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16. Abstract

A total of 792 journeyman air traffic controllers from ARTCC, TRACON, and FSS facilities answered a four-part questionnaire concerning (a) what they liked and disliked about ATC work, (b) how much they liked or disliked certain specific aspects of ATC work, (c) how they felt about shift work, and (d) their level of job satisfaction. In general, the three ATC specialties showed high agreement in their job-related attitudes. They liked most of their job tasks and the challenge of ATC work; they tended to dislike management, their work schedules, and job tasks not directly related to traffic control or flight service. Concerning shift work, it was found that the most negative attitudes were associated with night (2400 to 0800) shifts. Controllers also indicated a preference for rapid turn-around shift rotation schedules. Finally, these satisfaction questionnaires indicated that approximately 91% of the controllers surveyed were satisfied with their occupational choice. However, most had other career aspirations for the future. The findings were discussed in terms of the similarity of the controller groups to members of other occupations, and in terms of the significance of the findings for improving controller morale.

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JOB ATTITUDES OF AIR TRAFFIC CONTROLLERS: A COMPARISON OF THREE AIR TRAFFIC CONTROL SPECIALTIES

I. Introduction.

The systematic description of the job attitudes of air traffic control specialists (ATCSs) is fundamental to the development of a sound program designed to increase morale, and therefore improve the performance of the air traffic control (ATC) system. A previous survey of such attitudes involved journeymen ATCSs located in Terminal area facilities and trainees at the FAA Academy.[12] The present study was designed: (a) to partially replicate the survey for Terminal area facilities (Towers) to determine to what extent ATCS job attitudes may have changed since the administration of the previous survey (1968–1969),[12] (b) to expand the attitude survey to include ATCSs at Air Route Traffic Control Centers (Centers) and at Flight Service Stations (FSS), (c) to enlarge the survey to include rating scales of factors determined to be of significance in ATCS job attitudes, (d) to specifically determine attitudes toward work shifts and shift schedules, and (e) to provide a rating of overall degree of job satisfaction.

II. Method.

Subjects. A total of 792 ATCSs from 18 ATC facilities volunteered to participate in the survey. The age range of the participants was from 23 to 63 years with a mean of 35.5 years. Experience as a journeyman ranged from six months to 31 years, with a mean of 9.3 years. The three ATC options were represented by 172 ATCSs from Towers,* 513 from Centers, and 107 from FSSs. Six FAA regions were included in the project; one of each type of facility was visited in each region. All FSSs, all but one Center, and all but two Towers were in the highest activity level classification for their respective facility types.

*Each Tower surveyed was actually a combined Tower/Terminal Radar Approach Control facility in which all ATCSs rotated between tower cab and radar room positions.

Survey Questionnaires. There were four attitude questionnaires used in this study (see Appendix I). The first questionnaire, the Likes-Dislikes Questionnaire, asked the ATCS to indicate what he liked best and what he liked least about (a) ATC work in general, and (b) ATC work at his specific facility. This form was essentially a duplicate of the questionnaire used in the study of ATCS attitudes conducted during November 1968 through February 1969.[12] The second part of the present survey was the Rating Scales Questionnaire in which the respondent rated 34 specific aspects of ATC work which were frequently mentioned in the earlier study.[12] Each item was rated on a five-point scale which ranged from "like very much" to "dislike very much." The third questionnaire was the Shift Work Survey which was designed to obtain specific feelings about the shift work required in ATC operations. There were five pairs of questions concerning feelings, performance, and satisfaction associated with various shifts. One question in each pair asked the ATCS to indicate the shift which was associated with a specific positive feeling (e.g., best performance, most relaxed, most satisfaction) while the other question asked for an indication of the shift which was associated with the corresponding negative feeling (e.g., worst performance, most tense, least satisfaction). In addition, ATCSs were asked to indicate a preferred shift rotation schedule. The fourth, and final, part of the survey was the Satisfaction Questionnaire which asked the participant to rate his current satisfaction as an ATCS, to indicate his past career intentions, and his future career aspirations.

Procedure. The survey was conducted during December of 1971 and January of 1972. Most ATCSs participated in the survey during their regular working hours, while the remainder responded just before or after duty (compensation was provided for any overtime spent on the

survey). The entire task took approximately one hour, and included an interest inventory (the Strong Vocational Interest Blank) not related to the attitude survey. In each case, the Likes-Dislikes Questionnaire was answered first, then the interest inventory. The remaining three questionnaires were given in semi-randomized order across respondents, that is, an equal number of ATCSs answered these questionnaires in each of the three possible orders of presentation. Directions for answering each of the survey questionnaires were presented on the appropriate response sheet. The only general instructions provided were to work as rapidly as possible consistent with care in answering the items and to refrain from placing a name or other identifying information on any part of the survey. It was explained to the participants that each record would be completely anonymous, so that the respondent could answer each item with complete candor and without concern that his responses could be specifically related to him in any way.

Scoring. The responses to the Likes-Dislikes Questionnaire were scored according to the nine response categories established in the previous study of ATC personnel (these are designated FAA Response Categories).[12] The categories were labeled *Job Tasks*, *Job Challenge*, *Career Characteristics*, *Salary*, *Work Schedule*, *Peers*, *Facilities*, *Management*, and *Miscellaneous*. The statements from the Likes- and Dislikes-in-General sections of the questionnaire were also scored by the 16-category system devised by Herzberg.[5,6] The 16 Herzberg factors were derived from the research of Herzberg and others on the job attitudes of several widely divergent occupational groups (e.g., engineers, unskilled laborers).[5,6] In general, Herzberg found that job satisfaction was associated with factors such as *Achievement*, *Recognition*, *Work Itself*, *Advancement*, *Possibility of Growth*, and *Responsibility*, which he labeled "Motivator Factors." Dissatisfaction generally centered on what Herzberg designated as "Hygiene Factors," such as *Company Policy and Administration*, *Working Conditions*, *Supervision*, *Salary*, *Interpersonal Relations—Peers*, *—Subordinates*, *—Superiors*, *Factors in Personal Life*, *Job Security*, and *Status*. From these data, Herzberg developed the motivator-hygiene theory which holds that the factors which account for job satisfaction (Motivators) are separate and distinct from those factors which lead to job dissatisfaction (Hygiene Factors). The Herzberg approach was used to permit a determination of the extent to which the job attitudes of ATCSs are in keeping with those of employees in a variety of other occupations.

Descriptions of each FAA and Herzberg category are presented in Appendix II. Although some individuals provided more than the requested three statements per section, only the first three statements were considered in the various analyses.

Three judges were used in the classification of the responses into the FAA and Herzberg categories. Two of the judges were technicians with Bachelor's degrees in psychology, but both were naive with respect to the general area under investigation and to the Herzberg[5] theory. These two judges sorted all responses according to the criteria listed in Appendix II. To minimize bias in their classifications, the training provided was confined to clarification of the criteria and the technical terms used by ATCSs. The third judge (the author) classified only those statements on which there was a disagreement between the first two judges.

In order to insure that the judges in the present study were actually classifying responses in the FAA Response Categories by the same procedure as used in the previous study, the present judges rated a random sample of responses from the 1968–1969 survey.[12] The ratings of one judge agreed with the with the 1968 ratings on 88.3% of the sampled responses, while the second judge agreed with the previous raters on 87.0% of the responses sampled. It was estimated that these variations between the two groups of raters would have resulted in an average change of 1.3% in the percentages originally established. This amount of variation would not have resulted in any changes in frequency of statistical or experimental significance.

With the present data, the first two judges agreed on 87% of the ratings for the FAA Response Categories, and on 80% of the classifications in the Herzberg system. Most disagreements occurred because one judge or the other consistently scored a particular type of response inappropriately. For example, one judge scored all responses indicating that an ATCS did or did not like to work with pilots under the Herzberg

category of *Interpersonal Relationships—Subordinates*, instead of the appropriate category of *Work Itself*. The former category was supposed to be used only for statements pertaining to individuals with whom the respondent had a supervisory responsibility (such as trainees), while the latter classification was used for any comment concerning the actual job tasks, which included "working with pilots." This type of misclassification appeared to be the primary determinant in at least 50% of the disagreements in ratings. Thus, relatively few of the disagreements were based on discrepancies in the *interpretation* of responses.

III. Results and Discussion.

Part 1: What ATCSs Like and Dislike in ATC Work

FAA Response Categories

A total of 7,372 statements were obtained in response to this survey; of these, 52.6% were to the "like best" portions of the questionnaire. The percentages of these statements classified as belonging to each FAA Response Category for the various sections of the questionnaire are presented in Figures 1 and 2. In addition to the percentages obtained for each ATCS specialty (FSS, Center, Tower), the percentages obtained from the Tower personnel surveyed in the 1968–1969 study[12] are shown for comparison purposes.

ATC Work in General. As can be seen in Figure 1, the ATCSs most frequently mentioned their actual *Job Tasks* (30.1%) and the *Job Challenge* (27.3%) as aspects of ATC work which they liked best. Of the other possible types of responses, only those relating to *Career Characteristics* (14.1%) and *Salary* (11.8%) each accounted for 10% or more of the Likes-in-General responses.

Statements concerning *Management* (36.6%) occurred most frequently as a dislike about ATC work. Also mentioned with considerable frequency as sources of dissatisfaction were various aspects of ATC *Work Schedules* (18.3%) and *Job Tasks* (18.1%). No other category accounted for as many as 10% of the responses to the Dislikes-in-General section of the questionnaire.

The seeming paradox between the frequent mention of *Job Task* types of statements as both likes and dislikes may be explained by consideration of the content of this relatively broad response category (Appendix II). Specifically, the statements under the Likes-in-General section concerned working with radar, advising pilots, radio communications, and other tasks associated with the direct control of air traffic, or in the case of FSS personnel, of providing service to pilots. In contrast, the statements concerning *Job Tasks* made under the Dislikes-in-General section primarily concerned duties not directly related to the control of air traffic or provision of flight services. These included statements concerning extra duties, paper work, cleaning details, and training responsibilities.

ATC Work at the Facility. As far as their particular facility was concerned (Figure 2), the ATCSs most often mentioned that they liked their *Job Tasks* (36.5%). Much less frequent were positive comments about the *Facilities* they had for accomplishing their work (13.1%), the *Job Challenge* (12.2%), and their *Peers* (11.1%).

As with the general portion of the questionnaire, the major complaints of ATCSs about ATC work at their facilities concerned *Management* (39.5%). Negative statements concerning *Job Tasks* (23.6%) were also relatively frequent. There was also a considerable number of comments about the *Facilities* (14.1%) and *Work Schedules* (11.9%).

Agreement Between ATCS Specialties. The three ATC options showed substantial agreement in their responses. There were three correlations between specialities (Tower to Center, Tower to FSS, and Center to FSS) for each of the four questionnaire sections. These correlations provide an index of the degree of agreement between the rank-orders of the percentages of statements classified in each category by the controllers in the three ATC options. The values ranged from .69 to .99 and averaged .90. Of the 12 correlations, 10 were significant at the .01 level and the remaining two values were significant at the .05 level. The average correlations between Tower and Center, Tower and FSS, and Center and FSS options were .96, .89, and .84, respectively. Thus, it can be seen that while agreement between all groups was substantial, the Tower and Center groups were, as might have been expected, more similar to each other in their work-oriented attitudes than they were to FSS ATCSs.

Only a few differences of any importance were noted between the ATCS specialities. The FSS group made proportionally more statements about

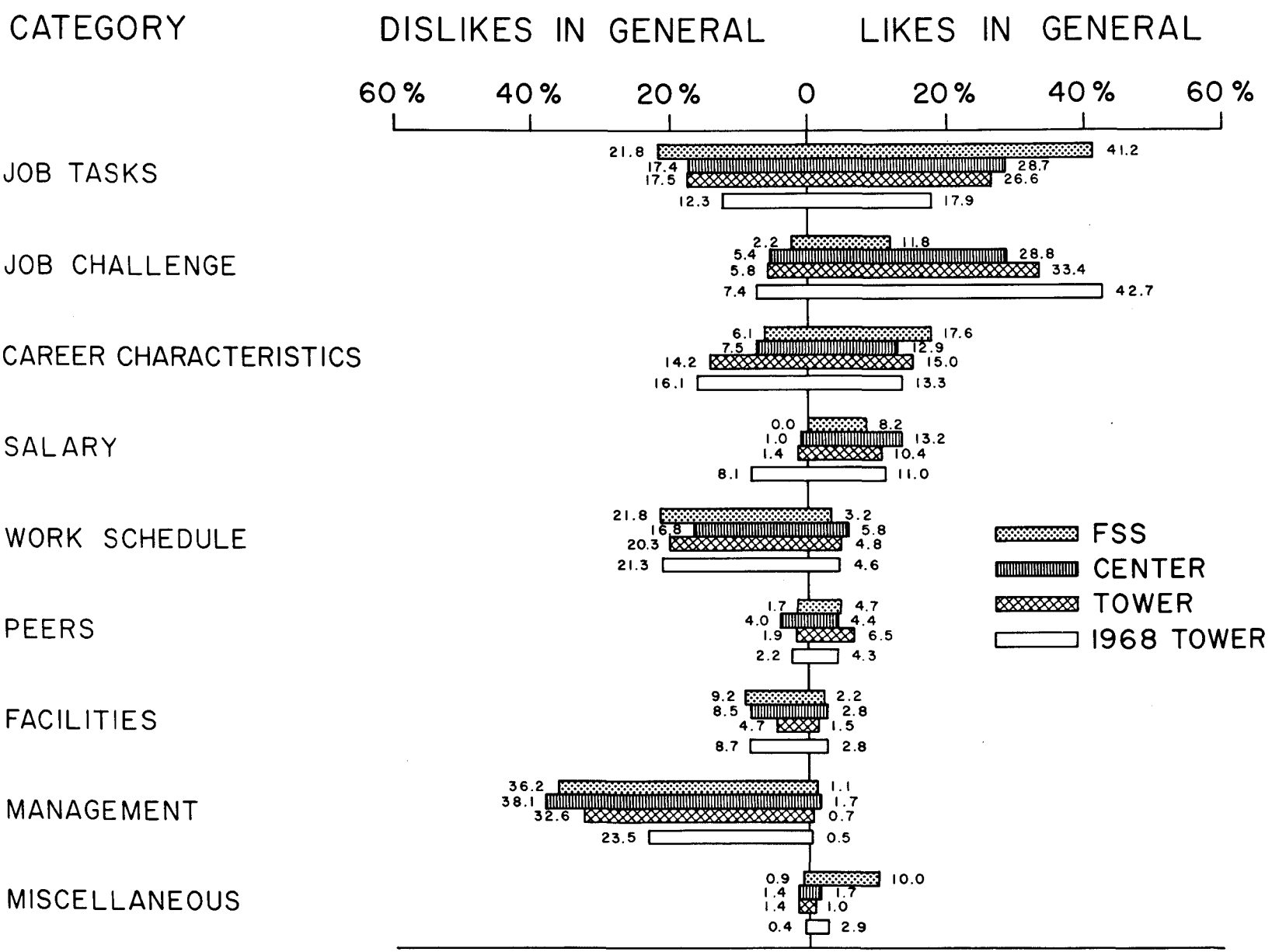

FIGURE 1. Percentages of Likes-in-General and Dislikes-in-General statements in each FAA Response Category for the three ATCS options.

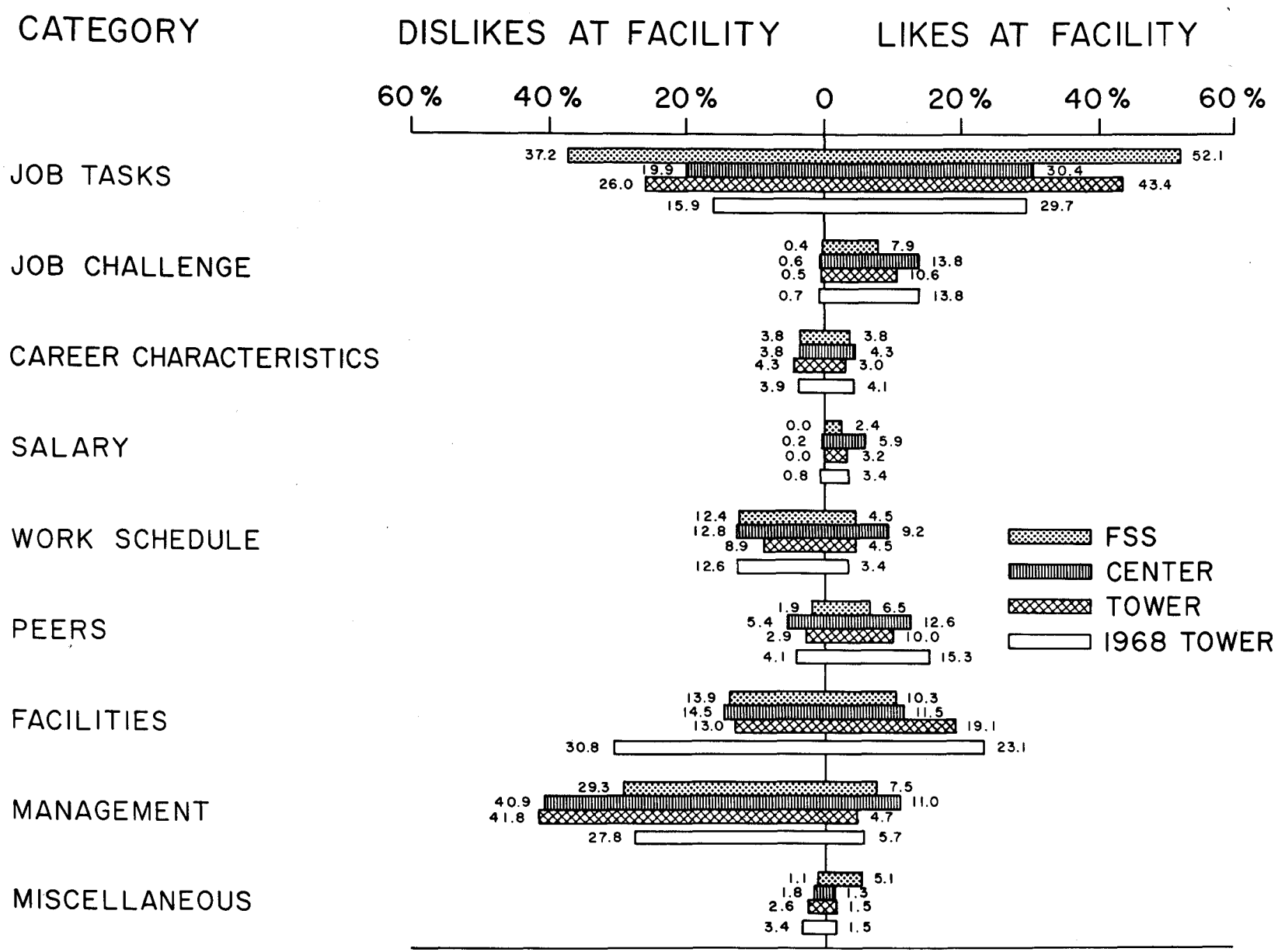

FIGURE 2. Percentages of Likes-at-Facility and Dislikes-at-Facility statements in each FAA Response Category for the three ATCS options.

Job Tasks in the Likes-in-General and Dislikes-at-Facility sections than did the other two groups ($p<.05$ or better for each comparison). The FSS group, as well as the Tower group, also made relatively more *Job Tasks* statements than Center ATCSs ($p<.05$) in the Likes-at-Facility section. The FSS group made comparatively fewer responses than the other two groups of the *Job Challenge* type in the Likes-in-General section, and of the *Management* variety in the Dislikes-in-General section.

The only other difference of note was that the Tower ATCSs made relatively more positive comments than did either the FSS or Center groups about their *Facilities* in the Likes-at-Facility section ($p<.01$).

The 1968–1969 and Current Surveys Compared. For purposes of making comparisons between the two surveys, only the Tower group from the current survey was employed in these analyses since no Center or FSS personnel were included in the 1968–1969 study.

With respect to general response trends, it was found that the current Tower group produced a somewhat greater proportion of positive responses to the questionnaire (53.2%) than did the 1968–1968 Tower group (49.8%). The difference in proportions was significant, $p<.05$.

The correations between the ranke-orders of the percentages of responses in the FAA Response Categories ranged from .88 to .97 and averaged .94 across the four questionnaire sections ($p<.01$ for each correlation). Thus, there was relatively good agreement between the two groups on the orderings of the categories. However, in each of the four questionnaire sections, the current Tower group was found to have made proportionally more statements about *Job Tasks* than did the 1968–1969 group ($p<.01$ for each comparison). The same was true for statements about *Management* in the two sections concerning the aspects of ATC work which the ATCSs dislike ($p<.01$). On the other hand, the 1968–1969 group of Tower ATCSs made relatively more complaints about *Facilities*, both in general ($p<.05$) and at the facility ($p<.05$), than did the current group. They also had a proportionally greater number of negative statements about *Salary* than did the more recent group ($p<.05$). The only areas in which the 1968–1969 group tended to be more positive were those of *Job Challenge* in the Likes-in-General section ($p<.05$) and *Peers* in the Likes-at-Facility section ($p<.05$).

Comments Section. It was found in the earlier study of Tower ATCSs that responses to the Comments section of the questionnaire were generally amplifications of statements made to the Dislikes-in-General or Dislikes-at-Facility sections. This also was found to be the case in the present survey after preliminary evaluation of the data. Therefore, no further formal analyses of the Comments responses were undertaken.

Herzberg Factors

Four Herzberg factors, *Work Itself*, *Salary*, *Achievement*, and *Working Conditions*, accounted for 76.8% of the statements which ATCSs made about aspects of ATC work which they liked in general (Figure 3). Just three factors, *Company Policy and Administration*, *Working Conditions*, and *Work Itself*, included 79.9% of the responses concerning what ATCSs disliked about ATC work in general.

Considering the Motivators and Hygiene Factors as groups, it was found that the six Motivators accounted for about two-thirds (66.6%) of the Likes-in-General statements, while 10 Hygiene Factors included more than three-fourths (76.8%) of the Dislikes-in-General statements. This difference in proportions of likes and dislikes statements accounted for by the two factors was significant ($p<.01$).

As predicted by the motivator-hygiene theory, the Motivators generally contained more statements concerning what ATCSs liked than what they disliked about ATC work. The *Work Itself*, *Achievement*, *Responsibility*, and *Recognition* factors each contained significantly more responses about positive than negative aspects of ATC work ($p<.05$ or better in each case). The other two Motivators, *Advancement* and *Possibility of Growth*, showed no differences between frequencies of likes and dislikes statements.

With respect to Hygiene Factors, again the results were generally in accord with the prediction of the motivator-hygiene theory that negative statements about ATC work would be predominant in these categories. This was true for the *Company Policy and Administration*, *Working Conditions*, *Supervision—Technical*, *Factors in Personal Life*, and *Interpersonal Relationships—Superiors* factors ($p<.01$ in each case). The *Salary* factor was the only Hygiene

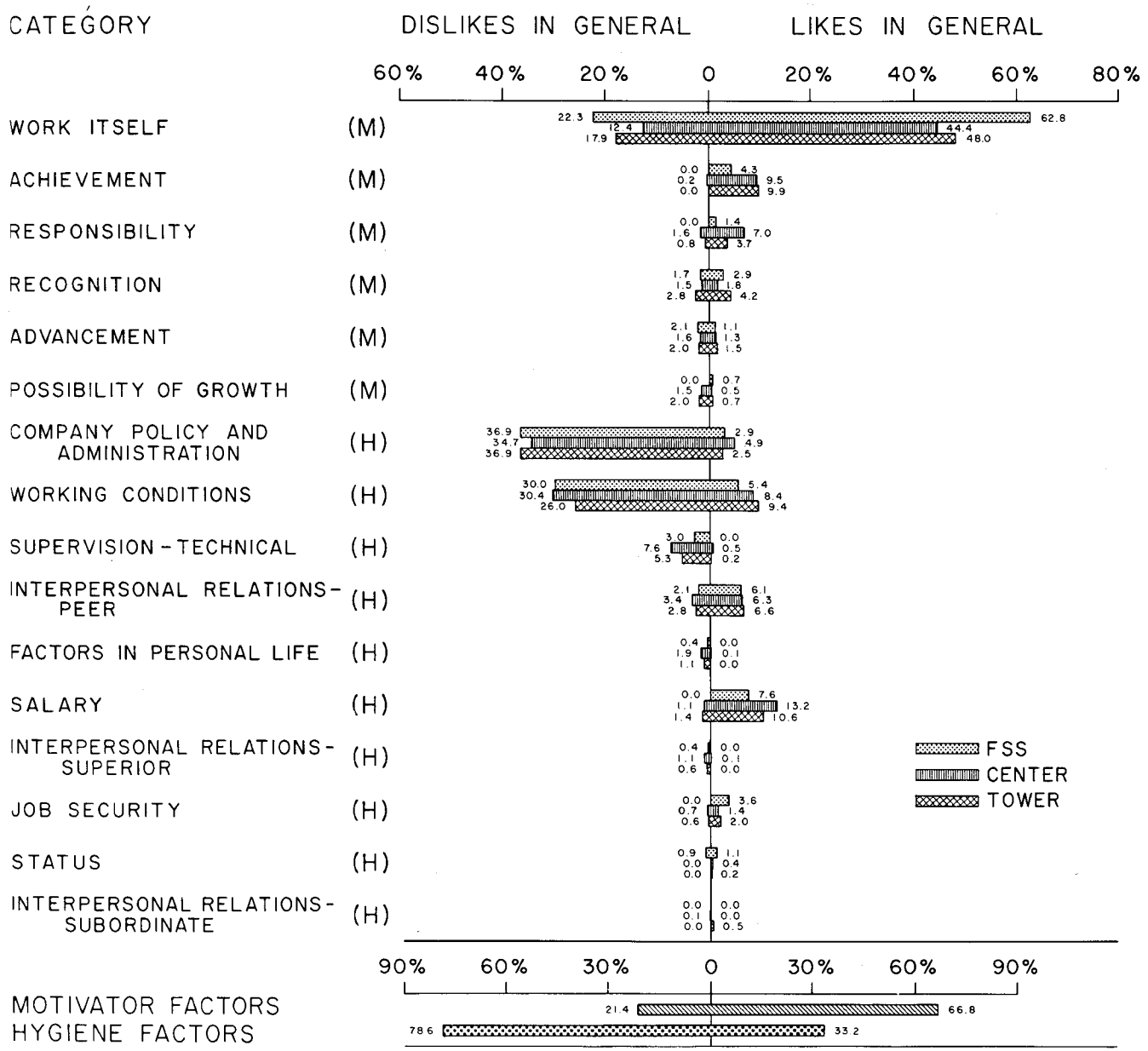

FIGURE 3. Percentages of Likes-in-General and Dislikes-in-General statements in each Herzberg category for the three ATCS options.

Factor containing a substantial number of statements which showed a reversal from the expected direction. There were significantly more responses indicating satisfaction than dissatisfaction over compensation ($p<.01$). Of the remaining four Hygiene Factors, two, *Interpersonal Relations—Peers* and *Job Security*, also followed the reversal trend; however, all four factors summed together accounted for only 6.2% of all the statements made to the questionnaire.

Discussion

These data suggest that, in general, the attitudes of ATCSs toward their profession have remained relatively consistent across the last three years. Those features of ATC work which controllers liked in the 1968–1969 survey,[12] such as the challenge of the work, the tasks associated with ATC work, and pride in the profession, were also frequently mentioned in this sampling of attitudes. Similarly, the principal sources of dislikes have changed only moderately, as management is still the source of the largest percentage of negative comments about work in ATC, while facilities, work schedules, and some job tasks (usually paper work or routine duties not directy associated with the control of traffic or assistance of pilots) also continue to be mentioned with notable frequency. However, even though the general trends in the job-related likes and dislikes of ATCSs have remained relatively constant, there is also evidence of some overall increase in the positive feelings of ATCSs toward their profession across the interval between the first survey and this one. The fact that ATCSs provided more statements about what they liked than what they disliked in ATC work in this survey, compared to the opposite tendency in the 1968–1969 study,[12] supports this conclusion.

The relative proportions of statements indicating dissatisfaction with management increased across surveys, as indicated by the 1968–1969 Tower and present Tower group comparison. This may be attributable to the fact that some annoyances with salary, work schedules, and, most importantly, facilities (equipment and physical environment) have been effectively reduced in the interim. Thus, it may be that management appears comparatively "worse" in this survey than in the 1968–1969 survey because there are fewer other sources for complaints. Since the percentages in the various categories in any one section are interrelated (reduction of comments in one category will lead to an increase in percentages in one or more other categories), such a conclusion seems reasonable.

Some perspective with respect to management may also be gained from these findings by comparison with the other occupational groups surveyed by Herzberg.[5] From surveys of 16 occupational groups, ranging from housekeepers to scientists, it was found that complaints concerning management ranked first as a source of dissatisfaction in all but two studies, and in those two studies management and technical supervision were essentially equal as a source of negative feelings. The average percentage of negative feelings accounted for by management in the studies reviewed by Herzberg was 31%, with a range of 17% to 64%. Since these percentages were established in a somewhat different way than the proportions obtained in this survey, undue emphasis should not be placed on a direct comparison of percentages. (Statements from narratives concerning events which yielded satisfaction or dissatisfaction in their jobs were scored on one or more categories in most of the studies related to the Herzberg theory, while in the present study each of the responses to the questions of what an ATCS liked or disliked about ATC work were scored in one and only one Herzberg category.) Nonetheless, it should be noted that the proportion of statements indicating dissatisfaction with management and/or supervision (35.5%) was approximately the equal of the average proportion obtained from the surveys reported by Herzberg. Probably the best conclusion that can be drawn from this comparison is that ATCS attitudes toward management are probably quite similar to those of members of most other occupational groups.

It is apparent from the data that there is a high degree of congruence between the three ATCS specialties in their attitudes toward ATC work. As would be expected, however, attitudes of Tower and Center controllers were more similar to each other than either of these groups was to FSS controllers. It is significant that FSS personnel made fewer positive comments about the challenge of ATC work, fewer negative comments about management, and more negative comments about the specific tasks they perform than did other ATCSs. These differences may reflect the fact that, not being involved in the

direct control of air traffic, the ATCS at the FSS finds his tasks somewhat less demanding and perhaps more routine than do the Center or Tower ATCSs. While the FSS employee may be very busy much of the time, the critical functions involved in traffic separation with the time and attention requirements of this task, are generally absent in the FSS. On the other hand, FSS personnel appear to be compensated for this to some degree by their opportunities for personal contact with pilots. Many Tower and Center ATCSs mentioned the desire for more such contact and were sometimes dissatisfied with the impersonal nature of their services. The difference between FSS and other ATSCs in their attitudes toward management also seems reasonable since it has been observed that the smaller, perhaps more informal, atmosphere of the FSS facility allows greater contact between the ATCS and managerial personnel than is possible in larger facilities such as Centers and Towers.

The results of scoring questionnaires according to the Herzberg categories indicates that ATCSs in all specialties have job attitudes which are highly comparable to employees in most other professions.[5] They tend to find satisfaction in those aspects of their profession which are best described as "Motivators," while dissatisfaction arises from "Hygiene Factors." This suggests that the two-factor theory of job satisfaction and the recommendations deriving from it are highly applicable to the ATC work setting. Specifically, there are two separate dimensions which must be considered in presonnel relations; first, that which gives an ATCS satisfaction, and second, that which causes the ATCS to feel dissatisfied. Neither is more important that the other according to Herzberg, but attending only to hygiene needs, while reducing unhappiness among employees, will not necessarily result in increased creativity, pride, or productivity. Moreover, actions directed toward correction of hygiene deficiencies are invariably short-term in effect. As Herzberg points out, the employee will want to know what has been done for him recently. Also, as hygiene improvements are obtained, it takes more and more change in a Hygiene Factor to produce a noticable reduction in dissatisfaction. This can be most easily illustrated with salary; the higher on the salary scale one goes, the more difficult it is to produce a significant increase in compensation for the employee.[7] Again, this is not to say that Hygiene Factors should not be attended to in personnel relations; to not attend to these facets of the employee's situation will invite negative consequences. It is just that too much should not be expected of such efforts. Instead, long-term changes in satisfaction can probably only be achieved through attention to Motivators. This type of attention leads into the area of job enrichment, a process which, as described by Herzberg,[5] improves the opportunities for employees to increase knowledge, understanding, creativity, personal growth, and direction over work activities. Input into procedure planning, increased responsibility, development of job tasks, and recognition for achievement are major components of this type of policy. The results of job-enrichment activities are improved employee self-concepts, improved morale, and greater investment in his profession.

Part 2: Rating ATC Work

The content of the rating scales used in this section of the survey represented the most frequently mentioned specific likes and dislikes in the 1968–1969 survey of Tower ATCSs.[12] These scales were designed to assess the *degree* to which various aspects of ATC work by ATCSs are seen as being positive or negative.

The results for the rating scales are presented in Table 1. Items rated on the positive portion of the scales tended to be aspects of ATC work which ATCSs frequently mentioned as something they liked about ATC work such as work itself, achievement, and challenge. Conversely, supervision, management, and some working conditions tend to be scored toward the negative end of the scale, just as they were mentioned relatively often as something ATCSs disliked about their work. Clearly, the most negative aspect of ATC work, at least among the attributes sampled by these scales, is working the night, or "graveyard," shift (2400–0800). It was ranked significantly lower than all other work features rated on this part of the survey ($p<.01$).

With respect to ratings of supervision and management, each higher level of management was seen significantly more negatively ($p<.05$ or better) than the preceding level of management. In other words, the less direct the contact between the ATCS and each management level, the more negative the view of the controller

Table 1

Mean like-dislike ratings of specific aspects of ATC work.

Scale[a]	Overall[b] Rating	Specialty		
		FSS	Center	Tower
Challenge (1)[c]	1.73*	1.58	1.73	1.90
Work in Aviation (6)	1.67	1.77	1.65	1.67
ATC Tasks (3)	1.51	1.35	1.54	1.54
ATC Career (11)	1.49	1.44	1.49	1.50
Constant Traffic Change (4)	1.44*	1.11	1.46	1.60
Work with Pilots (10)	1.43*	1.60	1.45	1.26
Service to Aviation (13)	1.37	1.49	1.34	1.40
Respect and Prestige (12)	1.36	1.27	1.35	1.46
Difficulty of the Work (2)	1.28*	1.13	1.27	1.42
Association with ATCSs (18)	1.26	1.30	1.24	1.31
Position Rotation (8)	1.16*	1.19	1.05	1.47
Moderate-Traffic Density (29)	.94	1.02	.96	.85
Salary (17)	.94	.92	.96	.86
Work Load (7)	.80*	.83	.67	1.16
High-Traffic Density (30)	.79*	.86	.61	1.24
Day Shifts (25)	.69*	.58	.88	.22
Civil Service (14)	.58*	1.13	.57	.27
Retirement Benefits (15)	.50*	1.20	.42	.27
Evening Shifts (26)	.32*	.35	.11	.90
ATC Procedures (5)	.31	.36	.26	.41
Work Environment (19)	.30*	.53	.19	.47
Shift Rotation (24)	.22*	.31	.10	.52
Radar Equipment (22)	.10*	-.02	-.07	.77
Number of ATCSs (23)	.01*	.38	-.16	.26
Non-Control Duties (9)	-.06	-.07	-.05	-.12
Promotion Opportunities (16)	-.13	.19	-.18	-.20
Communications Equipment (21)	-.14*	-.21	-.24	.21
Quality Supervision (31)	-.14*	.12	-.17	-.22
Quality Local Management (32)	-.21*	.38	-.33	-.24
Light-Traffic Density (28)	-.25	-.09	-.29	-.26
Airport Layout (20)	-.31	--	--	-.31
Quality Regional Management (33)	-.36*	.13	-.50	-.26
Quality National Management (34)	-.59*	-.01	-.71	-.63
Night Shifts (27)	-.80*	-.67	-.91	-.45

[a] For complete scale titles see Appendix I.

[b] The scale values were like very much (+2), like (+1), neither like nor dislike (0), dislike (-1), and dislike very much (-2). An asterisk following the value indicates a significant difference between rating from the three ATCS specialties.

[c] The number in parenthesis refers to scale numbers in Appendix I.

toward management at that level. These findings fit very well with studies of attitudes and "social distance," discussed below.

The ratings of the various types of shifts indicate that both moderate-density and high-density shifts are rated positively, with the moderate-traffic shift having the significantly higher rating ($p<.01$). In contrast, light-traffic shifts are viewed somewhat negatively. The differences in ratings between light-density shifts and the other two types were significant for both comparisons ($p<.01$).

On 21 of the 34 rating scales, there were significant differences in ratings between ATCS specialties (Table 1). It was found that FSS controllers have higher (i.e., towards the "like very much" end of the scale) ratings than either Tower ($p<.01$) or Center ($p<.01$ personnel on the three management scales, the Civil Service scale, the Retirement Benefit scale, and the scale concerning the number of trained controllers. The FSS group, however, did not rate the challenge of their work or the factor of constantly changing traffic as near to the "like very much" point on the scale as did the other two groups ($p<.05$ or better for each comparison).

Both FSS and Tower controllers felt more positive about their physical working environment than did Center ATCSs ($p<.05$ for both comparisons), and also had more positive feelings about Evening shifts than did Center employees ($p<.01$ for both comparisons). The Center group, on the other hand, felt more positively about Day shifts than did the FSS group ($p<.05$) which in turn had more positive ratings on this scale than the Tower group ($p<.01$). The Center and FSS groups were also more positive than Tower ATCSs about working with pilots ($p<.01$ for both comparisons).

The Tower ATCSs rated work load, their communication equipment, and high-density traffic more positively than did FSS and Center personnel ($p<.05$ or better for each comparison). Compared to Center ATCSs, Tower controllers were more positive on the scales for changing traffic, radar, number of controllers, rotating shifts, and local and regional management (all comparisons $p<.05$ or beter). The only scale on which the Center ATCSs had generally higher ratings than the Tower group was that concerned with being in Civil Service ($p<.05$).

With respect to supervisor and management ratings, it was found that the FSS group generally had more positive ratings of management than the other two groups. In fact, on the scales dealing with supervision, local management, and regional management, the FSS group was the only group to have a mean rating on the positive side of the scale. These differences between facility types were significant on the three scales for management ($p<.01$ for each comparison). Also, on the local and regional management scales, the Tower group gave higher ratings than the Center group ($p<.01$ for both comparisons).

Ratings on a total of 18 of the scales varied as a function of age (Table 2), experience (Table 3), or both (age and experience correlated .74 in this study). The challenge of ATC work was diminished for those ATCSs 45 years of age or more and for those with 20 or more years of experience, when compared to the other ATCSs ($p<.01$ for both comparisons). Experience apparently made a difference in rating the prestige associated with being a controller, as those ATCSs with less than five years of experience were significantly more positive toward this factor than more experienced personnel ($p<.01$). Ratings associated with various aspects of the ATC career, i.e., being in Civil Service, retirement benefits, and promotional opportunities, all varied as a function of age. With respect to Civil Service and retirement, the ATCSs 45 or older were significantly more positive than the younger controllers ($p<.01$ for each scale). On the promotion opportunity scale, the ATCSs who were 29 years of age or less were more positive in attitude than their seniors ($p<.01$).

Judgments concerning changing shifts also varied as a function of experience, but not age. Specifically, ATCSs with less than 10 years of experience were more positive toward rotating shifts than were controllers with more experience ($p<.05$). However, even the oldest and most experienced ATCSs were neutral or only slightly to the negative side of neutral in their judgments of this aspect of ATC work.

The relationships between age, experience, and judgments about night shifts were similar to those for changing shifts, although in all instances the ratings were highly negative.

It was also found that experience, but not age, was related to ratings of high-traffic-density

Table 2

Mean like-dislike ratings of specific aspects of ATC work as a function of age of ATCSs.

Scale	Age in Years					
	To 29	30-34	35-39	40-44	45-49	50+
Challenge*	1.74	1.80	1.72	1.73	1.58	1.55
Work in Aviation	1.70	1.65	1.64	1.66	1.73	1.76
ATC Tasks*	1.46	1.57	1.54	1.57	1.43	1.33
ATC Career	1.54	1.48	1.46	1.53	1.55	1.33
Constant Traffic Changes	1.43	1.48	1.50	1.53	1.40	1.07
Work with Pilots	1.32	1.41	1.41	1.53	1.67	1.55
Service to Aviation	1.29	1.31	1.40	1.43	1.51	1.55
Respect and Prestige	1.50	1.39	1.30	1.22	1.43	1.14
Difficulty of Work	1.26	1.29	1.30	1.41	1.21	1.02
Association with ATCSs	1.28	1.25	1.21	1.34	1.38	1.24
Position Rotation	1.24	1.21	1.09	1.20	1.05	1.07
Moderate-Traffic Density	.94	.96	.88	.87	.90	.98
Salary	1.02	.85	.95	1.01	1.05	.74
Work Load	.79	.74	.83	.76	.79	.86
High-Traffic Density	.77	.76	.87	.71	.58	.68
Day Shifts	.73	.56	.81	.81	.70	.71
Civil Service*	.49	.46	.53	.73	.03	.02
Retirement Benefits*	.50	.38	.39	.49	.83	1.07
Evening Shifts	.49	.45	.22	.14	.38	.40
ATC Procedures	.35	.33	.32	.20	.18	.35
Work Environment	.36	.26	.26	.24	.55	.20
Shift Rotation	.47	.19	.18	.12	.10	.05
Radar Equipment	.07	.04	.19	.02	.37	.00
Number of ATCSs	.05	-.02	-.02	-.11	.28	.20
Non-Control Duties*	-.18	-.03	.14	-.28	.10	-.31
Promotion Opportunities*	.37	-.10	-.33	-.43	-.52	-.29
Communications Equipment*	-.03	-.19	-.15	-.10	-.31	.00
Quality Supervision	.02	-.24	-.17	-.08	-.32	-.07
Quality Local Management	-.20	-.23	-.21	-.21	-.47	.07
Light-Traffic Density	-.20	-.31	-.31	-.30	-.05	-.10
Airport Layout*	-.14	-.33	-.49	-.69	-.33	.00
Quality Regional Management*	-.30	-.36	-.39	-.42	-.46	-.19
Quality National Management	-.52	-.66	-.64	-.69	-.52	-.20
Night Shifts	-.55	-.78	-.92	-.91	-.87	-.86

* Significant effect for age.

Table 3

Mean like-dislike ratings of specific aspects of ATC work as a function of experience of ATCSs.

Scale	Years of Experience				
	To 4	5-9	10-14	15-19	20+
Challenge*	1.73	1.79	1.73	1.66	1.55
Work in Aviation	1.64	1.68	1.67	1.71	1.77
ATC Tasks	1.45	1.53	1.59	1.50	1.41
ATC Career	1.54	1.48	1.47	1.47	1.36
Constant Traffic Changes	1.38	1.47	1.54	1.45	1.18
Work with Pilots	1.38	1.40	1.45	1.47	1.59
Service to Aviation	1.32	1.37	1.39	1.46	1.50
Respect and Prestige*	1.51	1.39	1.24	1.33	1.25
Difficulty of Work	1.19	1.36	1.36	1.26	1.05
Association with ATCSs	1.21	1.34	1.27	1.27	1.32
Position Rotation	1.22	1.26	1.14	1.05	.82
Moderate-Traffic Density	1.01	.89	.85	.95	.82
Salary*	1.09	.68	.91	.98	.64
Work Load	.77	.75	.84	.72	.95
High-Traffic Density*	.65	.86	.91	.64	.65
Day Shifts	.70	.59	.76	.66	.68
Civil Service	.59	.54	.57	.59	.81
Retirement Benefits	.63	.37	.41	.43	.82
Evening Shifts	.39	.43	.26	.17	.36
ATC Procedures	.35	.33	.24	.34	.38
Work Environment	.34	.39	.24	.19	.57
Shift Rotation*	.42	.37	.12	-.13	-.18
Radar Equipment	.08	.05	.13	.06	.52
Number of ATCSs*	.17	-.10	-.10	-.05	.50
Non-Control Duties	-.11	-.07	-.02	.00	-.14
Promotion Opportunities*	.41	-.08	-.45	-.73	-.36
Communications Equipment	-.04	-.21	-.19	-.22	.19
Quality Supervision*	.16	-.33	-.27	-.38	.00
Quality Local Management*	-.09	-.23	-.28	-.41	.09
Light-Traffic Density	-.15	-.23	-.40	-.24	-.14
Airport Layout	-.19	-.24	-.86	-.66	-.33
Quality Regional Management*	-.18	-.35	-.48	-.51	-.27
Quality National Management*	-.44	-.62	-.73	-.68	-.32
Night Shifts*	-.59	-.62	-.99	-1.05	-.77

* Significant effect for experience.

shifts. Both the least and the most experienced controllers gave considerably less positive ratings for these shifts than did ATCSs with five to 15 years of experience ($p<.01$ for each comparison).

All four scales dealing with supervision-management showed an experience effect. In general, the patterns were similar for each scale; the ATCSs with less than five or more than 20 years of experience were significantly less negative toward management than ATCSs at intermediate experience levels ($p<.05$ or better for each comparison).

It is worthy of note that the ratings on most of the scales were generally positive. On only two scales, those relating to national management and night shifts, did the mean rating approach the "dislike" point on the scale more closely than the "neither like nor dislike" point. In other words, these findings suggest that ATCSs generally like most aspects of their profession, and the features of ATC work which they do not care for are both relatively few and quite specific (e.g., night shifts).

The findings that ATCSs have a moderate aversion to light-traffic shifts and have a positive attitude toward work on moderate and heavy shifts both raise some questions about the assumption that high traffic and activity loads are noxious conditions for ATCSs. With two exceptions (the relatively inexperienced controller, who perhaps lacks the experience to handle heavy traffic confidently, and the older controller, who may not have or wish to use the energy required to stay "on top" of a heavy traffic load), ATCSs apparently like the activity that working moderate to heavy traffic requires.

Two of the scales which reflected differences between the three ATCS options provide some evidence about significant job characteristics in each specialty. Specifically, the FSS group responded less positively to the challenge of their work than did ATCSs in options having direct control of traffic. This supports the interpretation, based on results from the Likes-Dislikes questionnaires, to the effect that ATCSs at FSS facilities find the work somewhat less complex and less demanding than do ATCSs involved in direct traffic control. The other area of noteworthy difference is that both FSS and Tower ATCSs were much more satisfied with their work setting than Center ATCSs. This may be due largely to the fact that FSS and Tower personnel have the potential for more contact with the outdoors than Center ATCSs, who must perform most of their tasks in windowless, dimly lit rooms.

The finding that ATCS attitudes toward the FAA-Civil Service career tended to be related to age or experience probably reflects motivational differences between young controllers with limited experience and those approaching the latter stages of their career. It is not surprising that the older ATCSs have a more positive attitude toward the Civil Service system and its retirement features, since they are closest to realizing some of these benefits. On the other hand, the younger ATCSs appear less concerned about the "security" features of their career and instead like the promotional opportunities which they see before them. For the older ATCSs, promotions are no longer likely to be a significant positive factor, since they have reached a position in which opportunities for promotion within the ATC specialty are quite limited.

Among the most important findings from the rating scales are those which clarify the attitudes of ATCSs toward supervision and management. In the report on the 1968–1969 Tower survey,[12] it was speculated that ATCSs had a more positive view of local management and supervision than of non-local (regional and national) management, based on obtained differences between the number of times management was mentioned as something ATCSs liked at their facilities, as opposed to the very few times it was mentioned as something they liked about ATC work in general. Results from the present rating scales confirm the accuracy of this speculation, as regional and national management were rated progressively more negatively than management and supervision at the local level. The reason that ATCSs have a more negative view of higher management levels than local management may be that the ratings reflect the ATCSs' reactions to the physical, social, and psychological distance between themselves and each succeeding level of management. There is a considerable body of evidence in the field of social psychology which indicates that as "social distance" between an individual and some other individual or group increases, the probability that an individual will hold a negative or hostile attitude toward the distant one or ones also increases.[e.g., 2 15] In the

ATCSs' situation, there is less contact, less similarity of interest patterns, less direct interaction, and less opportunity to exchange opinions between the ATCS and managerial personnel with each succeeding level of management and, therefore, more opportunity for development of negative feelings for management. It should also be noted that this is a two-way phenomenon, and it is just as easy for management to assign negative attributes to ATCSs because of social distance. However, since there is little that ATCSs can do directly to reduce the distance between themselves and management, the responsibility is upon management to lessen the effect of these general tendencies by promoting (a) meaningful communication in both directions, (b) direct contact between management and employees under ordinary conditions, and (c) areas of common interest between management and the ATCS.

Part 3: Attitudes Toward Shift Work

Clearly, these findings support those from the other sections of the survey which indicate that night shifts are unpleasant for ATCSs, while day and evening shifts are perceived more positively. For each pair of shift work questions (feel best and feel worst, feel most relaxed and feel most tense, etc., see Table 4), there was a significant difference ($p<.01$ in all cases) between the distributions of day, evening, and night shifts checked on the two questions. On the questions associated with positive feelings (question 1, 3, 6, 7, and 9), both the day and evening shifts were selected significantly more often than the night shift ($p<.01$ in each case). On questions 1 (feel best), 3 (perform best), and 9 (most satisfying), the day shift was also chosen significantly more often ($p<.01$) than the evening shift. On questions 6 (most rested) and 7 (most relaxed), the evening shift was selected more often than the day shift ($p<.01$ for both cases). The questions directed at negative feelings associated with shifts (questions 2, 4, 5, 8, and 10) almost always elicited a greater number of night shift selections than either the day or evening shift choices. This was true for questions 2, 4, 5, and 10 ($p<.01$ in each case). On question 4 (feel worst) the evening shift was selected more often than the day shift ($p<.01$), while on question 5 (most tired) the reverse was true ($p<.01$); for both of these questions, the day and evening shifts were selected far less frequently than the night shift.

Question 8 (most tense) was the exception to this trend for negative feelings to be associated with night shifts. The day shift was checked more often on this question than either of the other two shifts ($p<.01$ for both comparisons), which in turn did not differ in frequency of selection from each other. Thus, the shift most frequently listed as the one which yields the most satisfaction, the best feelings, and the best performance is also the one which is listed as generating the most tension. This tends to reinforce the hypothesis that the pressure of control work is not objectionable to ATCSs in general, and in fact the absence of such pressure may be seen as unpleasant by them.

There were differences between ATCS specialties on all but question 4 (perform worst). Generally these differences were in the proportion of day to evening shifts selected by ATCSs from the various options, since the relative frequency of night shift selections was consistent across all three groups of ATCSs on most questions. For Tower ATCSs, the evening shift was most often listed as the one on which they "feel best" ($p<.01$), Center controllers listed the day shift most often ($p<.01$), while FSS personnel were equally positive to both types of shifts. With respect to performance and satisfaction (questions 3 and 9), both the Center and FSS groups indicated that the day shift was associated with best performance ($p<.01$ for both comparisons). For the Tower controllers, there was no significant difference between the frequencies assigned to the two shifts on these questions. When responding to the question of which shift is associated with "feeling most rested" (question 6), the Tower and FSS controllers chose the evening shift more often than the day shift ($p<.01$); the choices were essentially equal for the Center group. It should again be noted that on each of these questions, ATCSs at all facility types chose both day and evening shifts more often than night shifts.

On question 2, which asked on which shift the individual felt worse, the Tower ATCSs chose the day shift more often than the evening shift ($p<.01$), Center controllers chose the evening shift more often than the day shift ($p<.01$), and FSS personnel chose day and evening shifts equally often. On the fourth and tenth questions (worst performance and least satisfaction), both the Tower and FSS groups chose the day and evening shifts equally often, while the Center

Table 4

Percentages of ATCSs selecting Day (0800-1600), Evening (1600-2400), or Night (2400-0800) shifts in answer to questions concerning attitudes toward shift work.

Question	FSS			Center			Tower		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
On what shift do you									
1. Feel best	54%[a]	42%	4%	70%	29%	1%	30%	68%	2%
2. Feel worst	12%	12%	76%	7%	11%	83%	13%	3%	84%
3. Perform best	62%	36%	2%	76%	22%	1%	44%	55%	1%
4. Perform worst	11%	11%	78%	6%	14%	80%	9%	8%	82%
5. Feel most tired	20%	5%	75%	8%	12%	80%	21%	2%	77%
6. Feel most rested	36%	61%	3%	51%	47%	2%	16%	82%	1%
7. Feel most relaxed	22%	60%	19%	34%	53%	13%	15%	71%	14%
8. Feel most tense	69%	8%	23%	63%	23%	13%	74%	11%	15%
9. Get most satisfaction	67%	26%	7%	80%	17%	2%	43%	54%	2%
10. Get least satisfaction	14%	18%	69%	4%	13%	84%	11%	6%	83%

[a] Per cent indicating each shift.

ATCSs chose the day shift more often than the evening shift ($p<.01$). On the question concerning feeling "most tired" (question 5), the Tower and FSS groups chose the day shifts more often than evening shifts ($p<.01$ for each group), while Center ATCSs chose day and evening shifts equally often. On each of the foregoing questions concerning negative feeings, the night shift was selected most often by controllers from each facility type.

When asked if they liked their current shift rotation schedule, 61% of the ATCSs responded

Table 5

Percentages of ATCSs preferring various shift rotations, working hours, and days-off schedules.

ATCS Specialty	Rotation Schedule					
	2-2-1	2-5-5	3-2-0	3-1-1	No Rotation	Other[b]
FSS	36%	18%	0	3%	6%	38%
Center	44%	7%	6%	4%	8%	31%
Tower	53%	13%	3%	1%	2%	29%

	Working-Hours Schedule			
	0700-1500 1500-2300 2300-0700	0800-1600 1600-2400 2400-0800	0600-1400 1400-2200 2200-0600	Other[c]
FSS	36%	36%	20%	8%
Center	41%	26%	3%	30%
Tower	56%	20%	6%	18%

	Days-Off Schedule					
	Sat.-Sun.	Fri.-Sat.	Sun.-Mon.	Weekdays	Rotating	Other
FSS	26%	6%	8%	18%	28%	13%
Center	24%	22%	6%	16%	16%	16%
Tower	14%	23%	13%	24%	13%	12%

[a] The numbers refer to consecutive day, evening, and night shifts, respectively.

[b] Includes 62 alternative shift sequences listed by ATCSs.

[c] Includes 62 alternative working schedules listed by ATCSs.

affirmatively. The three ATCS groups did not differ significantly from each other on responses to this question.

Preferences with respect to shift rotations, hours, and days off are shown in Table 5. The shift sequence most perferred was the 2–2–1 schedule (a schedule of two days shifts, two evening shifts, and one night shift), followed by the 5–5–5 schedule. There were significant differences between ATCS specialties in the frequencies with which these schedules were listed. For the 2–2–1 sequence, the preference rates were 53%, 44%, and 36% for the Tower, Center, and FSS groups respectively. For the 5–5–5 schedule, the corresponding values were 13%, 7%, and 18%.

Only three hourly schedules met with substantial approval; these were the 7–3, 3–11, 11–7 schedules with 43.5% of the responses, the 8–4, 4–12, 12–8 schedules with 26.1% of the responses, and the 6–2, 2–10, 10–6 schedules with 5.8% of the responses. There were some differences in preference as a function of ATCS specialty, as Center and Tower ATCSs had strong perferences for the 7–3 and then the 8–4 hourly schedules

Table 6

Percentages of ATCSs preferring fast, intermediate, and slow turn-around shift rotation schedules[a] as a function of age and experience.

Schedule	Age in Years					
	To 29	30-34	35-39	40-44	45-49	50+
Fast	74%	66%	63%	60%	63%	47%
Intermediate	20%	28%	26%	36%	29%	47%
Slow	6%	6%	11%	4%	8%	7%

	Years of Experience				
	To 4	5-9	10-14	15-19	20+
Fast	74%	70%	59%	52%	57%
Intermediate	20%	24%	32%	38%	36%
Slow	5%	5%	9%	10%	7%

[a] Fast turn-around schedules included the 2-2-1, 1-1-1, 1-3-1, and 3-1-1 schedules. Intermediate rotation schedules included the 3-2-0, 2-3-0, or similar sequences. The slow turn-around schedules included 5-5-1, 5-5-5, 10-10-5, or similar schedules. In each case, the first number refers to consecutive Day shifts, the second to consecutive Evening shifts, and the third to consecutive Night shifts.

over the 6–2 schedule while the FSS group was relatively equally divided among these three schedules.

For days off, either Friday and Saturday (19.7%) or Saturday and Sunday (22.4%) were most popular with all three types of controllers. However, considerable proportions preferred rotating days off (17.0%) or weekdays off (18.5%).

For assessment of the effects of age and experience on preferred shifts, the shift sequences (in terms of days) were grouped into rapid (2–2–1, 1–1–1, 1–3–1, 3–1–1) schedules, intermediate (3–2–0, 2–3–0), etc. or long (5–5–1, 5–5–5, 10–10–5, etc.) turn-around schedules. The findings (Table 6) indicate that the rapid turn-around schedules are clearly preferred (60–74%) until the individual reaches age 50, and even then 47 %of the respondents prefer the short rotation sequences. Similar findings were obtained for experience level, although the trend for preference for the fast turn-around shifts tended to decrease progressively as experience increased ($p<.05$). Nonetheless, 57% of the ATCSs with 20 years or more of experience still preferred the fast turn-around shifts.

The 2–2–1 rotation, while being one of the most difficult to handle both physiologically and psychologically,[2] is clearly the preferred rotation schedule. While there was a trend for this preference to diminish somewhat as age and/or experience increased, even the most senior group of controllers perferred the rapid turn-around to longer rotation schedule. This finding may be seen as consistent with data presented by Mott, Mann, McLoughlin, and Warwick[9] which showed that age was not a factor closely associated with the ability of workers to tolerate rotating shift schedules.

It should be noted that other research has shown that the shorter the turn-around schedule, the greater the fatigue, loss of sleep, and loss in performance.[1] There is also evidence that while the expressed preference of employees may be for the rapid turn-around shift schedule, the longer the periods between rotating shifts, the better it is for the employee.[1] The ultimate in this trend is the fixed shift which, while often being resisted at first by employees used to rotation of shifts, is subsequently accepted and preferred after experience with the steady shift.[1]

PART 4: Satisfaction in Air Traffic Control Work

When asked to rate their satisfaction with being an ATCS, 91% of the respondents indicated they were satisfied or very satisfied with their profession. There were no differences related to controller option, age, or experience for these ratings. The mean rating on the five-point scale was 1.60, where a score of "1" represents a rating of "very satisfied," a score of "2" represents "satisfied," and a score of "5" corresponds to a "very dissatisfied" rating. Only three of the 757 ratings obtained on this scale indicated that the respondents were "very dissatisfied" with being ATCSs. The proportion of ATCSs reporting satisfaction with their job appears to be somewhat higher than that reported for some of their Eurpean counterparts, as Singer and Rutenfranz[11] found that approximately 79% of their sample of West German controllers indicated job satisfaction. The level of job satisfaction of the ATCSs surveyed in this study may also be somewhat higher than for employees in general; a typical figure for the proportion of employees reporting satisfaction is about 80%.[14]

About one-half of the sample had wanted some other career before they became controllers (50.9%). There were no differences between ATC specialties in the proportion of ATCSs indicating another area of occupational interest before being controllers. Not surprisingly, the most frequently mentioned occupation-of-choice was to become a pilot (35.3%) of the responses); the next most frequently mentioned profession was that of engineering (7.3% of the choices). No other single occupation accounted for as many as 5% of the choices listed, although the occupations of lawyer, teacher, physician, or private businessman were all mentioned 10 time or more. There was no correlation between present rating of job satisfaction and having previously desired an alternative career.

A full 74.5% of the ATCSs indicated no desire to enter another profession at this time. This percentage was relatively constant across ATC specialties and is somewhat higher than was found with the European ATCSs.[11] There was a significant ($p<.01$), and expected, inverse correlation between ratings of present satisfaction and an indicated desire to change professions ($-.33$). This means that ATCSs who indicated that they wanted to leave ATC work tended to

have lower job satisfaction ratings than ATCSs who did not want to change vocations at this time. Among those who did want to change professions, the most frequently cited alternative choice (13.5% of the alternatives listed) was to enter management, usually within the FAA. Moving into business was the next most frequently listed occupational choice (12.4%), followed by piloting (9.4%), farming or ranching (7.8%), computer programming (6.2%), and becoming a lawyer (5.2%).

Responses to the question of future aspirations in the FAA are presented in Table 7. It can be seen that professional plans change considerably as distance into the future increases ($p<.01$). A total of 50% of the respondents indicated that they would still like to be doing ATC work one year from now. However, only 19.7% still wanted to be controllers five years from the present. Finally, only 6.7% still wanted to be an ATCS 10 years from now. Approximately 36.4% of the ATCSs wanted to be supervisors within a year, about 36.9% wanted to be supervisors within five years, and 22.8% wanted this type of position within 10 years. Relatively few ATCSs had aspirations for management-level jobs within one year (5.4%); however, 28.2% of them indicated that they would like to be in management within five years, and 42% desired managerial positions within 10 years. The expressed desire for a staffing position (training officer, proficiency development, computers, etc.) within one, five, and 10 years increased slightly from 5.8% to 9.4% and 11%, respectively.

There were some differences between the career aspirations of ATCSs in the three specialties at the one- and five-year levels ($p<.01$ in each case). The Center ATCSs had a higher proportion of respondents who wished to still be active controllers at the end of one year than either the Tower or FSS groups ($p<.01$ for both comparisons). Looking ahead five years, both the Tower and FSS groups indicated more interest in management positions than did the Center per-

Table 7

Percentage of ATCSs indicating various FAA occupational preferences for one, five, and ten years from the present.

Preferred Occupation	1 year from now			5 years from now			10 years from now		
	FSS	Center	Tower	FSS	Center	Tower	FSS	Center	Tower
ATCS	38%	55.8%	41.9%	9.1%	23.4%	16.1%	5.5%	8.3%	2.6%
Supervisor	47%	31.5%	43.2%	34.3%	36.6%	39.1%	13.2%	23.9%	25.2%
Manager	6%	4.2%	8.4%	37.3%	24.1%	33.5%	44.0%	39.7%	47.0%
Staff Position[a]	6%	6.2%	4.5%	8.1%	10.3%	7.5%	16.5%	10.2%	9.9%
Other[b]	3%	2.3%	1.9%	11.1%	5.5%	3.7%	20.9%	17.9%	15.2%

[a] Staff positions included computer programming and operation, training officer, PDO positions, and other similar types of occupations.

[b] Primarily, but not exclusively, included statements concerning retirement.

sonnel ($p<.01$ for both comparisons). For the 10-year estimate, there were no differences between controller options.

Even though generally satisfied with their occupational choice, these data are consistent with the research of Graham[3] in showing that ATCSs do not consider ATC work, in and of itself, a particularly long-term career. Advancement is seen as occurring by a shift in occupation away from ATC work into managerial or other areas (e.g., computers) for which ATC experience may not be particularly relevant. Thus, ATCSs are unlike professionals in fields such as engineering, physics, medicine, or law who see occupational stability and advancement within their primary area of professional identification. As Super and Bohn[13] have noted, career stability in an occupation is generally directly related to the length and expense of preparation for the profession. Thus, it would be expected that ATCSs, who are trained in a relatively short time (three to five years), and at relatively little expense to themselves, will show a greater tendency to shift occupational identities than individuals who require up to 10 years of expensive preparation to become "journeyman" professionals.

The fact that ATCSs "top out" so early in their careers compounds the problem of the future in ATC work. As Graham[3] noted, ATCSs have the feeling that by age 35 the controller should be seeking bidding opportunities (i.e., opportunities for promotion in his and other facilities), at least if he comes from a major facility. In this sense, ATC work has more in common with skilled and clerical occupational level groups than with professional, or managerial, occupational levels. Advancement in law, medicine, or business is relatively continuous along a long gradient to a rather distant goal, whereas the skilled worker (or journeyman ATCS) reaches his probable limit at a relatively early age as far as status and occupational skills are concerned. Moreover, the skilled worker has a small chance for further advancement within his occupational skill.[10]

IV. Conclusions.

The general picture of ATCS attitudes which this survey presents is one of a group of employees who like their work, who are presently satisfied with their occupational choice, and whose attitudes about their work have become slightly more positive in the last few years. This shift toward improved morale is probably a function of reduction of dissatisfying conditions (e.g., improvement in equipment and facilities) and greater opportunities to participate in the decision processes concerning day-to-day job activities. Still, most of the satisfaction which an ATCS experiences comes from the work itself. Therefore, the areas of recognition, achievement, growth, and responsibility should receive the focus of attention in attempting to enrich the ATCSs' work experience.

Clearly, the dominant negative issue for all three ATCS specialties is that of management. In this, they share attitudes in common with European controllers[4, 11] and with empoyees in most other occupations.[5] However, the recent agency emphasis on training in management and supervision may have produced some improvement in this area. There are signs in the data that some effects of recent management programs have already become noticable, especially at the facility levels. In more than one instance, a perceived improvement in management was reported by an ATCS. Nonetheless, it is clear that management has much room for additional improvement according to ATCSs; the fact that ATCSs feel as do most other employee groups toward management is not justification for depreciating the importance of this finding.

This survey was not directly concerned with the issue of stress in ATCSs; however, some of the findings have implications for the consideration of this problem which should not be ignored. There is some evidence[e.g., 8] that ATC work in high traffic/work load settings (such as O'Hare Tower) is more stressful than such activities as long and/or difficult flights, extended decompression in an altitude chamber, or when inexperienced individuals spend 10 hours in a flight simulator. This may be true; however, it should also be noted that ATCSs report that they like heavy-traffic shifts better than they do light-traffic shifts and that the shift which they indicate provides the most satisfaction and best feelings is also the shift that is reported as making them most tense (the Day shift). Many statements indicated that the ATCSs liked the demanding nature of the job; approximately 56% of the controllers mentioned that they liked the pressure, the fast pace, and the fact that they did not get bored on the job. In fact, ATCSs often said that when traffic was light the work was boring; this

was presented as a very objectionable state of affairs. It therefore seems reasonable to conclude that ATCSs, as a rule, like to be "where the action is," and that this is one aspect of their work which is most appealing. This finding raises some significant questions which must be considered in plans for increasing automation of the ATC system. Specifically, how will the planned changes affect the work tasks of the ATCS, and what changes in ATCS work loads will work for the benefit of the ATC system? If automation makes the task routine and less challenging, the morale and efficiency of ATCSs may suffer considerable loss, and so negate the system advantages of the automation program. This is not to say that automation programs should not be undertaken. It is to say that such programs should take into account not only whether or not automation of tasks previously done by controllers can be accomplished, but also whether or not the changes will yield net improvements in the entire man-machine interaction.

Some of the data obtained in this study have strong implications for the career aspects of ATC work. At present, there is relatively little of the *career* (defined by Super and Bohn[13] as the developmental course of employment pursued over time) as contrasted with an *occupation* (which is what one does at any particular time) in the ATC vocation. An ATCS becomes a journeyman in a relatively short time and has few means of further progress within that occupation. He must generally switch occupations to advance. The ATCS expresses this in his career aspirations by planning to leave ATC work itself for supervision-management, or staff positions, which require the ATCS to learn new skills outside of the ATCS specialty, and which are largely independent of his experience in the specialty. In other words, ATC work, like vocations such as professional sports or the military, is seen largely as a "young man's" activity and as a relatively short-term occupation. Then, even by early retirement age, the ATCS is probably "over the hill" at least in terms of his self-concept.[3] In other words, ATC work is one in which the employee "peaks" early; this feature of the ATC occupation provides a considerable challenge for those concerned with maintaining and improving the long-term morale of ATCSs.

Addendum

After completion of the present report, a translation of a report entitled "Attitudes Toward the Work and Working Conditions Among Air Traffic Control Personnel in the Aviation Adminstration" by Kennholt and Bergstedt of the Swedish Personnel Administrative Council was received. Their findings are consistent with the findings of the present survey, and also with the work of Singer and Rutenfranz.[11] Swedish controllers tended to like and find satisfaction in their work, they tended to dislike management and their facilities. The only point of particular contrast between this survey and the Swedish survey was the Swedish dissatisfaction with salary levels, a complaint also mentioned by other European controllers.

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Appendix I
Survey Questionnaires

PART I: FIRST QUESTIONNAIRE

The items below concern your likes and dislikes about ATC work in general and at this facility.

DIRECTIONS

1. Try to list your comments in rank order, the most important first and so on.
2. Please make your comments brief and legible.

At This Facility

I. Cite three specific aspects of ATC work which you like BEST at THIS FACILITY.

1. _____
2. _____
3. _____

II. Cite three specific aspects of ATC work which you like LEAST at THIS FACILITY.

1. _____
2. _____
3. _____

In General

III. Cite three specific aspects of ATC work IN GENERAL which you like BEST.

1. _____
2. _____
3. _____

IV. Cite three specific aspects of ATC work IN GENERAL which you like LEAST.

1. _____
2. _____
3. _____

Comments

V. Briefly list any problem areas, recommendations, or comments you want to mention.

_____
_____
_____

PART II: RATING SCALES

Please rate each of the following aspects of the ATC profession in terms of whether it is part of ATC work which you like or dislike. Circle the mark which indicates your feeling. Please do not make ratings between marks.

	Like Very Much	Like	Neither Like Nor Dislike	Dislike	Dislike Very Much
1. Challenge of ATC work-----					
2. Difficulty of ATC work----					
3. ATC tasks (radar, communications, etc.)----------					
4. Constantly changing traffic situations----------					
5. Established traffic management procedures----------					
6. Working in aviation--------					
7. Amount of work load--------					
8. Rotation through different positions----------					
9. Non-control duties (paper work, training, etc.)------					
10. Working with pilots--------					
11. Career as a controller-----					
12. Respect and prestige of being a controller---------					
13. The service performed for aviation----------					
14. Being in civil service-----					
15. Retirement benefits--------					
16. Promotion opportunities----					

	Like Very Much	Like	Neither Like Nor Dislike	Dislike	Dislike Very Much
17. Level of salary					
18. Association with fellow controllers					
19. Physical working environment					
20. Airport layout					
21. Communications equipment					
22. Radar equipment					
23. Number of trained controllers					
24. Changing work shifts					
25. Working day shifts (approximately 8:00-4:00)					
26. Working evening shifts (approximately 4:00-12:00)					
27. Working night shifts (approximately 12:00-8:00)					
28. Light-traffic shifts					
29. Moderate-traffic shifts					
30. High-traffic shifts					
31. Quality of immediate supervision					
32. Quality of local management					
33. Quality of regional management					
34. Quality of national management					

PART III: SHIFT WORK SURVEY

Considering a Day shift to be approximately 8-4, an Evening shift approximately 4-12, and a Night shift approximately 12-8

On what shift do you	D	E	N
1. Feel best	_____	_____	_____
2. Feel worst	_____	_____	_____
3. Perform best	_____	_____	_____
4. Perform worst	_____	_____	_____
5. Feel most tired	_____	_____	_____
6. Feel most rested	_____	_____	_____
7. Feel most relaxed	_____	_____	_____
8. Feel most tense	_____	_____	_____
9. Get the most satisfaction	_____	_____	_____
10. Get the least satisfaction	_____	_____	_____

Do you like your current rotation schedule? _____Yes _____No

What schedule would you prefer for rotating shifts?

a. Scheduled hours for each of the following shifts (8:00 a.m.-4:00 p.m., etc.)

Day _____ Evening _____ Night _____

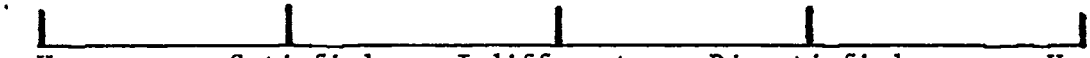
b. Sequence (Number of consecutive shifts of each type)

Day _____ Evening _____ Night _____

c. When would you like your days off? _____

PART IV: SATISFACTION QUESTIONNAIRE

1. How satisfied are you with being an air traffic controller?



2. Did you want to enter some other profession before you became a controller? Yes_____ No_____

   If your answer is yes, what did you want to do?_____

3. Do you now want to enter some other profession or line of work? Yes_____ No_____

   If your answer is yes, what do you want to do?_____

4. Assuming you continue in the FAA, what would you like to be doing professionally (that is, specific types of air traffic control work, supervision or management, new professions, positions at local, regional, or national level, etc.)?

   a) 1 year from now _____

   b) 5 years from now _____

   c) 10 years from now _____

5. How old are you? _____

6. How many years and months FAA ATC experience do you have? _____

Appendix II

Description of Response Categories

FAA Response Categories

Job Tasks--	Procedures, types of positions, position rotation, use of radar, amount of traffic, changing traffic situations, teamwork, work with different types of aircraft, controller/pilot cooperation, extra duties, training responsibilities, resolving problems, communications.
Job Challenge--	Job challenge, interest, satisfaction in doing difficult work, accomplishment, complexity of traffic, freedom to make decisions, responsibility, exciting, stress or pressure, fear of error or its consequences.
Career Characteristics--	Job security, career opportunities, advancement, pride in association with aviation, retirement program, EAR system, importance of the service, annual physical, being under Civil Service, fringe benefits.
Salary--	Amount of pay, comparative levels of pay.
Work Schedule--	Shift rotation, days off, break schedules, overtime, leave schedules.
Peers--	Co-workers, quality of controllers, controller attitude.
Facilities--	Location, equipment, airport layout, size, physical characteristics, crowding, maintenance, parking.

Appendix II (Cont'd)

Management--	Quality, relations with management, attitude toward ATCSs, amount of supervision, communication between ATCSs and management, cooperation, competence, support from management, recognition, staffing levels, training programs, employee selection, policy-making procedures, annual leave and sick leave policies.
Miscellaneous--	Association with professional pilots, contact with public, cooperation between ATC facilities, cooperation with airport management.

Herzberg Categories[5,6]

Work Itself--	Job tasks, challenge, difficulty, variety.
Achievement--	Success on the job, solving problems, seeing the results of one's work, vindication of ideas.
Responsibility--	Responsibility for own work, new responsibilities, responsibility for safety.
Recognition--	Recognition from peers, supervision, management, public for work.
Advancement--	Change in status by promotion.
Possibility of Growth--	Opportunity for development of skills and interests, potential for self-development, acquisition of new skills.
Company Policy and Administration--	Management, personnel policies, management quality and competence, organization, goals.

Working Conditions--	Physical conditions, work load, adequacy of facilities available to accomplish work, environmental characteristics of job.
Supervision--Technical--	Supervision competence, delegation of work, understanding of work, fairness, attitude.
Interpersonal Relations--Peers--	Cooperation between ATCSs, like or dislike of peers.
Factors in Personal Life--	Effects of work on family relationships.
Salary--	Compensation levels, salary increments.
Interpersonal Relations--Supervisors--	Honesty, support from supervision, friendliness.
Job Security--	Permanence, stability, long-term benefits.
Status--	Signs of status, gain or loss of status.
Interpersonal Relationships--Subordinates--	Working and personal relationships with trainees.