FLIGHT CREW SELECTION AT UNITED AIRLINES

Capt. William Traub*

Poor decisions in pilot selection can be very expensive and in today's environment of sophisticated equipment and increased competition, decisions do have a significant bearing on an airline's success or failure.

Looking only at training expense, we at United Airlines estimate a mistake in pilot selection could cost upwards of $250,000 over a 30-year pilot career.

On the other hand, good decisions in pilot selection pay off handsomely in terms of training requirements, whether we are discussing resource management skills, flying skills, or a composite of all of those talents that go into the makeup of an outstanding employee and ultimately in an outstanding captain.

In the past 25 years, United Airlines has hired more than 6,000 pilots. To do this it has been necessary to process over 90,000 applicants. As a result, in those 25 years we believe we have developed some skills in pilot selection.

As shown in figure 1, our qualifications for pilot employment have varied over the years from 1954, when we required a high school diploma and 165 hours of flight-time experience, to 1970, when we required a college degree and 500 hours of flight time.

There was also a period in the late 1960's during which we processed applicants with a private pilot license; if the applicant passed all of our tests we guaranteed him a job if he was able to obtain a commercial license within 1 yr.

The current qualifications shown in figure 1 came about as a result of a court decree. For those of you who don't know, United Airlines was challenged by the Equal Employment Opportunity Commission for discriminatory hiring practices in pilot selection.

This resulted in a court case and the signing of a court decree. Included in that decree were these minimum employment qualifications.

With the exception of the current hiring program, the changes we made in minimum employment qualifications were motivated primarily by applicant supply rather than any dissatisfaction with the quality of the pilots previously hired.

This is not to say we didn't make some mistakes. However, the effects of the mistakes were minimized largely due to the quality of applicants rather than any really scientific selection procedure.

*Flight Training Manager, United Airlines.

In 1975, United Airlines did something it had not attempted to do before, at least in any important detail. Looking ahead to the later 1970's and early 1980s, we could foresee a period of significant hiring. We would recall approximately 500 furloughed pilots and hire more than 1,000 new pilots.

To be sure we would pursue the proper hiring philosophy, United management formed what we call a pilot new-hire committee. The first challenge of the committee (fig. 2) was to evaluate past selection processes used at United Airlines. Further, we would expand our expertise in the methods of pilot selection by studying the state of the art and the hiring processes used by other airlines throughout the world. And finally, we would develop recommendations for future new-hire pilot selection, new-hire training, and the probationary year evaluation.

The committee pursued these matters for some 18 months and developed a philosophy of pilot selection. This philosophy forms the basis of United's present hiring and training program which is to date proving to be the most successful in our history.

Before reviewing our current philosophy, allow me to share with you several considerations that shaped the committee's development of philosophy and its recommendations (fig. 3).

First was the signing of the Equal Employment Opportunity Commission versus United Airlines Consent Decree, which reduced some of our previous hiring standards and set goals for employment of minorities and females as airline pilots.

As a result of the court decree, formal education and flight time could no longer be used as primary selection criteria in our hiring program.

Second, the committee was influenced by the heavy attack our previous standards were subjected to during the Equal Employment Opportunity Commission-United Airlines case, and our lack of proof that these standards related to any criterion of job performance. In the future we would be required to validate each step of the selection process we intended to use.

Third, and very importantly, a thorough study was undertaken of the psychological characteristics of our most successful and least successful pilots. This led to the development of what we call a criteria profile identifying those attitudes and personality traits possessed by our most successful pilots.

This profile was compared with a high degree of correlation to personality inventories developed by other airlines throughout the world.

Our study showed that although, at the time of hire, there were significant differences in personality characteristics between our most successful and least successful pilots, there were essentially no differences in education or flight time.

A large battery of psychological tests was administered to a sample group of pilots. The result of these tests was compared to flight management ratings of pilot's performance and the individual's report of job satisfaction. Again there was a high correlation between certain psychological traits and job performance of our most successful employees.

The committee also identified pilots who without significant additional periods of training apparently did not possess the necessary psychomotor skills to perform consistently at the high standards expected of a United Airlines pilot. In most cases they were not required to complete a thorough pilot training and evaluation program as part of new-hire training.

And finally, the committee identified pilots who were highly qualified at the time of hire, but who appeared to be psychologically unsuited for a career as an airline pilot. These men do not necessarily have proficiency problems, but do have personality and attitudinal characteristics that are costly in terms of supervisory time, employee morale, passenger relations, and cockpit harmony.

As a result of this research and study, the new-hire committee developed this philosophy of pilot selection (fig. 4): Select pilots who have basic flying skills plus the appropriate attitude and personality traits that make an outstanding employee and ultimately an outstanding captain.

To implement and conform to this philosophy we developed the following multi-step selection and training process (fig. 5):

First we developed a computerized pilot applicant tracking system that permits a completely centralized selection procedure whereby we are able to select for processing the best candidates regardless of where (geographically) they make application.

Second, a series of psychological tests was selected and validated by testing part of our incumbent pilot group. This allowed us to develop a profile to be sure applicants possessed the required attitude and personality traits.

The attitude and personality traits we at United consider important are listed in figure 6. I think we generally agree with Mr. Webster, but let me in any case tell you what we mean by each of these terms:

The individual must be *motivated* by a career in aviation itself, not by the high pay or other advantages.

The pilot must have a congruent *interest* pattern. Divergent interests are a negative characteristic. Interests should be predominantly in technical areas but with some interests in interacting with people.

Pilots should be *confident* of their ability and capability to control their environment, but not to the point of overconfidence.

A *realistic* outlook on life, free from abnormal anxiety reactions, is important. A pilot must make decisions based on facts and not be overly impatient.

By *conscientious* we mean someone who exhibits good goal-directed behavior.

Cooperative — accepts authority and procedures, and questions when appropriate — not a maverick.

Consistency — not always looking for ways to do things differently; willing to follow a consistent habit pattern.

And finally, *startle threshold.* An individual's ability to think logically and quickly under stress. Individuals who freeze or respond to inappropriate stimuli under stress have a low startle threshold.

Third (fig. 5), we designed a simulator evaluation to appraise an applicant's pilot skills and provide some additional insight into several attitude and personality traits. Startle threshold and self-confidence are assessed in addition to the basic psychomotor and information processing skills. This evaluation is computer-administered and computer-graded under the supervision of a flight training manager. The applicant flies a DC-10 simulator approximately 1 hour, performing seven carefully selected and highly structured maneuvers.

Fourth, an in-depth interview designed to assess the applicant's technical qualifications, and probe his attitude toward flying and his motivation for applying for the position of airline pilot.

We believe that interest in flying and attitude may be more important than education and flying experience if they are combined with the prerequisite intelligence, psychomotor skills, and personality traits. The interview is structured to verbally explore the attitude and personality traits just mentioned. To conduct the interviews we have carefully selected and thoroughly trained a group of flight managers from around our system.

The air crew selection test, or STANINE as it is more commonly known, is administered to obtain an indication of pilot aptitude and is a predictor of success in training. Additionally we feel this provides a useful measure of an applicant's cognitive skills, those skills we consider so important in the transition to a new aircraft.

Finally, an extensive medical assessment is accomplished. This step is designed to measure current health and also to predict long-term physical suitability for an airline career.

This multi-step selection process allows us to create a profile on each applicant (fig. 7). The profile is then presented to a board of review

composed of representatives from Flight Operations, Personnel, and Medical departments. The board makes a final decision on pilot selection based on a careful review of each profile.

After selection by the board, the pilot enters a 6-8 week new-hire training program followed by a 1-year line probationary period. The selection procedure is not finished until the probationary year is successfully completed.

New-hire training includes the following three parts (fig. 8). First, the use of individualized computer-managed and computer-assisted instruction. This training is criterion-based and is designed to ensure adequate aeronautical knowledge and knowledge in other areas appropriate to the job of being a flight crewmember.

Second, a pilot-skills training and evaluation program is provided, based on the premise that the new-hire will not function as a captain or copilot for some time. It is therefore imperative that an early flight-skills assessment be provided.

Third, a flight engineer transition training program is included in new-hire training, since initial line assignment will be as second officer.

Finally, an extensive probationary year line-evaluation program has been implemented to provide a continuation of the total evaluation philosophy and to ensure the new pilot meets the criteria profile established for a United Airlines pilot.

This program (fig. 9) consists of a line check each quarter of the first year given by a flight manager; a home study course on four flight-operations related subjects; and an oral examination on the equipment to which the pilot is assigned.

And finally, there is an additional pilot evaluation at the training center, if pilot skills during new-hire training are in any way marginal.

Although it is still early to reach totally definitive conclusions, all the indications are that 1978 was one of our most successful years of pilot employment. In that year over 6,000 applicants progressed through some phase of the selection process described earlier.

From those 6,000 applicants, 494 pilots were hired in 1978. They possess an average of 16.2 years of education, 3,300 hours of flight time experience, and this in spite of the fact that education and flight time were not primary considerations in selection. The group includes 21 women and 47 members of minorities, some with education and flight time well below the average.

The attrition rate in new-hire training was less than 2%, and reports from line flight operations management indicate that these people are outstanding in terms of job performance, motivation, and attitude.

Our work of examining, validating, and refining applicant criteria may never be finished, but overall we feel optimistic about the results of our process so far and expect to benefit even more in the future.

We also feel it has significant implications in the context of flight-deck resource management, since this precision approach to pilot selection provides us with a well-defined, predictable starting point. But it's only a beginning.

We may know through initial selection that we have a diamond in the rough. The shaping, polishing, and setting of this gem to meet our needs comes next. This explains my interest and the interest of United Airlines in this particular conference.

Thank you. Do you have any questions of comments?

DISCUSSION

CAPT. JOHANNESSEN, Scandinavian Airlines: You mentioned you had a psychological test of your most successful and most unsuccessful pilots in your course. Could I have the criteria for how you deem a pilot to be successful and/or unsuccessful, please?

CAPT. TRAUB: I can provide you with the names of the tests that we used. I'm not completely familiar with how the tests were scored. If that addresses your question.

CAPT. JOHANNESSEN: How do you say that the pilot is successful?

CAPT. TRAUB: It was based on flight management assessment of the pilot's performance and also the individual's feeling of job satisfaction.

CAPT. JOHANNESSEN: Was that subjective evaluation of the man by himself and by management?

CAPT. TRAUB: Yes.

UNIDENTIFIED: Did you hire any of the 350-hour types?

CAPT. TRAUB: Yes, we did hire some with very low experience, right about 350 hours.

CAPT. SIMONS, Pan Am: How do you maintain the flight engineer's piloting skills during his tenure as flight engineer?

CAPT. TRAUB: Over the years, we have made simulator time available to these people that they can use voluntarily when they go through a pilot or flight engineer training program. We also provide some pilot training

during that period of time. It is very limited but we do provide simulator experience and until recently airplane experience as well.

CAPT. SIMONS: This volunteer simulator, do you have a flight instructor with them or just let them fly the simulator?

CAPT. TRAUB: Most of the time not. It is set up with a tape program and they're free to use the tape in the simulator without an instructor.

CAPT. SIMONS: What's your recovery rate on flight engineers? We've got flight engineers flying for 8 or 10 years and they are now just becoming first officers and we're very concerned about the success of getting their pilot skills back after being off that long a time. Of all your flight engineers that have flown as flight engineer for quite a while, were all successful in coming back as a pilot?

CAPT. TRAUB: I can't say that all have been successful. The vast majority of them have been successful with varying degrees of training.

CAPT. SIMONS: We've already found that we have to give them a lot of excess training when they come back after being flight engineers for quite a long time, and I don't know what kind of support you get from a pilot group. When you say volunteer, it's like saying, you know, come up on your birthday. Plus, you're in Denver and you've got your pilots all over the system.

CAPT. TRAUB: We have recently introduced a new program. When a flight engineer upgrades to first officer, he must come to Denver several weeks to a month before transition training to go through what we call Initial First Officer Training, which is really ground training.

But during that period we also offer them — well, volunteer, if you will — pilot experience in the simulator. This is with an instructor and has been used by almost everyone recently.

CAPT. SIMONS: One other thing that you could use is a basketball court. You can tell a pilot by his physical coordination playing basketball. You get rid of the dumb ones right there.

CAPT. TRAUB: Maybe we should incorporate that into our pilot selection procedure.

UNIDENTIFIED: Do you do any explicit intelligence testing or do you infer the intelligence level from how they behave on all these other tests?

CAPT. TRAUB: Mostly the latter. The STANINE is, to some extent, an intelligence test, or the standard intelligence test is included in the STANINE.

MR. GERSZEUSKI, FAA: How do you define an unsuccessful pilot?

CAPT. TRAUB: We don't say unsuccessful; we say not as successful as others. Again, through flight management evaluation of that pilot and his record in training. Some pilots traditionally take more time in transitioning to new airplanes. Cockpit harmony and relations with crew members become known over a period of time.

CAPT. SIMONS: One other item. After your year of probation, it's my understanding you have fall-back privileges for anybody trying to upgrade in any manner. How do you like that system?

CAPT. TRAUB: What do you mean by fall-back privileges?

CAPT. SIMONS: Say, a flight engineer is going up to first officer. If he doesn't do it successfully, he's allowed to go back and fly as flight engineer. Or first officer trying to upgrade to captain, he's unsuccessful, he falls back to being a first officer. In other words, you don't have up-or-out, you have up-or-back. Has that been successful? Are you happy with that kind of training requirement — to fall back to a previous position?

CAPT. TRAUB: Yes, I think we are happy with that procedure.

CAPT. SIMONS: How do you get rid of the person you really want to get rid of?

CAPT. TRAUB: I'm sure the same way you in Pan American do. It's a case of decision, a corporate decision by the individual's manager, and supported by his director.

CAPT. SIMONS: I understand you haven't fired a pilot in many years.

CAPT. TRAUB: That's not correct; we have.

CAPT. SIMONS: The unsuccessful pilot you were talking about a while ago was the one you'd like to get rid of, but you can't?

CAPT. TRAUB: I think we all have that problem.

CAPT. CRUMP, United Airlines: If you establish any kind of a norm for a pilot, obviously you're going to have pilots that are superior to the norm and pilots that are inferior to that norm. I think a very careful, thorough study of the background of a number of pilots carried out by some of our personnel in Denver has given us a real good idea of a group of pilots we don't want to get rid of at all, but who are not performing in training to the same level of proficiency that other pilots do, and those are the pilots we use as a measure of this $250,000 in a career. And it's not necessarily the case of poor performance on the line. In many cases it's inability to take airline-type training in the same manner that other pilots are able to do.

CAPT. SIMONS: Well, you know training that poor performer can really get expensive. You well know that, I'm sure.

CAPT. TRAUB: Measured in about 1975 dollars we indicated about $250,000 over a 30-year career. Like you said, very expensive, and that's just in extra training attention during the career.

CAPT. WASTMAN, Flying Tigers: Have you had any difficulty in terminating a pilot during his probationary period?

CAPT. TRAUB: No.

CAPT. BORN, North Central: Did I understand you correctly to say that those new hires that might be questionable at the end of the probationary year were returned to Denver for further evaluation? Or all second officers?

CAPT. TRAUB: That's prior to the conclusion of the probationary period. We provide a pilot skills assessment during new-hire training, and also there is a pre-simulator evaluation that the applicant goes through. If either one of those is in any way marginal, then during the probationary period we bring the individual back and provide equivalent of first officer training or copilot training in one of our simulators. That includes a management check similar to what would have to be passed when the individual upgrades to first officer. We are trying to avoid the problems that the gentleman from Pan American was alluding to later on in the career, after 5 or 10 years as a flight engineer and now upgrading to copilot. We are trying to determine as best we can that they do have the skills and capability to make that transition.

CAPT. TURLINGTON, Pan American: I haven't been in this business as long as some, but I'm curious — in your 25 years it seems like motivation and desire were something we presumed a long time ago. Do you see a real difference now in how deeply you get into those aspects in your selection process?

CAPT. TRAUB: We're trying to test that now. I think you're right, we presumed that before. If somebody was applying for the job, and they had a good background, we presumed they had the motivation and desire. We're not assuming that any more — we're trying to test for it.

CAPT. ESTRIDGE, American: Would you describe to us the startle-threshold technique you use in the simulator? Is it a distractability element or a division of attention?

CAPT. TRAUB: Both, I guess. Without telling you too much about the simulator evaluation — before the last maneuver that they are required to perform in the simulator, we tell the applicant that this is the most important part of the evaluation. It really isn't, but we tell them that. We tell them that they will experience a critical emergency during this maneuver, and then we introduce that emergency at some period during the

maneuver. So we try to, I guess, overload them to some extent by telling them that it is a very important evaluation, and that it's also the most difficult maneuver that they are required to perform during the simulator evaluation.

CAPT. SCLIFO, Texas International: How do you get a guy with 350 hours and put him in a DC-10 simulator? It seems like that would be a little unfair.

CAPT. TRAUB: We don't fly it necessarily as a DC-10 simulator; we fly it just as an instrument-based trainer. And all applicants are well briefed on what they're required to perform in that simulator. We do to some extent, expect a little bit less of the 350-hour individual as opposed to the 3,000-hour applicant. Does that answer your question?

CAPT. SCLIFO: I just can't imagine how you get a guy with 350 hours and put him in a DC-10 simulator and, say, with the startle threshold — it seems like it would be almost impossible.

CAPT. TRAUB: I think we are amazed at how well some of the low-time applicants do. If they have a basically good instrument background and some information-processing skills, they handle it quite well. They are graded against each other so we develop a pretty good data base to make a judgment on that individual.

CAPT. SIMONS: One other area, Bill. Log book entries are hard to verify and you know you're getting people that say they have 350 hours and it's quite well known, you know, they don't. Is there any way you people verify their log books?

CAPT. TRAUB: I mentioned that we provided a pretty thorough training program for the flight managers that are participating in the interviews, and we point out to the managers that it's their responsibility to the best of their ability to make that verification. Now, I'm sure that some people do slip by, but I don't think that many do, in that they do have to fly a DC-10 simulator and they answer some very technical questions based on their level of experience in the interview situation.

CAPT. SIMONS: The reason I say that is that pilots who have been with us for 15 years will say "Gee, I really only had 40 hours when I hired on." I hear that all the time.

CAPT. TRAUB: We found that to be more true early in the hiring program. About a year ago we found people who had made errors in their logbooks. It's not turning up nearly as frequently now.

CAPT. SIMONS: I bet they had more motivation though.

CAPT. TRAUB: Right.

MR. SMITH, ALPA: To get back to the question having to do with the subjective assessment of the flight managers as to successful or not so successful compared to the norm. Was the flight manager required to rate the individual on a single scale of, let's say, 1 to 9, which was correlated with some psychological test? Or was it broken down into certain categories, for example, trainability, 1 to 9; interpersonnel relationships, 1 to 9; and then cross-correlated with these different psychological tests? And if in fact it was, do you have any idea what some of these correlation values in fact are or were?

CAPT. TRAUB: Our group in Chicago that had that responsibility felt very comfortable with the high degree of correlation, and they did use both the 1-9 evaluation, numerical evaluation, plus the written evaluations. And our psychologists on the staff had that information available to them.

MR. SMITH: You mean the psychologists determined the scale or the flight manager determined the scale?

CAPT. TRAUB: No, the psychologists set up the evaluation questionnaire. So, in effect, they determined the scale, and then it was adequately explained to the flight managers. Not so subjective is the training record of the same people. By training, I don't mean just in our training center in Denver, but their line checks and so forth, which were also included in the evaluation. Hopefully, we were able to minimize the errors by testing a large enough group of people.

MR. SMITH: But the directions to the management people who then evaluated the individuals were fairly specific as to the nature of the things that they were actually scoring?

CAPT. TRAUB: That's correct.

CAPT. JOHANNESSEN: How do you score a man's motivation? What criteria do you use?

CAPT. TRAUB: Well, we provide a word description of what a highly motivated pilot is versus a low motivation. And I would suppose such things as abuse of sick leave. An individual who really puts out nothing extra, and maybe has problems with proficiency checks, might have low motivation.

CAPT. JOHANNESSEN: But in the applicants?

CAPT. TRAUB: Oh, applicants. We try to look at their background to judge the motivation, to see how they prepare themselves for this job that they're trying to obtain. Some of the same qualities that we looked for in our own pilots we try to see in the applicants. How they have applied themselves in their academic training and their aviation training.

CAPT. JOHANNESSEN: Wouldn't it be very easy to fake motivation?

CAPT. TRAUB: That's correct. It is easy to fake. We just felt that with a multi-step process like ours, not too many would slip through.

CAPT. JOHANNESSEN: More specifically, for instance a man who has been, or a boy who has been a model aircraft pilot in his youth, is that a good motivation or ---.

CAPT. TRAUB: I think that, coupled with adequate training and performance as he was educated, would mean that he was highly motivated.

UNIDENTIFIED: To what extent, what value does prior military flying experience carry in your total selection criteria?

CAPT. TRAUB: We don't think that it's particularly important. The military does provide very good training and we recognize that, but beyond that training and how they perform in that training we give no particular credit for military versus nonmilitary. In fact, about 35 percent of the pilots we hired the first year were nonmilitary.

MR. McEMBER, Eastern: As a pilot-selectee flows through this program, does he get some indication at certain stages that he's doing well or doing poorly, or does it all wait 'til the end?

CAPT. TRAUB: Unfortunately, it really goes to the end. The applicant knows that through being invited back to the next stage, he's still in the process. Of course, if he's not successful at any step, we don't provide any feedback as to why, and we don't give any indication, as far as I know, ever in their career as to how they did during new-hire selection.

DR. LAUBER: Thank you, Bill. The task of selection is very interesting. Given current patterns of career progression, it poses an interesting problem, because the ideal selection characteristics for a subordinate crewmember may, in fact, be different from the ideal selection characteristics for the individual who is in command, or who plays the primary management role in the cockpit.

And yet, because of the way the system operates, you are, in the short run, selecting for subordinate crewmembers who will not upgrade to captain for many years. How do you select for both roles?

1954 – HIGH SCHOOL GRADUATE
COMMERCIAL PILOT LICENSE
MINIMUM 165 FLIGHT HOURS

1966 – 2 YEARS COLLEGE
PRIVATE PILOT LICENSE

1970 – 4 YEAR COLLEGE DEGREE
COMMERCIAL PILOT LICENSE
MINIMUM 500 FLIGHT HOURS

1978 – HIGH SCHOOL GRADUATE
COMMERCIAL PILOT LICENSE
MINIMUM 350 FLIGHT HOURS

Figure 1.- Pilot applicant qualifications.

1. EVALUATE PAST UNITED AIRLINES SELECTION PROCESSES
2. GAIN EXPERTISE IN PILOT SELECTION METHODS:
   - STATE OF THE ART
   - PROCESSES USED BY OTHER AIRLINES
3. DEVELOP RECOMMENDATIONS FOR:
   - PILOT SELECTION
   - NEW-HIRE TRAINING
   - PROBATIONARY YEAR EVALUATION

Figure 2.- Pilot new-hire committee.

1. EQUAL EMPLOYMENT OPPORTUNITY COMMISSION (EEOC) vs UNITED AIRLINES – CONSENT DECREE
2. VALIDATION OF SELECTION CRITERIA
3. PSYCHOLOGICAL CHARACTERISTICS OF OUR MOST SUCCESSFUL PILOTS
4. LACK OF NECESSARY PSYCHOMOTOR SKILLS
5. PSYCHOLOGICALLY NOT SUITED

Figure 3.- New-hire committee considerations.

BASIC FLYING SKILLS

\+ APPROPRIATE ATTITUDE AND PERSONALITY TRAITS

= POTENTIALLY OUTSTANDING EMPLOYEE/CAPTAIN

Figure 4.- Pilot selection philosophy.

1. COMPUTERIZED PILOT APPLICANT TRACKING SYSTEM
2. PSYCHOLOGICAL TESTS
3. SIMULATOR EVALUATION
4. INTERVIEW
5. AIRCREW SELECTION TEST – PILOT APTITUDE
6. MEDICAL ASSESSMENT

Figure 5.- Pilot selection.

- MOTIVATION
- INTERESTS
- SELF-CONFIDENCE
- EMOTIONAL STABILITY
- REALISTIC
- CONSCIENTIOUS
- COOPERATIVE
- CONSISTENCY
- STARTLE THRESHOLD

Figure 6.- Attitude and personality traits.

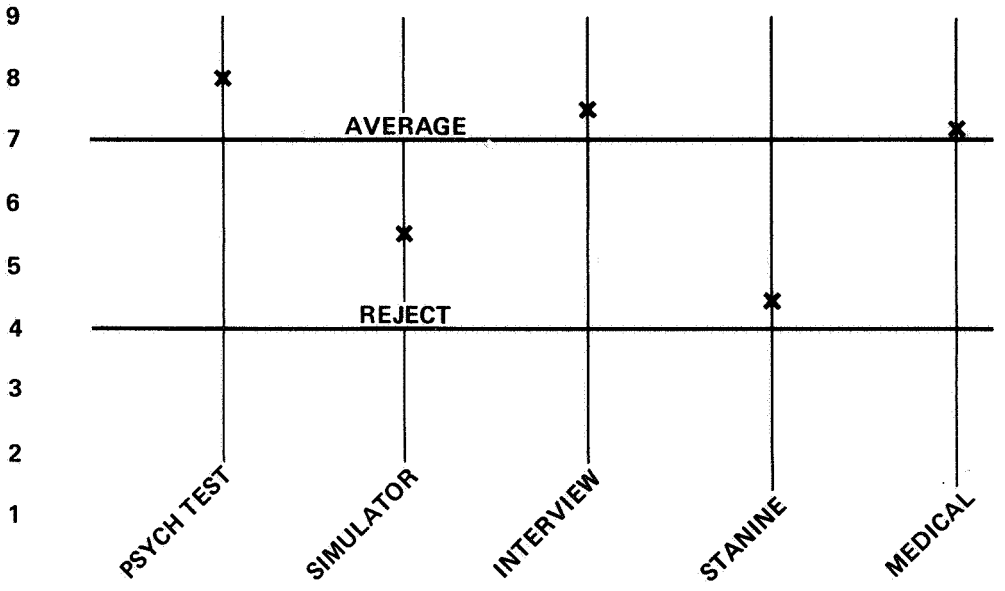

Figure 7.- Pilot selection profile.

1. INDIVIDUALIZED COMPUTER MANAGED INSTRUCTION
2. PILOT SKILLS TRAINING AND EVALUATION
3. FLIGHT ENGINEER TRAINING

Figure 8.- New-hire pilot training.

1. LINE CHECK EACH QUARTER
2. HOME STUDY COURSE
3. ORAL EXAMINATION
4. PILOTING SKILLS EVALUATION

Figure 9.- Probationary year program.