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CHABA

Memorandum Report No. 2

AD 112710

HEARING CONSERVATION DATA AND PROCEDURES

Final Report of Working Group 21

JUNE 1956

ARMED FORCES — NATIONAL RESEARCH COUNCIL
COMMITTEE ON HEARING AND BIO-ACOUSTICS

OFFICE OF THE EXECUTIVE SECRETARY

Central Institute for the Deaf
818 So. Kingshighway, St. Louis 10, Missouri

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Working Group 21

(authorized by the CHABA Council at the Eighth Meeting on 16 May, 1955)

MEMBERSHIP

Chairman:

Dr. Robert O. Fehr, Consulting Engineer,
General Engineering Laboratory, General
Electric Company

Members:

Civilians:

Dr. Hallowell Davis, Director of Research,
Central Institute for the Deaf
Dr. Aram Glorig, Director, Research Center
of the Subcommittee on Noise in Industry
of the AA00
Dr. Walter A. Rosenblith, Associate Pro-
fessor of Communication Bio-Physics,
Massachusetts Institute of Technology

Air Force:

Mr. Francis Brogan, USAF School of Avia-
tion Medicine, Randolph Field, Texas
Capt. Ronald Hansen (MSC), Bio-Acoustics
Section, Wright Air Development Center
Lt. Col. Charles N. Moss (MC), Office of The
Air Force Surgeon General

Army:

Col. John R. Hall (MC), Office of the Sur-
geon General, Army
Dr. R. Edwin Shutts, Audiology and Speech
Correction Center, Walter Reed Army
Hospital
Capt. Lee H. Miller (MC), Army Environ-
mental Health Laboratory

Members until 25 November 1955:

Major James A. Albrite (MC)
Dr. R. L. Cramer
Col. Charles Gersoni (MSC)
Dr. Michael Loeb

Navy:

Cdr. J. Siegel (MSC), Bureau of Medicine
and Surgery

Secretary:

Dr. J. Richardson Usher, Central Institute
for the Deaf

MEETINGS

1. 27-28 July 1955, at Subcommittee on Noise in Industry, 111 North Bonnie Brae, Los Angeles, California.
2. 5 October 1955, Subgroup at General Electric Turbine Works, Evendale, Ohio.
3. 14 October 1955, Subgroup at Aro, Inc., Tullahoma, Tennessee.
4. 26 October 1955, at Washington, D. C., Roger Smith Hotel.

REASON FOR ACTIVATING THE WORKING GROUP

In 1954 the Z 24-X-2 Subcommittee of the American Standards Association published its report "The Relations of Hearing Loss to Noise Exposure." Realizing that their results were not a full statement, the Subcommittee recommended the continuing collection of data upon which a better statement of the relations of hearing loss to noise exposure could be based. In the Spring of 1955, Dr. H. O. Parrack, the Air Force Noise and Vibration Control Coordinator, became interested in improving this statement. He suggested the formation of a Working Group to advise him on how to establish a hearing conservation program or programs for the Air Force that would satisfy the immediate special needs of the Air Force and which would, at the same time, generate the kind of data needed to broaden the statement of the relations of hearing loss to noise exposure.

As early as 1953 the Research Center of the Subcommittee on Noise in Industry (AAOO) had established a central IBM information pool for the collection of the type of information deemed necessary to show the relation of hearing loss to noise exposure on a statistical basis. A special audiometric data card had been developed by which industrial organizations cooperating with this program could forward employee audiograms to the Research Center IBM card pool, as well as certain information concerning their employees' exposure to noise.

Dr. Farrack considered that both industry and the Armed Forces were facing similar problems in establishing Conservation of Hearing programs, and that solutions applicable for the one group might, with small variations, be made applicable to the other. While the Hearing Conservation Programs for the two groups might differ in approach and in the methods used, the informa-

tion generated by these programs should result in the same kind of basic data. If the information generated by the Air Force Program, and possibly other Armed Services Conservation programs, could be included in the pool of noise exposure data already collected by the Research Center of the Subcommittee on Noise in Industry, a considerable contribution of basic data would result.

Since the Research Center was well started on the collection of basic data, Dr. Parrack thought it would be to the advantage of the Air Force to utilize the Center's experience in developing audiometric testing programs, data recording forms, and instructions for carrying on hearing conservation programs. If common procedures were used, the Air Force (and the other Armed Services, if they so desired) could submit data from selected programs to support the Research Center's over-all effort. In this way, the accumulation of a large body of data, covering a wide range of noise exposures, could be completed more rapidly.

Discussions within the CHABA Council concerning the purpose of this request for a Working Group disclosed considerable interest on the part of Major James P. Albrite (MC), Army Council Representative and Captain Clifford P. Phoebus (MC), Navy Council Representative. As a result of invitations issued by the Council, Army and Navy personnel were appointed to the Working Group.

The introduction of more powerful machinery in the factories, of jet aircraft (both civil and military), and of improved military machines and weapons has greatly increased the work hazards in the noisy areas around these machines. In nearly every case superior performance is achieved

through the addition or release of more power, which results in the generation of louder noises. Technological progress in the foreseeable future would appear to be forced to follow this same rule. The generation of louder noises has two unfortunate aspects. The first is that the workers in the immediate area are exposed to a noise of greater intensity. The second is that the area in which the noise levels may be dangerously high is enlarged, thus exposing more people and complicating the problem of protecting hearing. The determination of the exact relations of hearing loss to noise exposure therefore becomes of increasing importance as more powerful machinery is introduced. The Z-24 Subcommittee statements were based on a relatively small number of audiograms (about 200), and they assumed a contin-

uous exposure to steady noise not higher than about 104 db over-all sound pressure level. The Armed Services (and Industry, too) are faced with regular operating noise levels that are well above 104 db overall sound pressure level, as well as intermittent (not continuous) exposure of the same personnel to a variety of steady and non-steady noises at higher levels. Since the effect of the time factor in the case of intermittent exposure to noise is a field about which very little is known, the Z-24 data could not with safety be extrapolated to fit these situations. Clearly, the collection of an extensive body of data meeting certain minimum informational and technical standards is needed to extend the Z-24 data to fit these larger conditions.

ENDORSEMENT

This report is approved and endorsed by the Council of the Armed Forces - National Research Council Committee on Hearing and Bio-Acoustics. The Council suggests that the data card form and its instructions be used by each of the Armed Services for a trial period of one year. The Council is certain that the card form will meet the requirements for research into the problems of the relations of hearing loss to noise exposure. The Council hopes that the experience of the trial period with this card form can be used to develop a tri-Service card form which will serve the research purposes and also all other purposes for which medical records are maintained.

HALLOWELL DAVIS
Executive Secretary
By Direction
21 May 1956

**ARMED FORCES - NATIONAL RESEARCH COUNCIL
COMMITTEE ON HEARING AND BIO-ACOUSTICS**

Office of the Executive Secretary
Central Institute for the Deaf
818 South Kingshighway
St. Louis 10, Missouri
20 February 1955

Report to the CHABA Council from Working Group 21:

CHABA Working Group 21 herewith transmits to the Council an audiometric data card form which will elicit the minimum amount of data required for the eventual correlation of hearing losses with noise exposures. This card is based on the form already developed by the Research Center of the Subcommittee on Noise in Industry but contains modifications suggested by members of Working Group 21. Many of the changes have been made at the request of the military members. Industrial and military users are free to add additional information to the card to suit their particular purposes, but it should be reemphasized that the card represents the least quantity of information that will be useful in establishing causal relation between hearing loss and noise exposure. The particular form provides for efficient coding of the data and is planned to facilitate the transfer of the information to record cards for machine analysis. The Working Group recommends that the Council transmit the enclosed

data card form to the Armed Services for consideration and preparation as a tri-service (Department of Defense) form. The Working Group further recommends that Service regulations governing the use of the card should permit the transmittal of copies of completed cards to the Research Center of the Subcommittee on Noise in Industry for inclusion in their pool of noise exposure data.

The Working Group considers that the Hearing Conservation programs now being developed by the Armed Forces are approaching their stated objectives and that it is unnecessary for the Working Group to prepare any further documents concerning Hearing Conservation Programs at the present time.

The Chairman considers that the primary mission of the Working Group has been achieved and recommends that it be discharged.

ROBERT O. FEHR,
Chairman,
Working Group 21

The following pages contain instructions relating to the use of the audiometric data card. These instructions have been prepared to ensure that certain kinds of information appear in certain places on the card, and are for the guidance of the technician who fills in the data card at the time that a hearing test is given. Pages 8 through 10 explain the kind of information that should appear in each numbered box. The tentative job codes shown on page 13 are intended to help complete the entry in the box numbered 14-18 on Current Noise Exposure. Similarly, the codes for over-all noise levels at machines and in work areas (pages 11-12) are intended to help in completing the boxes numbered 22 through 27 concerning Previous Noise Exposure.

Instructions have been prepared (pages 14 through 18) to assist the IEM card punch operators in transcribing the information from the audiometric data card to the IBM card which will be filed in the pool of noise exposure information.

HEARING CONSERVATION DATA CARD NO. (1)

A. IDENTIFICATION

Last Name: First Middle (2) Status (2-10) Social Security No. - Service Number (10) Sex
 Military Civilian M-Y F-X

B. CURRENT NOISE EXPOSURE (21)

(11-13) Dept. or Job Location (14-18) (AESC; MOS) (19) Time in Job (20) Wears Ear Protection other than Dry Cotton During Exposure to Loud Noise (21) Most Frequently Used Ear Protection Class: Insert Covers Type: Elastic Muffs 6 Non-elastic (waxy) 4 Helmet 7 Rigid (fitted) 5 Other 8

C. PREVIOUS NOISE EXPOSURE

Time in each Category (22) (23) (24) (25) (26) (27) (28) Gunfire
 Previous Job (22) (23) (24) (25) (26) (27) (28) Basic training 1 Combat-Light Arms 2 Combat-Heavy Arms 3 Hunting 4 Target Practice 5
 Job before that All prior jobs Ear protection X Y X Y X Y X Y X Y X Y

D. MEDICAL HISTORY AND STATUS

(29) Aural Pain 1 Drainage 2 Ear Injury (mechanical) 3 Surgery (ear or mastoid) 4 Head Injury, with unconsciousness 5 Tinnitus Prior to First Noise Exposure 6 Tinnitus Following Exposure to Noise 7 Hearing Loss in Immediate Family 8 Malformation of External Ear or Canal 9 Obstruction of, or Drainage from Canal 10 Perforations of Drumhead 11 Upper Resp. Infection or Nasal Allergy 12 Tubal Obstruction 13

E. MOST RECENT NOISE EXPOSURE (34)

(33) Time Since (34) Used Ear Protection (35) Had Audiometric Test Before Yes No (36-38) Date-Mo/Yr Age (39-40) (41) (43) (45) (47) (49) (51) (53) (55) (57) (59) (61) (63) (65) (67) (69) (71) (73) (75) Min-Hours Days Min-Hours Days

F. HEARING LOSSES

Right: (57) (59) (61) (63) (65) (67) (69) (71) (73) (75) Min-Hours Days
 Left: (57) (59) (61) (63) (65) (67) (69) (71) (73) (75) Min-Hours Days Min-Hours Days

Remarks: (34) (35) (36-38) (39-40) (41) (43) (45) (47) (49) (51) (53) (55) (57) (59) (61) (63) (65) (67) (69) (71) (73) (75) Min-Hours Days Min-Hours Days

INSTRUCTIONS FOR COMPLETING THE HEARING CONSERVATION DATA CARD*

The material on the Hearing Conservation Data Card is divided into six major categories:

- a) Identification of Individual
- b) Current Noise Exposure
- c) Previous Noise Exposure
- d) Medical History and Status
- e) Most Recent Noise Exposure
- f) Hearing Losses

Additional Data. Additional data necessary to meet local needs and objectives may be recorded on supplementary sheets and attached to the present Data Card. The present form represents the minimum data that are required for a proposed nation-wide research study. The recommended codes and conventions must be followed to make the data most useful for this study and easy to copy or microfilm efficiently and without confusion. Uniformity in the form and coding of data for statistical study is very important.

Card Number. On the first card that is used for each individual, place the number 1 in the square at the top of the card. (The numbers in the parentheses are for the use of the key-punch operator.) As additional cards are used for the same person, enter the number of the card in the square at the top of each new card. For example, if it is the person's second audiogram, which is placed on a second card, enter the number 2 in this square.

a) Identification

Name. Record the subject's name, last name first.

Prepared by the Research Center, Subcommittee on Noise in Industry, 111 North Bonnie Brae Street, Los Angeles 26, California.

Military Status. Check the appropriate box to indicate whether the subject is a military or civilian employee.

Social Security Number. — Service Number. Record the subject's social security number or his service number, or both, in the proper space. If the subject is a military employee, make certain that the service number is recorded, and if he is a civilian employee, make certain that the social security number is recorded.

Sex. Indicate the person's sex by checking the appropriate square.

b) Current Noise Exposure

Department or Location. Record the department number, the coded location or the area where the subject generally works. For example: department 108; or, area 5; or, section 8 in hangar 6, etc.

Job or Noise Code. Record the utilization AFSC, MOS, or job or noise exposure code (to be developed), which best describes the subject's work. Where possible, the job code should include information about the noise and the subject's exposure to it. An example of such a code is presented on page 13.

Time in Job. Determine the length of time in years, or months if less than one year, that the subject has been working in the coded job environment. Circle the number in the square that is directly below the column heading containing this length of time. For example, if the subject has been working in the coded job environment for seven years, circle the number "5."

Exposure Time. Record the number of hours that the employee is exposed to his major noise exposure on a "typical" day. If less than one hour, record the number of minutes. If the exposure time cannot be determined, because of a complicated or irregular noise exposure, place an "X" in this square.

Wears Ear Protection Other Than Dry Cotton During Exposure to Loud Noise. Ask the subject if he wears ear protection other than dry cotton on the job. If he answers "yes," determine how frequently he wears ear protection when exposed to loud noise (90 db or greater) and check the appropriate square. If he answers "no," check "never."

Most Frequently Used Ear Protection. If the subject indicates that he wears ear protection other than dry cotton, determine the class of ear protection he most frequently uses (insert-type or ear covers) and check the proper square. Also determine the type of ear protector within this class that he most frequently uses, and check the appropriate square.

c) Previous Noise Exposure

Time in Each Category. A tentative code containing six categories for recording previous exposure to noise is presented on pages 11 and 12. These categories are based upon the over-all noise level of various job operations, graded in 10 db steps. Category "a" represents those jobs having an over-all noise level of 80 to 90 db, while category "f" represents jobs having an over-all noise level of 130 db or more. Record the number of years, or months if less than one year, that the employee has worked in each of these categories on his previous job, on the job before that, and on all prior jobs.

Ear Protection. Determine how frequently the subject used ear protection, other than dry cotton, on all previous jobs within each category. If on all previous jobs within a given category the subject "seldom" or "never" wore ear protection, leave the space for ear protection blank in that

column. If he indicates that he "always" or "frequently" wore ear protection, circle the letter under the appropriate column according to the code used in column 21 for the class of ear protection most frequently used. For example, if the subject worked for a total of three years in category "e," and he frequently wore insert plugs when exposed to noise in that category, circle the letter "X" in that column.

Gunfire. If the subject has had military basic training in which he was exposed to gunfire, check box No. 1. If he has had combat and used guns of 50 caliber or less, check "Light Arms," and if he used guns of greater than 50 caliber, check "Heavy Arms." If the subject has gone hunting ten or more times during his life (excluding air rifles), check "Hunting," and if he has engaged in target practice ten or more times (excluding basic training), check "Target Practice."

d) Medical History and Status

History. Check the proper boxes to indicate the presence of the corresponding data for each ear.

Check "Ear Injury (Mechanical)" if the subject has received any ear injury caused by a blow by a foreign object.

Check the first square behind "Hearing Loss in Immediate Family" if a blood relative (grandparent, parent, brother, sister, son or daughter) had a hearing loss which started before the age of forty. If more than one blood relative had such a hearing loss, check both of the squares behind this category.

Status. Check the proper boxes for each ear.

Check "Tubal Obstruction" if the drumhead is not seen to move, or pressure there is not felt by the subject, on performing the Valsalva maneuver.

e) Most Recent Noise Exposure

Time Since. Determine the length of time which has elapsed since the end of the subject's last

exposure to noise. Circle the number in the square that is directly below the column heading containing this length of time. For example, if it has been forty-five minutes circle the number "8."

Duration of. Determine the number of minutes or hours duration of the most recent noise exposure. Circle the number in the square that is directly below the column heading containing this length of time.

Used Ear Protector. Check the proper box to indicate whether ear protection was worn during the most recent noise exposure.

f) Hearing Losses

Had Audiometric Test Before. If it is the very first audiometric test the person has ever had, check "No." If he has had a previous pure tone audiogram, given by any agency, check "Yes."

Day of Week. Record the day of the week, i.e., Monday, Tuesday, etc., on which the test is given.

Date. Record in numbers the month and the last two digits of the year that the test is given. For example, if the test is given in June, 1956 record 6/56.

Age. Record the age of the subject as the number of years at his last birthday.

Pure Tone. Record the hearing loss in decibels in the appropriate space for each frequency. The recommended frequencies are: 500, 1000, 2000, 3000, 4000, and 6000. In addition, 250 and 1500 are optional.

Speech Reception. The determination of speech reception thresholds by means of recorded spondee word lists is optional.

It is recommended that the Hearing Conservation Data Card be filed with the subject's medical records after the data have been transferred to an IBM card.

Tentative
CODE FOR OVER-ALL NOISE LEVELS AT MACHINES¹

a (80-89 db)

c (100-109 db)

Lathe, automatic
Liming machine
Welder, arc

Conveyor, strip steel
Forging manipulator
Furnaces, oil, gas, electric
Grinder, pedestal, on small tools

b (90-99 db)

Boring machine
Drill, pneumatic
Drill, radial, vertical, etc.
Grinders, castings, pipe, metal parts, etc.
Jointer, wood
Lathe, engine
Lathe, turret, other than ram type
Leveler, steel plates
Mill, bloomer, strip steel
Mill, strip steel
Milling machine
Polisher, metal tubes
Ram, pneumatic, sand molds
Rivet bucking, fuselage
Router, aluminum stock
Sand muller
Sander, wood
Scarfig, acetylene welding equipment
Screw machine, automatic
Shaper, small steel parts
Shear, steel plate
Welder, butt, electric
Welder, gas, on steel
Welding machine, tube

Hammer, forging
Hammer, pneumatic, peening
Hammering machine, rotary, on steel tubes
Hoop machine, steel wire
Jolt squeeze machine, sand molding
Lathe, automatic, wood
Lathe, turret, ram type
Mill, roughing, steel plates
Planer, wood
Pointing machine, steel parts
Press, pneumatic
Press, punch, automatic
Push-up machine, sand molding
Rivet bucking, wings
Riveting gun, pneumatic, wing assembly
Riveting hammer, fuselage assembly
Sand slinger
Saw, circular, cutting metal
Saw, cut-off, circular, wood
Saw, friction, steel
Shakeout, castings
Shot blast, small castings
Surfacer, wood
Tumbler, small castings
Vibrator, pneumatic, sand molds
Wrench, pneumatic

¹Adapted from "A Noise Survey of Manufacturing Industries" by Henry D. Karplus and George L. Bonvallet, reprinted from American Industrial Hygiene Association Quarterly, 14:4, December, 1953.

d (110-119 db)

Air hoist, pneumatic
Chipper, pneumatic, castings
Core blower, sand cores
Corrugating machine, sheet steel
Cutting machine, hardened tools
Decoiler, steel coils
Hammer, bumping, on thin metal
Hammer, drop, automatic
Internal combustion engine test
Nail machine

Riveting jig, wing assembly
Sandblast machine, on hand tools

e (120-129 db)

Chipper, pneumatic, tank
Engine, airplane, propeller
Riveting gun, pneumatic, sub-assembly

f (130 db or over)

Engine, jet
Riveting hammer, pneumatic, on steel tank

Tentative

CODE FOR OVER-ALL NOISE LEVELS IN AREAS:

a (80-89 db)

Furnace, annealing
Grinding
Machine shop, lathes, presses, etc.
Machining, aluminum
Milling machines
Sand molding
Spraying, varnish, etc.
Veneer department
Welding, arc
Wood finishing, sanding, planing, jointing, etc.

b (90-99 db)

Castings, cleaning
Core room
Fabrication, steel, handling, cutting
Foundry operations, sand slinging, etc.
Furniture making, planers, jointers, saws, etc.
Hammer, drop forge
Mill, bloomer, roughing, strip, etc.
Mill shop, wood

ibid.

Power plant, alternators, etc.
Ramming, pneumatic
Riveting, routers, aircraft
Sawing, logs, etc.
Screw machine, automatic
Shot blast room
Steel pouring
Wire drawing

c (100-109 db)

Chipping, castings, etc.
Conveyor
Furnace, electric
Hammer, drop, automatic
Molding, push-up machines, etc.
Punch press, automatic
Riveting, pneumatic, large steel plate tanks
Tumblers

d (110-119 db)

Shakeouts
Chipping, pneumatic, cleaning steel tank welds

Tentative

Job	Code*
Boring machine operator.....	01-b
Chipper operator, pneumatic, on castings..	02-d
Chipper operator, pneumatic, on tanks	02-s
Core blower	03-d
Drill operator	04-b
Grinder operator on castings, pipe, metal parts, etc.....	05-b
Grinder operator, pedestal, on small tools.....	05-c
Hammer operator, bumping.....	06-d
Hammer operator, drop.....	07-d
Hammer operator, forging.....	07-c
Hammer operator, pneumatic, peening.....	08-c
Hammering machine operator, rotary, on steel tubes.....	09-c
Lathe operator, automatic.....	10-a
Lathe operator, engine, turret, other than ram type.....	10-b
Liming machine operator.....	11-a
Milling machine operator.....	12-b
Punch press operator.....	13-c
Riveter, pneumatic, wing, fuselage assembly.....	14-c
Riveter, pneumatic, sub-assembly.....	14-e
Riveter, pneumatic, on steel tanks.....	14-f
Rivet buckler, fuselage	15-b
Rivet buckler, wings.....	15-c
Router operator, aluminum stock.....	16-b
Saw operator, metal.....	17-c
Shaper operator, small steel parts.....	18-b
Shakeout operator, castings.....	19-c
Tumbler operator, small castings.....	20-c
Welder, arc	21-a
Welder, gas	21-b
Engine, airplane, propeller.....	22-e
Engine, jet	22-f

*The two digits are used to separate jobs having the same over-all noise level, and the letters correspond to the categories representing the over-all noise level of each job. This value can best be obtained by sound level measurements, but where this is not possible, a close approximation can be obtained from the classifications on pages 11 and 12.

INSTRUCTIONS FOR KEY-PUNCHING THE HEARING CONSERVATION DATA CARD

I. GENERAL INSTRUCTIONS

Punch the information found on the Hearing Conservation Data Card into the columns on the IBM card that are indicated by the numbers in the parentheses above each item of information. For example, punch the Hearing Conservation Data Card number into column (1) on the IBM card.

A small letter "o" behind a parenthesis indicates that an over-punch is to be placed in that column. When one of these columns is encountered, hold the IBM card in that column by depressing the extended space key until both sets of information have been punched into the card. For example, hold the IBM card in column (2)^o until both

military or civilian status and the first digit of the social security or service number have been punched.

Within each column, punch the number or letter¹ that is either checked, circled, or written in for that item of information. For example, in column (16)^o punch the last digit of the social security or service number which is written in, and the letter in front of the square that is checked under "sex."

Where there is no information for a particular item, punch a zero into the column containing that information.

II. SPECIFIC INSTRUCTIONS

Card Number

(1) Punch the number written in the square at the top of the card. For numbers 10 through 19, punch the unit digit and an X-punch; for numbers 20 through 29, punch the unit digit and a Y-punch; and for numbers 30 through 39, punch the unit digit and an X-Y-punch.

a) Identification

Name. The name is not punched into the I.B.M. card.

(2)^o **Status.** Holding the card in column 2, over-punch the appropriate letter.

¹The X-punch is sometimes referred to as an 11-punch, and the Y-punch is sometimes referred to as a 12- or R-punch.

(2-10)^o Social Security No. — Service Number.

If, under status, "Military" is checked, punch the service number in columns 2-10. If "Civilian" is checked, punch the social security number into these columns. If the number punched into these columns contains less than nine digits fill in the remaining columns with zeros through column 10, holding the card in this position.

(10)^o **Sex.** Over-punch the appropriate letter.

b) Current Noise Exposure

(11-13) **Dept. or Location.** Punch the numbers that are written in the square.

(14-18) **Job or Noise Code.** Punch the numbers that are written in the square. If there are less

than five digits in this square, fill in the remaining columns with zeros through column 18.

(19) **Time in Job.** Punch the number that is circled.

(20) **Exposure Time.** If less than one hour, punch a zero. If one hour or more, punch the number of hours written in the square, unless this number is larger than eight. If the number is eight or larger, punch an 8. If there is an X in the square, punch an X over-punch.

(21)° **Ear Protection.** Holding the card in column 21, punch the number checked under "Wears Ear Protection Other Than Dry Cotton During Exposure to Loud Noise," the letter over-punch for the class, and the number for the type checked under "Most Frequently Used Ear Protection."

c) Previous Noise Exposure

(22-27)° **Time in Each Category.** Add up the time in each category, and punch the appropriate columns according to the code used in (19) **Time in Job**, except that if the total time in a particular category is less than one year, punch a zero. Use the over-punch to punch in the letters circled for ear protection under the appropriate columns. Punch zeros in each of the blank columns.

(28) **Gunfire.** Punch the number, or numbers, checked.

d) Medical History and Status

(29-30) **History.** Punch the numbers checked for the right ear in column 29, and the numbers checked for the left ear in column 30.

(31-32) **Status.** Punch the numbers checked for the right ear in column 31, and the numbers checked for the left ear in column 32.

e) Most Recent Noise Exposure

(33) **Time Since.** Punch the number that is circled.

(34)° **Duration of, and Used Ear Protector.** Holding the card in column 34 with the extended space key, punch the number that is circled, and the letter that is checked.

f) Hearing Losses

(35)° **Had Audiometric Test Before, and Day of Week.** Holding the card in column 35, punch the letter that is checked, and the number corresponding to the day of the week that is written in the square. Use the following code to designate the day of the week: Monday—1; Tuesday—2; Wednesday—3; Thursday—4; Friday—5; Saturday—6; and Sunday—7.

(36-38) **Date.** Punch the numbers written in the square.

(39-40) **Age.** Punch the numbers written in the square.

(41-72) **Pure Tone Thresholds.** Punch the numbers written in the squares into the appropriate columns on the IBM card. Two columns are used for each frequency, but only the first of the two columns is indicated in the parentheses. Use an X-punch over the unit digit to indicate a minus threshold, and round 100 down to 99 so that it will fit into the two columns. If a frequency is left blank, skip over the columns that contain that frequency. If a frequency is marked "NR" punch an OY in the columns for that frequency.

(73-78) **Speech Reception Thresholds.** Punch the same as pure tone thresholds.

Project Number

(79-80) Punch the project number that has been assigned to you.

After punching the IBM cards, return the Hearing Conservation Data Cards to the medical department.

IBM CODE FOR HEARING CONSERVATION DATA CARD

DATA	COL. NO.	CODE
Card Number	1	Direct transposition of unit digit, using an X-punch to indicate 10-19, a Y-punch to indicate 20-29, and an X and Y-punch to indicate 30-39.
a) Identification		
Status	2°	Military X Civilian Y
Social Security Number or Service Number	2-10°	Direct transposition
Sex	10°	Male Y Female X
b) Current Noise Exposure		
Department or Location	11-18	Direct transposition of supplementary code
Job or Noise Code	14-18	Direct transposition of supplementary code
Time in Job	19	0-2 Months 0 3-5 Months X 6-11 Months Y 1 Year 1 2 Years 2 3 Years 3 4 Years 4 5-9 Years 5 10-14 Years 6 15-19 Years 7 20+ Years 8
Exposure Time	20	0-59 Minutes 0 1 Hour 1 2 Hours 2 3 Hours 3 4 Hours 4 5 Hours 5 6 Hours 6 7 Hours 7 8+ Hours 8 Indeterminate X
Ear Protection, Frequency	21°	Always or Frequently 1 Seldom or Never 2
Ear Protection Used		
Class	21°	Insert X Covers Y
Type	21°	Elastic 3 Non-elastic 4 Fitted 5 Muffs 6 Helmet 7 Other 8

DATA	COL. NO.	CODE
c) Previous Noise Exposure		
Category a	22°	0-11 Months 0
b	23°	1 Year 1
c	24°	2 Years 2
d	25°	3 Years 3
e	26°	4 Years 4
f	27°	5-9 Years 5
		10-14 Years 6
		15-19 Years 7
		20+ Years 8
Ear Protection	22°-27°	Insert X
		Covers Y
Gunfire	28	Basic Training 1
		Combat—Light Arms 2
		Combat—Heavy Arms 3
		Hunting 4
		Target Practice 5
d) Medical History and Status		
History—Right ear	29	Aural pain 1
		Drainage 2
		Ear injury (mechanical)..... 3
		Surgery (ear or mastoid)..... 4
Left ear	30	Head injury, with unconsciousness..... 5
		Tinnitus prior to first exposure..... 6
		Tinnitus following exposure..... 7
		Hearing Loss in immediate family..... 8
Status—Right ear	31	Malformation of external ear or canal..... 1
		Obstruction of, or drainage from canal..... 2
		Perforation of drumhead..... 3
Left ear	32	Upper respiratory infection or nasal allergy... 4
		Tubal obstruction 5
e) Most Recent Noise Exposure		
Time since exposure	33	1-9 Minutes 1
		10-29 Minutes 2
		30-59 Minutes 3
		1-7 Hours 4
		8-23 Hours 5
		24-47 Hours 6
		2-6 Days 7
		7-13 Days 8
		14+ Days 9
Duration of exposure	34°	0-29 Minutes 0
		30-59 Minutes 9
		1 Hour 1
		2 Hours 2
		3 Hours 3
		4 Hours 4
		5 Hours 5
		6 Hours 6
		7 Hours 7
		8+ Hours 8
Used ear protection	34°	Yes X
		No Y

DATA	COL. NO.	CODE
f) Hearing Losses		
Had audiometric test before	85°	Yes X No Y
Day of week	85°	Monday 1 Tuesday 2 Wednesday 3 Thursday 4 Friday 5 Saturday 6 Sunday 7
Date—Month	36	January 1 February 2 March 3 April 4 May 5 June 6 July 7 August 8 September 9 October 0 November X December Y
Year	87-88	Direct transposition
Age	89-40	Direct transposition
Audiometric data—Pure tone		Direct transposition where possible
Right ear	41-42	
250	43-44	
500	45-46	Minus value X-punch over unit digit
1000	47-48	
1500*	49-50	100—rounded down to 99
2000	51-52	
3000	53-54	No response—OY
4000	55-56	
6000		
Left ear	57-58	
250*	59-60	
500	61-62	Minus values—X-punch over unit digit
1000	63-64	
1500	65-66	100—rounded down to 99
2000	67-68	
3000	69-70	No response—OY
4000	71-72	
6000		
Audiometric data—Speech reception*		
Right ear	73-74	
Left ear	75-76	Same as for pure tone
Binaural	77-78	
Project Number	79-80	Assigned

*Optional