE: (907) 459-6500

TELECOPIER OPERATOR: \_\_\_\_\_

MESSAGE

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## CHAPTER 6

### PUBLIC WRONGS AND OFFENSES\*

Art. I.	General Provisions, §§ 6.101-6.104
Art. II.	Offenses Against Public Peace and Order, §§ 6.201-6.207
Art. III.	Offenses Against Persons and Property, §§ 6.301-6.398
Art. IV.	Offenses Against Public Morality and Decency, §§ 6.401-6.407
Art. V.	Weapons Offenses, §§ 6.501-6.508
Art. VI.	Offenses Against Public Justice, §§ 6.601-6.609
Art. VII.	Drug Abuse and Paraphernalia, §§ 6.701-6.706

#### ARTICLE I. GENERAL PROVISIONS

##### Sec. 6.101. General definitions.

As used in this chapter:

- (a) Intentionally; With Intent. A person acts "intentionally" or "with intent" if he acts with a conscious objective to cause the result or to engage in the conduct which is prohibited.
- (b) Knowingly; With Knowledge. A person acts "knowingly" or "with knowledge" if he acts with an awareness that his conduct is of the nature described or that the circumstance described exists.

\*Editor's note - Ord. No. 3491, enacted Sept. 13, 1976, repealed former Ch. 6 pertaining to public wrongs and offenses and enacted in lieu thereof a new Ch. 6 pertaining to the same subject matter. Former Ch. 6 was derived from the following ordinances: Ord. No. 1020, § 1, 5-23-60; Ord. No. 1024, § 1, 5-31-60; Ord. No. 1065, § 1, 1-23-61; Ord. No. 1074, § 1, 4-10-61; Ord. No. 1081, § 1, 5-8-61; Ord. No. 1101, § 1, 8-7-61; Ord. No. 1164, §§ 1, 2, 7-9-62; Ord. No. 1332, § 1, 6-21-65; Ord. No. 1491, §§ 1, 2, 5-9-66; Ord. No. 1688, § 1, 9-25-67; Ord. No. 1829, § 2, 5-5-69; Ord. No. 1856, § 1, 7-28-69; Ord. No. 1860, § 1, 8-18-69; Ord. No. 1900, § 1, 12-8-69; Ord. No. 1955, §§ 1-5, 4-20-70; Ord. No. 2016, § 1, 9-18-70; Ord. No. 2034, § 3, 9-21-70; Ord. No. 3014, § 1, 9-13-71; Ord. No. 3035, § 1, 10-18-71; Ord. No. 3131, § 1, 11-20-72; Ord. No. 3157, §§ 1, 2, 7-9-73; Ord. No. 3402, §§ 1, 2, 7-7-75; Ord. No. 3477, § 2, 3-22-76; Ord. No. 3503, § 1, 7-21-76.

When knowledge of the existence of a particular fact must be proven by the city, that knowledge is established if a person is aware of a substantial possibility of the existence of the fact; unless he actually believes that it does not exist. A person who is unaware of a conduct or a circumstance of which he would have been aware had he not been intoxicated acts knowingly with respect to that conduct or circumstance.

- (c) Peace Officer. "Peace officer" means a police officer, a state trooper or policeman, an agent of the Federal Bureau of Investigation or any other person who is authorized to carry firearms and enforce the laws of the city or the state or federal government.
- (d) Person. "Person" includes human beings and, where appropriate, corporations, unincorporated associations, firms and partnerships; and where the word "person" is used to designate the party whose property is the subject of an offense, it also includes the city, the state, and any government or governmental agency of any sort that may own property.
- (e) Police Officer. "Police officer" means a member of the city police department or a person authorized by the chief of police or his designee to act in the capacity of a city police officer.
- (f) Premises. "Premises" includes any real property, whether privately or publicly owned.
- (g) Private Place. A "private place" is any place which is not a public place.
- (h) Public Place. A "public place" is a place to which the general public has access.

and includes, but is not limited to, hallways, lobbies and other parts of apartment houses and hotels not constituting rooms or apartments designated for actual residence, public ways and retail business establishments.

- (i) **Public Way.** "Public way" includes public sidewalks, streets, alleys, trails, rivers, riverbanks, parks, all outdoor recreational facilities operated by the city, borough or state for use by the general public, and all parking lots, whether publicly or privately owned and operated.
- (j) **Recklessly.** A person acts "recklessly" if he is aware of and consciously disregards a substantial and unjustifiable risk that a particular result will occur or that a particular circumstance exists. The risk must be of such nature and degree that disregard thereof constitutes a gross deviation from the standard of care that a reasonable person would observe in the situation.
- (k) **Vehicle.** A "vehicle" is any device in or on which persons or property may be transported, whether on land or water or in the air, and includes, but is not limited to, cars, trucks, bicycles, motorcycles, snow machines, boats, airplanes, helicopters, dirigibles and hot air balloons.
- (l) **Self Defense.** "Self defense" means the protection of one's person or property against some injury attempted by another. Essential elements are that defendant does not provoke the difficulty and there must be impending peril. (Ord. No. 3491, § 3, 9-13-76; Ord. No. 4207, § 1, 3-28-83; Ord. No. 4971, § 1, 3-18-91)

#### Sec. 6.102. Mens rea of offenses.

(a) Unless otherwise specified in the definition of a particular offense the offenses defined by this

chapter require only a general intent to do the act or to cause the condition or result which is prohibited.

(b) Actual knowledge that particular conduct is prohibited is not an element of any offense defined by this chapter. (Ord. No. 3491, § 3, 9-13-76; Ord. No. 3544, § 1, 10-25-76)

#### Sec. 6.103. Penalties.

(a) Unless a different penalty is prescribed in this section or elsewhere in this chapter, a person convicted of any offense defined by this chapter shall be punished by a fine of not more than six hundred dollars (\$600.00) or by imprisonment for not more than sixty (60) days or by both such fine and imprisonment.

(b) A person convicted of any of the following offenses shall be punished by imprisonment for not less than sixty (60) days nor more than one (1) year and by a fine of not more than one thousand dollars (\$1,000.00):

FGC 6.402(a) — Prostitution.

FGC 6.402(b) — Promoting prostitution.

FGC 6.60 — Assault or battery on a police officer.

(c) A person convicted of any of the following offenses shall be punished by a fine only of not more than four hundred fifty dollars (\$450.00):

FGC 6.203 — Soliciting business on residential premises.

FGC 6.204 — Littering.

FGC 6.205 — Illegal handbilling.

FGC 6.206 — Drinking in public.

FGC 6.302 — Criminal mischief.

FGC 6.303 - Shoplifting merchandise by concealment, removal or false pretenses only if no previous shoplifting, theft, larceny, burglary or robbery conviction.

FGC 6.406 - Urinating in public.

(d) Community work. The court may order a defendant convicted of an offense to perform community work as a condition of probation, a suspended sentence or suspended imposition of sentence, or in addition to any fine or restitution ordered. If the defendant is sentenced to imprisonment the court may recommend to the department of corrections that the defendant perform community work.

- (1) Community work includes work in projects designed to reduce or eliminate environmental damage, protect the public health, or improve public lands, forests, parks, roads, highways, facilities or education. Community work may not confer a private benefit on a person except as may be incidental the public benefit.
- (2) The court may offer a defendant convicted of an offense the option of performing community work in lieu of a fine or a portion of a fine if the court finds the defendant is unable to pay the fine. The value of community work in lieu of a fine is three dollars (\$3.00) per hour.
- (3) The court may offer a defendant convicted of an offense the option of performing community work in lieu of a sentence of imprisonment. Substitution of community work shall be at a rate of eight (8) hours for each day of imprisonment. (Ord. No. 3491, § 3, 9-13-76; Ord.

No. 3539 § 2, 10-11-76; Ord. No. 3897, §§ 1, 2, 6-9-80; Ord. No. 4041, § 2, 10-26-81; Ord. No. 4495, § 1, 12-16-85; Ord. No. 4540, § 1, 6-23-86)

Sec. 6.104 Disposition of firearms held as evidence.

(a) After the conviction of any person for any offense involving the use, possession or transfer of a firearm has become final, any firearm held by the city police or district court and used, possessed or transferred in the commission of such offense shall be forfeited to the city police and destroyed or otherwise disposed of as the chief of police deems appropriate, unless the district court affirmatively finds upon evidence presented that the firearm was neither owned nor possessed with the permission of the owner by the person convicted of such offense.

(b) For the purpose of paragraph (a) of this

section, a conviction which has been set aside because of compliance with conditions of probation after a suspended imposition of sentence shall not be treated as having been set aside, but the forfeiture pursuant to paragraph (a) shall occur as if such conviction had not been set aside.

(c) A firearm held by the city police and neither forfeited pursuant to paragraph (a) of this section nor any longer needed as evidence in any criminal case may be returned to its owner, but only after the owner has positively identified the firearm and filled out, sworn to and executed under penalties of perjury a firearms transaction record certifying that he is the owner of the firearm and not prohibited from possessing such firearm by the provisions of Title 18, Chapter 44, of the United States Code. (Ord. No. 3533, § 1, 10-11-76)

## ARTICLE II. OFFENSES AGAINST PUBLIC PEACE AND ORDER

Sec. 6.201. Reserved.

Editor's note — Ord. No. 3001 adopted September 14, 1991 repealed § 6.201 pertaining to fire and city conduct due to duplication by state law. Former § 6.201 was derived from Ord. No. 3491, § 3, 9-13-76; Ord. No. 3534, § 1, 10-11-76; Ord. No. 4052, § 1, 10-5-81; and Ord. No. 4152, § 1, 9-27-82.

Sec. 6.202. Disturbing the peace.

(a) A person commits the offense of disturbing the peace if he:

- (1) In a public place, repeatedly or continuously shouts, blows a horn, plays a musical or recording or amplifying instrument, or otherwise generates loud sound or noise with the intent to disturb or in reckless disregard of the peace and privacy of others;
- (2) In a private place, engages in the conduct described in subparagraph (a)(1) of this

section, with the same intent or reckless disregard, after having been informed by another that the conduct is disturbing the peace and privacy of others not in the same place;

(3) Between the hours of 11:00 p.m. and 7:00 a.m., operates or uses a pile driver, pneumatic hammer, bulldozer, road grader, loader, power shovel, derrick, backhoe, power saw, manual hammer, motorcycle, snow machine or other instrument, appliance or vehicle which generates loud sounds or noise, after having been informed by another that such operation or use is disturbing the peace and privacy of others;

(4) Keeps any dog or other animal which is allowed to engage in frequent or prolonged barking or other loud noise-producing activity, after having been informed by another that such frequent or prolonged barking or noise-producing activity is disturbing the peace and privacy of others;

(5) Repeatedly or continuously sounds any horn or other sound-producing warning device on a motor vehicle when such repeated or continued sounding is not necessary to warn of any danger.

(b) As used in subparagraphs (a)(1) and (a)(2) of this section:

- (1) "Loud sound" in a public place means sound which is loud enough to inhibit the ability of a not unduly sensitive person in the same place to speak freely without leaving the same place.
- (2) "Loud sound" in a private place means sound which is loud enough to awaken a not unduly sensitive person in another private place.

- (3) The inside and outside of buildings and separate residences within an apartment house, and separate rooms within a hotel are different "places."

(c) As used in subparagraphs (a)(3) and (a)(4) of this section, "loud sound" or "loud noise" is sound or noise which would awaken, or cause difficulty in sleeping for, the average, not unduly sensitive individual attempting to sleep in any house, apartment, hotel, motel or other residence in the vicinity of the sound or noise-producing activity.

(d) Exemptions. The following sound or noise is not prohibited by this section:

- (1) Noise of safety signals, warning devices and emergency pressure relief valves when used for their warning of emergency purposes;
- (2) Noise produced by any authorized emergency vehicle when responding to an emergency call or when otherwise authorized by law or ordinance to activate its sirens or other warning devices;
- (3) Noises necessarily produced in the course of work required to protect persons or property from an imminent peril;
- (4) Noise produced by any activity for which a permit has been issued pursuant to paragraph (e) of this section.

(e) Applications for a permit for relief from the application of this section to any activity on the basis of undue hardship may be made to the city manager or his duly authorized representative. Any permit granted by the city manager hereunder shall contain all conditions upon which such permit has been granted and shall specify a reasonable time that the permit shall be effective. The city manager, or his duly authorized representative, may grant the relief as applied for if he finds:

- (1) That additional time is necessary for the applicant to alter or modify his activity or operation to comply with this section; or
- (2) That the activity, operation or noise source will be of a temporary duration, and cannot be done in a manner that would comply with other paragraphs of this section; and
- (3) That no other reasonable alternative is available to the applicant; and
- (4) Provided, however, that the city manager may prescribe any conditions or requirements he deems necessary to minimize adverse effects upon the community or the surrounding neighborhood.

(Ord. No. 5108, § 1, 5-24-93)

Editor's note — Ord. No. 5001 adopted September 14, 1991 repealed former § 6.203 pertaining to disturbance of the peace due to duplications by state law. Former § 6.203 was derived from Ord. No. 3491, § 1, 9-13-76.

**Sec. 6.203. Soliciting business on residential premises.**

(a) A person commits the offense of soliciting business on residential premises if, without having been expressly invited by the owner or occupant, he goes in or upon any residential premises within the city for the purpose of soliciting orders for or selling goods, services or other property.

(b) As used in this section:

- (1) "Goods" includes all movable things or substances which may be offered for sale, including, but not limited to, books, magazines and newspapers.
- (2) "Other property" means all property other than goods.

# Juneau Ordinance

Rokeberg

## OFFENSES AGAINST PUBLIC ORDER

(d) The city and borough manager or his designee shall prescribe such conditions and requirements of the permit as are deemed necessary to minimize the adverse effects of the noise on the community or neighborhood.

(e) The following phrases used in this section shall have the meanings given below:

(1) "Unreasonably loud noise" is a sound which, if, considering the nature and purpose of the defendant's conduct and the circumstances known to him or which should be known to him, including the nature of the location and the time of day or night, his conduct involves a substantial deviation from the standard of conduct that a reasonable, sober person would follow in the same situation. "Public place" does not include any element or quality of speech or conduct which is constitutionally protected.

(2) "Public place" shall have the same meaning in this section as that given the term in Section 42.20.090(b)(3).

(f) Disturbing the peace is a Class B misdemeanor. (Serial No. 85-56 § 45, 1985. Serial No. 78-36 § 3, 1978).

42.20.100 RIOT (a) It is unlawful for a person to participate with two or more others in a course of disorderly conduct:

(1) With purpose to commit or facilitate the commission of a felony or misdemeanor

(2) With the purpose to prevent or coerce official action, or

(3) When the actor or any other participant to the knowledge of the actor uses or plans to use a firearm or other deadly weapon.

(b) Riot is a Class A misdemeanor. (Serial No. 85-56 § 46, 1985. Serial No. 71-67 § 4 (part), 1971; CBJ § 42.20.050)

42.20.110 HARASSMENT (a) A person commits the crime of harassment if, with intent to harass or annoy another person, that person:

(1) Insults, taunts, or challenges another person in a manner

## OFFENSES AGAINST PUBLIC ORDER

(1) An order shall be a "lawful order" if it is one which is given where the person's presence, conduct or speech significantly impedes an officer in the performance of his duties in effecting an arrest, investigating a crime or possible crime, in investigating or assisting at an accident, in ensuring or securing public safety and similar acts where the presence, conduct or speech of the person is not constitutionally protected.

(2) A "public place" is a place where the public is permitted to assemble, enter or pass through, whether publicly or privately maintained, including but not limited to streets, sidewalks, parks, places of accommodation, transportation, business and entertainment, or any other places or premises which by their physical nature, function, custom, usage, notice, or lack thereof would cause a reasonable person to believe that no permission to enter or remain is required.

(c) Disorderly conduct is a Class B misdemeanor. (Serial No. 85-56 § 44, 1985; Serial No. 78-36 § 2, 1978).

42.20.095 DISTURBING THE PEACE. (a) It is unlawful for a person to:

(1) In a public place, make an unreasonably loud noise with the purpose to disturb or in the reckless disregard of the peace or privacy of others:

(2) In a private place, make an unreasonably loud noise with the purpose to disturb or in reckless disregard of the peace or privacy of others not in the same place, after being informed that such conduct is having or is likely to have that effect;

(3) Between the hours of eleven p.m. and seven a.m. operate or use a pile driver, pneumatic hammer, bulldozer, road grader, loader, power shovel, demick, backhoe, power saw, manual hammer, motorcycle, appliance or vehicle which generates an unreasonably loud noise, after having been informed by another that such operation or use is disturbing or is likely to disturb the peace or privacy of others.

June 100  
Denver, Colorado 80202  
Phone: (303)830-2200  
FAX No.: (303)863-8003



Teletype to: Shirley Armstrong

MAR 23 1995

From: Jeanne Mejeur

Message: Attached are state laws on vehicle noise. Only Georgia's specifically refers to music/stereo noise, though several of the others refer to decibel levels, which addresses the issue.

Number of Pages Telecopied (including cover sheet): 11

Date Sent: 3-23-95

Please place fax number and authorization code on reverse side.

CODE OF GEORGIA  
TITLE 40. MOTOR VEHICLES AND TRAFFIC  
CHAPTER 6. UNIFORM RULES OF THE ROAD  
ARTICLE 1. GENERAL PROVISIONS  
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Current through Act 1437, approved 5-8-92

40-6-14 Limits on sound volume produced by radio, tape player, or other mechanical sound-making device or instrument from within the motor vehicle.

(a) It is unlawful for any person operating or occupying a motor vehicle on a street or highway to operate or amplify the sound produced by a radio, tape player, or other mechanical sound-making device or instrument from within the motor vehicle so that the sound is plainly audible at a distance of 100 feet or more from the motor vehicle.

(b) The provisions of this Code section shall not apply to any law enforcement motor vehicle equipped with any communication device necessary in the performance of law enforcement duties or to any emergency vehicle equipped with any communication device necessary in the performance of any emergency procedures.

(c) The provisions of this Code section do not apply to motor vehicles used for business or political purposes, which in the normal course of conducting such business use sound-making devices. The provisions of this subsection shall not be deemed to prevent local authorities, with respect to streets and highways under their jurisdiction and within the reasonable exercise of the police power, from regulating the time and manner in which such business may be operated.

(d) The provisions of this Code section do not apply to the noise made by a horn or other warning device required or permitted by Code Section 40-8-70. The Department of Public Safety shall promulgate rules defining "plainly audible" and establish standards regarding the measurement of sound by law enforcement personnel.

(e) A violation of this Code section shall be a misdemeanor.

(Code 1981, s 40-6-14, enacted by Ga. L. 1991, p. 417, s 1.)

Code, s 40-6-14  
GA ST s 40-6-14

END OF DOCUMENT

WEST'S FLORIDA STATUTES ANNOTATED  
 TITLE XXIII. MOTOR VEHICLES  
 CHAPTER 316. STATE UNIFORM TRAFFIC CONTROL  
 COPR. (c) WEST 1993 No Claim to Orig. Govt. Works  
 Current through 1992 Special 'H' Session

## 316.293. Motor vehicle noise

(1) Definitions. The following words and phrases, when used in this section, shall have the meanings respectively assigned to them in this subsection, except where the context otherwise requires:

(a) "dB A" means the composite abbreviation for the A-weighted sound level and the unit of sound level, the decibel.

(b) "Gross combination weight rating" or "GCWR" means the value specified by the manufacturer as the loaded weight of a combination vehicle.

(c) "Gross vehicle weight rating" or "GVWR" means the value specified by the manufacturer as the loaded weight of a single vehicle.

(d) "Sound level" means the A-weighted sound pressure level measured with fast response using an instrument complying with the specification for sound level meters of the American National Standards Institute, Inc., or its successor bodies, except that only A-weighting and fast dynamic response need be provided.

(e) "Department" means the Department of Highway Safety and Motor Vehicles.

(2) Operating noise limits. No person shall operate or be permitted to operate a vehicle at any time or under any condition of roadway grade, load, acceleration, or deceleration in such a manner as to generate a sound level in excess of the following limit for the category of motor vehicle and applicable speed limit at a distance of 50 feet from the center of the lane of travel under measurement procedures established under subsection (3).

(a) For motorcycles other than motor-driven cycles:

	Sound level limit	
	Speed limit 35 mph or less	Speed limit over 35 mph
Before January 1, 1979	82 dB A	86 dB A
On or after January 1, 1979	78 dB A	82 dB A

(b) For any motor vehicle with a GVWR or GCWR of 10,000 pounds or more:

	Sound level limit	
	Speed limit 35 mph or less	Speed limit over 35 mph
On or after January 1, 1975	86 dB A	90 dB A

(c) For motor-driven cycles and any other motor vehicle not included in paragraph (a) or paragraph (b):

	Sound level limit	
	Speed limit 35 mph or less	Speed limit over 35 mph
Before January 1, 1979	76 dB A	82 dB A
On or after January 1, 1979	72 dB A	79 dB A

(3) Measurement procedures. The measurement procedures for determining compliance with this section shall be established by regulation of the Department of Environmental Regulation as provided in s. 403.415(9), in cooperation with the department. Such regulations shall include the selection of measurement sites and measurement procedures and shall take into consideration accepted scientific and professional methods for the measurement of vehicular sound levels. The measurement procedures may include adjustment factors to be applied to the noise limit for measurement distances of other than 50 feet from the center of the lane of travel.

(4) Applicability. This section applies to the total noise from a vehicle and shall not be construed as limiting or precluding the enforcement of any other provisions of this chapter relating to motor vehicle mufflers for noise control.

(5) Noise abatement equipment modifications.

(a) No person shall modify the exhaust system of a motor vehicle or any other noise-abatement device of a motor vehicle operated or to be operated upon the highways of this state in such a manner that the noise emitted by the motor vehicle is above that emitted by the vehicle as originally manufactured.

(b) No person shall operate a motor vehicle upon the highways of the state with an exhaust system or noise-abatement device so modified.

(6) Exempt vehicles. The following are exempt from the operation of this act:

(a) Emergency vehicles operating as specified in s. 316.072(5)(a).

(b) Any motor vehicle engaged in a professional or amateur sanctioned, competitive sports event for which admission or entry fee is charged, or practice or time trials for such event.

(c) Any motor vehicle engaged in a manufacturer's engineering, design, or equipment test.

(d) Construction or agricultural equipment either on a job site or traveling on the highways.

< < For credits, see Historical Note field. > >

## HISTORICAL NOTES

### HISTORICAL AND STATUTORY NOTES

#### 1990 Main Volume Historical and Statutory Notes

##### Derivation:

Laws 1979, c. 79-65, s 28.

Laws 1978, c. 78-280, s 2.

Laws 1976, c. 76-31, s 32.

Laws 1974, c. 74-110, s 4.

Laws 1976, c. 76-31, s 32, renumbered the section reference in subsec. (6) (a) from s 316.051(5) (a) to s 316.072(5) (a), effective October 1, 1977.

Laws 1978, c. 78-280, s 2, changed acceptable sound levels in reference to subsec. (2) (c) after January 1, 1979.

Laws 1979, c. 79-65, a reviser's bill, changed nomenclature and deleted provisions to reflect transfers of powers, duties and functions resulting from the Environmental Reorganization Act of 1975 (Laws 1975, c. 75-22), and to reflect the change in name of water management districts resulting from Laws 1975, c. 75-125.

West's F. S. A. s 316.293

FL ST s 316.293

END OF DOCUMENT

WEST'S FLORIDA STATUTES ANNOTATED  
TITLE XXIX. PUBLIC HEALTH  
CHAPTER 403. ENVIRONMENTAL CONTROL,  
PART I. POLLUTION CONTROL  
COPR. (c) WEST 1993 No Claim to Orig. Govt. Works  
Current through 1992 Special 'H' Session

## 403.415. Motor vehicle noise

(1) Short title.--This act shall be known and may be cited as the "Florida Motor Vehicle Noise Prevention and Control Act of 1974."

(2) (a) Legislative Intent.--The intent of the Legislature is to implement the state constitutional mandate of s. 7, Art. II of the State Constitution to improve the quality of life in the state by limiting the noise of new motor vehicles sold in the state and the noise of motor vehicles used on the highways of the state.

(b) It is also the intent of the Legislature to recognize the proposed United States Environmental Protection Act Noise Commission Standards Regulations for medium and heavy-duty trucks as being the most comprehensive available and in the best interest of Florida's citizenry and, further, that such regulation shall preempt all state standards not identical to such regulation.

(3) Definitions.--The following words and phrases when used in this section shall have the meanings respectively assigned to them in this subsection, except where the context otherwise requires:

(a) "dB A" means the composite abbreviation for A-weighted sound level, and the unit of sound level, the decibel.

(b) "Gross combination weight rating" or "GCWR" means the value specified by the manufacturer as the loaded weight of a combination vehicle.

(c) "Gross vehicle weight rating" or "GVWR" means the value specified by the manufacturer as the loaded weight of a single vehicle.

(d) "Motor vehicle" means any vehicle which is self-propelled and any vehicle which is propelled by electric power obtained from overhead trolley wires, but not operated upon rails.

(e) "Motorcycle" means any motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, but excluding a tractor or a moped.

(f) "Moped" means any vehicle with pedals to permit propulsion by human power, having a seat or saddle for the use of the rider and designed to travel on not more than three wheels, with a motor rated not in excess of 2 brake horsepower and not capable of propelling the vehicle at a speed greater than 30 miles per hour on level ground, and with a power-drive system that functions directly or automatically without clutching or shifting gears by the operator after the drive system is engaged. If an internal combustion engine is used, the displacement may not exceed 50 cubic centimeters.

(g) "Sound level" means the A-weighted sound pressure level measured with fast response using an instrument complying with the specification for sound level meters of the American National Standards Institute, Inc., or its successor bodies, except that only A-weighting and fast dynamic response need be provided.

(h) "Vehicle" means any device in, upon, or by which any person or property is or may be transported or drawn upon a highway, except devices moved by human power or used exclusively upon stationary rails or tracks.

(i) "Department" means the Department of Environmental Regulation.

(4) New vehicle noise limits.--No person shall sell, offer for sale, or lease a new motor vehicle that produces a maximum sound level exceeding the following limits at a distance of 50 feet from the center of the lane of travel under test procedures established under subsection (5):

(a) For motorcycles:

Date of manufacture	Sound level limit
From January 1, 1973, to December 31, 1974	86 dB A
On or after January 1, 1975	83 dB A

(b) For any motor vehicle with a GVWR over 10,000 pounds, for any school bus, and for any multipurpose passenger vehicle, which is defined as a motor vehicle with motive power designed to carry 10 persons or less and constructed either on a truck chassis or with special features for occasional off-road operation:

Date of manufacture	Sound level limit
From January 1, 1973, to December 31, 1976	86 dB A
On or after January 1, 1977	83 dB A

(5) Test procedures.--The test procedures for determining compliance with this section shall be established by regulation of the Department of Environmental Regulation and in cooperation with the Department of Highway Safety and Motor Vehicles in substantial conformance with applicable standards and recommended practices established by the Society of Automotive Engineers, Inc., or its successor bodies, and the American National Standards Institute, Inc., or its successor bodies, for the measurement of motor vehicle sound levels. Regulations establishing these test procedures shall be promulgated no later than December 1, 1974.

(6) Certification.--The manufacturer, distributor, importer, or designated agent thereof shall file a written certificate with the department stating that the specific makes and models of motor vehicles described thereon comply with the provisions of this section. No new motor vehicle shall be sold, offered for sale, or leased unless such certificate has been filed.

(7) Notification of certification.--The department shall notify the Department of Highway Safety and Motor Vehicles of all makes and models of motor vehicles for which valid certificates of compliance with the provisions of this section are filed.

(8) Replacement equipment.--

(a) No person shall sell or offer for sale for use as a part of the equipment of a motor vehicle any exhaust muffler, intake muffler, or other noise abatement device which, when installed, will permit the vehicle to be operated in a manner that the emitted sound level of the vehicle is increased above that emitted by the vehicle as originally manufactured and determined by the test procedures for new motor vehicle sound levels established under this section.

(b) The manufacturer, distributor, or importer, or designated agent thereof, shall file a written certificate with the department that his products sold within this state comply with the requirements of this section for their intended applications.

(9) Operating vehicle noise measurements.--The department shall establish, with the cooperation of the Department of Highway Safety and Motor Vehicles, measurement procedures for determining compliance of operating vehicles with the noise limits of s. 316.293(2). The department shall advise the Department of Highway Safety and Motor Vehicles on technical aspects of motor vehicle noise enforcement regulations, assist in the training of enforcement officers, and administer a sound-level meter loan program for local enforcement agencies.

(10) Enactment of local ordinances limited.--The provisions of this section shall be applicable and uniform throughout this state and in all political subdivisions and municipalities therein, and no local authority shall enact or enforce any ordinance on a matter covered by this section unless expressly authorized. However, this subsection shall not prevent any local authority from enacting an ordinance when such enactment is necessary to vest jurisdiction of violation of this section in the local court.

< < For credits, see Historical Note field. > >

## HISTORICAL NOTES

### HISTORICAL AND STATUTORY NOTES

#### 1993 Main Volume Historical and Statutory Notes

##### Derivation:

Laws 1987, c. 87-161, s 22.

Laws 1982, c. 82-49, s 1.

Laws 1980, c. 80-338, s 1.

Laws 1979, c. 79-164, s 98.

Laws 1979, c. 79-65, s 82.  
Laws 1978, c. 78-280, s 1.  
Laws 1976, c. 76-289, s 1.  
Laws 1975, c. 75-59, ss 1, 2.  
Laws 1974, c. 74-110, ss 1 to 3.

West's F. S. A. s 403.415  
FL ST s 403.415  
END OF DOCUMENT

NORTH DAKOTA CENTURY CODE

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TITLE 39. MOTOR VEHICLES  
CHAPTER 39-27. MOTORCYCLE EQUIPMENT

39-27-08. Exhaust system -- Prevention of noise.

Motorcycles must be equipped with an exhaust system incorporating a muffler or other mechanical device for the purpose of effectively reducing engine noise. Cutouts and bypasses in the exhaust system are prohibited. The system must be leakproof and all components must be securely attached to the vehicle and located so as not to interfere with the operation of the motorcycle. Shielding must be provided to prevent inadvertent contact with the exhaust system by the operator or passenger during normal operation. In addition, all motorcycles operating on streets and highways must meet the noise decibel limitations as established by the environmental protection agency. No person may sell, offer for sale, or install any noise suppressing system or device which will produce noise in excess of the maximum allowable decibel limitations of this section.

Source: S.L. 1975, ch. 365, s 8; 1979, ch. 441, s 1.

NDCC 39-27-08

ND ST 39-27-08

END OF DOCUMENT

PAOE'S OHIO REVISED CODE ANNOTATED  
TITLE 45: MOTOR VEHICLES--AERONAUTICS--WATERCRAFT  
CHAPTER 4513: TRAFFIC LAWS--EQUIPMENT; LOADS  
[EQUIPMENT]

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Current with laws passed and filed through 12-31-91

[ s 4513.22.1 ] s 4513.221 Regulation of vehicle and engine noise in unincorporated areas.

(A) The board of county commissioners of any county, and the board of township trustees of any township subject to section 505.17 of the Revised Code, may regulate passenger car and motorcycle noise on streets and highways under their jurisdiction. Such regulations shall include maximum permissible noise limits measured in decibels, subject to the requirements of this section.

(B) Regulations establishing maximum permissible noise limits measured in decibels shall prohibit the operation, within the speed limits specified herein, of a passenger car or motorcycle of a type subject to registration at any time or under any condition of load, acceleration, or deceleration in such manner as to exceed the following maximum noise limits, based on a distance of not less than fifty feet from the center of the line of travel:

(1) For passenger cars:

(a) When operated at a speed of thirty-five miles per hour or less, a maximum noise limit of seventy decibels;

(b) When operated at a speed of more than thirty-five miles per hour, a maximum noise limit of seventy-nine decibels.

(2) For motorcycles:

(a) When operated at a speed of thirty-five miles per hour or less, a maximum noise limit of eighty-two decibels;

(b) When operated at a speed of more than thirty-five miles per hour, a maximum noise limit of eighty-six decibels.

(C) Maximum noise limits established pursuant to division (B) of this section shall be measured on the "A" scale of a standard sound level meter meeting the applicable requirements for a type 2 sound level meter as defined in American national standards institute standard S1.4 - 1983, or the most recent revision thereof. Measurement practices shall be in substantial conformity with standards and recommended practice established by the society of automotive engineers, including SAE standard J 986 A NOV81, SAE standard J 366 MAR85, SAE standard J 331 A, and such other standards and practices as may be approved by the federal government.

(D) No regulation enacted under division (B) of this section shall be effective until signs giving notice of the regulation are posted upon or at the entrance to the highway or part thereof affected, as may be most appropriate.

(E) A board of county commissioners of any county may regulate noise from passenger cars, motorcycles, or other devices using internal combustion engines in the unincorporated area of the county, and a board of township trustees may regulate such noise in the unincorporated area of the township, in any of the following ways:

(1) By prohibiting operating or causing to be operated any motor vehicle, agricultural tractor, motorcycle, all-purpose vehicle, or snowmobile not equipped with a factory-installed muffler or equivalent muffler in good working order and in constant operation;

(2) By prohibiting the removing or rendering inoperative, or causing to be removed or rendered inoperative, other than for purposes of maintenance, repair, or replacement, of any muffler; (3) By prohibiting the discharge into the open air of exhaust of any stationary or portable internal combustion engine except through a factory-installed muffler or equivalent muffler in good working order and in constant operation;

(4) By prohibiting racing the motor of any vehicle described in division (E)(1) of this section in such a manner that the exhaust system emits a loud, cracking, or chattering noise unusual to its normal operation.

(F) Whoever violates any maximum noise limit established as provided in division (B) of this section or any of the prohibitions authorized in division (E) of this section is guilty of a minor misdemeanor. Fines collected under this section by the county shall be paid into the county general fund, and such fines collected by the township shall be paid into the township general fund. No regulation adopted under this section shall apply to commercial racetrack operations.

1990 Main Volume Credit

HISTORY: I-41 v H 131. Eff 6-26-86.

R. C. s 4513.221 (Page's)  
OH ST s 4513.221  
END OF DOCUMENT

GENERAL LAWS OF RHODE ISLAND ANNOTATED, 1956

REENACTMENT OF 1982

TITLE 31. MOTOR AND OTHER VEHICLES

CHAPTER 45. NOISE LIMITS FOR MOTOR VEHICLES

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Current through January Session (1992), Ch. 92-497

31-45-1 Noise limits.

No person shall operate a motor vehicle, nor shall the owner of any vehicle, allow such vehicle to be operated, at any time, or under any condition of grade, load, acceleration or deceleration, in such a manner as to exceed the following noise limit based on a distance of fifty (50) feet from the center of the lane of travel within the speed limit. For the purposes of this section, dbA means decibels measured with a calibrated sound level meter weighted to the "A" scale.

In speed zones of thirty-five (35) miles per hour or less not more than eighty-six (86) dbA. In speed zones of more than thirty-five (35) miles per hour not more than ninety (90) dbA.

History of Section.

As enacted by P.L. 1976, ch. 197, s 1.

Gen. Laws, 1956, s 31-45-1

RI ST s 31-45-1

END OF DOCUMENT

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Copies of minutes listed below were originally included in this file. The minutes are available on the legislative computer database. In order to save space copies of minutes have not been left in the files.

Mary Pagenkopf

House HESS April 20, 1995, 2:08 PM