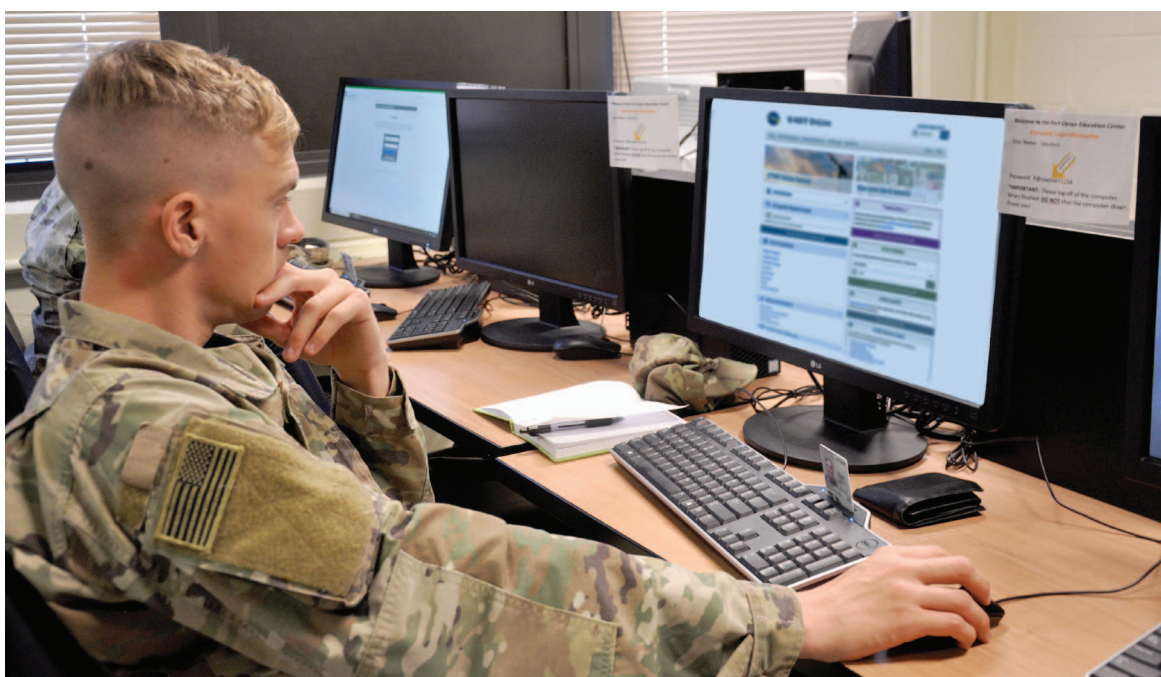JEFFREY B. WENGER, ELIZABETH HASTINGS ROER, JONATHAN P. WONG

Military-to-Civilian Occupational Matching

Using the O*NET to Provide Match Recommendations for the U.S. Navy, Marine Corps, and Air Force

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About This Report

Each year, about 200,000 U.S. service members leave active duty and transition to civilian employment. Many of these service members find this transition difficult because some military occupations have no direct parallel in the civilian economy. In this research, we collected data on the knowledge, skills, and abilities and other attributes of selected military occupations. Using those data, along with a civilian version of those exact same data, we were able to algorithmically match a military occupation to every civilian occupation and determine the best fit. The job-matching algorithm provides both high-quality occupational recommendations and reasons that the matches are high quality. These results will be useful for service members who are leaving the military in search of civilian employment, job counselors, and employers in search of workers with specific skill sets.

The research reported here was completed in January 2023 and underwent security review with the sponsor and the Defense Office of Prepublication and Security Review before public release.

RAND National Security Research Division

Acknowledgments

Summary

Each year, about 200,000 U.S. service members transition from the active component of the U.S. military into the civilian economy. Many of these service members will return to school for additional education, but many others will seek employment in the public or private sector. Because of the special nature of the military, many military occupations have no direct parallel in the civilian economy. Consequently, former service members can be left without a clear pathway to civilian employment—especially those members who want to use the specialized skills they developed in the military—and can end up unemployed or underemployed. Similarly, civilian employers might not recognize similarities between military and civilian occupations and might not reach out to veterans who are qualified for open positions.

The U.S. Department of Defense (DoD) and the armed services want to widen the aperture of what separating service members think that they can do when they leave the military and which jobs civilian employers think veterans are well-qualified to perform. In a previous study, researchers at the RAND Corporation developed a method of matching occupational characteristics from the civilian economy to occupations in the U.S. Army. The results of the original Army research were surprising: There were many civilian occupations that were high-quality matches (as defined in the study) to the selected Army military occupational specialties (MOSs) that had not been recommended by occupational experts. Those results, including a detailed discussion of the methodology and checks for robustness, are available in Wegner et al. (2017).

In this report, we extend the method used previously for Army research to the U.S. Navy, Marine Corps, and Air Force. We first collected data from active component enlisted sailors, marines, and airmen using the U.S. Department of Labor's (DoL's) occupational questionnaire known as the Occupational Information Network (O*NET). DoL uses the O*NET survey to profile almost 1,000 civilian occupations across the U.S. economy. The O*NET survey consists of six modules and contains 234 items that focus on knowledge, skills, abilities, work activities, work context, and work styles. In all, we collected data from more than 5,100 active component enlisted personnel across the three service branches we studied.

For each military occupation in our sample, we identified the most-similar civilian occupations by comparing service members' responses to the O*NET survey items with the responses that DoL obtained on those same survey items for each civilian occupation. By breaking down military jobs into their constituent features as identified by the survey questions and profiling military occupations using the same features that DoL uses to profile civilian occupations, we created an apples-to-apples comparison. This approach contrasts with existing methods for generating military-to-civilian occupation crosswalks (such as the DoL-sponsored

online tool, My Next Move for Veterans), which rely on analyses of high-level job descriptions by occupational analysts.

The O*NET survey instrument records responses for each survey item as a numeric score. We used those scores to calculate the difference between each military occupation's average response on any survey item to the average response of each civilian occupation to that same survey item. We aggregated the differences across all survey items into a single job-match score for each military-civilian occupation pair.

We supplemented our inspection of job attributes with additional survey questions designed to ascertain service members' satisfaction with their military occupations at the time of the survey. Our objective with these questions was to assess whether service members generally would find it useful to know which civilian occupations are most similar to their military occupations: If service members do not like their military occupation, then our methodology might identify civilian occupational matches that they might not find appealing either.

Key Findings

In general, there was a wide disparity in the number of *high-quality* matches (defined as a normalized match score of 80 or above) for each occupation within a service branch. There were very few high-quality civilian matches for occupations that entail highly specialized military-unique tasks: For instance, there were only three matches for a Navy boatswain's mate and two matches for a U.S. Marine Corps infantry rifleman. Conversely, there were some military occupations that had many high-quality matches, such as Navy hospital corpsman, Marine Corps administrative specialist, and Air Force knowledge operations management.

To identify occupations that transitioning service members might be able to enter immediately after separating from the military without substantial additional education, we focused our analysis on civilian occupations that do not require a bachelor's degree at entry. Filtering on such occupations removed over half the options.

For each military occupation included in this study, we identified the 50 highest-quality civilian occupational matches (out of more than 700 civilian occupations) not requiring a bachelor's degree at entry. We then selected one military occupation in each service branch to examine more closely. For each of these selected occupations, we compared top-ranked occupational attributes in each O*NET module with the top-ranked occupational attributes of one high-quality matching civilian occupation. This examination illustrates how the matching methodology works, and it also provides transitioning service members with a potential model for refining their job search efforts after looking at the list of occupational matches.

The following three findings were common to the match results across the three service branches we studied:

1. Every military occupation yielded at least two high-quality civilian occupational matches and often many more.

2. Close inspection of the characteristics of selected matched occupations suggested that our methodology accurately creates occupational matches based on similarity of occupational characteristics captured in the O*NET. Most of these occupational matches are based on general skills associated with military service, but many matches also are based on occupation-specific attributes, such as specific technical knowledge, skills, or abilities.
3. Service members generally were satisfied with their military occupations, suggesting that many of these members might find the match results that we provided to be useful for identifying civilian occupations that are both attainable based on their individual qualifications and acceptable based on their individual preferences.

Conclusion, Recommendations, and Future Research

The matching methodology we used appears to provide sensible job matches: Close inspection of the six O*NET modules for military occupations and their high-quality matches suggests that there is a high level of overlap in knowledge, skills, abilities, and job attributes. Although there is substantial overlap between our matches and those identified by the My Next Move for Veterans website, our matching methodology also provides many different results. Because our matching methodology leverages new information obtained from surveys administered for this project, we suspect that we have uncovered occupational matches that are based on similarities across occupations that would have been difficult to identify without the occupational decomposition that the O*NET provides. This expanded set of recommendations could be used to complement the existing recommendations, which could help service members and civilian employers expand their thinking about how military experience translates into civilian occupational qualifications.

Our results also identify military occupations with relatively few high-quality matching civilian occupations, which might help to focus available resources on providing service members in those occupations with more transition assistance. We recommend investigating whether additional transition services should be provided to service members who are in military occupations that have few good civilian occupational matches. The findings also suggest that there are general military-wide traits related to leadership, management, detail orientation, and stressful working conditions that appear to permeate throughout most military occupations. These traits, which might not be obvious in traditional occupational analyses, might provide value across a wider variety of civilian occupations than is currently recognized. We also recommend posting these research findings on the My Next Move for Veterans website. Providing transitioning service members access to this information could allow these members to better target their job search to civilian occupations that best match their military occupations and could directly improve service members' articulation of their skills when discussing their prospects with a future employer. Also, employers could use the results to better understand how military occupations match their requirements for open positions.

Future research could examine ways to incorporate transitioning service members' preferences into their civilian job search. One way to do this would be to develop weights within

the matching function so that individuals could increase the weight of the job attributes they like and decrease the weight of the attributes they want to avoid to gain more information about the civilian occupations to which they might consider transitioning.

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Chapter 1. Job-Matching Technology

Each year, about 200,000 U.S. service members leave the military (Gurkin, 2019); the majority of these service members will search for civilian employment and hope to find a good, well-paying job. Some transitioning service members might find a civilian job relatively easily and quickly, perhaps because they held jobs in the military that had direct civilian analogs: police, health care workers, mechanics, administrative workers, and cooks, to name a few. Because these jobs exist in both the military and civilian sectors—and because many of the duties are fundamentally the same—employment transitions between these types of occupations are likely to be faster, resulting in fewer weeks of unemployment and a smoother transition (assuming, of course, that the transitioning service member wants to continue in that line of work).

Other occupations in the military (mostly combat arms) have no direct civilian analog, such as infantry rifleman, aviation ordnanceman, and munitions systems technician. For these combat arms occupations, it is difficult to understand how the knowledge, skills, and abilities (KSAs) and other work experience that the service member gained in the military can be transferred to a civilian job. This can make the transition to civilian employment difficult for those service members, thereby increasing the duration of unemployment and potentially leading to other adverse outcomes, such as declines in health status and higher incidences of both depression and substance abuse (Krug and Eberl, 2018; Roelfs et al., 2011).

To improve this transition—and to reduce the number of mismatches between difficult-to-match military occupations and civilian occupations—transitioning service members, after enrolling in the Transition Assistance Program (TAP), are encouraged to use the U.S. Department of Labor's (DoL's) My Next Move for Veterans website. My Next Move for Veterans provides recommendations for civilian employment based on the transitioning service member's military occupation. For example, for a Marine Corps infantry rifleman, My Next Move for Veterans recommends five occupations to investigate: correctional officers and jailers, police and sheriff's patrol officers, private detectives and investigators, security guards, and surveying and mapping technicians. The occupational experts who made these recommendations thought that guarding things, wearing a uniform, and carrying a weapon would make these jobs similar. Clearly, there is some overlap between being an infantry rifleman and being a police officer, but does this occupational match provide the best use of the skills developed in the military?

In our analysis, we do not find those recommendations to be high-quality matches; instead, we recommend that a Marine Corps infantry rifleman explore the option of becoming a firefighter. This option taps into the physical demands—in terms of both strength and vision—of

being a rifleman and the teamwork, equipment maintenance, problem-solving, and critical thinking skills necessary for the job.

Guiding transitioning service members into occupations that are potentially good matches likely will shorten the duration of unemployment, increase wages, reduce job turnover, and lengthen job tenures.

Job search activity is an important component of finding a job, but there are many other factors as well, and we should not expect that a targeted and strategically sound search will solve all the problems that face service members who hope to successfully transition into the civilian economy. The general state of the local economy—and particularly, the unemployment rate— also will influence the speed of the job match. Service members should ask themselves the following questions:

- Am I willing to accept employment in a wide array of occupations?
- Do I have the right educational credentials necessary to do the job?
- Have I used my social network to search for work most efficiently?

All these factors have direct impacts on unemployment (Jones, 1991).

In this study, we focused on improving the job recommendations that are provided to transitioning service members. By better targeting service members' job searches, we can increase the likelihood that the service members are building on and leveraging the KSAs and work experience that they gained in their military jobs.

Unemployment and Job Search

To successfully transition from the military into a civilian job, most service members will conduct a job search. The field of economics has a well-developed theory about the dynamics of job search and an individual's decision to accept a job offer, including substantial empirical research examining the factors that drive the success of an individual's job search.[1] An implication of this research is that algorithmic matching of employees to jobs has the potential to overcome informational barriers to successful job matches, but this matching technology must be appropriately designed to ensure that matches are based on characteristics relevant to job success (Fuller et al., 2021). This implication is an important motivator for this project: We aim to leverage modern job-matching technology to improve transitioning service members' success in their job searches.

Economists theorize that job search and match is a cost-benefit decision (Mortensen, 1986). The transitioning service member searches for civilian employment, while civilian employers simultaneously search for workers. Potential employees inform employers about their skillsets by providing cover letters and résumés, taking screening tests, and interviewing. Employers must

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[1] See, for example, Mortensen, 1986; Mortensen and Pissarides, 1999, for theory; Eckstein and van den Berg, 2007; and Wolpin, 1995, for empirical work.

convince potential candidates that the wages and working conditions offered are adequate for the candidate to give up their leisure time and any other benefits that the candidate derives from not working. If a potential employee does not have the skills required for the job, they must decide whether to invest in those skills, either by returning to school or accepting a lower-seniority position as a way to gain valuable experience.

Job match is a two-sided proposition: Both the employer and employee must agree to make a match, which makes the process complicated and difficult to predict. Additional complexity results from employers and employees choosing the amount of time and effort spent searching for work or attempting to fill vacancies. More-strenuous search effort leads to more interviews and, ultimately, more job offers (Krueger and Mueller, 2010, 2011), while perceptions of job search efficacy influence search effort (Wanberg, Zhu, and Van Hooft, 2010).

Search effort is a fundamental input into job match. Dynamic search models of employment are governed, in part, by the job-matching technology (Mortensen and Pissarides, 1999). This is similar to the production function in the theory of the firm. The job-matching technology combines two inputs, job vacancies and unemployed people, and converts them into job matches. The technology is said to improve when more matches are produced from the same inputs (i.e., the number of vacancies and unemployed people). One way to improve the job-matching technology is to provide more and better information to both the employers and the employees. It is possible, however, that having more and better information can result in fewer matches if the algorithmic matching disqualifies candidates or matches on increasingly specific skill sets (see Fuller et al., 2021). Generally, evidence suggests that a considerable amount of unemployment is frictional (largely because of information gaps) and that this friction prevents qualified workers from finding acceptable employers and vice versa (Warren, 1991). By reducing these information gaps, the market should more readily match the unemployed to job vacancies, thereby improving the match technology. Other forms of unemployment (e.g., excess supply of labor) can be driven by business-cycle dynamics (e.g., cyclical unemployment) or systematic skills mismatch (e.g., structural unemployment). All these forms of unemployment are important and vary over time, but during the expansionary phase of the business cycle, frictional unemployment is thought to make up the largest share. Recent research finds that the expansion of the digital economy might have reduced frictional unemployment meaningfully, by as much as 0.5 percentage points (Lederman and Zouaidi, 2022).

To summarize, the role of job search is to match willing candidates to job openings. The information necessary to conduct a match has improved steadily since the introduction of the internet. The quantity, quality, timeliness, and ubiquity of job information has improved and continues to get better. New research is attempting to systematically use this information to generate better potential job matches.

Our goal with this report is to provide transitioning service members with high-quality civilian job recommendations that leverage the KSAs and work experience gained from military employment to improve job match, raise wages, reduce turnover, and improve job satisfaction.

We do this by building a job-matching algorithm that uses systematically collected data on all aspects of military and civilian jobs.

Targeted Job Search

Job-matching productivity in the United States (and worldwide) has undergone dramatic changes. Prior to the advent of the internet, job markets were local, remote work was practically nonexistent, and sharing information about qualifications and interest was expensive both in time and in money. Job searchers would have to subscribe to the local paper or visit the public library to check the help-wanted ads: To apply to a job, they would have to print and mail résumés and cover letters or visit the business directly to fill out an application. The advent of the internet changed all of that. Many papers have been written about the effectiveness of internet job search.[2] Early research seemed to indicate positive skill selection on who used the internet for job search; that is, the reason that job seekers who used internet job search were more successful than those who did not was not *because* they used the internet for their job search but because internet-using job seekers tended to be more-qualified job applicants. When researchers controlled for applicants' job qualifications (so as to make equivalent comparisons), some found that job finding was *reduced* for the group using the internet (Kuhn and Skuterud, 2004). More-recent research by Kuhn and Mansour (2014) reverses this earlier finding and shows that internet job search resulted in 25 percent faster re-employment.

The early internet represented just the first phase of job search changes. This transformation significantly lowered the costs of searching for work in multiple labor markets via web postings, such as on Craigslist (Kroft and Pope, 2014), and it also allowed for nearly costless and instantaneous transfer of information via electronic résumés and cover letters. This increased accessibility has given rise to many more people applying for job openings, with Glassdoor reporting that each corporate job listing receives approximately 250 applications (Glassdoor, 2015). A Jobvite report (2019) shows that the average number of applicants per job opening has been falling, from 52 in 2016, to 36 in 2017, to 29 in 2019, but these findings might be mixing business cycle trends with application rates and match quality. Longer-term trends in job application per vacancy after the advent of the internet are difficult to find, but, generally, evidence supports that a reduction in application costs has induced more applications per vacancy (Hadass, 2004).

The second phase of the internet's effect on job searches was the aggregation of job listings via websites, such as Indeed (established 2004) and Monster (established 1994), which are still among the leading job aggregation sites in the United States (Doktor, 2022; Paris, 2022). Indeed

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[2] See, for example, Kuhn and Mansour, 2014; Kuhn and Skuterud, 2004; Niles and Hanson, 2003; and Stevenson, 2011.

is reported to be the largest online job listing site, with more than 250 million monthly users and nearly ten new job listings added every second (Polner, 2023).

Because the internet has significantly reduced the cost of finding and applying for jobs, the number of applications that firms must sort and screen has increased dramatically. As this screening burden has increased, so too have the technological tools for conducting prescreening and ranking potential candidates. Many companies have begun using statistical matching, machine learning, and artificial intelligence systems to screen potential candidates. According to Fuller et al. (2021), more than 75 percent of U.S. firms use an applicant tracking system (ATS) to manage their applicant pool: Of those firms, more than 90 percent use their system to screen or rank candidates. The ranking system can have multiple attributes: At their most basic level, the system can examine whether a candidate meets the job requirements—such as having a bachelor's degree or knowing a particular programming language, software application, or hardware specification—while more-advanced systems can use artificial intelligence to understand who has been employed in the past and what criteria are systematically selected on for a particular match. Generally, these systems are unable to examine what is most important: the quality of post-match job performance. ATSs eliminate millions of potential workers who fail to meet some of the ranking criteria, even when those criteria are not proven to be predictive of job performance. Equally disconcerting is the possibility that these screening tools codify existing employment structures by replicating them automatically (Fuller et al., 2021).

In our research, we take an algorithmic approach to matching workers to jobs. However, unlike cases in which algorithmic search has improperly eliminated potentially good matches, we take all the data contained in the DoL's Occupational Information Network (O*NET) database (both civilian and military) to make our matches. The database profiles each occupation as a series of measures capturing the importance and level of 234 occupational attributes, such as the requirements and work conditions of jobs in that occupation. We created an algorithm that calculates the similarity between a particular military occupation and a particular civilian occupation, where the similarity increases as the distance between the two occupations' measured attributes decreases. The algorithm can be used to identify occupations that are good matches insofar as they have similar attributes, so that job seekers can perform a targeted search in specific occupations where they are most qualified. We calculate match scores to every civilian occupation in the O*NET database for all military occupations in our sample.

This project is an extension of similar work that researchers for the RAND Corporation conducted for the U.S. Army (Wenger et al., 2017), which was the basis for changes that DoL made to the My Next Move for Veterans website. My Next Move for Veterans is used in TAP, the program in which all service members are required to participate prior to leaving the military.

Organization of the Report

In Chapter 2, we briefly discuss the data and methods we used in this research, which are similar to the research methods used in the previous Army report (Wenger et al., 2017). In the next three chapters, we discuss the general results for each of the three services and then analyze the match quality of one specific example: Navy aviation structural mechanics to civilian millwrights (Chapter 3), Marine Corps riflemen to civilian firefighters (Chapter 4), and Air Force fighter aircraft integrated avionics to electrical or electronic repairers, commercial and industrial equipment (Chapter 5).[3] In Chapter 6, we conclude the report and provide caveats and policy recommendations. Finally, in the appendix, we list the 50 civilian occupations most closely matched to each of the military occupations analyzed in the study.

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[3] In this report, we looked only at the U.S. Air Force and not the U.S. Space Force. All mentions of the Air Force refer to the service, not the department.

Chapter 2. O*NET Data and Methodology

The primary data for this analysis are from responses to DoL's O*NET survey instrument. DoL uses the O*NET survey to profile almost 1,000 civilian occupations across the U.S. economy. For this analysis, we administered this same survey to active-component sailors, marines, and airmen. We then compared the resulting profiles of military occupations with DoL's profiles of civilian occupations to identify the civilian occupations most similar to the military occupations included in our analysis.

For each service branch, we analyzed survey responses for between nine and 12 military occupations, depending on survey response rates.[4] We profile each military occupation by taking the average response to each survey item across all responding individuals within that military occupation. Because the O*NET survey records responses for each survey item as a numeric score, we can then compare that military occupation's average response on any survey item with the response of each civilian occupation to that same survey. For instance, in the O*NET Abilities module, one survey item relates to trunk strength, which is defined as follows: "The ability to use your abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing" (O*NET Resource Center, 2023b). If the average rating for trunk strength is high for a military occupation but low for a civilian occupation, then the difference between those occupations for the trunk strength survey item is large, indicating that the occupations match poorly along that dimension of the occupations' profiles. More precisely, we calculated the numerical difference between military and civilian responses on each survey item. We then aggregated the differences into a single job-match score for each military-civilian occupation pair by summing the squares of the differences of all survey items. Higher raw scores are worse matches because they represent greater differences between the military and civilian job, accounting for all surveyed dimensions of the occupations' profiles. We rescaled the job-match scores to make them easier to interpret: The occupational pair with the highest raw score (i.e., the one with the greatest overall difference between occupation profiles and, therefore, the worst match) is zero, while the lowest raw score (i.e., the best match) is 100.

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[4] Military occupations are referred to as a military occupational specialty (MOS) in the Army and Marine Corps, a rating in the Navy, and an Air Force Specialty Code (AFSC) in the Air Force.

The Department of Labor's O*NET Survey

*O*NET Survey Description*

   The O*NET consists of six modules (questionnaires representing different job and worker domains): knowledge, skills, abilities, work activities, work context, and work styles. The knowledge, skills, abilities, and work activity modules together contain 161 items, all of which have two parts: an importance question and a level question. The work style and work context modules together contain 73 single-question items. In total, there are 234 items in the O*NET.

   For those modules with two-part questions, the first part (the importance question) is measured on a five-point scale: The lowest level (1) is rated as "not important" and the highest level (5) is rated as "extremely important." The second part (the level question) is measured on a seven-point scale, with question-specific anchors provided. The survey presents all two-part questions within a module using the same format. For instance, in the Knowledge module, respondents are first provided with a definition of the knowledge area and then asked two questions about it. As an example, the Economics and Accounting question provides the following definition of that knowledge area: "Knowledge of economic and accounting principles and practices, the financial markets, banking, and the analysis and reporting of financial data" (O*NET Resource Center, 2023b). Respondents are then asked "How *important* is ECONOMICS AND ACCOUNTING knowledge to the performance of *your current job*?" followed by "What *level* of ECONOMICS AND ACCOUNTING knowledge is needed to perform *your current job*?" For the Economics and Accounting level question, the survey provides anchors at levels 2, 4, and 6: For example, the anchor at level 4 is "Develop financial investment programs for individual clients."

   The Work Styles and Work Context modules contain one-part questions that are asked on a five-point scale. The Work Styles module first provides respondents a description of the work style in question and then asks how important that work style is to the respondent's job. For instance, the Achievement/Effort item begins with the following description: "Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks" (O*NET Resource Center, 2023b). The question is then posed: "How *important* is ACHIEVEMENT/EFFORT to the performance of *your current job*?" As with the two-part questions, the lowest level response (1) is rated as "not important" and the highest level (5) is rated as "extremely important." In the Work Context module, respondents are asked a question and then provided with a five-point scale with anchors at each point. For instance, one work context question is "How often does *your current job* require *face-to-face discussions with individuals and within teams*?" The anchors are 1, "never"; 2, "once a year or more but not every month"; 3, "once a month or more but not every week"; 4, "once a week or more but not every day"; and 5, "every day."

DoL's Survey of Civilian Occupations Using the O*NET Survey

DoL has sponsored the O*NET Data Collection Program since 1999. The program issues the O*NET survey and populates results into a publicly accessible online O*NET database characterizing civilian workers, occupations, and skills. The program seeks to regularly update results for the 923 occupations included in the database, integrating results from updated survey modules on a rolling basis: Since 2003, at least one module has been updated for between 54 and 226 occupations each year (O*NET Resource Center, 2023a).

The program employs three data collection methods (Reeder, Burgoyne, and Allen, 2020). Abilities and skills data are collected from trained occupational analysts. Data on the knowledge, work activities, work styles, work context, and education and training modules are collected through two different types of surveys: either a survey of workers or a survey of occupational experts. A survey of workers is the primary collection method, and the survey is identified in a two-stage sampling design: First, establishments are sampled based on statistical information about which industries are most likely to employ targeted occupations. Second, workers within the targeted occupations are sampled from the establishments and randomly assigned O*NET module surveys. The survey process is designed to collect 20 completed responses for each module for all sampled occupations. Responses are weighted "for each establishment and employee respondent to reduce bias and variance due to factors such as nonresponse, undercoverage, and the complex sample design" (O*NET Resource Center, 2021, p. B-13). A survey of occupational experts is the secondary collection method for these modules and is used when additional information is required for an occupation. An occupational expert is defined as "someone who has worked in the occupation for at least 1 year [including at some point in the most recent 6 months] and has 5 years of experience as an incumbent, trainer, or supervisor" (O*NET Resource Center, 2021, p. B-2). Potential occupational experts are identified from such sources as professional or trade association membership lists.

RAND's Survey of Military Occupations Using the O*NET Survey

In our research, we used the same questions contained in the O*NET survey and posed them to members of the active components in the Navy, Marine Corps, and Air Force. The goal was to make the survey as similar as possible across the civilian and military occupations being considered and to provide enough data to accurately measure job attributes. There were a few key differences with how the civilian and military surveys were administered. First, we administered our military survey online via a survey link using the MAX.gov website. Second, we opted to start each module at a random starting point. Our worry was that because some of the modules are quite long (e.g., the Abilities module has 52 two-part questions), respondents might experience survey fatigue, and we would systematically lose responses at the end of the survey (which would be the same questions for each drop out). By randomly varying the starting point, we avoided this scenario. We should also note that even though the starting question

varied, the question order did not change (except that we took the questions that normally occur before the random starting point and appended them to the end of the survey), and respondents were requested to complete the entire O*NET module that they were randomly assigned.[5] Third, although the Abilities module of the civilian survey was completed by occupational experts, for the military survey, this module was completed by the job incumbents themselves. In prior work performed by RAND researchers for the U.S. Army, Wenger et al. (2017) found that soldiers were able to accurately complete the Abilities module with no systematic problems.

To recruit survey participants, we worked with the Military-Civilian Transition Office (MCTO); each service branch's transition team selected ten military occupations per branch to sample.[6] MCTO obtained official email addresses for active component service members in the sampled occupations from the Defense Manpower Data Center (DMDC) and emailed invitations to those service members in April 2021. Subsequent waves of reminders were emailed to service members in those occupations that had not yet received sufficient responses to permit analysis. The final surveys were collected in April 2022.

In Table 2.1, we show demographic characteristics, years in military occupation, and the paygrade distribution for respondents from each of the service branches. The average age of respondents was significantly different across the service branches: Navy respondents were the oldest (35 years) and Marine Corps respondents the youngest (25 years). Marine Corps respondents were significantly less likely to be female than Navy respondents, and Navy respondents were significantly less likely to be female than Air Force respondents.[7] Navy respondents were significantly less likely to be white than respondents in the other service branches, while Marine Corps respondents were significantly more likely to be Hispanic or Latino. The share of respondents having greater than a high school diploma or equivalent was significantly different across all three service branches: Air Force respondents were the most likely to have a diploma or equivalent and Marine Corps respondents were the least likely. There are also significant differences in length of time in military occupation. A greater share of Navy and Air Force respondents had six or more years of experience in their current occupation than Marine Corps respondents. Respondents had corresponding significant differences in paygrade across service branches; more Navy and Air Force respondents held a rank of E-5 or higher than Marine Corps respondents.

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[5] We used all survey responses to calculate the average score for each question even if the respondent failed to complete the survey.

[6] RAND researchers proposed for inclusion into the study the ten most populous occupations in each service branch to cover as many transitioning service members as possible, given the limited resources for research and analysis. Each service branch's transition team opted instead to alter the choice of occupations to include occupations outside the ten most populous that were perceived to have difficulty transitioning to civilian employment. Additionally, response rates from some occupations were too low to complete the analysis. Marine Corps response rates, in particular, were low across several MOSs, so several additional MOSs were recruited into the sample. The final sample had sufficient responses to analyze ten Air Force, nine Navy, and 11 Marine Corps occupations.

[7] References to *significance* in this paragraph are to statistical significance.

Because of our sampling methodology, this survey is not representative of entire service branches or of subpopulations of interest within each military occupation, such as those service members who are most likely to exit service and subsequently seek civilian jobs. As discussed previously, respondents are those from selected military occupations who were willing and able to complete the survey. This survey recruitment process potentially results in systematic differences both within and across military occupations and service branches that affect match results: Service members who had time and computer access to complete the survey might not be representative of the average service member in that occupation or of the average service member in that occupation who is most likely to separate. Furthermore, the selection bias induced by the recruitment process might vary across the services if there were systematic differences across the services in respondent characteristics, such as paygrade.

As Table 2.1 shows, the Marine Corps sample differs in meaningful ways in characteristics relevant to job market outcomes. On average, Marines who completed the survey were much younger, were more likely to be Hispanic or Latino, had less education, had fewer years in their occupation, and had lower paygrades than respondents in the Navy and Air Force. That said, 75 percent of the Marines taking the O*NET survey were non-commissioned officers (or of rank E-4 and above), and nearly one-third were corporals (E-4). Navy and Air Force respondents were significantly more likely to be female than Marine Corps respondents, and the majority of Navy and Air Force respondents were in paygrades E-5 to E-9 (higher than the average Marine Corps respondent rank). One potential explanation for the large differences between the Marine Corps respondents and the Navy and Air Force respondents is the difficulty we had in collecting data from the Marine Corps. Because our direct email efforts for the Marine Corps did not generate enough responses to provide reliable estimates, we asked to have an administrative notification sent to Marines in specific MOSs so that we could collect an adequate sample to ensure robust estimates. As a result, the Marine respondents represent transitioning service members who leave the military relatively early in their careers.

Table 2.1. Characteristics of O*NET Survey Respondents, by Service Branch

Characteristic	Navy	Marine Corps	Air Force
Age (average)	35.2	25.0	31.9
Female (%)	18.9	14.9	21.9
Race (%)			
White	57.0	67.6	64.2
Black	18.8	12.3	16.2
Other	24.2	20.1	19.6
Hispanic or Latino (%)	21.8	32.0	21.0
Education (%)			
Did not graduate from high school (HS)	0.1	0.1	0.0
General equivalency diploma (GED)	1.4	1.1	0.4
High school graduate	20.2	51.4	13.2
Training certificate (after HS graduation)	2.5	3.1	2.1
Some college	52.2	37.3	59.4
Bachelor's or more advanced degrees	23.7	7.1	25.0
Years in military occupation (%)			
Two or fewer	3.4	30.1	9.9
Three to five	12.3	38.7	22.9
Six to nine	20.1	16.7	16.2
Ten or more	64.2	14.5	51.0
Pay grade (%)			
E-1 to E-3	1.4	25.0	8.8
E-4	11.7	31.3	17.2
E-5 to E-9	86.9	43.7	73.9

NOTE: The numbers of respondents by branch were 2,114 for the Navy, 1,900 for the Marine Corps, and 3,324 for the Air Force. Statistical significance of respondent demographic and service characteristics were performed using both one-way analysis of variance (ANOVA) and Dunn's nonparametric test of multiple comparisons with a Bonferroni adjustment. For these tests, each characteristic was converted to a binary variable. The ANOVA test of the null hypothesis of equal means across all three service branches was rejected with $p < 0.001$ for all characteristics. Dunn tests of the null hypothesis of equal means across each pair of services yielded the following results: The null was rejected with $p < 0.001$ for all pairwise service branch comparisons of age, education (high school, GED, or less versus training certificate or more), years in military occupation (five or fewer versus six or more), and paygrade (E-4 or lower versus E-5 or higher). For share of female respondents, the null was rejected with $p < 0.01$ for all pairwise comparisons and $p < 0.001$ for the Air Force to Marine Corps comparison. For race (White versus non-White), the null was rejected with $p < 0.05$ for the Air Force to Marine Corps comparison and $p < 0.001$ for all other comparisons. For share of Hispanic or Latino respondents, the null was rejected with $p < 0.001$ for both the Marine Corps to Air Force and Marine Corps to Navy comparisons, but the null of equivalent shares could not be rejected for the Air Force to Navy comparison.

In terms of sampling within military occupations, Wenger et al. (2017) conducted an analysis of inter-rater reliability for each of the ten sampled Army MOSs in that study using Fleiss' kappa. The researchers found "fair" agreement for seven of the ten sampled MOSs and "slight" agreement for the remaining three, concluding that the relatively low inter-rater agreement

"reflect(s) heterogeneity among pay grade, work assignment, and other factors within the MOS" (Wenger et al., 2017, p. 15). We suspect that the recruitment methods we used in this study imposed similar limitations on match results. As we discuss in Chapter 6, we propose addressing this limitation in future work.

Matching Methodology

A detailed methodology with simplified numerical examples is provided in Wenger et al. (2017). Here, we provide a brief overview of the distance metric formula, how we rescale the measure, and how to interpret the results.

The distance metric contains two formulas: one for the modules that have two-part questions, and a second one for the modules that have one-part questions. For the two-part questions, the formula is

$$\sum_{q=1}^{161} \left(MOS_q - Civ_q\right)_{im}^2 + \left|\left(MOS_q\right)_{im} * \left(MOS_q\right)_{lv} - \left(Civ_q\right)_{im} * \left(Civ_q\right)_{lv}\right| + \left(MOS_q - Civ_q\right)_{lv}^2,$$

where *MOS* is the average value of question q for the military occupation; *Civ* is the average value of question q for the civilian occupation; the subscript q indexes the question number; the subscript *im* indexes the importance component of the two-part question; and the subscript *lv* indexes the level component of the two-part question. Using the same notation as above, the one-part questions use the following formula:

$$\sum_{q=1}^{73} 25 * \left|MOS_q - Civ_q\right|.$$

By scaling this difference by a factor of 25, we ensure that the theoretical maximum difference for any single question is 100. This is seen by calculating the maximum score difference for both the two-part questions ($4^2 + 7 * 5 + 7^2$) and the one-part questions ($25 * 4$). By adding the results of both equations, we get the full results for all questions in the O*NET.[8]

Rescaling the Results of the Calculations

From the aforementioned equations, it is possible to have a score that ranges from zero (i.e., a perfect match) when every score between the two occupations is the same to a theoretical

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[8] This result relies on a small technical issue. In the two-part questions in the O*NET, if the respondent reports that the item is (1) "not important," they are instructed to skip the level question. In those cases, we assign a value of zero in our data collection. To the best of our knowledge, this is consistent with DoL practices. Therefore, it is possible to have a difference of $(7 - 0)$ squared and a subcomponent score of 49 rather than a difference of $(7 - 1)$ squared and a subcomponent score of 36.

maximum of 23,400 (or 100 times the total number of questions [243]). To ease interpretation, we rescaled the raw scores: We reassigned the minimum observed raw score, which represents the best match, to 100, and reassigned the maximum raw score, which represents the worst match, to zero. The scaling preserves ordering among all occupations. Finally, we classified a high-quality match to be any score 80 or above. This is somewhat arbitrary: Jobs that score 79 or 81 are not likely to be meaningfully different in terms of match quality. However, determining a rigorous, data-driven definition of "high-quality match" was outside the scope of this analysis, in part because the data collection methodology precluded calculation of externally valid match score standard errors. Instead, we choose to maintain a consistent cut off across service branches, using the match score threshold established in Wenger et al. (2017). In Chapter 6, we discuss future work that could examine score variance to differentiate match quality in a statistically meaningful way.

Individual Preferences

The job-matching measures described previously rely on information about the occupation: the KSAs, work styles, work contexts, and work activities. None of these measures relate to whether the worker likes these aspects of the job or if the worker can continue working in jobs characterized by these aspects. For example, work context might mean that an occupation requires the worker to work outdoors or in hot or noisy environments. It is possible that the worker dislikes these aspects of the occupation or is leaving the military in part because they are unable to continue working in such environments, perhaps because of a service-connected disability. If a worker's preferences (or acquired disabilities) are very strongly against these job attributes, then the worker might choose to change occupations, even if this means they will not get to take advantage of the human capital that they acquired in the previous occupation. One consequence of this is that our algorithm might be recommending matches that are based on similarity of occupational attributes that transitioning service members have strong preferences against or are no longer able to endure. It was beyond the scope of this study to generate distinct matches for within-military occupation subsets that might be of interest, such as for those service members who are separating early in their career voluntarily, leaving involuntarily, retiring, or separating with disabilities acquired during service. However, we did incorporate questions into our survey that were intended to elicit whether transitioning service members leaving voluntarily might benefit from match results based on job similarity.

For transitioning service members who are leaving voluntarily, *something* is driving the transition out of service, and for many service members, that something might be dislike of their job in the military.

To better understand whether we are recommending occupations that a transitioning service member would not choose, we asked O*NET survey respondents three questions about their satisfaction with their military work experience:

1. Thinking about your current job as a(n) [insert job title], how satisfied are you with this job?
2. How satisfied are you with serving in the [insert service branch]?
3. Thinking about your immediate supervisor, how satisfied are you with him or her?

If service members voluntarily separate from the military, three reasons they might do so are because they are dissatisfied with their occupation, dissatisfied with serving in the military, or dissatisfied with their supervisor. If most service members are dissatisfied with their occupation, they might not find the match results we provide to be useful because our methods would be identifying civilian occupations that are most similar to the military occupation that they do not like. Asking about circumstances other than their occupation in the second and third question helps to validate and interpret responses to the job satisfaction question. If service members are satisfied with all three aspects of their military experience that we asked about, then the job satisfaction results might not provide useful information: Service members who are satisfied with their military work experience might be less likely to voluntarily separate from their service branch and thus might not provide responses that are representative of our target population of transitioning service members. Service members who are satisfied with their occupation but are dissatisfied with either their service branch or their supervisor might be more representative of service members who are likely to separate from the military and be inclined to find a civilian occupation similar to their military one: Such responses to the satisfaction survey would provide the strongest evidence that our occupational matches will be useful.

The survey responses to these three questions, tabulated by service branch, are presented in Table 2.2. Overall, we find that a minority of sailors, marines, and airmen are dissatisfied with their military occupation. There is considerable variation by service branch: Sailors have the lowest levels of dissatisfaction (21.2 percent) and airmen have the highest (32.1 percent). These results suggest that a minority of service members would be dissatisfied with civilian occupations that are very similar to their military occupations, although, on average, those separating from the Air Force might be less inclined to find a civilian occupation that is very similar to their military one. Moreover, the responses to the other satisfaction questions reinforce this concern: Air Force respondents are more satisfied with serving (63.4 percent satisfaction rate) and with their supervisor (64.2 percent satisfaction rate) than they are with their occupation (45.2 percent satisfaction rate). Navy and Marine Corps responses to the other satisfaction questions are less informative, with satisfaction and dissatisfaction rates similar across the three questions.

However, we should exercise caution when interpreting these results across service branches because of the different mix of occupations within the service branches. To get a better sense of the differences, in Figure 2.1, we compare a single maintenance occupation from each service branch.

Table 2.2. Satisfaction with Job, Service Branch, and Supervisor

Question	Branch	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied
Job	Navy	63.0	15.8	21.2
	Marine Corps	56.0	18.4	25.7
	Air Force	45.2	22.8	32.1
Service branch	Navy	62.2	15.6	22.2
	Marine Corps	50.2	23.3	26.5
	Air Force	63.4	19.4	17.2
Supervisor	Navy	65.3	18.1	16.7
	Marine Corps	59.7	23.7	16.7
	Air Force	64.2	22.9	12.9

NOTE: Questions about satisfaction were asked on a 5-point Likert scale; "very satisfied" and "satisfied" were combined, as were "very dissatisfied" and "dissatisfied." n = 1,544 (Navy), 1,165 (Marine Corps), 2,394 (Air Force).

In Figure 2.1, we select one occupation in each service branch that has similar job duties: repairing and maintaining equipment. This allows us to compare job satisfaction more accurately across the branches. Once again, we find that Air Force respondents have the highest level of dissatisfaction; however, more than two-thirds of airmen are either satisfied or indifferent about their job. If the job satisfaction of survey respondents is representative of transitioning service members, then these survey results suggest that transitioning service members from the Navy, Marine Corps, and Air Force would, on average, not be dissatisfied with civilian occupations that are similar to their military occupations.

We note, however, that there might be transitioning service members who are looking for jobs that are quite dissimilar from their current military occupation. Future research could explore incorporating transitioning service members' job preferences. One way to do this would be to develop a set of weights that increases the impact on match score of attributes that an individual finds especially attractive or unattractive. With these weights in place, the match scores would be recalculated, and a custom set of matches would be provided.

Figure 2.1. Job Satisfaction for Technicians Across the Service Branches
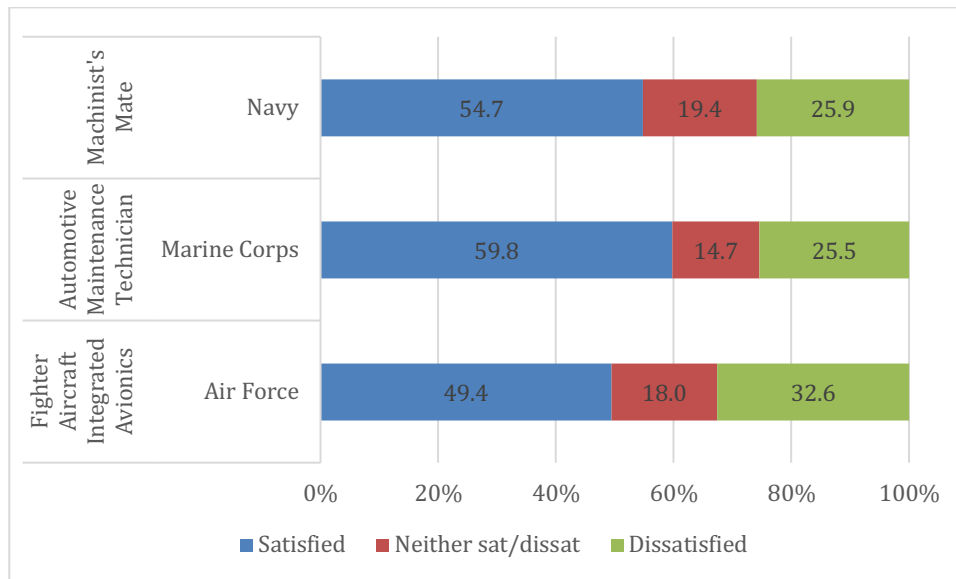
Comparison to My Next Move for Veterans Occupational Matching Method

My Next Move for Veterans is a prominent web-based source of military-civilian occupational matches sponsored by DoL. Although it was developed and is maintained by the National Center for O*NET Development, the occupational matching methodology is not based primarily on the O*NET survey instrument (My Next Move for Veterans, 2023a). The occupational matches for each military occupation identified on the My Next Move for Veterans website are the result of an algorithm that combines data from several sources (Morris, 2020):

- the DMDC's Military Occupational Classification crosswalk
- an analysis of selected military occupations commissioned by DoL and required by the VOW to Hire Heroes Act of 2011
- the Army matches identified in Wenger et al., (2017) (the precursor to the study described in this report)
- each service's Credentialling Opportunities On-Line (COOL) program
- the Careers in the Military website.

Other than Wenger et al. (2017), these data sources primarily consist of analyses completed by occupational experts. For instance, the DMDC's crosswalk is "based on a high level comparison of the description and job duties of military occupations provided by the services against the O*NET classification system" (Solutions for Information Design, 2014, p. 12). In response to a VOW to Hire Heroes Act of 2011 requirement, DoL commissioned a study supplementing the DMDC's matches for selected military occupations with additional matches identified through "data collection and analysis of job duties and skills with validation by military subject matter experts" (Solutions for Information Design, 2014, p. 14). COOL matches are based on each service's identification of civilian occupation "certifications and licenses

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related to military occupations" (U.S. Department of Defense [DoD], 2020). To the best of our knowledge, the job matches provided in this report and in Wenger et al. (2017) are the only examples of matches that are based on service members' completion of the O*NET survey.

Chapter 3. Navy Matches

The Number of Civilian Matches for Each Navy Rating

In this chapter, we describe the occupational matches that had a match score above 80 for each Navy rating we analyzed. We then describe Navy occupations that match to civilian occupations that do not require a bachelor's degree because relatively junior service members transitioning directly into the workforce might most urgently need to identify good job matches and might face the greatest uncertainties about how their experiences translate into qualifications for civilian occupations. We also discuss which jobs are *general matches*, defined as when four or more Navy ratings all match to a specific civilian occupation. Finally, we examine the rating-specific matches.

We select a single Navy rating to investigate the internal validity of the match. By internal validity, we are referring to whether having a particular military job enables a service member to be well qualified for a particular set of civilian occupations, and, if those reasons for being well qualified make sense. If we found that a hospital corpsman (HM) was a good match to a fashion model (they are *not* well matched) because of the HM's excellent night vision, we would be dubious, given the job duties of both a fashion model and an HM. Conversely, if we find that aviation structural mechanics (AMs) are well matched to millwrights because of their attention to detail, mechanical knowledge, troubleshooting skills, and time management, we would think this is a sensible match with good internal validity—that is, being an AM makes one well qualified for a civilian millwright job.

We assess the internal validity of the match by comparing the KSAs of a Navy rating with those of its top-rated civilian match. Our goal is to choose a Navy rating that is typically difficult to match to a civilian job, select its rating-specific civilian job match, and then investigate that civilian job's properties. Consequently, we will not select boatswain's mate (BM) because that rating does not have any rating-specific civilian matches.

In Table 3.1, we show all the high-quality matches (those with a scaled score greater than 80), where 100 represents the best civilian occupational match across all Navy ratings that we analyzed. As the table shows, nearly all Navy ratings have many high-quality civilian occupational matches, with the notable exception of BM. From this list of high-quality matches, we then exclude those occupations where a bachelor's degree or higher is the entry-level educational credential because our focus is on occupations that a sailor would be qualified to take when transitioning from the military or shortly thereafter. In doing this, we eliminated many occupational matches. For example, HM dropped from 124 to 62 high-quality matches. However, there are some cases in which eliminating the required educational credential made almost no difference, such as for BM, AM, and machinist's mate. Once we drop the occupations

that require at least a bachelor's degree, we then split the remaining occupations into two groups: those that match to a general set of KSAs (and therefore match well to several Navy ratings) and those that have occupational matches that are specific to a particular Navy rating.

As expected and as documented in the prior report for the Army produced by RAND researchers in Wenger et al., 2017, the majority of high-quality matches are matched to the types of general skills that are required for the performance of military duties: Leadership, clear communication, physical fitness, time management, teamwork, and stressful working environments are all essential traits and Navy working conditions, regardless of the rating. As we show in Table 3.2, these generalizable skills are most often associated with first-line supervisory roles in civilian occupations, often for firefighters or mechanics. In the main discussion section of this chapter, we focus on Navy rating-specific matches to home in on the most-salient features of a few key attributes. This allows the reader to better understand how the matching tool operates and what factors, in addition to the general military skills mentioned above, are driving our results.

Table 3.1. Number of High-Quality Civilian Occupational Matches for Each Navy Rating

Navy Rating	All	No Bachelor's Degree–Required Matches		
		All	General	Rating-Specific
Hospital corpsman (HM)	124	62	25	37
Culinary specialist (CS)	69	50	33	17
Electronics technician (ET)	63	40	29	11
Operations specialist (OS)	50	22	17	5
Aviation ordnanceman (AO)	32	25	24	1
Aviation structural mechanic (AM)	28	28	18	10
Aviation boatswain's Mate (AB)	26	25	22	3
Machinist's mate (MM)	24	21	20	1
Boatswain's mate (BM)	3	3	3	0

One important finding from Table 3.1 is the difficulty in identifying high-quality matches for BM, which had no high-quality rating-specific matches. This is not an indictment of the match algorithm; rather, it is an indicator that *relative* to the other Navy ratings, it is more difficult to match specific attributes developed in the BM rating to civilian jobs. Thus, because they appear to have more-limited career choices, sailors in the BM rating might require more extensive transition services. Contrast this with the job opportunities for the HM rating: Eliminating the bachelor's degree requirement reduces the number of high-quality matches from 124 to 62, which makes sense because most professionals in health-related civilian occupations hold a bachelor's degree or higher. Importantly, HM is a highly selective rating, meaning the length of training is long and the commitment to the Navy is commensurately longer (Navy Cyberspace,

2021). Thus, HM sailors who are transitioning to civilian employment might have a wider variety of job qualifications and likely are better trained and more experienced than other transitioning sailors. In addition to the general HM training (basic), there are more than 30 HM subfields in which HM sailors might receive training (Navy Recruiting Command, undated). Finally, because there are so many health specializations in both civilian and military medicine, it is unsurprising that HM has the most rating-specific matches.

A Specific Example of Match Quality: Navy Aviation Structural Mechanics and Civilian Millwrights

In this section, we examine, in detail, the match quality between Navy AMs and civilian millwrights. By making a detailed comparison, we can determine whether the recommended match is sensible (i.e., has good internal validity) given what we know about the primary duties of each job. We start by examining the job duties for an AM and then follow that by describing what a millwright does. We then turn to the O*NET modules and examine which KSAs and work attributes are most important for each job. If the match is truly of high quality, we should expect to find strong concordance between the jobs and alignment between their duties.

The Navy COOL website provides career guidance to transitioning service members. It shows credentials that are related to the transitioning service members rating, similar occupations in the civilian sector, and educational requirements for particular civilian jobs. Additionally, the website provides background information describing each Navy rating. The AM rating is described as follows:

> Aviation Structural Mechanics (AM) maintain aircraft airframe and structural components, flight surfaces and controls, hydraulic and pneumatic control and actuating systems and mechanisms, landing gear systems, and other utility systems; fabricate and repair metallic and nonmetallic materials. (U.S. Navy, 2022)

To become an AM, a sailor should be knowledgeable about tools and their uses, be physically fit, have good skills in mechanics and mathematics, and be able to read schematics and plans. The Armed Services Vocational Aptitude Battery (ASVAB) is a test that assesses the abilities of recruits to perform certain verbal, mathematic, mechanical, and spatial tasks. Typically, Navy ratings are made available *only* to recruits who demonstrate an aptitude for the rating. To qualify for the AM rating, a seaman recruit should have scores of either:

$$VE + AR + MK + AS = 210$$

or

$$VE + AR + MK + MC = 210,$$

where VE = verbal expression, AR = arithmetic reasoning, MK = mathematics knowledge, AS = auto and shop information, and MC = mechanical comprehension. Because the median score on each of these subcomponents is 50, the AM rating generally requires being in the upper half of the distribution on these test areas (U.S. Navy, undated).

In Table 3.2, we see that millwrights are one of the three best occupational matches for AM, with a match score of 95.6; only firefighters and first-line supervisors of firefighters score better. Because we will be comparing firefighters with a Marine Corps occupational match in the next chapter, here we select civilian millwrights as opposed to firefighters to compare with Navy AMs.

Civilian Millwrights

The job of a millwright is to install, adjust, maintain, and troubleshoot large industrial equipment. The job typically requires a five-year paid apprenticeship, although there are accelerated programs for individuals who have prior training or military experience. Most millwrights have completed some post–high school training (O*NET OnLine, 2023h).

The types of equipment that millwrights work with are found in mines, pulp processing plants, refineries, and energy plants. Typical systems include conveyors, processing equipment, bulk material handling, pumps, and compressors. Millwright work is often technical, requiring a high degree of precision and a variety of skills, such as welding, reading blueprints, and measuring precisely. Some of the most-important job attributes are the ability to communicate technical problems to both superiors and subordinates, problem-solving skills, attention to detail, and performing under time pressure. Millwrights might work additional hours and under stressful conditions when a machine is out of operation. The working conditions of a millwright are usually in an industrial environment, exposed to inclement weather or hot industrial conditions surrounded by machinery. The job also can be physically demanding, requiring moving, aligning, and installing large pieces of equipment, often with the aid of overhead cranes and other equipment.[9]

One noteworthy job attribute of a millwright is the teamwork associated with working on large industrial machines. Equally important is guaranteeing both the individual's safety and the safety of others on the team and in the facility (O*NET OnLine, 2023h).

DoL forecasts that the number of millwrights will grow rapidly over the next ten years. There are approximately 44,000 millwrights employed in the United States, and DoL expects this number to grow by more than 10 percent between 2020 and 2030 (O*NET OnLine, 2023h). In Table 3.2, we also provide information about the number of U.S. jobs for each high-quality civilian occupational match for AM. This can aid job searchers by letting them know how common the occupation is in the U.S. economy and can also serve as a point of comparison; for

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[9] See local union hiring call in Millwright & Machine Erectors Local 1607, undated; also see BuildWI, 2012, and Building Advantage, 2013, for hiring videos.

example, there are 311,000 firefighters and 657,000 electricians. The table also provides information about the median wages for each occupation: For millwrights, it is $57,300 per year. This information should also be helpful for job seekers when deciding which occupations to pursue. Finally, we provide the education level that a worker typically has when entering into the occupation. We have filtered out those occupations that require a bachelor's degree because transitioning service members who complete college after their enlisted service likely will be looking for jobs with different skillsets than the occupation they held when in the military.

Table 3.2. High-Quality Civilian Occupational Matches for Aviation Structural Mechanic (AM)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	97.9
Firefighters	311	52.5	Postsecondary nondegree award	96.0
Millwrights	44	57.3	High school diploma or equivalent	95.6
First-line supervisors of mechanics, installers, and repairers[a]	475	70.2	High school diploma or equivalent	91.8
Commercial divers	3	54.8	Postsecondary nondegree award	89.3
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	88.8
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	88.3
Electricians	657	56.9	High school diploma or equivalent	88.3
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	87.7
Forest and conservation technicians	30	38.9	Associate's degree	87.4
Aircraft mechanics and service technicians[a]	128	66.4	Postsecondary nondegree award	87.1
Service unit operators, oil and gas	44	47.4	No formal educational credential	86.1
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	86.0
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	84.7
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	83.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	83.8
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	82.6

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Ship engineers	7	76.0	Postsecondary nondegree award	82.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	81.6
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	81.0
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	81.0
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	80.9
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	80.8
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	80.7
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	80.6
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	80.4
Riggers	22	50.9	High school diploma or equivalent	80.4
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	80.3

SOURCE: Features employment and earnings data from the U.S. Bureau of Labor Statistics, 2021. Other data are from the DoL O*NET and DoD O*NET survey collected for this study.
[a] These civilian occupations also were identified as matches for AM by My Next Move for Veterans.

Why Millwrights Are Good Matches for Aviation Structural Mechanics

To understand why millwrights and AMs are well matched, we investigate the details of the work activities, work context, and work styles of AMs and compare them with the most-important attributes for millwrights. This is summarized in Table 3.3; the items in common between both occupations are shaded. It seems clear that repairing and maintaining mechanical equipment should be the most important work activity for both occupations, and indeed, we see this work activity at the top of the list for both occupations. Also important for both occupations is inspecting equipment and solving problems. Safety equipment is used in both occupations, with both occupations indicating that they use this equipment every day. Face-to-face discussions, being exact or accurate, being responsible for others' health and safety, and using hand tools are important for both occupations. Finally, in the work style category, both occupations list attention to detail as the most important attribute, followed by integrity and dependability. Cooperation and adaptability/flexibility are also important for both occupations.

Overall, when we compare the top ten work activities, work context, and work styles across these two occupations, we find that they share many attributes. This is not surprising because the algorithm was designed to assess a match based on the maximum similarity between

occupations. However, it is striking that, of the 41 questions about work activities, 57 questions about work context, and 16 questions about work styles, AMs and millwrights rated many of the same work attributes commonly in the top ten. This would not necessarily be required to have a good overall match: If all items were scored similarly on average, the jobs would be close but not necessarily ranked in the same order, so a good match could be produced that did not prioritize the same items.

In Table 3.3, we can see which work activities, work contexts, and work styles were in the top ten for AMs and which of these work attributes were also in the top ten for millwrights. Overall, five work activities, six work context items, and eight work styles were shared across both occupations. This concordance for these three O*NET modules strikes us as quite high, lending credibility to our findings.

Table 3.3. Top-Rated Work Attributes for Aviation Structural Mechanic

Work Activities	Work Context	Work Style
Repairing and maintaining mechanical equipment (23.4)	Wear common protective or safety equipment such as safety shoes, glasses, gloves, hearing protection, hard hats, or life jackets (4.9)	Attention to detail (4.7)
Documenting/recording information (22.1)	Electronic mail (4.8)	Integrity (4.7)
Organizing, planning, and prioritizing work (22)	Face-to-face discussions (4.8)	Dependability (4.5)
Communicating with supervisors, peers, or subordinates (21.6)	Contact with others (4.7)	Leadership (4.5)
Guiding, directing, and motivating subordinates (20.7)	Sounds, noise levels are distracting or uncomfortable (4.6)	Initiative (4.4)
Coaching and developing others (20.7)	Importance of being exact or accurate (4.5)	Analytical thinking (4.4)
Updating and using relevant knowledge (20.6)	Work with work group or team (4.5)	Persistence (4.3)
Inspecting equipment, structures, or material (20.3)	Responsible for others' health and safety (4.5)	Stress tolerance (4.3)
Training and teaching others (19.8)	Telephone (4.4)	Cooperation (4.3)
Provide consultation and advice to others (19.6)	Spend time using your hands to handle, control, or feel objects, tools, or controls (4.4)	Adaptability/flexibility (4.3)

NOTE: Items in shaded cells are listed among the top ten most important items for both AM (as identified by the survey we issued) and civilian millwrights (as identified by the DoL O*NET survey data). For work activities, the number in parentheses is the average raw score assigned by sailors in Navy rating AM multiplied together (importance × level); the maximum score is 5 × 7 = 35. For work context and work style, the number in parentheses is the average importance score (the maximum score is 5).

As a final check on the quality of the matches, we turn to the KSAs that each occupation rated as important (Table 3.4). Once again, KSAs that are common to both occupations are in

shaded cells. Examining the knowledge areas that are important for both occupations, we find, unsurprisingly, that mechanical knowledge is the most important for both occupations. In all, seven knowledge areas are ranked in the top ten for each of these occupations. We see a similar story for skills and abilities: Six skills and five abilities are in the top ten for both AM and millwright.

Table 3.4. Top-Rated KSAs for Aviation Structural Mechanic

Knowledge	Skills	Abilities
Mechanical (30.8)	Troubleshooting (26)	Speech clarity (22.7)
Education and training (17.5)	Equipment maintenance (25.6)	Written comprehension (21.7)
Administration and management (15.2)	Repairing (23.4)	Manual dexterity (20.3)
Public safety and security (14.1)	Time management (23.1)	Oral expression (20.2)
English language (13.7)	Instructing (22.1)	Extent flexibility (19.9)
Production and processing (12.3)	Quality control analysis (21.8)	Oral comprehension (19.8)
Clerical (11.6)	Operation monitoring (21.2)	Selective attention (19.6)
Engineering and technology (11.5)	Installation (21.1)	Problem sensitivity (19.1)
Computers and electronics (11.4)	Reading comprehension (20.8)	Deductive reasoning (19.1)
Customer and personal service (10.6)	Coordination (20.7)	Visualization (19.1)
Physics (10.3)	Judgment and decision making (20.5)	Near vision (18.4)

NOTE: Items in shaded cells are listed among the top ten most important items for both AMs (as identified by the survey we issued) and civilian millwrights (as identified by the DoL O*NET survey data). The number in parentheses is the average raw score assigned by sailors in rating AM multiplied together (importance × level); the maximum score is 5 × 7 = 35.

We can also see that there are many technical or demonstrable skills, such as experience troubleshooting, maintaining, repairing, installing, and monitoring, that are important for both jobs. We also see several softer skills that might be more difficult to demonstrate and that might be important to potential civilian employers, such as time management and quality control analysis.

Using this analysis and a review of the full set of high-quality matches for AM, it appears that the match score has identified at least 20 sensible civilian occupations that rely on mechanical abilities and other skills developed while in the military. The full results for the Navy are presented in Tables A.1 through A.9 of the appendix of this report. Our checks on the internal validity of the measure make sense: Both AMs and millwrights rely on mechanical knowledge, repairing skills, manual dexterity, wearing protective equipment, and strict attention to detail. Interestingly, if you examine the occupations that are thought to be similar to millwrights in the civilian labor market, DoL reports that occupations that rely on mechanical knowledge include

both millwrights and civilian aircraft mechanics and service technicians (O*NET Online, 2023g).

We note two final aspects of matches for AMs. First, the firefighter occupation is also a recommended match for reasons that are somewhat different from a millwright. Although equipment maintenance is done by firefighters, there is also an enormous emphasis on safety and timeliness. For firefighters, teamwork is essential for extinguishing fires; working with a group or a team was also listed as important for an AM but was somewhat less important for a millwright. Second, many AM matches were for first-line supervisors. These supervisors oversee and manage the daily operations of personnel. It is unlikely that newly transitioned sailors will be in a supervisory role (especially if they have not directly done a similar job). We should exercise caution in recommending first-line supervisors jobs to young veterans. That said, employers might be keen to hire these types of employees if they are looking for people with leadership and management skills.

Comparison with My Next Move for Veterans Matches for Aviation Structural Mechanics

As shown in Table 3.2, only two high-quality civilian occupational matches for AM identified by our algorithm are also identified by My Next Move for Veterans as a close (i.e., top 15) match: (1) first-line supervisors of mechanics, installers, and repairers and (2) aircraft mechanics and service technicians (My Next Move for Veterans, 2023b). Comparison of the top-rated work attributes and KSAs for AM with the work attributes and KSAs listed on the O*NET for these two civilian occupations suggests that each of these two matches is being driven by different features. First-line supervisors of mechanics, installers, and repairers have modest overlap in technical KSAs associated with mechanical work but have far more overlap in so-called soft KSAs associated with leadership, management, and training (O*NET Online, 2023e). Conversely, aircraft mechanics and service technicians have considerable overlap in technical-based KSAs related to maintaining, troubleshooting, and repairing mechanical equipment and to work attributes, such as working in high-stakes, fast-paced environments while moderately exposed to environmental stressors—that is, flight lines and hangars (O*NET Online, 2023b).

My Next Move for Veterans identifies maintenance workers, machinery as a top civilian career match for the Navy AM rating (My Next Move for Veterans, 2023b). Based on our understanding of the occupational specialist–driven matching process employed by My Next Move for Veterans, we suspect that similarities in the job descriptions between these two occupations explains their identification as a close match. Comparing the KSAs and work attributes of the two occupations suggests that, although there is significant overlap in technical KSAs and some overlap in work attributes related to those technical requirements, AM seems to entail both a wider variety of soft KSAs—especially related to training and management—and more KSAs and job attributes that reflect the stressful, high-stakes environment of military flight operations. Notably, the median wage for maintenance workers, machinery ($48,900) (O*NET Online, 2023g) is lower than all but seven of the 28 occupations listed in Table 3.2.

Chapter 4. Marine Corps Matches

The Number of Civilian Matches for Each Marine Corps MOS

In this chapter, we focus on the general and specific job matches for 11 MOSs in the Marine Corps. These MOSs make up the overwhelming majority of the enlisted Marine Corps. Table 4.1 summarizes our results, and the remainder of this section examines the results of the total number of high-quality matches, the number of high-quality matches requiring less than a bachelor's degree, and the general versus MOS-specific matches for the high-quality matches not requiring a bachelor's degree.

Table 4.1. Number of High-Quality Civilian Occupational Matches for Each Marine Corps MOS

| MOS | All | No Bachelor's Degree–Required Matches | | |
		All	General	MOS-Specific
Administrative specialist (0111)	170	48	18	30
Aviation supply specialist (6672)	123	80	40	40
Data systems administrator (0671)	106	47	30	17
Logistics/embarkation specialist (0431)	85	49	35	14
Food service specialist (3381)	76	51	40	11
Intelligence specialist (0231)	43	3	2	1
Network administrator (0631)	41	26	24	2
Automotive maintenance technician (3521)	20	20	8	12
Transmissions system operator (0621)	12	11	11	0
Military police (5811)	3	3	2	1
Infantry rifleman (0311)	2	2	2	0

First, the number of high-quality matches between military and civilian occupations mostly conformed with our expectations. High-quality matches are those that score 80 or above on the match score, as described in Chapter 2. MOSs requiring a wide variety of skills, such as administrative specialist (MOS 0111), had many times the number of high-quality matches when compared with the MOS with the lowest number of high-quality matches, infantry rifleman (MOS 0311). Notably though, food service specialists (MOS 3381) also had many more high-quality matches than infantry rifleman (MOS 0311). This likely is attributable to the service

management component of the food service specialty MOS that likely aligns with many civilian occupations: the planning, management, and purchasing and accounting of supplies.

The number of high-quality matches requiring less than a bachelor's degree also conformed with our expectations. MOSs with more-demanding critical-thinking or technical skills that are commonly aligned with jobs requiring a bachelor's degree, such as administrative specialist (MOS 0111) and data systems administrator (MOS 0671), showed fewer than 60 matches for jobs requiring less than a bachelor's degree. Interestingly, the infantry rifleman MOS is less associated with skills that align with jobs requiring a bachelor's degree, but this MOS also contained relatively few matches in this category. This is more attributable to the low number of high-quality matches of all varieties for that MOS, however.

General Versus MOS-Specific Matches

Interestingly, the MOSs with above-average numbers (greater than 19) of general matches (i.e., civilian occupations that match with at least four of the top ten MOSs) center around MOSs with specific skill sets:

- network administrator (MOS 0631)
- food service specialist (MOS 3381)
- aviation supply specialist (MOS 6672)
- logistics/embarkation specialist (MOS 0431)
- data systems administrator (MOS 0671).

This is likely attributable to the fact that three of these MOSs (food service specialist, aviation supply specialist, and logistics/embarkation specialist) have job duties related to logistics functions, such as the handling, management, and distribution of supplies. The other two MOSs are related to information and communications technology–related tasks (network administrator and data systems administrator).

This bifurcation is also noticeable when examining the number of MOS-specific matches for each of the top eleven MOSs. Five MOSs (intelligence specialist [MOS 0231], network administrator [MOS 0631], transmissions system operator [MOS 0621], military police [MOS 5811], and infantry rifleman [MOS 0311]) have two or fewer MOS-specific matches, while the remaining seven MOSs have eleven or more MOS-specific matches. The MOSs in our sample have either a very low or a high number of MOS-specific matches.

Finally, it is noticeable that aviation supply specialist contains the highest number of MOS-specific matches *and* the highest number of general matches. This might be attributable to several notable features of this MOS and its civilian matches. First, approximately two-thirds of the high-quality civilian matches for aviation supply specialist require less than a bachelor's degree at entry. Among MOSs with an above-average (greater than 62) total number of high-quality matches, half of those matches, on average, require a bachelor's degree or greater at entry. Aviation supply specialists seem to have attributes similar to an unusually large number of civilian occupations requiring less than a bachelor's degree at entry. Second, aviation supply

specialists might have a wider variety of technical skills than other MOSs in our sample. Among the high-quality matches listed in Table A.12 of the appendix are several occupations in the aviation industry and many other technical occupations across a wide variety of other industries, which generates both general and MOS-specific matches.

A Specific Example of Match Quality: Marine Corps Infantry Rifleman and Civilian Firefighters

In this section, we examine, in detail, the match quality for the MOS with the largest number of individual marines, infantry rifleman (MOS 0311), to its best match, civilian firefighters. The rifleman MOS is described as follows:

> The Riflemen employ the M16M4/A4 Service Rifle, the M203 Grenade Launcher and the M27 Infantry Automatic Rifle (IAR). Riflemen are the primary scouts, assault, and close combat forces available to the MAGTF [Marine Air-Ground Task Force]. They are the foundation of the Marine Infantry Organization, and as such are the nucleus of the fire team in the rifle squad, the scout team in the LAR [Light Armored Reconnaissance] Squad, and Scout Snipers in the infantry battalion. Noncommissioned Officers are assigned as Fire Team Leaders, Scout Team Leaders, and Rifle Squad Leaders. (U.S Marine Corps, 2022)

Table 4.2 summarizes high- and moderate-quality civilian occupational matches for the infantry rifleman MOS.

Table 4.2. High- and Moderate-Quality Civilian Occupational Matches for the Infantry Rifleman MOS

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Firefighters	311	52.5	Postsecondary nondegree award	80.6
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	80.2
Forest and conservation technicians	30	38.9	Associate's degree	75.7
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	73.0
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	72.9
Commercial divers	3	54.8	Postsecondary nondegree award	72.3
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	71.9

SOURCE: Features employment and earnings data from the U.S. Bureau of Labor Statistics, 2021. Other data are from the DoL O*NET and DoD O*NET survey collected for this study.

It is not surprising to see that the civilian occupations that scored above 80 in the match score are minimal—there are effectively very few high-quality matches in the civilian economy for former infantry rifleman Marines. The two civilian occupations that are good matches are firefighters and first-line supervisors of firefighting and prevention workers. We also list all the matches that exceed 70 points (ten points below our high-quality threshold) and find only five additional occupations:

- forest and conservation technicians
- captains, mates, and pilots of water vessels
- commercial divers
- first-line supervisors of mechanics, installers, and repairers
- first-line supervisors of farming, fishing, and forestry workers.

Most of these matches are common with other Marine Corps MOSs and most are physically demanding jobs, often performed in the outdoors. Working cooperatively or on a team is also a highlight of many of these jobs, and for the first-line supervisors, so is leading and directing subordinates. Finally, there is often a problem-solving or analytical component to many of these jobs that is akin to the problem-solving required of infantry riflemen.

Overall, this analysis finds that matching to specific civilian occupations might be difficult for infantry riflemen. We should not interpret this to mean that KSAs developed in this MOS are not valuable or useful in the civilian context. What this means is that, taken as a whole, the very particular combination of KSAs required for infantry rifleman do not match well to *specific* civilian occupations. However, as we can see in the work style descriptions listed in Table 4.4, dependability, attention to detail, cooperation, leadership, adaptability, stress tolerance, integrity, and initiative are the most-important attributes for the infantry rifleman, and those attributes are highly sought after by many employers for many civilian occupations.

Civilian Firefighters

Firefighters are preeminent emergency first responders in many communities. They "[c]ontrol and extinguish fires or respond to emergency situations where life, property, or the environment is at risk. Duties may include fire prevention, emergency medical service, hazardous material response, search and rescue, and disaster assistance" (O*NET Online, 2023d). The job typically requires specialized training and certification in emergency medical services prior to entry, with a few months of training at a fire academy when entering the occupation. Some jurisdictions might require additional credentials, such as a commercial driver's license or an apprenticeship. There are approximately 326,100 firefighters in the United States, and the median wage is $50,700 annually. There is expected to be a 4 percent to 7 percent growth in the number of firefighters by 2031, driven primarily by the need to replace those who are retiring or otherwise leaving the occupation (U.S. Bureau of Labor Statistics, 2022b).

Why Firefighters Are Good Matches for Infantry Riflemen

Table 4.3 summarizes the top-rated KSAs for the infantry rifleman MOS. Items in shaded cells represent attributes that appear in the top ten most important attributes for both infantry rifleman and firefighters. For example, in the knowledge category, public safety and security is rated as the second-most important attribute for infantry riflemen, while this was rated as the most important attribute for firefighters. The education and training attribute was the most important for infantry riflemen and the fourth-most important for firefighters. Overall, there seems to be good concordance with the knowledge and skills areas shared by riflemen and firefighters: Five knowledge areas (out of 33 total) and six skills are in the top ten for both occupations. The abilities attribute has somewhat lower concordance between the two occupations—only two abilities are shared in the top ten—indicating the physical demands and requirements of the infantry rifleman MOS.

Table 4.3. Top-Rated KSAs for MOS 0311

Knowledge	Skills	Abilities
Education and training (19)	Coordination (25.8)	Reaction time (27.9)
Public safety and security (18.3)	Judgment and decision making (25.8)	Night vision (27.9)
Geography (12.7)	Critical thinking (25.5)	Trunk strength (27.9)
Administration and management (12.5)	Complex problem solving (24.9)	Stamina (26)
Customer and personal service (12.1)	Instructing (24.8)	Far vision (25.6)
English language (11.4)	Speaking (22.5)	Static strength (25)
Personnel and human resources (9)	Active listening (21.4)	Depth perception (24)
Communications and media (8.8)	Active learning (21.3)	Peripheral vision (23.6)
Clerical (8.7)	Equipment maintenance (20.8)	Sound localization (23.6)
Computers and electronics (8.3)	Management of personnel resources (20.8)	Speed of limb movement (23.5)

NOTE: Items in shaded cells are listed among the top ten most important items for both infantry riflemen (as identified by the survey we issued) and civilian firefighters (as identified by the DoL O*NET survey data). The number in parentheses is the average raw score assigned by marines in MOS 0311 multiplied together (importance × level); the maximum score is 5 × 7 = 35.

The strong emphasis on education and training and public safety and security are expected. The emphasis on (1) administration and management and (2) personnel and human resources is also expected; the military is a large bureaucracy and understanding how to navigate it is crucial. Computer and communications skills are also expected because infantry riflemen often use sophisticated technology in their work.

This breadth of knowledge is also true for the skills demanded in the infantry rifleman MOS. Some of these skills are individual skills, such as coordination or maintaining the considerable

amount of equipment, some of it sophisticated, with which the individual is entrusted. Other skills are related to solving tactical problems, which demands skills related to formulating a plan and communicating it.

Least surprising are the abilities related to this MOS. Infantry rifleman is a physically demanding occupation, requiring fast reactions during combat in addition to strength and endurance during operations and exercises.

Table 4.4 summarizes the top-rated work attributes for the infantry rifleman MOS. Again, there appears to be high concordance between infantry rifleman and civilian firefighter with work context and work style, and somewhat less so with work activities; because the rifleman and firefighter work tasks are fundamentally different, this should not be very surprising. Seven work context attributes and eight work style attributes are shared in the top ten for both occupations.

Table 4.4. Top-Rated Work Attributes for MOS 0311

Work Activities	Work Context	Work Style
Performing general physical activities (30.3)	Contact with others (4.7)	Dependability (4.6)
Guiding, directing, and motivating subordinates (24.2)	Face-to-face discussions (4.4)	Attention to detail (4.5)
Making decisions and solving problems (23.6)	Time pressure (4.4)	Cooperation (4.5)
Organizing, planning, and prioritizing work (22.2)	Work with work group or team (4.2)	Leadership (4.5)
Coordinating the work and activities of others (20.5)	Electronic mail (4.2)	Achievement/effort (4.4)
Coaching and developing others (20.4)	Coordinate or lead others (4.1)	Adaptability/flexibility (4.4)
Assisting and caring for others (20.2)	Outdoors, exposed to weather (4.1)	Analytical thinking (4.2)
Communicating with supervisors, peers, or subordinates (20.1)	Telephone (4)	Stress tolerance (4.2)
Developing and building teams (19.9)	Importance of being exact or accurate (4)	Integrity (4.2)
Establishing and maintaining interpersonal relationships (19.9)	Wear common protective or safety equipment such as safety shoes, glasses, gloves, hearing protection, hard hats, or life jackets (3.9)	Initiative (4.1)

NOTE: Items in shaded cells are listed among the top ten most important items for both infantry riflemen (as identified by the survey we issued) and civilian firefighters (as identified by the DoL O*NET survey data). For work activities, the number in parentheses is the average raw score assigned by marines in MOS 0311 multiplied together (importance × level); the maximum score is 5 × 7 = 35. For work context and work style, the number in parentheses is the average importance score; the maximum score is 5.

The work activities, work context, and work style listed in the table align well with the expectations for infantry riflemen and the infantry units to which they are most often assigned.

Physically and mentally challenging activities performed in concert with others is a hallmark of infantry operations. The context illustrates the wide variety of garrison and field environments that infantry riflemen operate in. Finally, the work style aligns with the activities, in their emphasis on teamwork and coordination.

Comparison with My Next Move for Veterans Matches for Infantry Rifleman

None of the high-quality matches identified in Table 4.2 are identified as top matches for infantry riflemen by My Next Move for Veterans. The top matches identified by My Next Move for Veterans include several occupations related to security and policing (e.g., correctional officers and jailers, police and sheriff's patrol officers, private detectives and investigators, security guards, bailiffs, transit and railroad police, and transportation security screeners) and some occupations that might overlap in the types of technology used (e.g., surveying and mapping technicians; broadcast technicians; and explosives workers, ordnance handling experts, and blasters) (My Next Move for Veterans, 2023c).

Comparison of the KSAs and work attributes for infantry riflemen and police and sheriff's patrol officers is suggestive of why the occupations are not identified by the algorithmic match process as high-quality matches (O*NET online, 2023i). Police and sheriff's patrol officers' KSAs are closely linked to the social context of police work and are thus more related to interacting with others (active listening, social perceptiveness, speaking) than are infantry riflemen's KSAs. Police and sheriff's patrol officers' top abilities reflect the need to deftly manage complicated social interactions (problem sensitivity, deductive and inductive reasoning, and several communication abilities) while infantry riflemen's top abilities are much more closely related to military operational environments (reaction time, night vision, trunk strength, and stamina). Similarly, comparison of work attributes suggests that the two occupations have substantial differences in day-to-day work activities. Police and sheriff's patrol officers' top work activities are performing for or working directly with the public, getting information, resolving conflicts, and negotiating with others; infantry riflemen's top work activities are performing general physical activities and guiding, directing, and motivating subordinates. The My Next Move for Veterans match of these two occupations might be based on some overlap in job descriptions and physical qualifications, but our examination of the O*NET survey results suggests that there might be important differences between the nature of the two jobs that transitioning infantry riflemen should be aware of in their job search.

Chapter 5. Air Force Matches

The Number of Civilian Matches for Each Air Force AFSC

Table 5.1 shows the number of civilian occupations that are high-quality matches (score of 80 or higher) to each AFSC in our sample set. All the AFSCs in our sample have at least eight high-quality matches, and some AFSCs have many more. For instance, knowledge operations management (3D0X1) matches well to 218 civilian occupations. Other AFSCs have few high-quality matches: fighter aircraft integrated avionics (2A3X4), advanced fighter aircraft integrated avionics (2A5X1), aircraft armament systems (2W1X1) and aerospace medical service (4N0X1) each have only eight high-quality civilian occupational matches.

AFSCs vary in the proportion of high-quality matches requiring at least a bachelor's degree at entry. For three of the AFSCs—knowledge operations management (3D0X1), cyber systems operations (3D0X2), and aerospace medical service (4N0X1)—more than 60 percent of the high-quality civilian matches require a bachelor's degree at entry. On the other hand, for three other AFSCs—fighter aircraft integrated avionics (2A3X4), advanced fighter aircraft integrated avionics (2A5X1), and aircraft armament systems (2W1X1)—none of the high-quality matches requires a bachelor's degree at entry.

Among the high-quality matches that do not require a bachelor's degree at entry, most AFSCs have a mix of general and AFSC-specific matches. The exceptions are fighter aircraft integrated avionics (2A3X4), which has no AFSC-specific match, and aerospace medical service (4N0X1), which has only one AFSC-specific match. Finally, AFSCs with many high-quality matches tend to have a higher share of AFSC-specific matches than general matches, while AFSCs with few high-quality matches tend to have a higher share of general matches. This might indicate that for AFSCs for which transitioning airmen struggle to find good civilian job matches, being in the Air Force—irrespective of their specific job in the Air Force—requires workforce attributes that match well with a small subset of civilian occupations.

Table 5.1. Number of High-Quality Civilian Occupational Matches for Each Air Force AFSC

		No Bachelor's Degree–Required Matches		
AFSC	**All**	**All**	**General**	**AFSC-Specific**
Knowledge operations management (3D0X1)	218	66	3	63
Materiel management (2S0X1)	91	52	11	41
Munitions systems (2W0X1)	55	50	15	35
Cyber systems operations (3D0X2)	40	15	3	12
Air transportation (2T2X1)	31	29	11	18
Security forces (3P0X1)	10	9	6	3
Fighter aircraft integrated avionics (2A3X4)	8	8	8	0
Advanced fighter aircraft integrated avionics (2A5X1)	8	8	6	2
Aircraft armament systems (2W1X1)	8	8	7	1
Aerospace medical service (4N0X1)	8	2	1	1

A Specific Example of Match Quality: Air Force Fighter Aircraft Integrated Avionics and Civilian Electrical and Electronic Repairers, Commercial and Industrial Equipment

Fighter Aircraft Integrated Avionics

For the remainder of this chapter, we focus on the fighter aircraft integrated avionics AFSC (2A3X4). This AFSC is described in the *Air Force Enlisted Classification Directory* as follows:

> Isolates malfunctions and repairs and inspects A-10/U-2, F-15, and F-16/CV-22 integrated avionics systems at organizational levels. Troubleshoots, inspects, removes, installs, repairs, modifies, and operates aircraft avionic systems, components, and associated support equipment. Performs and supervises general aircraft servicing and handling procedures. (Air Force Personnel Center, 2021, p. 129)

Selection into this AFSC requires a high school diploma or GED, ideally having completed courses in physics and math (Air Force Personnel Center, 2021, p. 129), and having received a score of 70 or better on the electronic aptitude score derived from the ASVAB (Air Force Personnel Center, 2021, Attachment 4, p. 396).

Table 5.2 lists the top ten high-quality civilian occupations matches for the fighter aircraft integrated avionics AFSC (see Table A.26 in the appendix for a longer list of matches). The diversity in the list of top high-quality matching civilian occupations suggests that there are multiple job attributes that are driving these matches. The first two matches in the table seem to be based on job requirements related to mechanical knowledge and ability. As with many other military occupations (including those detailed in the previous chapters), the fighter aircraft integrated avionics AFSC matches well to a firefighting and prevention occupation, perhaps

based on the focus on public safety and emergency response. This AFSC also matches well to two agriculture and forestry occupations and to water vessel workers, which all require general science knowledge and physical work and might entail working outdoors. As with occupations detailed in earlier chapters, many of the top matches are supervisory, likely because of the leadership experience gained by military members.

Table 5.2. High-Quality Civilian Occupational Matches for Fighter Aircraft Integrated Avionics (2A3X4)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers[a]	475	70.2	High school diploma or equivalent	90.5
Electrical and electronics repairers, commercial and industrial equipment[a]	55	62.0	Postsecondary nondegree award	82.9
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	82.6
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	82.4
Forest and conservation technicians	30	38.9	Associate's degree	82.2
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	80.8
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	80.1
Commercial divers	3	54.8	Postsecondary nondegree award	80.1

SOURCE: Features employment and earnings data from the U.S. Bureau of Labor Statistics, 2021. Other data are from the DoL O*NET and DoD O*NET survey collected for this study.
[a] These civilian occupations were also identified as matches for fighter aircraft integrated avionics (2A3X4) by My Next Move for Veterans.

Civilian Electrical and Electronic Repairers, Commercial and Industrial Equipment

For the remainder of this chapter, we will examine the occupational match between the fighter aircraft integrated avionics AFSC (2A3X4) and its second-best match in Table 5.1, electrical and electronic repairers, commercial and industrial equipment. This match appears to be based primarily on overlapping technical job requirements as opposed to general military job requirements and conditions. This civilian occupation pays well in the civilian sector, given the educational requirements at entry; is projected to have modest employment growth by 2030; and is nonsupervisory at entry.

This civilian occupation is one of five types of electrical and electronics installers and repairers; other types focus on different types of electronic equipment, such as power tools, motors, transportation equipment, and power generation equipment (U.S. Bureau of Labor Statistics, 2022a). Repairers of commercial and industrial electrical and electronics equipment

"[r]epair, test, adjust, or install electronic equipment, such as industrial controls, transmitters, and antennas" (O*NET Online, 2023c). Some specific occupational tasks include

- using test equipment, software, visual inspection, and knowledge of electronics to test faulty equipment
- setting up, calibrating, testing, and using test equipment
- repairing electronic equipment
- maintaining records of equipment problems, tests, repairs, and parts inventories
- studying technical documentation
- communicating, consulting, and coordinating with others.

Moreover, "[i]nstallers and repairers may have to lift heavy equipment and work in awkward positions. They spend most of their day walking, standing, or kneeling" (U.S. Bureau of Labor Statistics, 2022a). Most people in this occupation work full time, and some might have to travel to job sites. The largest employers of electrical and electronics installers and repairers (across all types) by industry are manufacturing (17 percent), utilities (10 percent), and repair and maintenance (11 percent) (U.S. Bureau of Labor Statistics, 2022a).

Jobs for electrical and electronic repairers, commercial and industrial equipment typically require at least a high school diploma; most jobs also require additional education or work experience. Understanding of electrical equipment and electronics is required, and many workers in this occupation have taken courses in electronics and many have worked as electricians (U.S. Bureau of Labor Statistics, 2022a).

In 2021, the median wage for electrical and electronic repairers, commercial and industrial equipment, was $61,760, and there were 52,800 jobs in the United States. DoL expects employment numbers to grow 2 percent from 2020 to 2030, for a total of 54,000 jobs in 2030. Most of this growth in employment is projected to come from the need to replace workers who retire or otherwise exit the occupation and from recovery from the coronavirus disease 2019 (COVID-19)–related economic recession. There is relatively low employment growth in this occupation despite a large share of the occupation being employed in manufacturing, which itself is projected to grow, in part because "improvements in electrical and electronic equipment design and increased use of disposable tool parts are expected to reduce the need for electrical and electronic equipment installers and repairers" (U.S. Bureau of Labor Statistics, 2022a).

Why Electrical and Electronic Repairers, Commercial and Industrial Equipment Are a Good Match for Air Force Fighter Aircraft Integrated Avionics (2A3X4)

To understand why electrical and electronic repairers, commercial and industrial equipment match well to the fighter aircraft integrated avionics AFSC, we next compare the two occupations' attributes and requirements. Table 5.3 lists the work attributes that survey respondents in this AFSC identified as being among the top ten most important for the respective work attribute category (i.e., work activities, context, and style). Attributes in shaded cells were

also identified by electrical and electronic repairers, commercial and industrial equipment as among the top ten most important for that same work attribute category.

Table 5.3 shows that the two occupations have high overlap in work context and work style; there are six commonalities among the top ten work contexts, and eight among the top ten work styles. However, there are only three points of overlap in work activities: repairing and maintaining electronic equipment, documenting/recording information, and communicating with supervisors, peers, or subordinates. Two of these overlapping work activities directly describe the defining tasks of both the Air Force and civilian occupations: repairing and maintaining electronic equipment and then documenting and recording information about the repair activity. The low overlap in work activities might reflect the relatively high seniority of the sample of Air Force respondents. Air Force respondents in this AFSC identified several work activities indicative of management and leadership roles, such as guiding, directing, and motivating subordinates; training and teaching others; coaching and developing others; and organizing, planning, and prioritizing work. Among the top ten work activities for electrical and electronic repairers, commercial and industrial equipment, several of those that do not match to the fighter aircraft integrated avionics AFSC are technical: working with computers; identifying objects, actions, and events; inspecting equipment, structures, or materials; monitoring processes, materials, or surroundings; and controlling machines and processes (U.S. Bureau of Labor Statistics, 2022c). Moreover, several of the top ten work activities for the AFSC are just below the top ten for the civilian occupation.

Table 5.3. Top-Rated Work Attributes for Fighter Aircraft Integrated Avionics AFSC (2A3X4)

Work Activities	Work Context	Work Style
Updating and using relevant knowledge (22.1)	Electronic mail (4.7)	Attention to detail (4.7)
Repairing and maintaining electronic equipment (21.6)	Importance of being exact or accurate (4.6)	Integrity (4.6)
Guiding, directing, and motivating subordinates (21.2)	Face-to-face discussions (4.6)	Initiative (4.5)
Communicating with supervisors, peers, or subordinates (21.2)	Telephone (4.5)	Dependability (4.4)
Training and teaching others (20)	Time pressure (4.4)	Adaptability/flexibility (4.4)
Coaching and developing others (19.6)	Contact with others (4.4)	Self-control (4.3)
Documenting/recording information (18.9)	Responsibility for outcomes and results (4.3)	Cooperation (4.3)
Handling and moving objects (18)	Work with work group or team (4.3)	Analytical thinking (4.3)
Organizing, planning, and prioritizing work (17.6)	Coordinate or lead others (4.2)	Stress tolerance (4.2)
Repairing and maintaining mechanical equipment (15.9)	Wear common protective or safety equipment such as safety shoes, glasses, gloves, hearing protection, hard hats, or life jackets (4.1)	Persistence (4.2)

NOTE: Items in shaded cells are listed among the top ten most important items for both the fighter aircraft integrated avionics AFSC (as identified by the survey we issued) and the electronic repairers, commercial and industrial equipment occupation (as identified by the DoL O*NET survey data). For work activities, the number in parentheses is the average raw score assigned by personnel in the AFSC multiplied together (importance × level); the maximum score is 5 × 7 = 35. For work context and work style, the number in parentheses is the average importance score; the maximum score is 5.

Table 5.4 shows significant overlap in the KSAs required for both the fighter aircraft integrated avionics AFSC and electrical and electronic repairers, commercial and industrial equipment. This might be because even the more senior members of the AFSC who responded to the survey retain the fundamental occupation KSAs, even if their day-to-day tasks focus more on leading and managing than on directly applying the KSAs. The responses summarized in Table 5.4 indicate close alignment of the technical knowledge and skills required for both occupations: Seven of the top ten knowledge areas for the fighter aircraft integrated avionics AFSC are also in the top ten for electrical and electronic repairers, commercial and industrial equipment. Moreover, the two occupations share the same top two knowledge areas: mechanical and computers and electronics. Similarly, the occupations share six of the top ten skills, several of which are technical skills related to diagnosing and fixing problems.

The fighter aircraft integrated avionics AFSC appears to have low dependence on so-called soft KSAs. Although several of the top work attributes listed in Table 5.3 suggest that communication, coordination, leading, and managing are important aspects of the job, Table 5.4 suggests that the KSAs supporting those activities might nonetheless be somewhat less important

than technical skills. The relatively few soft skills identified by survey respondents might help explain why the AFSC has few high-quality matches to civilian occupations: Technical skills are more occupation-specific, but soft skills are valued across many occupations.

Table 5.4. Top-Rated KSAs for Fighter Aircraft Integrated Avionics AFSC (2A3X4)

Knowledge	Skills	Abilities
Mechanical (25.4)	Troubleshooting (24.6)	Written comprehension (23.4)
Computers and electronics (16.5)	Repairing (23.4)	Selective attention (21.5)
Education and training (16.3)	Time management (22.4)	Extent flexibility (20.4)
Administration and management (15.1)	Complex problem solving (22.3)	Oral expression (19.7)
Public safety and security (15.1)	Instructing (21.3)	Oral comprehension (19)
English language (12)	Critical thinking (20.9)	Problem sensitivity (19)
Engineering and technology (11.7)	Active learning (20.6)	Time sharing (18.3)
Communications and media (10.3)	Quality control analysis (20.4)	Finger dexterity (18.1)
Clerical (10.2)	Management of personnel resources (20.2)	Deductive reasoning (17.9)
Production and processing (10.1)	Reading comprehension (20.2)	Manual dexterity (17.8)

NOTE: Items in shaded cells are listed among the top ten most important items for both the fighter aircraft integrated avionics AFSC (as identified by the survey we issued) and the electronic repairers, commercial and industrial equipment occupation (as identified by the DoL O*NET survey data). The number in parentheses is the average raw score assigned by personnel in the AFSC multiplied together (importance × level); the maximum score is 5 × 7 = 35.

Comparison with My Next Move for Veterans Matches for Fighter Aircraft Integrated Avionics (2A3X4)

Several of the occupations we identified as good matches for the fighter aircraft integrated avionics AFSC were also identified by My Next Move for Veterans (2023d). Although the algorithm used in this report did not identify these occupations as exceeding the match score of 80 (used to define high-quality matches), several of these occupations came close, with scores in the 70s (see Table A.26 in the appendix for details). The lower-than-expected match quality yielded by our algorithm might reflect the relative seniority of Air Force survey participants, or it might reflect Air Force–unique job duties or attributes.

The top match for the fighter aircraft integrated avionics AFSC identified by My Next Move for Veterans, aerospace engineering and operations technologists and technicians, is not within the top 50 matches identified by our algorithm. Examining the job description of the civilian occupation and the titles reported by those completing the O*NET survey for the civilian occupation, it seems the jobs would be closely related. The job description for aerospace engineering and operations technologists and technicians is as follows:

> Operate, install, adjust, and maintain integrated computer/communications systems, consoles, simulators, and other data acquisition, test, and measurement instruments and equipment, which are used to launch, track, position, and

evaluate air and space vehicles. May record and interpret test data. (O*NET
OnLine, 2023a)

Titles reported by those surveyed in the civilian occupation include avionics technician and similar terms. Work activities and skills show the most dissimilarity between the two occupations. Interestingly, work activities and skills for the AFSC seem to emphasize repair, while those for aerospace engineering and operations technologists and technicians seem to emphasize inspection and monitoring.

Chapter 6. Summary and Conclusions

In this report, we collected new and unique data using DoL's occupational survey, known as the O*NET. We administered the O*NET survey to active component sailors, marines, and airmen. Once we collected these data, we were able to calculate a distance metric using a formula developed in previous RAND research (Wenger et al., 2017). Intuitively, the distance metric calculates the difference between the average response for each question in the O*NET for a military occupation and for a civilian occupation. We repeated this for every question and then summed across all the differences. Occupations that are similar had small differences. We rescaled this measure so that it ranges from 0 (no match) to 100 (best match) for each service branch.

Our primary finding is that most military occupations have several good civilian matches, even after filtering out occupations for which a first-term enlisted service member is not likely to be qualified (e.g., occupations requiring a bachelor's degree or requiring supervisory or management skills). The matches are sensible because the types of job attributes that are important for the military job also are important for the civilian match. It is also noteworthy that some military occupations have very few high-quality matches. In particular, infantry rifleman (MOS 0311) in the Marine Corps has only two high-quality matches, and boatswain's mate (BM) in the Navy has only three.

Navy Summary

In Table 6.1, we list the top nonsupervisory match not requiring a bachelor's degree for the nine Navy ratings analyzed in this study.[10] Overall, we find that many Navy ratings match well with firefighters; in five out of nine ratings, firefighter is the best civilian match. In two out of nine ratings, forest and conservation technicians is the best match. Forest and conservation technicians do the following:

> Provide technical assistance regarding the conservation of soil, water, forests, or related natural resources. May compile data pertaining to size, content, condition, and other characteristics of forest tracts under the direction of foresters, or train and lead forest workers in forest propagation and fire prevention and suppression. May assist conservation scientists in managing, improving, and protecting rangelands and wildlife habitats. (O*NET Online, 2023f)

It is noteworthy that this occupation also includes elements of fire prevention and suppression.

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[10] Tables A.1 through A.9 in the appendix contain the top 50 civilian occupational matches not requiring a bachelor's degree for each Navy rating.

Other matches for Navy ratings, such as electronics technician and hospital corpsman, also are sensible and appear to be rating-specific. The headline match for hospital corpsman might be a bit surprising, but there are many other high-quality matches for that rating, and many of them relate to health care technicians: radiation therapists, vocational nurses, community health workers, magnetic resonance imaging technologist, and respiratory therapists.

Table 6.1. Best Nonsupervisory Match with No Bachelor's Degree Required for Each Navy Occupation

Navy Occupation	Civilian Occupation	Match Score
Aviation boatswain's mate (AB)	Firefighters	93.5
Aviation ordnanceman (AO)	Firefighters	91.1
Aviation structural mechanic (AM)	Firefighters	96.0
Boatswain's mate (BM)	Firefighters	89.2
Culinary specialist (CS)	Forest and conservation technicians	96.7
Electronics technician (ET)	Electrical and electronics repairers, commercial and industrial equipment	94.1
Hospital corpsman (HM)	Morticians, undertakers, and funeral arrangers	91.3
Machinist's mate (MM)	Firefighters	88.2
Operations specialist (OS)	Forest and conservation technicians	84.3

Marine Corps Summary

In Table 6.2, we present the top matches with no bachelor's degree required for the 11 Marine Corps MOSs analyzed in this study.[11] Once again, we see that firefighters and forest and conservation technicians are listed. Other occupations, such as millwright, regularly appear on the list of top civilian occupational matches. Other occupations that appear to have sensible matches are military police, which is matched with civilian police and sheriff's patrol officer, and network administrator, which is matched with electrical and electronic engineering technologist and technician. Unexpectedly, intelligence specialist (0231) is best matched with mechanical engineering technologist and technician, although this MOS has only three high-quality matches (see Table A.15).

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[11] Tables A.10 through A.20 in the appendix contain the top 50 civilian occupational matches not requiring a bachelor's degree for each Marine Corps MOS.

Table 6.2. Best Nonsupervisory Match with No Bachelor's Degree Required for Each Marine Corps Occupation

Marine Corps Occupation	Civilian Occupation	Match Score
Administrative specialist (0111)	Community health workers	90.4
Automotive maintenance technician (3521)	Millwrights	92.4
Aviation supply specialist (6672)	Forest and conservation technicians	95.8
Data systems administrator (0671)	Broadcast technicians	96.4
Food service specialist (3381)	Forest and conservation technicians	92.1
Intelligence specialist (0231)	Mechanical engineering technologists and technicians	80.2
Logistics/embarkation specialist (0431)	Forest and conservation technicians	95.2
Military police (5811)	Police and sheriff's patrol officers	83.8
Network administrator (0631)	Electrical and electronic engineering technologists and technicians	89.5
Infantry Rifleman (0311)	Firefighters	80.6
Transmissions system operator (0621)	Forest and conservation technicians	88.5

Air Force Summary

In Table 6.3, we list the top occupational matches for the ten Air Force AFSCs analyzed in this study.[12] For the Air Force, the same general pattern of results holds: Firefighters and forest and conservation technicians are two common occupations, and some of the other more AFSC-specific occupations have specific civilian matches that are more unique to them (e.g., medical services matches to mortician, security forces to police officers).

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[12] Tables A.21 through A.30 in the appendix contain the top 50 civilian occupational matches not requiring a bachelor's degree for each AFSC.

Table 6.3. Best Nonsupervisory Match with No Bachelor's Degree Required for Each Air Force Occupation

Air Force Occupation	Civilian Occupation	Match Score
Advanced fighter aircraft integrated avionics (2A5X1)	Firefighters	84.6
Aerospace medical service (4N0X1)	Morticians, undertakers, and funeral arrangers	80.0
Air transportation (2T2X1)	Forest and conservation technicians	96.5
Aircraft armament systems (2W1X1)	Firefighters	88.4
Cyber systems operations (3D0X2)	Broadcast technicians	90.8
Fighter aircraft integrated avionics (2A3X4)	Electrical and electronics repairers, commercial and industrial equipment	82.9
Knowledge operations management (3D0X1)	Desktop publishers	96.9
Materiel management (2S0X1)	Electrical and electronic engineering technologists and technicians	91.9
Munitions systems (2W0X1)	Forest and conservation technicians	97.0
Security forces (3P0X1)	Police and sheriff's patrol officers	87.1

Limitations

Benchmarking Within the Service Branch

As we discussed in Chapter 2, we calculated the raw distance metric for each pair of military and civilian occupations and then converted the raw score into a score scaled from 0 to 100, where 0 is the worst match and 100 is the best match. We did this separately for each service branch. This allows us to compare military occupations within each service branch by the relative overall quantity and quality of matches to civilian occupations. For example, in the Navy, the best overall match (the one that scored 100) is a culinary specialist matching to first-line supervisor of mechanics, installers, and repairers. The consequence of this is that all matches are measured in quality relative to this match (in terms of similarity across the job attributes measured by the survey). This also allows us to make statements about the number of high-quality matches because matches that are far away from (i.e., dissimilar to) the culinary specialist to first-line supervisor match are demonstrably poorer matches. This method allows us to detect military occupations that have few high-quality matches, such as Marine Corps infantry rifleman.

This method has much to endorse it, but it relies on the best match being similar enough to the other matches that it can be used as a benchmark to other civilian matches. This is the case for the Navy and Marine Corps matches but is less so for the Air Force. Our separate analysis of raw distance scores suggests that the Air Force's best match was substantially better than other matches, and, therefore, there were few scores as close by. For this reason, we recommend using

a high-quality match score cutoff of 70 as opposed to 80 for the Air Force. However, in this analysis, we have maintained a consistent measure cutoff of 80 so that we can compare all service branches equally and produce one consistent set of results.

In the appendix tables, we produce the top 50 matches regardless of match score. In reviewing the Air Force results, we find that many of the matches that we would anticipate being good matches appear to have a score between 70 and 80.

Transitioning Service Member Preferences

As we discussed in Chapter 2, our analysis suggests that most sailors and marines and nearly half of airmen are satisfied with their current military occupation: If these service members were to transition from the military to a civilian job, they might search for a civilian occupation that is similar to their military occupation. However, for a significant minority of service members, this is not the case. Therefore, the matches provided here might be less useful if the transitioning service member prefers a job with a different skill mix than their military occupation. One option would be to reweight questions (i.e., customize the influence that each question has on calculating the distance between occupations) so that we can provide customized recommendations that suit an individual's preferences while still leveraging as many of their skills as possible.

Matching Military Occupations to Civilian Occupations by Job Qualifications

The algorithm employed in our analysis matches military and civilian occupations using occupational similarity. However, veterans who served in a given military occupation might have gained sufficient qualifications for certain civilian occupations even if the occupations are dissimilar overall. For instance, the austere, stressful, or high-tempo operational conditions that are characteristic of military operations—and not as common in civilian occupations—might increase the differences between certain military and civilian occupations that otherwise might have extremely similar job requirements.

The algorithm feasibly could be extended to match occupations based on job qualifications, identifying when a given military occupation imparts service members with the KSAs required in a civilian job, even if those KSAs feature less prominently in the O*NET profile of the military occupation. This extension could especially help civilian employers identify veteran candidates who are qualified for certain high-demand civilian jobs. However, updating the algorithm in this way would require information on civilian occupational requirements that are not directly captured by the civilian occupation O*NET database.

Standard Errors and Variances

We would like to know the standard error and variance of our match score so that we can differentiate between close and far matches in a standardized way; however, it is beyond the scope of this research to develop such measures. Follow-on research using all four service

branches in DoD could investigate the possibility of developing this measure, including investigating differences in matches across different subpopulations within each military occupation.

Policy Recommendations

Although there are many specific recommended occupations throughout this analysis, there are two overarching recommendations.

First, TAP officials should be made aware that there are some military occupations that have very few high-quality matches. Although this is certainly known to TAP counselors, it might not be clear to them how few good options are available—and what the next best option might be— for certain military occupations. The implication of finding so few good matches for Marine Corps riflemen and Navy BMs is that additional resources might need to be dedicated to help these service members transition from active component service to the civilian economy. At the same time, many matches across all military occupations are based on soft skills, such as leadership skills and skills related to navigating large institutions, which might not be apparent without the decomposition achieved by the O*NET survey.

Second, the results from this study should be made available and posted on the My Next Move for Veterans website, just as the Army research findings from Wenger et al. (2017) were. It is important to get the broadest feasible set of occupations listed because this website is used extensively as part of TAP's employment component. In the absence of an employer-specific tool, posting results on the My Next Move for Veterans website also can serve as a resource to educate civilian employers that veterans from certain military occupations might be especially well-suited to fill a given civilian job. To maximize the number of veterans helped by the job-matching algorithm described in this report, DoD could commit to issuing the O*NET survey to service members across all military occupations on a regular basis, enabling the posting of up-to-date match results for all separating service members.

Appendix. O*NET Matches for Navy, Marine Corps, and Air Force

Navy Ratings Matches to Civilian Occupations

Table A.1. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aviation Boatswain's Mate (AB)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	94.6
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	93.6
Firefighters	311	52.5	Postsecondary nondegree award	93.5
Forest and conservation technicians	30	38.9	Associate's degree	90.6
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	89.5
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	88.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	87.7
Commercial divers	3	54.8	Postsecondary nondegree award	87.4
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	86.7
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	86.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	83.3
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	83.2
Commercial pilots	37	93.3	High school diploma or equivalent	82.8
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	82.7
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	82.1
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	81.5
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	81.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Millwrights	44	57.3	High school diploma or equivalent	81.0
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	80.5
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	80.5
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	80.4
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	80.2
Athletes and sports competitors	8	50.9	No formal educational credential	80.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	80.1
Electricians	657	56.9	High school diploma or equivalent	80.0
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	79.7
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	79.6
Forest and conservation workers	6	30.6	High school diploma or equivalent	78.7
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	78.7
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	78.6
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	78.5
Chefs and head cooks	101	53.4	High school diploma or equivalent	78.4
Environmental engineering technologists and technicians	17	51.6	Associate's degree	78.3
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	78.1
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	77.8
Avionics technicians	21	67.8	Associate's degree	77.4
Agricultural technicians	22	42.0	Associate's degree	77.4
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	77.1
Transit and railroad police	4	72.6	High school diploma or equivalent	76.9

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Carpenters	699	49.5	High school diploma or equivalent	76.6
Environmental science and protection technicians, including health	32	46.9	Associate's degree	76.5
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	75.5
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	75.4
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	75.4
Ship engineers	7	76.0	Postsecondary nondegree award	75.3
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	74.8
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	74.5
Service unit operators, oil and gas	44	47.4	No formal educational credential	74.3
Riggers	22	50.9	High school diploma or equivalent	74.2
Airfield operations specialists	11	51.3	High school diploma or equivalent	74.0

Table A.2. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aviation Ordnanceman (AO)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	98.1
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	96.9
Firefighters	311	52.5	Postsecondary nondegree award	91.1
Forest and conservation technicians	30	38.9	Associate's degree	90.7
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	89.6
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	88.3
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	87.8
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	87.4
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	87.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	86.5
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	85.4
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	85.0
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	84.9
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	84.8
Commercial divers	3	54.8	Postsecondary nondegree award	83.4
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	83.3
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	83.2
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	82.5
Forest and conservation workers	6	30.6	High school diploma or equivalent	82.5
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	81.1
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	81.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	81.0
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	80.9
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	80.7
Avionics technicians	21	67.8	Associate's degree	80.1
Millwrights	44	57.3	High school diploma or equivalent	79.9
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	79.9
Environmental science and protection technicians, including health	32	46.9	Associate's degree	79.8
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	79.8
Commercial pilots	37	93.3	High school diploma or equivalent	79.5
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	79.4
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	79.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	79.0
Athletes and sports competitors	8	50.9	No formal educational credential	78.9
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	78.6
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	78.5
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	78.3
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	78.1
Agricultural technicians	22	42.0	Associate's degree	78.1
Chefs and head cooks	101	53.4	High school diploma or equivalent	78.0
Transit and railroad police	4	72.6	High school diploma or equivalent	78.0
Electricians	657	56.9	High school diploma or equivalent	77.9
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	77.9
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	77.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	77.2
Environmental engineering technologists and technicians	17	51.6	Associate's degree	76.6
Airfield operations specialists	11	51.3	High school diploma or equivalent	75.8
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	75.5
Service unit operators, oil and gas	44	47.4	No formal educational credential	75.2
Water and wastewater treatment plant and system operators	119	49.1	High school diploma or equivalent	74.9

Table A.3. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aviation Structural Mechanic (AM)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	97.9
Firefighters	311	52.5	Postsecondary nondegree award	96.0
Millwrights	44	57.3	High school diploma or equivalent	95.6
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	91.8
Commercial divers	3	54.8	Postsecondary nondegree award	89.3
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	88.8
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	88.3
Electricians	657	56.9	High school diploma or equivalent	88.3
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	87.7
Forest and conservation technicians	30	38.9	Associate's degree	87.4
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	87.1
Service unit operators, oil and gas	44	47.4	No formal educational credential	86.1
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	86.0
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	84.7
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	83.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	83.8
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	82.6
Ship engineers	7	76.0	Postsecondary nondegree award	82.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	81.6
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	81.0
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	81.0
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	80.9

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	80.8
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	80.7
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	80.6
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	80.4
Riggers	22	50.9	High school diploma or equivalent	80.4
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	80.3
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	79.9
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	79.6
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	79.3
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	79.2
Commercial pilots	37	93.3	High school diploma or equivalent	78.8
Helpers—extraction workers	13	37.9	High school diploma or equivalent	78.5
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	78.3
Nuclear technicians	6	84.2	Associate's degree	78.1
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	77.9
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	77.7
Avionics technicians	21	67.8	Associate's degree	77.0
Carpenters	699	49.5	High school diploma or equivalent	76.9
Boilermakers	14	65.4	High school diploma or equivalent	76.8
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	76.6
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	76.4
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	76.2
Elevator and escalator installers and repairers	25	88.5	High school diploma or equivalent	76.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical and electronics installers and repairers, transportation equipment	10	70.2	Postsecondary nondegree award	76.0
Signal and track switch repairers	7	76.2	High school diploma or equivalent	75.9
Farm equipment mechanics and service technicians	36	43.9	High school diploma or equivalent	75.8
Sailors and marine oilers	26	44.9	No formal educational credential	75.4
Stationary engineers and boiler operators	30	64.7	High school diploma or equivalent	75.2

Table A.4. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Boatswain's Mate (BM)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	91.4
Firefighters	311	52.5	Postsecondary nondegree award	89.2
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	82.5
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	79.1
Commercial divers	3	54.8	Postsecondary nondegree award	78.9
Millwrights	44	57.3	High school diploma or equivalent	78.6
Forest and conservation technicians	30	38.9	Associate's degree	76.8
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	75.7
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	75.3
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	75.3
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	74.1
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	73.9
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	73.9
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	73.8
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	73.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	72.3
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	72.1
Service unit operators, oil and gas	44	47.4	No formal educational credential	71.7
Electricians	657	56.9	High school diploma or equivalent	71.6
Commercial pilots	37	93.3	High school diploma or equivalent	71.1
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	70.8
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	69.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	69.1
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	68.6
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	67.8
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	67.7
Ship engineers	7	76.0	Postsecondary nondegree award	67.6
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	67.6
Transit and railroad police	4	72.6	High school diploma or equivalent	67.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	66.5
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	65.9
Riggers	22	50.9	High school diploma or equivalent	65.8
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	65.3
Carpenters	699	49.5	High school diploma or equivalent	65.2
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	65.0
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	64.3
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	64.3
Chefs and head cooks	101	53.4	High school diploma or equivalent	64.2
Athletes and sports competitors	8	50.9	No formal educational credential	64.2
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	64.0
Sailors and marine oilers	26	44.9	No formal educational credential	64.0
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	63.9
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	63.9
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	63.6
Boilermakers	14	65.4	High school diploma or equivalent	63.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Avionics technicians	21	67.8	Associate's degree	63.0
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	63.0
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	62.8
Forest and conservation workers	6	30.6	High school diploma or equivalent	62.3
Telecommunications line installers and repairers	122	58.9	High school diploma or equivalent	62.2

Table A.5. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Culinary Specialist (CS)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	100
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	98.0
Forest and conservation technicians	30	38.9	Associate's degree	96.7
Firefighters	311	52.5	Postsecondary nondegree award	95.4
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	94.2
Chefs and head cooks	101	53.4	High school diploma or equivalent	93.8
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	92.5
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	91.9
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	91.9
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	91.5
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	91.1
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	89.8
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	89.1
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	88.2
Athletes and sports competitors	8	50.9	No formal educational credential	88.0
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	87.6
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	86.9
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	86.9
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	86.9
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	86.5
Forest and conservation workers	6	30.6	High school diploma or equivalent	86.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	86.3
Commercial divers	3	54.8	Postsecondary nondegree award	85.1
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	85.1
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	85.0
Environmental science and protection technicians, including health	32	46.9	Associate's degree	84.9
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	84.7
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	84.6
Transit and railroad police	4	72.6	High school diploma or equivalent	84.3
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	84.1
First-line supervisors of food preparation and serving workers	892	34.6	High school diploma or equivalent	84.1
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	84.1
Food service managers	197	56.6	High school diploma or equivalent	83.7
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	83.6
Agricultural technicians	22	42.0	Associate's degree	83.0
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	82.8
Correctional officers and jailers	406	47.4	High school diploma or equivalent	82.4
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	82.4
Environmental engineering technologists and technicians	17	51.6	Associate's degree	82.3
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	81.9
Radiation therapists	17	86.8	Associate's degree	81.9
Avionics technicians	21	67.8	Associate's degree	81.8
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	81.5
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	81.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Medical appliance technicians	14	41.8	High school diploma or equivalent	80.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	80.6
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	80.6
Millwrights	44	57.3	High school diploma or equivalent	80.4
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	80.3
Electricians	657	56.9	High school diploma or equivalent	80.1

Table A.6. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Electronics Technician (ET)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	99.7
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	94.1
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	93.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	90.9
Forest and conservation technicians	30	38.9	Associate's degree	90.7
Avionics technicians	21	67.8	Associate's degree	90.4
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	89.4
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	89.1
Environmental science and protection technicians, including health	32	46.9	Associate's degree	88.8
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	88.4
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	87.5
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	87.3
Firefighters	311	52.5	Postsecondary nondegree award	87.0
Environmental engineering technologists and technicians	17	51.6	Associate's degree	86.8
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	86.7
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	86.6
Medical equipment repairers	49	51.6	Associate's degree	86.5
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	86.2
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	85.3
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	85.0
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	84.8
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	84.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	84.2
Commercial divers	3	54.8	Postsecondary nondegree award	83.9
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	83.9
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	83.6
Aerospace engineering and operations technologists and technicians	12	68.6	Associate's degree	83.1
Agricultural technicians	22	42.0	Associate's degree	83.0
Industrial engineering technologists and technicians	63	57.3	Associate's degree	82.8
Forest and conservation workers	6	30.6	High school diploma or equivalent	82.8
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	82.7
Commercial pilots	37	93.3	High school diploma or equivalent	82.6
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	82.3
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	82.0
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	81.7
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	81.7
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	81.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	80.9
Broadcast technicians	26	43.6	Associate's degree	80.6
Sound engineering technicians	11	53.5	Postsecondary nondegree award	80.2
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	80.0
Electricians	657	56.9	High school diploma or equivalent	79.7
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	79.4
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	79.1
Airfield operations specialists	11	51.3	High school diploma or equivalent	79.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	78.9
Chefs and head cooks	101	53.4	High school diploma or equivalent	78.6
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	78.5
Audio and video technicians	62	47.9	Postsecondary nondegree award	78.5
Transit and railroad police	4	72.6	High school diploma or equivalent	78.4

Table A.7. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Hospital Corpsman (HM)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	94.8
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	94.6
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	94.3
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	94.0
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	91.4
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	91.3
Correctional officers and jailers	406	47.4	High school diploma or equivalent	90.9
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	90.6
Radiation therapists	17	86.8	Associate's degree	90.4
Firefighters	311	52.5	Postsecondary nondegree award	90.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	90.3
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	90.2
Forest and conservation technicians	30	38.9	Associate's degree	89.9
Licensed practical and licensed vocational nurses	676	48.8	Postsecondary nondegree award	89.1
Community health workers	59	42	High school diploma or equivalent	89.0
Magnetic resonance imaging technologists	39	74.7	Associate's degree	88.8
Respiratory therapists	132	62.8	Associate's degree	88.3
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	87.8
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	87.5
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	87.4
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	87.3
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	87.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Chefs and head cooks	101	53.4	High school diploma or equivalent	86.8
Environmental science and protection technicians, including health	32	46.9	Associate's degree	86.6
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	86.5
Transit and railroad police	4	72.6	High school diploma or equivalent	86.2
Surgical assistants	77	51.8	Postsecondary nondegree award	85.6
Athletes and sports competitors	8	50.9	No formal educational credential	85.4
Diagnostic medical sonographers	74	75.9	Associate's degree	84.8
Recreation workers	326	28.4	High school diploma or equivalent	84.6
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	84.2
Veterinary technologists and technicians	109	36.3	Associate's degree	84.1
Phlebotomists	128	36.3	Postsecondary nondegree award	84.0
Environmental engineering technologists and technicians	17	51.6	Associate's degree	83.5
Medical assistants	710	35.9	Postsecondary nondegree award	83.3
Forest and conservation workers	6	30.6	High school diploma or equivalent	83.3
Lodging managers	32	56.7	High school diploma or equivalent	83.3
Agricultural technicians	22	42.0	Associate's degree	83.2
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	83.0
Psychiatric technicians	85	35.0	Postsecondary nondegree award	82.9
Cardiovascular technologists and technicians	56	59.1	Associate's degree	82.9
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	82.7
Nuclear medicine technologists	18	79.6	Associate's degree	82.5
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	82.4
Surgical technologists	107	49.7	Postsecondary nondegree award	82.3
Medical equipment repairers	49	51.6	Associate's degree	82.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	82.0
Funeral home managers	10	74.2	Associate's degree	82.0
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	81.8
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	81.8

Table A.8. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Machinist's Mate (MM)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	93.3
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	89.8
Firefighters	311	52.5	Postsecondary nondegree award	88.2
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	87.9
Forest and conservation technicians	30	38.9	Associate's degree	87.7
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	85.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	84.4
Commercial divers	3	54.8	Postsecondary nondegree award	84.3
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	84.2
Millwrights	44	57.3	High school diploma or equivalent	84.1
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	84.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	83.9
Avionics technicians	21	67.8	Associate's degree	82.9
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	82.6
Electricians	657	56.9	High school diploma or equivalent	82.3
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	82.1
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	81.9
Environmental science and protection technicians, including health	32	46.9	Associate's degree	81.3
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	81.2
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	80.8
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	80.2
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	79.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	79.5
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	79.4
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	79.4
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	79.3
Ship engineers	7	76.0	Postsecondary nondegree award	79.0
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	78.9
Environmental engineering technologists and technicians	17	51.6	Associate's degree	78.8
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	78.7
Commercial pilots	37	93.3	High school diploma or equivalent	78.7
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	78.5
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	77.8
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	77.6
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	77.4
Water and wastewater treatment plant and system operators	119	49.1	High school diploma or equivalent	77.3
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	77.3
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	76.9
Service unit operators, oil and gas	44	47.4	No formal educational credential	76.4
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	76.3
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	76.3
Forest and conservation workers	6	30.6	High school diploma or equivalent	75.9
Medical equipment repairers	49	51.6	Associate's degree	75.9
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	75.9
Signal and track switch repairers	7	76.2	High school diploma or equivalent	75.8

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Nuclear technicians	6	84.2	Associate's degree	75.5
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	75.2
Agricultural technicians	22	42.0	Associate's degree	74.3
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	73.9
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	73.9

Table A.9. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Operations Specialist (OS)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	87.9
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	86.0
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	85.8
Forest and conservation technicians	30	38.9	Associate's degree	84.3
Environmental science and protection technicians, including health	32	46.9	Associate's degree	84.2
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	83.8
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	83.1
Sound engineering technicians	11	53.5	Postsecondary nondegree award	83.0
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	83.0
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	82.5
Audio and video technicians	62	47.9	Postsecondary nondegree award	82.2
Environmental engineering technologists and technicians	17	51.6	Associate's degree	82.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	81.8
Community health workers	59	42	High school diploma or equivalent	81.5
Broadcast technicians	26	43.6	Associate's degree	81.5
Correctional officers and jailers	406	47.4	High school diploma or equivalent	80.9
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	80.7
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	80.6
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	80.6
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	80.6
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	80.4
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	80.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	79.8
Forest and conservation workers	6	30.6	High school diploma or equivalent	79.6
Commercial pilots	37	93.3	High school diploma or equivalent	78.9
Medical equipment repairers	49	51.6	Associate's degree	78.6
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	78.6
Magnetic resonance imaging technologists	39	74.7	Associate's degree	78.4
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	78.3
Desktop publishers	7	47.6	Associate's degree	78.0
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	78.0
Athletes and sports competitors	8	50.9	No formal educational credential	78.0
Traffic technicians	7	47.8	High school diploma or equivalent	77.9
Recreation workers	326	28.4	High school diploma or equivalent	77.8
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	77.8
Agricultural technicians	22	42.0	Associate's degree	77.6
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	77.2
Chefs and head cooks	101	53.4	High school diploma or equivalent	76.9
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	76.8
Airfield operations specialists	11	51.3	High school diploma or equivalent	76.8
Lodging managers	32	56.7	High school diploma or equivalent	76.5
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	76.4
Firefighters	311	52.5	Postsecondary nondegree award	76.1
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	75.9
Avionics technicians	21	67.8	Associate's degree	75.4
Industrial engineering technologists and technicians	63	57.3	Associate's degree	75.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	75.1
Gambling managers	3	75.5	High school diploma or equivalent	74.8
Civil engineering technologists and technicians	67	54.1	Associate's degree	74.8
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	74.6

Marine Corps MOS Matches to Civilian Occupations

Table A.10. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Administrative Specialist (0111)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Lodging managers	32	56.7	High school diploma or equivalent	95.0
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	93.9
First-line supervisors of office and administrative support workers	1,427	58.5	High school diploma or equivalent	93.0
Community health workers	59	42	High school diploma or equivalent	90.4
Dispatchers, except police, fire, and ambulance	188	41.0	High school diploma or equivalent	89.5
Desktop publishers	7	47.6	Associate's degree	89.3
Gambling managers	3	75.5	High school diploma or equivalent	89.3
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	88.8
Postmasters and mail superintendents	14	78.1	High school diploma or equivalent	87.9
Property, real estate, and community association managers	220	59.7	High school diploma or equivalent	87.7
Sound engineering technicians	11	53.5	Postsecondary nondegree award	87.6
Order clerks	120	35.6	Some college, no degree	87.3
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	86.9
Private detectives and investigators	32	53.3	High school diploma or equivalent	86.0
Recreation workers	326	28.4	High school diploma or equivalent	85.8
Magnetic resonance imaging technologists	39	74.7	Associate's degree	85.7
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	85.6
Audio and video technicians	62	47.9	Postsecondary nondegree award	85.3
Real estate sales agents	169	49.0	High school diploma or equivalent	85.1
Broadcast technicians	26	43.6	Associate's degree	84.9
Funeral home managers	10	74.2	Associate's degree	84.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	84.7
Computer user support specialists	635	52.7	Some college, no degree	84.7
Residential advisors	102	31.2	High school diploma or equivalent	84.5
Computer network support specialists	184	65.5	Associate's degree	84.3
Opticians, dispensing	68	38.5	High school diploma or equivalent	84.2
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	84.1
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	83.6
Environmental science and protection technicians, including health	32	46.9	Associate's degree	83.4
Public safety telecommunicators	93	43.3	High school diploma or equivalent	83.4
First-line supervisors of retail sales workers	1,063	41.6	High school diploma or equivalent	82.9
Hearing aid specialists	8	52.6	High school diploma or equivalent	82.8
Travel guides	38	29.5	High school diploma or equivalent	82.8
First-line supervisors of personal service workers	175	42	High school diploma or equivalent	82.7
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	82.7
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	82.2
Medical assistants	710	35.9	Postsecondary nondegree award	81.8
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	81.5
Social and human service assistants	400	36.0	High school diploma or equivalent	81.4
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	81.4
Human resources assistants, except payroll and timekeeping	108	43.2	Associate's degree	81.3
Food service managers	197	56.6	High school diploma or equivalent	81.3
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	81.2
Executive secretaries and executive administrative assistants	503	63.1	High school diploma or equivalent	81.2
Architectural and civil drafters	99	57.5	Associate's degree	81.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Claims adjusters, examiners, and investigators	287	68.3	High school diploma or equivalent	81.0
Environmental engineering technologists and technicians	17	51.6	Associate's degree	80.4
Gambling surveillance officers and gambling investigators	8	35.3	High school diploma or equivalent	80.1
Hotel, motel, and resort desk clerks	223	25.5	High school diploma or equivalent	79.9
Concierges	37	32.4	High school diploma or equivalent	79.6

Table A.11. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Automotive Maintenance Technician (3521)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Millwrights	44	57.3	High school diploma or equivalent	92.4
Firefighters	311	52.5	Postsecondary nondegree award	90.6
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	87.9
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	86.5
Commercial divers	3	54.8	Postsecondary nondegree award	86.0
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	85.8
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	85.2
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	85.1
Forest and conservation technicians	30	38.9	Associate's degree	84.6
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	84.0
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	83.7
Electricians	657	56.9	High school diploma or equivalent	83.6
Service unit operators, oil and gas	44	47.4	No formal educational credential	83.3
Ship engineers	7	76.0	Postsecondary nondegree award	82.4
Farm equipment mechanics and service technicians	36	43.9	High school diploma or equivalent	82.3
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	81.8
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	81.3
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	81.0
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	80.4
Bus and truck mechanics and diesel engine specialists	253	50.2	High school diploma or equivalent	80.3
Electrical and electronics installers and repairers, transportation equipment	10	70.2	Postsecondary nondegree award	80.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	79.6
Helpers—extraction workers	13	37.9	High school diploma or equivalent	79.4
Automotive service technicians and mechanics	620	44.0	Postsecondary nondegree award	79.4
Riggers	22	50.9	High school diploma or equivalent	79.3
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	79.2
Signal and track switch repairers	7	76.2	High school diploma or equivalent	77.5
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	77.3
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	77.2
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	77.2
Boilermakers	14	65.4	High school diploma or equivalent	77.1
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	77.0
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	77.0
Industrial machinery mechanics	386	55.5	High school diploma or equivalent	76.9
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	76.8
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	75.8
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	75.7
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	75.6
Electronic equipment installers and repairers, motor vehicles	10	39.6	High school diploma or equivalent	75.5
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	75.1
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	74.9
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	74.7
Carpenters	699	49.5	High school diploma or equivalent	74.6
Elevator and escalator installers and repairers	25	88.5	High school diploma or equivalent	74.6

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Telecommunications line installers and repairers	122	58.9	High school diploma or equivalent	74.5
Plumbers, pipefitters, and steamfitters	417	56.3	High school diploma or equivalent	74.3
Sailors and marine oilers	26	44.9	No formal educational credential	74.2
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	74.2
Rail-track laying and maintenance equipment operators	18	56.4	High school diploma or equivalent	74.0
Commercial pilots	37	93.3	High school diploma or equivalent	73.7

Table A.12. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aviation Supply Specialist (6672)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	100
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	99.6
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	96.3
Forest and conservation technicians	30	38.9	Associate's degree	95.8
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	94.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	94.6
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	94.1
Forest and conservation workers	6	30.6	High school diploma or equivalent	93.5
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	92.7
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	92.3
Environmental science and protection technicians, including health	32	46.9	Associate's degree	91.0
Chefs and head cooks	101	53.4	High school diploma or equivalent	91.0
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	91.0
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	90.9
Athletes and sports competitors	8	50.9	No formal educational credential	90.5
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	90.0
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	89.9
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	89.7
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	89.4
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	89.2
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	89.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Parts salespersons	254	32.5	No formal educational credential	89.0
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	88.9
Environmental engineering technologists and technicians	17	51.6	Associate's degree	88.7
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	88.5
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	88.4
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	88.1
Agricultural technicians	22	42.0	Associate's degree	87.8
Correctional officers and jailers	406	47.4	High school diploma or equivalent	87.6
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	87.5
Airfield operations specialists	11	51.3	High school diploma or equivalent	87.1
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	87.1
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	86.7
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	86.3
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	85.9
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	85.8
Traffic technicians	7	47.8	High school diploma or equivalent	85.6
Avionics technicians	21	67.8	Associate's degree	85.4
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	85.0
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	85.0
Postmasters and mail superintendents	14	78.1	High school diploma or equivalent	84.9
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	84.8
Industrial engineering technologists and technicians	63	57.3	Associate's degree	84.5
Food service managers	197	56.6	High school diploma or equivalent	84.5

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Recreation workers	326	28.4	High school diploma or equivalent	84.4
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	84.4
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	84.3
Animal trainers	15	31.5	High school diploma or equivalent	84.1
Broadcast technicians	26	43.6	Associate's degree	84.0
Sound engineering technicians	11	53.5	Postsecondary nondegree award	83.7

Table A.13. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Data Systems Administrator (0671)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Broadcast technicians	26	43.6	Associate's degree	96.4
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	96.2
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	93.5
Sound engineering technicians	11	53.5	Postsecondary nondegree award	92.7
Audio and video technicians	62	47.9	Postsecondary nondegree award	92.2
Medical equipment repairers	49	51.6	Associate's degree	91.8
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	90.0
Computer network support specialists	184	65.5	Associate's degree	89.8
Desktop publishers	7	47.6	Associate's degree	88.1
Environmental science and protection technicians, including health	32	46.9	Associate's degree	88.1
Avionics technicians	21	67.8	Associate's degree	87.4
Environmental engineering technologists and technicians	17	51.6	Associate's degree	87.0
Forest and conservation technicians	30	38.9	Associate's degree	86.7
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	86.6
Industrial engineering technologists and technicians	63	57.3	Associate's degree	86.6
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	86.4
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	86.4
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	86.4
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	86.4
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	86.2
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	85.4
Computer user support specialists	635	52.7	Some college, no degree	85.2
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	85.0
Audiovisual equipment installers and repairers	26	41.5	Postsecondary nondegree award	85.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Traffic technicians	7	47.8	High school diploma or equivalent	84.5
Computer numerically controlled tool programmers	26	57.7	Postsecondary nondegree award	84.4
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	83.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	83.8
Magnetic resonance imaging technologists	39	74.7	Associate's degree	83.6
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	83.0
Aerospace engineering and operations technologists and technicians	12	68.6	Associate's degree	83.0
Community health workers	59	42	High school diploma or equivalent	82.9
Agricultural technicians	22	42.0	Associate's degree	82.7
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	82.6
Forest and conservation workers	6	30.6	High school diploma or equivalent	82.5
Recreation workers	326	28.4	High school diploma or equivalent	81.9
Food science technicians	22	42.0	Associate's degree	81.6
Aircraft structure, surfaces, rigging, and systems assemblers	38	53.2	High school diploma or equivalent	81.5
Photographers	42	41.3	High school diploma or equivalent	81.3
Civil engineering technologists and technicians	67	54.1	Associate's degree	80.7
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	80.7
Private detectives and investigators	32	53.3	High school diploma or equivalent	80.5
Parts salespersons	254	32.5	No formal educational credential	80.5
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	80.2
Athletes and sports competitors	8	50.9	No formal educational credential	80.2
Architectural and civil drafters	99	57.5	Associate's degree	80.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	80.0
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	80.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	79.9
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	79.6

Table A.14. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Food Service Specialist (3381)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	94.2
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	92.9
Forest and conservation technicians	30	38.9	Associate's degree	92.1
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	90.5
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	89.3
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	89.0
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	88.9
Chefs and head cooks	101	53.4	High school diploma or equivalent	88.3
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	87.2
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	86.6
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	86.1
Athletes and sports competitors	8	50.9	No formal educational credential	85.9
Forest and conservation workers	6	30.6	High school diploma or equivalent	85.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	85.5
Environmental engineering technologists and technicians	17	51.6	Associate's degree	85.4
Medical equipment repairers	49	51.6	Associate's degree	85.1
Food service managers	197	56.6	High school diploma or equivalent	84.7
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	84.7
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	84.3
First-line supervisors of food preparation and serving workers	892	34.6	High school diploma or equivalent	83.5
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	83.5

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Medical appliance technicians	14	41.8	High school diploma or equivalent	82.8
Environmental science and protection technicians, including health	32	46.9	Associate's degree	82.6
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	82.6
Agricultural technicians	22	42.0	Associate's degree	82.5
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	82.5
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	82.4
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	82.2
Sound engineering technicians	11	53.5	Postsecondary nondegree award	82.0
Industrial engineering technologists and technicians	63	57.3	Associate's degree	82.0
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	81.9
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	81.9
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	81.8
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	81.8
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	81.4
Audio and video technicians	62	47.9	Postsecondary nondegree award	81.2
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	81.2
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	81.0
Firefighters	311	52.5	Postsecondary nondegree award	81.0
Broadcast technicians	26	43.6	Associate's degree	80.9
Magnetic resonance imaging technologists	39	74.7	Associate's degree	80.9
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	80.8
Recreation workers	326	28.4	High school diploma or equivalent	80.7
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	80.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Community health workers	59	42	High school diploma or equivalent	80.4
Correctional officers and jailers	406	47.4	High school diploma or equivalent	80.4
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	80.3
Avionics technicians	21	67.8	Associate's degree	80.3
Commercial divers	3	54.8	Postsecondary nondegree award	80.2
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	80.2

Table A.15. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Intelligence Specialist (0231)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	81.3
Desktop publishers	7	47.6	Associate's degree	80.2
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	80.2
Private detectives and investigators	32	53.3	High school diploma or equivalent	79.5
Community health workers	59	42	High school diploma or equivalent	79.5
Sound engineering technicians	11	53.5	Postsecondary nondegree award	78.9
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	78.5
Audio and video technicians	62	47.9	Postsecondary nondegree award	78.5
Environmental science and protection technicians, including health	32	46.9	Associate's degree	78.1
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	77.6
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	77.1
Broadcast technicians	26	43.6	Associate's degree	77.1
Lodging managers	32	56.7	High school diploma or equivalent	77.0
First-line supervisors of office and administrative support workers	1,427	58.5	High school diploma or equivalent	76.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	76.6
Recreation workers	326	28.4	High school diploma or equivalent	76.5
Computer network support specialists	184	65.5	Associate's degree	76.2
Computer user support specialists	635	52.7	Some college, no degree	76.1
Air traffic controllers	22	130.4	Associate's degree	75.9
Environmental engineering technologists and technicians	17	51.6	Associate's degree	75.4
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	75.0
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	74.9
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	74.5

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Gambling managers	3	75.5	High school diploma or equivalent	74.3
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	74.3
Magnetic resonance imaging technologists	39	74.7	Associate's degree	74.2
Correctional officers and jailers	406	47.4	High school diploma or equivalent	74.1
Dispatchers, except police, fire, and ambulance	188	41.0	High school diploma or equivalent	74.1
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	73.9
Forest and conservation technicians	30	38.9	Associate's degree	73.6
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	73.5
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	73.5
Architectural and civil drafters	99	57.5	Associate's degree	73.4
Traffic technicians	7	47.8	High school diploma or equivalent	73.3
Residential advisors	102	31.2	High school diploma or equivalent	73.3
Civil engineering technologists and technicians	67	54.1	Associate's degree	73.2
Industrial engineering technologists and technicians	63	57.3	Associate's degree	73.0
Postmasters and mail superintendents	14	78.1	High school diploma or equivalent	72.5
Funeral home managers	10	74.2	Associate's degree	72.4
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	72.4
Social and human service assistants	400	36.0	High school diploma or equivalent	72.3
Fabric and apparel patternmakers	5	49.7	High school diploma or equivalent	72.3
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	71.9
Travel guides	38	29.5	High school diploma or equivalent	71.9
Real estate sales agents	169	49.0	High school diploma or equivalent	71.7
Public safety telecommunicators	93	43.3	High school diploma or equivalent	71.7
Gambling surveillance officers and gambling investigators	8	35.3	High school diploma or equivalent	71.6

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	71.3
Agricultural technicians	22	42.0	Associate's degree	71.2
Medical equipment repairers	49	51.6	Associate's degree	70.9

Table A.16. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Logistics/Embarkation Specialist (0431)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	97.7
Forest and conservation technicians	30	38.9	Associate's degree	95.2
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	93.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	92.9
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	92.6
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	92.4
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	92.0
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	90.8
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	90.5
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	90.4
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	89.9
Environmental science and protection technicians, including health	32	46.9	Associate's degree	89.7
Forest and conservation workers	6	30.6	High school diploma or equivalent	89.4
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	88.6
Agricultural technicians	22	42.0	Associate's degree	88.5
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	88.2
Environmental engineering technologists and technicians	17	51.6	Associate's degree	87.3
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	87.3
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	86.9
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	86.7
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	86.6
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	86.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	85.8
Athletes and sports competitors	8	50.9	No formal educational credential	85.8
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	85.0
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	85.0
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	84.9
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	84.9
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	84.5
Airfield operations specialists	11	51.3	High school diploma or equivalent	83.9
Firefighters	311	52.5	Postsecondary nondegree award	83.5
Chefs and head cooks	101	53.4	High school diploma or equivalent	83.4
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	83.1
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	82.9
Traffic technicians	7	47.8	High school diploma or equivalent	82.5
Commercial pilots	37	93.3	High school diploma or equivalent	82.3
Commercial divers	3	54.8	Postsecondary nondegree award	81.9
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	81.8
Avionics technicians	21	67.8	Associate's degree	81.6
Medical equipment repairers	49	51.6	Associate's degree	81.6
Community health workers	59	42	High school diploma or equivalent	81.4
Correctional officers and jailers	406	47.4	High school diploma or equivalent	81.2
Transportation inspectors	27	78.4	High school diploma or equivalent	81.2
Industrial engineering technologists and technicians	63	57.3	Associate's degree	80.8
Transit and railroad police	4	72.6	High school diploma or equivalent	80.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	80.6
Sound engineering technicians	11	53.5	Postsecondary nondegree award	80.4
Postmasters and mail superintendents	14	78.1	High school diploma or equivalent	80.3
Recreation workers	326	28.4	High school diploma or equivalent	80.2
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	79.9

Table A.17. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Military Police (5811)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	88.6
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	83.8
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	83.4
Firefighters	311	52.5	Postsecondary nondegree award	79.4
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	77.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	75.8
Transit and railroad police	4	72.6	High school diploma or equivalent	75.3
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	74.9
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	74.1
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	72.3
Forest and conservation technicians	30	38.9	Associate's degree	72.1
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	70.9
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	67.1
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	66.4
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	64.8
Commercial pilots	37	93.3	High school diploma or equivalent	64.3
Correctional officers and jailers	406	47.4	High school diploma or equivalent	63.3
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	62.3
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	62.1
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	61.8
Animal control workers	12	38.4	High school diploma or equivalent	61.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Athletes and sports competitors	8	50.9	No formal educational credential	60.9
Commercial divers	3	54.8	Postsecondary nondegree award	60.7
Forest and conservation workers	6	30.6	High school diploma or equivalent	60.3
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	60.0
Chefs and head cooks	101	53.4	High school diploma or equivalent	59.9
Airfield operations specialists	11	51.3	High school diploma or equivalent	59.8
Licensed practical and licensed vocational nurses	676	48.8	Postsecondary nondegree award	59.1
Ambulance drivers and attendants, except emergency medical technicians	14	27.9	High school diploma or equivalent	59.1
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	59.1
Environmental science and protection technicians, including health	32	46.9	Associate's degree	58.8
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	57.7
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	57.6
Radiation therapists	17	86.8	Associate's degree	57.1
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	56.4
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	56.4
Respiratory therapists	132	62.8	Associate's degree	56.3
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	55.4
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	55.2
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	53.6
Agricultural technicians	22	42.0	Associate's degree	53.6
Phlebotomists	128	36.3	Postsecondary nondegree award	53.5
Lodging managers	32	56.7	High school diploma or equivalent	53.4

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	53.2
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	53.1
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	52.9
Surgical assistants	77	51.8	Postsecondary nondegree award	52.8
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	52.7
Millwrights	44	57.3	High school diploma or equivalent	52.1
Motorboat operators	2	55.9	Postsecondary nondegree award	52.0

Table A.18. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Network Administrator (0631)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	89.5
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	88.9
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	88.5
Broadcast technicians	26	43.6	Associate's degree	87.2
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	86.8
Medical equipment repairers	49	51.6	Associate's degree	86.7
Sound engineering technicians	11	53.5	Postsecondary nondegree award	86.4
Forest and conservation technicians	30	38.9	Associate's degree	86.3
Audio and video technicians	62	47.9	Postsecondary nondegree award	86.2
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	86.1
Avionics technicians	21	67.8	Associate's degree	85.9
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	85.8
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	85.3
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	84.8
Agricultural technicians	22	42.0	Associate's degree	83.9
Environmental engineering technologists and technicians	17	51.6	Associate's degree	83.5
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	83.2
Environmental science and protection technicians, including health	32	46.9	Associate's degree	83.0
Computer network support specialists	184	65.5	Associate's degree	82.8
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	82.3
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	81.9
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	81.4
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	81.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Industrial engineering technologists and technicians	63	57.3	Associate's degree	80.5
Athletes and sports competitors	8	50.9	No formal educational credential	80.4
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	80.1
Correctional officers and jailers	406	47.4	High school diploma or equivalent	80.0
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	79.8
Traffic technicians	7	47.8	High school diploma or equivalent	79.5
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	79.3
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	79.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	79.0
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	79.0
Aerospace engineering and operations technologists and technicians	12	68.6	Associate's degree	78.8
Forest and conservation workers	6	30.6	High school diploma or equivalent	78.8
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	78.8
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	78.7
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	78.7
Chefs and head cooks	101	53.4	High school diploma or equivalent	78.4
Commercial divers	3	54.8	Postsecondary nondegree award	78.2
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	78.2
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	78.0
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	77.8
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	77.8
Aircraft structure, surfaces, rigging, and systems assemblers	38	53.2	High school diploma or equivalent	77.8
Magnetic resonance imaging technologists	39	74.7	Associate's degree	77.8

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Desktop publishers	7	47.6	Associate's degree	77.7
Firefighters	311	52.5	Postsecondary nondegree award	77.5
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	77.3
Computer user support specialists	635	52.7	Some college, no degree	77.2

Table A.19. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Infantry Rifleman (0311)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Firefighters	311	52.5	Postsecondary nondegree award	80.6
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	80.2
Forest and conservation technicians	30	38.9	Associate's degree	75.7
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	73.0
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	72.9
Commercial divers	3	54.8	Postsecondary nondegree award	72.3
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	71.9
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	69.8
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	68.4
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	68.0
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	67.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	67.2
Millwrights	44	57.3	High school diploma or equivalent	66.7
Commercial pilots	37	93.3	High school diploma or equivalent	66.5
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	66.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	65.9
Electricians	657	56.9	High school diploma or equivalent	65.5
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	65.4
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	65.3
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	65.1
Athletes and sports competitors	8	50.9	No formal educational credential	65.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Transit and railroad police	4	72.6	High school diploma or equivalent	64.9
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	64.9
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	64.3
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	64.2
Forest and conservation workers	6	30.6	High school diploma or equivalent	63.3
Environmental science and protection technicians, including health	32	46.9	Associate's degree	63.0
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	62.3
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	62.3
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	61.9
Chefs and head cooks	101	53.4	High school diploma or equivalent	60.7
Ship engineers	7	76.0	Postsecondary nondegree award	60.5
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	60.5
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	60.4
Ambulance drivers and attendants, except emergency medical technicians	14	27.9	High school diploma or equivalent	60.3
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	60.2
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	60.2
Agricultural technicians	22	42.0	Associate's degree	59.9
Environmental engineering technologists and technicians	17	51.6	Associate's degree	59.5
Avionics technicians	21	67.8	Associate's degree	59.3
Sailors and marine oilers	26	44.9	No formal educational credential	59.2
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	59.1
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	58.9
Service unit operators, oil and gas	44	47.4	No formal educational credential	58.8

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	58.6
Signal and track switch repairers	7	76.2	High school diploma or equivalent	58.6
Carpenters	699	49.5	High school diploma or equivalent	58.6
Telecommunications line installers and repairers	122	58.9	High school diploma or equivalent	58.3
Airfield operations specialists	11	51.3	High school diploma or equivalent	58.1
Riggers	22	50.9	High school diploma or equivalent	58.0

Table A.20. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Transmissions System Operator (0621)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Forest and conservation technicians	30	38.9	Associate's degree	88.5
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	88.1
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	86.9
Firefighters	311	52.5	Postsecondary nondegree award	85.5
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	83.3
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	82.3
Commercial divers	3	54.8	Postsecondary nondegree award	82.2
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	80.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	80.9
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	80.4
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	80.2
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	79.9
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	79.7
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	79.5
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	78.9
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	78.9
Avionics technicians	21	67.8	Associate's degree	78.6
Electricians	657	56.9	High school diploma or equivalent	78.1
Environmental science and protection technicians, including health	32	46.9	Associate's degree	78.1
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	77.8
Millwrights	44	57.3	High school diploma or equivalent	77.8
Athletes and sports competitors	8	50.9	No formal educational credential	77.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Agricultural technicians	22	42.0	Associate's degree	77.1
Forest and conservation workers	6	30.6	High school diploma or equivalent	76.3
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	76.0
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	75.8
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	75.6
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	75.6
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	75.4
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	74.7
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	74.5
Commercial pilots	37	93.3	High school diploma or equivalent	74.3
Electrical and electronics installers and repairers, transportation equipment	10	70.2	Postsecondary nondegree award	74.2
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	74.0
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	73.7
Ship engineers	7	76.0	Postsecondary nondegree award	73.6
Medical equipment repairers	49	51.6	Associate's degree	73.4
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	73.1
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	73.1
Signal and track switch repairers	7	76.2	High school diploma or equivalent	72.7
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	72.4
Environmental engineering technologists and technicians	17	51.6	Associate's degree	72.4
Transit and railroad police	4	72.6	High school diploma or equivalent	71.8
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	71.8
Service unit operators, oil and gas	44	47.4	No formal educational credential	71.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	71.6
Airfield operations specialists	11	51.3	High school diploma or equivalent	71.6
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	71.4
Electronic equipment installers and repairers, motor vehicles	10	39.6	High school diploma or equivalent	71.3
Ambulance drivers and attendants, except emergency medical technicians	14	27.9	High school diploma or equivalent	71.1

Air Force AFSC Matches to Civilian Occupations

Table A.21. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Advanced Fighter Aircraft Integrated Avionics (2A5X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	87.5
Firefighters	311	52.5	Postsecondary nondegree award	84.6
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	82.6
Millwrights	44	57.3	High school diploma or equivalent	82.1
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	81.4
Commercial divers	3	54.8	Postsecondary nondegree award	81.1
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	80.1
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	80.1
Forest and conservation technicians	30	38.9	Associate's degree	79.1
Electricians	657	56.9	High school diploma or equivalent	77.0
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	76.9
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	76.7
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	74.6
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	74.4
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	74.1
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	73.8
Service unit operators, oil and gas	44	47.4	No formal educational credential	73.8
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	73.6
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	73.4
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	73.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	72.7
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	72.6
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	72.1
Ship engineers	7	76.0	Postsecondary nondegree award	71.8
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	71.8
Avionics technicians	21	67.8	Associate's degree	71.7
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	71.6
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	71.6
Commercial pilots	37	93.3	High school diploma or equivalent	70.8
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	70.6
Signal and track switch repairers	7	76.2	High school diploma or equivalent	70.6
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	70.3
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	70.1
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	69.8
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	69.7
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	69.6
Nuclear technicians	6	84.2	Associate's degree	69.5
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	68.8
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	68.5
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	67.9
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	67.8
Helpers—extraction workers	13	37.9	High school diploma or equivalent	67.7
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	67.4

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Riggers	22	50.9	High school diploma or equivalent	67.0
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	66.6
Elevator and escalator installers and repairers	25	88.5	High school diploma or equivalent	66.4
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	66.3
Stationary engineers and boiler operators	30	64.7	High school diploma or equivalent	66.2
Environmental science and protection technicians, including health	32	46.9	Associate's degree	66.1
Boilermakers	14	65.4	High school diploma or equivalent	66.0

Table A.22. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aerospace Medical Service (4N0X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	80.6
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	80.3
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	80.0
Community health workers	59	42	High school diploma or equivalent	79.9
Licensed practical and licensed vocational nurses	676	48.8	Postsecondary nondegree award	79.9
Respiratory therapists	132	62.8	Associate's degree	78.4
Magnetic resonance imaging technologists	39	74.7	Associate's degree	78.3
Radiation therapists	17	86.8	Associate's degree	77.4
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	77.1
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	76.6
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	76.4
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	76.2
Correctional officers and jailers	406	47.4	High school diploma or equivalent	75.9
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	75.7
Diagnostic medical sonographers	74	75.9	Associate's degree	75.6
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	75.1
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	74.7
Medical assistants	710	35.9	Postsecondary nondegree award	74.1
Recreation workers	326	28.4	High school diploma or equivalent	73.9
Forest and conservation technicians	30	38.9	Associate's degree	73.4
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	73.2
Psychiatric technicians	85	35.0	Postsecondary nondegree award	73.0
Surgical assistants	77	51.8	Postsecondary nondegree award	72.9

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Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	72.5
Cardiovascular technologists and technicians	56	59.1	Associate's degree	72.4
Lodging managers	32	56.7	High school diploma or equivalent	72.0
Environmental science and protection technicians, including health	32	46.9	Associate's degree	71.8
Nuclear medicine technologists	18	79.6	Associate's degree	71.5
Phlebotomists	128	36.3	Postsecondary nondegree award	71.4
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	71.1
Veterinary technologists and technicians	109	36.3	Associate's degree	71.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	70.8
Funeral home managers	10	74.2	Associate's degree	70.3
Radiologic technologists and technicians	207	61.9	Associate's degree	70.2
Physical therapist assistants	93	59.8	Associate's degree	70.1
Transit and railroad police	4	72.6	High school diploma or equivalent	70.0
Firefighters	311	52.5	Postsecondary nondegree award	69.8
Occupational therapy aides	6	30.2	High school diploma or equivalent	69.4
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	68.7
Residential advisors	102	31.2	High school diploma or equivalent	68.5
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	68.4
Chefs and head cooks	101	53.4	High school diploma or equivalent	68.4
Gambling managers	3	75.5	High school diploma or equivalent	68.3
Forest and conservation workers	6	30.6	High school diploma or equivalent	68.3
Surgical technologists	107	49.7	Postsecondary nondegree award	68.2
Embalmers	4	47.6	Associate's degree	67.3
Environmental engineering technologists and technicians	17	51.6	Associate's degree	67.2
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	67.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Athletes and sports competitors	8	50.9	No formal educational credential	67.2
Occupational therapy assistants	43	62.9	Associate's degree	66.5

Table A.23. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Air Transportation (2T2X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Forest and conservation technicians	30	38.9	Associate's degree	96.5
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	93.7
Firefighters	311	52.5	Postsecondary nondegree award	93.5
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	93.4
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	93.0
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	92.8
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	91.4
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	87.8
Commercial divers	3	54.8	Postsecondary nondegree award	87.2
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	86.4
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	85.9
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	85.7
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	85.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	84.4
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	84.4
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	83.6
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	83.4
Electricians	657	56.9	High school diploma or equivalent	83.0
Forest and conservation workers	6	30.6	High school diploma or equivalent	82.7
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	82.6
Airfield operations specialists	11	51.3	High school diploma or equivalent	82.5

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Commercial pilots	37	93.3	High school diploma or equivalent	82.4
Environmental science and protection technicians, including health	32	46.9	Associate's degree	82.3
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	82.3
Millwrights	44	57.3	High school diploma or equivalent	81.8
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	81.0
Agricultural technicians	22	42.0	Associate's degree	80.2
Rail yard engineers, dinkey operators, and hostlers	5	51.7	High school diploma or equivalent	80.0
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	80.0
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	79.9
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	79.8
Riggers	22	50.9	High school diploma or equivalent	79.7
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	79.7
Carpenters	699	49.5	High school diploma or equivalent	79.6
Environmental engineering technologists and technicians	17	51.6	Associate's degree	79.5
Transit and railroad police	4	72.6	High school diploma or equivalent	79.4
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	79.3
Telecommunications line installers and repairers	122	58.9	High school diploma or equivalent	79.0
Service unit operators, oil and gas	44	47.4	No formal educational credential	78.7
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	78.6
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	78.5
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	78.5
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	78.4
Pump operators, except wellhead pumpers	11	48.1	High school diploma or equivalent	78.4

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	78.2
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	78.2
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	78.1
Ambulance drivers and attendants, except emergency medical technicians	14	27.9	High school diploma or equivalent	77.8
Gas plant operators	15	73.0	High school diploma or equivalent	77.8
Athletes and sports competitors	8	50.9	No formal educational credential	77.5

Table A.24. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Aircraft Armament Systems (2W1X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	88.9
Firefighters	311	52.5	Postsecondary nondegree award	88.4
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	87.3
Millwrights	44	57.3	High school diploma or equivalent	84.9
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	83.3
Commercial divers	3	54.8	Postsecondary nondegree award	82.4
Forest and conservation technicians	30	38.9	Associate's degree	81.8
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	80.6
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	79.4
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	78.9
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	78.0
Electricians	657	56.9	High school diploma or equivalent	77.7
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	77.7
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	77.5
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	77.4
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	77.1
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	77.0
Service unit operators, oil and gas	44	47.4	No formal educational credential	75.8
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	75.7
Ship engineers	7	76.0	Postsecondary nondegree award	75.5
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	75.2

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	73.6
Mobile heavy equipment mechanics, except engines	148	55.4	High school diploma or equivalent	73.6
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	73.1
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	73.0
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	73.0
Rotary drill operators, oil and gas	16	53.8	No formal educational credential	72.7
Tank car, truck, and ship loaders	13	45.6	No formal educational credential	72.6
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	72.3
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	72.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	71.7
Riggers	22	50.9	High school diploma or equivalent	71.2
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	70.8
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	70.6
Commercial pilots	37	93.3	High school diploma or equivalent	70.6
Avionics technicians	21	67.8	Associate's degree	70.4
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	70.4
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	70.3
Helpers—extraction workers	13	37.9	High school diploma or equivalent	70.2
Electrical power-line installers and repairers	115	75.0	High school diploma or equivalent	70.1
Electrical and electronics installers and repairers, transportation equipment	10	70.2	Postsecondary nondegree award	70.0
Signal and track switch repairers	7	76.2	High school diploma or equivalent	69.9
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	69.6

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Pump operators, except wellhead pumpers	11	48.1	High school diploma or equivalent	69.4
Manufactured building and mobile home installers	3	35.1	High school diploma or equivalent	69.3
Nuclear technicians	6	84.2	Associate's degree	69.2
Automotive service technicians and mechanics	620	44.0	Postsecondary nondegree award	69.1
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	68.7
Farm equipment mechanics and service technicians	36	43.9	High school diploma or equivalent	68.3
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	67.8

Table A.25. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Cyber Systems Operations (3D0X2)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Broadcast technicians	26	43.6	Associate's degree	90.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	88.9
Computer network support specialists	184	65.5	Associate's degree	87.2
Audio and video technicians	62	47.9	Postsecondary nondegree award	87.1
Desktop publishers	7	47.6	Associate's degree	85.6
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	85.2
Computer user support specialists	635	52.7	Some college, no degree	84.9
Medical equipment repairers	49	51.6	Associate's degree	84.5
Sound engineering technicians	11	53.5	Postsecondary nondegree award	84.2
Environmental engineering technologists and technicians	17	51.6	Associate's degree	82.1
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	81.8
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	81.3
Industrial engineering technologists and technicians	63	57.3	Associate's degree	81.2
Traffic technicians	7	47.8	High school diploma or equivalent	80.5
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	80.4
Architectural and civil drafters	99	57.5	Associate's degree	79.7
Environmental science and protection technicians, including health	32	46.9	Associate's degree	79.3
Computer numerically controlled tool programmers	26	57.7	Postsecondary nondegree award	78.1
Aerospace engineering and operations technologists and technicians	12	68.6	Associate's degree	78.0
First-line supervisors of office and administrative support workers	1,427	58.5	High school diploma or equivalent	77.9
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	77.8
Avionics technicians	21	67.8	Associate's degree	77.4
Magnetic resonance imaging technologists	39	74.7	Associate's degree	77.2
Audiovisual equipment installers and repairers	26	41.5	Postsecondary nondegree award	76.9

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	76.8
Web developers	156	77.2	Associate's degree	76.8
Private detectives and investigators	32	53.3	High school diploma or equivalent	76.6
Order clerks	120	35.6	Some college, no degree	76.3
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	76.2
Mechanical drafters	52	58.3	Associate's degree	75.7
Fabric and apparel patternmakers	5	49.7	High school diploma or equivalent	75.6
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	75.5
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	75.5
Community health workers	59	42	High school diploma or equivalent	75.3
Civil engineering technologists and technicians	67	54.1	Associate's degree	75.1
Prepress technicians and workers	28	41.4	Postsecondary nondegree award	74.6
Electrical and electronics drafters	23	62.1	Associate's degree	74.5
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	74.1
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	74.1
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	74.0
Recreation workers	326	28.4	High school diploma or equivalent	73.5
Dispatchers, except police, fire, and ambulance	188	41.0	High school diploma or equivalent	73.3
Food science technicians	22	42.0	Associate's degree	73.3
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	73.0
Gambling surveillance officers and gambling investigators	8	35.3	High school diploma or equivalent	72.7
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	72.6
Medical appliance technicians	14	41.8	High school diploma or equivalent	72.5
Forest and conservation technicians	30	38.9	Associate's degree	72.3
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	72.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	72.1

Table A.26. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Fighter Aircraft Integrated Avionics (2A3X4)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	90.5
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	82.9
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	82.6
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	82.4
Forest and conservation technicians	30	38.9	Associate's degree	82.2
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	80.8
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	80.1
Commercial divers	3	54.8	Postsecondary nondegree award	80.1
Avionics technicians	21	67.8	Associate's degree	79.7
Firefighters	311	52.5	Postsecondary nondegree award	79.5
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	79.0
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	77.9
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	76.9
Environmental science and protection technicians, including health	32	46.9	Associate's degree	76.7
Environmental engineering technologists and technicians	17	51.6	Associate's degree	76.3
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	76.3
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	76.2
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	76.2
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	75.9
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	75.6
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	75.2
Electricians	657	56.9	High school diploma or equivalent	75.1

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	75.1
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	74.9
Millwrights	44	57.3	High school diploma or equivalent	74.7
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	74.6
Agricultural technicians	22	42.0	Associate's degree	74.3
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	73.3
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	73.0
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	72.8
Gas plant operators	15	73.0	High school diploma or equivalent	72.7
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	72.6
Signal and track switch repairers	7	76.2	High school diploma or equivalent	72.5
Ship engineers	7	76.0	Postsecondary nondegree award	72.5
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	72.2
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	71.9
Nuclear technicians	6	84.2	Associate's degree	71.9
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	71.6
Pump operators, except wellhead pumpers	11	48.1	High school diploma or equivalent	71.6
Commercial pilots	37	93.3	High school diploma or equivalent	71.4
Medical equipment repairers	49	51.6	Associate's degree	71.2
Forest and conservation workers	6	30.6	High school diploma or equivalent	71.0
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	70.9
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	70.8
Airfield operations specialists	11	51.3	High school diploma or equivalent	70.7

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	70.7
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	70.4
Industrial engineering technologists and technicians	63	57.3	Associate's degree	70.4
Electrical and electronics installers and repairers, transportation equipment	10	70.2	Postsecondary nondegree award	70.0

Table A.27. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Knowledge Operations Management (3D0X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Desktop publishers	7	47.6	Associate's degree	96.9
First-line supervisors of office and administrative support workers	1,427	58.5	High school diploma or equivalent	95.5
Computer user support specialists	635	52.7	Some college, no degree	91.7
Computer network support specialists	184	65.5	Associate's degree	91.3
Web developers	156	77.2	Associate's degree	90.0
Architectural and civil drafters	99	57.5	Associate's degree	89.7
Community health workers	59	42	High school diploma or equivalent	89.7
Sound engineering technicians	11	53.5	Postsecondary nondegree award	89.4
Executive secretaries and executive administrative assistants	503	63.1	High school diploma or equivalent	89.4
Audio and video technicians	62	47.9	Postsecondary nondegree award	89.2
Order clerks	120	35.6	Some college, no degree	89.0
Dispatchers, except police, fire, and ambulance	188	41.0	High school diploma or equivalent	89.0
Broadcast technicians	26	43.6	Associate's degree	88.6
Private detectives and investigators	32	53.3	High school diploma or equivalent	87.8
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	87.5
Recreation workers	326	28.4	High school diploma or equivalent	87.5
Residential advisors	102	31.2	High school diploma or equivalent	86.9
Lodging managers	32	56.7	High school diploma or equivalent	86.8
Human resources assistants, except payroll and timekeeping	108	43.2	Associate's degree	86.4
Travel guides	38	29.5	High school diploma or equivalent	85.9
Opticians, dispensing	68	38.5	High school diploma or equivalent	85.6
Correspondence clerks	6	38.4	High school diploma or equivalent	85.4
Gambling managers	3	75.5	High school diploma or equivalent	85.1
First-line supervisors of personal service workers	175	42	High school diploma or equivalent	85.1

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Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Prepress technicians and workers	28	41.4	Postsecondary nondegree award	85.0
File clerks	92	34.1	High school diploma or equivalent	85.0
Procurement clerks	61	44.7	High school diploma or equivalent	84.9
Electrical and electronics drafters	23	62.1	Associate's degree	84.8
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	84.6
Mechanical drafters	52	58.3	Associate's degree	84.6
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	84.5
Fabric and apparel patternmakers	5	49.7	High school diploma or equivalent	84.3
Hearing aid specialists	8	52.6	High school diploma or equivalent	84.0
Property, real estate, and community association managers	220	59.7	High school diploma or equivalent	83.9
Paralegals and legal assistants	333	52.9	Associate's degree	83.7
Secretaries and administrative assistants, except legal, medical, and executive	1,850	38.9	High school diploma or equivalent	83.2
Public safety telecommunicators	93	43.3	High school diploma or equivalent	83.1
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	83.0
Real estate sales agents	169	49.0	High school diploma or equivalent	82.7
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	82.6
Civil engineering technologists and technicians	67	54.1	Associate's degree	82.6
Cargo and freight agents	97	43.8	High school diploma or equivalent	82.5
First-line supervisors of retail sales workers	1,063	41.6	High school diploma or equivalent	82.4
First-line supervisors of non-retail sales workers	240	78.6	High school diploma or equivalent	82.1
Postmasters and mail superintendents	14	78.1	High school diploma or equivalent	82.0
Gambling surveillance officers and gambling investigators	8	35.3	High school diploma or equivalent	82.0
Traffic technicians	7	47.8	High school diploma or equivalent	82.0

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Social and human service assistants	400	36.0	High school diploma or equivalent	82.0
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	81.9
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	81.8

Table A.28. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Materiel Management (2S0X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	93.8
Electrical and electronic engineering technologists and technicians	115	67.5	Associate's degree	91.9
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	90.8
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	90.8
Forest and conservation technicians	30	38.9	Associate's degree	90.5
Environmental engineering technologists and technicians	17	51.6	Associate's degree	90.5
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	90.3
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	90.1
Environmental science and protection technicians, including health	32	46.9	Associate's degree	89.1
Forest and conservation workers	6	30.6	High school diploma or equivalent	88.7
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	88.5
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	88.4
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	88.0
Broadcast technicians	26	43.6	Associate's degree	88.0
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	86.9
Medical equipment repairers	49	51.6	Associate's degree	86.4
Agricultural technicians	22	42.0	Associate's degree	86.1
Athletes and sports competitors	8	50.9	No formal educational credential	85.9
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	85.1
Traffic technicians	7	47.8	High school diploma or equivalent	85.1
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	85.1
Audio and video technicians	62	47.9	Postsecondary nondegree award	84.7
Geological technicians, except hydrologic technicians	16	50.6	Associate's degree	84.3

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Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Sound engineering technicians	11	53.5	Postsecondary nondegree award	84.2
Avionics technicians	21	67.8	Associate's degree	83.8
Power distributors and dispatchers	10	95.1	High school diploma or equivalent	83.6
Industrial engineering technologists and technicians	63	57.3	Associate's degree	83.5
Weighers, measurers, checkers, and samplers, recordkeeping	58	36.6	High school diploma or equivalent	83.0
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	82.9
Surveying and mapping technicians	53	46.2	High school diploma or equivalent	82.8
Community health workers	59	42	High school diploma or equivalent	82.7
Production, planning, and expediting clerks	362	49.6	High school diploma or equivalent	82.4
Airfield operations specialists	11	51.3	High school diploma or equivalent	82.4
Recreation workers	326	28.4	High school diploma or equivalent	82.2
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	81.9
Correctional officers and jailers	406	47.4	High school diploma or equivalent	81.9
Food science technicians	22	42.0	Associate's degree	81.7
Magnetic resonance imaging technologists	39	74.7	Associate's degree	81.5
Aircraft structure, surfaces, rigging, and systems assemblers	38	53.2	High school diploma or equivalent	81.4
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	81.3
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	81.1
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	81.1
Animal trainers	15	31.5	High school diploma or equivalent	80.9
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	80.9
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	80.8
Parts salespersons	254	32.5	No formal educational credential	80.5

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Chefs and head cooks	101	53.4	High school diploma or equivalent	80.5
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	80.5
Civil engineering technologists and technicians	67	54.1	Associate's degree	80.4
Computer numerically controlled tool programmers	26	57.7	Postsecondary nondegree award	80.2

**Table A.29. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for
Munitions Systems (2W0X1)**

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	99.1
Forest and conservation technicians	30	38.9	Associate's degree	97.0
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	95.3
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	91.8
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	91.8
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	91.3
Firefighters	311	52.5	Postsecondary nondegree award	90.7
Commercial divers	3	54.8	Postsecondary nondegree award	89.9
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	88.8
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	88.7
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	88.7
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	88.0
Electrical and electronics repairers, commercial and industrial equipment	55	62.0	Postsecondary nondegree award	87.0
Environmental science and protection technicians, including health	32	46.9	Associate's degree	86.8
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	86.0
Electricians	657	56.9	High school diploma or equivalent	85.9
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	85.9
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	85.8
Environmental engineering technologists and technicians	17	51.6	Associate's degree	85.4
Agricultural technicians	22	42.0	Associate's degree	85.4
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	85.3
Forest and conservation workers	6	30.6	High school diploma or equivalent	85.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	84.7
Airfield operations specialists	11	51.3	High school diploma or equivalent	84.6
Pump operators, except wellhead pumpers	11	48.1	High school diploma or equivalent	84.1
Wind turbine service technicians	6	56.2	Postsecondary nondegree award	84.0
Electrical and electronics repairers, powerhouse, substation, and relay	23	85.3	Postsecondary nondegree award	83.8
Electric motor, power tool, and related repairers	15	46.6	High school diploma or equivalent	83.7
Avionics technicians	21	67.8	Associate's degree	83.5
Millwrights	44	57.3	High school diploma or equivalent	83.4
Control and valve installers and repairers, except mechanical door	51	60.6	High school diploma or equivalent	83.4
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	83.2
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	82.9
Chemical equipment operators and tenders	93	50.5	High school diploma or equivalent	82.9
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	82.8
Gas compressor and gas pumping station operators	4	67.8	High school diploma or equivalent	82.4
Petroleum pump system operators, refinery operators, and gaugers	40	78.8	High school diploma or equivalent	82.3
Gas plant operators	15	73.0	High school diploma or equivalent	82.2
Electro-mechanical and mechatronics technologists and technicians	13	59.8	Associate's degree	82.2
Aircraft mechanics and service technicians	128	66.4	Postsecondary nondegree award	82.0
Commercial pilots	37	93.3	High school diploma or equivalent	81.9
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	81.8
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	81.4
Ship engineers	7	76.0	Postsecondary nondegree award	81.3

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Water and wastewater treatment plant and system operators	119	49.1	High school diploma or equivalent	81.0
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	81.0
Mechanical engineering technologists and technicians	40	58.2	Associate's degree	80.7
Chefs and head cooks	101	53.4	High school diploma or equivalent	80.7
Rail yard engineers, dinkey operators, and hostlers	5	51.7	High school diploma or equivalent	80.4
Transit and railroad police	4	72.6	High school diploma or equivalent	80.1

Table A.30. Top 50 Civilian Occupational Matches Not Requiring a Bachelor's Degree for Security Forces (3P0X1)

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of police and detectives	122	93.0	High school diploma or equivalent	90.5
First-line supervisors of firefighting and prevention workers	69	78.9	Postsecondary nondegree award	89.2
Police and sheriff's patrol officers	655	65.5	High school diploma or equivalent	87.1
Firefighters	311	52.5	Postsecondary nondegree award	85.9
First-line supervisors of mechanics, installers, and repairers	475	70.2	High school diploma or equivalent	82.2
Transit and railroad police	4	72.6	High school diploma or equivalent	81.3
Fire inspectors and investigators	14	64.6	Postsecondary nondegree award	81.1
Forest and conservation technicians	30	38.9	Associate's degree	80.4
Detectives and criminal investigators	106	86.9	High school diploma or equivalent	80.3
First-line supervisors of correctional officers	53	60.9	High school diploma or equivalent	78.8
Aircraft cargo handling supervisors	10	53.6	High school diploma or equivalent	77.2
Forest fire inspectors and prevention specialists	3	42.1	High school diploma or equivalent	77.0
Captains, mates, and pilots of water vessels	28	77.1	Postsecondary nondegree award	74.5
First-line supervisors of farming, fishing, and forestry workers	23	50.1	High school diploma or equivalent	72.9
First-line supervisors of construction trades and extraction workers	614	67.8	High school diploma or equivalent	72.0
Morticians, undertakers, and funeral arrangers	25	54.1	Associate's degree	71.4
First-line supervisors of material-moving machine and vehicle operators	477	54.9	High school diploma or equivalent	71.0
Correctional officers and jailers	406	47.4	High school diploma or equivalent	70.9
Commercial pilots	37	93.3	High school diploma or equivalent	70.7
Environmental science and protection technicians, including health	32	46.9	Associate's degree	69.7
First-line supervisors of production and operating workers	600	62.9	High school diploma or equivalent	69.6

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Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
First-line supervisors of landscaping, lawn service, and groundskeeping workers	104	51.0	High school diploma or equivalent	69.3
Airfield operations specialists	11	51.3	High school diploma or equivalent	68.9
Commercial divers	3	54.8	Postsecondary nondegree award	68.7
Athletes and sports competitors	8	50.9	No formal educational credential	68.6
Ambulance drivers and attendants, except emergency medical technicians	14	27.9	High school diploma or equivalent	68.6
Forest and conservation workers	6	30.6	High school diploma or equivalent	68.5
Chefs and head cooks	101	53.4	High school diploma or equivalent	68.2
Farmers, ranchers, and other agricultural managers	6	68.1	High school diploma or equivalent	67.6
Explosives workers, ordnance handling experts, and blasters	23	48.5	High school diploma or equivalent	66.7
Animal control workers	12	38.4	High school diploma or equivalent	66.5
Locksmiths and safe repairers	16	43.7	High school diploma or equivalent	65.4
Telecommunications equipment installers and repairers, except line installers	191	61.5	Postsecondary nondegree award	65.2
Hazardous materials removal workers	44	45.3	High school diploma or equivalent	64.3
First-line supervisors of helpers, laborers, and material movers, hand	477	54.9	High school diploma or equivalent	64.1
Heating, air conditioning, and refrigeration mechanics and installers	344	50.6	Postsecondary nondegree award	63.8
Occupational health and safety technicians	21	53.3	High school diploma or equivalent	63.8
Agricultural technicians	22	42.0	Associate's degree	63.3
Environmental engineering technologists and technicians	17	51.6	Associate's degree	62.7
Transportation, storage, and distribution managers	132	96.4	High school diploma or equivalent	62.5
First-line supervisors of housekeeping and janitorial workers	141	42.0	High school diploma or equivalent	62.3
Licensed practical and licensed vocational nurses	676	48.8	Postsecondary nondegree award	61.8
Radio, cellular, and tower equipment installers and repairers	13	57.7	Associate's degree	61.6

Civilian Occupation	Number of U.S. Jobs (thousands)	Median Wages ($, thousands)	Education at Entry	Match Score
Electricians	657	56.9	High school diploma or equivalent	60.5
Millwrights	44	57.3	High school diploma or equivalent	60.4
Motorboat operators	2	55.9	Postsecondary nondegree award	60.1
Construction and building inspectors	114	62.9	High school diploma or equivalent	59.6
Telecommunications line installers and repairers	122	58.9	High school diploma or equivalent	59.6
Radiation therapists	17	86.8	Associate's degree	59.3
Surgical assistants	77	51.8	Postsecondary nondegree award	59.0

Abbreviations

AB	aviation boatswain's mate
AFSC	Air Force Specialty Code
AM	aviation structural mechanic
AO	aviation ordnanceman
ASVAB	Armed Services Vocational Aptitude Battery
BM	boatswain's mate
COOL	Credentialing Opportunities On-Line
CS	culinary specialist
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
DoL	U.S. Department of Labor
ET	electronics technician
GED	general equivalency diploma
HM	hospital corpsman
KSAs	knowledge, skills, and abilities
MM	machinist's mate
MOS	military occupational specialty
O*NET	Occupational Information Network
OS	operations specialist
TAP	Transition Assistance Program

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E ach year, about 200,000 U.S. service members leave active duty and transition to civilian employment. Many of these service members find this transition difficult because some military occupations have no direct parallel in the civilian economy.

In a previous study, researchers at the RAND Corporation developed a method of matching occupational characteristics from the civilian economy to occupations in the U.S. Army. In this report, the authors extend that method to the U.S. Navy, Marine Corps, and Air Force.

The authors collected data from more than 5,100 active component enlisted personnel across the three service branches using the U.S. Department of Labor's (DoL's) Occupational Information Network (O*NET) survey. For each military occupation surveyed, the authors identified the most-similar civilian occupations by comparing service members' responses to the O*NET survey items with the responses that DoL obtained on those same survey items for almost 1,000 civilian occupations. This approach contrasts with existing methods for generating military-to-civilian occupation crosswalks, which rely on analyses of high-level job descriptions by occupational analysts.

The authors were able to algorithmically match a military occupation to every civilian occupation and determine the best fit. The job-matching algorithm provides both high-quality occupational recommendations for each military occupation and the reasons that those matches are high quality. These results will be useful for service members who are leaving the military in search of civilian employment, job counselors, and employers in search of workers with specific skill sets.

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