Risk factors for the development of noise-induced hearing loss in Canadian Forces personnel

Sharon M. Abel

Defence R&D Canada—Toronto

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Author

Sharon M. Abel, PhD

Approved by

Keith Hendy, MEngSc

Head, Human Factors Research and Engineering

Approved for release by

K. M. Sutton

Chair, Document Review and Library Committee

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This study, approved by the Defence Research and Development Canada Human Research Ethics Committee, was conducted in conformity with the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans.

Abstract

The escalating cost of claims for noise-induced hearing loss in the Canadian Forces supports the need to review and upgrade current hearing conservation practices. A prospective study was conducted to assess risk factors for the development of hearing loss in a wide range of military trades. A total of 1,057 individuals working in land, sea and air environments contributed their current hearing test results and first hearing test results on record. They also completed a 56-item questionnaire relating to demographics, occupational and non occupational noise exposure history, training in and utilization of personal hearing protection, and factors other than noise which might affect hearing, including head injury, ear disease, medications, solvent exposure and leisure noise. Medical personnel at five participating Canadian Forces military bases in Ontario and Nova Scotia recruited the subjects, distributed the questionnaires and assessed hearing. Apparatus and protocols for the latter conformed to current clinical practice. The prevalence of moderate to severe hearing loss progressed with years of noise exposure, with hearing thresholds in those over 45 years ranging broadly from normal to over 70 dB HL. Unprotected exposure to solvents and to leisure noise appeared to be significant determinates of adverse outcome, while the effects of head injury, history of ear disease, and the use of medications were minimal. The survey suggested that training on the hazards of noise exposure and the selection and utilization of hearing protection were inadequate. Hearing protection was reported to be incompatible with other gear, uncomfortable and an impediment to communication.

Résumé

En raison de l'escalade des coûts des réclamations pour la perte d'audition due au bruit au sein des Forces canadiennes, il est nécessaire de revoir et d'améliorer les pratiques actuelles relatives à la protection de l'ouïe. Une étude prospective a été menée à des fins d'évaluation des facteurs de risque associés à la perte d'audition dans une vaste gamme de groupes professionnels militaires (GPM). En tout, 1 057 personnes travaillant en milieu terrestre, maritime ou aérien ont autorisé l'utilisation des résultats de leur dernier test auditif ainsi que du premier test auditif dans leur dossier. Ces personnes ont aussi rempli un questionnaire de 56 questions sur les sujets suivants : données démographiques, exposition professionnelle et non professionnelle au bruit dans le passé, formation concernant les protecteurs auditifs individuels, utilisation de ces protecteurs et facteurs autres que le bruit qui pourraient nuire à l'audition, dont les blessures à la tête, les maladies de l'oreille, les médicaments, l'exposition à des solvants et le bruit associé aux loisirs. Le personnel médical de cinq bases militaires participantes des Forces canadiennes de l'Ontario et de la Nouvelle-Écosse a recruté les sujets, distribué le questionnaire et évalué l'acuité auditive. Les appareils et protocoles utilisés pour cette évaluation étaient conformes à la pratique clinique actuelle. La prévalence de la perte d'audition de modérée à grave progressait avec le nombre d'années d'exposition au bruit, le seuil auditif chez les plus de 45 ans variant globalement de normal à plus de 70 dB HL. L'exposition à des solvants et l'exposition au bruit associé aux loisirs sans aucune protection semblaient être des déterminants importants d'un résultat indésirable, alors que les effets des blessures à la tête, des antécédents de maladie de l'oreille et de l'usage de médicaments étaient minimes. Il ressort du sondage que la formation concernant les dangers de l'exposition au bruit ainsi que le choix et l'utilisation des protecteurs auditifs était inadéquate. De l'avis des répondants, en plus d'être inconfortables et incompatibles avec d'autres dispositifs, les protecteurs auditifs nuisent à la communication.

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Executive summary

Statistics compiled by Veterans Affairs Canada show that claims for noise-induced hearing loss (NIHL) in the Canadian Forces have risen to well over 33 million dollars annually (2000-2001). Escalating costs prompted a review of hearing conservation practices in the Canadian Forces. A prospective cross-sectional study was carried out to assess risk factors for the development of NIHL in a wide range of military trades. Five Canadian Forces bases in Ontario and Nova Scotia participated in the investigation. All personnel who were scheduled for a routine hearing test from November 1, 2002 to October 31, 2003 were invited to volunteer. No restrictions were placed on age, gender, military trade or length of military service. Volunteers contributed the results of their current audiogram measured by base medical personnel at the time of the clinic visit, as well as the first audiogram in the clinic chart. They also completed a 56-item questionnaire concerning various risk factors for acquiring a hearing loss, which documented the subject's age, gender, previous trades, noise and solvent exposures, training in and utilization of hearing protection and respirators, and perceived hearing handicap. Subjects were also asked about their history of ear disease, head injuries, symptoms of tinnitus and dizziness, use of medications, sideline work and recreational activities. Noise dosimetry measurements were made in a small sample of individuals randomly chosen from selected trades at each base.

A total of 1,057 individuals (910 males and 147 females) working in 107 land, sea, air and shared (purple) trades participated. The majority of subjects reported that training on the dangers of noise exposure and methods of preventing hearing loss were inadequate. While they recognized the benefits of using personal hearing protection, they often found these to be incompatible with other gear, uncomfortable and an impediment to hearing and communication. Over half the sample were exposed to solvents known to potentiate NIHL. However, only a small proportion wore respiratory protective equipment. Head injury, ear disease and the use of medications that might affect hearing were rare. Subjects did participate in noisy leisure activities, which involved the use of power tools, exposure to rock music and attendance at disco/dance bars. The prevalence of moderate to severe hearing loss progressed with age, with hearing thresholds in those over 45 years ranging broadly from normal to over 70 dB HL. In this group, 20% had a high-frequency moderate to severe hearing exceeding 40 dB HL. Decrements relative to hearing thresholds at recruitment were almost twice those expected from aging alone. Solvent exposure appeared to have a relatively greater negative impact than noise on hearing. Finally, results from seventeen selected trades with 15 or more participants mirrored those of the total sample, in terms of both hearing and the responses to the questionnaire.

The findings of this investigation suggest that the current prevalence and escalation of NIHL in the Canadian Forces is due to (1) insufficient training on the hazards of noise exposure, and the selection and utilization of hearing protection, (2) problems with the wearing of hearing protection, including discomfort with extended usage, incompatibility with other gear, and difficulty communicating in noise, and (3) unprotected exposure to solvents and leisure noise. These conclusions are supported by the data, as well as by comments made by the participants. Based on the findings recommendations are made to enhance and expand the Canadian Forces hearing conservation program currently in place.

Abel, S.M. 2004. Risk factors for the development of noise-induced hearing loss in Canadian Forces personnel. DRDC Toronto ECR 2004-116, Defence Research and Development Canada—Toronto.

Sommaire

Les statistiques compilées par le ministère des Anciens Combattants révèlent que les réclamations pour la perte d'audition due au bruit au sein des Forces canadiennes ont augmenté bien au delà de 33 millions de dollars par année (2000-2001). Cette escalade des coûts justifiait un examen des pratiques de protection de l'ouïe au sein des Forces canadiennes. Une étude transversale prospective a été menée pour l'évaluation des facteurs de risque associés à la perte d'audition due au bruit chez une vaste gamme de groupes professionnels militaires (GPM). Cinq bases des Forces canadiennes de l'Ontario et de la Nouvelle-Écosse ont participé à l'enquête. Tout le personnel qui devait subir un examen auditif régulier entre le 1er novembre 2002 et le 31 octobre 2003 a été invité à se porter volontaire. Aucune restriction n'a été imposée en ce qui concerne l'âge, le sexe, le GPM ni la durée du service militaire. Les volontaires ont autorisé l'utilisation des résultats de leur dernier audiogramme effectué par le personnel médical de la base au moment de leur consultation à la clinique ainsi que ceux de leur premier audiogramme classé dans leur dossier à la clinique. Ils ont aussi rempli un questionnaire qui comportait 56 questions sur divers facteurs de risque associés à la perte d'audition et qui a permis d'obtenir des détails sur l'âge, le sexe, les GPM antérieurs, les expositions au bruit et aux solvants, la formation concernant les appareils de protection auditive et respiratoire, l'utilisation de ces appareils et la déficience auditive perçue. Les sujets ont aussi été priés de donner des détails sur leurs antécédents de maladies de l'oreille, de blessures à la tête et de symptômes tels que les acouphènes et les étourdissements, d'indiquer s'ils prenaient des médicaments et s'ils avaient un emploi secondaire et de préciser leurs activités de loisirs. Des mesures ont été prises à l'aide d'un dosimètre de bruit chez un petit échantillon de sujets choisis au hasard parmi certains GPM de chaque base.

En tout, 1 057 sujets (910 hommes et 147 femmes) de 107 GPM de la Force terrestre, de la Force maritime, de la Force aérienne ou GPM communs (force pourpre) ont participé à l'étude. La majorité des sujets ont indiqué que la formation concernant les dangers de l'exposition au bruit et les méthodes de prévention de la perte d'audition était inadéquate. Les sujets reconnaissaient les bienfaits associés au port de protecteurs auditifs individuels, mais, de l'avis de bon nombre d'entre eux, en plus d'être inconfortables et incompatibles avec d'autres dispositifs, ces protecteurs nuisaient à l'audition et à la communication. Plus de la moitié de l'échantillon avait été exposé à des solvants connus pour potentialiser la perte d'audition due au bruit. Toutefois, seule une petite proportion des sujets portait un dispositif de protection respiratoire. Les blessures à la tête, les maladies de l'oreille et l'usage de médicaments qui pouvaient nuire à l'audition étaient rares. Les sujets avaient des loisirs bruyants qui comprenaient l'utilisation d'outils électriques, l'exposition à de la musique rock et des sorties dans les discothèques et les bars. La prévalence de la perte d'audition de modérée à grave progressait avec l'âge, le seuil auditif chez les plus de 45 ans variant globalement de normal à plus de 70 dB HL. Dans ce groupe, 20 % des sujets présentaient une perte d'audition des hautes fréquences de modérée à grave avec un seuil auditif des hautes fréquences dépassant 40 dB HL. La diminution du seuil auditif par rapport au moment du recrutement était près de deux fois plus importante que celle attendue du fait du vieillissement seulement. L'exposition à des solvants semblait avoir des conséquences négatives sur l'audition relativement plus grandes que le bruit. Finalement, les résultats obtenus avec 17 GPM particuliers composés de 15 participants ou plus reflétaient ceux obtenus dans l'ensemble de l'échantillon en ce qui concerne l'audition et les réponses au questionnaire.

Les résultats de l'enquête laissent croire qu'actuellement, la prévalence et la hausse de la perte d'audition due au bruit au sein des Forces canadiennes est attribuable à 1) une formation insuffisante concernant les dangers de l'exposition au bruit ainsi que le choix et l'utilisation des protecteurs auditifs; 2) des problèmes liés au port des protecteurs auditifs, y compris l'inconfort lors d'un usage prolongé, l'incompatibilité avec d'autres dispositifs et la difficulté de communiquer en présence de bruit; et 3) l'exposition sans protection à des solvants et au bruit associé aux loisirs. Ces conclusions sont étayées par les données ainsi que par les commentaires des participants. À la suite de ces résultats, des recommandations ont été faites pour améliorer et étendre le programme de protection de l'ouïe des Forces canadiennes déjà en place.

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Introduction

The development of noise-induced hearing loss

Unprotected exposure to high-level sound results in permanent hearing loss, generally referred to as either noise-induced hearing loss (NIHL) or noise-induced permanent threshold shift (NIPTS). The magnitude of the shift relative to normal hearing thresholds will depend on a combination of factors. These include the level of the sound to which the individual has been exposed, the number of hours of exposure per day, the number of years of daily exposure, and the use of personal hearing protection. For continuous steady-state noise, it is considered safe to listen to sound levels less than 85 dBA (CSA, 2002), although in some jurisdictions 90 dBA is taken as the critical level for risk of hearing damage (NIOSH, 1988). For federal employees in Canada the limit is 87 dBA (MOL, 1991). The unit, dBA, indicates that the sound pressure level (dB SPL) has been subjected to a weighting network that de-emphasizes the low-frequency components of the sound to model subjective loudness (Tempest, 1985; Berglund and Lindvall, 1995). According to the Canadian standard for hearing protection, the risk of hearing damage will be minimal at a level of 85 dBA, if the duration of exposure does not exceed 8 hours (CSA, 2002). Based on the equal energy principal (total energy equals power times duration), the exposure duration should be halved for every 3 dB increment in level.

Noise exposures are reported to be escalating, along with the prevalence of hearing impairment (Morata, 1999). NIHL is said to be among the most prevalent work-related medical conditions in both the United States and Europe. According to a recently published survey (Franks et al., 1996), about 30 million workers in the US are exposed to potentially hazardous noise levels. Noise is considered the cause of about 30% of all cases of acquired hearing loss. Biological changes from metabolic stress and mechanical damage following noise exposure are complex and include pathology of neural, sensory, supporting and vascular cells of the peripheral end organ for hearing, i.e., the cochlea (Henderson and Hamernick, 1995; Levine et al., 1998). Research in animal models has shown that the hearing damage caused by limited exposures may be reversible, resulting in a temporary threshold shift (TTS) that gradually disappears over a number of hours of relative quiet. However, continued or repeated exposures will result in irreversible sensory hair cell loss and concomitant permanent sensorineural, predominately high tone, hearing loss (Forge, 1996).

Numerous studies conducted in industry have demonstrated that although high-level sounds to which the individual is exposed may have broad frequency spectrum, the most vulnerable frequency region for hearing loss is 4-6 kHz. This outcome reflects the natural resonance of the ear canal at 3.8 kHz and transfer function of the middle ear (Leikin et al. 2000). Hearing loss in this region is clearly evident after 3-5 years of exposure (e.g., Bauer et al., 1991; Kryter, 1991; Lutman and Spencer, 1991; Brühl et al., 1994; Pelausa et al., 1995). The hearing threshold "notch" in the audiogram in this frequency region deepens with continued exposure and hearing loss gradually spreads to lower and higher frequencies. In a survey of hydro-electric, steel-making and nickel mining industries, Abel and Haythornthwaite (1984) showed that the rate of hearing loss at 4 kHz in noise-exposed workers was on average 1.5 dB per year, compared with 0.5 dB per year in individuals with office jobs. Individual differences were large, ranging from a slight improvement in hearing to a loss of 55 dB over a 10-year period, denoting a wide range of

personal susceptibility. Similar findings have been published for automobile sheet-metal workers (Brühl et al., 1994).

Exposure to high-level impulse noise

Many researchers have argued that the equal energy principal does not apply to impulse noise. According to International standards, the risk criterion for impulse noise from small calibre weapons is an unprotected instantaneous sound pressure level of 140 dBC (essentially unweighted), without correction for the number of impulses (ISO, 1990). This criterion has been challenged in a recent NATO publication (NATO RTO, 2003) which suggests instead a sound exposure level (SEL) of 116 dBA per impulse for up to 50 impulses presented at the rate of one impulse every 5-10 sec. SEL is the level which if held constant for 1 sec would convey the same sound energy as the noise event. This value corresponds to a peak level of about 153 dBC. In comparison, the recommended level for impulses from blasts is 135 dBA, SEL per impulse at the entrance to the protected ear, for up to 100 impulses at the rate of 1 per min. The NATO document goes on to suggest that the equal energy principal may be applied in either case if the critical number of impulses is exceeded, i.e., 124 dBA, SEL (corresponds to 8 hours at 80 dBA) for impulses from small calibre weapons and 143 dBA, SEL (corresponds to 8 hours at 98.4 dBA) for impulses from blasts. A higher level is allowed for blasts because of their predominately low-frequency spectra.

High-level impulsive sounds from weapons are a particularly damaging source of noise exposure in military environments (Smoorenburg, 1982; Dancer et al., 1998). Peak levels may be as high as 185 dB SPL. Both the nature of the injury and the pattern of recovery differ substantially from that of continuous noise, comprising mechanical (structural) damage as well as metabolic stress. While the latter will begin to recover as soon as the exposure ceases, the former may not reach a maximum until several hours later (Levine et al., 1998). Studies of NIHL in animal models have shown that the assessment of risk should take into account the temporal pattern, duration, rise time, frequency spectrum, and the peak pressure of the impulse, as well as the total energy of the exposure for given noise sources (Henderson and Hamernik, 1986; Price and Kalb, 1991; Smoorenburg, 1992). Alternative methods for the modelling of damage risk have been the subject of many investigations (e.g., Clark and Brinkmann, 2000; NATO RTO, 2003). These suggest the use of an acoustic head simulator to estimate the sound pressure levels reaching the human ear and the attenuation that may be provided by various types of hearing protection devices, used alone or in combination (Dancer et al., 1999).

According to Henselman et al. (1995), a study by Walden and colleagues in the 1970's (Walden et al., 1975) of the U.S. Army hearing conservation data registry demonstrated that 20-30% of personnel with two or more years of service had clinically significant hearing loss. With fifteen or more years of service, the percentage of hearing-impaired soldiers exceeded 50%. In a more recent investigation, Bohnker et al. (2002) studied the audiograms of almost 70,000 men and women in the U.S. Navy and Marine Corps. Subjects ranged in age from 17-50 years. As expected, the prevalence of hearing loss increased with age. However, at all ages, mean values were greater than published age corrected norms. The standard deviation of measured hearing thresholds across subjects also increased with age, demonstrating an increasingly broad range of outcome, possibly reflecting wide differences in individual susceptibility. In comparing their data with historical reports, the authors could not find any evidence for an improvement in hearing conservation over time.

The effectiveness of hearing protectors for preventing NIHL from small firearms and large-calibre weapons was investigated by Christiansson and Wintzell (1993). The subjects were 204 Swedish male infantry officers, ranging in age from less than 30 to 60 years, who instructed conscripts in the use of firearms. The period of exposure ranged from 6.5 to 22.5 years. Peak exposures levels ranged between 156-185 dB SPL. Those under the age of 50 years had used hearing protection regularly. Across the sample, the maximum loss was observed at 6 kHz. By 35 years of age, the average hearing threshold at 6 kHz was 25 dB HL (hearing level, i.e., loss, relative to normal threshold) and by 45 years, 40 dB HL. The prevalence of hearing loss in spite of hearing protector usage suggested that hearing conservation programs developed for application in industrial settings may not be adequate for military trades. This is supported by a study by Fletcher and Chandler (1983) that compared hearing in military and civilian engineers. While the two groups performed virtually the same jobs, the prevalence of hearing loss was greater in the military group. The difference was attributed to exposure to weapons' noise.

The importance of analyzing between-ear differences in hearing was demonstrated by Pelausa et al. (1995). In this study, the development of NIHL was investigated in 134 Canadian Forces personnel aged 20-30 years and employed in four military trades, three of these (infantry, artillery and armour) associated with high sound levels. Hearing threshold measurements made after three years of service were compared with measurements at recruitment. The results showed that in all groups, 3% of individuals had a high-frequency hearing loss exceeding 20 dB HL on admission to the Canadian Forces. By the three-year recall the prevalence of mild-to-moderate hearing loss had increased to 21% at 6 kHz for those employed in the infantry. By comparison, data published by the International Standards Organization (ISO, 1984) indicated that only 10% of a highly screened population of 30-year old males would be expected to exceed a threshold of 16 dB HL at 6 kHz. The distribution of left ear/right ear differences in this group showed a striking trend for higher thresholds of about 10-20 dB in the left ear compared with the right that were not apparent at recruitment. Assuming that the majority of subjects were right-handed, the direction of the interaural difference in hearing within subjects is consistent with the argument that the hearing loss was the result of the use of small-calibre weapons.

Confounding factors in the measurement of NIHL

The assessment of hearing loss from occupational noise exposure may be confounded by a number of factors. Studies reported in the literature have focused on the interaction with aging, exposure to potentially ototoxic organic solvents (e.g., toluene and styrene), exposure to high-level sound from non occupational sources (i.e., leisure noise), and the use of ototoxic drugs.

Aging

The two main causes of hearing loss are aging and noise exposure. Difficulty in separating the effect of the noise arises when the attempt is made to match control and experimental groups on all but the noise exposure. Matching variables must include but are not limited to a history of ear disease, preventative measures such as the use of hearing protection, educational background and socio-economic level (Prince, 2002). Isolation of a pure aging effect is equally difficult because it is rare to find subjects who have not had some form of noise exposure (Rosenhall and Pedersen, 1995; Prince et al., 2003). In spite of these problems, several databases that describe the effects of aging on hearing that may be used as a baseline against which to judge the effects of noise

exposure have been published (e.g., Corso, 1963; Brant and Fozard, 1990). For example, the International Standards Organization provides databases for males and females who are otologically normal and highly screened for factors that may affect hearing, as well as for males and females from a typical unscreened population of an industrialized country (ISO, 1990). Many studies have been conducted with the goal of specifying the relationship between aging and noise exposure (e .g., Corso, 1976; Corso, 1980; Lutman and Spencer, 1991; Macrae, 1991; and Dobie, 1992). In the ISO standard, hearing loss is modelled as an accelerating function of age while noise-induced hearing loss is modelled as a decelerating function of the exposure duration (Dobie, 1994). It is assumed that the effects of aging and noise exposure are additive. A variable adjustment is included when the shift in hearing loss from each factor is large. Some investigators have argued that it is possible to determine the primary cause of the hearing loss, age or noise, from the configuration of the audiogram. The effects of aging start at the highest frequencies, gradually progressing to lower frequencies. In contrast, noise-induced hearing loss is first evident as a notch in the region of 3-4 kHz that deepens with continuing exposure and gradually spreads to both lower and higher frequencies (Coles et al., 2000).

Solvent exposures

The risk to hearing of inhalation of organic solvents is not well understood. Results of studies conducted in animal models (e.g., Pryor et al., 1984; Fechter et al. 1992) and human subjects (e.g., Muijser et al., 1988; Morata et al., 1993) have raised the possibility that certain aromatic hydrocarbons, particularly toluene, xylene and styrene, may be ototoxic. Pryor er al. (1984) demonstrated that rats who inhaled toluene on a daily basis for five weeks sustained a high-frequency hearing loss. Morphologic examination of the cochlea indicated a pattern of hair cell damage that was consistent with this outcome. There is ample evidence that in the workplace the combination of organic solvents and noise is pervasive. According to a survey conducted by the National Institute for Occupational Safety and Health in the U.S., occupational sectors that are implicated include agriculture, oil and gas extraction, construction, transportation, electric and gas services, automotive dealers and repair services, gasoline service stations and a wide range of manufacturing industries such as textiles, paper products, printing and publishing (Morata et al., 1994).

There is mounting evidence that noise-induced hearing loss is potentiated by exposure to organic solvents (Barregård and Axelsson, 1984; Sass-Kortsak et al., 1995). For example, Fechter et al. (2000) compared the effects on hearing in the rat of combinations of carbon monoxide and noise at various concentrations and levels, respectively. At moderate noise levels, the greater the concentration of carbon monoxide (500 ppm and above), the greater the hearing loss. At severe noise exposures, the effect of the carbon monoxide was obscured by the impact of the noise. It was also shown that the presence of carbon monoxide interfered with recovery from noise exposure during periods of silence. Outer hair cell damage in the cochlea was apparent for both solvent and noise, supporting the hypothesis of same site of injury.

Similar findings are available from human studies. Morata et al. (1993) compared pure-tone hearing thresholds in workers exposed to noise, noise and toluene, a mixture of solvents including toluene, or neither agent. The subjects had worked a minimum of one year in printing and paint manufacturing industries in Brazil. Noise levels ranged

between 88-98 dBA. Toluene exposure was beyond the recommended limit. The results indicated that, compared with the control group, the risk of hearing loss was four times greater for the noise alone group, five times greater for the solvent alone group and eleven times greater for those with combined exposures. In a more recent study of human subjects, Sliwinska-Kowalska et al. (2001) compared hearing loss in workers exposed to a either a mixture of organic solvents at concentrations below permissible levels in paint and lacquer industries, the solvents in combination with noise levels greater than 85 dBA, or neither agent. The number of years of exposure varied widely (0.5-39 years) across subjects within group. Hearing loss was defined as an elevated hearing threshold in excess of 25 dB HL at any frequency from 1-8 kHz. In the control group, the prevalence of hearing loss was 36% compared with 57.5% for solvent exposure and 61.5% for solvent plus noise exposure. Mean hearing thresholds for the noise plus solvent group were about 5 dB greater than those for the solvent alone group in the range of 2-4 kHz.

Recreational noise

There has been increasing concern in recent years about the damaging effect of high-level sound exposure during leisure activities (Clark, 1991). The sources are diverse and include amplified music at rock concerts and disco/dance bars, motorcycles, snowmobiles, firearms, power and chain saws, and impulse generating toys such as cap pistols. Levels from such sources can be in excess of 100 dBA (Axelsson et al., 1981; Clark, 1991). Axelsson et al. (1987) investigated the incidence of hearing loss in childhood. In a longitudinal study of 2,325 children, aged 7, 10 and 13 years, they found that at 13 years 16% of boys and 9% of girls had a hearing loss exceeding 20 dB HL at one or more sound frequencies in the region of 0.5 to 8 kHz. Based on the configuration of the loss, the authors concluded that the most likely cause was noise exposure. Corroborative evidence was published by Brookhauser et al. (1992). In a series of 2284 consecutive patients younger than 20 years, who had been referred to a pediatric otolaryngology/audiology clinic, 5% were diagnosed as having sensorineural hearing loss, classified as probably noise-induced based on history and audiometric configuration. The lower incidence relative to the Axelsson et al.(1987) study may be due to the elimination of cases that included a conductive hearing loss component from middle ear disease.

Several studies have assessed hearing loss in young adults in the context of medical evaluation for military recruitment. For example, in a random sample of 500 18-year old Swedish male conscripts, Axelsson et al. (1994) demonstrated a 14% prevalence of hearing loss. Hearing loss was defined as a threshold equal to or greater than 20 dB HL at any test frequency. Most often, the loss was in the region of 4-8 kHz. Seventy-nine percent of the sample reported that they listened to pop music often or very often, and 17% had attended more than 10 rock concerts. Twenty-one percent played a musical instrument. No statistically significant correlations, however, were found between any of these survey factors and hearing loss. A considerably higher prevalence of high-frequency hearing loss among young adults was reported for 18-year old Norwegian male conscripts (Borchgrevink, 1993). Prevalence was found to increase from 15% to 25% among a sample of about 30,000 individuals over a 10-year period from the early 1980's to the early 1990's. The author argued that the observed increase in prevalence reflected the increase in leisure noise, particularly rock music. This conclusion is supported by

recent evidence of hearing loss in a small sample of disc jockeys (with a mean age of 29 years) working in nightclubs (Bray et al., 2004). Across subjects, job-related noise exposure levels ranged from 98-108 dB. Subjects also regularly visited other clubs and used personal music players. Three subjects had hearing loss well in excess of published age norms and an additional four showed early signs of NIHL. Seventeen reported tinnitus.

Ototoxic medications

The effects of noise exposure may also interact with the effects of medication. Agents that result in high-frequency hearing loss include aminoglycoside antibiotics (antibacterial agents) such as kanamycin and neomycin and antineoplastic agents such as cisplatinum. The dosage will determine whether these drugs will produce hearing loss and whether they will act synergistically with noise exposure. To date, drug and noise interactions have not been studied in detail for human subjects (Humes, 1884). In a representative study of the effects on hearing of antineoplastic agents conducted by Aguilar-Markulis et al. (1981), fifty patients received an 18-24 month intravenous treatment regimen of low dose cis-dichlorodiammineplatinum once a week for six treatments, and every three weeks thereafter. Over the course of one year, 26% showed a mild loss of 10-20 dB at two frequencies, 32% showed a moderate loss of 20-40 dB at 4 or 8 kHz, and 2% a marked loss greater than 40 dB at 4 or 8 kHz. The onset of hearing loss, defined as a shift in threshold of at least 15 dB, was noted as early as 6 weeks after the start of treatment in 15% of cases, from 6 weeks to 12 months in 50%, and by the 18^{th} month in 15%. Partial recovery following treatment was demonstrated in only 26% of the sample. Cumulative dosage rather than schedule of administration appeared to be the critical factor for ototoxicity (Waters et al., 1991).

Consequences of noise exposure and NIHL

The impact of noise exposure on human health is wide-ranging and includes both auditory and non-auditory outcomes (Berglund and Lindvall, 1995). With respect to audition, studies have shown that individuals with acquired high-frequency hearing loss will have difficulty with speech understanding in noisy backgrounds (Humes, 1991; Smoorenburg, 1992). The degree of difficulty will depend on the spectrum of the noise and will be compounded in reverberant surroundings. Smoorenburg (1992), for example, studied hearing thresholds and the speech reception threshold (SRT - the level at which 50% of sentences could be repeated correctly) in quiet and in a speech spectrum noise background ranging from 35 to 80 dBA in 200 subjects with NIHL. The results showed that the SRT in quiet was related to hearing thresholds below 1 kHz and the SRT in noise to thresholds above 1 kHz. There was a significant correlation between the SRT in noise and the average pure-tone threshold at 2 kHz and 4 kHz. A noticeable handicap (decrement in SRT in noise) was apparent even when the hearing loss at these frequencies was relatively mild at 30 dB HL.

The presence of high-level background sound is also detrimental to the performance of non-auditory tasks (Abel, 1990; Kjellberg, 1990). Negative outcomes have been documented for vigilance and selective attention, sensory-motor behaviour and recall (Davies and Jones, 1985). Continuous high-level sounds exceeding damage risk criteria have also been implicated in sleep disorders (Vallet et al., 1980; Eberhardt et al., 1987; Griefahn et al., 2000), cardiovascular disease

(Kent et al, 1986) and mental health (Tarnopolski et al., 1980). Hockey and co-workers explored the effects of noise on vigilance and time-sharing tasks requiring sustained and selective attention. In one experiment (Hockey, 1970) subjects were asked to perform a tracking task (designated high priority) while detecting the presentation of lights at different spatial locations (designated low priority). When the experiment was performed in a 100 dB SPL noise background, deficits were observed for the low priority task, particularly for signals presented from peripheral positions. The effect of the noise was a reallocation of attention. In another experiment, Hamilton and Hockey (1970) studied verbal learning and memory in noise. Subjects were shown a series of slides, each with an adjective in one of the four corners. One group performed the task in relative quiet (55 dB SPL) and the other in noise (80 dB SPL). While the higher sound level did not affect the recall of the adjectives, it did result in poorer recall of the spatial location. A surprising outcome was that the noise was beneficial for ordered recall of the words. However subjects could not reorder words presented in noise for category clustering. Conclusions drawn from studies of the effects of noise on health are not clear cut (Abel, 1990). Laboratory sleep research studies conducted by Thiessen and colleagues at the National Research Council of Canada used taped traffic noise to investigate various sleep parameters, including difficulty falling asleep, alteration in the pattern of sleep stages and awakening (e.g., Thiessen, 1978; Thiessen and Lapointe, 1983). The noise varied from 35 to 80 dBA across nights and was presented periodically. As the level increased, the number of awakenings increased by 40% and the probability of a decrease to a lighter sleep stage increased by 70%. Some adaptation occurred for those subjects who continued the experiment over a longer period. There is also some evidence that high-level noise exposure may result in an increase in hypertension (Kent et al., 1986). In a study by Cantrell (1974), for example, male subjects were confined to a noisy dormitory for a period of 50 days and nights. High-frequency sounds ranging in level from 80 to 90 dB SPL were introduced periodically 24 hours a day. A rise in plasma cortisol and blood cholesterol levels were observed and persisted for at least a week after the conclusion of the experiment. Unfortunately, no controls were introduced for the possible confounding effects of lifestyle and/or general health. Research relating to noise and mental health have demonstrated that psychiatric symptoms and mental hospital admissions are more prevalent in the vicinity of airports (e.g., McLean and Tarnopolsky, 1977). These studies, like those on cardiovascular disease, have been criticized on the basis of experimental design issues (Berglund et al., 1990).

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Rationale

Recent studies conducted by Veterans Affairs Canada indicate that the cost of claims for noise-induced hearing loss have risen to well over 33 million dollars annually (2000-2001) for a labour force of about 50,000 individuals. This payout is well in excess of the approximately 20 million dollars in compensation costs cited by Workplace Safety and Insurance Board of Ontario (Vye, 2001) for a provincial labour force of about 2 million in the manufacturing, construction, agriculture and mining sectors (Statistics Canada, 2003). The Canadian Forces introduced a hearing conservation program in the 1950s (Neely, 1959). Components include noise measurement, the reduction of noise at the source where possible, education on the hazards of noise exposure, utilization of personal hearing protection and the regular monitoring of hearing. Escalating compensation costs support the need to review and upgrade current hearing conservation practices.

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Research design and methodology

Research design

Part I: Hearing assessment and survey of risk factors for NIHL

A prospective cross-sectional study was carried out at five Canadian Forces Bases, three in Ontario (Borden, Trenton and Petawawa) and two in Nova Scotia (Greenwood and Halifax). With the agreement of the base surgeons, all personnel who were scheduled for a routine hearing test from November 1, 2002 to October 31, 2003 were invited to participate. No restrictions were placed on age, gender, military trade or length of military service. The only exception was that participants had to have completed at least one year of employment in the Canadian Forces. Clinic personnel distributed Information Sheets (see Annex A) and protocols which described the study and answered questions that might be raised. Patients were advised that they were not obliged to participate and that non participation would not be recorded in personnel files or in any way affect their job status. Those who agreed to take part were asked to contribute the results of their most recent audiogram, as well as the first audiogram in the clinic chart. While preferable, the latter was not necessarily the enrolment audiogram. At least one year, however, must have elapsed between the first and current assessments.

Volunteers were also asked to complete a 56-item questionnaire concerning various risk factors for acquiring a hearing loss (see Annex B). The questionnaire was an expanded version of a survey developed and tested by Pelausa et al. (1995). It included four sections. The first asked for demographic information including the subject's age, gender, previous trades, and work-related noise exposure history. The second focused on the current work environment and included questions about noise and solvent exposures, training in and utilization of hearing protection and respirators, head injury, and perceived hearing handicap. The third questioned the subject about his/her history of ear problems, and in particular about ear infections and ear symptoms, head injuries, dizziness, and medications prescribed. The final section focused on civilian noise exposure, with special reference to recreational activities. These questions enabled the investigators to take into account various causes of any observed hearing loss, in addition to occupational noise exposure, particularly solvent exposure, head injury, ear disease, medications which might be potentially harmful to hearing, and noise during leisure activities.

Part II: Assessment of noise exposure in selected trades

So that noise exposure could be assessed objectively, eleven individuals were randomly chosen from each of 15 trades at each base by clinic personnel to wear a personal dosimeter over one full work shift. The plan was to choose trades with a previously demonstrated high risk of hearing loss and a workforce of at least 25 individuals. In practice, selection was often based on the availability and willingness of a sufficient number of individuals to participate. Dosimetry was chosen in preference to noise level measurements, so as to gain a realistic appraisal of individual cumulative noise exposure

in excess of safe levels defined by Treasury Board guidelines (the equal energy equivalent of 87 dBA over an 8-hour work shift). The shift could include movement among several sites with different types and levels of noise backgrounds. It was understood that this might result in some variation in noise exposure within each trade.

The dosimetry and hearing assessment investigations were unrelated. In general, subjects who volunteered for the dosimetry study had not participated in the hearing study in Part I above. Two contractors were employed to carry out the measurements. Human Systems Incorporated (HSI) surveyed the trades at the three CF bases in Ontario. G.W. Hearing Conservation and Civic Audiology Ltd. (HCCA) surveyed the trades at the two CF bases in Nova Scotia. The contractor spent fifteen work days at each base. As far as possible, a different trade was assessed each day. The methodology and results are described in detail in separate contract reports. Only those data which help to clarify the hearing assessments are described herein.

Subjects

The study protocols were approved by the Defence Research and Development Canada Human Research Ethics Committee. Each subject read the protocol and provided written informed consent before participating. For Part I of the study, volunteers signed Consent Form I before completing the questionnaire and having their current hearing thresholds measured (see Annex C). For Part II, volunteers selected from the targeted trade groups were given the protocol and Consent Form II immediately prior to the work shift during which the dosimetry measurements were to be made (see Annex C).

Apparatus

In Part I of the study, subjects at each of the five bases were tested individually in a sound proof booth (Eckel Industries, Model AB200). Hearing thresholds were measured using a Beltone audiometer (Model 119) and TDH-39 matched headset.

In Part II of the study, each subject was fitted with a noise dosimeter (Quest Model Q-300). The dosimeter was about the size of a cellular phone, measuring 140 x 70 x 40 mm and weighing 440 grams, and was worn on a belt or in a shirt pocket. A miniature microphone to pick up the sound was remote-wired to the dosimeter and fastened to clothing on the left shoulder by means of a small alligator clip. Time integrated measurements could be made of the wearer's sound exposure over a specified time period, as well as periodic peak levels. This information was stored in the dosimeter for later downloading and analysis.

Procedure

For Part I, as soon as the Consent Form was signed, the subject was given a copy of the questionnaire to complete. Hearing thresholds were then measured by clinic personnel once at each of seven pure tone frequencies (0.5, 1, 2, 3, 4, 6 and 8 kHz), in each ear. Thresholds were determined using the standardized method of adjustment (Yantis, 1985). The sound level was systematically increased and decreased in steps of 5 dB to find the critical value (i.e., the threshold) that separated the audible from the inaudible range. Following the hearing assessment,

the subject's file (the Consent Form, completed questionnaire, and copies of the current audiogram and first audiogram on file) were mailed to the experimenters at DRDC Toronto.

For Part II, volunteers were fitted with the personal dosimeter at the beginning of the work shift. The fitting and the removal of the device after eight hours was done by the contractor who had been trained by the experimenters. This same individual downloaded the data to a laptop computer and reset the dosimeter for subsequent measurements. Subjects were given an Activity Sheet to complete at the end of the day, detailing equipment they had used (see Annex C).

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Results

The data that accrued from Part I, hearing assessment and survey of risk factors for NIHL, were analysed first for the total sample, and subsequently for selected trades identified by military occupational codes (MOCs) for which there were at least 15 subjects. The data from Part II, dosimetry, will be discussed within the context of the second of these analyses.

The total sample

Demographics

In all, 1,057 subjects (910 males and 147 females) participated in the hearing study. The numbers contributed by each of the five CF bases ranged from 157 to 257. As shown in Table 1, the total number of military personnel currently employed at the five bases is 20,650. Given the assumption that hearing assessments are conducted at least once every five years, the population sampled would have been approximately 4,130. A comparison of the number assumed to have been sampled and the number of participants indicates that about 25% volunteered for the study. The relatively low percentage may reflect military deployment during the period of data accrual.

Table 2 shows the distribution of subjects by age category. Because there were relatively few older than 55 years, the 46-55 years and 56-65 years categories were combined for subsequent analyses. Table 3 provides summary statistics on current age, age at recruitment, total years of service and years of service in the current trade. This information indicates that for our sample, the mean age at recruitment was 20 years, just over half the subjects (55%) were aged 36-45 years at the time of this study, subjects had been employed for 19 years on average and had served in the current trade for 15 years. These data support the conclusion that for the majority of subjects, the trade (and thus likely the noise exposure profile) had not changed over the course of their military careers.

The relationship between age and number of years of military service is depicted in Figure 1. The two variables were significantly correlated ($r = +0.872$, $p<0.001$). A regression analysis applied to the data indicated that a straight line provided a good fit to the data (Daniel, 1983). Years of service (YOS) could be predicted from the equation:

$$YOS = 0.948\ AGE - 18.323 \qquad (1)$$

The assumption was made that number of years of service was an index of number of years of noise exposure. Because years of service and age were highly correlated, the decision was made to assess effects of age rather than years of service in subsequent analyses.

The gender and age distributions of the CF are shown in Annex D. The information presented indicates that the current strength of the CF is 61,415. A comparison of the sample and population distributions is given in Table 4. The gender distributions were

virtually identical with 86% males and 14% females for the sample versus 88% males and 12% females for the population, as were the percentages of non commissioned members (77%) and officers (23%). With respect to age, the sample underestimated the population by 8-11% in the two younger categories and overestimated the population by 13% and 6% in the two older categories. This may be due in part to a one year mismatch in the boundaries for the age categories.

The trades (and their associated MOCs) that were represented in the sample are listed in Table 5, separately for non-commissioned member and officers. Detailed descriptions of each trade are given for reference in Annex E. In all, there were 107. In some instances, similar trades were grouped together (e.g., MOCs 42, 83, 84) based on the work carried out. The numbers associated with each trade or trade grouping ranged from 1 to 97. A number of these trades that are know to be associated with high-level noise exposure, e.g., Infantry, Armoured and Artillery Soldiers (Pelausa et al., 1995), are poorly represented. This may have been the result of overseas deployment during the period of the study. Twenty-six trades that were not represented in the sample are listed in Table 6.

Table 7 provides a sorting of trades by military environment: Land, Sea, Air or shared by the three environments (designated Purple). Relatively quiet (control) trades in these environments are listed separately. Decisions regarding inclusion were based in part on the descriptions of the trades (see Annex E), as well as information provided by subjects in the questionnaires. Selection of control trades was based on the following criteria: more than 80% of respondents (1) answered "never" or "occasionally" to the question "Is your regular place of work noisy?" and (2) answered "no noise or "mild" to the question: "How bad is the noise usually?". As these data indicate, only 9% of the sample were not routinely exposed to noise on the job. Noisy Land, Sea, Air and Purple trades accounted for 15%, 14%, 36% and 27% of the sample, respectively.

Survey of risk factors

The distribution of responses given to each of the survey questions is presented in Tables 8 to 55, without regard to age or number of years of exposure. Corresponding tables which show the distributions of responses by age category are given in Annex F.

1. Perception of changes in hearing and noise levels in the workplace. Tables 8-10 show that 27% believe that their hearing was moderately or much worse since joining the Canadian Forces; 47% reported that their workplace is often or constantly noisy and 59% said that the noise to which they are exposed is moderate or severe.

2. Training on hearing loss prevention. Tables 11-13 indicate that the greater proportion of the sample (82%) had either received no training or one hour or less on the dangers of noise exposure. Further, 89% had received either no training or one hour or less on the proper use of hearing protection devices. Fully, 50% judged their training on the dangers associated with noise exposure as either negligible or poor quality.

3. Utilization of personal hearing protectors. Tables 14-16 support the conclusion that 80% of the sample were exposed to noise at least some of the time. While relatively

few (17%) of those exposed indicated that they never wore hearing protection devices in noise, only 42% wore these devices for more than half the work shift. In 77%, supervisors advised about the need for hearing protection either occasionally or not at all.

4. Drawbacks of hearing protector utilization. Tables 17-28 provide a synopsis of the subjects' attitudes toward the use of personal hearing protection. On the whole, the participants appeared to understand the utility of these devices. Only 19% often or definitely agreed that hearing protectors were not beneficial. However, 22% often or definitely agreed that they were uncomfortable and 50% believed that they would interfere with hearing. Only 10% felt that they would pose a danger at work. Comfort and auditory impairment, then, seem to be the major impediments to utilization.

5. Few subjects (3%) had moderate to great difficulty listening in a quiet room. By comparison, 32% experienced moderate to great difficulty in noise. Similar outcomes were observed for listening over the telephone. Subjects who had difficulty in noise were likely those with acquired hearing loss. The percentage is similar to the percentage who believed that their hearing had become worse since joining the CF. Both distance from the source (i.e., listening across a room) in noise without hearing protection and understanding orders in noise with hearing protection increased the percentage who experienced significant difficulty by about 20%.

6. Exposure to Solvents: As shown in Tables 29 and 30, over half the sample (61%) were exposed to solvents at work. Of this group, only 19% said that they wore respiratory protective equipment for more than half the work shift.

7. Head injury: The data presented in Tables 31-34 provide some information on the incidence of permanent hearing loss from a head injury sustained at work. Relatively few subjects (9%) had a history of work-related head injury. Of these, 10% complained of a moderate or severe permanent hearing loss. In one-third of these cases, both ears were affected. Only 8% of affected individuals were not satisfied with the treatment they had received.

8. Ear infections, non work related head injuries and the use of medications: As shown in Tables 35 and 36, 41% and 32% of the sample had experienced ear infections during childhood and adulthood, respectively. However, very few individuals (3% of the total sample) believed that they currently had a hearing loss from a previous ear infection. Tables 37 and 38 indicate that 12% had sustained a head injury outside of work. However, no subject had a permanent hearing loss as a result of the incident(s). Based on the data in Table 39 no subject was suffering from a permanent hearing loss as a result of medications.

9. Tinnitus and dizziness: Previous research has shown that exposure to loud sounds may result in tinnitus (noise in the head or ears) as well as hearing loss. Tinnitus accompanied by both hearing loss and dizziness may be indicative of inner ear disease (Kruger, 1988). The data in Tables 40-43 indicate that half the sample (52%) had experienced some tinnitus. Of these, 34% perceived the tinnitus to be moderate or loud, 11% experienced moderate to much interference with their ability to hear, and 3% experienced sleep disturbance often or all the time. According to Tables 44

and 45, 15% of the sample had bouts of dizziness. Of these, only 24% definitely experienced the dizziness as the perception of circling. That latter would be indicative of inner ear (vestibular) involvement. As indicated in Tables 46 and 47, the dizziness rarely interfered with work, and was rarely related to hearing loss.

10. Exposure to leisure noise: Data relating to subjects' exposure to leisure noise are given in Tables 48-51. Of the 1,057 respondents, 53% claimed that they were exposed to loud sounds during leisure activities. The most prevalent sources of those suggested to respondents were power tools (58%), rock music (28%) and disco/dance bars (16%). The number of hours of exposure ranged widely across individuals from 5 minutes to 45 hours. Long durations may have resulted from subjects' inadvertently combining work and non work related exposures in their responses. Only 30% wore hearing protection more than half the time during leisure activities, with muffs and plugs used equally often.

11. Sideline work: As shown in Table 52, relatively few subjects (8%) worked outside the military. Of these, 62% claimed that they were exposed to loud sounds during this work (Table 53). Of this latter group, 40% wore hearing protection often or all the time (Table 54). Muffs were used in preference to plugs (Table 55).

Hearing thresholds

Mean current hearing thresholds (dB HL) from 0.5 kHz to 8 kHz are given for left and right ears for each of four age categories in Table 56. A repeated measures analysis of variance (ANOVA) applied to the data from those subjects for whom results were available for all seven frequencies tested (N=948) showed significant effects of age group, ear, frequency, frequency by age group, ear by frequency and ear by frequency by age group ($p<0.001$). Post hoc pair wise comparisons using the least significant difference (LSD) test (Daniel, 1983) indicated that, averaged across frequencies, hearing thresholds for the two younger groups were no different (8 dB HL). Thresholds for both these groups were significantly lower than those observed for each of the two older groups which were significantly different from each other (13 dB vs 20 dB). Averaged across groups, thresholds increased from 8 dB HL to 18 dB HL from 0.5 kHz to 8 kHz. The difference between ears within groups at each frequency was at most 4 dB. Figures 2a and 2b show the distributions of hearing thresholds observed at 4 kHz and 6 kHz in the left and right ears by age group. For both frequencies the distributions are positively skewed toward high values, increasingly with age. These data demonstrate that, although the mean hearing thresholds were within normal limits, the percentage of individuals with moderate to severe hearing loss increased with years of service. The percentage of subjects in each of the four age categories with hearing thresholds exceeding 40 dB HL at 4 kHz and 6 kHz is presented in Figure 3. These data show that in the oldest group, approximately 17-26% had a moderate to severe hearing, a greater proportion (4-5%) in the left ear than the right at these two frequencies.

A comparison of mean enrolment and current hearing thresholds is shown in Figure 4. Analyses were based on the data from those subjects in whom the first audiogram was actually the enrolment audiogram (N=650). Results are shown separately for the four age groups. A repeated measures ANOVA applied to the data from those subjects in whom measurements were available for both ears at six frequencies from 0.5-6 kHz (N=647)

showed significant effects of age group, time of measurement, ear, and frequency ($p<0.001$); time by age group, frequency by age group, time by ear, time by frequency, and ear by frequency ($p<0.001$); time by frequency by age group, time by ear by frequency ($p<0.001$); and time by ear by age group ($p<0.04$). Differences due to the time of measurement (enrolment vs current) ranged from 1-2 dB across frequency for the 18-25 year olds, from 0-4 dB for the 26-35 year olds, from 1-8 dB for the 36-45 year olds and from 0-16 dB for the 46-55 year olds. The largest differences were observed at 4 kHz or 6 kHz.

As stated above, enrolment audiograms were available for 650 subjects (61% of the sample). Table 57 provides a listing of years of service (in five year bins) for the first available audiogram together with distributions of hearing thresholds for 4 kHz and 6 kHz for the left ear. These are the frequencies that have been shown to be most susceptible to the damaging effects of noise. Shown for comparison are the distributions of current hearing thresholds for the same number of years of service. These data are also presented graphically in Figure 5. The table shows that for the majority of subjects (84%) the first audiogram was measured within the first five years. In these individuals, 90% had hearing thresholds less than 20 dB HL at 4 kHz and 78% had hearing thresholds less than 20 dB HL at 6 kHz. Regardless of whether the first or current audiogram is examined, the proportion with no more than a mild hearing loss of less than 30 dB HL at these two frequencies remains above 85% over the 20 years of service, or in terms of age, until the mid 40's. Steep declines are then evident.

Because a relatively high proportion of subjects had indicated that they had been exposed to solvents, a comparison was made of hearing thresholds in those individuals with and without solvent exposure, who had or had not been exposed to noise. A subject was defined as solvent exposed only if he/she had responded in the affirmative on the questionnaire and 80% or more of the individuals in his/her trade said that they had been exposed. In all, 398 subjects met these criteria. A subject was defined as not exposed to solvents if he/she had responded negatively on the questionnaire and if less than 20% of the those in his/her trade had responded that they had been exposed. In all, 147 subjects met these criteria. From these groups a further selection was made of subjects who had been (1) exposed to noise "often or constantly" and the severity of the noise was "moderate or severe" and (2) those who were "never or occasionally" exposed to noise and the noise was "no noise" or mild", using the responses to the questionnaire. Table 58 shows the number of subjects in each trade (n_{moc}) along with the number exposed to solvents (n_{exp}). Table 59 shows the numbers of subjects satisfying the conditions defined above for each of the four combinations of solvent and noise exposure. Mean hearing thresholds plotted as a function of frequency for subjects in each of the four cells are presented in Figure 6 for subjects aged 36-45 and 46-65 years. A comparison of the data indicates that solvents have a relatively greater negative impact than noise on hearing thresholds, particularly in the high frequencies above 3 kHz. The difference increases with age (years of exposure). An ANOVA was not applied to these data because of the wide difference in numbers of subjects in each of the four conditions.

Selected trades

Demographics

Trades that had fifteen or more subjects were selected for individual consideration. These are listed in Table 60. These trades account for 667 subjects or 63% of the entire sample of 1,057. A review of the current age, years of service and years in current trade indicates that, in general, the trades were comparable. That is, the mean age ranged from 35 to 43 years and the mean total years of service ranged from 13 to 24 years. In contrast, the mean number of years in the current trade was somewhat broader, ranging from 7 to 22 years. In most trades, the mean numbers of years in service and years in the current trade were virtually identical, i.e., they differed by 6 years at most. The exceptions were the flight engineers (11 years) and aircraft structures technicians (12 years). Further review indicated that the large differences in these cases were attributable to the fact that virtually all of the individuals in these two trades had previously worked in an engineering technical trade (e.g., Aero Engineering Technician, Airframe Technician or Instrument Electronics Technician). These may have been approved prerequisites. Thus, on balance, it seems safe to conclude that the noise exposure had not changed substantially throughout the individual's career.

Survey of risk factors

Comparisons of the distributions of responses given to each of the survey questions for the 17 selected trades are presented in Tables 61-108. In these tables, the data have been averaged across age categories.

1. Perception of changes in hearing and noise levels in the workplace. Tables 61-63 show that in about half the trades selected 25% or more believed that their hearing was moderately or much worse since joining the Canadian Forces. Only the Medical Technicians and Military Police had fewer than 20% in these response categories. Trades groups in which more than 50% responded that their workplace was often or constantly noisy included Flight Engineers, Air Navigators, Pilots, Vehicle Technicians, Aviation and Avionics Technicians, Aircraft Structures Technicians, Cooks and Traffic Technicians. More than 40% of Flight Engineers, Air Navigators and Aircraft Structures Technicians said that the noise was severe.

2. Training on hearing loss prevention. Tables 64-66 indicate that, with the exception of Aircraft Structures Technicians, 68% or more of the subjects in each trade had either received no training or one hour or less on the dangers of noise exposure. Further, more than 75% in every trade had received either no training or one hour or less on the proper use of hearing protection devices. Regardless of trade, fewer than 13% judged their training on the dangers associated with noise exposure to be good.

3. Utilization of personal hearing protectors. Tables 67-69 support the conclusion that except for Military Police, Resource Management Support Clerks and Cooks, at least 65% of individuals in each trade group were exposed to noise. Except for these trades, generally subjects said that they wore hearing protectors in noise. However,

in only three trades, Flight Engineers, Air Navigators and Pilots, did more than 50% wear these devices for a full work shift. In only Infantry Soldiers and Aircraft Structures Technicians were more than 40% often or constantly reminded by their supervisors to wear hearing protection.

4. Drawbacks of hearing protector utilization. Tables 70-81 provide information on subjects' attitudes toward the use of personal hearing protectors. Across trades, only 0-28% often or definitely agreed that hearing protection devices would not be beneficial. However, 25% or more of Flight Engineers, Pilots, Marine Surface and Subsurface personnel, Medical Technicians, Cooks, Supply Technicians and Traffic Technicians often or definitely agreed that they were uncomfortable, and 40% or more of all trades but Air Navigators and Pilots often or definitely agreed that they would interfere with hearing. As well, Cooks (48%), Infantry Soldiers (28%) and Mobile Support Equipment Operators (24%) felt that they would often or definitely pose a danger at work.

   In every trade selected, the majority of subjects (more than 70%) did not experience difficulty listening in a quiet room without protectors. The presence of noise resulted in moderate to great difficulty in more than 40% of Infantry Soldiers, Signal Operators, Vehicle Technicians and Supply Technicians. In well over half the selected trades (11 of 17), more than 40% of subjects experienced moderate or great difficulty when answering the telephone in a noisy room. As for the total sample, in every trade distance from the source (i.e., listening across a room) and the use of hearing protection increased the percentage who experienced significant difficulty.

5. Exposure to Solvents: As shown in Tables 82 and 83 over half the sample (60% or more) in all trades except Air Navigators, Pilots, Military Police, Resource Management Support Clerks, Cooks, Supply Technicians and Traffic Technicians were exposed to solvents. For the exposed subjects in each group, with the exception of the Aircraft Structures Technicians, the greater proportion (more than 70%) either did not wear respiratory equipment or did so for less than half the work shift.

6. Head injury: The data presented in Tables 84-87 relate to hearing loss from head injury. Across the selected trades only the Infantry Soldiers, Vehicle Technicians, and Medical Technicians reported more than a 15% incidence of head injury at work. Of the 61 affected individuals in these trades, only 6 had more than a mild permanent hearing loss from the accident.

7. Ear infections, non work related head injuries and the use of medications: As shown in Tables 88 and 89, at least 30% of the individuals in each trade had experienced ear infections in either childhood or adulthood. Across trades, only 7 individuals had more than a mild permanent hearing loss as a result.

   Tables 90 and 91 indicate that head injuries outside of work occurred in more than 25% of the group for only Infantry Soldiers, Marine Surface and Subsurface personnel and Medical Technicians. There were no reported cases of permanent hearing loss.

The data in Table 92 support the conclusion that no subject in any trade group was suffering from a permanent hearing loss as a result of medications.

8. Tinnitus and dizziness: The data in Tables 93-96 indicate that with the exception of Flight Engineers, less than 20% of each trade group believed that they experienced tinnitus often or constantly. In all those who experienced tinnitus in each trade, the tinnitus was perceived to cause moderate to much interference in less than 25% of the group, and often or constant sleep disturbance in less than 20% of the group. As shown in Tables 97-100, less than 6% of any group experienced dizziness often or all the time. Of those who experienced any, this symptom was definitely felt as the perception of circling in more than 40% in only Medical Technicians, Mobile Support Equipment Operators and Cooks. Dizziness rarely interfered with work or was related to hearing.

9. Exposure to leisure noise: Data relating to subjects' exposure to leisure noise are given in Tables 101-104. As in the case of the total sample, at least half the individuals in each trade had been exposed to leisure noise some of the time. The notable exception were Medical Technicians, Military Police and Cooks. In most trades the most likely source was power tools, followed by rock music. Except for Infantry Soldiers less than 50% in each trade wore hearing protection more than half the time during these exposures.

10. Sideline work: As shown in Table 105, relatively few subjects in each trade worked outside the military. With a few exceptions, those who engaged in sideline work did so occasionally. For those who did work outside the military in each trade, 50% or more were exposed to loud sounds often or all the time only in Air Navigators and Vehicle Technicians (Table 106). The numbers were too small to allow an assessment of hearing protector utilization (Tables 107 and 108).

Hearing Thresholds

Figure 7 compares mean hearing thresholds by trade for 427 subjects for whom an enrolment audiogram was available. Data are presented only for subjects in the 36-45 year old age category, which contained the majority and those trades with a least 7 in this age range. The effect of trade could not evaluated statistically because of the wide difference in numbers of subjects, 7-41. Visual inspection of the data for 4 kHz suggested that Air Navigators and Resource Management Support Clerks sustained the smallest change in hearing from enrolment (3-4 dB) while Infantry Soldiers sustained the greatest change (13 dB). The prevalence of various categories of hearing loss from normal to severe at both 4 kHz and 6 kHz for the left and right ears in the 36-45 year olds is detailed in Tables 1091a-d. These data show that for the most part subjects had no more than a mild hearing loss. Figure 8 provides a display of subjects in each of the selected trades with moderate to severe hearing loss exceeding 40 dB HL at 4 kHz and 6 kHz, ordered by prevalence. The data plotted indicate that the trades in which 15% or more of subjects had sustained a moderate to severe hearing loss were Flight Engineers (left ear at 4 kHz and right and left ears at 6 kHz), Signal Operators (left ear at 6 kHz) and Cooks (left ear at 6 kHz). In Figure 9, the cumulative percentages associated with hearing thresholds ranging from 90 dB HL (deafness) to –10 dB HL (normal hearing) are displayed for these particular trades for four frequencies, 0.5 kHz, 2 kHz, 4 kHz and 6

kHz, for all subjects in the selected trade, without respect to age. Mid-frequency (2 kHz) hearing thresholds have been shown to be a good predictor of speech understanding. Since thresholds at this frequency are no more than mildly elevated (no more than 40 dB HL), it is not expected that subjects would have difficulty with speech understanding in quiet. This outcome is in contrast to the higher frequencies, 4 kHz and 6 kHz, where moderate to severe hearing loss is more prevalent.

The relationship between dosimetry measurements and hearing loss within trade.

Noise dosimetry measurements were made in sixteen of the seventeen selected trades, in seven trades by both contractors (see Table 110). Average sound levels were chosen as a basis for comparison of exposures across trades. As detailed in Table 111, these ranged from 72.2 dBA (Medical Technicians) to 90.7 dBA (Pilots). A comparison of the average sound levels in each trade with the percentage of subjects who said that the their workplace was often or constantly noisy and percentage who said that the noise was moderate to severe is shown in Figure 10. As can be seen from these plots, there does not appear to be a one-to-one relationship between the physical measurement of sound and the perceptual indices of exposure.

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Discussion

This investigation was carried out to explore risk factors for the development of noise-induced hearing loss in Canadian military trades. Although numerous studies in the literature have explored both the development and methods for the prevention of hearing loss from noise exposure in both industrial and military settings, the prevalence of noise-induced hearing loss continues to rise in industrialized countries (Morata, 1999). The Canadian Forces initiated a hearing conservation program in the 1950s (Neely, 1959). Program components include noise measurement, the reduction of noise at source where possible (i.e., through engineering controls), education on the hazards of noise exposure, the utilization of personal hearing protectors, and regular monitoring of hearing. In spite of these safeguards, the cost of claims has risen to well over 33 million dollars annually (2000-2001). With the objective of uncovering possible oversights in the implementation of the program, the attempt was made in the present study to document pre-disposing risk factors and to assess the development of hearing loss in a wide range of land, sea, and air trades. A cross-sectional study design was used. Current and first available hearing test results were compared within individuals who had been scheduled for a routine hearing test and who had agreed to participate in the study. These subjects were then stratified by age and MOC. Subjects were also asked to provide information on diverse factors including age, gender, number of years of military service, history of trades, perceived change in hearing, training on the risks associated with noise exposure and methods of conserving hearing, as well as occupational and non occupational noise exposure, solvent exposure, use of protective gear, head injury, hearing health history and use of ototoxic medications.

The number of volunteers were fewer than expected. Approximately 25% of those who would have been scheduled for a routine hearing test agreed to participate. This estimate would be in error to the extent that clinic visits were precluded by overseas deployment. Nontheless, the male/female and non commissioned member/officer distributions closely matched that of the population of the Canadian Forces. Under and over estimations of each of the four age categories studied were about 10% on average. Across the sample of 1,057 subjects, 107 out of a possible 133 current military trades were sampled: 20 Land, 20 Sea, 15 Air, 23 Purple, and 29 Control. In only 17 trades, however, were there sufficient subjects for independent analysis. Of these only one (Medical Technicians) might be considered a quiet trade. The hearing threshold and survey data were analysed first for the total sample and subsequently for each of the 17 trades. Differences due to gender (male versus female) and rank (non commissioned member versus officer) were not evaluated because of the relatively large difference in numbers of individuals that would be compared. Because of the high correlation between number of years of service and age, the significance of only the latter variable was assessed. This approach had the advantage of allowing for the comparison of outcomes with International standards (see below).

The responses to the survey confirmed that noise was a concern for about one-half the total sample. Close to one-third perceived that their hearing had deteriorated over the term of their employment. Yet training on the hazards of noise exposure and methods of preventing hearing loss, as well as consistent use of personal hearing protectors was poor. Supervisors rarely reminded personnel about the latter. Most subjects believed that hearing protection was beneficial, and relatively few felt that these devices might pose a danger at work. Rather, discomfort and to a greater degree the belief that the wearing of hearing protection might interfere with hearing, were issues of concern. This was supported by the observation that 48% reported

moderate to great difficulty understanding orders in a noisy room while wearing hearing protection.

Other risk factors for hearing loss that were considered were solvent exposure, head injury, ear infections, the use of ototoxic medications and exposure to noise during side line work or leisure. Well over half the sample (61%) said that they were exposed to solvents at work. Few (less than 20%) wore respirators. As detailed in the review of the literature, there is ample evidence that exposure to solvents alone or in combination with noise will result in hearing loss through injury to the inner ear (Fechter et al., 2000; Sliwinska-Kowalska et al., 2001). By comparison, the percentages of subjects who had sustained a head injury, suffered ear disease or used medications that might affect hearing were relatively small. Although a fair number reported that they suffered bouts of dizziness (15%) and/or tinnitus (52%), symptoms that may be indicative of inner ear pathology, there appeared to be little concern that these interfered with hearing, the ability to work or sleep. Few subjects (8%) were engaged in sideline work, noisy or quiet, but at least half participated in noisy leisure activities. The most likely sources of noise were power tools, rock music and disc/dance bars. This finding is in line with earlier reports (e.g., Pelausa et al., 1995; Bray et al., 2004).

Analysis of the audiometric data confirmed subjects' perceptions that their hearing had deteriorated over time. While mean current thresholds were no greater than 35 dB HL across the frequency range examined, the distributions of results across subjects at each frequency were positively skewed to higher values. At the most susceptible frequencies for NIHL, 4 kHz and 6 kHz, a hearing loss in excess of 20 dB was evident in approximately 15% of the youngest group (16-25 years). By mid-life (45 years and older) that proportion had increased to 60%, with 20% showing a moderate to severe hearing loss exceeding 40 dB HL. Norms published for otologically normal persons (ISO, 1984) show that the change in hearing over the age range studied should be no greater than 10 dB for 50% of the population at these frequencies. Changes in mean hearing thresholds between the youngest and oldest groups in the present study were 16 dB and 18 dB, respectively at 4 kHz and 6 kHz. A cursory comparison of the effects of solvent and noise exposure either alone or in combination suggested that the solvents might be the more hazardous agent. In 46-65 year olds, hearing thresholds at 3-8 kHz were relatively higher for those subjects exposed to either solvents or solvents in combination with noise than for those not exposed to solvents, with or without noise as a factor.

In only 17 of the 107 trades represented in the sample were the numbers of subjects judged sufficient for independent consideration. They ranged widely from Cooks and Medical Technicians to Infantry Soldiers and Pilots, and accounted for 63% of the total sample. The demographics of subjects in each trade mirrored those of the larger group. Analysis of the survey data showed that the perception that the workplace was noisy was not confined to trades for a particular environment, and was as likely to be reported by Cooks as Pilots or Vehicle Technicians. Generally, the noise was found to be severe by the air trades. Except for Aircraft Structure Technicians, training on hearing loss prevention was considered poor. In only Flight Engineers, Air Navigators, Pilots and Traffic Technicians were a relatively high proportion of individuals likely to wear hearing protection for a full work shift. In only a few trades were hearing protectors not considered beneficial. Only the Cooks, Infantry Soldiers and Mobile Support Equipment Operators thought they might pose a danger. A significant proportion in all trades thought they would interfere with hearing. More than half the subjects in 11 of the 17 trades were exposed to solvents and, in each, the use of respirators was not common practice. As for the total sample, permanent hearing loss from head injury, ear infections and the use of

medications was rare. Tinnitus and dizziness did not interfere with hearing or the performance of work-related tasks.

With respect to changes in hearing, by 36-45 years by age, across the sampled trades, the Infantry Soldiers had sustained the greatest average elevation in hearing threshold at 4 kHz in the left ear. Sampled trades in which 15% or more subjects in this age category had a moderate to severe hearing loss of 40 dB or more in one or other ear at either 4 kHz or 6 kHz included Flight Engineers, Signal Operators, and Cooks. Hearing thresholds would be expected to increase for the oldest age category. Unfortunately, the numbers of subjects available in each trade were not sufficient to extend this analysis. It is of importance to note that the three trades of those sampled that appeared to be at greatest risk did not have the highest average sound levels as determined in the dosimetry studies nor did rankings of perceived severity of the noise across trades correspond with the ranking of average sound level. This mismatch may have been due in part to the fact that the dosimetry measurements may not have been made during typical field operations.

While the results discussed above provide some clues as to some of the underlying factors responsible for the escalating burden of noise-induced hearing loss in the Canadian Forces, the comments made by the participants themselves underscore the main problems dramatically. Each subject was invited to include comments at the end of the survey about any aspect of the study or their experiences that might be relevant to the investigation. A representative selection of what they said follows.

Aviation Technician: "I've worked on flight line on four different bases…I have made significant efforts to protect my hearing….but the loud screeching sound of turbines and turbine engines still come through…"

Mobile Support Equipment Operator: "As an MSE OP, certain vehicles are very loud inside and as an instructor I am unable to wear hearing protection."

Pilot: "I have 4800 hours on the C130 Hercules and the headset that I'm issued to wear is the same one I was issued in 1989. There are much better ones available and studies seem to come and go, but never end positively with new headsets."

Aviation Technician: "Engine run-ups are extremely loud. It is what causes ringing in my ears. I wear ear plugs and a communications headset, but it doesn't really matter."

Military Police: "…chain of command would not supply proper comms equipment and despite several requests still have not."

Director of Music: "The noise levels during a full band rehearsal are often quite loud…….In order to hear each other, most musicians cannot wear ear defenders."

Aviation Technician: "…inside the hanger 99.8% of the personnel are not wearing hearing protection and concurrent activities…are being carried out outside the hanger which are damaging their hearing abilities."

Traffic Technician: "As it's nearly impossible to carry out a conversation in the back of the aircraft without removing one side of the headset, this practice was and is still common practice amongst in flight check personnel."

Medical Technician: "Spent most of my military in field units. Most of my noise exposure was with Army units."

Signal Operator: "Monitoring multiple radios plus telephones makes it almost impossible to wear protective equipment. HF radio systems are particularly noisy."

Medical Technician: "…ear protection is never worn during a stand-to or mock attack."

Supply Technician: "…they offer cheap off the shelf, tube yellow ear plugs that are ineffective and don't stay in due to their shape."

Marine Engineering Technician: "Sea training use of 'thunder flash" (loud bang) is harmful if too close and without warning."

Naval Communicator: "The initial 15 years of going to sea involved noise at levels higher than tolerable. Ignorance toward noise and its effects resulted in my hearing loss….."

Pilot: "CC130 Hercules Aircraft recently underwent an avionics upgrade. The intercom systems and radios are full of static and very noisy. Very difficult to distinguish instructions without volume turned up."

Aviation Technician: "I have had trouble wearing earmuffs in winter with a toque."

Search and Rescue Technician: "I do not wear foam ear plugs due to comfort issues."

Conclusions

The results of this investigation lead to the conclusion that the prevalence and escalation of noise-induced hearing loss in the Canadian Forces is due to:

1. Insufficient training the hazards of noise exposure, hearing protection selection and hearing protector utilization.

2. Problems with hearing protection use including discomfort with extended usage, incompatibility with gear, and difficulty communicating in noise.

3. Unprotected exposure to solvents and leisure noise.

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Recommendations

1. Comments made by subjects support the creation of end-user focus groups for high-risk trades to capture the impact of hearing conservation programs and practices currently in place on individual workers. Previous studies have shown that these may be used to advantage to supplement and clarify both audiometric and structured survey data (Prince et al., 2004). Individual users of personal hearing protection and their supervisors could use these sessions to provide insight into problems with the utilization of hearing protection.

2. Tailored intervention studies should be conducted to determine the type of hearing protection that would be suitable for individual users in each trade (Lusk et al., 2003). In particular, the utility of implementing newer hearing protector technologies should be assessed in field studies. Special consideration should be given to both the type of noise and the level of noise to which personnel are exposed, communication capability, comfort and compatibility with other gear (Dancer et al, 1999; Abel et al., 2000).

3. Training on the hazards of noise exposure (both occupational and non occupational) must be mandatory for all CF personnel at recruitment and with each new posting. These lectures must include instruction on the proper fitting of the hearing protection that will be used on the job, as well as periodic monitoring to ensure maximum effectiveness.

4. Strategies for hearing loss prevention must include active surveillance of hearing protection practices by supervisors and flagging by clinical personnel of changes in hearing that exceed strictly defined criteria, immediate and appropriate intervention, and an evaluation of the effectiveness of the intervention (Helfer et al., 2000).

5. Steps must be taken to control solvent exposures. Although few studies have explored dose response relationships in human subjects, it is clear from the results available that solvents alone or in combination will result in cochlear pathology. The data available demonstrates clearly that even if solvent concentrations meet the criteria set out in regulatory guidelines, they may nonetheless potentiate noise-induced hearing loss (Sliwinska-Kowalska et al., 2001). Education on the risks of solvent exposure and training on the use of respiratory equipment should be mandatory for all personnel.

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Figures

Figure 1

The Relationship Between Age and Years of Service (N = 1057)

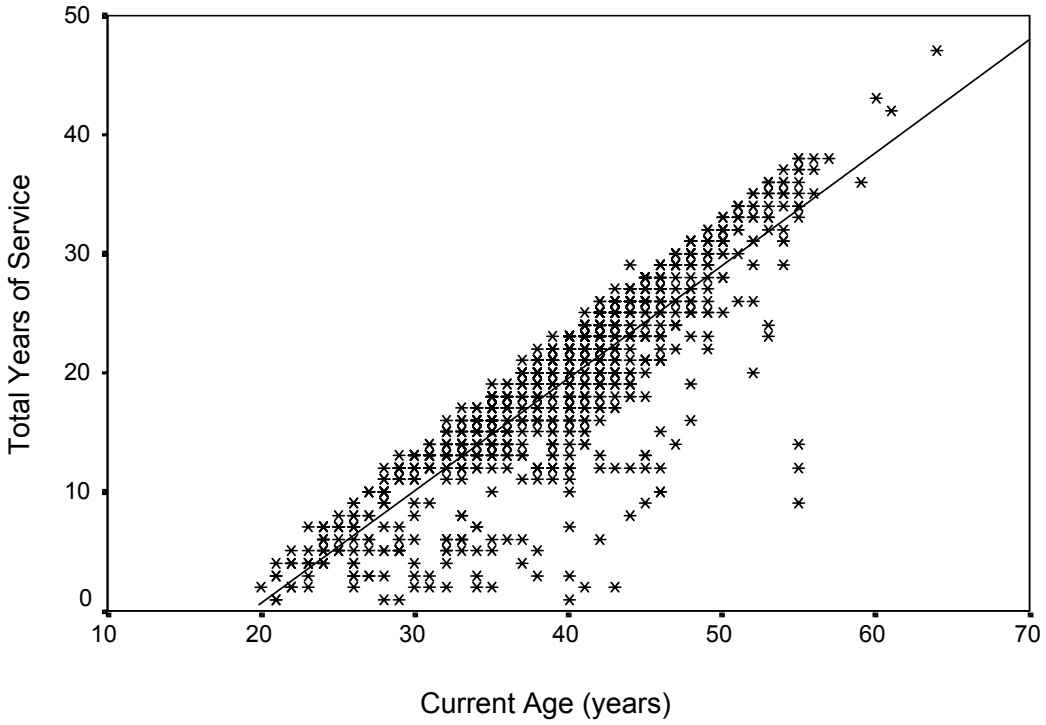
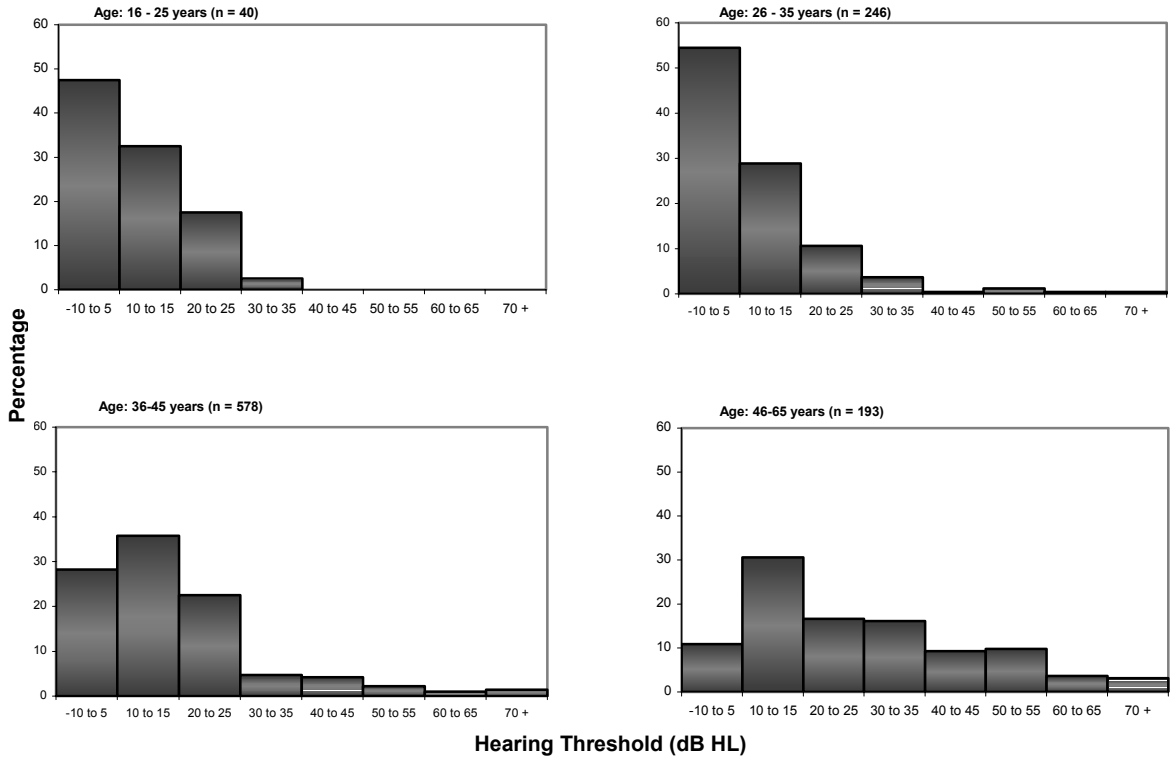


Figure 2a

The Distribution of Current Hearing Thresholds (dB HL) for Four Age Groups (N = 1057). Results for 4 kHz.

Left Ear - 4 kHz



Right Ear - 4 kHz

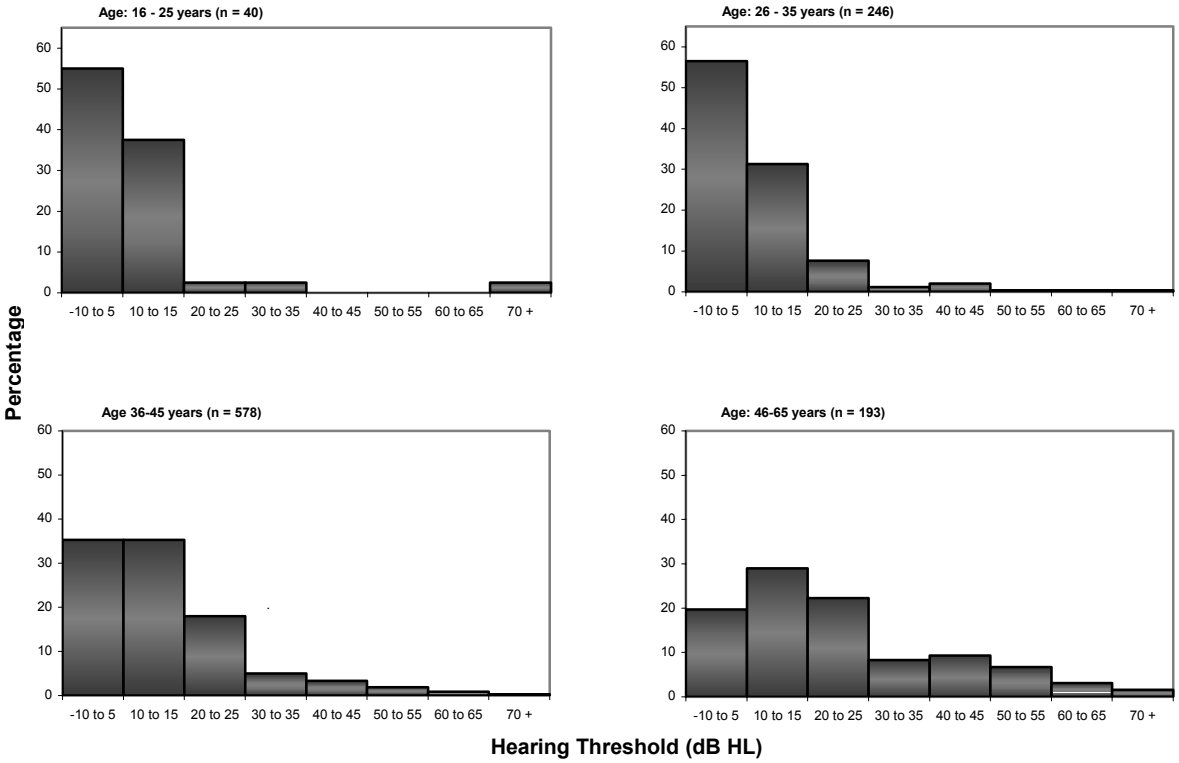
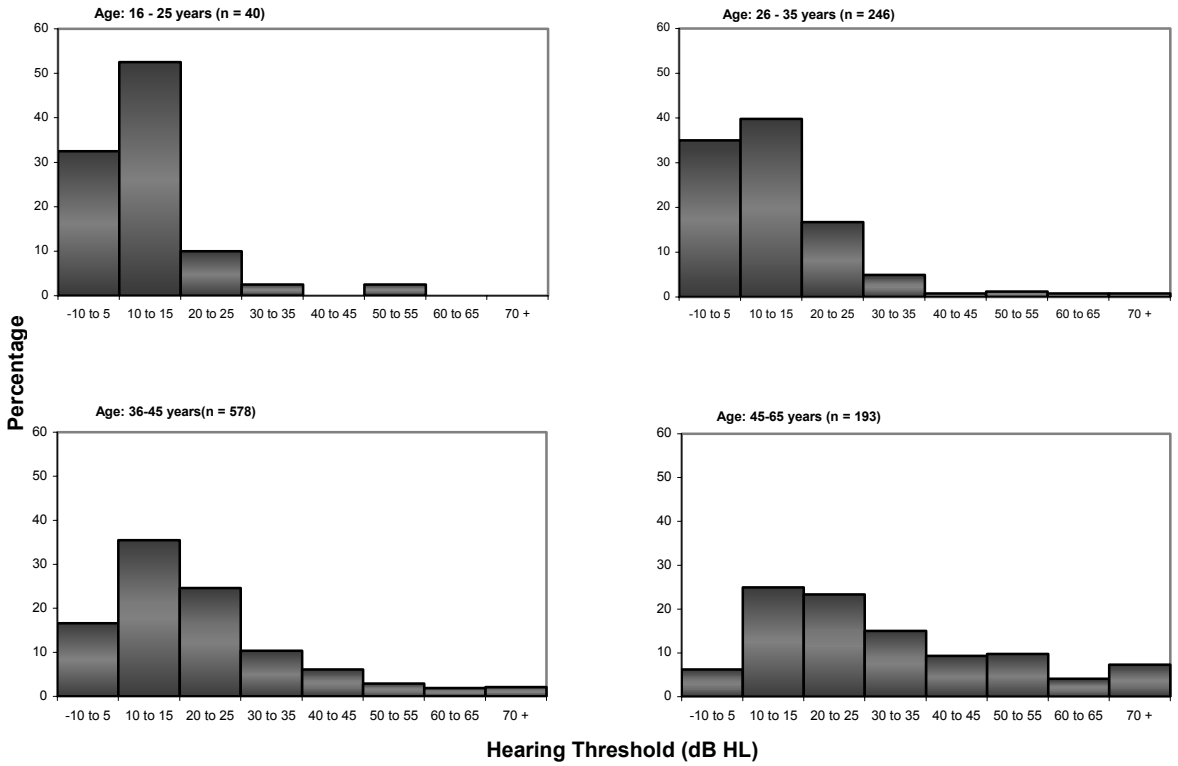


Figure 2b

The Distribution of Current Hearing Thresholds (dB HL) for Four Age Groups (N = 1057). Results for 6 kHz.

Left Ear - 6 kHz



Right Ear - 6 kHz

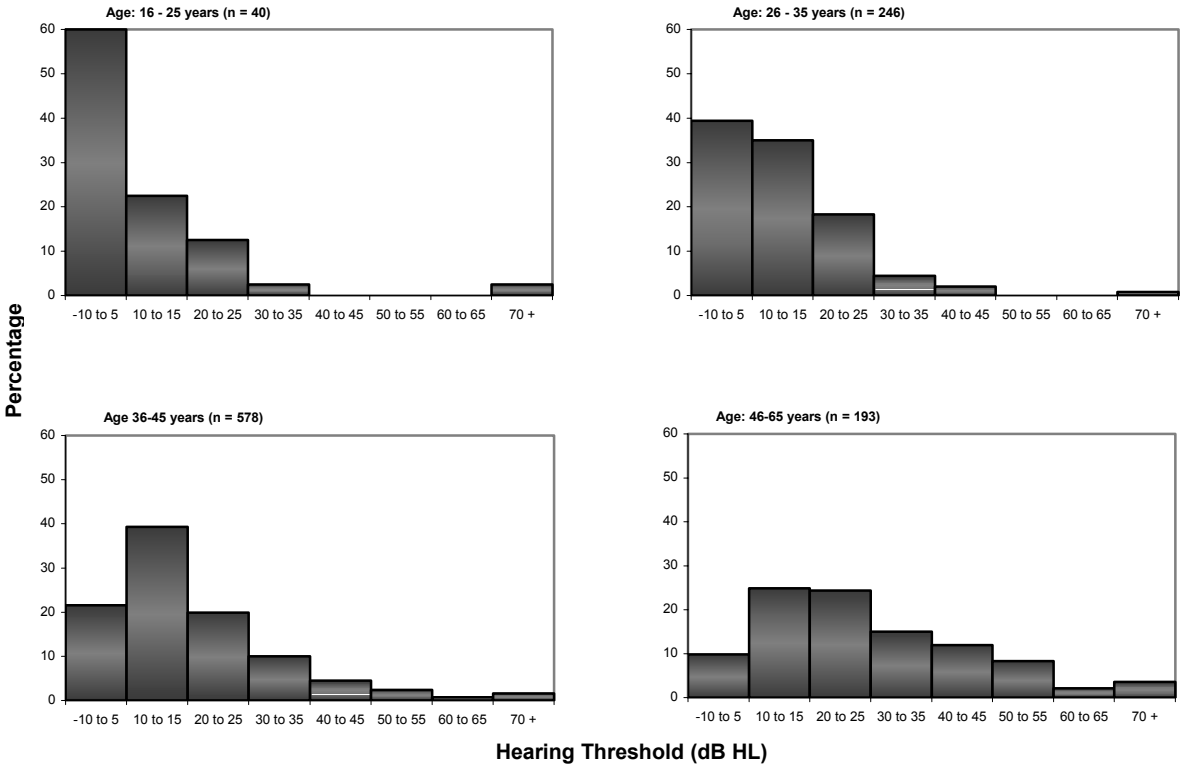


Figure 3

The Relationship Between Age Group and the Prevalence of Current Moderate to Severe Hearing Loss at 4 and 6 kHz (N = 1057)

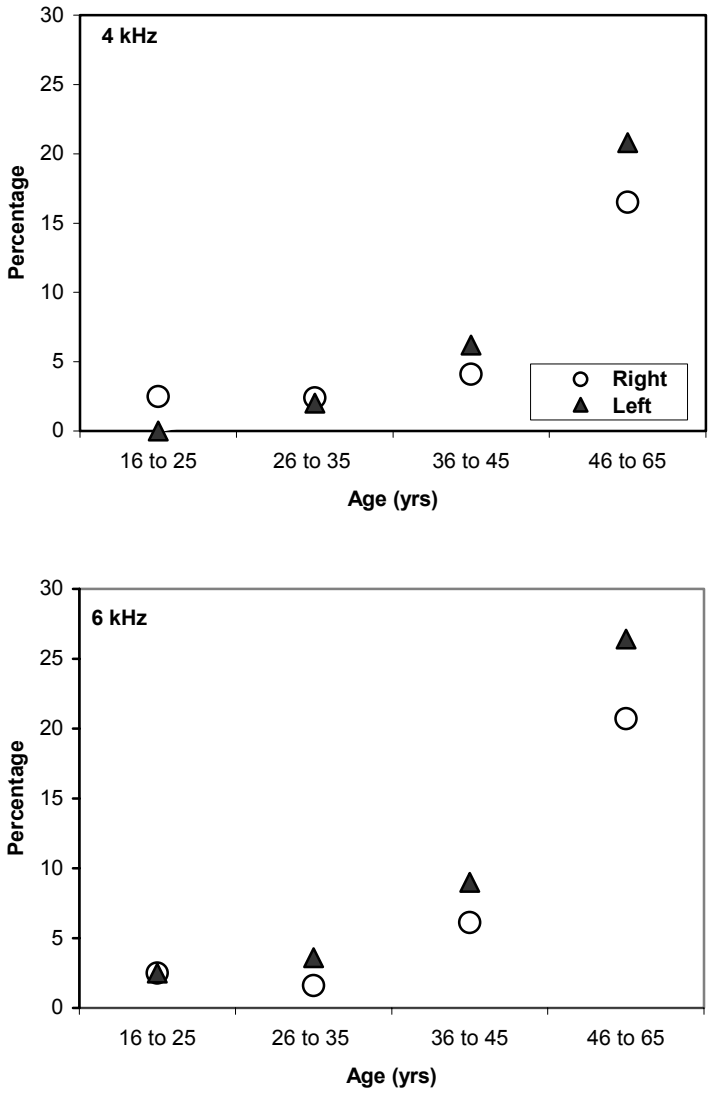
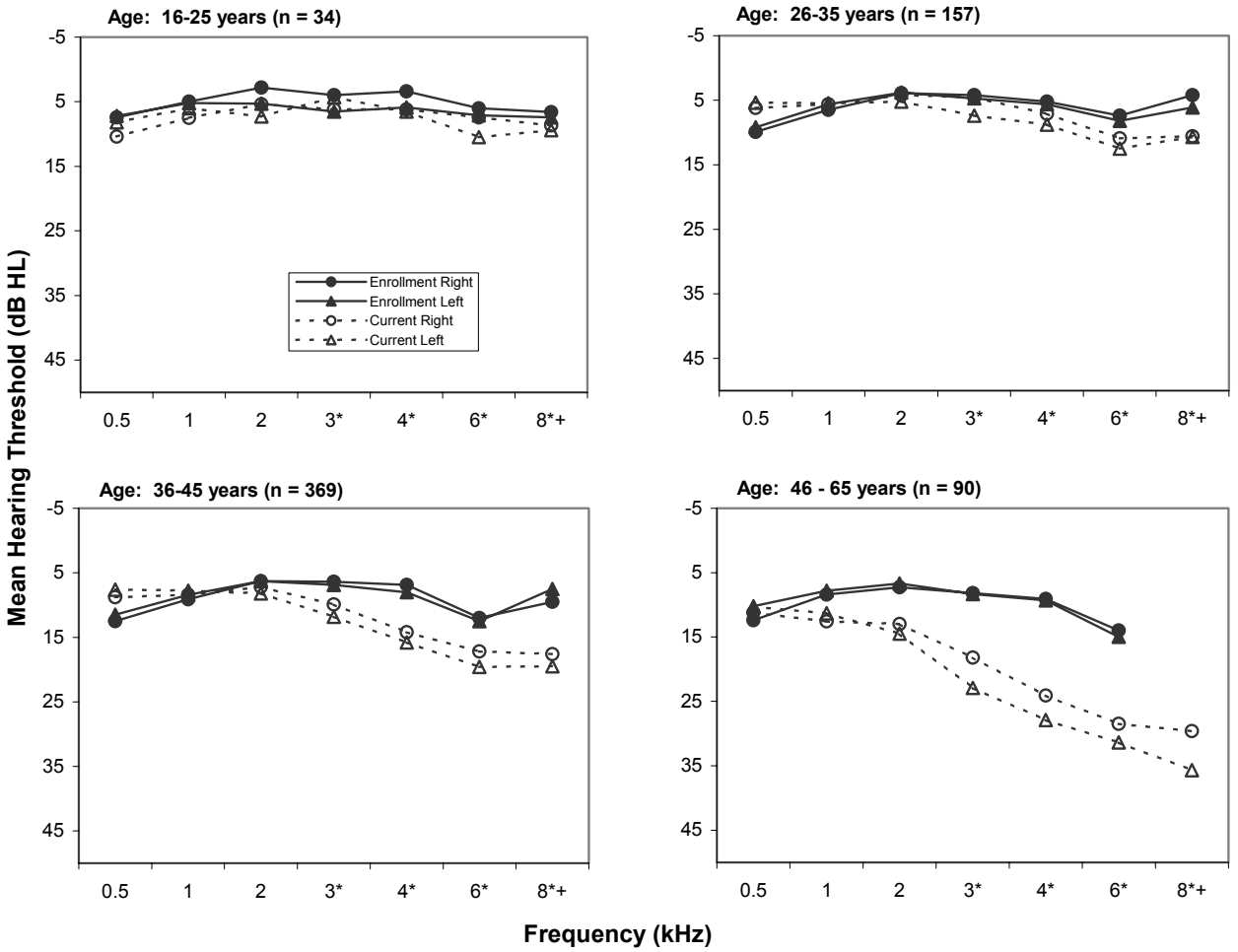


Figure 4

Enrolment and Current Hearing Thresholds (dB HL) for Four Age Groups: Cases with an enrolment audiogram (n = 650)

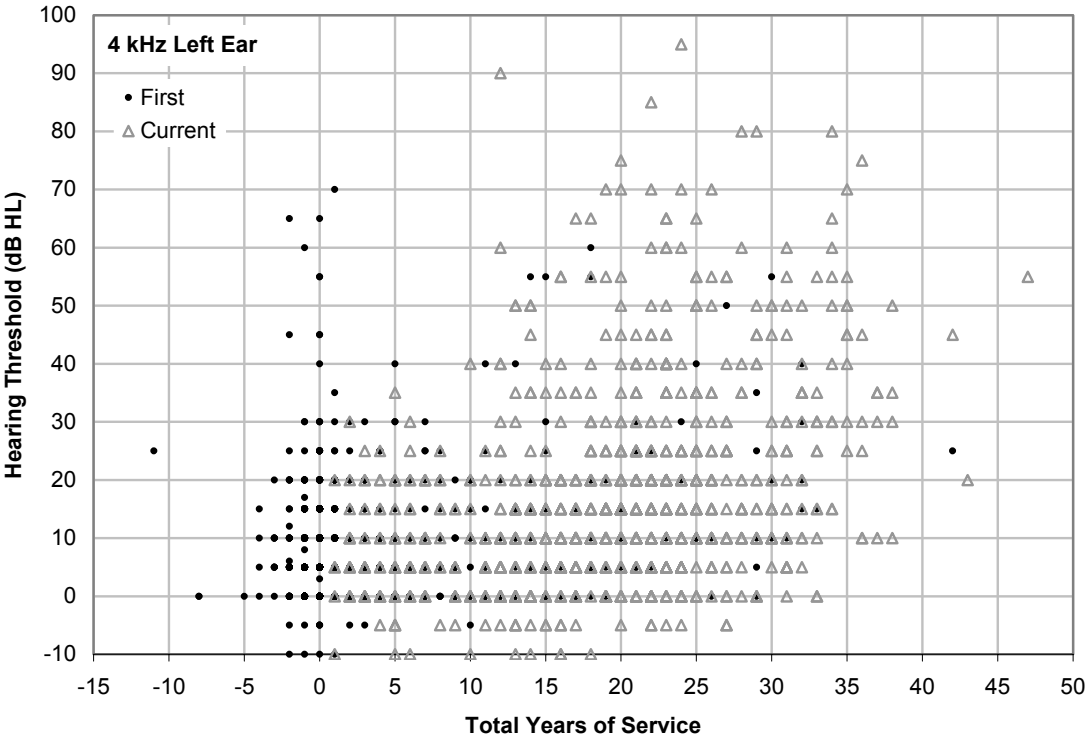


* n for Enrolment 3 kHz: 26–35=156; 4 kHz: 36–45=368, 46–65=89, 6 kHz: 26-35=156, 36–45=368, 46-65=89

*+ n for 8 kHz Enrolment: 16–25=22, 26–35=36, 36–45=10, 46-65=1; Current: 16–25=26; 26–35=157; 36–45=369; 46-65=81

Figure 5

First Available and Current Hearing Thresholds



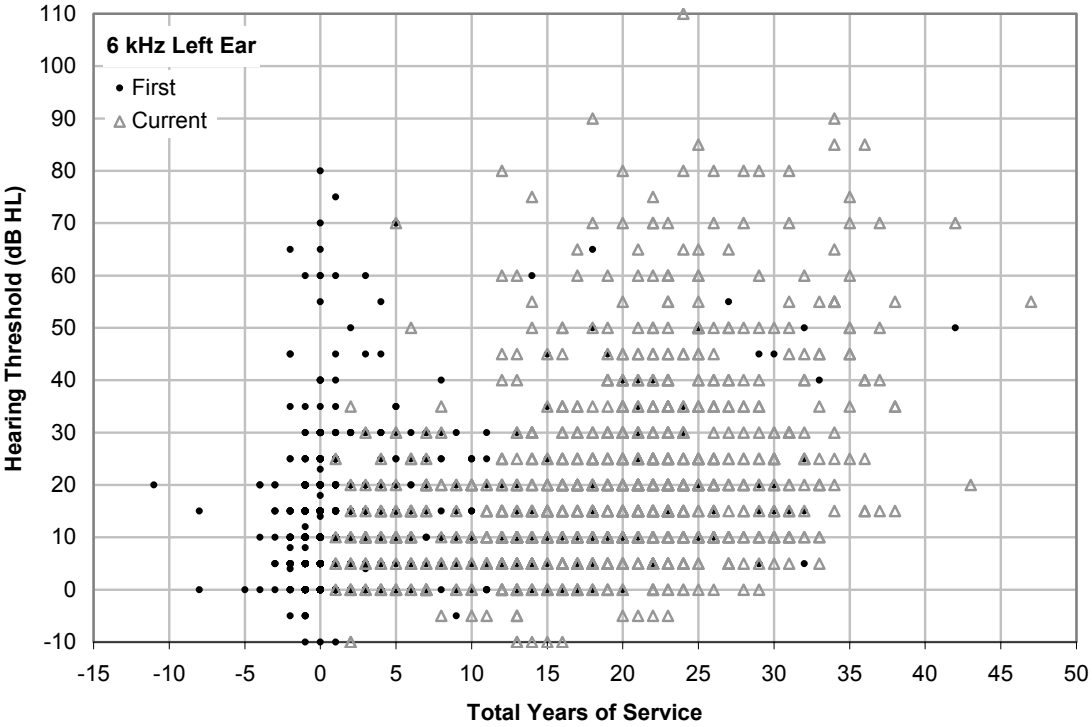
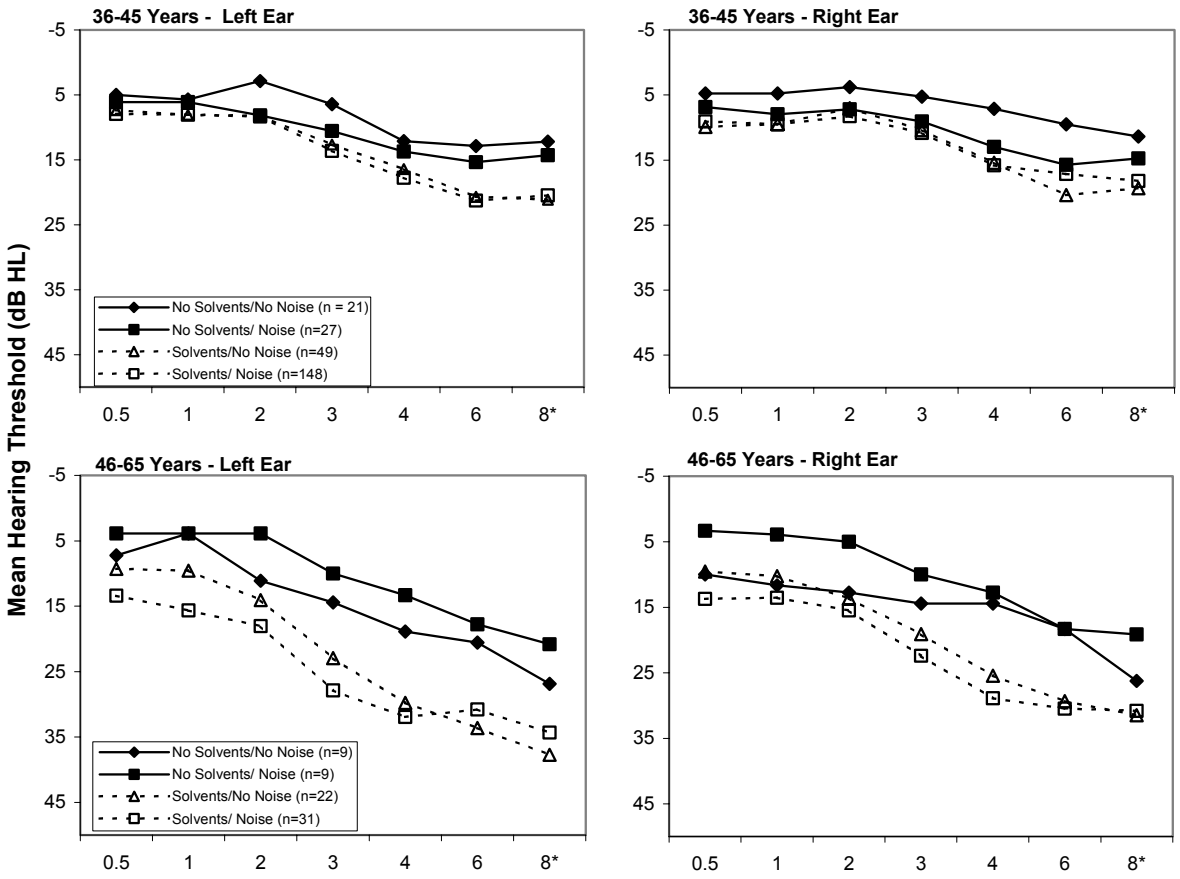


Figure 6

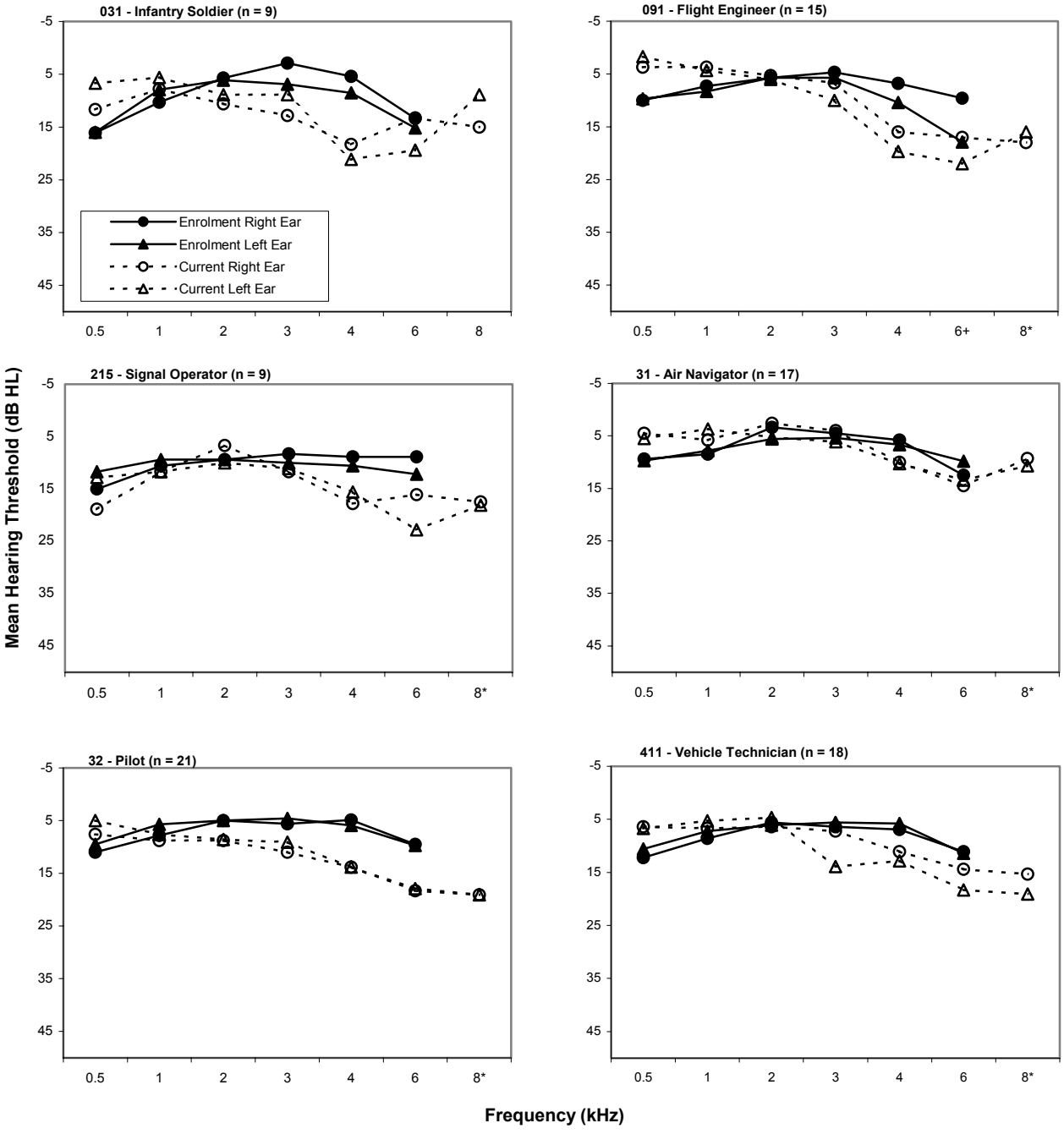
Effects of Solvents Exposure on Hearing Thresholds (dB HL) in the Two Older Age Categories



*n at 8 kHz: 36-45 yrs n = 18, 21, 44, and 131; 46-64 yrs n = 8, 6, 20, and 31

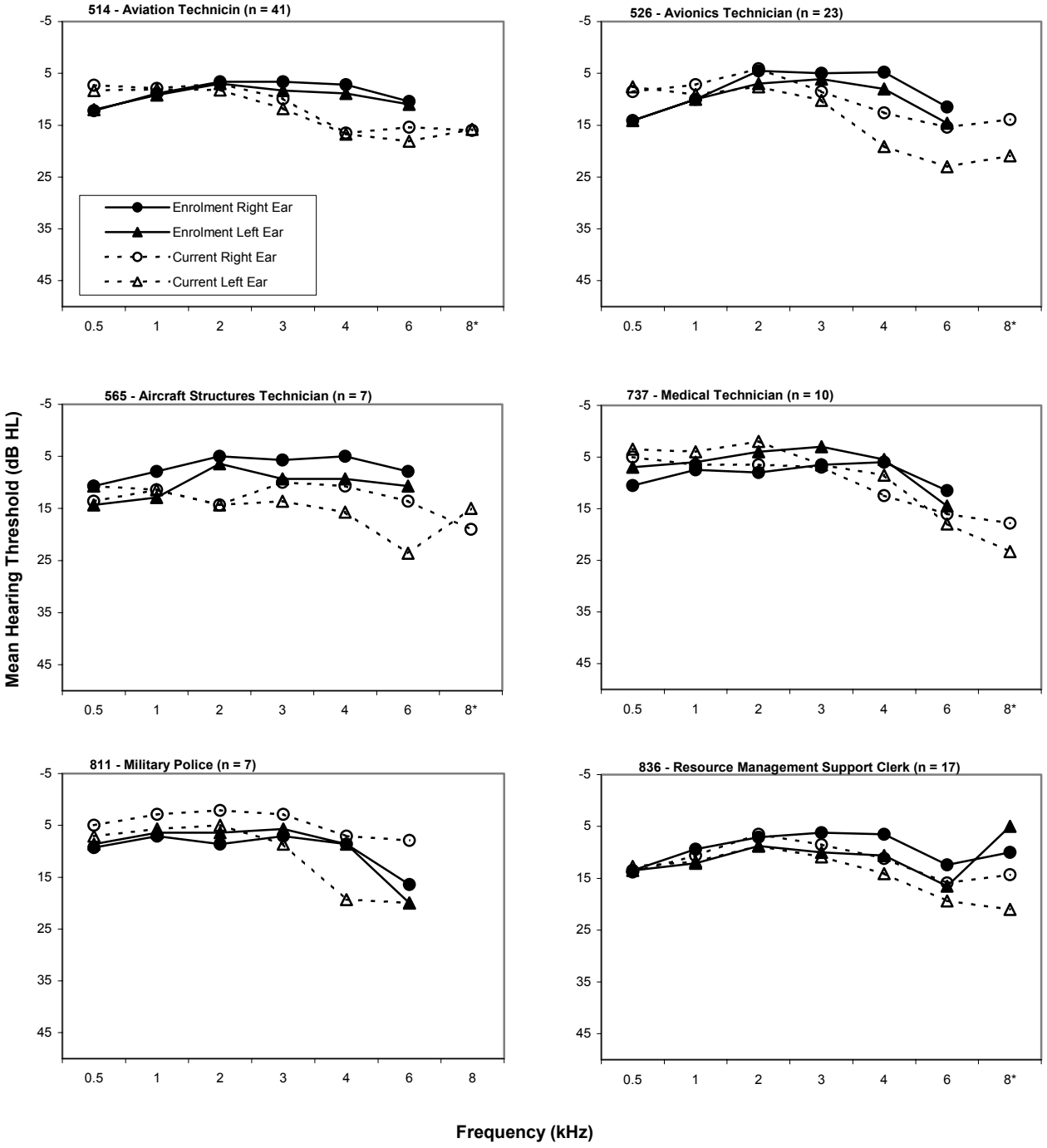
Figure 7

Enrolment and Current Hearing Thresholds (dB HL) for 36 - 45 Year-olds in Selected Trades: Cases with an enrolment audiogram (n = 427)



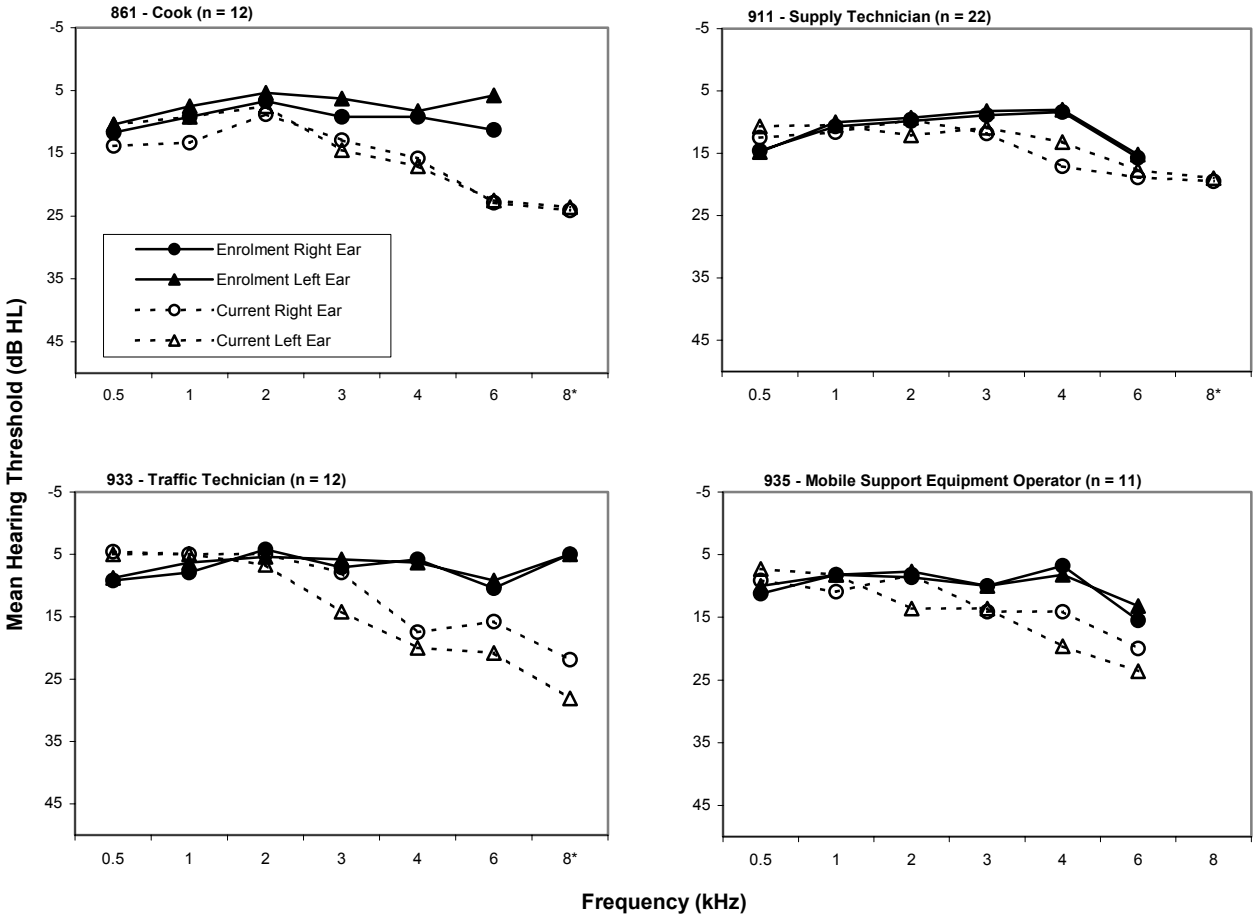
+n for Enrolment 6 kHz: 091 n=14; *n for Current 8 kHz: 091 n=10; 215 n=8; 31 n=15; 32 n=17; 411 n=16

Figure 7 (cont'd)



*n for Current 8 kHz: MOC - 514 n=36; 526 n=22; 565 n=5; 737 n=9; 836 n = 15

Figure 7 (cont'd)



*n for Current 8 kHz: MOC - 861 n=11; 911 n=19; 933 n=8

Figure 8

Percentage of 36- 45 year olds with Moderate to Severe Hearing Loss at 4 kHz and 6 kHz in Selected Trades

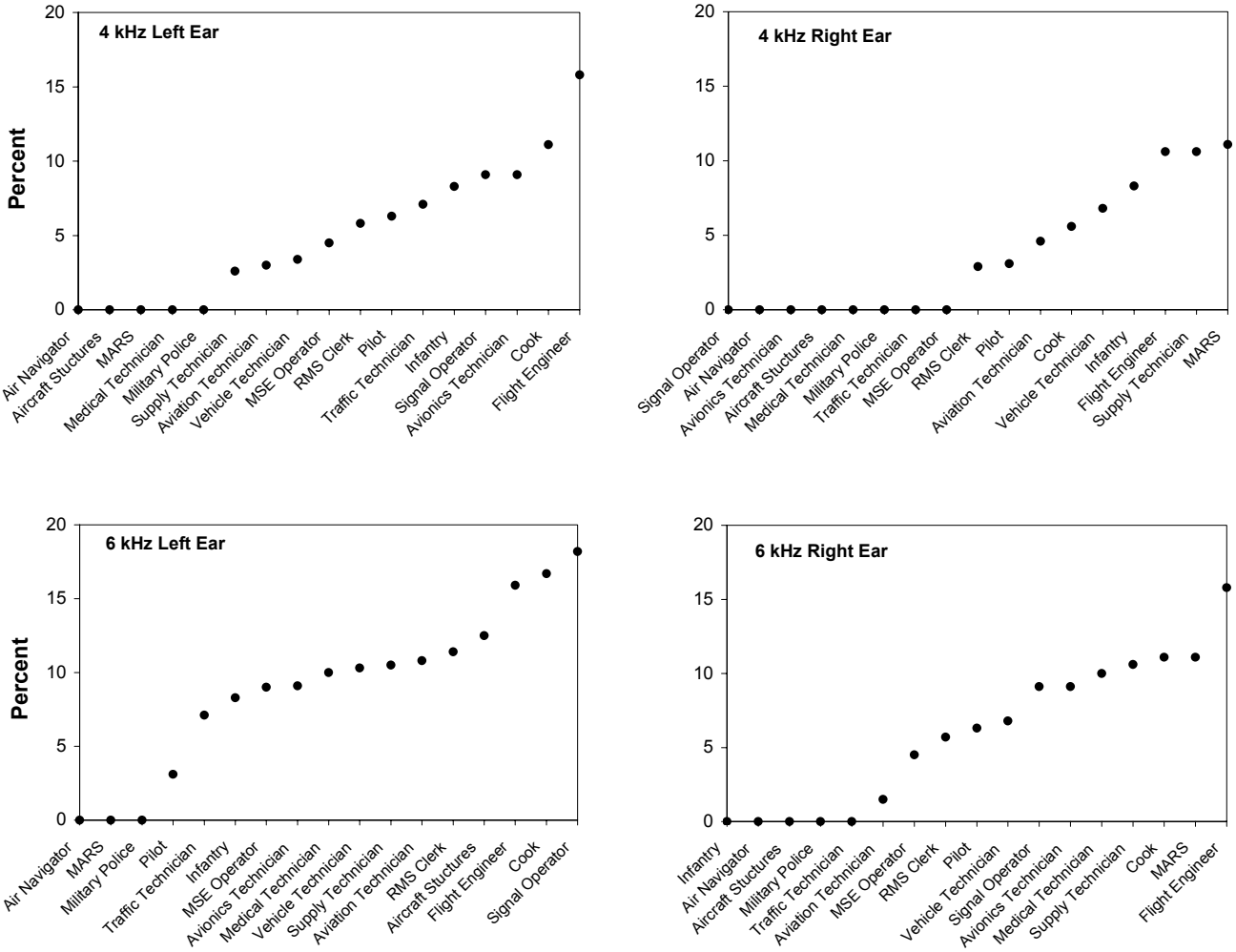


Figure 9a

Cumulative Percentage of Flight Engineers (MOC 091) with Hearing Thresholds (dBHL) at Different Levels (n=33)

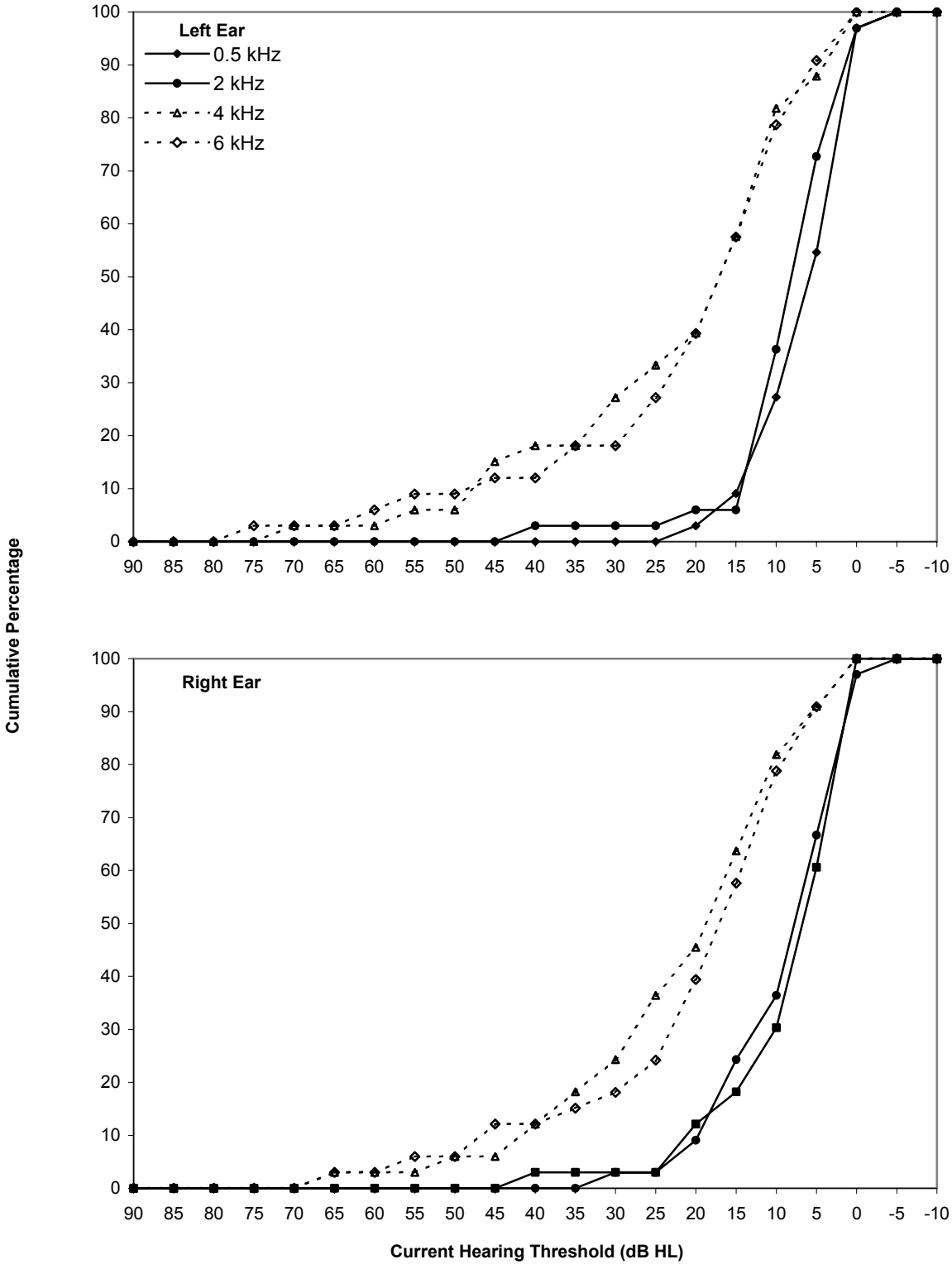


Figure 9b

Cumulative Percentage of Signal Operators (MOC 215) with Hearing Thresholds (dB HL) at Different Levels (n=16)

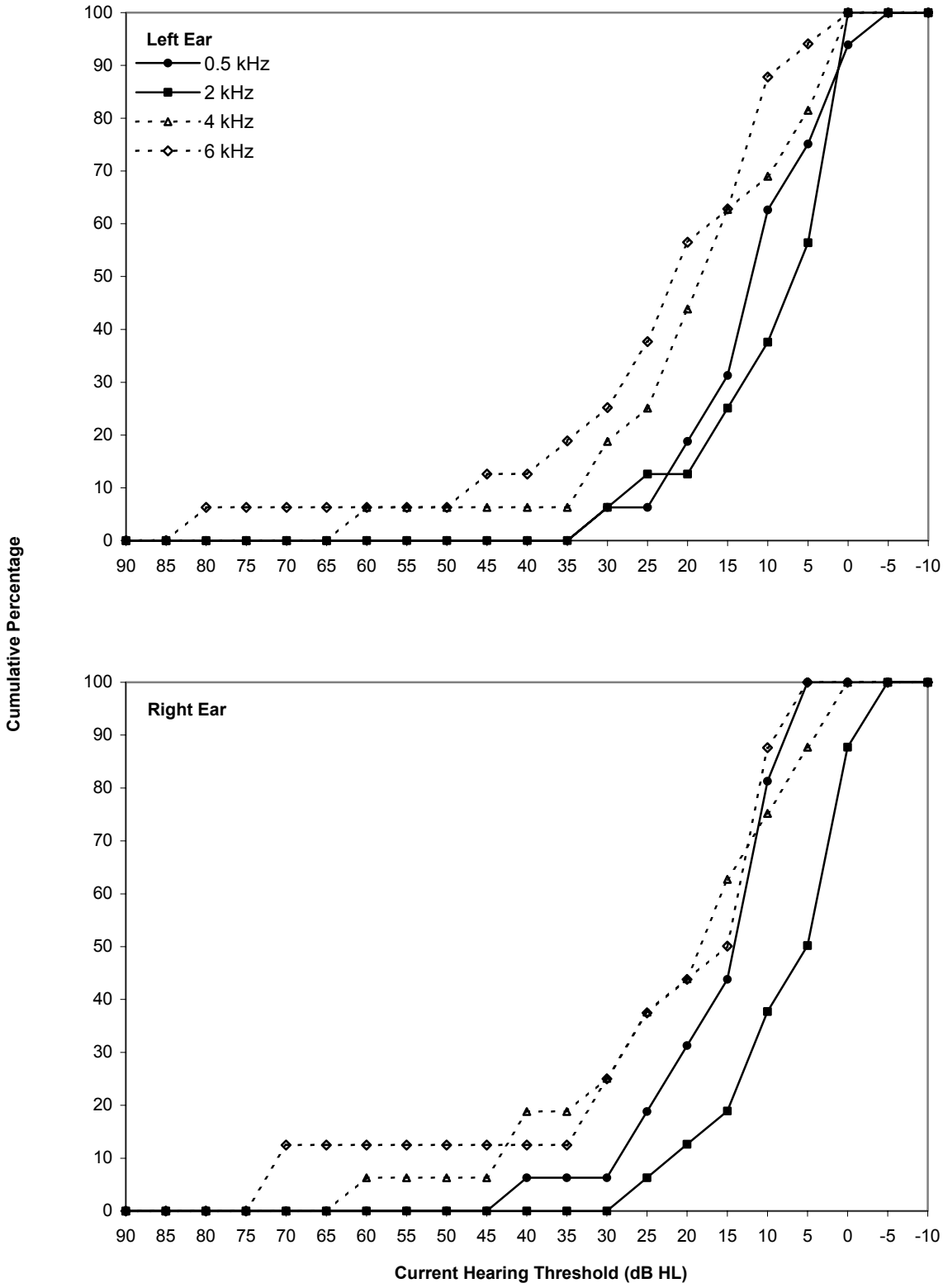


Figure 9c

Cumulative Percentage of Cooks (MOC 861) with Hearing Thresholds (dB HL) at Different Levels (n=29)

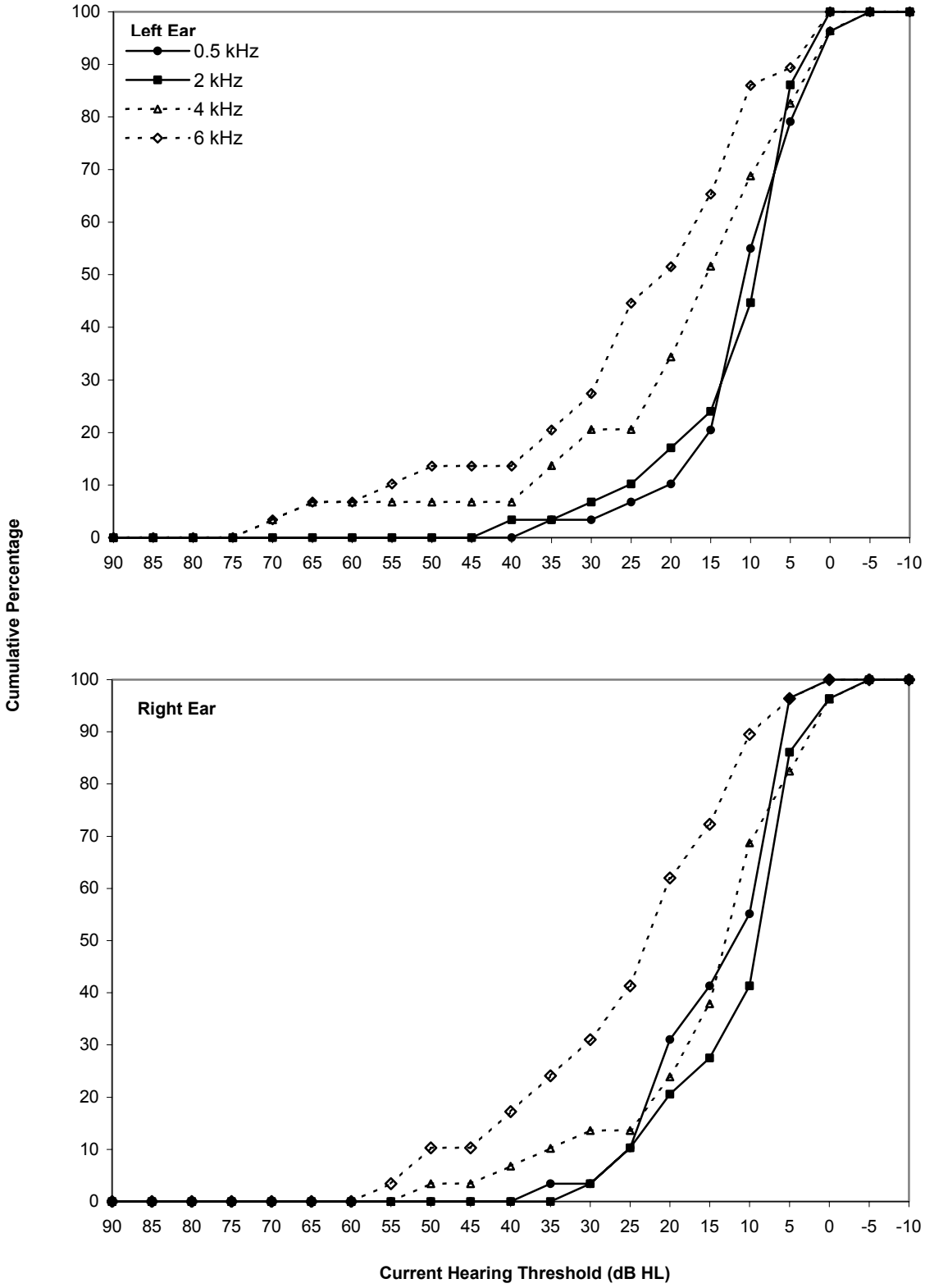
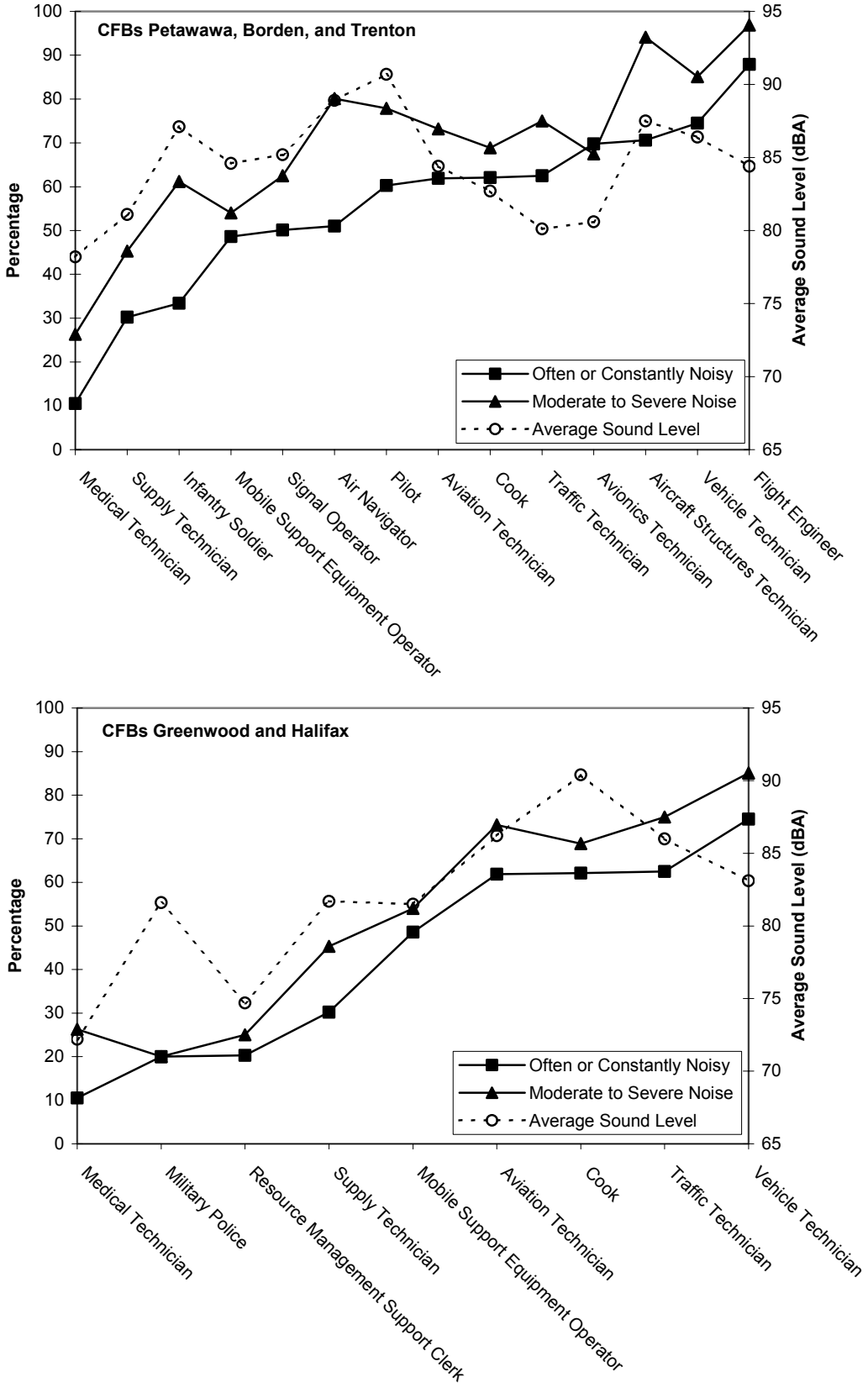


Figure 10

Perceived Noisiness and Severity of Noise in the Workplace Compared to the Average Sound Level (dBA) for Selected Trades



Tables

Table 1

Number of People Employed at Each Canadian Forces Base

CF Base	Number of Employees	Environment
CFB Borden	4,500	Purple (training base)
CFB Trenton	2,650	Air Force (air)
CFB Petawawa	4,700	Army (land)
CFB Greenwood	2,000	Air Force (air)
CFB Halifax	6,800	Navy (sea)
TOTAL	20,650	

Table 2

The Distribution of Subjects by Age (N = 1057)

Age (years)	n	%
16 – 25	40	4.0
26 – 35	246	23.0
36 – 45	578	55.0
46 – 55	185	18.0
56 – 65	8	1.0
Total	1057	100.0

Table 3

Summary Statistics on Current Age, Age at Recruitment, Total Years of Service, and Number of Years in Current Trade (N = 1057)

	Current Age (years)	Age at Recruitment (years)	Total Years of Service (years)	Years of Service in Trade (years)
Mean	39.59	20.38	19.20	14.60
Standard Deviation	7.14	3.78	7.76	8.22
Minimum	20	15	1	0.25
Maximum	64	46	47	37

Table 4a

Comparison of Gender Distributions of the Canadian Forces and the Sample Population

Canadian Forces (N = 61,415)			Sample (N = 1,057)		
Gender	n	Percent (%)	Gender	n	Percent (%)
Male	53,777	88	Male	910	86
Female	7,638	12	Female	147	14

Table 4b

Comparison of Officer (OFF) and Non-Commissioned Member (NCM) Distributions of the Canadian Forces and the Sample Population

Canadian Forces (N = 61,415)			Sample (N = 1,057)		
Rank	n	Percent (%)	Rank	n	Percent (%)
OFF	13,821	23	OFF	249	24
NCM	47,594	77	NCM	808	76

Table 4c

Comparison of Age Distributions of the Canadian Forces and the Sample Population

Canadian Forces (N = 61,415)			Sample (N = 1,057)		
Age (yrs)	n	Percent (%)	Age (yrs)	n	Percent (%)
16 – 24	8,973	15	16 – 25	40	4
25 – 34	19,093	31	26 – 35	246	23
35 – 44	25,801	42	36 – 45	578	55
> 44	7,548	12	> 46	193	18

Table 5

Trades for Non-Commissioned Members (n = 808, 76%)

MOC*	Job Title	n	MOC	Job Title	n
011	Armoured Soldier	2	434	Fire Control Systems Tech.	5
021	Artillery Soldier Field	2	441	Materials Technician	9
022	Artillery Soldier Air Defence	4	514	Aviation Systems Technician	97
031	Infantry Soldier	18	526	Avionic Systems	43
041	Field Engineer	1	541	Imagery Technician	4
052	Line Technician	6	565	Aircraft Structures Technician	17
065	Naval Weapons Technician	12	641	Refrigeration and Mechanical Tech.	2
081	Airborne Electronic Sensor Op.	8	642	Electrical Distribution Tech.	4
091	Flight Engineer	33	643	Electrical Generating Sys. Tech	5
111	Intelligence Operator	3	646	Plumbing & Heating Technician	1
121	Meteorological Technician	4	648	Construction Technician	5
131	Search and Rescue Technician	9	649	Const. Eng. Procedures Tech.	4
168-170	Aerospace Control	10	651	Fire Fighter	12
181	Boatswain	10	713	Operating Room Technician	1
215	Signal Operator	16	714	Medical Laboratory Technician	1
226	ATIS Technician	12	722	Dental Clinic Assistant	1
227	LCIS Technician	10	725	Dental Technician – Hygienist	2
275	Naval Combat Information Operator	5	732	Medical Technician – Phys Asst	6
276	Naval Electronic Sensor Operator	7	711/737	Medical Technician	19
277	Naval Communicator	8	738	Dental Technician	2
278	Tactical Acoustic Sensor Operator	8	811	Military Police	20
283-286	Naval Electronics Technician (A)	28	831/836	Resource Management Support	64
313	Marine Engineering Technician	10	861	Cook	29
314	Marine Engineering Artificer	12	862	Steward	11
315	Marine Engineering Systems Op.	2	871	Musician	2
321	Hull Technician	6	881	Postal Clerk	3
331	Electrical Technician	8	911	Supply Technician	53
342	Clearance Diver Technician	1	921	Ammunition Technician	3
411	Vehicle Technician	47	933	Traffic Technician	40
421	Weapons Technician (land)	4	935	Mobile Support Equipment Operator	37

Trades for Officers (n = 249, 24%)

MOC	Job Title	n	MOC	Job Title	n
21	Armour	1	61, 62	Chaplain	1
22	Artillery	4	66	Public Affairs	4
23	Infantry	2	67	Legal	2
31	Air Navigator	51	71B	MARS – Surface Ship	51
32	Pilot	68	71C	MARS – Submarine	68
39	Aerospace Control	9	72	Personnel Selection	9
41	Aerospace Engineering	10	74	Training Development	10
42,83,84	Communications&Electronics Eng.	7	75	Music	7
43	Land Electrical & Mech Eng.	4	78	Logistics	4
44A	Maritime Engineering	2	78B	Logistics - Sea	2
44D	Maritime Eng – Naval Architect	1	78C	Logistics – Land	1
46	Airfield Engineering	2	78D	Logistics – Air	2
48A	Health Care Administration	3	81	Military Police (Officer)	3
49	Physical Therapy	1	82	Intelligence Officer	1
51	Dental	3	87	Naval Combat Systems Engineering	3
54	Pharmacy	1	88	Marine Systems Engineering	1
55	Medical	3	91-93	Cadet Instructor Cadre	3
57	Nursing	5	R86U	Naval Control of Shipping	5
58	Social Work	2			2

*MOC = Military Occupation Code

Table 6

Active Military Trades with No Participants

MOC*	Job Title	MOC	Job Title
042	Field Engineer Equipment Operator	52	Heath Service Operations
11	General Officer	56	Medical Associate Officer
12	General Officer Specialist	64	Air Weapons Control
142	Geomatics Technician	647	Water, Fuel, & Environment Technician
191	Oceanographic Technician	716/733	Preventative Medicine Technician
212	Teletype Operator	718	Biomedical Electronics Technician
24	Engineers	731	Medical Tech – Aeromedical Tech
312	Marine Engineering Mechanic	735	X – Ray Technician
332	Marine Electrician	736	Biomedical Technician
341	Clearance Diver	71D	MARS – Clearance Diving
42B	Communications & Electronics Eng. (L)	71E	MARS – Software Programmer
44B	Maritime Engineering – Marine Systems	833	Court Reporter
44C	Maritime Engineering – Combat Systems	98	Training

*MOC = Military Occupation Code

Table 7

List of Trades by Environment (N = 1057)

ARMY (Land) Trades

MOC*	Job Title	Abbrev.	n
011	Armoured Soldier	CRMN	2
021	Artillery Soldier – Field	ARTYMN FD	2
022	Artillery Soldier – Air Defence	ARYTMN AD	4
031	Infantry Soldier	INFMN	18
041	Field Engineer	FD ENG	1
052	Line Technician	LMN	6
21	Armour Officer	ARMOUR	1
215	Signal Operator	SIG OP	16
22	Artillery Officer	ARTY	4
23	Infantry Officer	INF	2
227	Land Comms & Info Systems Technician	LCIS TECH	10
411	Vehicle Technician	VEH TECH	47
421	Weapons Technician (land)	W TECH L	4
43	Land Electrical & Mechanical Engineer	EME	4
434	Fire Control Systems Technician	FCS TECH	5
441	Materials Technician	MAT TECH	9
51	Dental	DENT	3
722	Dental Clinical Assistant	DENT CL A	1
725	Dental Technician – Hygienist	DENT TECH-HYCST	2
738	Dental Technician	DENT TECH	2
78C	Logistics (land)	LOG (land)	7
881	Postal Clerk	POST CLK	3
921	Ammunition Technician	AMMO TECH	3
			TOTAL 156

NAVY (Sea) Trades

MOC*	Job Title	Abbrev.	n
065	Naval Weapons Technician	NWT	12
181	Boatswain	BOSN	10
275	Naval Combat Information Operator	NCI OP	5
276	Naval Electronic Sensor Operator	NES OP	7
277	Naval Communicator	NAV COM	8
278	Tactical Acoustic Sensor Operator	TAS OP	8
283	Naval Electronics Technician (Acoustic)	NET (A)	5
284	Naval Electronics Technician (Comms)	NET (C)	8
285	Naval Electronics Technician (Tactical)	NET (T)	5
286	Naval Electronics Technician (Manager)	NET (M)	10
313	Marine Engineering Technician	MAR ENGTECH	10
314	Marine Engineering Artificer	MAR ENGART	12
R315	Marine Engineering Systems Operator	---	2
321	Hull Technician	H TECH	6
331	Electrical Technician	E TECH	8
342	Clearance Diver Technician	CL DIV TECH	1
44A	Maritime Engineering	MARE	2
71B	MARS – Surface Ship	MARS SS	15
71C	MARS – Submarine	MARS SUB	2
862	Steward	STWD	11
88	Marine Systems Engineering	MS ENG	1
			TOTAL 148

*MOC = Military Occupation Code

Table 7 (Cont'd)
AIR FORCE (Air) Trades

MOC*	Job Title	Abbrev.	n
081	Airborne Electronic Sensor Operator	AES OP	8
091	Flight Engineer	FLT ENG	33
131	Search and Rescue Technician	SAR TECH	9
168-9, 170	Aerospace Control Operator/Radar Control	AC OP	10
226	Aerospace Telecomms and Info Systems	ATIS TECH	12
31	Air Navigator	ANAV	51
32	Pilot	PLT	68
39	Aerospace Control Officer	AES	9
41	Aerospace Engineering	AES ENG	10
514	Aviation Technician	AVN TECH	97
526	Avionics Technician	AVS TECH	43
565	Aircraft Structures Technician	ACS TECH	17
651	Fire Fighter	FIRE FTR	12
			TOTAL 379

PURPLE (Shared) Trades

MOC	Job Title	Abbrev.	n
111	Intelligence Operator	INT OP	3
641	Refrigeration and Mechanical Technician	RM TECH	2
642	Electrical Distribution Technician	ED TECH	4
643	Electrical Generating Systems Technician	EGS TECH	5
646	Plumbing and Heating Technician	PH TECH	1
648	Construction Technician	CONST TECH	5
649	Construction Engineering Procedures Tech.	CE SUPT	4
713	Operating Room Technician	OR TECH	1
75	Music	MUSIC	2
78	Logistics	LOG	4
81	Security Officer	SECUR	1
811	Military Police	MP	20
836	Resource Management Support Clerk	RMS CLK	64
861	Cook	COOK	29
871	Musician	MUSICIAN	2
911	Supply Technician	SUP TECH	53
933	Traffic Technician	TFC TECH	40
935	Mobile Support Equipment Operator	MSE OP	37
92A	Cadet Instructor Cadre	CIC	4
			Total 281

*MOC = Military Occupation Code

Table 7 (cont'd)
CONTROL Trades

MOC*	Job Title	Abbrev.	n
121	Meteorological Technician	MET TECH	4
42, 83-84	Communications and Electronics Engineer	CELE	7
44D	Maritime Engineering – Naval Construct	MARE – NC	1
46	Airfield Engineering	AF ENGR	2
48	Health Care Administration	HCA	3
49	Physical Therapy	PHY TH	1
541	Imagery Technician	IMAGE TECH	4
54	Pharmacy	PHARM	1
55	Medical	MED	3
57	Nursing	NUR	5
58	Social work	SOCW	2
61	Chaplain (P)	CHAP (P)	3
62	Chaplain (RC)	CHAP (RC)	3
66	Public Affairs	PAFF	3
67	Legal	LEGAL	1
714	Medical Laboratory Technician	MLAB TECH	1
72	Personnel Selection	PSEL	2
732	Medical Technician (Physician's Assistant)	MED TECH – PA	6
711/737	Medical Technician	MED TECH	19
74	Training Development	TRG DEV	5
78B	Logistics (Sea)	LOG	2
78D	Logistics (Air)	LOG	7
82	Intelligence Officer	INT	3
87	Naval Combat Systems Engineering	NCS ENG	1
91	Navy Cadet Instructor Cadre	CIC	1
93	Cadet Instructor Cadre	CIC	2
R86U	Naval Control of Shipping Officer	NCS	1
			TOTAL 93

*MOC = Military Occupation Code

Note: 1. Selection of control (non-noisy) trades was based on the following criteria:
In the survey, more than 80% of respondents answered "never" or "occasionally" to the question "Is your regular place of work noisy?" and answered "no noise" or "mild" to the question "How bad is the noise usually?"

2. In all of these trades, participants could be exposed to injurious noise levels when deployed.

Table 8

Perceived Change in Hearing since Joining the CF

	Frequency	Percent
Better or no change	303	28.7
Slightly worse	456	43.1
Moderately worse	194	18.4
Much worse	87	8.2
No answer	17	1.6
Total	1057	100.0

Table 9

Perceived Noisiness of Workplace

	Frequency	Percent
Never	101	9.6
Occasionally	454	43.0
Often	351	33.2
Constantly	149	14.1
No answer	2	0.2
Total	1057	100.0

Table 10

Perceived Severity of Noise in the Workplace

	Frequency	Percent
No noise	82	7.8
Mild	348	32.9
Moderate	456	43.1
Severe	166	15.7
No answer	5	0.5
Total	1057	100.0

Table 11

Training Received on the Dangers of Noise Exposure

	Frequency	Percent
None	314	29.7
1 hour or less	551	52.1
Less than half a day	154	14.6
A full day	32	3.0
No answer	6	0.6
Total	1057	100.0

Table 12

Demonstrations Received on the Proper Use of Hearing Protectors

	Frequency	Percent
None	322	30.5
1 hour or less	623	58.9
Less than half a day	98	9.3
A full day	13	1.2
No answer	1	0.1
Total	1057	100.0

Table 13

Perceived Quality of Training Received Regarding Loud Noise

	Frequency	Percent
No training	134	12.7
Poor	393	37.2
Adequate	458	43.3
Good	71	6.7
No answer	1	0.1
Total	1057	100.0

Table 14

Types of Hearing Protectors Used by CF Personnel

	Frequency	Percent
No noise - none	201	19.0
With noise – none	122	11.5
Plugs	180	17.0
Muffs	139	13.2
Plugs and/or muffs	180	17.0
Headset	156	14.8
Headset and plugs	69	6.5
No answer	10	0.9
Total	1057	100.0

Table 15

How Often Hearing Protectors are Worn When Noisy at Work

	Frequency	Percent
No noise at work	200	18.9
Never	143	13.5
< ½ of a work shift	336	31.8
> ½ of a work shift	135	12.8
100% of a work shift	214	20.2
No answer	29	2.7
Total	1057	100.0

Table 16

How Often Supervisors Advise the Need to Use Hearing Protectors

	Frequency	Percent
Not at all	439	41.5
Occasionally	376	35.6
Often	166	15.7
Constantly	71	6.7
No answer	5	0.5
Total	1057	100.0

Table 17

Belief that Hearing Protectors are not Beneficial

	Frequency	Percent
No noise	72	6.8
Disagree	737	69.7
Occasionally agree	26	2.5
Often agree	38	3.6
Definitely agree	161	15.2
No answer	23	2.2
Total	1057	100.0

Table 18

Belief that Hearing Protectors are Uncomfortable

	Frequency	Percent
No noise	63	6.0
Disagree	289	27.3
Occasionally agree	447	42.3
Often agree	166	15.7
Definitely agree	67	6.3
No answer	25	2.4
Total	1057	100.0

Table 19

Belief that Hearing Protectors Will Interfere With Hearing

	Frequency	Percent
No noise	63	6.0
Disagree	156	14.8
Occasionally agree	285	27.0
Often agree	265	25.1
Definitely agree	265	25.1
No answer	23	2.2
Total	1057	100.0

Table 20

Belief that Hearing Protectors May Pose a Danger at Work

	Frequency	Percent
No noise	119	11.3
Disagree	643	60.8
Occasionally agree	165	15.6
Often agree	37	3.5
Definitely agree	65	6.1
No answer	28	2.6
Total	1057	100.0

Table 21

Difficulty Listening in a Quiet Room Without Hearing Protectors

	Frequency	Percent
No difficulty	892	84.4
Slight difficulty	116	11.0
Moderate difficulty	30	2.8
Great difficulty	3	0.3
No answer	16	1.5
Total	1057	100.0

Table 22

Difficulty Listening in a Noisy Room Without Hearing Protectors

	Frequency	Percent
No difficulty	275	26.0
Slight difficulty	413	39.1
Moderate difficulty	270	25.5
Great difficulty	73	6.9
No answer	26	2.5
Total	1057	100.0

Table 23

Difficulty Listening Across a Quiet Room Without Hearing Protectors

	Frequency	Percent
No difficulty	680	64.3
Slight difficulty	264	25.0
Moderate difficulty	72	6.8
Great difficulty	17	1.6
No answer	24	2.3
Total	1057	100.0

Table 24

Difficulty Listening Across a Noisy Room Without Hearing Protectors

	Frequency	Percent
No difficulty	151	14.3
Slight difficulty	281	26.6
Moderate difficulty	359	34.0
Great difficulty	240	22.7
No answer	26	2.5
Total	1057	100.0

Table 25

Difficulty Understanding Orders in a Quiet Room With Hearing Protectors

	Frequency	Percent
No difficulty	460	43.5
Slight difficulty	373	35.3
Moderate difficulty	129	12.2
Great difficulty	28	2.6
No answer	67	6.4
Total	1057	100.0

Table 26

Difficulties Understanding Orders in a Noisy Room With Hearing Protectors

	Frequency	Percent
No difficulty	159	15.0
Slight difficulty	283	26.8
Moderate difficulty	284	26.9
Great difficulty	228	21.6
No answer	103	9.8
Total	1057	100.0

Table 27

Difficulty Answering a Telephone in a Quiet Room

	Frequency	Percent
No difficulty	925	87.5
Slight difficulty	94	8.9
Moderate difficulty	16	1.5
Great difficulty	3	0.3
No answer	19	1.8
Total	1057	100.0

Table 28

Difficulty Answering a Telephone in a Noisy Room

	Frequency	Percent
No difficulty	188	17.8
Slight difficulty	403	38.1
Moderate difficulty	291	27.5
Great difficulty	150	14.2
No answer	25	2.4
Total	1057	100.0

Table 29

Exposure to Solvents

	Frequency	Percent
Never exposed to solvents	386	36.5
Exposed to solvents in one or more trades	649	61.4
No answer	22	2.1
Total	1057	100.0

Table 30

Use of Respiratory Protective Equipment During Exposure to Solvents

	Frequency	Percent
Never	294	45.3
< ½ of a work shift	227	35.0
> ½ of a work shift	70	10.8
100 % of a work shift	54	8.3
No answer	4	0.6
Total	649	100.0

Table 31

History of Accidents at Work Involving Head Injuries

	Frequency	Percent
No accidents	961	90.9
One accident	54	5.1
Two accidents	12	1.1
More than two accidents	9	0.9
No answer	21	2.0
Total	1057	100.0

Table 32

Presence of Permanent Hearing Loss Due to Head Injury

	Frequency	Percent
No, returned to normal	31	32.3
Yes, mild hearing loss	30	31.3
Yes, moderate hearing loss	10	10.4
Severe hearing loss	1	1.0
No answer	24	25.0
Total	96	100.0

Table 33

Ears That Were Affected by the Accident

	Frequency	Percent
Neither ear	8	8.3
Right ear	15	15.6
Left ear	19	19.8
Both ears	34	35.4
No answer	20	20.8
Total	96	100.0

Table 34

Satisfaction With Treatment Received

	Frequency	Percent
No treatment	29	30.2
Dissatisfied	8	8.3
Somewhat satisfied	22	22.9
Very satisfied	17	17.7
No answer	20	20.8
Total	96	100.0

Table 35

History of Ear Infections

		Frequency	Percent
Childhood	None	568	53.7
	One	146	13.8
	Two	73	6.9
	More than two	217	20.5
	No answer	53	5.0
	Total	1057	100.0
Adulthood	None	701	66.3
	One	144	13.6
	Two	77	7.3
	More than two	121	11.4
	No answer	14	1.4
	Total	1057	100.0

Table 36

Effect of Ear Infections on Hearing

	Frequency	Percent
No ear infections	577	54.6
Hearing returned to normal	402	38.0
Mild hearing loss	25	2.4
Moderate hearing loss	10	0.9
Severe hearing loss	1	0.1
No answer	42	4.0
Total	1057	100.0

Table 37

History of Head Injuries Outside of Work

	Frequency	Percent
None	917	86.8
One	95	9.0
Two	23	2.2
More than two	10	0.9
No answer	12	1.1
Total	1057	100.0

Table 38

Effect of the Head Injury on Hearing

	Frequency	Percent
None	110	85.9
Yes, hearing returned to normal	16	12.5
Yes, with permanent hearing loss	0	0
No answer	2	1.9
Total	128	100.0

Table 39

Use of Medications that May Have Affected Hearing

	Frequency	Percent
None	1015	96.0
Yes, but no effect on hearing	8	0.8
Yes, but hearing returned to normal	10	0.9
Yes, with permanent hearing loss	1	0.1
No answer	23	2.2
Total	1057	100.0

Table 40

Presence of Noise in Head or Ears

	Frequency	Percent
No	497	47.0
Occasionally	436	41.2
Often	49	4.6
Constantly	61	5.8
No answer	14	1.3
Total	1057	100.0

Table 41

Loudness of Noise in Head or Ears

	Frequency	Percent
Low	355	65.0
Moderate	166	30.4
Loud	24	4.4
No answer	1	0.2
Total	546	100.0

Table 42

Interference of Noise in Head or Ears With Hearing

	Frequency	Percent
None	278	50.9
Slight interference	208	38.1
Moderate interference	45	8.2
Much interference	14	2.6
No answer	1	1.8
Total	546	100.0

Table 43

Disturbance of Noise in Head or Ears With Sleep

	Frequency	Percent
None	413	75.6
Occasionally	115	21.1
Often	8	1.5
All the time	10	1.8
Total	546	100.0

Table 44

Presence of Dizzy Spells

	Frequency	Percent
None	881	83.3
Occasionally	147	13.9
Often	9	0.9
All the time	1	0.1
No answer	19	1.8
Total	1057	100.0

Table 45

Perception of Body Turning in Circles

	Frequency	Percent
No	49	31.2
Not sure	49	31.2
Maybe	22	14.0
Definitely	37	23.6
Total	157	100.0

Table 46

Interference of Dizzy Spells With Work

	Frequency	Percent
None	110	70.1
Occasionally	46	29.3
Often	0	0
All the time	1	0.6
Total	157	100.0

Table 47

Occurrence of Dizzy Spells with Noises in Head or Ears and Problems with Hearing

	Frequency	Percent
None	87	55.4
Not sure	51	32.5
Maybe	15	9.6
Definitely related	4	2.5
Total	157	100.0

Table 48

Exposure to Loud Sounds during Leisure

	Frequency	Percent (%)
No	498	47.1
Occassionally – less than ½ time	537	50.8
Often – more than ½ time	10	0.9
All the time	1	0.1
No answer	11	1.0
Total	1057	100.0

Table 49

Sources of Loud Noise during Leisure

	Frequency	Percent (%)	Avg. Hours/week	Range
Power tools	611	57.8*	3.12	5 min – 45 hr
Guns (hunting/gunclubs)	128	12.1	1.29	5 min – 10 hr
Off-road vehicles	91	8.6	4.89	15 min – 45 hr
Motorcycles	97	9.2	4.57	30 min – 20 hr
Snowmobiles	56	5.3	3.24	10 min – 24 hr
Rock music	300	28.4	3.46	15 min – 20 hr
Disco/dance bars	166	15.7	2.43	12 min – 10 hr
Others	124	11.7	7.18	30 min – 70 hr

* Percentage of N = 1057

Table 50

Use of Hearing Protective Devices During Leisure

	Frequency	Percent
No noisy activities	294	27.8
None	219	20.7
< ½ of the time	179	16.9
> ½ of the time	125	11.8
All of the time	191	18.1
No answer	49	4.6
Total	1057	100.0

Table 51

Kinds of Hearing Protective Devices Used in Leisure

	Frequency	Percent
None	120	15.7
Ear plugs	223	29.2
Ear muffs	238	31.2
Ear plugs and ear muffs	102	13.4
Other	28	3.7
No answer	52	6.8
Total	763	100.0

Table 52

Work Outside the Military

	Frequency	Percent
No	951	90.0
Yes, occasionally	62	5.9
Yes, weekends	8	0.8
Yes, regularly after-hours	14	1.3
No answer	22	2.1
Total	1057	100.0

Table 53

Exposure to Loud Sounds During Sideline Work

	Frequency	Percent
No	32	38.1
Occasionally	37	44.0
Often	13	15.5
Constantly	2	2.4
Total	84	100.0

Average hours of exposure: 4.46

Table 54

Use of Hearing Protectors During Sideline Work

	Frequency	Percent
None	19	36.5
Occasionally	12	23.1
Often	11	21.2
All the time	10	19.2
Total	52	100.0

Table 55

Kinds of Hearing Protectors Used in Sideline Work

	Frequency	Percent
None	0	0.0
Ear plugs	10	30.3
Ear Muffs	15	45.5
Ear plugs and ear muffs	6	18.2
Other	1	3.0
No answer	1	3.0
Total	33	100.0

Table 56

Current Hearing Threshold (dB HL) as a Function of Age

Age (yrs)**	n	Ear	Frequency (kHz) 0.5	1	2	3	4	6	8+
16 – 25	40	Left	7.4 (6.3)*	5.9 (5.8)	7.3 (8.4)	6.9 (10.2)	8.3 (9.6)	10.3 (10.2)	10.0 (13.8)
		Right	9.8 (7.8)	7.5 (6.7)	5.6 (8.3)	6.4 (9.9)	8.0 (15.7)	9.4 (14.6)	11.1 (19.1)
26 – 35	246	Left	5.8 (7.1)	5.6 (7.4)	5.5 (8.0)	7.9 (10.2)	9.2 (11.9)	12.5 (12.7)	11.9 (13.7)
		Right	6.7 (7.5)	5.8 (7.0)	4.5 (7.6)	5.6 (9.6)	8.1 (11.6)	11.8 (11.5)	11.5 (10.8)
36 – 45	578	Left	7.6 (7.9)	7.6 (8.5)	7.9 (9.3)	12.3 (12.4)	16.0 (14.8)	20.4 (16.1)	20.6 (17.5)
		Right	8.9 (8.2)	8.7 (8.5)	7.4 (8.8)	10.3 (11.4)	13.8 (13.2)	17.7 (15.0)	18.1 (15.6)
46 – 65	193	Left	10.6 (12.7)	11.2 (13.0)	13.5 (13.6)	21.9 (18.6)	26.4 (18.8)	30.5 (20.5)	34.2 (23.3)
		Right	11.0 (9.1)	11.6 (9.9)	11.6 (11.3)	17.4 (14.8)	22.2 (17.4)	27.6 (18.8)	29.7 (22.1)

** age range = 20 – 64 years
* mean (standard deviation)
+ n for 8 kHz (16 – 25 yrs = 31; 26 – 35 yrs = 227; 36 – 45 yrs = 519; 46 – 65 yrs = 172)

Table 57

A Comparison of First and Current Hearing Thresholds at 4 kHz and 6 kHz, Left Ear, As a Function of Years of Service

Frequency	Audiogram	Years of Service	n	Hearing Threshold (dB HL) < 20 dB	< 30 dB
4 kHz (n = 1043*)	First	1 - 5 years	874 (84%)	784 (90%)	852 (97%)
		6 - 10 years	78 (8%)	65 (83%)	77 (99%)
		11 - 15 years	37 (4%)	28 (76%)	32 (86%)
		16 - 20 years	22 (2%)	17 (77%)	20 (91%)
		21 - 25 years	14 (1%)	7 (50%)	11 (79%)
		> 25 years	18 (2%)	9 (50%)	13 (72%)
	Current	1 - 5 years	66 (6%)	52 (79%)	64 (97%)
		6 - 10 years	63 (6%)	54 (86%)	61 (97%)
		11 - 15 years	180 (17%)	149 (83%)	164 (91%)
		16 - 20 years	260 (25%)	184 (71%)	231 (89%)
		21 - 25 years	282 (27%)	156 (55%)	230 (82%)
		> 25 years	192 (18%)	89 (46%)	123 (64%)

* N = 1057 – 14 participants were not included; 12 did not have a first hearing test or did not have a date for the first hearing test and 2 did not have hearing thresholds at 4 kHz

6 kHz (n = 1041[+])	First	1 - 5 years	873 (84%)	682 (78%)	811 (93%)
		6 - 10 years	77 (7%)	54 (70%)	70 (91%)
		11 - 15 years	37 (4%)	26 (70%)	32 (86%)
		16 - 20 years	22 (2%)	16 (73%)	18 (82%)
		21 - 25 years	14 (1%)	5 (36%)	7 (50.0)
		> 25 years	18 (2%)	9 (50%)	12 (67%)
	Current	1 - 5 years	66 (6%)	54 (82%)	61 (92%)
		6 - 10 years	63 (6%)	44 (70%)	59 (94%)
		11 - 15 years	179 (17%)	136 (76%)	161 (90%)
		16 - 20 years	259 (25%)	151 (58%)	208 (80%)
		21 - 25 years	282 (27%)	123 (44%)	200 (71%)
		> 25 years	192 (18%)	64 (33%)	111 (58%)

[+] N = 1057 – 16 participants were not included; 12 did not have a first hearing test or did not have a date for the first hearing test and 4 did not have hearing thresholds at 6 kHz

Table 58

Exposure to Solvents in Current Trade

MOC	Job Title	n_{moc}	n_{exp}	% n_{moc}
011	Armoured Soldier	2	2	100.0
021	Artillery Soldier – Field	2	2	100.0
022	Artillery Soldier – Air Defence	4	3	75.0
031	Infantry Soldier	18	14	77.8
041	Field Engineer	1	0	0.0
052	Line Technician	6	5	83.3
065	Naval Weapons Technician	12	12	100.0
081	Airborne Electronic Sensor Operator	8	5	62.5
091	Flight Engineer	33	32	97.0
111	Intelligence Operator	3	1	33.3
121	Meteorological Technician	4	2	50.0
131	Search and Rescue Technician	9	5	55.6
168	Aerospace Control Operator	3	0	0.0
169	Aerospace Operator	4	0	0.0
170	Radar Controller	3	1	33.3
181	Boatswain	10	9	90.0
21	Armour	1	1	100.0
215	Signal Operator	16	12	75.0
22	Artillery	4	1	25.0
226	ATIS Technician	12	11	91.7
227	LCIS Technician	10	8	80.0
23	Infantry	2	2	100.0
275	Naval Combat Information Operator	5	3	60.0
276	Naval Electronic Sensor Operator	7	6	85.7
277	Naval Communicator	8	6	75.0
278	Tactical Acoustic Sensor Operator	8	7	87.5
283	Naval Electronics Technician (A)	5	4	80.0
284	Naval Electronics Technician (C)	8	6	75.0
285	Naval Electronics Technician (T)	5	5	100.0
286	Naval Electronics Technician (M)	10	10	100.0
31	Air Navigator	51	5	9.8
313	Marine Engineering Technician	10	10	100.0
314	Marine Engineering Artificer	12	11	91.7
315	Marine Engineering Systems Op.	2	2	100.0
32	Pilot	68	9	13.2
321	Hull Technician	6	5	83.3
331	Electrical Technician	8	8	100.0
342	Clearance Diver Technician	1	1	100.0
39	Aerospace Control	9	1	11.1
41	Aerospace Engineering	10	6	60.0
411	Vehicle Technician	47	47	100.0
42C	Communications & Electronics Eng (A)	4	1	25.0
421	Weapons Technician (land)	4	4	100.0
43	Land Electrical & Mechanical Eng.	4	3	75.0
434	Fire Control Systems Technician	5	4	80.0
44A	Maritime Engineering	2	1	50.0
44D	Maritime Eng – Naval Architect	1	1	100.0
441	Materials Technician	9	9	100.0
46	Airfield Engineering	2	0	0.0
48A	Health Care Administration	3	1	33.3
49	Physical Therapy	1	0	0.0
51	Dental	3	1	33.3
514	Aviation Systems Technician	97	93	95.9
526	Avionic Systems	43	38	88.4

Table 58 (cont'd)

MOC	Job Title	n_{moc}	n_{exp}	% n_{moc}
54	Pharmacy	1	0	0.0
541	Imagery Technician	4	1	25.0
55	Medical	3	3	100.0
565	Aircraft Structures Technician	17	17	100.0
57	Nursing	5	3	60.0
58	Social Work	2	1	50.0
61	Chaplain (P)	3	1	33.3
62	Chaplain (RC)	3	0	0.0
641	Refrigeration and Mechanical Tech.	2	2	100.0
642	Electrical Distribution Technician	4	4	100.0
643	Electrical Generating Sys. Technician	5	4	80.0
646	Plumbing & Heating Technician	1	1	100.0
648	Construction Technician	5	5	100.0
649	Const. Eng. Procedures Technician	4	3	75.0
651	Fire Fighter	12	10	83.0
66	Public Affairs	3	0	0.0
67	Legal	1	0	0.0
71B	MARS – Surface Ship	15	11	73.3
71C	MARS – Submarine	2	1	50.0
713	Operating Room Technician	1	1	100.0
714	Medical Laboratory Technician	1	1	100.0
72	Personnel Selection	2	0	0.0
722	Dental Clinic Assistant	1	1	100.0
725	Dental Technician – Hygienist	2	1	50.0
732	Medical Technician – Physicians Asst	6	2	33.3
737	Medical Technician (711)	19	12	63.2
738	Dental Technician	2	2	100.0
74	Training Development	5	2	40.0
75	Music	2	0	0.0
78	Logistics	4	1	25.0
78B	Logistics - Sea	2	1	50.0
78C	Logistics – Land	7	2	28.6
78D	Logistics – Air	7	1	14.3
81	Military Police (Officer)	1	1	100.0
811	Military Police	20	7	35.0
82	Intelligence Officer	3	1	33.3
83	Communications & Electronics Eng (A)	2	1	50.0
836	Resource Management Support	64	14	21.9
84	Communications & Electronics (signals)	1	0	0.0
861	Cook	29	17	58.6
862	Steward	11	3	27.3
87	Marine Systems Engineering	1	0	0.0
871	Musician	2	0	0.0
88	Naval Combat Systems Engineering	1	1	100.0
881	Postal Clerk	3	3	100.0
91A	Navy Cadet Instructor Cadre	1	0	0.0
911	Supply Technician	53	28	52.8
92A	Cadet Instructor Cadre	4	2	50.0
921	Ammunition Technician	3	3	100.0
93A	Cadet Instructor Cadre	2	1	50.0
933	Traffic Technician	40	11	27.5
935	Mobile Support Equipment Operator	37	26	70.3
R86U	NCS Officer	1	0	0.0
	TOTAL	**1057**	**649**	

Table 59

Categorization of Subjects by Solvent and Noise Exposure

		SOLVENTS*	
		No	Yes
NOISE+	No	49	83
	Yes	61	239

*SOLVENTS: Yes = greater than or equal to 80% of participants in a trade indicated exposure to solvents (n = 398)
No = less than 20% of participants in a trade indicated exposure to solvents (n = 147)

+NOISE: Yes = Participants indicated exposure to noise “Often” or “Constantly” and severity of noise “Moderate” or “Severe”
No = Participants indicated exposure to noise “Never” or “Occasionally” and severity of noise “No noise” or “mild”

Table 60

Summary Statistics for Selected Trades:
Current Age, Total Years of Service, and Number of Years in Current Trade

MOC	Job Title	n	Current Age	Total Years of Service	Years in Trade
031	Infantry Soldier	18	41.2 (6.6)*	21.7 (7.1)	22.0 (6.9)
091	Flight Engineer	33	42.9 (5.6)	23.9 (6.2)	13.1 (8.1)
215	Signal Operator	16	37.1 (5.9)	17.4 (5.9)	16.3 (6.8)
31	Air Navigator	51	35.4 (7.3)	15.2 (7.2)	12.7 (7.1)
32	Pilot	68	37.8 (7.2)	17.3 (7.6)	14.1 (7.6)
411	Vehicle Technician	47	38.7 (6.9)	19.4 (6.8)	17.3 (7.9)
514	Aviation Technician	97	38.4 (5.9)	18.2 (6.3)	11.8 (6.8)
526	Avionics Technician	43	40.4 (5.9)	20.8 (6.1)	14.5 (8.3)
565	Aircraft Structures Technician	17	38.3 (7.4)	18.9 (8.2)	7.4 (6.1)
71B	Marine Surface and Subsurface	15	40.0 (5.5)	19.8 (6.4)	17.2 (7.6)
737	Medical Technician	19	35.8 (7.9)	13.4 (8.8)	10.9 (8.3)
811	Military Police	20	35.8 (5.9)	15.5 (7.2)	12.9 (7.7)
836	Resource Management Support Clerk	64	40.8 (6.6)	18.6 (7.8)	16.2 (8.8)
861	Cook	29	39.7 (6.1)	19.5 (6.9)	17.4 (7.9)
911	Supply Technician	53	39.3 (5.3)	18.1 (6.8)	16.3 (6.8)
933	Traffic Technician	40	38.8 (8.2)	18.8 (9.2)	16.3 (8.7)
935	Mobile Support Equipment Operator	37	39.9 (6.8)	19.4 (8.4)	17.8 (8.6)

* Mean (Standard Deviation)

Table 61

Perceived Change in Hearing Since Joining the CF in Selected Trades

MOC	Trade	No Change or Better	Slightly Worse	Moderately Worse	Much Worse	No Answer	Total n
031	Infantry Soldier	1 (5.6)*	6 (33.3)	7 (38.9)	3 (16.7)	1 (5.6)	18
091	Flight Engineer	3 (9.1)	15 (45.5)	9 (27.3)	6 (18.2)	0 (0.0)	33
215	Signal Operator	3 (18.8)	8 (50.0)	3 (18.8)	1 (6.3)	1 (6.3)	16
31	Air Navigator	15 (29.4)	24 (47.1)	9 (17.6)	2 (3.9)	1 (2.0)	51
32	Pilot	26 (38.2)	27 (39.7)	13 (19.1)	2 (2.9)	0 (0.0)	68
411	Vehicle Technician	9 (19.1)	25 (53.2)	9 (19.1)	4 (8.5)	0 (0.0)	47
514	Aviation Technician	22 (22.7)	49 (50.5)	19 (19.6)	5 (5.2)	2 (2.1)	97
526	Avionics Technician	4 (9.3)	21 (48.8)	12 (27.9)	5 (11.6)	1 (2.3)	43
565	Aircraft Structures Technician	4 (23.5)	6 (35.3)	4 (23.5)	2 (11.8)	1 (5.9)	17
71B	Marine Surface and Subsurface	5 (33.3)	7 (46.7)	3 (20.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	8 (42.1)	8 (42.1)	3 (15.8)	0 (0.0)	0 (0.0)	19
811	Military Police	8 (40.0)	9 (45.0)	2 (10.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	25 (39.1)	25 (39.1)	9 (14.1)	4 (6.3)	1 (1.6)	64
861	Cook	12 (41.4)	9 (31.0)	5 (17.2)	3 (10.3)	0 (0.0)	29
911	Supply Technician	17 (32.1)	23 (43.4)	6 (11.3)	6 (11.3)	1 (1.9)	53
933	Traffic Technician	8 (20.0)	19 (47.5)	6 (15.0)	6 (15.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	10 (27.0)	17 (45.9)	7 (18.9)	1 (2.7)	2 (5.4)	37

*frequency of occurrence (percent of n)

Table 62

Perceived Noisiness of the Workplace in Selected Trades

MOC	Trade	Never	Occasionally	Often	Constantly	No Answer	Total n
031	Infantry Soldier	0 (0.0)*	12 (66.7)	3 (16.7)	3 (16.7)	0 (0.0)	18
091	Flight Engineer	0 (0.0)	4 (12.1)	17 (51.5)	12 (36.4)	0 (0.0)	33
215	Signal Operator	0 (0.0)	8 (50.0)	7 (43.8)	1 (6.3)	0 (0.0)	16
31	Air Navigator	3 (5.9)	22 (43.1)	18 (35.3)	8 (15.7)	0 (0.0)	51
32	Pilot	4 (5.9)	22 (32.4)	32 (47.1)	9 (13.2)	1 (1.5)	68
411	Vehicle Technician	0 (0.0)	12 (25.5)	22 (46.8)	13 (27.7)	0 (0.0)	47
514	Aviation Technician	0 (0.0)	37 (38.1)	42 (43.3)	18 (18.6)	0 (0.0)	97
526	Avionics Technician	1 (2.3)	12 (27.9)	18 (41.9)	12 (27.9)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	5 (29.4)	7 (41.2)	5 (29.4)	0 (0.0)	17
71B	Marine Surface and Subsurface	0 (0.0)	11 (73.3)	4 (26.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	5 (26.3)	12 (63.2)	2 (10.5)	0 (0.0)	0 (0.0)	19
811	Military Police	3 (15.0)	14 (70.0)	3 (15.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	14 (21.9)	36 (56.3)	10 (15.6)	3 (4.7)	1 (1.6)	64
861	Cook	0 (0.0)	11 (37.9)	12 (41.4)	6 (20.7)	0 (0.0)	29
911	Supply Technician	4 (7.5)	33 (62.3)	13 (24.5)	3 (5.7)	0 (0.0)	53
933	Traffic Technician	1 (2.5)	14 (35.0)	20 (50.0)	5 (12.5)	0 (0.0)	40
935	Mobile Support Equipment Operator	3 (8.1)	16 (43.2)	12 (32.4)	6 (16.2)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 63

Perceived Severity of Noise in the Workplace in Selected Trades

MOC	Trade	No Noise	Mild	Moderate	Severe	No Answer	Total n
031	Infantry Soldier	0 (0.0)*	7 (38.9)	10 (55.6)	1 (5.6)	0 (0.0)	18
091	Flight Engineer	0 (0.0)	0 (0.0)	14 (42.4)	18 (54.5)	1 (3.0)	33
215	Signal Operator	0 (0.0)	5 (31.3)	8 (50.0)	2 (12.5)	1 (6.3)	16
31	Air Navigator	3 (5.9)	7 (13.7)	18 (35.3)	23 (45.1)	0 (0.0)	51
32	Pilot	3 (4.4)	12 (17.6)	43 (63.2)	10 (14.7)	0 (0.0)	68
411	Vehicle Technician	0 (0.0)	7 (14.9)	33 (70.2)	7 (14.9)	0 (0.0)	47
514	Aviation Technician	1 (1.0)	25 (25.8)	47 (48.5)	24 (24.7)	0 (0.0)	97
526	Avionics Technician	1 (2.3)	13 (30.2)	23 (53.5)	6 (14.0)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	1 (5.9)	9 (52.9)	7 (41.2)	0 (0.0)	17
71B	Marine Surface and Subsurface	0 (0.0)	11 (73.3)	4 (26.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	6 (31.6)	8 (42.1)	5 (26.3)	0 (0.0)	0 (0.0)	19
811	Military Police	5 (25.0)	10 (50.0)	4 (20.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	8 (12.5)	39 (60.9)	15 (23.4)	1 (1.6)	1 (1.6)	64
861	Cook	0 (0.0)	9 (31.0)	15 (51.7)	5 (17.2)	0 (0.0)	29
911	Supply Technician	5 (9.4)	24 (45.3)	24 (45.3)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	1 (2.5)	8 (20.0)	17 (42.5)	13 (32.5)	1 (2.5)	40
935	Mobile Support Equipment Operator	2 (5.4)	15 (40.5)	15 (40.5)	5 (13.5)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 64

Training Received on the Dangers of Noise Exposure in Selected Trades

MOC	Trade	None	1 hour or less	Less than half a day	A full day	No Answer	Total n
031	Infantry Soldier	8 (44.4)*	6 (33.3)	3 (16.7)	0 (0.0)	1 (5.6)	18
091	Flight Engineer	3 (9.1)	21 (63.6)	7 (21.2)	2 (6.1)	0 (0.0)	33
215	Signal Operator	7 (43.8)	7 (43.8)	2 (12.5)	0 (0.0)	0 (0.0)	16
31	Air Navigator	7 (13.7)	28 (54.9)	13 (25.5)	3 (5.9)	0 (0.0)	51
32	Pilot	10 (14.7)	36 (52.9)	15 (22.1)	7 (10.3)	0 (0.0)	68
411	Vehicle Technician	8 (17.0)	28 (59.6)	8 (17.0)	1 (2.1)	2 (4.3)	47
514	Aviation Technician	18 (18.6)	53 (54.6)	22 (22.7)	4 (4.1)	0 (0.0)	97
526	Avionics Technician	5 (11.6)	27 (62.8)	8 (18.6)	2 (4.7)	1 (2.3)	43
565	Aircraft Structures Technician	1 (5.9)	8 (47.1)	7 (41.2)	1 (5.9)	0 (0.0)	17
71B	Marine Surface and Subsurface	6 (40.0)	7 (46.7)	2 (13.3)	0 (0.0)	0 (0.0)	15
737	Medical Technician	8 (42.1)	8 (42.1)	2 (10.5)	1 (5.3)	0 (0.0)	19
811	Military Police	13 (65.0)	7 (35.0)	0 (0.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	27 (42.2)	31 (48.4)	6 (9.4)	0 (0.0)	0 (0.0)	64
861	Cook	14 (48.3)	14 (48.3)	1 (3.4)	0 (0.0)	0 (0.0)	29
911	Supply Technician	14 (26.4)	34 (64.2)	3 (5.7)	1 (1.9)	1 (1.9)	53
933	Traffic Technician	9 (22.5)	25 (62.5)	4 (10.0)	2 (5.0)	0 (0.0)	40
935	Mobile Support Equipment Operator	15 (40.5)	16 (43.2)	6 (16.2)	0 (0.0)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 65

Demonstrations Received on the Proper Use of Hearing Protectors in Selected Trades

MOC	Trade	None	1 hour or less	Less than half a day	A full day	Total n
031	Infantry Soldier	5 (27.8)*	12 (66.7)	1 (5.6)	0 (0.0)	18
091	Flight Engineer	6 (18.2)	19 (57.6)	7 (21.2)	1 (3.0)	33
215	Signal Operator	5 (31.3)	9 (56.3)	2 (12.5)	0 (0.0)	16
31	Air Navigator	15 (29.4)	29 (56.9)	6 (11.8)	1 (2.0)	51
32	Pilot	16 (23.5)	41 (60.3)	10 (14.7)	1 (1.5)	68
411	Vehicle Technician	9 (19.1)	33 (70.2)	5 (10.6)	0 (0.0)	47
514	Aviation Technician	32 (33.0)	51 (52.6)	10 (10.3)	4 (4.1)	97
526	Avionics Technician	14 (32.6)	24 (55.8)	4 (9.3)	1 (2.3)	43
565	Aircraft Structures Technician	1 (5.9)	12 (70.6)	4 (23.5)	0 (0.0)	17
71B	Marine Surface and Subsurface	4 (26.7)	9 (60.0)	2 (13.3)	0 (0.0)	15
737	Medical Technician	9 (47.4)	7 (36.8)	2 (10.5)	1 (5.3)	19
811	Military Police	9 (45.0)	11 (55.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	20 (31.3)	40 (62.5)	4 (6.3)	0 (0.0)	64
861	Cook	9 (31.0)	20 (69.0)	0 (0.0)	0 (0.0)	29
911	Supply Technician	17 (32.1)	34 (64.2)	1 (1.9)	1 (1.9)	53
933	Traffic Technician	14 (35.0)	22 (55.0)	3 (7.5)	1 (2.5)	40
935	Mobile Support Equipment Operator	13 (35.1)	22 (59.5)	2 (5.4)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 66

Perceived Quality of Training Received Regarding Loud Noise in Selected Trades

MOC	Trade	No training	Poor	Adequate	Good	No answer	Total n
031	Infantry Soldier	3 (16.7)	8 (44.4)	5 (27.8)	2 (11.1)	0 (0.0)	18
091	Flight Engineer	2 (6.1)	15 (45.5)	16 (48.5)	0 (0.0)	0 (0.0)	33
215	Signal Operator	3 (18.8)	5 (31.5)	6 (37.5)	2 (12.5)	0 (0.0)	16
31	Air Navigator	4 (7.8)	15 (29.4)	29 (56.9)	3 (5.9)	0 (0.0)	51
32	Pilot	5 (7.4)	24 (35.3)	34 (50.0)	5 (7.4)	0 (0.0)	68
411	Vehicle Technician	2 (4.3)	20 (42.6)	23 (48.9)	2 (4.3)	0 (0.0)	47
514	Aviation Technician	5 (5.2)	36 (37.1)	47 (48.5)	9 (9.3)	0 (0.0)	97
526	Avionics Technician	3 (7.0)	18 (41.9)	21 (48.8)	1 (2.3)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	4 (23.5)	11 (64.7)	2 (11.8)	0 (0.0)	17
71B	Marine Surface and Subsurface	2 (13.3)	5 (33.3)	8 (53.3)	0 (0.0)	0 (0.0)	15
737	Medical Technician	4 (21.1)	5 (26.3)	9 (47.4)	1 (5.3)	0 (0.0)	19
811	Military Police	5 (25.0)	7 (35.0)	7 (35.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	14 (21.9)	21 (32.8)	25 (39.1)	3 (4.7)	1 (1.6)	64
861	Cook	6 (20.7)	13 (44.8)	8 (27.6)	2 (6.9)	0 (0.0)	29
911	Supply Technician	7 (13.2)	20 (37.7)	22 (41.5)	4 (7.5)	0 (0.0)	53
933	Traffic Technician	6 (15.0)	16 (40.0)	16 (40.0)	2 (5.0)	0 (0.0)	40
935	Mobile Support Equipment Operator	2 (5.4)	21 (56.8)	12 (32.4)	2 (5.4)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 67

How Often Supervisors Advise the Need to Use Hearing Protectors in Selected Trades

MOC	Trade	Never	Occasionally	Often	Constantly	No answer	Total n
031	Infantry Soldier	4 (22.2)*	6 (33.3)	6 (33.3)	2 (11.1)	0 (0.0)	18
091	Flight Engineer	16 (48.5)	11 (33.3)	4 (12.1)	2 (6.1)	0 (0.0)	33
215	Signal Operator	8 (50.0)	7 (43.8)	1 (6.3)	0 (0.0)	0 (0.0)	16
31	Air Navigator	24 (47.1)	16 (31.4)	6 (11.8)	5 (9.8)	0 (0.0)	51
32	Pilot	37 (54.4)	20 (29.4)	7 (10.3)	4 (5.9)	0 (0.0)	68
411	Vehicle Technician	9 (19.1)	20 (42.6)	9 (19.1)	9 (19.1)	0 (0.0)	47
514	Aviation Technician	27 (27.8)	42 (43.3)	22 (22.7)	6 (6.2)	0 (0.0)	97
526	Avionics Technician	13 (30.2)	17 (39.5)	11 (25.6)	2 (4.7)	0 (0.0)	43
565	Aircraft Structures Technician	4 (23.5)	5 (29.4)	7 (41.2)	1 (5.9)	0 (0.0)	17
71B	Marine Surface and Subsurface	2 (13.3)	8 (53.3)	4 (26.7)	1 (6.7)	0 (0.0)	15
737	Medical Technician	11 (57.9)	4 (21.1)	4 (21.1)	0 (0.0)	0 (0.0)	19
811	Military Police	8 (40.0)	7 (35.0)	4 (20.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	50 (78.1)	13 (20.3)	0 (0.0)	0 (0.0)	1 (1.6)	64
861	Cook	22 (75.9)	4 (13.8)	1 (3.4)	2 (6.9)	0 (0.0)	29
911	Supply Technician	23 (43.4)	22 (41.5)	7 (13.2)	1 (1.9)	0 (0.0)	53
933	Traffic Technician	11 (27.5)	15 (37.5)	9 (22.5)	5 (12.5)	0 (0.0)	40
935	Mobile Support Equipment Operator	22 (59.5)	9 (24.3)	5 (13.5)	1 (2.7)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 68

Types of Hearing Protectors Used by CF Personnel in Selected Trades

MOC	Trade	None – no noise	None – with noise	Plugs	Muffs	Plug &/or Muffs	Comms Headset	Headset & Plugs	No answer	Total n
031	Infantry Soldier	1 (5.6)*	1 (5.6)	7 (38.9)	1 (5.6)	5 (27.8)	0 (0.0)	3 (16.7)	0 (0.0)	18
091	Flight Engineer	0 (0.0)	0 (0.0)	1 (3.0)	1 (3.0)	1 (3.0)	20 (60.6)	9 (27.3)	1 (3.0)	33
215	Signal Operator	0 (0.0)	5 (31.3)	2 (12.5)	0 (0.0)	2 (12.5)	6 (37.5)	1 (6.3)	0 (0.0)	16
31	Air Navigator	3 (5.9)	2 (3.9)	2 (3.9)	0 (0.0)	1 (2.0)	24 (47.1)	19 (37.3)	0 (0.0)	51
32	Pilot	3 (4.4)	1 (1.5)	9 (13.2)	1 (1.5)	1 (1.5)	37 (54.4)	14 (20.6)	2 (2.9)	68
411	Vehicle Technician	1 (2.1)	3 (6.4)	11 (23.4)	17 (36.2)	15 (31.9)	0 (0.0)	0 (0.0)	0 (0.0)	47
514	Aviation Technician	3 (3.1)	1 (1.0)	7 (7.2)	28 (28.9)	41 (42.3)	8 (8.2)	9 (9.3)	0 (0.0)	97
526	Avionics Technician	4 (9.3)	2 (4.7)	6 (14.0)	15 (34.9)	10 (23.3)	2 (4.7)	2 (4.7)	2 (4.7)	43
565	Aircraft Structures Technician	0 (0.0)	0 (0.0)	5 (29.4)	4 (23.5)	8 (47.1)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	1 (6.7)	0 (0.0)	5 (33.3)	2 (13.3)	2 (13.3)	3 (20.0)	2 (13.3)	0 (0.0)	15
737	Medical Technician	6 (31.6)	4 (21.1)	4 (21.1)	1 (5.3)	4 (21.1)	0 (0.0)	0 (0.0)	0 (0.0)	19
811	Military Police	9 (45.0)	0 (0.0)	5 (25.0)	3 (15.0)	2 (10.0)	0 (0.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	36 (56.3)	17 (26.6)	8 (12.5)	1 (1.6)	1 (1.6)	0 (0.0)	0 (0.0)	1 (1.6)	64
861	Cook	13 (44.8)	11 (37.9)	4 (13.8)	1 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	29
911	Supply Technician	10 (18.9)	18 (34.0)	17 (32.1)	3 (5.7)	5 (9.4)	0 (0.0)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	2 (5.0)	2 (5.0)	8 (20.0)	7 (17.5)	5 (12.5)	14 (35.0)	2 (5.0)	0 (0.0)	40
935	Mobile Support Equipment Operator	6 (16.2)	9 (24.3)	9 (24.3)	6 (16.2)	7 (18.9)	0 (0.0)	0 (0.0)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 69

How Often Hearing Protectors are Worn when Noisy at Work in Selected Trades

MOC	Trade	Never	< half of a work shift	> half of a work shift	100% of a work shift	No Noise	No answer	Total n
031	Infantry Soldier	2 (11.1)*	8 (44.4)	2 (11.1)	3 (16.7)	1 (5.6)	2 (11.1)	18
091	Flight Engineer	0 (0.0)	5 (15.2)	11 (33.3)	17 (51.5)	0 (0.0)	0 (0.0)	33
215	Signal Operator	3 (18.8)	6 (37.5)	3 (18.8)	2 (12.5)	0 (0.0)	2 (12.5)	16
31	Air Navigator	1 (2.0)	4 (7.8)	6 (11.8)	37 (72.5)	3 (5.9)	0 (0.0)	51
32	Pilot	0 (0.0)	11 (16.2)	13 (19.1)	39 (57.4)	3 (4.4)	2 (2.9)	68
411	Vehicle Technician	5 (10.6)	29 (61.7)	7 (14.9)	5 (10.6)	1 (2.1)	0 (0.0)	47
514	Aviation Technician	4 (4.1)	46 (47.4)	20 (20.6)	20 (20.6)	3 (3.1)	4 (4.1)	97
526	Avionics Technician	1 (2.3)	21 (48.8)	9 (20.9)	6 (14.0)	4 (9.3)	2 (4.7)	43
565	Aircraft Structures Technician	0 (0.0)	9 (52.9)	5 (29.4)	3 (17.6)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	2 (13.3)	5 (33.3)	5 (33.3)	2 (13.3)	1 (6.7)	0 (0.0)	15
737	Medical Technician	6 (31.6)	5 (26.3)	0 (0.0)	2 (10.5)	6 (31.6)	0 (0.0)	19
811	Military Police	1 (5.0)	4 (20.0)	1 (5.0)	2 (10.0)	9 (45.0)	3 (15.0)	20
836	Resource Management Support Clerk	16 (25.0)	5 (7.8)	2 (3.1)	1 (1.6)	36 (56.3)	4 (6.3)	64
861	Cook	10 (34.5)	5 (17.2)	1 (3.4)	0 (0.0)	13 (44.8)	0 (0.0)	29
911	Supply Technician	19 (35.8)	21 (39.6)	1 (1.9)	0 (0.0)	10 (18.9)	2 (3.8)	53
933	Traffic Technician	3 (7.5)	12 (30.0)	8 (20.0)	14 (35.0)	2 (5.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	14 (37.8)	8 (21.6)	7 (18.9)	2 (5.4)	6 (16.2)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 70

Belief that Hearing Protectors are not Beneficial in Selected Trades

MOC	Trade	No Noise	Disagree	Occasionally Agree	Often Agree	Definitely Agree	No Answer	Total n
031	Infantry Soldier	0 (0.0)*	11 (61.1)	0 (0.0)	3 (16.7)	2 (11.1)	2 (11.1)	18
091	Flight Engineer	0 (0.0)	31 (93.9)	0 (0.0)	0 (0.0)	2 (6.1)	0 (0.0)	33
215	Signal Operator	0 (0.0)	12 (75.0)	0 (0.0)	1 (6.3)	3 (18.8)	0 (0.0)	16
31	Air Navigator	0 (0.0)	44 (86.3)	0 (0.0)	1 (2.0)	6 (11.8)	0 (0.0)	51
32	Pilot	1 (1.5)	53 (77.9)	1 (1.5)	1 (1.5)	12 (17.6)	0 (0.0)	68
411	Vehicle Technician	1 (2.1)	34 (72.3)	1 (2.1)	3 (6.4)	8 (17.0)	0 (0.0)	47
514	Aviation Technician	0 (0.0)	76 (78.4)	3 (3.1)	2 (2.1)	15 (15.5)	1 (1.0)	97
526	Avionics Technician	0 (0.0)	34 (79.1)	1 (2.3)	1 (2.3)	7 (16.3)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	17(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	0 (0.0)	11 (73.3)	0 (0.0)	1 (6.7)	3 (20.0)	0 (0.0)	15
737	Medical Technician	4 (21.1)	12 (63.2)	0 (0.0)	0 (0.0)	3 (15.8)	0 (0.0)	19
811	Military Police	4 (20.0)	15 (75.0)	0 (0.0)	0 (0.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	20 (31.3)	32 (50.0)	3 (4.7)	3 (4.7)	3 (4.7)	3 (4.7)	64
861	Cook	4 (13.8)	12 (41.4)	4 (13.8)	3 (10.3)	4 (13.8)	2 (6.9)	29
911	Supply Technician	2 (3.8)	36 (67.9)	2 (3.8)	2 (3.8)	9 (17.0)	2 (3.8)	53
933	Traffic Technician	1 (2.5)	29 (72.5)	0 (0.0)	0 (0.0)	8 (20.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	1 (2.7)	20 (54.1)	2 (5.4)	1 (2.7)	8 (21.6)	5 (13.5)	37

*frequency of occurrence (percent of n)

Table 71

Belief that Hearing Protectors are Uncomfortable in Selected Trades

MOC	Trade	No Noise	Disagree	Occasionally Agree	Often Agree	Definitely Agree	No Answer	Total n
031	Infantry Soldier	0 (0.0)*	4 (22.2)	10 (55.6)	1 (5.6)	2 (11.1)	1 (5.6)	18
091	Flight Engineer	0 (0.0)	6 (18.2)	17 (51.5)	6 (18.2)	3 (9.1)	1 (3.0)	33
215	Signal Operator	0 (0.0)	8 (50.0)	6 (37.5)	2 (12.5)	0 (0.0)	0 (0.0)	16
31	Air Navigator	0 (0.0)	18 (35.3)	23 (45.1)	9 (17.6)	1 (2.0)	0 (0.0)	51
32	Pilot	0 (0.0)	20 (29.4)	24 (35.3)	21 (30.9)	2 (2.9)	1 (1.5)	68
411	Vehicle Technician	1 (2.1)	12 (25.5)	21 (44.7)	7 (14.9)	4 (8.5)	2 (4.3)	47
514	Aviation Technician	0 (0.0)	37 (38.1)	47 (48.5)	10 (10.3)	2 (2.1)	1 (1.0)	97
526	Avionics Technician	0 (0.0)	11 (25.6)	27 (62.8)	4 (9.3)	1 (2.3)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	3 (17.6)	13 (76.5)	1 (5.9)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	0 (0.0)	2 (13.3)	5 (33.3)	7 (46.7)	1 (6.7)	0 (0.0)	15
737	Medical Technician	3 (15.8)	3 (15.8)	8 (42.1)	3 (15.8)	2 (10.5)	0 (0.0)	19
811	Military Police	3 (15.0)	8 (40.0)	5 (25.0)	2 (10.0)	2 (10.0)	0 (0.0)	20
836	Resource Management Support Clerk	16 (25.0)	12 (18.8)	19 (29.7)	8 (12.5)	6 (9.4)	3 (4.7)	64
861	Cook	5 (17.2)	6 (20.7)	7 (24.1)	7 (24.1)	2 (6.9)	2 (6.9)	29
911	Supply Technician	1 (1.9)	18 (34.0)	16 (30.2)	15 (28.3)	1 (1.9)	2 (3.8)	53
933	Traffic Technician	0 (0.0)	10 (25.0)	17 (42.5)	7 (17.5)	4 (10.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	1 (2.7)	12 (32.4)	11 (29.7)	5 (13.5)	3 (8.1)	5 (13.5)	37

*frequency of occurrence (percent of n)

Table 72

Belief that Hearing Protectors will Interfere with Hearing in Selected Trades

MOC	Trade	No Noise	Disagree	Occasionally Agree	Often Agree	Definitely Agree	No Answer	Total n
031	Infantry Soldier	1 (5.6)*	0 (0.0)	5 (27.8)	8 (44.4)	4 (22.2)	0 (0.0)	18
091	Flight Engineer	0 (0.0)	9 (27.3)	6 (18.2)	6 (18.2)	10 (30.3)	2 (6.1)	33
215	Signal Operator	1 (6.3)	0 (0.0)	4 (25.0)	5 (31.3)	6 (37.5)	0 (0.0)	16
31	Air Navigator	0 (0.0)	13 (25.5)	19 (37.3)	7 (13.7)	12 (23.5)	0 (0.0)	51
32	Pilot	0 (0.0)	21 (30.9)	19 (27.9)	16 (23.5)	10 (14.7)	2 (2.9)	68
411	Vehicle Technician	0 (0.0)	7 (14.9)	11 (23.4)	17 (36.2)	11 (23.4)	1 (2.1)	47
514	Aviation Technician	0 (0.0)	14 (14.4)	27 (27.8)	29 (29.9)	26 (26.8)	1 (1.0)	97
526	Avionics Technician	0 (0.0)	4 (9.3)	14 (32.6)	14 (32.6)	11 (25.6)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	3 (17.6)	3 (17.6)	6 (35.3)	5 (29.4)	0 (0.0)	17
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	5 (33.3)	5 (33.3)	5 (33.3)	0 (0.0)	15
737	Medical Technician	3 (15.8)	1 (5.3)	3 (15.8)	6 (31.6)	6 (31.6)	0 (0.0)	19
811	Military Police	4 (20.0)	4 (20.0)	3 (15.0)	1 (5.0)	8 (40.0)	0 (0.0)	20
836	Resource Management Support Clerk	15 (23.4)	5 (7.8)	14 (21.9)	13 (20.3)	16 (25.0)	1 (1.6)	64
861	Cook	3 (10.3)	2 (6.9)	6 (20.7)	7 (24.1)	10 (34.5)	1 (3.4)	29
911	Supply Technician	1 (1.9)	8 (15.1)	11 (20.8)	15 (28.3)	16 (30.2)	2 (3.8)	53
933	Traffic Technician	0 (0.0)	7 (17.5)	10 (25.0)	9 (22.5)	12 (30.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	1 (2.7)	5 (13.5)	11 (29.7)	7 (18.9)	9 (24.3)	4 (10.8)	37

*frequency of occurrence (percent of n)

Table 73

Belief that Hearing Protectors May Pose a Danger at Work in Selected Trades

MOC	Trade	No Noise	Disagree	Occasionally Agree	Often Agree	Definitely Agree	No Answer	Total n
031	Infantry Soldier	0 (0.0)*	5 (27.8)	7 (38.9)	2 (11.1)	3 (16.7)	1 (5.6)	18
091	Flight Engineer	0 (0.0)	27 (81.8)	3 (9.1)	1 (3.0)	1 (3.0)	1 (3.0)	33
215	Signal Operator	1 (6.3)	8 (50.0)	3 (18.8)	0 (0.0)	3 (18.8)	1 (6.3)	16
31	Air Navigator	1 (2.0)	44 (86.3)	3 (5.9)	1 (2.0)	1 (2.0)	1 (2.0)	51
32	Pilot	2 (2.9)	50 (73.5)	11 (16.2)	2 (2.9)	1 (1.5)	2 (2.9)	68
411	Vehicle Technician	1 (2.1)	26 (55.3)	14 (29.8)	4 (8.5)	1 (2.1)	1 (2.1)	47
514	Aviation Technician	1 (1.0)	71 (73.2)	16 (16.5)	2 (2.1)	6 (6.2)	1 (1.0)	97
526	Avionics Technician	1 (2.3)	32 (74.4)	8 (18.6)	1 (2.3)	1 (2.3)	0 (0.0)	43
565	Aircraft Structures Technician	0 (0.0)	12 (70.6)	2 (11.8)	1 (5.9)	1 (5.9)	1 (5.9)	17
71B	Marine Surface and Subsurface	0 (0.0)	13 (86.7)	2 (13.3)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	6 (31.6)	11 (57.9)	1 (5.3)	0 (0.0)	1 (5.3)	0 (0.0)	19
811	Military Police	6 (30.0)	9 (45.0)	3 (15.0)	1 (5.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	27 (42.2)	28 (43.8)	1 (1.6)	3 (4.7)	2 (3.1)	3 (4.7)	64
861	Cook	6 (20.7)	4 (13.8)	3 (10.3)	3 (10.3)	11 (37.9)	2 (6.9)	29
911	Supply Technician	4 (7.5)	34 (64.2)	11 (20.8)	1 (1.9)	1 (1.9)	2 (3.8)	53
933	Traffic Technician	3 (7.5)	24 (60.0)	10 (25.0)	0 (0.0)	1 (2.5)	2 (5.0)	40
935	Mobile Support Equipment Operator	1 (2.7)	18 (48.6)	5 (13.5)	4 (10.8)	5 (13.5)	4 (10.8)	37

*frequency of occurrence (percent of n)

Table 74

Difficulty Listening in a Quiet Room Without Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	13 (72.2)*	3 (16.7)	2 (11.1)	0 (0.0)	0 (0.0)	18
091	Flight Engineer	25 (75.8)	6 (18.2)	1 (3.0)	0 (0.0)	1 (3.0)	33
215	Signal Operator	13 (81.3)	2 (12.5)	1 (6.3)	0 (0.0)	0 (0.0)	16
31	Air Navigator	50 (98.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	64 (94.1)	3 (4.4)	0 (0.0)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	37 (78.7)	8 (17.0)	2 (4.3)	0 (0.0)	0 (0.0)	47
514	Aviation Technician	77 (79.4)	14 (14.4)	4 (4.1)	1 (1.0)	1 (1.0)	97
526	Avionics Technician	36 (83.7)	5 (11.6)	2 (4.7)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	15 (88.2)	2 (11.8)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	14 (73.7)	3 (15.8)	0 (0.0)	1 (5.3)	1 (5.3)	19
811	Military Police	19 (95.0)	1 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	55 (85.9)	8 (12.5)	0 (0.0)	0 (0.0)	1 (1.6)	64
861	Cook	26 (89.7)	2 (6.9)	0 (0.0)	0 (0.0)	1 (3.4)	29
911	Supply Technician	44 (83.0)	5 (9.4)	1 (1.9)	0 (0.0)	3 (5.7)	53
933	Traffic Technician	37 (92.5)	1 (2.5)	1 (2.5)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	28 (75.7)	6 (16.2)	0 (0.0)	0 (0.0)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 75

Difficulty Listening Across a Quiet Room Without Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	8 (44.4)*	5 (27.8)	4 (22.2)	1 (5.6)	0 (0.0)	18
091	Flight Engineer	22 (66.7)	4 (12.1)	5 (15.2)	0 (0.0)	2 (6.1)	33
215	Signal Operator	9 (56.3)	6 (37.5)	1 (6.3)	0 (0.0)	0 (0.0)	16
31	Air Navigator	36 (70.6)	14 (27.5)	1 (2.0)	0 (0.0)	0 (0.0)	51
32	Pilot	55 (80.9)	10 (14.7)	2 (2.9)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	25 (53.2)	15 (31.9)	6 (12.8)	1 (2.1)	0 (0.0)	47
514	Aviation Technician	56 (57.7)	25 (25.8)	8 (8.2)	6 (6.2)	2 (2.1)	97
526	Avionics Technician	28 (65.1)	12 (27.9)	3 (7.0)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	10 (58.8)	5 (29.4)	1 (5.9)	0 (0.0)	1 (5.9)	17
71B	Marine Surface and Subsurface	9 (60.0)	5 (33.3)	1 (6.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	10 (52.6)	6 (31.6)	1 (5.3)	0 (0.0)	2 (10.5)	19
811	Military Police	16 (80.0)	3 (15.0)	1 (5.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	45 (70.3)	14 (21.9)	2 (3.1)	2 (3.1)	1 (1.6)	64
861	Cook	18 (62.1)	10 (34.5)	0 (0.0)	0 (0.0)	1 (3.4)	29
911	Supply Technician	34 (64.2)	11 (20.8)	5 (9.4)	0 (0.0)	3 (5.7)	53
933	Traffic Technician	26 (65.0)	9 (22.5)	2 (5.0)	0 (0.0)	3 (7.5)	40
935	Mobile Support Equipment Operator	24 (64.9)	8 (21.6)	2 (5.4)	0 (0.0)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 76

Difficulty Listening in a Noisy Room Without Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	3 (16.7)*	4 (22.2)	5 (27.8)	6 (33.3)	0 (0.0)	18
091	Flight Engineer	4 (12.1)	16 (48.5)	7 (21.2)	5 (15.2)	1 (3.0)	33
215	Signal Operator	1 (6.3)	8 (50.0)	7 (43.8)	0 (0.0)	0 (0.0)	16
31	Air Navigator	16 (31.4)	26 (51.0)	9 (17.6)	0 (0.0)	0 (0.0)	51
32	Pilot	26 (38.2)	30 (44.1)	11 (16.2)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	10 (21.3)	18 (38.3)	13 (27.7)	6 (12.8)	0 (0.0)	47
514	Aviation Technician	20 (20.6)	37 (38.1)	30 (30.9)	7 (7.2)	3 (3.1)	97
526	Avionics Technician	8 (18.6)	18 (41.9)	16 (37.2)	1 (2.3)	0 (0.0)	43
565	Aircraft Structures Technician	5 (29.4)	6 (35.3)	4 (23.5)	0 (0.0)	2 (11.8)	17
71B	Marine Surface and Subsurface	2 (13.3)	8 (53.3)	5 (33.3)	0 (0.0)	0 (0.0)	15
737	Medical Technician	6 (31.6)	5 (26.3)	7 (36.8)	0 (0.0)	1 (5.3)	19
811	Military Police	10 (50.0)	6 (30.0)	2 (10.0)	2 (10.0)	0 (0.0)	20
836	Resource Management Support Clerk	25 (39.1)	21 (32.8)	14 (21.9)	3 (4.7)	1 (1.6)	64
861	Cook	9 (31.0)	10 (34.5)	8 (27.6)	1 (3.4)	1 (3.4)	29
911	Supply Technician	12 (22.6)	15 (28.3)	19 (35.8)	3 (5.7)	4 (7.5)	53
933	Traffic Technician	7 (17.5)	20 (50.0)	8 (20.0)	3 (7.5)	2 (5.0)	40
935	Mobile Support Equipment Operator	8 (21.6)	14 (37.8)	9 (24.3)	3 (8.1)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 77

Difficulty Listening Across a Noisy Room Without Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	2 (11.1)*	1 (5.6)	7 (38.9)	7 (38.9)	1 (5.6)	18
091	Flight Engineer	2 (6.1)	9 (27.3)	12 (36.4)	9 (27.3)	1 (3.0)	33
215	Signal Operator	0 (0.0)	5 (31.3)	5 (31.3)	6 (37.5)	0 (0.0)	16
31	Air Navigator	6 (11.8)	16 (31.4)	21 (41.2)	6 (11.8)	2 (3.9)	51
32	Pilot	10 (14.7)	27 (39.7)	22 (32.4)	8 (11.8)	1 (1.5)	68
411	Vehicle Technician	2 (4.3)	15 (31.9)	15 (31.9)	15 (31.9)	0 (0.0)	47
514	Aviation Technician	11 (11.3)	26 (26.8)	35 (36.1)	23 (23.7)	2 (2.1)	97
526	Avionics Technician	1 (2.3)	16 (37.2)	15 (34.9)	11 (25.6)	0 (0.0)	43
565	Aircraft Structures Technician	1 (5.9)	5 (29.4)	8 (47.1)	2 (11.8)	1 (5.9)	17
71B	Marine Surface and Subsurface	0 (0.0)	3 (20.0)	8 (53.3)	4 (26.7)	0 (0.0)	15
737	Medical Technician	5 (26.3)	3 (15.8)	6 (31.6)	3 (15.8)	2 (10.5)	19
811	Military Police	6 (30.0)	7 (35.0)	3 (15.0)	4 (20.0)	0 (0.0)	20
836	Resource Management Support Clerk	17 (26.6)	15 (23.4)	17 (26.5)	13 (20.3)	2 (3.1)	64
861	Cook	9 (31.0)	2 (6.9)	13 (44.8)	4 (13.8)	1 (3.4)	29
911	Supply Technician	6 (11.3)	13 (24.5)	16 (30.2)	15 (28.3)	3 (5.7)	53
933	Traffic Technician	6 (15.0)	13 (32.5)	11 (27.5)	9 (22.5)	1 (2.5)	40
935	Mobile Support Equipment Operator	4 (10.8)	12 (32.4)	12 (32.4)	8 (21.6)	1 (2.7)	37

*frequency of occurrence (percent of n)

Table 78

Difficulty Understanding Orders in a Quiet Room With Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	4 (22.2)*	5 (27.8)	7 (38.9)	2 (11.1)	0 (0.0)	18
091	Flight Engineer	14 (42.4)	11 (33.3)	5 (15.2)	1 (3.0)	2 (6.1)	33
215	Signal Operator	5 (31.3)	6 (37.5)	1 (6.3)	2 (12.5)	2 (12.5)	16
31	Air Navigator	23 (45.1)	19 (37.3)	3 (5.9)	1 (2.0)	5 (9.8)	51
32	Pilot	35 (51.5)	25 (36.8)	2 (2.9)	0 (0.0)	6 (8.8)	68
411	Vehicle Technician	14 (29.8)	24 (51.1)	4 (8.5)	5 (10.6)	0 (0.0)	47
514	Aviation Technician	44 (45.4)	34 (35.1)	14 (14.4)	1 (1.0)	4 (4.1)	97
526	Avionics Technician	14 (32.6)	20 (46.5)	8 (18.6)	1 (2.3)	0 (0.0)	43
565	Aircraft Structures Technician	6 (35.3)	9 (52.9)	1 (5.9)	0 (0.0)	1 (5.9)	17
71B	Marine Surface and Subsurface	8 (53.3)	6 (40.0)	1 (6.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	7 (36.8)	6 (31.6)	3 (15.8)	0 (0.0)	3 (15.8)	19
811	Military Police	13 (65.0)	5 (25.0)	1 (5.0)	1 (5.0)	0 (0.0)	20
836	Resource Management Support Clerk	29 (45.3)	22 (34.4)	10 (15.6)	1 (1.6)	2 (3.1)	64
861	Cook	12 (41.4)	8 (27.6)	4 (13.8)	0 (0.0)	5 (17.2)	29
911	Supply Technician	26 (49.1)	15 (28.3)	5 (9.4)	3 (5.7)	4 (7.5)	53
933	Traffic Technician	15 (37.5)	14 (35.0)	9 (22.5)	0 (0.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	14 (37.8)	11 (29.7)	5 (13.5)	1 (2.7)	6 (16.2)	37

*frequency of occurrence (percent of n)

Table 79

Difficulty Understanding Orders in a Noisy Room With Hearing Protectors in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	1 (5.6)*	3 (16.7)	2 (11.1)	12 (66.7)	0 (0.0)	18
091	Flight Engineer	2 (6.1)	9 (27.3)	11 (33.3)	6 (18.2)	5 (15.2)	33
215	Signal Operator	2 (12.5)	5 (31.3)	2 (12.5)	3 (18.8)	4 (25.0)	16
31	Air Navigator	10 (19.6)	17 (33.3)	12 (23.5)	7 (13.7)	5 (9.8)	51
32	Pilot	12 (17.6)	22 (32.4)	20 (29.4)	3 (4.4)	11 (16.2)	68
411	Vehicle Technician	3 (6.4)	12 (25.5)	14 (29.8)	18 (38.3)	0 (0.0)	47
514	Aviation Technician	10 (10.3)	27 (27.8)	25 (25.8)	23 (23.7)	12 (12.4)	97
526	Avionics Technician	4 (9.3)	10 (23.3)	14 (32.6)	15 (34.9)	0 (0.0)	43
565	Aircraft Structures Technician	1 (5.9)	3 (17.6)	8 (47.1)	3 (17.6)	2 (11.8)	17
71B	Marine Surface and Subsurface	0 (0.0)	6 (40.0)	6 (40.0)	3 (20.0)	0 (0.0)	15
737	Medical Technician	3 (15.8)	6 (31.6)	5 (26.3)	2 (10.5)	3 (15.8)	19
811	Military Police	5 (25.0)	5 (25.0)	6 (30.0)	2 (10.0)	2 (10.0)	20
836	Resource Management Support Clerk	14 (21.9)	16 (25.0)	14 (21.9)	18 (28.1)	2 (3.1)	64
861	Cook	8 (27.6)	3 (10.3)	6 (20.7)	7 (24.1)	5 (17.2)	29
911	Supply Technician	9 (17.0)	12 (22.6)	10 (18.9)	17 (32.1)	5 (9.4)	53
933	Traffic Technician	2 (5.0)	14 (35.0)	10 (25.0)	8 (20.0)	6 (15.0)	40
935	Mobile Support Equipment Operator	5 (13.5)	10 (27.0)	7 (18.9)	9 (24.3)	6 (16.2)	37

*frequency of occurrence (percent of n)

Table 80

Difficulty Answering a Telephone in a Quiet Room in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	14 (77.8)*	3 (16.7)	1 (5.6)	0 (0.0)	0 (0.0)	18
091	Flight Engineer	27 (81.8)	5 (15.2)	0 (0.0)	0 (0.0)	1 (3.0)	33
215	Signal Operator	15 (93.8)	1 (6.3)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	50 (98.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	64 (94.1)	3 (4.4)	0 (0.0)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	37 (78.7)	9 (19.1)	0 (0.0)	0 (0.0)	1 (2.1)	47
514	Aviation Technician	84 (86.6)	8 (8.2)	1 (1.0)	2 (2.1)	2 (2.1)	97
526	Avionics Technician	38 (88.4)	4 (9.3)	1 (2.3)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	13 (76.5)	3 (17.6)	0 (0.0)	0 (0.0)	1 (5.9)	17
71B	Marine Surface and Subsurface	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	17 (89.5)	1 (5.3)	0 (0.0)	0 (0.0)	1 (5.3)	19
811	Military Police	20 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	20
836	Resource Management Support Clerk	55 (85.9)	6 (9.4)	2 (3.1)	0 (0.0)	1 (1.6)	64
861	Cook	26 (89.7)	2 (6.9)	0 (0.0)	0 (0.0)	1 (3.4)	29
911	Supply Technician	46 (86.8)	4 (7.5)	0 (0.0)	0 (0.0)	3 (5.7)	53
933	Traffic Technician	38 (95.0)	1 (2.5)	0 (0.0)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	29 (78.4)	3 (8.1)	2 (5.4)	0 (0.0)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 81

Difficulty Answering a Telephone in a Noisy Room in Selected Trades

MOC	Trade	No Difficulty	Slight Difficulty	Moderate Difficultly	Great Difficulty	No answer	Total n
031	Infantry Soldier	2 (11.1)*	2 (11.1)	5 (27.8)	9 (50.0)	0 (0.0)	18
091	Flight Engineer	4 (12.1)	11 (33.3)	11 (33.3)	6 (18.2)	1 (3.0)	33
215	Signal Operator	2 (12.5)	8 (50.0)	4 (25.0)	2 (12.5)	0 (0.0)	16
31	Air Navigator	11 (21.6)	26 (51.0)	13 (25.5)	0 (0.0)	1 (2.0)	51
32	Pilot	18 (26.5)	37 (54.4)	12 (17.6)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	3 (6.4)	14 (29.8)	15 (31.9)	15 (31.9)	0 (0.0)	47
514	Aviation Technician	14 (14.4)	45 (46.4)	25 (25.8)	10 (10.3)	3 (3.1)	97
526	Avionics Technician	5 (11.6)	19 (44.2)	10 (23.3)	8 (18.6)	1 (2.3)	43
565	Aircraft Structures Technician	1 (5.9)	4 (23.5)	9 (52.9)	2 (11.8)	1 (5.9)	17
71B	Marine Surface and Subsurface	2 (13.3)	5 (33.3)	6 (40.0)	2 (13.3)	0 (0.0)	15
737	Medical Technician	4 (21.1)	5 (26.3)	5 (26.3)	4 (21.1)	1 (5.3)	19
811	Military Police	8 (40.0)	4 (20.0)	6 (30.0)	2 (10.0)	0 (0.0)	20
836	Resource Management Support Clerk	15 (23.4)	20 (31.3)	16 (25.0)	11 (17.2)	2 (3.1)	64
861	Cook	8 (27.6)	4 (13.8)	13 (44.8)	3 (10.3)	1 (3.4)	29
911	Supply Technician	7 (13.2)	21 (39.6)	14 (26.4)	8 (15.1)	3 (5.7)	53
933	Traffic Technician	8 (20.0)	16 (40.0)	12 (30.0)	3 (7.5)	1 (2.5)	40
935	Mobile Support Equipment Operator	5 (13.5)	14 (37.8)	10 (27.0)	7 (18.9)	1 (2.7)	37

*frequency of occurrence (percent of n)

Table 82

Exposure to Solvents in Selected Trades

MOC	Trade	Never Exposed	Exposed	No Answer	Total n
031	Infantry Soldier	3 (16.7)*	14 (77.8)	1 (5.6)	18
091	Flight Engineer	0 (0.0)	32 (97.0)	1 (3.0)	33
215	Signal Operator	4 (25.0)	12 (75.0)	0 (0.0)	16
31	Air Navigator	46 (90.2)	5 (9.8)	0 (0.0)	51
32	Pilot	58 (85.3)	9 (13.2)	1 (1.5)	68
411	Vehicle Technician	0 (0.0)	47(100.0)	0 (0.0)	47
514	Aviation Technician	2 (2.1)	93 (95.9)	2 (2.1)	97
526	Avionics Technician	4 (9.3)	38 (88.4)	1 (2.3)	43
565	Aircraft Structures Technician	0 (0.0)	17(100.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	4 (26.7)	11 (73.3)	0 (0.0)	15
737	Medical Technician	6 (31.6)	12 (63.2)	1 (5.3)	19
811	Military Police	13 (65.0)	7 (35.0)	0 (0.0)	20
836	Resource Management Support Clerk	48 (75.0)	14 (21.9)	2 (3.1)	64
861	Cook	11 (37.9)	17 (58.6)	1 (3.4)	29
911	Supply Technician	24 (45.3)	28 (52.8)	1 (1.9)	53
933	Traffic Technician	27 (67.5)	11 (27.5)	2 (5.0)	40
935	Mobile Support Equipment Operator	7 (18.9)	26 (70.3)	4 (10.8)	37

*frequency of occurrence (percent of n)

Table 83

Use of Respiratory Protective Equipment During Exposure to Solvents in Selected Trades

MOC	Trade	Never	< ½ work shift	> ½ work shift	100% work shift	No answer	n^+
031	Infantry Soldier	6 (42.9)*	5 (35.7)	3 (21.4)	0 (0.0)	0 (0.0)	14
091	Flight Engineer	17 (53.1)	13 (40.6)	1 (3.1)	1 (3.1)	0 (0.0)	32
215	Signal Operator	11 (91.7)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	12
31	Air Navigator	4 (80.0)	0 (0.0)	1 (20.0)	0 (0.0)	0 (0.0)	5
32	Pilot	7 (77.8)	2 (22.2)	0 (0.0)	0 (0.0)	0 (0.0)	9
411	Vehicle Technician	18 (38.3)	24 (51.1)	2 (4.3)	3 (6.4)	0 (0.0)	47
514	Aviation Technician	18 (19.4)	48 (51.6)	17 (18.3)	9 (9.7)	1 (1.1)	93
526	Avionics Technician	17 (44.7)	14 (36.8)	6 (15.8)	1 (2.6)	0 (0.0)	38
565	Aircraft Structures Technician	0 (0.0)	7 (41.2)	6 (35.3)	3 (17.6)	1 (5.9)	17
71B	Marine Surface and Subsurface	9 (81.8)	1 (9.1)	1 (9.1)	0 (0.0)	0 (0.0)	11
737	Medical Technician	6 (50.0)	3 (25.0)	1 (8.3)	2 (16.7)	0 (0.0)	12
811	Military Police	6 (85.7)	1 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	7
836	Resource Management Support Clerk	7 (50.0)	3 (21.4)	2 (14.3)	1 (7.1)	1 (7.1)	14
861	Cook	10 (58.8)	3 (17.6)	1 (5.9)	3 (17.6)	0 (0.0)	17
911	Supply Technician	18 (64.3)	7 (25.0)	2 (7.1)	1 (3.6)	0 (0.0)	28
933	Traffic Technician	6 (54.5)	2 (18.2)	2 (18.2)	1 (9.1)	0 (0.0)	11
935	Mobile Support Equipment Operator	17 (65.4)	8 (30.8)	0 (0.0)	1 (3.8)	0 (0.0)	26

* frequency of occurrence (percent of n^+, participants who indicate exposure to solvents; see Table 82)

Table 84

History of Accidents at Work Involving Head Injuries in Selected Trades

MOC	Trade	None	One accident	Two accidents	> two accidents	No answer	Total n
031	Infantry Soldier	15 (83.3)*	2 (11.1)	0 (0.0)	0 (0.0)	1 (5.6)	18
091	Flight Engineer	29 (87.9)	1 (3.0)	0 (0.0)	2 (6.1)	1 (3.0)	33
215	Signal Operator	15 (93.8)	1 (6.3)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	51 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	63 (92.6)	4 (5.9)	0 (0.0)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	38 (80.9)	6 (12.8)	1 (2.1)	2 (4.3)	0 (0.0)	47
514	Aviation Technician	89 (91.8)	5 (5.2)	2 (2.1)	0 (0.0)	1 (1.0)	97
526	Avionics Technician	39 (90.7)	3 (7.0)	1 (2.3)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	15 (88.2)	1 (5.9)	1 (5.9)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	15 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	15 (78.9)	2 (10.5)	0 (0.0)	1 (5.3)	1 (5.3)	19
811	Military Police	18 (90.0)	0 (0.0)	1 (5.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	58 (90.6)	4 (6.3)	1 (1.6)	0 (0.0)	1 (1.6)	64
861	Cook	26 (89.7)	2 (6.9)	1 (3.4)	0 (0.0)	0 (0.0)	29
911	Supply Technician	50 (94.3)	2 (3.8)	0 (0.0)	0 (0.0)	1 (1.9)	53
933	Traffic Technician	37 (92.5)	1 (2.5)	0 (0.0)	0 (0.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	33 (89.2)	1 (2.7)	0 (0.0)	0 (0.0)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 85

Presence of Permanent Hearing Loss Due to Head Injury in Selected Trades

MOC	Trade	Returned to Normal	Mild Hearing Loss	Moderate Hearing Loss	No Answer	n^+
031	Infantry Soldier	1 (33.3)*	2 (66.7)	0 (0.0)	0 (0.0)	3
091	Flight Engineer	2 (50.0)	0 (0.0)	1 (25.0)	1 (25.0)	4
215	Signal Operator	0 (0.0)	0 (0.0)	1(100.0)	0 (0.0)	1
31	Air Navigator	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
32	Pilot	4 (80.0)	0 (0.0)	0 (0.0)	1 (20.0)	5
411	Vehicle Technician	4 (44.4)	2 (22.2)	2 (22.2)	1 (11.1)	9
514	Aviation Technician	3 (37.5)	3 (37.5)	1 (12.5)	1 (12.5)	8
526	Avionics Technician	1 (25.0)	2 (50.0)	0 (0.0)	1 (25.0)	4
565	Aircraft Structures Technician	0 (0.0)	2(100.0)	0 (0.0)	0 (0.0)	2
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	---
737	Medical Technician	1 (25.0)	2 (50.0)	0 (0.0)	1 (25.0)	4
811	Military Police	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)	2
836	Resource Management Support Clerk	2 (33.3)	3 (50.0)	0 (0.0)	1 (16.7)	6
861	Cook	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)	3
911	Supply Technician	2 (66.7)	0 (0.0)	0 (0.0)	1 (33.3)	3
933	Traffic Technician	0 (0.0)	0 (0.0)	1 (33.3)	2 (66.7)	3
935	Mobile Support Equipment Operator	0 (0.0)	1 (25.0)	0 (0.0)	3 (75.0)	4

* frequency of occurrence (percent of n^+, participants who indicate a history of head injuries at work; See Table 84)

Table 86

Ears That Were Affected by the Accident in Selected Trades

MOC	Trade	Neither Ear	Right Ear	Left Ear	Both Ears	No Answer	n^+
031	Infantry Soldier	0 (0.0)*	0 (0.0)	0 (0.0)	3(100.0)	0 (0.0)	3
091	Flight Engineer	0 (0.0)	0 (0.0)	0 (0.0)	3 (75.0)	1 (25.0)	4
215	Signal Operator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
31	Air Navigator	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
32	Pilot	1 (20.0)	0 (0.0)	2 (40.0)	1 (20.0)	1 (20.0)	5
411	Vehicle Technician	0 (0.0)	4 (44.4)	2 (22.2)	3 (33.3)	0 (0.0)	9
514	Aviation Technician	1 (12.5)	0 (0.0)	1 (12.5)	6 (75.0)	0 (0.0)	8
526	Avionics Technician	0 (0.0)	2 (50.0)	2 (50.0)	0 (0.0)	0 (0.0)	4
565	Aircraft Structures Technician	0 (0.0)	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
737	Medical Technician	1 (25.0)	0 (0.0)	0 (0.0)	2 (50.0)	1 (25.0)	4
811	Military Police	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)	2
836	Resource Management Support Clerk	2 (33.3)	0 (0.0)	1 (16.7)	2 (33.3)	1 (16.7)	6
861	Cook	0 (0.0)	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	3
911	Supply Technician	1 (33.3)	0 (0.0)	0 (0.0)	1 (33.3)	1 (33.3)	3
933	Traffic Technician	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	2 (66.7)	3
935	Mobile Support Equipment Operator	0 (0.0)	0 (0.0)	1 (25.0)	0 (0.0)	3 (75.0)	4

* frequency of occurrence (percent of n^+, participants who indicate a history of head injuries at work; See Table 84)

Table 87

Satisfaction With Treatment Received in Selected Trades

MOC	Trade	No treatment	Dissatisfied	Somewhat satisfied	Very satisfied	No Answer	n^+
031	Infantry Soldier	3(100.0)*	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
091	Flight Engineer	1 (25.0)	1 (25.0)	1 (25.0)	0 (0.0)	1 (25.0)	4
215	Signal Operator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
31	Air Navigator	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
32	Pilot	3 (60.0)	0 (0.0)	0 (0.0)	1 (20.0)	1 (20.0)	5
411	Vehicle Technician	3 (33.3)	1 (11.1)	3 (33.3)	2 (22.2)	0 (0.0)	9
514	Aviation Technician	4 (50.0)	1 (12.5)	2 (25.0)	1 (12.5)	0 (0.0)	8
526	Avionics Technician	2 (50.0)	0 (0.0)	1 (25.0)	1 (25.0)	0 (0.0)	4
565	Aircraft Structures Technician	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
737	Medical Technician	0 (0.0)	0 (0.0)	1 (25.0)	2 (50.0)	1 (25.0)	4
811	Military Police	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	2
836	Resource Management Support Clerk	1 (16.7)	1 (16.7)	3 (50.0)	0 (0.0)	1 (16.7)	6
861	Cook	0 (0.0)	1 (33.3)	1 (33.3)	0 (0.0)	1 (33.3)	3
911	Supply Technician	1 (33.3)	0 (0.0)	1 (33.3)	0 (0.0)	1 (33.3)	3
933	Traffic Technician	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (66.7)	3
935	Mobile Support Equipment Operator	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (75.0)	4

* frequency of occurrence (percent of n^+, participants who indicate a history of head injuries at work; See Table 84)

Table 88a

History of Ear Infections as a Child in Selected Trades

MOC	Trade	None	One	Two	More than two	No answer	Total n
031	Infantry Soldier	8 (44.4)*	5 (27.8)	2 (11.1)	2 (11.1)	1 (5.6)	18
091	Flight Engineer	21 (63.6)	2 (6.1)	1 (3.0)	8 (24.2)	1 (3.0)	33
215	Signal Operator	10 (62.5)	1 (6.3)	0 (0.0)	4 (25.0)	1 (6.3)	16
31	Air Navigator	31 (60.8)	4 (7.8)	1 (2.0)	11 (21.6)	4 (7.8)	51
32	Pilot	37 (54.4)	12 (17.6)	4 (5.9)	11 (16.2)	4 (5.9)	68
411	Vehicle Technician	25 (53.2)	9 (19.1)	2 (4.3)	7 (14.9)	4 (8.5)	47
514	Aviation Technician	57 (58.8)	17 (17.5)	3 (3.1)	16 (16.5)	4 (4.1)	97
526	Avionics Technician	21 (48.8)	2 (4.7)	3 (7.0)	16 (37.2)	1 (2.3)	43
565	Aircraft Structures Technician	10 (58.8)	2 (11.8)	3 (17.6)	1 (5.9)	1 (5.9)	17
71B	Marine Surface and Subsurface	5 (33.3)	1 (6.7)	5 (33.3)	2 (13.3)	2 (13.3)	15
737	Medical Technician	7 (36.8)	3 (15.8)	2 (10.5)	6 (31.6)	1 (5.3)	19
811	Military Police	10 (50.0)	1 (5.0)	1 (5.0)	5 (25.0)	3 (15.0)	20
836	Resource Management Support Clerk	29 (45.3)	11 (17.2)	8 (12.5)	14 (21.9)	2 (3.1)	64
861	Cook	20 (69.0)	3 (10.3)	4 (13.8)	2 (6.9)	0 (0.0)	29
911	Supply Technician	29 (54.7)	7 (13.2)	4 (7.5)	12 (22.6)	1 (1.9)	53
933	Traffic Technician	20 (50.0)	6 (15.0)	1 (2.5)	10 (25.0)	3 (7.5)	40
935	Mobile Support Equipment Operator	24 (64.9)	3 (8.1)	2 (5.4)	6 (16.2)	2 (5.4)	37

*frequency of occurrence (percent of n)

Table 88b

History of Ear Infections as a Adult in Selected Trades

MOC	Trade	None	One	Two	More than two	No answer	Total n
031	Infantry Soldier	10 (55.6)*	4 (22.2)	0 (0.0)	3 (16.7)	1 (5.6)	18
091	Flight Engineer	22 (66.7)	3 (9.1)	4 (12.1)	3 (9.1)	1 (3.0)	33
215	Signal Operator	12 (75.0)	2 (12.5)	2 (12.5)	0 (0.0)	0 (0.0)	16
31	Air Navigator	41 (80.4)	5 (9.8)	2 (3.9)	3 (5.9)	0 (0.0)	51
32	Pilot	42 (61.8)	12 (17.6)	3 (4.4)	9 (13.2)	2 (2.9)	68
411	Vehicle Technician	28 (59.6)	8 (17.0)	5 (10.6)	4 (8.5)	2 (4.3)	47
514	Aviation Technician	69 (71.1)	10 (10.3)	8 (8.2)	9 (9.3)	1 (1.0)	97
526	Avionics Technician	29 (67.4)	3 (7.0)	6 (14.0)	5 (11.6)	0 (0.0)	43
565	Aircraft Structures Technician	12 (70.6)	2 (11.8)	3 (17.6)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	10 (66.7)	2 (13.3)	0 (0.0)	3 (20.0)	0 (0.0)	15
737	Medical Technician	11 (57.9)	2 (10.5)	2 (10.5)	3 (15.8)	1 (5.3)	19
811	Military Police	11 (55.0)	5 (25.0)	1 (5.0)	2 (10.0)	1 (5.0)	20
836	Resource Management Support Clerk	39 (60.9)	12 (18.8)	4 (6.3)	8 (12.5)	1 (1.6)	64
861	Cook	17 (58.6)	4 (13.8)	3 (10.3)	5 (17.2)	0 (0.0)	29
911	Supply Technician	35 (66.0)	7 (13.2)	3 (5.7)	8 (15.1)	0 (0.0)	53
933	Traffic Technician	27 (67.5)	3 (7.5)	5 (12.5)	3 (7.5)	2 (5.0)	40
935	Mobile Support Equipment Operator	24 (64.9)	3 (8.1)	5 (13.5)	5 (13.5)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 89

Effect of Ear Infections on Hearing in Selected Trades

MOC	Trade	No ear infections	Hearing Returned to normal	Mild Hearing Loss	Moderate Hearing Loss	Severe Hearing Loss	No answer	Total n
031	Infantry Soldier	9 (50.0)*	6 (33.3)	1 (5.6)	0 (0.0)	0 (0.0)	2 (11.1)	18
091	Flight Engineer	16 (48.5)	13 (39.4)	0 (0.0)	0 (0.0)	1 (3.0)	3 (9.1)	33
215	Signal Operator	10 (62.5)	6 (37.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	30 (58.8)	20 (39.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.0)	51
32	Pilot	29 (42.6)	35 (51.5)	0 (0.0)	0 (0.0)	0 (0.0)	4 (5.9)	68
411	Vehicle Technician	28 (59.6)	14 (29.8)	3 (6.4)	0 (0.0)	0 (0.0)	2 (4.3)	47
514	Aviation Technician	59 (60.8)	31 (32.0)	1 (1.0)	2 (2.1)	0 (0.0)	2 (4.2)	97
526	Avionics Technician	22 (51.2)	19 (44.2)	1 (2.3)	0 (0.0)	0 (0.0)	1 (2.3)	43
565	Aircraft Structures Technician	10 (58.8)	4 (23.5)	1 (5.9)	1 (5.9)	0 (0.0)	1 (5.9)	17
71B	Marine Surface and Subsurface	8 (53.3)	7 (46.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	11 (57.9)	6 (31.6)	1 (5.3)	0 (0.0)	0 (0.0)	1 (5.3)	19
811	Military Police	10 (50.0)	9 (45.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	32 (50.0)	26 (40.6)	1 (1.6)	1 (1.6)	0 (0.0)	4 (6.3)	64
861	Cook	18 (62.1)	10 (34.5)	1 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	29
911	Supply Technician	26 (49.1)	22 (41.5)	3 (5.7)	2 (3.8)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	21 (52.5)	13 (32.5)	1 (2.5)	0 (0.0)	0 (0.0)	5 (12.5)	40
935	Mobile Support Equipment Operator	24 (64.9)	11 (29.7)	1 (2.7)	0 (0.0)	0 (0.0)	1 (2.7)	37

*frequency of occurrence (percent of n)

Table 90

History of Head Injuries Outside Work in Selected Trades

MOC	Trade	None	One	Two	> than two	No answer	Total n
031	Infantry Soldier	12 (66.7)*	2 (11.1)	1 (5.6)	2 (11.1)	1 (5.6)	18
091	Flight Engineer	29 (87.9)	2 (6.1)	0 (0.0)	1 (3.0)	1 (3.0)	33
215	Signal Operator	15 (93.8)	0 (0.0)	1 (6.3)	0 (0.0)	0 (0.0)	16
31	Air Navigator	44 (86.3)	5 (9.8)	2 (3.9)	0 (0.0)	0 (0.0)	51
32	Pilot	59 (86.8)	8 (11.8)	1 (1.5)	0 (0.0)	0 (0.0)	68
411	Vehicle Technician	40 (85.1)	4 (8.5)	0 (0.0)	2 (4.3)	1 (2.1)	47
514	Aviation Technician	86 (88.7)	8 (8.2)	2 (2.1)	1 (1.0)	0 (0.0)	97
526	Avionics Technician	38 (88.4)	4 (9.3)	1 (2.3)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	16 (94.1)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	11 (73.3)	3 (20.0)	1 (6.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	14 (73.7)	1 (5.3)	3 (15.8)	0 (0.0)	1 (5.3)	19
811	Military Police	18 (90.0)	1 (5.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	54 (84.4)	6 (9.4)	3 (4.7)	0 (0.0)	1 (1.6)	64
861	Cook	25 (86.2)	1 (3.4)	0 (0.0)	2 (6.9)	1 (3.4)	29
911	Supply Technician	48 (90.6)	4 (7.5)	1 (1.9)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	35 (87.5)	3 (7.5)	1 (2.5)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	29 (78.4)	5 (13.5)	1 (2.7)	0 (0.0)	2 (5.4)	37

*frequency of occurrence (percent of n)

Table 91

Effect of Head Injury on Hearing in Selected Trades

MOC	Trade	None	Returned to normal	Permanent Loss	No Answer	n^+
031	Infantry Soldier	4 (80.0)	0 (0.0)	0 (0.0)	1 (20.0)	5
091	Flight Engineer	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
215	Signal Operator	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
31	Air Navigator	6 (85.7)	1 (14.3)	0 (0.0)	0 (0.0)	7
32	Pilot	9 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	9
411	Vehicle Technician	6 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	6
514	Aviation Technician	10 (90.9)	1 (9.1)	0 (0.0)	0 (0.0)	11
526	Avionics Technician	4 (80.0)	1 (20.0)	0 (0.0)	0 (0.0)	5
565	Aircraft Structures Technician	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
71B	Marine Surface and Subsurface	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	4
737	Medical Technician	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	4
811	Military Police	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
836	Resource Management Support Clerk	7 (77.8)	2 (22.2)	0 (0.0)	0 (0.0)	9
861	Cook	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	3
911	Supply Technician	4 (80.0)	1 (20.0)	0 (0.0)	0 (0.0)	5
933	Traffic Technician	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	4
935	Mobile Support Equipment Operator	5 (83.3)	1 (16.7)	0 (0.0)	0 (0.0)	6

* frequency of occurrence (percent of n^+, participants who indicate a history of head injuries outside of work; see Table 90)

Table 92

Use of Medications that May Have Affected Hearing in Selected Trades

MOC	Trade	None	Yes, no effect	Hearing returned to normal	No answer	Total n
031	Infantry Soldier	16 (88.9)*	1 (5.6)	0 (0.0)	1 (5.6)	18
091	Flight Engineer	30 (90.9)	0 (0.0)	0 (0.0)	3 (9.1)	33
215	Signal Operator	16(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	51(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	65 (95.6)	1 (1.5)	1 (1.5)	1 (1.5)	68
411	Vehicle Technician	46 (97.9)	0 (0.0)	0 (0.0)	1 (2.1)	47
514	Aviation Technician	94 (96.9)	1 (1.0)	0 (0.0)	2 (2.1)	97
526	Avionics Technician	42 (97.7)	0 (0.0)	0 (0.0)	1 (2.3)	43
565	Aircraft Structures Technician	16 (94.1)	0 (0.0)	0 (0.0)	1 (5.9)	17
71B	Marine Surface and Subsurface	13 (86.7)	0 (0.0)	0 (0.0)	2 (13.3)	15
737	Medical Technician	16 (84.2)	0 (0.0)	2 (10.5)	1 (5.3)	19
811	Military Police	19 (95.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	60 (93.8)	1 (1.6)	0 (0.0)	3 (4.7)	64
861	Cook	29(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	29
911	Supply Technician	51 (96.2)	1 (1.9)	1 (1.9)	0 (0.0)	53
933	Traffic Technician	37 (92.5)	0 (0.0)	2 (5.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	36 (97.3)	1 (2.7)	0 (0.0)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 93

Presence of Noise in Head or Ears in Selected Trades

MOC	Trade	None	Occasionally < half the time	Often > half the time	Constantly	No answer	Total n
031	Infantry Soldier	6 (33.3)*	8 (44.4)	2 (11.1)	1 (5.6)	1 (5.6)	18
091	Flight Engineer	16 (48.5)	8 (24.2)	3 (9.1)	5 (15.2)	1 (3.0)	33
215	Signal Operator	4 (25.0)	9 (56.3)	1 (6.3)	2 (12.5)	0 (0.0)	16
31	Air Navigator	31 (60.8)	18 (35.3)	0 (0.0)	2 (3.9)	0 (0.0)	51
32	Pilot	46 (67.6)	20 (29.4)	1 (1.5)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	17 (36.2)	24 (51.1)	2 (4.3)	3 (6.4)	1 (2.1)	47
514	Aviation Technician	48 (49.5)	34 (35.1)	7 (7.2)	7 (7.2)	1 (1.0)	97
526	Avionics Technician	22 (51.2)	15 (34.9)	1 (2.3)	5 (11.6)	0 (0.0)	43
565	Aircraft Structures Technician	8 (47.1)	7 (41.2)	2 (11.8)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	5 (33.3)	9 (60.0)	1 (6.7)	0 (0.0)	0 (0.0)	15
737	Medical Technician	3 (15.8)	12 (63.2)	1 (5.3)	2 (10.5)	1 (5.3)	19
811	Military Police	14 (70.0)	5 (25.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	30 (46.9)	21 (32.8)	9 (14.1)	3 (4.7)	1 (1.6)	64
861	Cook	14 (48.3)	13 (44.8)	1 (3.4)	1 (3.4)	0 (0.0)	29
911	Supply Technician	26 (49.1)	20 (37.7)	0 (0.0)	6 (11.3)	1 (1.9)	53
933	Traffic Technician	19 (47.5)	18 (45.0)	2 (5.0)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	13 (35.1)	17 (45.9)	0 (0.0)	4 (10.8)	3 (8.1)	37

*frequency of occurrence (percent of n)

Table 94

Loudness of Noise in Head or Ears in Selected Trades

MOC	Trade	Low	Moderate	Loud	n^+
031	Infantry Soldier	6 (54.5)*	5 (45.5)	0 (0.0)	11
091	Flight Engineer	8 (50.0)	4 (25.0)	4 (25.0)	16
215	Signal Operator	7 (58.3)	4 (33.3)	1 (8.3)	12
31	Air Navigator	18 (90.0)	2 (10.0)	0 (0.0)	20
32	Pilot	17 (81.0)	4 (19.0)	0 (0.0)	21
411	Vehicle Technician	17 (58.6)	12 (41.4)	0 (0.0)	29
514	Aviation Technician	30 (62.5)	15 (31.3)	3 (6.3)	48
526	Avionics Technician	11 (52.4)	7 (33.3)	3 (14.3)	21
565	Aircraft Structures Technician	4 (44.4)	4 (44.4)	1 (11.1)	9
71B	Marine Surface and Subsurface	8 (80.0)	2 (20.0)	0 (0.0)	10
737	Medical Technician	10 (66.7)	5 (33.3)	0 (0.0)	15
811	Military Police	4 (80.0)	1 (20.0)	0 (0.0)	5
836	Resource Management Support Clerk	16 (48.5)	13 (39.4)	4 (12.1)	33
861	Cook	9 (60.0)	6 (40.0)	0 (0.0)	15
911	Supply Technician	13 (50.0)	11 (42.3)	2 (7.7)	26
933	Traffic Technician	15 (75.0)	5 (25.0)	0 (0.0)	20
935	Mobile Support Equipment Operator	13 (61.9)	7 (33.3)	1 (4.8)	21

* frequency of occurrence (percent of n^+, participants who indicate having noise in the head or ears; See Table 93)

Table 95

Interference of Noise in Head or Ears with Hearing in Selected Trades

MOC	Trade	None	Slight Interference	Moderate interference	Much interference	No Answer	n+
031	Infantry Soldier	2 (18.2)+	7 (63.6)	2 (18.2)	0 (0.0)	0 (0.0)	11
091	Flight Engineer	7 (43.8)	6 (37.5)	1 (6.3)	2 (12.5)	0 (0.0)	16
215	Signal Operator	2 (16.7)	8 (66.7)	1 (8.3)	1 (8.3)	0 (0.0)	12
31	Air Navigator	10 (50.0)	10 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	20
32	Pilot	12 (57.1)	9 (42.9)	0 (0.0)	0 (0.0)	0 (0.0)	21
411	Vehicle Technician	14 (48.3)	12 (41.4)	3 (10.3)	0 (0.0)	0 (0.0)	29
514	Aviation Technician	22 (45.8)	20 (41.7)	4 (8.3)	2 (4.2)	0 (0.0)	48
526	Avionics Technician	10 (47.6)	7 (33.3)	3 (14.3)	1 (4.8)	0 (0.0)	21
565	Aircraft Structures Technician	5 (55.6)	2 (22.2)	2 (22.2)	0 (0.0)	0 (0.0)	9
71B	Marine Surface and Subsurface	8 (80.0)	1 (10.0)	1 (10.0)	0 (0.0)	0 (0.0)	10
737	Medical Technician	8 (53.3)	6 (40.0)	1 (6.7)	0 (0.0)	0 (0.0)	15
811	Military Police	2 (40.0)	2 (40.0)	0 (0.0)	0 (0.0)	1 (20.0)	5
836	Resource Management Support Clerk	14 (42.4)	13 (39.4)	5 (15.2)	1 (3.0)	0 (0.0)	33
861	Cook	8 (53.3)	6 (40.0)	1 (6.7)	0 (0.0)	0 (0.0)	15
911	Supply Technician	14 (53.8)	8 (30.8)	3 (11.5)	1 (3.8)	0 (0.0)	26
933	Traffic Technician	11 (55.0)	8 (40.0)	1 (5.0)	0 (0.0)	0 (0.0)	20
935	Mobile Support Equipment Operator	12 (57.1)	7 (33.3)	0 (0.0)	2 (9.5)	0 (0.0)	21

+ frequency of occurrence (percent of n+, participants who indicate having noise in the head or ears; See Table 93)

Table 96

Disturbance of Noise in Head or Ears with Sleep in Selected Trades

MOC	Trade	None	Occasionally < half the time	Often > half the time	Constantly	n+
031	Infantry Soldier	6 (54.5)*	4 (36.4)	1 (9.1)	0 (0.0)	11
091	Flight Engineer	10 (62.5)	3 (18.8)	1 (6.3)	2 (12.5)	16
215	Signal Operator	10 (83.3)	1 (8.3)	0 (0.0)	1 (8.3)	12
31	Air Navigator	13 (65.0)	7 (35.0)	0 (0.0)	0 (0.0)	20
32	Pilot	19 (90.5)	2 (9.5)	0 (0.0)	0 (0.0)	21
411	Vehicle Technician	24 (82.8)	3 (10.3)	0 (0.0)	2 (6.9)	29
514	Aviation Technician	32 (66.7)	13 (27.1)	1 (2.1)	2 (4.2)	48
526	Avionics Technician	14 (66.7)	6 (28.6)	1 (4.8)	0 (0.0)	21
565	Aircraft Structures Technician	8 (88.9)	1 (11.1)	0 (0.0)	0 (0.0)	9
71B	Marine Surface and Subsurface	10(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	10
737	Medical Technician	10 (66.7)	4 (26.7)	0 (0.0)	1 (6.7)	15
811	Military Police	4 (80.0)	1 (20.0)	0 (0.0)	0 (0.0)	5
836	Resource Management Support Clerk	23 (69.7)	10 (30.3)	0 (0.0)	0 (0.0)	33
861	Cook	10 (66.7)	4 (26.7)	1 (6.7)	0 (0.0)	15
911	Supply Technician	16 (61.5)	7 (26.9)	2 (7.7)	1 (3.8)	26
933	Traffic Technician	16 (80.0)	4 (20.0)	0 (0.0)	0 (0.0)	20
935	Mobile Support Equipment Operator	18 (85.7)	3 (14.3)	0 (0.0)	0 (0.0)	21

* frequency of occurrence (percent of n+, participants who indicate having noise in the head or ears; See Table 93)

Table 97

Presence of Dizzy Spells in Selected Trades

MOC	Trade	None	Occasionally < half the time	Often > half the time	All the time	No answer	Total n
031	Infantry Soldier	14 (77.8)*	3 (16.7)	1 (5.6)	0 (0.0)	0 (0.0)	18
091	Flight Engineer	30 (90.9)	2 (6.1)	0 (0.0)	0 (0.0)	1 (3.0)	33
215	Signal Operator	12 (75.0)	4 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	50 (98.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	67 (98.5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.5)	68
411	Vehicle Technician	32 (68.1)	12 (25.5)	1 (2.1)	0 (0.0)	2 (4.3)	47
514	Aviation Technician	78 (80.4)	14 (14.4)	1 (1.0)	0 (0.0)	4 (4.1)	97
526	Avionics Technician	37 (86.0)	6 (14.0)	0 (0.0)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	14 (82.4)	3 (17.6)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	11 (73.3)	4 (26.7)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	12 (63.2)	5 (26.3)	1 (5.3)	0 (0.0)	1 (5.3)	19
811	Military Police	14 (70.0)	5 (25.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	49 (76.6)	13 (20.3)	1 (1.6)	0 (0.0)	1 (1.6)	64
861	Cook	19 (65.5)	8 (27.6)	1 (3.4)	0 (0.0)	1 (3.4)	29
911	Supply Technician	39 (73.6)	14 (26.4)	0 (0.0)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	36 (90.0)	2 (5.0)	0 (0.0)	0 (0.0)	2 (5.0)	40
935	Mobile Support Equipment Operator	28 (75.7)	5 (13.5)	1 (2.7)	1 (2.7)	2 (5.4)	37

*frequency of occurrence (percent of n)

Table 98

Perception of Body Turning in Circles in Selected Trades

MOC	Trade	No	Not sure	Maybe	Definitely	n^+
031	Infantry Soldier	1 (25.0)*	1 (25.0)	2 (50.0)	0 (0.0)	4
091	Flight Engineer	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	2
215	Signal Operator	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	4
31	Air Navigator	0 (0.0)	0 (0.0)	1(100.0)	0 (0.0)	1
32	Pilot	---	---	---	---	---
411	Vehicle Technician	6 (46.2)	2 (15.4)	1 (7.7)	4 (30.8)	13
514	Aviation Technician	3 (20.0)	5 (33.3)	5 (33.3)	2 (13.3)	15
526	Avionics Technician	0 (0.0)	5 (83.3)	0 (0.0)	1 (16.7)	6
565	Aircraft Structures Technician	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)	3
71B	Marine Surface and Subsurface	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)	4
737	Medical Technician	2 (33.3)	1 (16.7)	0 (0.0)	3 (50.0)	6
811	Military Police	1 (20.0)	2 (40.0)	0 (0.0)	2 (40.0)	5
836	Resource Management Support Clerk	5 (35.7)	2 (14.3)	3 (21.4)	4 (28.6)	14
861	Cook	1 (11.1)	2 (22.2)	2 (22.2)	4 (44.4)	9
911	Supply Technician	4 (28.6)	6 (42.9)	1 (7.1)	3 (21.4)	14
933	Traffic Technician	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	2
935	Mobile Support Equipment Operator	0 (0.0)	3 (42.9)	1 (14.3)	3 (42.9)	7

* frequency of occurrence (percent of n^+, participants who indicate having dizzy spells; See Table 97)

Table 99

Interference of Dizzy Spells with Work in Selected Trades

MOC	Trade	None	Occasionally < half the time	Often > half the time	All the time	n^+
031	Infantry Soldier	2 (50.0)*	2 (50.0)	0 (0.0)	0 (0.0)	4
091	Flight Engineer	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
215	Signal Operator	2 (50.0)	2 (50.0)	0 (0.0)	0 (0.0)	4
31	Air Navigator	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
32	Pilot	---	---	---	---	---
411	Vehicle Technician	8 (61.5)	5 (38.5)	0 (0.0)	0 (0.0)	13
514	Aviation Technician	9 (60.0)	6(40.0)	0 (0.0)	0 (0.0)	15
526	Avionics Technician	3 (50.0)	3 (50.0)	0 (0.0)	0 (0.0)	6
565	Aircraft Structures Technician	3(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
71B	Marine Surface and Subsurface	4(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	4
737	Medical Technician	3 (50.0)	3 (50.0)	0 (0.0)	0 (0.0)	6
811	Military Police	3 (60.0)	2 (40.0)	0 (0.0)	0 (0.0)	5
836	Resource Management Support Clerk	10 (71.4)	4 (28.6)	0 (0.0)	0 (0.0)	14
861	Cook	4 (44.4)	5 (55.6)	0 (0.0)	0 (0.0)	9
911	Supply Technician	11 (78.6)	3 (21.4)	0 (0.0)	0 (0.0)	14
933	Traffic Technician	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
935	Mobile Support Equipment Operator	4 (57.1)	2 (28.6)	0 (0.0)	1 (14.3)	7

* frequency of occurrence (percent of n^+, participants who indicate having dizzy spells; See Table 97)

Table 100

Occurrence of Dizzy Spells with Noise in Head or Ears and Problems with Hearing in Selected Trades

MOC	Trade	No	Not sure	Maybe	Definitely	n^+
031	Infantry Soldier	1 (25.0)*	2 (50.0)	1 (25.0)	0 (0.0)	4
091	Flight Engineer	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	2
215	Signal Operator	3 (75.0)	1 (25.0)	0 (0.0)	0 (0.0)	4
31	Air Navigator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	1
32	Pilot	---	---	---	---	---
411	Vehicle Technician	6 (46.2)	5 (38.5)	2 (15.4)	0 (0.0)	13
514	Aviation Technician	7 (46.7)	2 (13.3)	3 (20.0)	3 (20.0)	15
526	Avionics Technician	5 (83.3)	1 (16.7)	0 (0.0)	0 (0.0)	6
565	Aircraft Structures Technician	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)	3
71B	Marine Surface and Subsurface	3 (75.0)	0 (0.0)	1 (25.0)	0 (0.0)	4
737	Medical Technician	2 (33.3)	3 (50.0)	1 (16.7)	0 (0.0)	6
811	Military Police	3 (60.0)	2 (40.0)	0 (0.0)	0 (0.0)	5
836	Resource Management Support Clerk	8 (57.1)	5 (35.7)	0 (0.0)	1 (7.1)	14
861	Cook	4 (44.4)	4 (44.4)	1 (11.1)	0 (0.0)	9
911	Supply Technician	9 (64.3)	5 (35.7)	0 (0.0)	0 (0.0)	14
933	Traffic Technician	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
935	Mobile Support Equipment Operator	4 (57.1)	0 (0.0)	3 (42.9)	0 (0.0)	7

* frequency of occurrence (percent of n^+, participants who indicate having dizzy spells; See Table 97)

Table 101

Exposure to Loud Sounds During Leisure in Selected Trades

MOC	Trade	Never	Occasionally < ½ the time	Often > ½ the time	All the time	No answer	Total n
031	Infantry Soldier	7 (38.9)*	11 (61.1)	0 (0.0)	0 (0.0)	0 (0.0)	18
091	Flight Engineer	7 (21.2)	25 (75.8)	0 (0.0)	0 (0.0)	1 (3.0)	33
215	Signal Operator	7 (43.8)	9 (56.3)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	23 (45.1)	28 (54.9)	0 (0.0)	0 (0.0)	0 (0.0)	51
32	Pilot	23 (33.8)	45 (66.2)	0 (0.0)	0 (0.0)	0 (0.0)	68
411	Vehicle Technician	25 (53.2)	20 (42.6)	1 (2.1)	0 (0.0)	1 (2.1)	47
514	Aviation Technician	43 (44.3)	49 (50.5)	3 (3.1)	0 (0.0)	2 (2.1)	97
526	Avionics Technician	18 (41.9)	25 (58.1)	0 (0.0)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	5 (29.4)	12 (70.6)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	8 (53.3)	7 (46.7)	0 (0.0)	0 (0.0)	0 (0.0)	15
737	Medical Technician	14 (73.7)	4 (21.1)	0 (0.0)	0 (0.0)	1 (5.3)	19
811	Military Police	13 (65.0)	6 (30.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	33 (51.6)	30 (46.9)	0 (0.0)	0 (0.0)	1 (1.6)	64
861	Cook	19 (65.5)	9 (31.0)	1 (3.4)	0 (0.0)	0 (0.0)	29
911	Supply Technician	28 (52.8)	25 (47.2)	0 (0.0)	0 (0.0)	0 (0.0)	53
933	Traffic Technician	16 (40.0)	23 (57.5)	0 (0.0)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	22 (59.5)	13 (35.1)	1 (2.7)	1 (2.7)	0 (0.0)	37

*frequency of occurrence (percent of n)

Table 102

Sources of Loud Noise During Leisure in Selected Trades

MOC	Trade	n	Power Tools	Guns	Off-Road Vehicles	Motor-cycles	Snow-mobiles	Rock Music	Disco/ Dance	Other
031	Infantry Soldier	18	12 (66.7)*	8 (44.4)	5 (27.8)	0 (0.0)	1 (5.6)	2 (11.1)	0 (0.0)	1 (5.6)
091	Flight Engineer	33	27 (81.8)	5 (15.2)	2 (6.1)	6 (18.2)	1 (3.0)	9 (27.3)	4 (12.1)	4 (12.1)
215	Signal Operator	16	10 (62.5)	5 (31.3)	2 (12.5)	4 (25.0)	2 (12.5)	5 (31.3)	1 (6.3)	0 (0.0)
31	Air Navigator	51	25 (49.0)	0 (0.0)	3 (5.9)	2 (3.9)	2 (3.9)	12 (23.5)	14 (27.5)	7 (13.7)
32	Pilot	68	43 (63.2)	8 (11.8)	6 (8.8)	7 (10.3)	3 (4.4)	18 (26.5)	15 (22.1)	10 (14.7)
411	Vehicle Technician	47	38 (80.9)	11 (23.4)	11 (23.4)	6 (12.8)	6 (12.8)	13 (27.7)	7 (14.9)	3 (6.4)
514	Aviation Technician	97	60 (61.9)	10 (10.3)	7 (7.2)	16 (16.5)	8 (8.2)	30 (30.9)	13 (13.4)	16 (16.5)
526	Avionics Technician	43	32 (74.4)	2 (4.7)	6 (14.0)	2 (4.7)	1 (2.3)	10 (23.3)	4 (9.3)	7 (16.3)
565	Aircraft Structures Technician	17	14 (82.4)	3 (17.6)	2 (11.8)	2 (11.8)	2 (11.8)	8 (47.1)	3 (17.6)	3 (17.6)
71B	Marine Surface and Subsurface	15	8 (53.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (20.0)	2 (13.3)	1 (6.7)
737	Medical Technician	19	8 (42.1)	2 (10.5)	0 (0.0)	0 (0.0)	0 (0.0)	4 (21.1)	2 (10.5)	1 (5.3)
811	Military Police	20	8 (40.0)	4 (20.0)	1 (5.0)	0 (0.0)	2 (10.0)	3 (15.0)	2 (10.0)	2 (10.0)
836	Resource Management Support Clerk	64	28 (43.8)	5 (7.8)	4 (6.3)	7 (10.9)	4 (6.3)	23 (35.9)	11 (17.2)	4 (6.3)
861	Cook	29	8 (27.6)	2 (6.9)	1 (3.4)	2 (6.9)	0 (0.0)	4 (13.8)	2 (6.9)	5 (17.2)
911	Supply Technician	53	22 (41.5)	6 (11.3)	1 (1.9)	6 (11.3)	2 (3.8)	19 (35.8)	10 (18.9)	3 (5.7)
933	Traffic Technician	40	21 (52.5)	3 (7.5)	5 (12.5)	4 (10.0)	2 (5.0)	10 (25.0)	7 (17.5)	4 (10.0)
935	Mobile Support Equipment Operator	37	16 (43.2)	6 (16.2)	8 (21.6)	6 (16.2)	4 (10.8)	12 (32.4)	3 (8.1)	4 (10.8)

*frequency exposed (percent of n exposed)

Table 103

Use of Hearing Protective Devices During Leisure in Selected Trades

MOC	Trade	No noisy activities	No hearing protection	< ½ the time	> ½ the time	All the time	No answer	Total n
031	Infantry Soldier	3 (16.7)*	0 (0.0)	5 (27.8)	5 (27.8)	5 (27.8)	0 (0.0)	18
091	Flight Engineer	3 (9.1)	8 (24.2)	8 (24.2)	4 (12.1)	9 (27.3)	1 (3.0)	33
215	Signal Operator	5 (31.3)	4 (25.0)	3 (18.8)	1 (6.3)	3 (18.8)	0 (0.0)	16
31	Air Navigator	9 (17.6)	15 (29.4)	10 (19.6)	6 (11.8)	8 (15.7)	3 (5.9)	51
32	Pilot	12 (17.6)	17 (25.0)	18 (26.5)	9 (13.2)	9 (13.2)	3 (4.4)	68
411	Vehicle Technician	7 (14.9)	9 (19.1)	11 (23.4)	4 (8.5)	12 (25.5)	4 (8.5)	47
514	Aviation Technician	24 (24.7)	14 (14.4)	17 (17.5)	16 (16.5)	21 (21.6)	5 (5.2)	97
526	Avionics Technician	7 (16.3)	6 (14.0)	14 (32.6)	7 (16.3)	9 (20.9)	0 (0.0)	43
565	Aircraft Structures Technician	2 (11.8)	4 (23.5)	5 (29.4)	5 (29.4)	1 (5.9)	0 (0.0)	17
71B	Marine Surface and Subsurface	6 (40.0)	5 (33.3)	0 (0.0)	2 (13.3)	2 (13.3)	0 (0.0)	15
737	Medical Technician	8 (42.1)	1 (5.3)	4 (21.1)	1 (5.3)	3 (15.8)	2 (10.5)	19
811	Military Police	5 (25.0)	7 (35.0)	0 (0.0)	1 (5.0)	5 (25.0)	2 (10.0)	20
836	Resource Management Support Clerk	30 (46.9)	17 (26.6)	7 (10.9)	4 (6.3)	3 (4.7)	3 (4.7)	64
861	Cook	12 (41.4)	10 (34.5)	2 (6.9)	2 (6.9)	2 (6.9)	1 (3.4)	29
911	Supply Technician	18 (34.0)	16 (30.2)	3 (5.7)	5 (9.4)	7 (13.2)	4 (7.5)	53
933	Traffic Technician	8 (20.0)	7 (17.5)	4 (10.0)	6 (15.0)	9 (22.5)	6 (15.0)	40
935	Mobile Support Equipment Operator	13 (35.1)	7 (18.9)	5 (13.5)	1 (2.7)	7 (18.9)	4 (10.8)	37

*frequency of occurrence (percent of n)

Table 104

Kinds of Hearing Protective Devices Used in Leisure in Selected Trades

MOC	Trade	None	Ear Plugs	Ear muffs	Plugs and Muffs	Other	No answer	Not applicable	Total n
031	Infantry Soldier	0 (0.0)*	5 (27.8)	5 (27.8)	4 (22.2)	1 (5.6)	0 (0.0)	3 (16.7)	18
091	Flight Engineer	4 (12.1)	8 (24.2)	8 (24.2)	6 (18.2)	3 (9.1)	1 (3.0)	3 (9.1)	33
215	Signal Operator	4 (25.0)	4 (25.0)	2 (12.5)	1 (6.3)	0 (0.0)	0 (0.0)	5 (31.5)	16
31	Air Navigator	7 (13.7)	15 (29.4)	6 (11.8)	3 (5.9)	6 (11.8)	5 (9.8)	9 (17.6)	51
32	Pilot	9 (13.2)	23 (33.8)	13 (19.1)	2 (2.9)	4 (5.9)	5 (7.4)	12 (17.6)	68
411	Vehicle Technician	1 (2.1)	9 (19.1)	21 (44.7)	6 (12.8)	0 (0.0)	2 (4.3)	8 (17.0)	47
514	Aviation Technician	5 (5.2)	16 (16.5)	24 (24.7)	19 (19.6)	3 (3.1)	6 (6.2)	24 (24.7)	97
526	Avionics Technician	3 (7.0)	12 (27.9)	16 (37.2)	4 (9.3)	1 (2.3)	0 (0.0)	7 (16.3)	43
565	Aircraft Structures Technician	2 (11.8)	3 (17.6)	9 (52.9)	0 (0.0)	0 (0.0)	1 (5.9)	2 (11.8)	17
71B	Marine Surface and Subsurface	2 (13.3)	4 (26.7)	2 (13.3)	0 (0.0)	0 (0.0)	1 (6.7)	6 (40.0)	15
737	Medical Technician	2 (10.5)	3 (15.8)	5 (26.3)	0 (0.0)	0 (0.0)	1 (5.3)	8 (42.1)	19
811	Military Police	6 (30.0)	1 (5.0)	2 (10.0)	3 (15.0)	0 (0.0)	3 (15.0)	5 (25.0)	20
836	Resource Management Support Clerk	11 (17.2)	12 (18.8)	7 (10.9)	3 (4.7)	0 (0.0)	1 (1.6)	30 (46.9)	64
861	Cook	6 (20.7)	7 (24.1)	2 (6.9)	1 (3.4)	1 (3.4)	0 (0.0)	12 (41.4)	29
911	Supply Technician	6 (11.3)	9 (17.0)	9 (17.0)	8 (15.1)	0 (0.0)	4 (7.5)	17 (32.1)	53
933	Traffic Technician	4 (10.0)	6 (15.0)	13 (32.5)	4 (10.0)	1 (2.5)	4 (10.0)	8 (20.0)	40
935	Mobile Support Equipment Operator	6 (16.2)	2 (5.4)	8 (21.6)	3 (8.1)	2 (5.4)	3 (8.1)	13 (35.1)	37

*frequency of occurrence (percent of n)

Table 105

Work Outside of the Military in Selected Trades

MOC	Trade	No	Occasionally	Weekends	Regularly	No answer	Total n
031	Infantry Soldier	15 (83.3)*	3 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	18
091	Flight Engineer	30 (90.9)	2 (6.1)	0 (0.0)	0 (0.0)	1 (3.0)	33
215	Signal Operator	14 (87.5)	2 (12.5)	0 (0.0)	0 (0.0)	0 (0.0)	16
31	Air Navigator	47 (92.2)	3 (5.9)	0 (0.0)	0 (0.0)	1 (2.0)	51
32	Pilot	65 (95.6)	1 (1.5)	0 (0.0)	1 (1.5)	1 (1.5)	68
411	Vehicle Technician	35 (74.5)	9 (19.1)	1 (2.1)	1 (2.1)	1 (2.1)	47
514	Aviation Technician	88 (90.7)	5 (5.2)	0 (0.0)	2 (2.1)	2 (2.1)	97
526	Avionics Technician	43(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	43
565	Aircraft Structures Technician	16 (94.1)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	17
71B	Marine Surface and Subsurface	14 (93.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (6.7)	15
737	Medical Technician	17 (89.5)	1 (5.3)	0 (0.0)	0 (0.0)	1 (5.3)	19
811	Military Police	19 (95.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.0)	20
836	Resource Management Support Clerk	59 (92.2)	4 (6.3)	0 (0.0)	0 (0.0)	1 (1.6)	64
861	Cook	28 (96.6)	0 (0.0)	0 (0.0)	1 (3.4)	0 (0.0)	29
911	Supply Technician	44 (83.0)	5 (9.4)	2 (3.8)	1 (1.9)	1 (1.9)	53
933	Traffic Technician	39 (97.5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.5)	40
935	Mobile Support Equipment Operator	34 (91.9)	1 (2.7)	0 (0.0)	0 (0.0)	2 (5.4)	37

*frequency of occurrence (percent of n)

Table 106

Exposure to Loud Sounds During Sideline Work in Selected Trades

MOC	Trade	None	Occasionally < ½ the time	Often > ½ the time	All the time	No answer	n^+
031	Infantry Soldier	1 (33.3)*	2 (66.7)	0 (0.0)	0 (0.0)	0 (0.0)	3
091	Flight Engineer	0 (0.0)	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
215	Signal Operator	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	2
31	Air Navigator	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)	0 (0.0)	3
32	Pilot	0 (0.0)	0 (0.0)	2(100.0)	0 (0.0)	0 (0.0)	2
411	Vehicle Technician	3 (27.3)	5 (45.5)	3 (27.3)	0 (0.0)	0 (0.0)	11
514	Aviation Technician	2 (25.0)	3 (37.5)	2 (25.0)	0 (0.0)	0 (0.0)	7
526	Avionics Technician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
565	Aircraft Structures Technician	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
737	Medical Technician	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
811	Military Police	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
836	Resource Management Support Clerk	1 (25.0)	2 (50.0)	1 (25.0)	0 (0.0)	0 (0.0)	4
861	Cook	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
911	Supply Technician	4 (50.0)	4 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	8
933	Traffic Technician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
935	Mobile Support Equipment Operator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1

* frequency of occurrence (percent of n^+, participants who indicate working outside the military; See Table 105)

Table 107

Use of Hearing Protectors During Sideline Work in Selected Trades

MOC	Trade	None	Occasionally < ½ the time	Often > ½ the time	Constantly	No answer	n^+
031	Infantry Soldier	0 (0.0)*	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	2
091	Flight Engineer	0 (0.0)	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
215	Signal Operator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
31	Air Navigator	2(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
32	Pilot	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)	2
411	Vehicle Technician	1 (11.1)	2 (22.2)	4 (44.4)	1 (11.1)	1 (11.1)	9
514	Aviation Technician	2 (40.0)	0 (0.0)	0 (0.0)	3 (60.0)	0 (0.0)	5
526	Avionics Technician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
565	Aircraft Structures Technician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
71B	Marine Surface and Subsurface	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
737	Medical Technician	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
811	Military Police	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
836	Resource Management Support Clerk	0 (0.0)	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	3
861	Cook	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
911	Supply Technician	2 (50.0)	1 (25.0)	1 (25.0)	0 (0.0)	0 (0.0)	4
933	Traffic Technician	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0
935	Mobile Support Equipment Operator	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1

*frequency of occurrence (percent of n^+; participants who indicate exposure to noise in sideline work; See Table 106)

Table 108

Kinds Of Hearing Protectors Used During Sideline Work in Selected Trades

MOC	Trade	Ear Plugs	Ear Muffs	Plugs & Muffs	Other	n^+
031	Infantry Soldier	1 (50.0)*	0 (0.0)	1 (50.0)	0 (0.0)	2
091	Flight Engineer	1 (50.0)	1 (50.0)	0 (0.0)	0 (0.0)	3
215	Signal Operator	0 (0.0)	1(100.0)	0 (0.0)	0 (0.0)	1
31	Air Navigator	---	---	---	---	---
32	Pilot	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)	2
411	Vehicle Technician	3 (42.9)	3 (42.9)	1 (14.3)	0 (0.0)	7
514	Aviation Technician	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	3
526	Avionics Technician	---	---	---	---	---
565	Aircraft Structures Technician	---	---	---	---	---
71B	Marine Surface and Subsurface	---	---	---	---	---
737	Medical Technician	1(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
811	Military Police	---	---	---	---	---
836	Resource Management Support Clerk	0 (0.0)	3(100.0)	0 (0.0)	0 (0.0)	3
861	Cook	---	---	---	---	---
911	Supply Technician	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0)	2
933	Traffic Technician	---	---	---	---	---
935	Mobile Support Equipment Operator	---	---	---	---	---

* frequency of occurrence (percent of n^+; participants who indicate using hearing protection in sideline work; See Table 107))

Table 109a

The Relationship Between Selected Trades and Degree of Current Hearing Loss for 36 – 45 Year Olds at 4 kHz, Left Ear

MOC	Trade	n	Normal Hearing	Slight Hearing Loss	Mild Hearing Loss	Moderate Hearing Loss	Moderately Severe Hearing Loss	Severe Hearing Loss
031	Infantry Soldier	12	50.0*	16.7	25.0	8.3	0.0	0.0
091	Flight Engineer	19	63.2	15.8	5.3	10.5	5.3	0.0
215	Signal Operator	11	45.5	36.4	9.1	0.0	9.1	0.0
31	Air Navigator	23	78.3	21.7	0.0	0.0	0.0	0.0
32	Pilot	32	68.8	25.0	0.0	6.3	0.0	0.0
411	Vehicle Technician	29	72.4	10.3	13.8	3.4	0.0	0.0
514	Aviation Technician	65	64.6	27.7	4.6	1.5	0.0	1.5
526	Avionics Technician	33	48.5	27.3	15.2	9.1	0.0	0.0
565	Aircraft Structures Technician	8	62.5	25.0	12.5	0.0	0.0	0.0
71B	Marine Surface and Subsurface	9	88.9	11.1	0.0	0.0	0.0	0.0
737	Medical Technician	10	80.0	10.0	10.0	0.0	0.0	0.0
811	Military Police	9	44.4	44.4	11.1	0.0	0.0	0.0
836	Resource Management Support Clerk	35	80.0	5.7	8.6	0.0	2.9	2.9
861	Cook	18	61.1	22.2	5.6	0.0	11.1	0.0
911	Supply Technician	38	73.7	21.1	2.6	0.0	2.6	0.0
933	Traffic Technician	14	42.9	35.7	14.3	7.1	0.0	0.0
935	Mobile Support Equipment Operator	22	45.5	36.4	13.6	4.5	0.0	0.0

* percent

Table 109b

The Relationship Between Selected Trades and Degree of Current Hearing Loss for 36 – 45 Year Olds at 4 kHz, Right Ear

MOC	Trade	n	Normal Hearing	Slight Hearing Loss	Mild Hearing Loss	Moderate Hearing Loss	Moderately Severe Hearing Loss	Severe Hearing Loss
031	Infantry Soldier	12	66.7*	25.0	0.0	0.0	8.3	0.0
091	Flight Engineer	19	52.6	26.3	10.5	5.3	5.3	0.0
215	Signal Operator	11	54.5	18.2	27.3	0.0	0.0	0.0
31	Air Navigator	23	87.0	13.0	0.0	0.0	0.0	0.0
32	Pilot	32	65.6	28.1	3.1	3.1	0.0	0.0
411	Vehicle Technician	29	79.3	10.3	3.4	3.4	0.0	3.4
514	Aviation Technician	65	63.1	16.9	15.4	4.6	0.0	0.0
526	Avionics Technician	33	72.7	15.2	12.1	0.0	0.0	0.0
565	Aircraft Structures Technician	8	100.0	0.0	0.0	0.0	0.0	0.0
71B	Marine Surface and Subsurface	9	88.9	0.0	0.0	11.1	0.0	0.0
737	Medical Technician	10	70.0	20.0	10.0	0.0	0.0	0.0
811	Military Police	9	100.0	0.0	0.0	0.0	0.0	0.0
836	Resource Management Support Clerk	35	82.9	8.6	5.7	2.9	0.0	0.0
861	Cook	18	77.8	5.6	11.1	5.6	0.0	0.0
911	Supply Technician	38	65.8	18.4	5.3	5.3	5.3	0.0
933	Traffic Technician	14	50.0	28.6	21.4	0.0	0.0	0.0
935	Mobile Support Equipment Operator	22	77.3	22.7	0.0	0.0	0.0	0.0

* percent

Table 109c

The Relationship Between Selected Trades and Degree of Current Hearing Loss for 36 – 45 Year Olds at 6 kHz, Left Ear

MOC	Trade	n	Normal Hearing	Slight Hearing Loss	Mild Hearing Loss	Moderate Hearing Loss	Moderately Severe Hearing Loss	Severe Hearing Loss
031	Infantry Soldier	12	33.3*	58.3	0.0	8.3	0.0	0.0
091	Flight Engineer	19	68.4	15.8	0.0	5.3	5.3	5.3
215	Signal Operator	11	27.3	36.4	18.2	9.1	0.0	9.1
31	Air Navigator	23	60.9	26.1	13.0	0.0	0.0	0.0
32	Pilot	32	56.3	25.0	15.6	3.1	0.0	0.0
411	Vehicle Technician	29	58.6	13.8	17.2	6.9	3.4	0.0
514	Aviation Technician	65	47.7	27.7	13.8	10.8	0.0	0.0
526	Avionics Technician	33	45.5	15.2	30.3	6.1	3.0	0.0
565	Aircraft Structures Technician	8	25.0	50.0	12.5	12.5	0.0	0.0
71B	Marine Surface and Subsurface	9	77.8	0.0	22.2	0.0	0.0	0.0
737	Medical Technician	10	50.0	30.0	10.0	10.0	0.0	0.0
811	Military Police	9	55.6	33.3	11.1	0.0	0.0	0.0
836	Resource Management Support Clerk	35	68.6	14.3	5.7	5.7	5.7	0.0
861	Cook	18	44.4	22.2	16.7	5.6	11.1	0.0
911	Supply Technician	38	60.5	21.1	7.9	0.0	2.6	0.0
933	Traffic Technician	14	35.7	21.4	35.7	7.1	0.0	0.0
935	Mobile Support Equipment Operator	22	54.5	18.2	18.2	4.5	0.0	4.5

* percent

Table 109d

The Relationship Between Selected Trades and Degree of Current Hearing Loss for 36 – 45 Year Olds at 6 kHz, Right Ear

MOC	Trade	n	Normal Hearing	Slight Hearing Loss	Mild Hearing Loss	Moderate Hearing Loss	Moderately Severe Hearing Loss	Severe Hearing Loss
031	Infantry Soldier	12	66.7*	25.0	8.3	0.0	0.0	0.0
091	Flight Engineer	19	73.7	10.5	0.0	10.5	5.3	0.0
215	Signal Operator	11	54.5	18.2	18.2	0.0	9.1	0.0
31	Air Navigator	23	73.9	13.0	13.0	0.0	0.0	0.0
32	Pilot	32	65.6	15.6	12.5	0.0	6.3	0.0
411	Vehicle Technician	29	65.5	13.8	13.8	3.4	0.0	3.4
514	Aviation Technician	65	64.6	18.5	15.4	1.5	0.0	0.0
526	Avionics Technician	33	63.6	15.2	12.1	6.1	3.0	0.0
565	Aircraft Structures Technician	8	75.0	12.5	12.5	0.0	0.0	0.0
71B	Marine Surface and Subsurface	9	44.4	44.4	0.0	11.1	0.0	0.0
737	Medical Technician	10	60.0	30.0	0.0	10.0	0.0	0.0
811	Military Police	9	100.0	0.0	0.0	0.0	0.0	0.0
836	Resource Management Support Clerk	35	68.6	14.3	11.4	5.7	0.0	0.0
861	Cook	18	38.9	38.8	11.1	11.1	0.0	0.0
911	Supply Technician	38	52.6	21.1	15.8	5.3	0.0	5.3
933	Traffic Technician	14	57.1	7.1	35.7	0.0	0.0	0.0
935	Mobile Support Equipment Operator	22	50.0	27.3	18.2	4.5	0.0	0.0

* percent

Hearing Levels (Yantis, 1985)

1)	Normal Hearing	-10 to 15 dB HL
2)	Slight Hearing Loss	16 to 25 dB HL
3)	Mild Hearing Loss	26 to 40 dB HL
4)	Moderate Hearing Loss	41 to 55 dB HL
5)	Moderately Severe Hearing Loss	56 to 70 dB HL
6)	Severe Hearing Loss	71 to 90 dB HL

Table 110

Numbers of Subjects Tested by Dosimetry

MOC	Trade	n DRDC Toronto	n Human Systems Inc.	n HCCA Ltd.
031	Infantry Soldier	18	13	0
091	Flight Engineer	33	12	0
215	Signal Operator	16	12	0
31	Air Navigator	51	6	0
32	Pilot	68	9	0
411	Vehicle Technician	47	11	16
514	Aviation Technician	97	9	12
526	Avionics Technician	43	11	0
565	Aircraft Structures Technician	17	10	0
71B	Marine Surface and Subsurface	15	0	0
737	Medical Technician	19	14	11
811	Military Police	20	0	17
836	Resource Management Support Clerk	64	0	20
861	Cook	29	9	9
911	Supply Technician	53	7	22
933	Traffic Technician	40	9	12
935	Mobile Support Equipment Operator	37	20	22

Table 111

Average Sound Level for Selected Trades

		Average Sound Level (dBA)	
MOC	Trade	Human Systems Inc.	HCCA Ltd.
031	Infantry Soldier	87.1	
091	Flight Engineer	84.4	---
215	Signal Operator	85.2	---
31	Air Navigator	88.9	---
32	Pilot	90.7	---
411	Vehicle Technician	86.4	83.1
514	Aviation Technician	84.4	86.2
526	Avionics Technician	80.6	---
565	Aircraft Structures Technician	87.5	---
71B	Marine Surface and Subsurface	---	---
737	Medical Technician	78.2	72.2
811	Military Police	---	81.6
836	Resource Management Support Clerk	---	74.7
861	Cook	82.7	90.4
911	Supply Technician	81.1	81.7
933	Traffic Technician	80.1	86.0
935	Mobile Support Equipment Operator	84.6	81.5

Annex A

Information Sheet

A Study of Risk Factors for the Development of Noise-Induced Hearing Loss by the Defence Research & Development Canada - Toronto

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Q. What will this study be trying to accomplish?

A. This study is an investigation of the development of noise-induced hearing loss in Canadian Forces personnel. The specific focus will be the evaluation of various risk factors that might influence the rate of change in hearing over time.

Q. How will this be done and what is involved?

A. Over the course of a 10-month period, individuals who are undergoing a routine assessment of their hearing will be asked for permission to copy their test results, as well as their first hearing test results on record, to the study database.

Participants will also be given a survey questionnaire to complete. The survey takes about 30 minutes and includes questions about age, gender, previous jobs, previous and current work-related noise exposure, leisure noise, as well as training in and use of personal hearing protectors. There are also questions about history of ear problems and head injury, and use of medications.

Q. Who can take part in this study?

A. The study will be open to all men and women, aged 18-60 years, who are employed in a land, air and naval trades, at five Canadian Forces bases (Borden, Greenwood Halifax, Petawawa, and Trenton). Participation is ***completely voluntary***.

Q. How will the results be used?

A. All the information collected will be stored in a computerized data base. These data will then be statistically analyzed to determine how various factors interact to affect the growth of hearing loss.

Q. Will the results be kept confidential?

A. Absolutely! Information will be reported in such a way that no individual will be identified. The information we obtain from you personally will not be shared with anyone else. Once the study is finished, all identifying information such as names will be destroyed.

Q. Who will be conducting this study?

A. Dr. Sharon Abel and Mr. Brian Crabtree, researchers in the Communications Group, Defence Research and Development Canada - Toronto will be conducting the study. The study is being funded by Veterans Affairs Canada..

Q. Why should I participate?

A. The numbers of Canadian Forces personnel with moderately severe hearing loss at retirement age is relatively higher than experienced in the general population. The goal of this study is to identify those factors that contribute to hearing loss. Here are some ways that your participation may help you and your colleagues:

- It will help to identify trades that are associated with high noise levels.
- It will help us to understand why hearing protector programs currently in place may fail.
- It will help us to evaluate the contributions to hearing loss of pre-existing medical conditions, injuries and leisure activities.
- It will identify areas of particular concern to the workforce.

This information will allow us to develop new programs to reduce the social and financial burden of hearing impairment.

Please do not hesitate to contact either Dr. Abel (416 635-2037) or Mr. Crabtree (416 635-2078), if you wish to obtain additional information about any aspect of this study. They would be pleased to respond to your questions and concerns.

Communications Group
Defence Research and Development Canada - Toronto
Toronto, Ontario

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Annex B

Questionnaire

A STUDY OF RISK FACTORS FOR NOISE-INDUCED HEARING LOSS IN CANADIAN FORCES PERSONNEL

QUESTIONNAIRE

DCIEM is conducting a study of risk factors for noise-induced hearing loss in Canadian Forces personnel. We would be grateful if you would assist us by completing the following questionnaire about your noise exposure history, hearing protector practice and the history of any ear problems you may have had. Any information that you provide will be kept in strict confidence and will be reported only as part of group trends without identifying you personally. The results will contribute to the success of the Canadian Forces Hearing Conservation Program.

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

Answer each question by providing the information requested, or by highlighting and marking (☒) the box that most closely matches your experience or situation.

If you wish to change your answer, please highlight and delete the original answer and mark your new choice.

Remember, there are no "right" or "wrong" answers. Please be honest when responding.

We encourage you to add any information ***that you think might be pertinent***. A space for your comments is provided on the final page of the questionnaire.

Thank you very much for your co-operation!

A STUDY OF RISK FACTORS FOR NOISE-INDUCED HEARING LOSS IN CANADIAN FORCES PERSONNEL

(Protected B when completed)

A. PERSONAL INFORMATION (please print)

1. MOC: _____ Service Number: _____
2. Name: (last name first) _____
3. Age: _____ Years
4. Sex: _____
5. Age at CF recruitment: _____ years
6. Current Military Trade: _____
7. Number of years in Current Military Trade:
8. Please list the trades you have worked in since joining the CF, *starting with the current trade*

Trade	Number of years
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B. MILITARY WORK ENVIRONMENT (please highlight and mark one response)

1. Since joining the CF, has your hearing changed?

- ❑ 0 = better or no change
- ❑ 1 = slightly worse
- ❑ 2 = moderately worse
- ❑ 3 = much worse

2. Is your regular place of work noisy?

- ❑ 0 = never
- ❑ 1 = occasionally
- ❑ 2 = often
- ❑ 3 = constantly

3. How bad is the noise usually?

- ❑ 0 = no noise
- ❑ 1 = mild
- ❑ 2 = moderate
- ❑ 3 = severe

4. Have you ever received any lectures or training films on the dangers of noise exposure?

- ❑ 0 = no
- ❑ 1 = yes, 1 hour or less
- ❑ 2 = yes, less than half a day
- ❑ 3 = yes, a full day

5. Were you ever given any demonstrations on the proper use of hearing protective devices such as ear plugs and ear muffs?

- ❑ 0 = no
- ❑ 1 = yes, 1 hour or less
- ❑ 2 = less than half a day
- ❑ 3 = yes, a full day of demonstrations

6. Overall, how would you rate your CF training regarding the dangers of exposure to loud noise?

- ❑ 0 = no training
- ❑ 1 = poor
- ❑ 2 = adequate
- ❑ 3 = good

7. At work, do your superiors advise you about the need to wear hearing protection in noise?

- ❑ 0 = no
- ❑ 1 = occasionally
- ❑ 2 = often
- ❑ 3 = constantly

8. What kind of hearing protection do you usually use when it is noisy at work?

- ❑ 0 = none, no noise at work; please go to question 10 (skip question 9)
- ❑ 1 = I don't wear hearing protection in noise
- ❑ 2 = I wear plugs
- ❑ 3 = I wear muffs
- ❑ 4 = I wear plugs and/or muffs
- ❑ 5 = I wear a communication headset
- ❑ 6 = I wear a communication headset and ear plugs

9. How often do you use these at work when it is noisy?

- ❑ 0 = never
- ❑ 1 = less than half my work shift
- ❑ 2 = more than half my work shift
- ❑ 3 = regularly - 100% of my work shift

10. What is your opinion of the following statements?
Please use the following choices:

0 = not applicable (no noise at work)
1 = disagree
2 = occasionally agree
3 = often agree
4 = definitely agree

a) Hearing protection is not beneficial: _____
b) Plugs and / or muffs are uncomfortable: _____
c) I can't hear as well wearing them: _____
d) Wearing them may pose a danger in my job: _____

11. Describe any hearing difficulties you may have experienced at work.
Please use the following choices:

0 = no difficulty
1 = slight difficulty
2 = moderate difficulty
3 = great difficulty

a) Listening to someone face-to-face, *without hearing protectors*, in a quiet room: _____
b) Listening to someone, *without hearing protectors*, across a quiet room: _____
c) Answering the telephone in a quiet room: _____
d) Listening to someone face-to-face, *without hearing protectors*, in a noisy room: _____
e) Listening to someone, *without hearing protectors*, across a noisy room: _____
f) Answering the telephone in a noisy room: _____
g) Understanding orders, *while wearing hearing protectors*, when the room is quiet: _____
h) Understanding orders, *while wearing hearing protectors* in a noisy room: _____

12. Since your CF recruitment, have you ever been exposed to solvents as part of your job?

❑ 0 = never exposed to solvents; go to question 14 (skip question 13)
❑ 1 = exposed to solvents in one or more trades

13. Did you wear respiratory protective equipment during your exposure to solvents?

❑ 0 = never
❑ 1 = less than half my work shift
❑ 2 = more than half my work shift
❑ 3 = regularly - 100% of my work shift

14. Since joining the CF, were you involved in any accidents involving head injuries at work which affected your hearing?

- ❑ 0 = none; go to Part C (skip questions 15, 16, and 17)
- ❑ 1 = one accident
- ❑ 2 = two accidents
- ❑ 3 = more than two accidents (please specify number:)

Please document these, detailing place, date and circumstances as far as you recall:

_____

_____

_____

15. Did the accidents(s) permanently worsen your hearing?

- ❑ 0 = no, my hearing returned to normal
- ❑ 1 = yes, mild hearing loss
- ❑ 2 = yes, moderate hearing loss
- ❑ 3 = severe hearing loss

16. Which ear(s) were affected?

- ❑ 0 = neither ear (hearing returned to normal)
- ❑ 1 = right ear
- ❑ 2 = left ear
- ❑ 3 = both ears

17. Were you satisfied with any treatment you may have received?

- ❑ 0 = no treatment
- ❑ 1 = dissatisfied
- ❑ 2 = somewhat satisfied
- ❑ 3 = very satisfied

C. EAR STATUS (please highlight and mark one response)

1. Did you have any ear infections when you were a child (under the age of 18 years)?

- ❑ 0 = none
- ❑ 1 = one
- ❑ 2 = two
- ❑ 3 = more than two

2. Have you had any ear infections as an adult (over the age of 18 years)?

- ❑ 0 = none
- ❑ 1 = one
- ❑ 2 = two
- ❑ 3 = more than two

3. Did the infection(s) permanently affect your hearing?

- ❑ 0 = no ear infections
- ❑ 1 = no, my hearing returned to normal
- ❑ 2 = yes, mild hearing loss
- ❑ 3 = yes, moderate hearing loss
- ❑ 4 = severe hearing loss

4. Have you ever had any bad head injuries outside of work?

- ❑ 0 = none; go to question 6 (skip question 5)
- ❑ 1 = one
- ❑ 2 = two
- ❑ 3 = more than two

5. Did the head injuries outside of work affect your hearing?

- ❑ 0 = no
- ❑ 1 = yes, but my hearing returned to normal
- ❑ 2 = yes, I now have a permanent hearing loss

6. Have you ever taken any medication or drugs which may have affected your hearing?

- ❑ 0 = no
- ❑ 1 = yes, but no effect on my hearing
- ❑ 2 = yes, but my hearing returned to normal
- ❑ 3 = yes, I now have a permanent hearing loss as a result

7. Do you hear noises in your ears or head such a ringing or buzzing sounds?

- ❑ 0 = no; go to question 10 (skip questions 8, 9, and 10)
- ❑ 1 = occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = constantly

8. Is the noise in your head or ears loud?

- ❑ 0 = low
- ❑ 1 = moderate
- ❑ 2 = loud

9. Does the noise in your head or ears interfere with your hearing?

- ❑ 0 = no
- ❑ 1 = slight interference
- ❑ 2 = moderate interference
- ❑ 3 = much interference

10. Does the noise in your head or ears disturb your sleep?

- ❑ 0 = no
- ❑ 1 = occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = constantly

11. Do you have dizzy spells:

- ❑ 0 = no; go to Part D (skip questions 12, 13, and 14)
- ❑ 1= occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = all the time

12. When you have these dizzy spells, does the world or your body seem to turn in circles?

- ❑ 0 = no
- ❑ 1 = not sure
- ❑ 2 = maybe
- ❑ 3 = definitely

13. Are your dizzy spells interfering with your work?

- ❑ 0 = no
- ❑ 1= occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = all the time

14. Do the dizzy spells seem to occur together with noises in your head or ears and problems with your hearing?

- ❑ 0 = no
- ❑ 1 = not sure
- ❑ 2 = maybe
- ❑ 3 = definitely related

D. CIVILIAN LIFE (Please highlight and mark <u>one</u> response)

1. Are you exposed to loud sounds during your free time?

- ❑ 0 = no
- ❑ 1 = occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = all the time

2. Which of the following sources of loud sound apply to you (please highlight and mark those noise sources that apply to you, and indicate how often are you exposed to each:

a) power tools:	❑	hours/week:	_____
b) guns (hunting/gun clubs):	❑	hours/week:	_____
c) off-road vehicles:	❑	hours/week:	_____
d) motorcycles:	❑	hours/week:	_____
e) snowmobiles:	❑	hours/week:	_____
f) rock music:	❑	hours/week:	_____
g) disco/dance bars:	❑	hours/week:	_____
h) others (please list):	❑	hours/week:	_____
_____		hours/week:	_____
_____		hours/week:	_____
_____		hours/week:	_____

3. Do you wear hearing protection during these noisy activities?

- ❑ 0 = no, I don't participate in noisy activities; go to question 5 (skip question 4)
- ❑ 1 = no, I don't wear hearing protection during noisy activities
- ❑ 2 = yes, less than half the time
- ❑ 3 = yes, more than half the time
- ❑ 4 = yes, all the time

4. What kind of hearing protection do you generally use?

- ❑ 0 = none
- ❑ 1 = ear plugs
- ❑ 2 = ear muffs
- ❑ 3 = ear plugs and ear muffs
- ❑ 4 = other – please s<u>pecify:</u>_____

5. Do you also work outside the military?

- ❑ 0 = no; you have completed the questionnaire. **Comments? Note on next page.**
- ❑ 1 = yes, occasionally
- ❑ 2 = yes, weekends
- ❑ 3 = yes, regularly after-hours

Please describe your sideline occupations:

_____
_____
_____
_____
_____

6. Are you exposed to loud sounds in your sideline work?

- ❑ 0 = no; you have completed the questionnaire. **Comments? Please note them below**.
- ❑ 1 = occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = constantly

Please estimate the hours per week of noise exposure, on average: _____

7. Do you wear hearing protection during your sideline work?

- ❑ 0 = no; you have completed the questionnaire. **Comments? Please note them below**.
- ❑ 1 = occasionally - less than half the time
- ❑ 2 = often - more than half the time
- ❑ 3 = constantly

8. What kind of hearing protection do you usually use?

- ❑ 0 = none
- ❑ 1 = ear plugs
- ❑ 2 = ear muffs
- ❑ 3 = ear plugs and ear muffs
- ❑ 4 = other - please specify: _____

COMMENTS

Please add any information you think might be relevant to this study. We would appreciate your comments:

_____

_____

_____

_____

_____

THANK YOU!

Annex C

Consent Forms I and II and Activity Sheet for Dosimetry

VOLUNTEER CONSENT FORM (I)

Title: A Study of Risk Factors for Noise-induced Hearing Loss in Canadian Forces Personnel

Principal Investigator: Dr. Sharon M. Abel, Ph.D., Communications Group, DRDC Toronto
Co-Investigator: Mr. R. Brian Crabtree, P.Eng., Head, Communications Group, DRDC Toronto
Co-Investigator: Col. David A. Salisbury, CD, MD, MHSc, Deputy Director General, DRDC Toronto
Co-Investigator: Dr. David Pedlar, Ph.D., Director, Research Directorate, Veterans Affairs Canada

1. I, ... hereby volunteer to participate as a test subject in an experiment to investigate noise-induced hearing loss in Canadian Forces personnel. I understand that the goal of this investigation is to upgrade the Canadian Forces hearing conservation program. I have been told that a copy of the results of the routine hearing test which I am about to undergo and my first hearing test on record, along with this Consent Form will be sent to the research team located at DRDC Toronto. I will also be asked to complete a questionnaire relating to my noise exposure history during work and leisure time, my hearing status, and any injuries that may have affected my hearing. The completed questionnaire will be mailed to the research team located in Toronto.

2. I understand that, although my Base Commander has agreed to support this study, I am under no obligation to participate. My superiors will not know whether I do or do not participate in this study. My participation in this study is completely voluntary and entirely independent of my job and medical care. I have been informed that I may, at any time, revoke my consent and withdraw from the study without penalty or prejudice, and that the investigators may terminate my participation at any time, regardless of my wishes.

3. I understand that the information I provide will be held in strict confidence, and will be reported only as part of group trends. My results will be kept entirely confidential and anonymous and will be accessed only by the researchers involved in this study. Information which identifies me personally (e.g., my name, address, telephone number and service number) will be removed when the test results are presented or published.

4. I have been told that participation in this study is completely non-invasive and poses no physical risks to me. The results may benefit me in the future by helping to upgrade hearing conservation programs that minimize the risk of hearing damage due to noise exposure. If I have any questions about this study at any time, I can contact Dr. S.M. Abel or Mr. R.B. Crabtree in Toronto at (416) 635-2000.

5. Having read and understood the terms of DRDC Toronto research protocol No. L-288, I freely offer my consent to participate.

Signature of Volunteer: ..... Date: .....

Address: .....

..... Postal Code: .....

Telephone Number: .....

CF Base: ..... Service number: .....

Name of Witness (please print): .....

Signature of Witness: ..... Date: .....

VOLUNTEER CONSENT FORM (II)

Title: <u>A Study of Risk Factors for Noise-induced Hearing Loss in Canadian Forces Personnel</u>

Principal Investigator: Dr. Sharon M. Abel, Ph.D., Communications Group, DRDC Toronto
Co-investigator: Mr. R. Brian Crabtree, P.Eng., Head, Communications Group, DRDC Toronto
Co-Investigator: Col. David A. Salisbury, CD, MD, MHSc, Deputy DG, DRDC Toronto

1. I, ...……..... hereby volunteer to participate as a test subject in an experiment to investigate noise-induced hearing loss in Canadian Forces personnel. I understand that the goal of this study is to upgrade the Canadian Forces hearing conservation program. As a participant I will be asked to wear a personal, pocket-sized noise dosimeter during one 8-hour work period. A miniature microphone will be affixed to my collar. I have been told that such devices are routinely used to estimate noise exposure in the workplace. They have no capability to record or reproduce conversation. The device will be fitted and removed by a trained biomedical technician.

2. I understand that, although my Base Commander has agreed to support this study, I am under no obligation to participate. My superiors will not know whether I do or do not participate in this study. My participation is completely voluntary and entirely independent of my job and medical care. I have been informed that I may, at any time, revoke my consent and withdraw from the study without penalty or prejudice, and that the investigators may terminate my participation at any time, regardless of my wishes.

3. I understand that the information I provide will be held in strict confidence, and will be reported only as part of group trends. My results will be kept entirely confidential and anonymous and will be accessed only by the researchers involved in this study. Information which identifies me personally (e.g., my name, address, telephone number and service number) will be removed when the test results are presented or published.

4. I have been told that participation in this study is completely non-invasive and poses no physical risks to me. The results may benefit me in the future by helping to upgrade hearing conservation programs that minimize the risk of earing damage due to noise exposure. If I have any questions about this study at any time, I can contact Dr. S.M. Abel or Mr. R.B. Crabtree in Toronto at (416) 635-2000.

5. Having read and understood the terms of DCIEM research protocol No. L-288, I freely offer my consent to participate.

Signature of Volunteer: ..... **Date:** .....

Address: .....

..... **Postal Code:** .....

Telephone Number: .....

CF Base: ..... **Service number:** .....

Name of Witness (please print): .....

Signature of Witness: ..... **Date:** .....

CF NOISE SURVEY

Name: _____ Subject No. (1-11): _____
Dosimeter Serial No._____ (# _ _)
Microphone placement: _____

1. Date: _____ 2. CF Base: _____

3. MOC: _____ 4. Trade: _____

5. Service I.D. _____ 6. Rank: _____

7. Age:_____ 8. Gender: _____ 8. Handedness (Right or Left) _____

9. Length of service in Regular/Reserve Force: _____

10. Please tell us your job and list your duties today, in order of occurrence;
Job: _____
Duties: _____
_____
_____
_____

11. Equipment (e.g., machine tools) used today:
_____
_____
_____

12. Aircraft flown in, vehicles used or ship spaces (areas) worked in today:
_____
_____
_____

13. Weapons of any type used today:
_____
_____
_____

14. Were you exposed to loud sounds during rest periods at work today?
Please list.
_____
_____
_____

15. What percentage of your time was spent in the field over the past six months?_____

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS SURVEY.

Annex D

Age and Gender Profile of the Canadian Forces

Table D1

The Distribution of the CF Regular Force by Age and Gender

Gender	Rank	Age (years)			
		16 – 24	25 – 34	35 – 44	45 +
Male	Officers	1,349	3,253	4,694	2,507
	Non-Commissioned Members	6,477	13,199	17,931	4,367
	Total Male	7,826	16,452	22,625	6,874
Female	Officers	450	765	588	215
	Non-Commissioned Members	697	1,876	2,588	459
	Total Female	1,147	2,641	3,176	674
	Total	8,973	19,093	25,801	7,548

Annex E

Description of Trades

Military Occupation Code (MOC) Job Descriptions
As described in the Careers Section of the Canadian Forces Website (www.forces.ca)

ARMY TRADES

011 – Armoured Soldier

Each Armoured Soldier belongs to one of the Armoured regiments of the Canadian Army, and serves as a member of the crew of an armoured fighting vehicle (AFV). His or her primary duties are to operate and maintain the AFV, its weapon systems (ballistic computers, laser range-finders and thermal sights as well as guns) and its communication equipment (sophisticated radars andradios). Armoured Soldiers are trained to fight as members of the Combat Arms team, which also includes the Infantry, the Artillery and the Combat Engineers. Armoured Soldiers begin their career with one of two types of AFV: the tank or the reconnaissance (recce) vehicle.

As a member of a tank crew trained as a driver, operator or gunner, an Armoured Soldier has the following primary duties:

- Drive and maintain the tank
- Fire the tank's main gun;
- Load the tank's main gun and machineguns; and
- Maintain the tank's communications equipment.

As a member of a recce vehicle crew trained as a driver or an observer, an Armoured Soldier has the following primary duties:

- Drive and maintain the recce vehicle;
- Load, fire and maintain the recce vehicle's machine-guns;
- Maintain and operate the recce vehicle's radio equipment; and
- Gather and relay information about the enemy and the terrain.

021 – Artillery Soldier Field

Field Artillery Soldiers are members of Field Artillery units of the Royal Regiment of Canadian Artillery. Like Armoured, Infantry, Air Defence Artillery and Combat Engineer units, Field Artillery units are part of the Combat Arms team that actually engages the enemy. The Field Artillery's contribution is indirect fire delivered in support of the arms that close with and destroy the enemy.

Field Artillery Soldiers — normally called "Field Gunners" — have the following primary duties:

- Position, load, aim, fire and maintain field guns, including the LG1 wheeled, 105-mm howitzers, and the M109 self-propelled 155-mm howitzer;
- Handle, sort and store artillery ammunition;
- Establish line communications using field telephones and sophisticated radio equipment;
- Use and maintain personal weapons and section-level weapons up to and including machine-guns and anti-tank weapons;
- Drive and maintain various wheeled and tracked vehicles;
- Operate technically advanced commandpost computers, laser range-finders and fire-control computers;
- Operate and maintain survey and locating equipment
- Provide fire-support advice to the Infantry and Armour;
- When necessary, fight as an infantry (includes use of personal weapons, reconnaissance and section level tactics).

022 – Artillery Soldier Air Defence
Air Defence Artillery Soldiers are members of Air Defence Artillery units of the Royal Regiment of Canadian Artillery. The Air Defence Artillery is part of the Combat Arms, but its primary function is to prevent enemy aircraft from interfering with our operations, especially by defending airfields.

Air Defence Artillery Soldiers — normally called "Air Defence Gunners" — have the following primary duties:

- Operate and maintain air defence weapons systems, including the ADATS, the Javelin S-15 and the Oerlikon twin 35-mm gun;
- Operate air defence target-acquisition and tracking radars;
- Handle, sort and store air defence artillery ammunition and missiles;
- Drive and maintain various wheeled and tracked vehicles;
- Operate field telephones and sophisticated radios;
- Operate and maintain personal weapons and section-level weapons (e.g., machine-guns and light anti-tank weapons); and
- When necessary, fight as infantry (includes use of personal weapons, reconnaisance and section level tactics).

031 – Infantry Soldier
Each Infantry Soldier belongs to one of the Infantry regiments of the Canadian Army, some of which bear battle honours more than a century old. As the Army's primary war-fighters and the core of the Combat Arms team, Infantry Soldiers are responsible for closing with and destroying the enemy. Supported by the Artillery, regiments of Armour and the Combat Engineers, Infantry Soldiers are capable of operating anywhere in the world in any environment — Arctic tundra, mountains, jungle or desert — and in any combination of arms, including airmobile and amphibious operations.

Infantry Soldiers have the following primary duties:

- Expertly operate and maintain a wide range of personal and section-level weapons, including rifle (with and without bayonet), hand-grenades, light, medium and heavy machine-guns; and anti-tank weapons;
- Use sophisticated equipment for field communications, navigation and night-vision surveillance;
- Inspect and maintain weapon systems, vehicles and equipment (including clothing, survival gear and personal defensive equipment);
- Participate in airborne operations;
- Operate with support elements such as fighter aircraft, tactical helicopters (troop-carrying and reconnaissance) and artillery;
- Engage in unarmed combat; and
- Employ fieldcraft and battle procedures including camouflage and concealment, patrol, assault, defence, and escapeand- evasion tactics.

041 – Field Engineer (information provided by a military recruiter in the Human Systems Inc. contract report)
The functions of the Field Engineers are

- To assist troops to live, move and fight on the battlefield
- To assist in denying the same ability to the enemy
- To perform duties in aid of the civil power
- Provide assistance to civil authority
- Participate in peace-keeping operations
- To perform construction and maintenance tasks in support of DND and non-DND government agencies
- To drive and operate vehicles an equipment in support and Engr. Ops

- To maintain field installations and facilities

Field Engineers fight as Infantry when required

052 – Line Technician

Line Technicians belong to the Communications and Electronics (C&E) branch of the Canadian Forces, and are responsible for providing the infrastructure for communications services between Combat Arms units in the field. This work includes (but is not limited to) designing, planning and installing telecommunications networks of copper and fiber-optic cable, and constructing and maintaining complex antenna systems. Because they work in operational areas, Line Technicians are also trained as combat soldiers.

Line Technicians have the following primary duties:

- Operate specialized construction equipment such as backhoes, trenchers,and pole-and-cable trailers;
- Operate commercial and military-type vehicles in operational and non-operational environments;
- Design, plan, construct, inspect and test overhead, underground and underwater communication cable routes for permanent bases and tactical locations;
- Use and maintain power tools such as power saws, pneumatic drills, hydraulic tools and cable-pressurization equipment;
- Plan, engineer, supervise, install and maintain permanent and tactical communication cable plants to support voice and data communications;
- Operate communications test equipment such as optical time domain reflectometers (OTDRs), time domain reflectometers (TDRs), voltage standing wave ratio (VSWR) testers and local area network (LAN) testers; and
- When necessary, fight as infantry (includes use of personal weapons, reconnaissance and section-level tactics).

21 – Armour Officer

Armour Officers are commissioned members of Canada's Armour regiments, which (like the Artillery, Infantry and Combat Engineers) belong to the Combat Arms.

Armour has two roles in battle: reconnaissance and direct-fire support.

At the beginning of their careers, Armour Officers are troop leaders commanding 15 to 23 soldiers and four tanks (in an Armour squadron) or eight armoured reconnaissance vehicles (in a Reconnaissance squadron). In this capacity, they are responsible for their soldiers' training, morale, discipline and combat efficiency, and for the operational readiness of their equipment.

As Reconnaissance Troop Leaders, they employ stealth, flexibility and innovation on the battlefield, using advanced sensors and equipment, to locate the enemy and identify high-value targets for the commander. As Tank Troop Leaders or Direct-Fire Support Troop Leaders, they employ mobility, flexibility and shock action on the battlefield to use armoured direct-fire systems to destroy enemy targets. They may be deployed abroad on operational missions, or in Canada in support of civil authorities in cases of national emergency. They work with Armour soldiers to crew and fight from armoured fighting vehicles such as the Leopard main battle tank, the Coyote surveillance vehicle, and the Command and Reconnaissance variant of the Light Utility Vehicle, Wheeled (LUVW).

215 – Signal Operator

Signal Operators are members of the Communications and Electronics Branch of the Canadian Forces. Their job is to provide Army units with fast, reliable voice and data communications, and they do it by means of top-of-the-line satellite, digitized, fixed, airtransportable and mobile information and

communications equipment.

A Signal Operator has the following primary duties:

- Install and operate satellite communication systems and digitized high-frequency, very high frequency, and ultra high frequency radios with all types of antennae;
- Manage and administer local area networks (LANs) and local distribution networks;
- Transmit and receive messages and data;
- Operate cryptographic equipment and generate key material;
- Co-ordinate circuit restoration in communications and information networks;
- Plan communications services; and
- Perform in land operations, when necessary, fight as infantry (includes use of personal weapons, reconnaissance and section level tactics)

22 – Artillery Officer

Artillery Officers are commissioned members of the Royal Regiment of Canadian Artillery, which (like the Armour, Infantry and Combat Engineers) belongs to the Combat Arms. Artillery has three principal roles in battle: indirect fire support, air defence, and target acquisition.

In a Field Artillery unit, Artillery Officers are Troop Commanders leading 30 soldiers and 3 guns. In an Air Defence Unit, they command 4 Air Defence Anti-Tank Systems (ADATS) and 40 soldiers. Target Acquisition units have many configurations, but they most likely command a troop of Counter Battery (CB) Radars or Unmanned Aerial Vehicles (UAV) composed of 20 to 25 soldiers. In this capacity, they are responsible for their soldiers' training, morale, discipline and combat efficiency, and for the operational readiness of their equipment. As Artillery Officers, their main duties are to solve problems, make timely decisions, and prepare for new and greater responsibilities. In addition to field guns and missile systems, they are be expected to become experts with a wide variety of high-technology equipment including (but not limited to) laser range-finders, fire-control computers, surveillance and target-acquisition radars, and UAVs. They may be deployed overseas on operational missions, and in Canada in support of civil authorities in cases of national emergency.

23 – Infantry Officer

Infantry Officers are commissioned members of Canada's Infantry regiments, which (like the Armour, Artillery and Combat Engineers) belong to the Combat Arms. The role of Infantry in battle is to close with and destroy the enemy.

At the beginning of their careers, Infantry Officers, serve either in a mechanized battalion equipped with the LAV III armoured fighting vehicle, or a light infantry battalion. They are Platoon Leaders in command of 30 to 35 soldiers, and are responsible for their training and combat efficiency, discipline, morale, physical condition and well-being, often under the most demanding circumstances. Infantry Officers develop the skills and confidence required to perform a wide range of duties, from commanding and leading soldiers as part of a Combat Arms team to occupying various staff positions involving planning, training, intelligence, logistics and personnel administration.

227 – Land Communications and Information Systems Technician

Land Communication and Information Systems Technicians (LCIS TECHs) repair and maintain all types of Army communications and information systems. These include: communications equipment and radio systems, radio relay systems, radar systems, ground surveillance and miscellaneous radiation detection and associated equipment, and cryptographic equipment. LCIS TECHs also maintain strategic, long range radio communications systems, portable satellite communications systems, microwave systems, personal computers and area networks, and ground telecommunications systems.

Their primary technical functions are the following:

- Perform system restoration, preventive and corrective maintenance, inspections, modifications, installations and acceptance checks, as well as repair and overhaul;
- Perform installations as well as preventive and corrective maintenance on a wide range of radio, radar, switching, data processing, cryptographic, terminal, audio and video equipment;
- Install and operate test and diagnostic equipment to determine the general condition of systems; and
- Repair and calibrate radiation detection equipment.

411 – Vehicle Technician

Vehicle Technicians belong to the Electrical and Mechanical Engineering Branch of the Canadian Forces. Each Vehicle Technician is a member of a team responsible for maintaining, repairing and overhauling CF land vehicles and related equipment to keep them in top condition.

A Vehicle Technician has the following primary duties:

- Inspect, repair, overhaul and modify all types of automotive equipment and components;
- Repair, adjust and modify automotive systems (i.e., cooling, air-intake, fuel, exhaust, electrical, drive-train, brake, frame, steering and suspension);
- Repair, adjust, overhaul and modify powered equipment such as electrical generators and fuel-fired heating devices;
- Use and maintain common and specialized tools, basic garage hydraulic, mechanical and pneumatic equipment and oxyacetylene welding equipment;
- Carry out the recovery of all types of vehicles used in the land forces, utilizing standard towing trucks and specialized tracked and wheeled recovery vehicles;
- Drive all types of vehicles ranging from small jeeps to tank transporters; and
- Prepare and process maintenance documentation dealing with work orders, individual time cards and parts request forms.
- Perform in land operations, when necessary, fight as infantry (includes use of personal weapon, reconnaissance and section level tactics)

421 – Weapons Technician Land

Weapons Technicians – Land are members of the Electrical and Mechanical Engineering Branch of the Canadian Forces. They are responsible for the maintenance and repair of weapons, weapons systems and ancillary equipment, including: small arms (rifles, submachine-guns and handguns); larger hand-controlled and shoulder–controlled weapons such as machine-guns and non guided anti-tank weapons; sub-calibre adapters; training devices, including simulators; grenade projectors, mortars and launcher systems; and light weapons and turret systems for armoured fighting vehicles. They are also responsible for the maintenance and repair of miscellaneous equipment such as scales, hydraulic lifts, locks and security containers, personal flotation devices, rebreathers, and equipment for heating, cooking and lighting in the field.

43 – Land Electrical and Mechanical Engineering

Electrical and Mechanical Engineering (EME) Officers are commissioned members of the Electrical and Mechanical Engineering Branch of the Canadian Forces, responsible for the maintenance and engineering support of all Army equipment, and of the land-based equipment of the Navy and Air Force. They lead the soldier technicians who keep CF equipment in top condition, and work in every equipment life-cycle phase, from design, evaluation and acquisition through in-service support to eventual disposal.

EME Officers can practice virtually any engineering discipline, as military equipment incorporates the full range of current technology, including thermal, electro-optic and radar sensing and guidance devices; fourth-generation computer hardware, firmware and software; and the most modern electronic,

mechanical and hydraulic systems. EME Officers' duties involve command authority, technical staff responsibility, and specialized engineering knowledge. To ensure the combat effectiveness of the personnel under their command, they must be a good leaders, proficient in tactics, training and administration. Most of the personnel their command will be the highly skilled technicians of the Vehicle, Weapon, Fire-Control Systems and Material occupations.

434 – Fire Control Systems Technician
Fire Control Systems Technicians belong to the Electrical and Mechanical Engineering Branch of the Canadian Forces. They are the only electronic-optronic technicians dedicated to the Army, but they also support Air Force and Navy requirements. Firecontrol systems are the weapon components that ensure accurate delivery of ammunition to the intended target, and Fire Control Systems Technicians are responsible for maintaining, repairing and modifying this equipment to keep it in top condition.

A Fire Control Systems Technician has the following primary duties:
- Inspect, test, diagnose faults in, adjust, repair, recondition and modify electrical, electromechanical, electronic, electro-optic and mechanical equipment, optical instruments, and control systems for weapons and missiles;
- Repair surveillance and thermal observation systems;
- Maintain vehicle satellite navigation systems;
- Maintain fibre-optic systems;
- Repair LASER systems;
- Maintain optical, electrical and electronic test equipment;
- Repair portable and trailer-mounted power-generating systems;
- Operate and maintain general-purpose and specialized tools and equipment; and
- Drive military-pattern vehicles.

441 – Materials Technician
Materials Technicians belong to the Electrical and Mechanical Engineering Branch of the Canadian Forces. The Materials Technician is a versatile, highly skilled person who is usually employed with a Maintenance Unit.

The main activities of the Materials Technician are:
- Welding;
- Machining;
- Sheet metal work;
- Painting; and
- Work with textiles, fibreglass and composite.

These skills are applied primarily in the maintenance and repair of land vehicles and related equipment, mostly in Army units but also in the Air Force and Navy.

51 – Dental
Dental Officers are commissioned members of the Canadian Forces Dental Services. Their primary duty is to practise dentistry in the military milieu. In the Canadian Forces, both at home in Canada and overseas when deployed on operations, their practices include all aspects of preventive dentistry and the provision of dental treatment for oral diseases, injuries, and defects of the teeth and their supporting structures. They are also asked to assist other health care personnel when your particular skills are required, and to teach subjects in which they have received post-graduate training.

738 – Dental Technician
Dental Technicians are the members of the Canadian Forces Medical Service health care team who are responsible (with Dental Officers) for delivering dental services to Canadian Forces members and,

occasionally, their dependants.

A Dental Technician has the following primary duties:

- Assist the Dental Officer, performing the full range of chairside duties;
- Perform preventive dentistry procedures and deliver preventive dentistry instruction;
- Produce dental x-rays and preliminary impressions for study casts;
- Perform clinical dental laboratory procedures;
- Perform preventive maintenance on dental equipment;
- Manage dental supplies and records;
- Drive and maintain the Mobile Dental Clinic; and
- Operate and maintain the Air Transportable Kit.

78C – Logistics

Throughout the course of their career, Logistics Officers (LOG) will work in one or several of the five main disciplines of this MOC: Supply Chain Management, Transportation, Human Resource Management, Finance, and Food Services and could have the opportunity to work in one or more of the following three areas of expertise: Movements, Postal, and Ammunition. Through a combination of training and assignments, Logistics Officers will develop different skill sets in one or more of the above-noted disciplines or areas of expertise. They must be able to live and work in a combat environment. Consequently, they will receive the necessary training to maximize their safety and that of their subordinates.

Their duties could include some of the following functions: procurement, warehousing, material control, distribution, disposal of military materiel, equipment, and ammunition, the provision of various means of transportation for the movement of personnel and all types and sizes of cargo throughout the world, the provision of food services, postal services, human resource or financial services. In the performance of their duties, they will lead other officers, non-commissioned members and civilian employees.

Logistics – Land (Army). In the early stages they are employed as platoon commanders in a General Support or Close Support Service Battalion, after which they may choose to focus on one or more of the main Logistics disciplines. Senior Army Logistics Officers have a wider range of command and staff opportunities. Most junior officers are employed within the Army.

Army Logistics Officers at the rank of Lieutenant Colonel or higher normally work at National Defence Headquarters performing tasks related to the management of Joint and Combined Operations, logistics systems, and general logistics.

881 – Postal Clerk

Postal Clerks (POST CLKs) provide members of the military and, under some circumstances, their dependants, with a full range of postal services at Canadian Forces bases and establishments.

- Perform all mail handling duties related to the receipt, dispatch and delivery of mail
- Operate a postal tracing service
- Maintain the security of mail and of post office premises as well as the security of cash, postal valuables and sensitive equipment
- Prepare and distribute bills of lading for international and domestic mail dispatched by road, rail, sea and air
- Operate a postal financial counter in accordance with Canada Post regulations and directives
- Conduct financial accounting and audit duties at military post offices
- Type routine correspondence, forms and documents
- Operate office equipment including calculators, photocopiers, computers and postage meters

921 – Ammunition Technician
The role of the AMMO TECH is to perform the highly technical inspections, proof and test of ammunition, and perform ammunition maintenance functions on tri-service ammunition. These functions include repairing, assembling, disassembling, refurbishing, modifying, disposal, as well as certifying ammunition and range scrap free from explosives.

AMMO TECHs provide advice on all explosive safety matters, maintain field installations and facilities, drive SMP vehicles and MHE, operate equipment in support of operations, and use radios and computers.

They are also responsible for the logistical functions associated with the storage and maintenance of ammunition. They will perform duties in aid of the civil power, in the form of RSP and disposal of explosive ordnance and improvised explosive devices, provide assistance to civil authority, participate in peacekeeping operations, and fight as infantry in an emergency.

NAVY TRADES

065 – Naval Weapons Technician
Naval Weapons Technicians (NW TECH) are responsible for the maintenance and operation of all shipboard armament equipment and systems as well as the care and custody of all onboard ammunition and explosives.

- Prepare, use and store all onboard ammunition and explosives, including naval gun ammunition, Close-In Weapon System (CIWS) ammunition, missiles, rockets, torpedoes, demolitions, pyrotechnics and small arms ammunition
- Operate, control and maintain combat systems, including naval gun systems, naval missile and missile-handling systems, torpedo-launching and handling systems, acoustic sensor handling systems, torpedo decoy systems, Close-In Weapon System, rocket-launching systems, hydraulic cranes, davits and capstans, weapons panels and interfaces and hydraulic stabilized platforms
- Carry out preventative and corrective maintenance on mechanical and fluid powered (hydraulic/pneumatic) components of weapons systems
- Fabricate mechanical and fluid powered components and parts for weapons systems equipment
- Test and repair electrical/electronic components of weapons systems
- Prepare job-related maintenance and administrative documents.

181 – Boatswain
Boatswains (BOSN) in the Canadian Forces are professionally trained sailors. The range of their activities and supervisory responsibilities is wider than in most other sea occupations. Complex seamanship evolutions requiring heavy equipment and well-controlled groups of personnel are a major part of the BOSN's work:

- Operate and maintain shipboard equipment associated with cargo handling and inter-ship transfer of personnel, fuel and material at sea
- Operate and maintain ship's anchor and cable equipment including that used in towing, launch and recovery of ship's boats and rescue operations
- Operate and navigate small craft, including ship's boats, auxiliary vessels and tenders, in enclosed waters
- Perform tasks associated with ship's rigging, rope work and lifesaving equipment
- Organize and conduct activities associated with storage, training and use of small arms, demolitions and ammunition
- Plan, organize and conduct drills and ceremonies such as ceremonial salutes, honour guards and burials at sea
- Assist and supervise deck crews in cleaning, preserving and painting the ship and its equipment

- Operate a variety of occupation-associated equipment such as outboard motors, sewing machines (to repair canvas) and forklifts and cranes on replenishment ships
- Coordinate watchkeeping duties at sea and in harbour
- Organize internal security and boarding parties as required

275 – Naval Combat Information Operator
Naval Combat Information Operators (NCI OP) are responsible for the operation of all shipboard surveillance radar equipment and systems as well as for the compilation of the tactical picture. NCI OPs are operators and perform no maintenance functions whatsoever:

- Operate warning and navigation radars, radar consoles, identification of friend or foe (IFF) equipment, gyroscopes, speed logs, wind finding equipment, navigation equipment, external/internal communication equipment, tactical displays, data link and information processing systems
- As members of a ship's Combat Information Organisation they assist and advise the ship's command in navigation, control of ships and aircraft by sending, receiving, identifying, evaluating, classifying, tracking and reporting radar and intelligence data from tactical sensors and displays
- Record and display all sensor and intelligence data
- Perform operator functional checks on equipment by using Built-In Test Equipment, Integrated Test Equipment and basic on-line fault diagnostic procedures.

276 – Naval Electronic Sensor Operator
Naval Electronic Sensor Operators (NES OPs) are responsible for the operation of all types of electronic warfare intercept receivers, countermeasure transmitters, above water detection and fire control equipment. NES OPs are operators and perform no maintenance functions whatsoever:

- Operate electronic support measures, electronic countermeasures, communication intercept equipment, gun and missile fire-control radar and electro-optical equipment
- As members of the ship's Combat Information Organization, NES OPs assist and advise the ship's command by intercepting, identifying, classifying, correlating and disseminating electronic emission information and feeding that information into the tactical picture
- Conduct intelligence gathering and communication security monitoring
- Assist in command decisions by compilation and analysis of electronic warfare, above water weapons, fire control and intelligence data
- Perform operator functional checks on equipment by using Built-In Test Equipment, Integrated Test Equipment and basic on-line fault diagnostic procedures

277 – Naval Communicator
Naval Communicators (NAV COMMs) are trained in all areas of naval communications, including radio teletype, computer networking, satellite, tactical voice and visual communications. On board ship they provide real-time tactical information by voice radio, intership radio teletype and visual signalling. Additionally, they operate a variety of sophisticated systems including: computer-based message processing network, radio communication control system, and cryptographic and satellite equipment:

- Operate systems, which include: shipboard radio/satellite equipment; message processing via local area network; and cryptographic equipment
- Communicate by: inter ship, ship/shore radio teletype; ship/shore satellite, voice and radio teletype; INMARSAT voice, facsimile and email; tactical international and administrative voice radio; flashing light (Morse code); flag signalling; and semaphore

- Tactical Signalling: advise command on tactical signalling and ship manoeuvring; and encode/decode and disseminate tactical and manoeuvring signals
- Perform and advise on shipboard flag ceremonial procedures

278 – Tactical Acoustics Sensor Operator
The Tactical Acoustic Sensor Operator (TAS OP) is responsible for the operation of active and passive acoustic equipment; acoustic simulators; internal and external communication equipment; acoustic range prediction systems; and noise monitoring, recording and bathythermograph equipment. At the Underwater Warfare Director (UWWD) level, the TAS OP is responsible for the direction of Underwater Warfare (UWW) sensors and weapons. As the Operations Watch Officer (OWO), the TAS OP is responsible for tactical employment of Surveillance Towed Array Sensor Systems (SURTASS) ships and fixed sensors, and provides cueing in direct support of Anti-Submarine Warfare (ASW) forces and intelligence commands. As the Senior TAS OP he or she is responsible for the coordination of the Combat Team. As a member of the Combat or Operations Team, the TAS OP searches, detects, localizes, identifies, classifies, correlates and disseminates acoustic information; gathers and evaluates oceanographic data; and feeds that information into the recognized maritime picture. The TAS OP is also part of the ship's intelligence gathering team, compiling and analyzing acoustic intelligence information:

- Operate and use all types of active and passive sonars, sonar simulators, internal and underwater communication equipment, bathythermograph equipment and sonobuoys
- As members of the ship's Action Information Organization, assist the ship's command personnel in navigation and control of ships and aircraft by searching, detecting, evaluating, classifying, tracking and reporting sonar and intelligence data
- Gather and evaluate oceanographic data
- Assist in command decisions by compiling and analyzing sonar and intelligence data
- Perform operator function checks on equipment by using Built-in Test Equipment, Integrated Test Equipment, and basic on-line fault diagnostic procedures
- Adjust oceanographic equipment in order to obtain the best displays of oceanographic data
- Operate data transmission systems
- Identify significant features of displayed oceanographic data
- Prepare and maintain visual displays of analyzed data using status boards, charts and watchkeeping records
- Convert analyzed data into comprehensive reports
- Perform administrative functions as necessary

283 – Naval Electronics Technician (Acoustic)
Naval Electronics Technician (Acoustic) [NE TECH (A)] personnel are responsible for the maintenance of all shipboard acoustic equipment and associated systems. NE TECH (A) personnel will receive academic and equipment-related training leading to employment at sea as Apprentice Technicians. This Apprentice Developmental Period, lasting approximately 24 months, provides experience on the equipment that Naval Electronics Technicians (Acoustic) are responsible for and that they will subsequently maintain. On completion of this developmental period, NE TECH (A) personnel will commence their Journeyman Technician training. As an Apprentice, they will perform maintenance and repairs on the following types of equipment:

- Underwater Communication Equipment
- Doppler Speed Log
- Wind-Indicating System
- Radio Navigation Aids
- Sound Path Plotting Systems
- Depth-Finding Equipment

- Towed Array Sonar Receiver
- Gyro Repeaters
- Depth-Measuring Equipment
- Stabilized Horizon Reference
- Data Terminal Displays
- High-Speed Printers
- Cartridge Magnetic Tape Units
- Video-Switching and Navigation Information Distribution Equipment

284 – Naval Electronics Technician (Communications)
Naval Electronics Technician (Communications) [NE TECH (C)] personnel are responsible for the maintenance of all shipboard internal and external communications equipment and systems, including radio navigation aids and beacons. They are technicians and perform no operator functions whatsoever.

NE TECH (C) personnel receive academic and equipment training leading to employment at sea as Apprentice Technicians. This Apprentice Developmental Period, lasting approximately 24 months, provides Naval Electronics Technicians (Communications) with experience on the equipment that they are responsible for and will subsequently maintain. On completion of this developmental period, NE TECH (C) personnel will commence their Journeyman Technician training. As an Apprentice, they will perform maintenance and repair on the following types of equipment:

- Internal Communication System
- Ship's Electric Clock System
- Ship's Entertainment Broadcast System
- Magnetic Tape Units
- High Speed Printers
- Maritime Mobile Radio System

285 – Naval Electronics Technician (Tactical)
Naval Electronics Technician (Tactical) [NE TECH (T)] personnel are responsible for the maintenance of all shipboard radar, firecontrol and electronic warfare equipment and associated systems. They are technicians and perform no operator functions whatsoever.

NE TECH (T) personnel receive academic and equipment-related training leading to employment at sea as an Apprentice Technician. This Apprentice Developmental Period, lasting approximately 24 months, provides experience on the equipment that they are responsible for and that they will subsequently maintain. On completion of this developmental period, NE TECH (T) personnel will commence their Journeyman Technician training. As an Apprentice, they will perform maintenance and repairs on the following types of equipment:

- Navigation Radar
- Magnetic Tape Units
- Data Terminal Sets
- High Speed Printers
- Radar Distribution Unit
- Radiation Control Unit
- Analogue Display Equipment

286 – Naval Electronics Technician (Manager)
Not available

313 – Marine Engineering Technician and 314 – Marine Engineering Artificer
Not available
(The following description is given for 312 – Marine Engineering Mechanic)
Marine Engineering Mechanics (MAR ENG MECH) are the personnel who operate and monitor a ship's mechanical equipment. The systems for which they are responsible are diverse and complex; the job is technical and challenging:

- Assist in the operation of main and auxiliary high-pressure boilers, diesel and gas turbine propulsion engines
- Operate pneumatic, hydraulic, mechanical and electrical control systems used in monitors, alarms, helicopter haul-down and replenishment-at-sea equipment
- Operate refrigeration, ventilation and air conditioning equipment
- Operate ship's steering equipment
- Operate the systems which produce the ship's domestic and boiler feed water
- Operate filling and transfer systems for water, fuels and lubricants
- Under supervision, inspect, test, maintain, repair, modify and install equipment associated with the trade
- Assist with departmental records and maintenance reports
- Assist with administration

R315 – Marine Engineering Systems Operator (Diesel Mechanic)
Diesel Mechanics are responsible for the operation and maintenance of marine engineering equipment aboard naval vessels having diesel or diesel-electric propulsion systems. The systems for which they are responsible are diverse and complex; the job is technical and challenging.

321 – Hull Technician
Hull Technicians (H TECHs) maintain the ship's structure, stability, plumbing, heating, air-conditioning, damage control and fire fighting equipment. They are the ship's carpenter, welder, metal worker and damage control expert.

- Maintain air-conditioning and ventilation systems
- Test, maintain and repair ship structure and hull fittings
- Maintain, repair and install ship boats and liferafts
- Perform arc and oxyacetylene welding
- Perform carpentry and painting to maintain and repair ship fittings
- Operate and maintain firefighting and damage repair equipment
- Read and interpret sketches, engineering and mechanical drawings
- Maintain and repair ship piping systems, pumping and flooding systems, steam heating and de-icing equipment, and the ship's pollution and sanitation systems
- Calculate ship stability and identify potential problems

331 – Electrical Technician
Not Available

342 – Clearance Diver Technician
Not available

44A – Maritime Engineering
Not available

71(B, C) – Marine Surface and Subsurface Officer (MARS)
The primary function of the Maritime Surface and Sub-surface military occupation is to provide officers to man the seagoing combatant units of Maritime Command. The primary task of officers within the military occupation is command, co-ordination, and control of Military Maritime Operations. To do this, they must be able to lead and make decisions, often under adverse conditions of physical discomfort and mental stress. Furthermore, they are required to gain knowledge and expertise in a wide spectrum of activities relating to the exercise of sea power, including maritime strategy, tactics and procedures in the operation of ships, submarines and aircraft, maritime sensors, combat information, and weapons systems. They may also be called upon to provide an input into the design, the procurement, and the evaluation of ships or systems. In addition to the primary tasks as an officer to the MARS military occupation, they are required to perform staff, training and administrative duties which require this background.

862 – Steward
Stewards (STWDs) are members of the Navy and a STWDs job is primarily the provision of hospitality services within the Navy. A STWDs duties are varied and range from food and beverage services to financial management and administration. They are not Cooks (MOC 861), although they may work alongside Cooks and some food preparation will comprise part of their duties.

- Serve food and beverages (alcoholic and nonalcoholic) on formal and informal occasions at sea and ashore as well as on board military aircraft, including VIP flights
- Prepare light meals, snacks and hors-d'œuvres on ships and aircraft
- Operate military warehouses at sea and in deployed operations
- Operate ship borne convenience stores (known as Ship Exchanges)
- Maintain records, financial accounts and filing systems for activities relating to the use of public and non-public funds (NPF)
- Operate military clubs (known as messes), including allocation and control of facilities, mess fund accounting, bar management and staff supervision
- Manage military accommodations, including room allocation, reception, furnishings, key control, cleaning and maintenance
- Provide non-public funds (NPF) management on all HMC ships

88 – Marine Systems Engineer
The primary task of the maritime engineers is to provide engineering expertise for the support of ships and marine facilities; the design, development and acquisition of naval weapons and equipment; and the operation of sophisticated naval vessels.

Marine Systems Engineering embraces ship propulsion systems (gas turbine, steam turbine and diesel engine); electrical power generation and power distribution systems; air and water conditioning and distribution systems; and machinery automatic control systems. Their responsibilities range from the conceptual design stages of equipment, to systems engineering design and construction. They are also responsible for operating and maintaining these systems.

In addition to their primary tasks, they will be required to fill staff, training or administrative positions requiring their background or expertise.

AIR FORCE TRADES

081 – Airborne Electronic Sensor Operator
Not available

091 – Flight Engineer (information provided by a military recruiter in the Human Systems Inc. contract report)
The function of the Flight Engineer is to act as an operator/maintainer in support of CF air operations.

Air operational tasks include:
- Mission planning
- Pre and post-flight inspections
- Monitoring and operation of aircraft systems
- Identifying and responding correctly to emergency and abnormal situations
- Calculation of aircraft and power plant performance data, weight and balance, take off and landing data
- Special duties associated with specific mission roles, including NCG operations

Maintenance activities include:
- The certification of aircraft for flight
- The completion of scheduled and unscheduled inspections
- Rectification and certification of aircraft unservicables, and petroleum, oil, and lubricants (POL) replenishment

Flight Engineers also carry out a variety of Operational Flight Trainer (OFT) duties, administration and supervisory functions, and are the subject matter experts on technical matters to the aircraft commander.

131 – Search and Rescue Technician (information provided by a military recruiter in the Human Systems Inc. contract report)
SAR Techs are highly trained specialists who provide on-scene medical attention and rescue for aviators, mariners and others in distress in remote or hard to reach areas. They are trained in advanced trauma life-support, land and sea survival, rescue techniques from helicopters, parachuting, diving, mountain climbing and rappelling. In the air, they act as spotters, providing medical care during medical evacuation flights, direct the dropping of equipment and supplies by parachute and parachute and hoist from the planes and helicopters. On the ground, they render on-site medical care to casualties, organize and lead ground search teams and perform mountain rescue operations to assist and recover casualties. They are trained to operate boats and to perform both surface and underwater rescue scuba gear. They are trained as survival experts under all Canadian climatic and terrain conditions including on land, at sea, in the Arctic, on mountains and on glaciers. They are also trained to communicate with over-flying aircraft by use of radios, flares, smoke, ground and hand signalling devices and other methods.

168,169,170 – Aerospace Control Operator, Radar Controller
The Aerospace Control Operator (AC OP) operates radars, computers, communications and other sensor systems in the surveillance and control of airspace, both Canadian and foreign. AC Ops participate in tactical operations during air sovereignty, domestic airspace defence and counter drug smuggling missions, as well as in peacekeeping aerospace missions and enforcement of Canadian, NORAD and NATO aerospace policies. The AC Op controls and coordinates the movement of military and civilian air/ground traffic at CF aerodromes and tactical units:

- Operate command and control systems (i.e., Sector Operations Control Centre (SOCC), Airborne Warning and Control System (AWACS), Space Tracking)
- Operate electronic display consoles
- Operate communications systems and associated equipment
- Operate the Precision Approach Radar (PAR)
- Provide ground control instructions to aircraft and vehicular traffic operating on the aerodrome surface

- Provide flight advisory to aircraft
- Interpret weather reports
- Maintain records
- Respond to emergency situations
- Perform occupation-related administrative functions

226 – Aerospace Telecommunication & Information Systems Technician
The Aerospace Telecommunications and Information Systems Technician (ATIS Tech) performs, supervises and directs the repair and maintenance of all types of Air Force telecommunications systems, as well as information technology infrastructure supporting national operational command and control information systems. These include: static and deployable airfield communication, radar and navigational systems, long-range radio communications systems, deployable long-range radar and associated communication link systems, special purpose electronic systems used in signals intelligence operations, and cryptographic equipment. ATIS techs also manage and maintain mobile and fixed satellite communications systems, microwave systems, switchboards, cable plants, and all forms of command and control computer systems and networks. Their primary technical functions are to perform preventive and corrective maintenance, system restoration, special inspections, modifications, installations and acceptance checks, as well as the repair and overhaul of all types of telecommunications, navigation and cryptographic systems.

- Perform preventive and corrective maintenance on all types of radios, radar and data processing, cryptograph, terminal, audio and video equipment
- Perform inspections, performance tests and adjustments on strategic and tactical fixed and mobile telecommunications equipment
- Perform repairs, overhaul and support maintenance on telecommunications equipment
- Perform installations and acceptance tests
- Liaise with all levels of command and functional groups, including Base level personnel
- Maintain and/or advise other occupations on the maintenance of the electromechanical and refrigeration requirements of telecommunications equipment Deploy as part of a Contingency Support Wing, as part of 8 Air Communications and Control Squadron, as part of a Tactical Control Radar Squadron, or as part of the Canadian Forces Joint Signals Regiment
- Manage the life-cycle of material related to various telecommunications and information systems

31 – Air Navigator
The primary function of Air Navigators (ANAV) is to plan, coordinate and direct the tactical missions of their aircraft and crew in a highly dynamic environment, in order to achieve military objectives. Air Navigators will often direct and coordinate the tactical activities of other units to achieve operational objectives. To accomplish their mission, Air Navigators employ precision tactical navigation systems, sophisticated sensors, communication systems, electronic warfare equipment and weapon delivery systems. Missions that Air Navigators may lead include:

- Search and Rescue
- Anti-Submarine Operations
- Maritime Surface Surveillance and Targeting
- Sovereignty and Fisheries Patrols
- Counter-Narcotics Operations
- Tactical Airlift
- Air-to-Air Refuelling
- Humanitarian Relief
- Combined Operations with Foreign Militaries

Experienced Air Navigators assist in the formulation of strategic and operational policies and plans, determine air requirements and set standards. Air Navigators are employed as flight instructors at either the Canadian Forces Air Navigation School (CFANS) or one of the Operational Training Units (OTU). They also participate in the development, testing and procurement of aerospace systems and equipment for the Canadian Forces. Air navigators are well suited for many operational, technical and administrative positions and are eligible for Command at all operational levels. This military occupation offers progressive advancement and numerous opportunities for a well-balanced career.

32 – Pilot
Serving as a Pilot in the Canadian Forces is a demanding and rewarding career. The Canadian Forces operate a variety of aircraft including basic and jet trainers, helicopters, heavy transport and long-range patrol aircraft as well as high performance fighters. Military pilots must be able to make use of navigation and communication systems including some of the most advanced technology presently available in the field of aviation. They also be required to operate the armament and fire control systems carried on board many of the operational types of aircraft. As part of a normal career progression, a Canadian Forces Pilot will be required to serve in staff positions and/or instructional positions. Air Force pilots fly a range of aircraft to carry out its many domestic and international roles.

39 – Aerospace Controller
Aerospace Controllers (AECs) fulfil the traditional duties of Air Traffic Control and Air Weapons Control. Through the use of radar and other electronic systems, AECs are responsible for the conduct of aerospace surveillance, warning and control by detecting, tracking, and controlling the interception and identification of airborne objects. Integral to the Canadian Air Navigation System, AECs provide control, utilizing radar and non-radar techniques, to civilian and military aircraft in flight, and to aircraft and vehicles on the aerodrome. Aerospace controllers also perform aerodrome management and computer programming duties/functions.

Aerospace Controllers are required to perform training, administrative, and staff duties requiring aerospace command and control expertise. They serve in various staff positions on Wings and at various national and international headquarters and in support of military missions. They can also be selected as an Airborne controller or Tactical Director on NATO and NORAD Airborne Early Warning aircraft in either Europe or North America, or as an Airborne Intercept Controller onboard the new Canadian Frigates. They can anticipate performing duties in support of deployed and contingency air operations across Canada and throughout the world.

41 – Aerospace Engineering
Aerospace Engineering officers are responsible for all aspects of the maintenance and management of military aircraft (whether associated with the Air Force, Army or Navy) and all of their support equipment and facilities during military operations in peacetime or at war.

Aerospace Engineers, are called upon to manage and supervise the personnel and resources required for servicing, inspection and repair of aircraft. They may be in charge of the design, development and testing of new systems, and the modifications to existing ones; or may be assigned the task of conducting the life cycle management of aircraft and air weapon systems. AEREs, participate in the formulation of plans, policies, standards, and specifications of present and future military aircraft and their support equipment and facilities, and provide technical advice on aircraft operation.

514 – Aviation Technician
The Aviation Systems Technician (AVN TECH) is a member of the air maintenance team that handles, services and maintains Canadian Forces aircraft, ground equipment and associated support facilities. The

AVN TECH is responsible for the maintenance of aircraft aviation systems which include the following:

- Propulsion system and components
- Airframe system and components
- Electrical system and components
- Weapon system and components
- Aircraft life support equipment

They also perform the following duties:

- Test aviation systems
- Inspect aviation systems for defects
- Fix defects in aviation systems
- Perform quality assurance checks
- Prepare and maintain aircraft forms and statistical data
- Perform aircraft handling tasks which include parking, towing, marshalling, starting, refuelling, cleaning and de-icing
- Operate aircraft support equipment

526 – Avionics Systems Technician

The Avionics Systems Technicians (AVS TECHs) are aircraft electronic technicians. They are responsible for maintaining all automatic flight control systems, navigation systems, compass systems, airborne communication systems, power generation, power distribution, lighting systems, monitoring and warning circuits, and radar systems on both land and ship-based fixed-wing aircraft and helicopters. As part of the aircraft maintenance team, the AVS TECH is responsible for first line servicing operations in launching and recovering all types of aircraft.

- Carry out performance tests, preventive/ corrective maintenance, and calibration of aircraft communication, intercom, search radar, fire control radar, acoustic sensing, infra-red radar, electronic warfare, navigation, compass, and flight control systems and their associated components
- Set up and operate test equipment to maintain the above systems
- Operate and maintain computer-controlled automatic test stations
- Serve as an instructor in field technical training units, training squadrons or basic training units
- Prepare and maintain aircraft forms and statistical data
- Operate aircraft support equipment
- Perform first line servicing tasks such as marshalling, parking, towing, starting, refueling, cleaning and de-icing

565 – Aircraft Structures Technician

The Aircraft Structures Technician (ACS TECH) is a member of the air maintenance team that handles, services and maintains Canadian Forces aircraft and associated equipment. The ACS TECH is responsible for the maintenance and repair of the aircraft structures and related components. This occupation encompasses a variety of skills and abilities relating to tasks such as metal and composite repair, refinishing, painting, machining and welding.

- Carry out inspections of aircraft structures and related components
- Fix defects by repair or replacement using unique aircraft fastening hardware, ferrous and non-ferrous materials, composite materials, chemicals, adhesives, paints and textiles
- Manufacture and install aircraft structural components required for prototype modifications and projects

- Weld base metals, alloys and casting materials, using oxyacetylene, electrical arc, inert gas and resistance welding techniques and equipment
- Manufacture original aircraft equipment, components or replacement items from base metals using special cutting tools, engine lathe and milling machines
- Fabricate or repair aircraft structures using composite, fibreglass, textiles, leather, plastic and synthetic components
- Carry out corrosion control inspections of ferrous and non-ferrous materials, on and off aircraft structures
- Prepare and maintain aircraft forms and statistical data
- Act as an integral member of the aircraft maintenance operation in the areas of aircraft servicing, supply, tool control and safety

651 – Fire Fighter

The primary purpose of a military Fire Fighter (FIRE FTR) is to prevent the loss of life or property due to fire. Personnel in this occupation serve in all three elements, performing a variety of tasks including aircraft rescue, structural, wildland and shipboard fire fighting, automobile extrication, hazardous material, and confined space/high-angle rescue. Fire investigation, fire prevention and life safety inspection are also areas of expertise.

- As a member of a fire attack team, perform rescue, extinguishment, ventilation, overhaul and forcible entry operations
- Drive and operate all types of structural, aircraft rescue and wildland fire fighting vehicles used on all Canadian Forces Bases/Wings
- Inspect and test all fixed fire suppression and detection systems within DND establishments
- Maintain Fire Department ancillary equipment such as ladders, hose, rope, breathing apparatus, extinguishers, personal protective equipment and all associated rescue equipment and vehicles
- Perform inspector duties, conduct inspections and project reviews, and provide recommendations and corrective measures
- Provide peer and public instruction and education
- Respond to hazardous material, automobile extrication, confined space and high-angle rescue situations
- Investigate fires
- Provide helicopter rescue and damage control services as a member of a fire fighting team while onboard HMC ships
- Provide maintenance to all fire fighting equipment while onboard HMC ships
- Respond as part of an Airfield Engineering Squadron (AES)
- Respond to aircraft cable engagements on Wings and be capable of providing Mobile Arrestor Gear (MAG) skills on deployment
- As Senior Fire Fighter, provide command and control at the site of a fire and function as Fire Chief on military bases, ships and army encampments
- Perform Emergency Medical Response (EMR)

PURPLE (SHARED) TRADES

111 – Intelligence Operator

The military intelligence community ensures that the commanders of land, sea and air operations have the necessary information to plan and successfully achieve missions. The main tool of the trade—the intelligence cycle—involves collecting raw data and processing it into valuable intelligence. Entry into the trade is open only to CF members.

Intelligence operators administer databases where collected information is integrated, evaluated and analyzed to produce reports and briefings for use in operations.

641 – Refrigeration and Mechanical Technician
The Refrigeration and Mechanical Systems Technician (RM TECH) provides Heating, Ventilation and Air Conditioning (HVAC), Refrigeration, Aircraft Arresting Systems and Radar (mechanical) systems engineering support to operational units so that they may live, move and fight on the battlefield, and deny enemy troops the same ability. During peacetime, RM TECHs maintain their skills while employed at home units or on humanitarian and United Nations operational assignments. The RM TECH occupation is one of seven Construction Engineering occupations involved in the supply of all construction, civil, electrical and mechanical engineering services in support of Canadian Forces operations worldwide:

- Operate, maintain and repair fixed and mobile refrigeration systems and associated control equipment
- Operate, maintain and repair heating, ventilation and air-conditioning systems and associated control equipment
- Operate, maintain and repair Aircraft Arresting Systems
- Operate, maintain, repair and overhaul mechanical systems associated with the Aircraft Radar Systems
- Produce associated designs and specifications
- Produce mechanical drawings
- Conduct reconnaissance

642 – Electrical Distribution Technician
The Electrical Distribution Technician (ED TECH) provides electrical engineering support to operational units so that they may live, move and fight on the battlefield and deny enemy troops the same ability. During peacetime, Electrical Distribution Technicians maintain their skills while employed at home units or on humanitarian and United Nations operational assignments. The ED TECH occupation is one of seven Construction Engineering occupations involved in the supply of all construction, civil, electrical and mechanical engineering services in support of Canadian Forces operations worldwide.

- Install, repair and maintain high and low voltage electrical distribution systems
- Install, repair and maintain portable and fixed airfield lighting systems
- Install, repair and maintain fire and security systems
- Produce electrical designs and specifications
- Produce electrical drawings
- Conduct reconnaissance

643 – Electrical Generation Systems Technician
The Electrical Generation Systems Technician (EGS TECH) provides electrical power generation support to operational units so that they may live, move and fight on the battlefield, and deny enemy troops the same ability. During peacetime, EGS TECHs maintain their skills while employed at home units or on humanitarian and United Nations operational assignments. The EGS TECH occupation is one of the seven Construction Engineering occupations involved in the supply of all construction, civil, electrical and mechanical engineering services in support of Canadian Forces operations worldwide:

- Operate, maintain and repair mobile electrical generators and associated control equipment
- Operate, maintain and repair power plant electrical generators and associated control equipment
- Operate and maintain engine prime movers associated with construction Engineer driven equipment (i.e., Aircraft Arresting Systems, Water Purification Units)

- Operate, maintain and repair SUPS (Static uninterruptible Power Systems) and RUPS (Rotary Uninterruptible Power Systems)
- Overhaul electrical generation systems and equipment
- Produce associated designs and specifications
- Produce mechanical drawings
- Conduct reconnaissance

646 – Plumbing and Heating Technician
The Plumbing and Heating Technician (PH TECH) provides plumbing and heating engineering support to operational units so that they may live, move and fight on the battlefield and deny enemy troops the same ability. During peacetime Plumbing and Heating Technicians maintain their skills while employed at home units or on humanitarian and United Nations operational assignments. The PH TECH occupation is one of seven Construction Engineering occupations involved in the supply of all construction, civil, electrical and mechanical engineering services in support of Canadian Forces operations worldwide:

- Install and maintain interior plumbing systems
- Install and maintain interior water supply systems
- Install and maintain heating systems
- Produce related designs and specifications
- Produce related drawings
- Install and maintain field ablution facilities
- Conduct reconnaissance

648 – Construction Technician
The Construction Technician (CONST TECH) provides structural engineering support to operational units so that they may live, move and fight on the battlefield and deny enemy troops the same ability. During peacetime CONST TECHs maintain their skills while employed at home units or on humanitarian and United Nations operational assignments. The CONST TECH occupation is one of seven Construction Engineering occupations involved in the supply of all construction, civil, electrical and mechanical engineering services in support of Canadian Forces operations worldwide:

- Construct, repair and maintain buildings for the protection of personnel and equipment
- Produce structural designs and specifications
- Produce structural drawings
- Construct field defences
- Harden field structures
- Erect prefabricated structures
- Conduct reconnaissance

649 – Construction Engineering Procedures Technician
Not available

713 – Operating Room Technician
Not available

75 – Music
The primary functions of the members of the Director of Music military occupation are to command and conduct Regular Force bands. Directors of Music must prepare the members of their band for any engagement assigned to them, and conduct or supervise performances, be they concerts, parades or other functions. They may be called upon to write arrangements of specific pieces as required. Being the sole

officers within their band, they are also required to gain and apply knowledge in general administration, military administration, public relations, human resources, career management, supply procedures, and protocol. Directors of Music are musical advisors to their home unit.

78 – Logistics
(see description in ARMY)

81 – Security Officer
Officers of the Security military occupation are responsible for the management of personnel and materiel resources assigned to Military Police and Security organisations. Security Officers specialize in providing timely and effective Security and Military Police (SAMP) services in support of land, sea and air operations. In the fulfilment of their functions, they are expected to provide leadership and professional direction.

Duties include the provision of advice to Commanders and staff; the safeguarding of information, materiel, personnel and operations from terrorism, espionage, subversion, sabotage, extremism, crimes and disinformation; assistance in the enforcement of discipline; the prevention, detection and investigation of crime; the control of traffic, prisoners of war, detainees, and refugees; and the collection, collation, analysis and dissemination of information relevant to criminal and security intelligence.

To assume these responsibilities, Security Officers must be knowledgeable in the full range of SAMP services and be capable of acting as security, police or staff officers in all environments.

Security Officers serve in a variety of employment areas including small independent operational units, headquarters units at bases and commands, and at the national level, in National Defence Headquarters, Ottawa.

811 – Military Police
The Military Police (MP) is the police force of the Department of National Defence and the Canadian Forces. Military Police personnel provide a variety of operational, law enforcement, investigative and security services at bases and units across Canada and throughout the world, wherever members of the Canadian Forces are asked to serve. They exercise jurisdiction over all persons who are subject to the Code of Service Discipline.

Military Police are an integral part of the military justice system in much the same way as civilian police are part of the civil criminal justice system. Military Police routinely train and work hand in hand with their civilian counterparts in the provision of policing and security services to the Canadian Forces. Military Police have special status within the military justice system. They hold the title of "Specially Appointed Personnel" and, as such, are awarded certain special powers under the National Defence Act in order to fulfil their policing duties; for example, Military Police are given the power to arrest, to detain and to search. The Criminal Code of Canada recognizes Military police as peace officers. As a result, they can arrest and lay charges for certain specific offences pursuant to the National Defence Act and the Criminal Code, and lay charges in the civil criminal courts:

- Support the operational missions of commanders, wherever located in the world, by directly providing police, security, investigative and operation-specific support
- Enforce laws and regulations relative to the maintenance of discipline and good order within the Canadian Forces
- Investigate and report on incidents involving service and criminal offences, and breaches of departmental or national security

- Perform movement control duties such as traffic control and traffic accident investigation, refugee and prisoner of war control, and where required, personnel control through access control and similar processes
- Through crime prevention, protect personnel, material, information and information technology against criminal activities such as subversion, sabotage, espionage and other forms of attack
- Supervise personnel held in custody such as prisoners of war and service prisoners/detainees
- Provide security for Canadian embassies throughout the world
- Prepare and maintain records and reports

836 – Resource Management Support Clerk
Resource Management Support Clerks (RMS CLKs) provide administrative and financial support to all military activities. This career field, because it is one of the largest in the military, offers a wide scope of employment opportunities, both in terms of the working environment and tasks assigned.

Tasks are:
- Human resources administration
- Financial management support services
- Personnel support services
- Corporate and general purpose administration

861 – Cook
A Cook in the Canadian Forces is responsible for preparing a full range of types and varieties of nutritious food products for military personnel and National Defence employees. They operate, clean and maintain food services equipment and facilities. They also manage food safety, assist in the handling and control of food and non-food supplies, and practise workplace health and safety procedures. The meals they prepare and serve range from cafeteria-style menu items to formal multi-course meals for military and civilian dignitaries. A Cook may serve with and in support of seagoing ships and submarines, land field forces and air force squadrons, either on static or deployed operations.

871 – Musician
Military Musicians (MUSCN) provide musical support for all aspects of military life, including ceremonial parades, graduations, ship ceremonies, etc. They also perform at government functions such as the opening of Parliament. Military Musicians, by means of public performances, provide an important public relations vehicle for the Canadian Forces.

- Provide musical support for official military and government functions
- Perform as instrumentalists and/or conductors in various musical ensembles such as concert bands, parade bands, dance bands and small chamber groups.

911 – Supply Technician
Supply Technicians (SUP TECHs) are responsible for ensuring that all the supplies necessary for Canadian Forces operations are available when and where they are required. The diverse materiel they handle includes food, fuel, heavy machinery, stationery and clothing. Purchasing, warehousing, shipping, receiving and stock control are all functions of this occupation.

Tasks:
- Receive, handle and prepare items for shipment
- Operate military vehicles up to 10 tonne, and material handling equipment such as forklifts
- Prepare invoices and shipping documents
- Order material from internal and external sources and purchase supplies (by cash or contract)
- Deliver supplies to operational units

- Perform stock recordkeeping, stocktaking and inventory control
- Maintain accounting and financial records

933 – Traffic Technician
Traffic Technicians (TFC TECH) plan and execute the movement of personnel and materiel by road, rail, air and sea. Their duties include passenger reception, warehouse operations, aircraft and rail load planning, documentation and aircraft loading/unloading.

- Prepare, load, secure and offload baggage, cargo and freight from road, rail, air and water transport vehicles
- Plan and arrange movements of personnel, furniture and effects, materiel and equipment by military and commercial means
- Liaise with commercial moving, storage and transportation firms
- Prepare, process, record and account for all transportation documents and forms relating to personnel and materiel movements
- Process passengers for travel at military air terminals and coordinate movement of passengers through commercial terminals
- As a member of a team, load and unload aircraft of materiel and people
- Operate military cargo, passenger vehicles and materiel handling equipment
- Process transportation charges and maintain financial records

935 – Mobile Support Equipment Operator
The Mobile Support Equipment Operator (MSE Op) operates military vehicles ranging in size from standard automobiles to snow removal equipment and all-terrain vehicles in support of the mobility of the Canadian Forces.

- Operate buses, automobiles, trucks and tractor-trailers
- Operate specialized mobile equipment such as fuelling tankers, snowplows, tractors and all-terrain vehicles
- Receive, load, secure and unload materiel and equipment transported by road
- Provide transportation support for combat and field operations
- Maintain equipment in serviceable condition by cleaning, inspecting and correcting minor faults
- Prepare dispatch schedules and coordinate user requirements for vehicles and equipment using the Automated Fleet Management System (FMS)
- Prepare and maintain jobrelated forms, records and reports

92A – Cadet Instructor Cadre
Not available

CONTROL TRADES

121 – Meteorological Technician
Meteorological Technicians (MET TECH) are employed in observing, briefing and forecasting weather conditions in support of operations at Air Force Wings and Squadrons, on Naval Ships at sea and in Land Force facilities.

- Observe and record surface, marine and upper air weather conditions
- Process, analyze and interpret meteorological information
- Operate and maintain specialized meteorological instruments and equipment
- Brief wing, ship and land unit personnel on actual and expected weather conditions
- Forecast weather conditions

42/83/84 – Communications and Electronics Engineer

83 – Communication and Electronics Engineer

Communications and Electronics Engineering (Air) (CELE (AIR)) officers perform a wide range of tasks critical to the command, control and electronic security of the Canadian Forces in general, and the Air Force in particular. This includes the provision of telecommunications and information management services supporting operations in Canada and abroad. Other areas of responsibility will involve the formulation of policy; project management; the planning for and the acquisition of ground based surveillance, communications and information technology systems; and the operation and maintenance of the majority of tactical Air force and strategic communications, Air traffic management and electronics systems employed by the Canadian Forces (excluding systems in Aircraft and ships).

CELE (Air) Officers are involved with numerous high tech electronic systems that support our Departmental command and control environment such as the computer networks and communications systems that support surveillance/ reconnaissance/intelligence, data/information/knowledge management, air traffic control, the full spectrum of terrestrial radio and satellite communications from HF to EHF, radar and navigation, electronic warfare, cryptography, electronic intelligence, and communications and network security.

84 – Signals Officer

Signals Officers are commissioned members of the Communications and Electronics Branch of the Canadian Forces (CF). Their main function is to deliver telecommunications services to the Canadian Forces, especially the Army; and to command units that specialize in command, control, computers and communications.

Signals Officers plan and manage communications systems for CF units and headquarters deployed in Canada and around the world, and are responsible for the operations and maintenance of all CF communications systems that are not built into aircraft, boats or ships. As staff officers, they may be employed in policy development and project management. They are extensively involved in systems engineering and network operations, working with Army command support equipment such as:

- Purpose designed, computer based Information Systems that assist with Battlefield Command and Control, Reconnaissance and Surveillance, and Target Acquisition
- the full spectrum of radio systems from HF to EHF
- electronic warfare systems
- cryptographic and communications- security systems

44D – Maritime Engineering – Naval Construct

Not available

46 – Airfield Engineering

Airfield Engineering (AF ENGR) officers are members of the Canadian Military Engineer Branch and perform a wide range of tasks necessary to assist the Canadian Forces. Airfield Engineering officers are employed in various engineer units and are called upon to:

- Operate in support of an air base to assist the Air Force to live, fly and fight;
- Provide mapping, charting and geodesic support to sea, land and air operations;
- Provide construction engineering support to Air Force and naval installations; and
- Provide fire engineering support.

Regardless of the area of employment, Airfield Engineering officers are required to lead an organization of highly trained men and women on a full-time basis. Their duties include career planning and performance assessment. They plan, develop and implement airfield engineering field training, which

involves military engineering tasks and projects, including preparation or approval of drawings, specifications, standards and estimates of cost in manpower, money and materials for both static and deployed operations. They provide advice, maintain liaison on military engineering matters, and exercise leadership and technical control over all organizations involved in engineering services, including the administration and control of manpower, funds and material. Airfield Engineering officers may be required to deploy on UN missions for periods up to one year.

48 – Health Care Administration
Health Care Administrators are commissioned members of the Canadian Forces Health Service. They are vital members of the health care team, ensuring that Canadian soldiers, sailors and Air Force personnel receive high-quality health care wherever they may be, in garrison or on a base or wing in Canada, or deployed on International or Domestic operations.

They are required to understand the principles and practices of health care administration, and the resource-management organization and operations of the Canadian Forces Health Service, the Canadian Forces as a whole, and the Department of National Defence. They also develop a thorough understanding of the roles, capabilities and needs of the soldiers, sailors and Air Force personnel with whom they are working, including those in the operational, technical and support occupations as well as those in the Canadian Forces Health Services.

Health Care Administration Officers, serve in operational units (a Field Ambulance, the Field Hospital, aeromedical staging units and area medical support units) or static facilities such as a clinic on a base or wing. They are also employed at regional or national headquarters, or in a training unit, and may be expected to deploy on International or Domestic operations.

49 – Physical Therapy
A Physiotherapy Officer enjoys a career both as a primary health care provider and as a Commissioned Officer of the Canadian Forces Medical Service. Physiotherapy Officers, are responsible for assessing and treating military personnel, and for establishing treatment plans for a variety of orthopaedic, neuro-musculoskeletal and sports physiotherapy conditions. Some members are treated as inpatients post-surgically, however most of the clientele are treated on an outpatient basis. After measuring impairments and disability level, the primary treatment objective, based on specific discharge criteria, will be to return CF members as quickly as possible to the functional levels their jobs require. HCAs have an important role to play in the education of the CF members in order to avoid aggravation or reoccurrence of injury.

As well as manual therapy and soft-tissue techniques, they use physical agents such as cold, heat, hydrotherapy, acupuncture and electrotherapy modalities. The equipment includes conventional tools such as weights, pulleys, exercise apparatus, traction tables, dynamometers, assistive devices, orthopaedic supplies, orthoses and splinting, and sophisticated devices such as isokinetic-isotonic systems, treadmills and other computerized aerobic-fitness equipment.

Many of the patients will present with acute and sub-acute neuro-musculoskeletal conditions arising from injuries sustained in sports or training; however, they also treat CF members with chronic problems such as neck and low-back pain. They are involved in worksite assessments and industrial ergonomics to evaluate the potential of tasks and equipment to produce musculoskeletal injuries. They are also actively involved in injury prevention and health promotion, which will include giving advice, helping people with their exercise programs, and motivating them. This will include back care and sports injury education, pre-deployment education and training when required, and reconditioning programs. They are also responsible for promoting physiotherapy with other members of the military health care team and contributing to the in-service education program of your Health Care Centre.

541 – Imagery Technician
Imagery Technicians (IMAGE TECHs) are trained to provide imagery for all elements (Sea, Land and Air) of the Canadian Forces. Responsibilities include the operation of still and video cameras (both conventional and digital); the making of prints, video and multi-media productions; quality control of products; photo finishing in the photo laboratory; and maintenance of occupation-related equipment.

- Provide imaging services in support of military operations, public affairs and engineering activities, and document the important events in the life and times of the Canadian Forces
- Operate video and still imagery equipment
- Process film and produce prints
- Maintain an imagery database
- Perform preventive and corrective maintenance on imaging equipment
- Test and evaluate new imaging equipment
- Provide imaging solutions to customers

54 – Pharmacy
Military Pharmacists are integral members of the Canadian Forces health care team, which is dedicated to preserving the health of Canadian Forces personnel. The role of a Pharmacist is constantly changing and is no longer confined to the distribution of drugs. Pharmacists must now be effective in identifying and resolving complex drug-related problems. They must dedicate time to consultation with patients, physicians, and other health care professionals. They are expected to participate in the education of pharmacy students and interns, to become members of advisory and professional committees, and to maintain their clinical competence through structured and self-directed learning initiatives.

Canadian Forces pharmacists must be prepared to provide pharmaceutical care in peacetime, during peace support operations, and in times of war. To meet their operational role, military pharmacists require clinical knowledge regarding the treatment of battlefield injuries and disease. More particularly, they must be knowledgeable in the drug therapy aspects of emergency medicine, intensive care therapy, pain management, infectious diseases, and medical countermeasures for nuclear, biological and chemical warfare. Additionally, pharmacists manage the medical supply system for the Canadian Forces. These duties involve the procurement, warehousing, distribution and disposal of pharmaceuticals, medical supplies, and medical equipment.

Military pharmacist can work as a clinic pharmacist on a military base, as a pharmacist in a field medical unit, or as a materiel manager in a medical depot. They must be prepared to deploy anywhere in the world during times of conflict, peace support operations, or humanitarian missions.

55 – Medical Officer
Medical Officers are commissioned members of the Canadian Forces Medical Service. The primary duty of Medical Officers is to practise medicine in the military milieu. In the Canadian Forces, both at home in Canada and overseas when deployed on operations, medical practice focuses on health protection and education, occupational health and safety, primary care, and environmental medicine, including the physiological challenges of high altitude and deep-sea diving.

Like other commissioned and senior non-commissioned members of the Canadian Forces, Medical Officers have a special responsibility: providing leadership. Leadership roles for Medical Officers vary according to interest, assignment and rank, but there is one constant: the Medical Officer leads the clinical team. With the right training, and a strong interest in tactics, administration and management, Medical Officers may also find opportunities to command sections, companies and units.

57 – Nursing
Nursing Officers are commissioned members of the Canadian Forces Medical Service (CFMS). The primary duty of Nursing Officers is to nurse sick and injured patients, not only in static facilities such as a garrison, base or wing Health Care Centre, but also in operational facilities such as a Field Hospital. Nursing Officers also provide preventive, occupational and environmental health care services.

Nursing Officers can work at a military out-patient facility, a military facility that offers in-patient care, or a civilian tertiary-care facility. They also serve in operational units (the Field Ambulance, a Field Hospital and aeromedical staging units) and may be employed at national headquarters or at a training unit. They can also expect to be deployed overseas on an operational mission.

58 – Social Work
Social Work Officers are commissioned members of the Canadian Forces Medical Service. Working in collaboration with other health care professionals, the primary duty of a Social Work Officer is to deliver professional social work services in a military milieu to support the morale, efficiency and mental health of Canada's soldiers, sailors and air personnel.

As well as the full range of challenges common to Canadian society, Canadian Forces members and their families cope with additional stresses associated with frequent moves and separations caused by service requirements. These stresses can give rise to social and family circumstances that involve complex social work interventions. The Social Workers mission is to ensure that Canadian Forces members and their dependants receive the clinical social work services normally available to civilians through community mental health and social services agencies.

The duties of a Social Worker involve:

- Providing clinical intervention services directly to Canadian Forces members and family members
- Assisting in the resolution of compassionate situations so that career action is not required
- Consulting with and advising Commandants, Commanding Officers and supervisors on the social circumstances encountered by personnel in their units
- Assisting officers responsible for personnel career matters by investigating and reporting on compassionate situations
- Delivering preventive and rehabilitative programs in the areas of:
- pre- and post-deployment stress , suicide intervention, family violence

61 and 62 – Chaplain
The primary function of Chaplains is to provide religious and spiritual ministrations to all members of the Canadian Forces unit regardless of religious affiliation. Duties include officiating at special functions, providing pastoral care to members and their families, and advising the Commanding Officer regarding the spiritual ethical welfare and morale of the unit. They may be called upon to liaise with civilian religious faith groups, to refer members to other care providers such as social workers or medical personnel and to provide directed care after critical incidents. Being the only chaplain in the unit, they are also required to gain and apply knowledge in general military administration and chaplain branch policies.

66 – Public Affairs
Public Affairs is that management command function that communicates information about an organization to the public. Implicit in this function is the requirement to evaluate public attitudes, to identify the policies and the procedures of the organization with the public interest, and to execute a program of action to keep the public informed which may include media relations.

PAOs are specialized in the development and implementation of communication approaches that ensure the transparency of DND/CF and support the public understanding of its mandates, choices and activities

Public Affairs Officers are required to plan, organize, direct, implement, and later evaluate public affairs programs designed to keep the public informed of the activities, programs, objectives, and policies of the Department of National Defence and the Canadian Forces. They analyse and evaluate attitudes, contribute to policy formulation and execution, gather and disseminate information to both internal and external agencies on the Department of National Defence (DND) and the Canadian Forces (CF), and develop and maintain effective communications with representatives of the media mass-communication agencies, special interest groups, and individuals in order to facilitate the flow of information to the public.

67 – Legal
Legal Officers are commissioned members of the Legal Branch of the Canadian Forces, which is commanded by the Judge Advocate General (JAG). The JAG acts as legal adviser to the Governor General, the Minister of National Defence, the Department of National Defence and the Canadian Forces in matters relating to military law, and has the superintendence of the administration of military justice in the Canadian Forces.

The Office of the JAG provides the military justice system with qualified personnel (military judges, prosecution and defence counsel). It also supplies Legal Officers to CF establishments across Canada and deployed missions overseas to deliver legal services in the fields of operational law, international law, training, military personnel law, and military justice.

The primary duty of a Legal Officer is to practise law in the military milieu, which may include any of the following tasks:

- Providing advice on international and domestic law to the commander of a deployed force
- Providing general legal advice and services to the commanding officer of a Canadian Forces Base
- Providing advice on operational legal issues at National Defence Headquarters
- Representing clients at Court Martial and appearing before the Court Martial Appeal Court
- Representing the interests of the Canadian Forces and the Department of National Defence as: A member of a Canadian delegation negotiating international treaties and a member of the military liaison staff at an allied headquarters
- Delivering training on military law and military justice

714 – Medical Laboratory Technician
The Medical Laboratory Technician (M LAB TECH) is a member of the Health Services team that provides health care for Canadian Forces personnel. The M LAB TECH provides military doctors with medical laboratory data used in the treatment and diagnosis of surgical and medical conditions in detachments and clinics as well as combat and operational units.

- Conducts professional practice according to established protocols, safety guidelines, and existing legislation.
- Collect and prepare biological specimens for analysis
- Performs routine and specialized analysis and validate results.
- Performs analytical techniques on specimens that originate from a variety of sources.
- Practises and promotes the principle of quality management.
- Practises and promotes efficient utilization of resources.
- Performs a variety of duties common to the military

72 – Personnel Selection
Officers of the Personnel Selection (PSEL) military occupation classification (MOC) provide behaviourial science services to enable the Canadian Forces (CF) to effectively assess, acquire, integrate, and maintain personnel for operational and support roles.

The primary tasks of Personnel Selection Officers (PSO) require the application of professional behavioural science knowledge and procedures in the assessment of people and human factors that affect working relationships. The primary duties include:

- Through interviews, psychological testing, and other sources of information, assessing the suitability of individuals for military service and recommend subsequent assignment to an appropriate military occupation for training.
- Assessing and recommending the suitability of military personnel for special training or employment.
- Assisting CF members with their professional development, accreditation and transition to civilian life in accordance with the Personal Enhancement Program.
- Providing second career assistance in the form of workshops and counselling to CF members, transitioning to a second career.
- Providing professional advice to military commanders at all levels, and conduct personnel applied and advanced behavioural research at the Directorate of Human Resources and Research Evaluation (DHRRE) to enable the CF to meet its training and personnel requirements.
- Conducting occupational analysis at the Directorate Military Human Resources Requirements (DMHRR) in National Defence Headquarters (NDHQ).
- Teaching military leadership, management and behavioural sciences at the Royal Military College (RMC) and at the Canadian Forces Management Development School (CFMDS).
- Training and monitoring PSOs and Military Career Counsellors (MCCs) in the use of interview, personnel assessment and counselling techniques either at a base or in recruiting centers.
- Managing and administering military personnel resettlement programs such as the Second Career Assistance Network (SCAN) at NDHQ, Command Headquarters (CHQs), formations and bases.

732 – Medical Technician – Physician's Assistant
Not available

737 – Medical Technician
Medical Technicians belong to the Canadian Forces Medical Service, and are integral members of the military health-care team. They work with Physicians, Physician Assistants and Nurses to treat the sick and injured in all kinds of Canadian Forces operations and units.

A Medical Technician has the following primary duties:

- Provide initial care for ill / injured patients;
- In trauma cases, provide basic life support treatments;
- Prescribe some medications in accordance with their scope of practice
- Provide medical support during environmental operations
- Recover casualties from the point of injury and transport them to a medical facility by wheeled or tracked ambulance, or by air
- Participate in rescues from crashed vehicles, tanks, ships, aircraft and damaged buildings
- Give basic advice on disease prevention, hygiene and sanitation, perform specific environmental health and preventive medicine duties
- Collect specimens and perform basic laboratory procedures
- Operate and maintain medical and life-support equipment
- Perform electrocardiograms (ECGs) and audiograms (hearing tests)
- Initiate, maintain and distribute medical records, documents, reports and returns; and

- Maintain, replenish and account for general and medical supplies

74 – Training Development
The Canadian Forces' most valuable resource is its trained personnel. A significant portion of the annual Defence budget is devoted to the training task. The Canadian Forces (CF) Individual Training System (ITS) was introduced with the primary aim of improving the effectiveness, efficiency and economy of our training. Implicit in this aim is the control of the quantity and the quality of training by orienting training by orienting training to the desired performance.
Training Development Officers (TDO) act as the « change agent » or catalyst to bring about improvements in training. They analyse training needs, suggest solutions to training problems and, where necessary, implement their solutions. They are employed at School, Unit, Base, Command, and National Defence Headquarters levels to ensure the optimum effectiveness of training for the minimum expenditure of time, money, and personnel. The selection and employment of the most effective and appropriate methods, techniques and equipment, and the evaluation of new methods and technologies will be a prime focus of their work.

78B Logistics (Sea)
(for a full description, see 78C – Logistics in the ARMY)
Logistics – Sea (Navy). In the early stages of their careers, the emphasis is on employment/ training at sea and employment at a Naval Formation, Base or Unit. As early as possible, they serve at sea as a Ship's Supply Officer, after which they may choose to focus on one or more of the main Logistics disciplines. Senior Naval Logistics Officers have a wider range of command and staff opportunities. Most junior officers are employed within the Navy. Naval Logistics Officers at the rank of Commander or higher normally work at National Defence Headquarters performing tasks related to the management of Joint and Combined Operations, logistics systems, and general logistics.

78D – Logistics (Air)
(for a full description, see 78C – Logistics in the ARMY)
Logistics – Air (Air Force). In the early stages of their careers, they are employed in entry level junior Logistics positions at an operational Wing where they learn about the unique aspects of providing support to air operations. This experience will be followed by a first line tour at a squadron as Squadron Logistics Officer or Mobile Air Movements Support Officer. Most junior officers are employed within the Air Force. Air Force Logistics Officers at the rank of Lieutenant Colonel or higher normally work at National Defence Headquarters performing tasks related to the management of Joint and Combined Operations, logistics systems, and general logistics.

82 – Intelligence Officer
The military intelligence community ensures that the commanders of land, sea and air operations have the necessary information to plan and successfully achieve missions. The main tool of the trade—the intelligence cycle—involves collecting raw data and processing it into valuable intelligence. Entry into the trade is open only to CF members.

Intelligence officers co-ordinate resource allocation to support the intelligence cycle. They may be employed in areas such as human intelligence, imagery or targeting.

87 – Naval Combat Systems Engineer
The primary task of the maritime engineers is to provide engineering expertise for the support of ships and marine facilities; the design, development and acquisition of naval weapons and equipment; and the operation of sophisticated naval vessels.

Naval Combat Systems Engineering deals with engineering and technical aspects of weapons systems (including naval guns, missiles and torpedoes), communications systems (satellite communications, UHF, HF), navigation systems (inertial navigation, ring laser gyros, microwave systems), active and passive surveillance systems (radar, infrared detection and sonar), as well as the electronic distribution and the computer network which integrates these systems. They are involved in all engineering facets of the operation and maintenance of the electronics-based Combat Systems.

In addition to their primary tasks, they are required to fill staff, training or administrative positions requiring their background or expertise.

91 – Cadet Instructor Cadre
Not available

92 – Cadet Instructor Cadre
No available

R86U – Naval Control of Shipping
The primary function of the Naval Control of Shipping (NCS) military occupation is to man the Naval Control of Shipping Units for Maritime Command. The primary task of officers within this occupation is to provide the interface between military and civilian shipping authorities. To do this you will be required to gain knowledge and expertise in the tracking of merchant shipping and in many aspects of commercial shipping and naval operations. Naval Control of Shipping is an operational role assigned exclusively to the Naval Reserve.

Annex F

Responses to Survey Questions: Effects of Age

Table F1

Perceived Change in Hearing since Joining the CF (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Better or no change	27 (67.5)*	107 (43.5)	146 (25.3)	23 (11.9)	303 (28.7)[+]
Slightly worse	9 (22.5)	106 (43.1)	263 (45.5)	78 (40.4)	456 (43.1)
Moderately worse	2 (5.0)	25 (10.2)	116 (20.1)	51 (26.4)	194 (18.4)
Much worse	0 (0.0)	6 (2.4)	43 (7.4)	38 (19.7)	87 (8.2)
No answer	2 (5.0)	2 (0.8)	10 (1.7)	3 (1.6)	17 (1.6)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F2

Perceived Noisiness of the Workplace (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Never	8 (20.0)*	16 (6.5)	50 (8.7)	27 (14.0)	101 (9.6)[+]
Occasionally	16 (40.0)	106 (43.1)	236 (40.8)	96 (49.7)	454 (43.0)
Often	13 (32.5)	82 (33.3)	206 (35.6)	50 (25.9)	351 (33.2)
Constantly	3 (7.5)	41 (16.7)	86 (14.9)	19 (9.8)	149 (14.1)
No answer	0 (0.0)	1 (0.4)	0 (0.0)	1 (0.5)	2 (0.2)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F3

Perceived Severity of Noise in the Workplace (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise	5 (12.5)*	17 (6.9)	40 (6.9)	20 (10.4)	82 (7.8)[+]
Mild	15 (37.5)	75 (30.5)	182 (31.5)	76 (39.4)	348 (32.9)
Moderate	16 (40.0)	118 (48.0)	252 (43.6)	70 (36.3)	456 (43.1)
Severe	4 (10.0)	36 (14.6)	102 (17.6)	24 (12.4)	166 (15.7)
No answer	0 (0.0)	0 (0.0)	2 (0.3)	3 (1.6)	5 (0.5)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F4

Training Received on the Dangers of Noise Exposure (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	18 (45.0)*	86 (35.0)	154 (26.6)	56 (29.0)	314 (29.7)[+]
1 hour or less	13 (32.5)	127 (51.6)	308 (53.3)	103 (53.4)	551 (52.1)
Less than half a day	6 (15.0)	25 (10.2)	97 (16.8)	26 (13.5)	154 (14.6)
A full day	3 (7.5)	7 (2.8)	14 (2.4)	8 (4.1)	32 (3.0)
No answer	0 (0.0)	1 (0.4)	5 (0.8)	0 (0.0)	6 (0.6)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F5

Demonstrations Received on the Proper Use of Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	11 (27.5)*	83 (33.7)	178 (30.8)	50 (25.9)	322 (30.5)[+]
1 hour or less	23 (57.5)	141 (57.3)	340 (58.8)	119 (61.7)	623 (58.9)
Less than half a day	5 (12.5)	18 (7.3)	53 (9.2)	22 (11.4)	98 (9.3)
A full day	1 (2.5)	4 (1.6)	6 (1.0)	2 (1.0)	13 (1.2)
No answer	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.0)	1 (0.1)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F6

Perceived Quality of Training Received Regarding Loud Noise (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No training	7 (17.5)*	33 (13.4)	71 (12.3)	23 (11.9)	134 (12.7)[+]
Poor	7 (17.5)	94 (38.2)	222 (38.4)	70 (36.3)	393 (37.2)
Adequate	19 (47.5)	109 (44.3)	243 (42.0)	87 (45.1)	458 (43.3)
Good	7 (17.5)	10 (4.1)	42 (7.3)	12 (6.2)	71 (6.7)
No answer	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.1)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F7

Types of Hearing Protectors Used by CF Personnel (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise - none	9 (22.5)*	41 (16.7)	93 (16.1)	58 (30.1)	201 (19.0)[+]
With noise – none	4 (10.0)	18 (7.3)	78 (13.5)	22 (11.4)	122 (11.5)
Plugs	7 (17.5)	50 (20.3)	93 (16.1)	30 (15.5)	180 (17.0)
Muffs	4 (10.0)	30 (12.2)	82 (14.2)	23 (11.9)	139 (13.2)
Plugs and/or muffs	9 (22.5)	38 (15.4)	105 (18.2)	28 (14.5)	180 (17.0)
Headset	4 (10.0)	46 (18.7)	87 (15.1)	19 (9.8)	156 (14.8)
Headset and plugs	3 (7.5)	22 (8.9)	35 (6.1)	9 (4.7)	69 (6.5)
No answer	0 (0.0)	1 (0.4)	5 (0.9)	4 (2.1)	10 (0.9)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F8

How Often Supervisors Advise the Need to Use Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	12 (30.0)*	93 (37.8)	244 (42.2)	90 (46.6)	439 (41.5)[+]
Occasionally	10 (25.0)	86 (35.0)	209 (36.2)	71 (36.8)	376 (35.6)
Often	15 (37.5)	44 (17.9)	88 (15.2)	19 (9.8)	166 (15.7)
Constantly	3 (7.5)	21 (8.5)	37 (6.4)	10 (5.2)	71 (6.7)
No answer	0 (0.0)	2 (0.8)	0 (0.0)	3 (1.6)	5 (0.5)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F9

How Often Hearing Protectors are Worn at Work (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Never	3 (7.5)*	20 (8.1)	93 (16.1)	27 (14.0)	143 (13.5)[+]
< ½ of a work shift	11 (27.5)	80 (32.5)	187 (32.4)	58 (30.1)	336 (31.8)
> ½ of a work shift	3 (7.5)	36 (14.6)	82 (14.2)	14 (7.3)	135 (12.8)
100% of a work shift	13 (32.5)	65 (26.4)	107 (18.5)	29 (15.0)	214 (20.2)
No noise at work	9 (22.5)	41 (16.7)	93 (16.1)	57 (29.5)	200 (18.9)
No answer	1 (2.5)	4 (1.6)	16 (2.8)	8 (4.1)	29 (2.7)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F10

Belief that Hearing Protectors are not Beneficial (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise	5 (12.5)*	16 (6.5)	31 (5.4)	20 (10.4)	72 (6.8)+
Disagree	24 (60.0)	178 (72.4)	419 (72.5)	116 (60.1)	737 (69.7)
Occasionally agree	2 (5.0)	6 (2.4)	14 (2.4)	4 (2.1)	26 (2.5)
Often agree	1 (2.5)	10 (4.1)	18 (3.1)	9 (4.7)	38 (3.6)
Definitely agree	8 (20.0)	33 (13.4)	87 (15.1)	33 (17.1)	161 (15.2)
No answer	0 (0.0)	3 (1.2)	9 (1.6)	11 (5.7)	23 (2.2)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F11

Belief that Hearing Protectors are Uncomfortable (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise	6 (15.0)*	14 (5.7)	29 (5.0)	14 (7.3)	63 (6.0)+
Disagree	11 (27.5)	86 (35.0)	150 (26.0)	42 (21.8)	289 (27.3)
Occasionally agree	18 (45.0)	93 (37.8)	256 (44.3)	80 (41.5)	447 (42.3)
Often agree	3 (7.5)	35 (14.2)	98 (17.0)	30 (15.5)	166 (15.7)
Definitely agree	2 (5.0)	13 (5.3)	38 (6.6)	14 (7.3)	67 (6.3)
No answer	0 (0.0)	5 (2.0)	7 (1.2)	13 (6.7)	25 (2.4)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F12

Belief that Hearing Protectors will Interfere with Hearing (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise	5 (12.5)*	15 (6.1)	29 (5.0)	14 (7.3)	63 (6.0)+
Disagree	5 (12.5)	44 (17.9)	80 (13.8)	27 (14.0)	156 (14.8)
Occasionally agree	8 (20.0)	65 (26.4)	161 (27.9)	51 (26.4)	285 (27.0)
Often agree	10 (25.0)	63 (25.6)	152 (26.3)	40 (20.7)	265 (25.1)
Definitely agree	12 (30.0)	55 (22.4)	148 (25.6)	50 (25.9)	265 (25.1)
No answer	0 (0.0)	4 (1.6)	8 (1.4)	11 (5.7)	23 (2.2)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F13

Belief that Hearing Protectors May Pose a Danger at Work (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noise	6 (15.0)*	21 (8.5)	62 (10.7)	30 (15.5)	119 (11.3)+
Disagree	26 (65.0)	166 (67.5)	351 (60.7)	100 (51.8)	643 (60.8)
Occasionally agree	6 (15.0)	39 (15.9)	86 (14.9)	34 (17.6)	165 (15.6)
Often agree	1 (2.5)	3 (1.2)	26 (4.5)	7 (3.6)	37 (3.5)
Definitely agree	1 (2.5)	12 (4.9)	43 (7.4)	9 (4.7)	65 (6.1)
No answer	0 (0.0)	5 (2.0)	10 (1.7)	13 (6.7)	28 (2.6)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F14

Difficulty Listening in a Quiet Room Without Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	37 (92.5)*	227 (92.3)	482 (83.4)	146 (75.6)	892 (84.4)+
Slight difficulty	3 (7.5)	12 (4.9)	71 (12.3)	30 (15.5)	116 (11.0)
Moderate difficulty	0 (0.0)	4 (1.6)	16 (2.8)	10 (5.2)	30 (2.8)
Great difficulty	0 (0.0)	0 (0.0)	1 (0.2)	2 (1.0)	3 (0.3)
No answer	0 (0.0)	3 (1.2)	8 (1.4)	5 (2.6)	16 (1.5)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F15

Difficulty Listening in a Noisy Room Without Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	19 (47.5)*	84 (34.1)	123 (21.3)	49 (25.4)	275 (26.0)+
Slight difficulty	14 (35.0)	108 (43.9)	234 (40.5)	57 (29.5)	413 (39.1)
Moderate difficulty	7 (17.5)	40 (16.3)	168 (29.1)	55 (28.5)	270 (25.5)
Great difficulty	0 (0.0)	10 (4.1)	41 (7.1)	22 (11.4)	73 (6.9)
No answer	0 (0.0)	4 (1.6)	12 (2.1)	10 (5.2)	26 (2.5)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F16

Difficulty Listening Across a Quiet Room Without Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	36 (90.0)*	182 (74.0)	358 (61.9)	104 (53.9)	680 (64.3)[+]
Slight difficulty	3 (7.5)	49 (19.9)	159 (27.5)	53 (27.5)	264 (25.0)
Moderate difficulty	1 (2.5)	8 (3.3)	39 (6.7)	24 (12.4)	72 (6.8)
Great difficulty	0 (0.0)	3 (1.2)	11 (1.9)	3 (1.6)	17 (1.6)
No answer	0 (0.0)	4 (1.6)	11 (1.9)	9 (4.7)	24 (2.3)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F17

Difficulty Listening Across a Noisy Room Without Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	10 (25.0)*	51 (20.7)	69 (11.9)	21 (10.9)	151 (14.3)[+]
Slight difficulty	13 (32.5)	74 (30.1)	156 (27.0)	38 (19.7)	281 (26.6)
Moderate difficulty	13 (32.5)	82 (33.3)	207 (35.8)	57 (29.5)	359 (34.0)
Great difficulty	4 (10.0)	34 (13.8)	135 (23.4)	67 (34.7)	240 (22.7)
No answer	0 (0.0)	5 (2.0)	11 (1.9)	10 (5.2)	26 (2.5)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F18

Difficulties Understanding Orders in a Quiet Room With Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	19 (47.5)*	120 (48.8)	254 (43.9)	67 (34.7)	460 (43.5)[+]
Slight difficulty	15 (37.5)	82 (33.3)	207 (35.8)	69 (35.8)	373 (35.3)
Moderate difficulty	4 (10.0)	21 (8.5)	74 (12.8)	30 (15.5)	129 (12.2)
Great difficulty	0 (0.0)	8 (3.3)	15 (2.6)	5 (2.6)	28 (2.6)
No answer	2 (5.0)	15 (6.1)	28 (4.8)	22 (11.4)	67 (6.3)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F19

Difficulties Understanding Orders in a Noisy Room With Hearing Protectors (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	8 (20.0)*	38 (15.4)	86 (14.9)	27 (14.0)	159 (15.0)+
Slight difficulty	12 (30.0)	84 (34.1)	149 (25.8)	38 (19.7)	283 (26.8)
Moderate difficulty	10 (25.0)	59 (24.0)	166 (28.7)	49 (25.4)	284 (26.9)
Great difficulty	5 (12.5)	42 (17.1)	130 (22.5)	51 (26.4)	228 (21.6)
No answer	5 (12.5)	23 (9.3)	47 (8.1)	28 (14.5)	103 (9.7)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F20

Difficulty Answering a Telephone in a Quiet Room (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	38 (95.0)*	229 (93.1)	505 (87.4)	153 (79.3)	925 (87.5)+
Slight difficulty	1 (2.5)	11 (4.5)	53 (9.2)	29 (15.0)	94 (8.9)
Moderate difficulty	0 (0.0)	2 (0.8)	8 (1.4)	6 (3.1)	16 (1.5)
Great difficulty	0 (0.0)	0 (0.0)	3 (0.5)	0 (0.0)	3 (0.3)
No answer	1 (2.5)	4 (1.6)	9 (1.6)	5 (2.6)	19 (1.8)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F21

Difficulty Answering a Telephone in a Noisy Room (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No difficulty	11 (27.5)*	60 (24.4)	89 (15.4)	28 (14.5)	188 (17.8)+
Slight difficulty	16 (40.0)	102 (41.5)	226 (39.1)	59 (30.6)	403 (38.1)
Moderate difficulty	11 (27.5)	52 (21.1)	166 (28.7)	62 (32.1)	291 (27.5)
Great difficulty	1 (2.5)	28 (11.4)	87 (15.1)	34 (17.6)	150 (14.2)
No answer	1 (2.5)	4 (1.6)	10 (1.7)	10 (5.2)	25 (2.4)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F22

Exposure to Solvents (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Never exposed to solvents	21 (52.5)*	114 (46.3)	185 (32.0)	66 (34.2)	386 (36.5)[+]
Exposed to solvents	19 (47.5)	127 (51.6)	383 (66.3)	120 (62.2)	649 (61.4)
No answer	0 (0.0)	5 (2.0)	10 (1.7)	7 (3.6)	22 (2.1)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F23

Use of Respiratory Protective Equipment During Exposure to Solvents (n_{total} = 671)**

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
Never	7 (36.8)*	42 (32.1)	177 (46.2)	68 (56.7)	294 (45.3)[+]
< ½ of a work shift	5 (26.3)	56 (42.1)	130 (33.9)	36 (30.0)	227 (35.0)
> ½ of a work shift	3 (15.8)	15 (11.8)	47 (12.3)	5 (4.2)	70 (10.8)
100 % of a work shift	4 (21.1)	14 (11.0)	28 (7.3)	8 (6.7)	54 (8.3)
No answer	0 (0.0)	3 (2.4)	1 (0.4)	3 (2.5)	22 (3.4)
Total (n)	19	127	383	120	649(100.0)

** n_{total} = participants who indicate exposure to solvents; see Table F22)
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F24

History of Accidents at Work Involving Head Injuries (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No accidents	39 (97.5)*	224 (91.1)	525 (90.8)	173 (89.6)	961 (90.9)+
One accident	1 (2.5)	11 (4.5)	32 (5.5)	10 (5.2)	54 (5.1)
Two accidents	0 (0.0)	2 (0.8)	7 (1.2)	3 (1.6)	12 (1.1)
More than two	0 (0.0)	1 (0.4)	5 (0.9)	3 (1.6)	9 (0.9)
No answer	0 (0.0)	8 (3.3)	9 (1.6)	4 (2.1)	21 (2.0)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F25

Presence of Permanent Hearing Loss Due to Head Injury (n_{total} = 96)**

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
Returned to normal	0 (0.0)	7 (31.8)	19 (35.8)	5 (25.0)	31 (32.3)+
Mild hearing loss	1(100.0)	5 (22.7)	18 (34.0)	6 (30.0)	30 (31.3)
Moderate hearing loss	0 (0.0)	2 (9.1)	4 (7.5)	4 (20.0)	10 (10.4)
Severe hearing loss	0 (0.0)	0 (0.0)	1 (1.9)	0 (0.0)	1 (1.0)
No answer	0 (0.0)	8 (36.4)	11 (20.8)	5 (25.0)	24 (25.0)
Total (n)	1	22	53	20	96 (100.0)

**n_{total} = participants who indicate a history of head injuries at work; See Table F24
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

Table F26

Ears That Were Affected by the Accident (n_{total} = 96)**

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
Neither ear	0 (0.0)*	2 (9.1)	5 (9.4)	1 (5.0)	8 (8.3)+
Right ear	0 (0.0)	3 (13.6)	7 (13.2)	5 (25.0)	15 (15.6)
Left ear	0 (0.0)	6 (27.3)	11 (20.8)	2 (10.0)	19 (19.8)
Both ears	1(100.0)	3 (13.6)	23 (43.4)	7 (35.0)	34 (35.4)
No answer	0 (0.0)	8 (36.4)	7 (13.2)	5 (25.0)	20 (20.8)
Total (n)	1	22	53	20	96(100.0)

**n_{total} = participants who indicate a history of head injuries at work; See Table F24
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

Table F27

Satisfaction With Treatment Received (n_{total} = 96)**

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
No treatment	0 (0.0)*	2 (9.1)	21 (39.6)	6 (30.0)	29 (30.2)+
Dissatisfied	0 (0.0)	2 (9.1)	5 (9.4)	1 (5.0)	8 (8.3)
Somewhat satisfied	0 (0.0)	5 (22.7)	13 (24.5)	4 (20.0)	22 (22.9)
Very satisfied	1(100.0)	5 (22.7)	7 (13.2)	4 (20.0)	17 (17.7)
No answer	0 (0.0)	8 (36.4)	7 (13.2)	5 (25.0)	20 (20.8)
Total (n)	1	22	53	20	96(100.0)

**n_{total} = participants who indicate a history of head injuries at work; See Table F24
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

Table F28

History of Ear Infections (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Childhood					
None	19 (47.5)*	130 (52.8)	304 (52.6)	115 (59.6)	568 (53.7)+
One	5 (12.5)	41 (16.7)	75 (13.0)	25 (13.0)	146 (13.8)
Two	0 (0.0)	14 (5.7)	45 (7.8)	14 (7.3)	73 (6.9)
More than two	16 (40.0)	52 (21.1)	125 (21.6)	24 (12.4)	217 (20.5)
No answer	0 (0.0)	9 (3.7)	29 (5.0)	15 (7.8)	53 (5.0)
Total (n)	40	246	578	193	1057(100.0)
Adulthood					
None	28 (70.0)*	188 (76.4)	369 (63.8)	116 (60.1)	701 (66.3)+
One	6 (15.0)	25 (10.2)	84 (14.5)	29 (15.0)	144 (13.6)
Two	3 (7.5)	11 (4.5)	47 (8.1)	16 (8.3)	77 (7.3)
More than two	3 (7.5)	19 (7.7)	74 (12.8)	25 (13.0)	121 (11.4)
No answer	0 (0.0)	3 (1.2)	4 (0.7)	7 (3.6)	14 (1.3)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); +frequency of occurrence (percent of N)

Table F29

Effect of Ear Infections on Hearing (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No ear infections	20 (50.0)*	153 (62.2)	306 (52.9)	98 (50.8)	577 (54.6)[+]
Hearing returned to normal	18 (45.0)	88 (35.8)	228 (39.4)	68 (35.2)	402 (38.0)
Mild hearing loss	1 (2.5)	2 (0.8)	14 (2.4)	8 (4.1)	25 (2.4)
Moderate hearing loss	0 (0.0)	0 (0.0)	4 (0.7)	6 (3.1)	10 (0.9)
Severe hearing loss	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.0)	1 (0.1)
No answer	1 (2.5)	3 (1.2)	25 (4.3)	13 (6.7)	42 (4.0)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F30

History of Head Injuries Outside of Work (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	32 (80.0)*	214 (87.0)	502 (86.9)	169 (87.6)	917 (86.8)[+]
One	7 (17.5)	21 (8.5)	51 (8.8)	16 (8.3)	95 (9.0)
Two	1 (2.5)	7 (2.8)	12 (2.1)	3 (1.6)	23 (2.2)
More than two	0 (0.0)	2 (0.8)	8 (1.4)	0 (0.0)	10 (0.9)
No answer	0 (0.0)	2 (0.8)	5 (0.9)	5 (2.6)	12 (1.1)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F31

Effect of the Head Injury on Hearing (n_{total} = 128)**

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	8(100.0)*	28 (93.3)	59 (83.1)	15 (78.9)	110 (85.9)[+]
Hearing returned to normal	0 (0.0)	2 (6.7)	11 (15.5)	3 (15.8)	16 (12.5)
Permanent hearing loss	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
No answer	0 (0.0)	0 (0.0)	1 (1.4)	1 (5.3)	2 (1.6)
Total (n)	8	30	71	19	128(100.0)

** n_{total} = participants who indicate a history of head injuries outside of work; see Table F30
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F32

Use of Medications that May Have Affected Hearing (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	39 (97.5)*	241 (98.0)	551 (95.3)	184 (95.3)	1015 (96.0)[+]
Yes, no effect on hearing	0 (0.0)	0 (0.0)	7 (1.2)	1 (0.5)	8 (0.8)
Yes, hearing returned to normal	1 (2.5)	2 (0.8)	6 (1.0)	1 (0.5)	10 (0.9)
Yes, permanent hearing loss	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.1)
No answer	0 (0.0)	3 (1.2)	14 (2.4)	6 (3.1)	23 (2.2)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F33

Presence of Noise in Head or Ears (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No	23 (57.5)*	142 (57.7)	249 (43.1)	83 (43.0)	497 (47.0)[+]
Occasionally, < ½ the time	14 (35.0)	83 (33.7)	257 (44.5)	82 (42.5)	436 (41.2)
Often, > ½ the time	1 (2.5)	6 (2.4)	29 (5.0)	13 (6.7)	49 (4.6)
Constantly	2 (5.0)	11 (4.5)	36 (6.2)	12 (6.2)	61 (5.8)
No answer	0 (0.0)	4 (1.6)	7 (1.2)	3 (1.6)	14 (1.3)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F34

Loudness of Noise in Head or Ears (n_{total} = 546)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
Low	10 (58.8)*	67 (67.0)	213 (66.1)	65 (60.7)	355 (65.0)[+]
Moderate	7 (41.2)	29 (29.0)	94 (29.2)	36 (33.6)	166 (30.4)
Loud	0 (0.0)	4 (4.0)	15 (4.7)	5 (4.7)	24 (4.4)
No answer	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	1 (0.2)
Total (n)	17	100	322	107	546 (100.0)

**n_{total} = participants who indicate having a ringing or buzzing noise in the head or ears; See Table F33
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F35

Interference of Noise in Head or Ears with Hearing (n_{total} = 546)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	10 (58.8)*	55 (55.0)	171 (53.1)	42 (39.3)	278 (50.9)[+]
Slight interference	6 (35.3)	34 (34.0)	117 (36.3)	51 (47.7)	208 (38.1)
Moderate interference	1 (5.9)	6 (6.0)	26 (8.1)	12 (11.2)	45 (8.2)
Much interference	0 (0.0)	5 (5.0)	8 (2.5)	2 (1.7)	15 (2.7)
Total (n)	17	100	322	107	546 (100.0)

** n_{total} = participants who indicate having a ringing or buzzing noise in the head or ears; See Table F33
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F36

Disturbance of Noise in Head or Ears with Sleep (n_{total} = 546)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	13 (76.5)*	73 (73.0)	250 (77.6)	77 (72.0)	413 (75.6)[+]
Occasionally, < ½ the time	2 (11.8)	25 (25.0)	60 (18.6)	28 (26.2)	115 (21.1)
Often, > ½ the time	1 (5.9)	1 (1.0)	5 (1.6)	1 (0.9)	8 (1.5)
All the time	1 (5.9)	1 (1.0)	7 (2.2)	1 (0.9)	10 (1.8)
Total (n)	17	100	322	107	546 (100.0)

** n_{total} = participants who indicate having a ringing or buzzing noise in the head or ears; See Table F33
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F37

Presence of Dizzy Spells (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
None	35 (87.5)*	211 (85.8)	474 (82.0)	161 (83.4)	881 (83.3)[+]
Occasionally, < ½ the time	2 (5.0)	26 (10.6)	92 (15.9)	27 (14.0)	147 (13.9)
Often, > ½ the time	2 (5.0)	2 (0.8)	5 (0.9)	0 (0.0)	9 (0.9)
All the time	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)	1 (0.1)
No answer	1 (2.5)	6 (2.4)	7 (1.2)	5 (2.6)	19 (1.8)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F38

Perception of Body Turning in Circles (n_{total} = 157)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
No	0 (0.0)*	10 (34.5)	27 (27.8)	12 (44.4)	49 (31.2)$^{+}$
Not sure	0 (0.0)	10 (34.5)	33 (34.0)	6 (22.2)	49 (31.2)
Maybe	1 (25.0)	3 (10.3)	13 (13.4)	5 (18.5)	22 (14.0)
Definitely	3 (75.0)	6 (20.7)	24 (24.7)	4 (14.8)	37 (23.6)
Total (n)	4	29	97	27	157 (100.0)

** n_{total} = participants who indicate having dizzy spells; See Table F38
*frequency of occurrence (percent of n); $^{+}$frequency of occurrence (percent of n_{total})

Table F39

Interference of Dizzy Spells with Work (n_{total} = 157)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	1 (25.0)*	22 (75.9)	67 (69.1)	20 (74.1)	110 (70.1)$^{+}$
Occasionally, < ½ the time	3 (75.0)	6 (20.6)	30 (30.9)	7 (25.9)	46 (29.3)
Often, > ½ the time	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
All the time	0 (0.0)	1 (3.4)	0 (0.0)	0 (0.0)	1 (0.6)
Total (n)	4	29	97	27	157 (100.0)

** n_{total} = participants who indicate having dizzy spells; See Table F38
*frequency of occurrence (percent of n); $^{+}$frequency of occurrence (percent of n_{total})

Table F40

Occurrence of Dizzy Spells with Noises in Head or Ears and Problems with Hearing (n_{total} = 157)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	0 (0.0)*	17 (58.6)	56 (57.7)	14 (51.9)	87 (55.4)$^{+}$
Not sure	2 (50.0)	10 (34.5)	27 (27.8)	12 (44.4)	51 (32.5)
Maybe	2 (50.0)	2 (6.9)	10 (10.3)	1 (3.7)	15 (9.6)
Definitely related	0 (0.0)	0 (0.0)	4 (4.1)	0 (0.0)	4 (2.5)
Total (n)	4	29	97	27	157 (100.0)

** n_{total} = participants who indicate having dizzy spells; See Table F38
*frequency of occurrence (percent of n); $^{+}$frequency of occurrence (percent of n_{total})

Table F41

Exposure to Loud Sounds during Leisure (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No	21 (52.5)*	121 (49.2)	281 (48.6)	75 (38.9)	498 (47.1)[+]
Occassionally – < ½ the time	18 (45.0)	119 (48.4)	290 (50.2)	110 (57.0)	537 (50.8)
Often – > ½ the time	1 (2.5)	4 (1.6)	2 (0.3)	3 (1.6)	10 (0.9)
All the time	0 (0.0)	0 (0.0)	1 (0.2)	0 (0.0)	1 (0.1)
No answer	0 (0.0)	2 (0.8)	4 (0.7)	5 (2.6)	11 (1.0)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F42

Exposure to Loud Sounds during Leisure (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
Power tools	22 (55.0)*	119 (48.4)	344 (59.5)	126 (65.3)	611 (57.8)[+]
Guns (hunting/gunclubs)	6 (15.0)	29 (11.8)	73 (12.6)	20 (10.4)	128 (12.1)
Off-road vehicles	6 (15.0)	20 (8.1)	53 (9.2)	12 (6.2)	91 (8.6)
Motorcycles	4 (10.0)	30 (12.2)	46 (8.0)	17 (8.8)	97 (9.2)
Snowmobiles	5 (12.5)	17 (6.9)	26 (4.5)	8 (4.1)	56 (5.3)
Rock music	19 (47.5)	85 (34.6)	149 (25.8)	47 (24.4)	300 (28.4)
Disco/dance bars	24 (60.0)	64 (26.0)	59 (10.2)	19 (9.8)	166 (15.7)
Others	4 (10.0)	25 (10.2)	69 (11.9)	26 (13.5)	124 (11.7)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F43

Use of Hearing Protective Devices During Leisure (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No noisy activities	6 (15.0)*	75 (30.5)	154 (26.6)	59 (30.6)	294 (27.8)[+]
None	19 (47.5)	58 (23.6)	112 (19.4)	30 (15.5)	219 (20.7)
< ½ of the time	8 (20.0)	46 (18.7)	94 (16.3)	31 (16.1)	179 (16.9)
> ½ of the time	5 (12.5)	26 (10.6)	71 (12.3)	23 (11.9)	125 (11.8)
All of the time	2 (5.0)	32 (13.0)	118 (20.4)	39 (20.2)	191 (18.1)
No answer	0 (0.0)	9 (3.7)	29 (5.0)	11 (5.7)	49 (4.6)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F44

Kinds of Hearing Protective Devices Used in Leisure (n_{total} = 763)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	11 (32.4)*	35 (20.5)	60 (14.2)	14 (10.4)	120 (15.7)[+]
Ear plugs	9 (26.5)	62 (36.3)	123 (29.0)	29 (21.6)	223 (29.2)
Ear muffs	4 (11.8)	44 (25.7)	132 (31.1)	58 (43.3)	238 (31.2)
Plugs & muffs	6 (17.6)	14 (8.2)	66 (15.6)	16 (11.9)	102 (13.4)
Other	1 (2.9)	6 (3.5)	16 (3.8)	5 (3.7)	28 (3.7)
No answer	3 (8.8)	10 (5.8)	27 (6.4)	12 (9.0)	52 (6.8)
Total (n)	34	171	424	134	763 (100.0)

** n_{total} = participants who indicate use of hearing protection; See Table F43
*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of n_{total})

Table F45

Work Outside of the Military (N = 1057)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (N)
No	37 (92.5)*	223 (90.7)	519 (89.8)	172 (89.1)	951 (90.0)[+]
Yes, occasionally	2 (5.0)	10 (4.1)	36 (6.2)	14 (7.3)	62 (5.9)
Yes, weekends	1 2.5)	3 (1.2)	3 (0.5)	1 (0.5)	8 (0.8)
Yes, regularly after-hours	0 (0.0)	4 (1.6)	8 (1.4)	2 (1.0)	14 (1.3)
No answer	0 (0.0)	6 (2.4)	12 (2.1)	4 (2.1)	22 (2.1)
Total (n)	40	246	578	193	1057(100.0)

*frequency of occurrence (percent of n); [+]frequency of occurrence (percent of N)

Table F46

Exposure to Loud Sounds During Sideline Work (n_{total} = 84)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
No	1 (33.3)*	3 (17.6)	19 (40.4)	9 (52.9)	32 (38.1)+
Occassionally – < ½ the time	1 (33.3)	10 (58.8)	20 (42.6)	7 (41.2)	37 (44.0)
Often – > ½ the time	1 (33.3)	4 (23.5)	7 (14.9)	1 (5.9)	13 (15.5)
Constantly	0 (0.0)	0 (0.0)	1 (2.1)	0 (0.0)	2 (2.4)
Total (n)	3	17	47	17	84 (100.0)

**n_{total} = participants who indicate working outside the military; See Table F45
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

Table F47

Use of Hearing Protectors During Sideline Work (n_{total} = 52)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
None	1 (50.0)*	4 (28.6)	9 (32.1)	5 (62.5)	19 (36.5)+
Occassionally – < ½ the time	0 (0.0)	6 (42.9)	4 (14.3)	2 (25.0)	12 (23.1)
Often – > ½ the time	0 (0.0)	3 (21.4)	7 (25.0)	1 (12.5)	11 (21.2)
All the time	1 (50.0)	1 (7.1)	8 (28.6)	0 (0.0)	10 (19.2)
Total (n)	2	14	28	8	52(100.0)

**n_{total} = participants who indicate exposure to noise in sideline work; See Table F46
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

Table F48

Kinds of Hearing Protectors Used in Sideline Work (n_{total} = 33)

Age	16 – 25 yrs	26 – 35 yrs	36-45 yrs	46-65 yrs	Total (n_{total})
Ear plugs	1(100.0)*	5 (50.0)	3 (15.8)	1 (33.3)	10 (30.3)+
Ear Muffs	0 (0.0)	3 (30.0)	10 (52.6)	2 (66.7)	15 (45.5)
Plugs and muffs	0 (0.0)	1 (10.0)	5 (26.3)	0 (0.0)	6 (18.2)
Other	0 (0.0)	0 (0.0)	1 (5.3)	0 (0.0)	1 (3.0)
No answer	0 (0.0)	1 (10.0)	0 (0.0)	0 (0.0)	1 (3.0)
Total (n)	1	10	19	3	33 (100.0)

**n_{total} = participants who indicate using hearing protection in sideline work; See Table F47
*frequency of occurrence (percent of n); +frequency of occurrence (percent of n_{total})

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14. ABSTRACT

(U) The escalating cost of claims for noise−induced hearing loss in the Canadian Forces supports the need to review and upgrade current hearing conservation practices. A prospective study was conducted to assess risk factors for the development of hearing loss in a wide range of military trades. A total of 1,057 individuals working in land, sea and air environments contributed their current hearing test results and first hearing test results on record. They also completed a 56−item questionnaire relating to demographics, occupational and non occupational noise exposure history, training in and utilization of personal hearing protection, and factors other than noise which might affect hearing, including head injury, ear disease, medications, solvent exposure and leisure noise. Medical personnel at five participating Canadian Forces military bases in Ontario and Nova Scotia recruited the subjects, distributed the questionnaires and assessed hearing. Apparatus and protocols for the latter conformed to current clinical practice. The prevalence of moderate to severe hearing loss progressed with years of noise exposure, with hearing thresholds in those over 45 years ranging broadly from normal to over 70 dB HL. Unprotected solvent and noise during leisure appeared to be significant determinates of adverse outcome, while the effect of head injury, history of ear disease, and the use of medications was minimal. The survey suggested that training on the hazards of noise exposure and the selection and utilization of hearing protection were inadequate. Hearing protection was reported to be incompatible with other gear, uncomfortable and an impediment to communication.

(U) En raison de l’escalade des coûts des réclamations pour la perte d’audition due au bruit au sein des Forces canadiennes, il est nécessaire de revoir et d’améliorer les pratiques actuelles relatives à la protection de l’ouïe. Une étude prospective a été menée à des fins d’évaluation des facteurs de risque associés à la perte d’audition dans une vaste gamme de groupes professionnels militaires (GPM). En tout, 1 057 personnes travaillant en milieu terrestre, maritime ou aérien ont autorisé l’utilisation des résultats de leur dernier test auditif ainsi que du premier test auditif dans leur dossier. Ces personnes ont aussi rempli un questionnaire de 56 questions sur les sujets suivants : données démographiques, exposition professionnelle et non professionnelle au bruit dans le passé, formation concernant les protecteurs auditifs individuels, utilisation de ces protecteurs et facteurs autres que le bruit qui pourraient nuire à l’audition, dont les blessures à la tête, les maladies de l’oreille, les médicaments, l’exposition à des solvants et le bruit associé aux loisirs. Le personnel médical de cinq bases militaires participantes des Forces canadiennes de l’Ontario et de la Nouvelle?Écosse a recruté les sujets, distribué le questionnaire et évalué l’acuité auditive. Les appareils et protocoles utilisés pour cette évaluation étaient conformes à la pratique clinique actuelle. La prévalence de la perte d’audition de modérée à grave progressait avec le nombre d’années d’exposition au bruit, le seuil auditif chez les plus de 45 ans variant globalement de normal à plus de 70 dB HL. L’exposition à des solvants et l’exposition au bruit associé aux loisirs sans aucune protection semblaient être des déterminants importants d’un résultat indésirable, alors que les effets des blessures à la tête, des antécédents de maladie de l’oreille et de l’usage de médicaments étaient minimes. Il ressort du sondage que la formation concernant les dangers de l’exposition au bruit ainsi que le choix et l’utilisation des protecteurs auditifs était inadéquate. De l’avis des répondants, en plus d’être inconfortables et incompatibles avec d’autres dispositifs, les protecteurs auditifs nuisent à la communication.

15. KEYWORDS, DESCRIPTORS or IDENTIFIERS

(U) prevalence of noise−induced hearing loss; risk factors for hearing loss; hearing protection; hearing conservation; noise dosimetry