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Selection of UAS personnel (SUPer) phase I report: Identification of critical skills, abilities, and other characteristics and recommendations for test battery development

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14. ABSTRACT

This report describes a review of recent military Unmanned Aircraft System/Remotely Pilot Aircraft (UAS/RPA) job/task analyses, with the goals of identifying the most critical skills, abilities, and other characteristics (SAOCs) needed for successful Air Vehicle Operator (AVO) performance, and recommending the development of a test battery to assess these SAOCs.

Subject matter experts (SMEs) from the Navy, Air Force, and Army performed the review. The SMEs identified and assigned importance ratings to 115 SAOCs that appeared in one or more existing military job/task analyses. Where available, psychometric data for current DoD proprietary personnel selection and classification tests were examined to determine the extent to which the tests measure these critical SAOCs and to identify measurement gaps. The review indicated that many of the most important SAOCs could be measured by existing tests. Where gaps in measurement were identified, recommendations were made regarding modification of existing tests or development of new tests to measure the requisite SAOCs. Consideration was also given as to whether or not candidate tests could be adapted for administration on the Automated Pilot Examination (APEX) system, the web-based system used to administer other Navy aviation aptitude tests. Future work will focus on applying the results of this review toward the development and validation of an UAS/RPA AVO selection battery.

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Selection for UAS Personnel (SUPer) Phase I Report: Identification of Critical Skills, Abilities, and Other Characteristics and Recommendations for Test Battery Development

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EXECUTIVE SUMMARY

This report describes a review of recent military Unmanned Aircraft System/Remotely Pilot Aircraft (UAS/RPA) job/task analyses, with the goals of identifying the most critical skills, abilities, and other characteristics (SAOCs) needed for successful Air Vehicle Operator (AVO) performance, and recommending the development of a test battery to assess these SAOCs. Subject matter experts (SMEs) from the Navy, Air Force, and Army performed the review. The SMEs identified and assigned importance ratings to 115 SAOCs that appeared in one or more existing military job/task analyses. Where available, psychometric data for current DoD proprietary personnel selection and classification tests were examined to determine the extent to which the tests measure these critical SAOCs and to identify measurement gaps. The review indicated that many of the most important SAOCs could be measured by existing tests. Where gaps in measurement were identified, recommendations were made regarding modification of existing tests or development of new tests to measure the requisite SAOCs. Consideration was also given as to whether or not candidate tests could be adapted for administration on the Automated Pilot Examination (APEX) system, the web-based system used to administer other Navy aviation aptitude tests. Future work will focus on applying the results of this review toward the development and validation of an UAS/RPA AVO selection battery.

INTRODUCTION

In May 2014, the Office of Naval Research initiated a four year effort entitled Unmanned Aerial Systems Interface, Selection, and Training Technologies (UASISTT). The goal of the UASISTT effort is to improve the processes of selecting, training, and equipping Unmanned Aircraft System/Remotely Pilot Aircraft (UAS/RPA) operators. The effort is aimed at UAS/RPA Group 3, 4, and 5 platforms, focusing on the Air Vehicle Operator (AVO) position.

The goal of the selection portion of UASISTT, Selection for UAS Personnel (SUPer), is to identify, develop, and validate selection measures for UAS/RPA AVOs. It is being led by Georgia Institute of Technology (Georgia Tech) and a team of subject matter experts (SMEs) with expertise in UAS/RPAs, personnel measurement, psychometrics, and selection and classification methods. In addition to the SMEs from Georgia Tech, the team includes members from Georgia Tech Research Institute (GTRI), Navy, Air Force, and Army. SUPer comprises several tasks that will result in the development, validation, and operational implementation of a test battery to assess UAS/RPA AVO aptitude/suitability.

This report focuses on the processes that resulted in recommendations for test battery development. These processes included a) the synthesis of existing military UAS/RPA job-task analysis data to identify critical entry-level skills, abilities, and other characteristics (SAOCs), b) identification of a set of psychometric and administrative criteria by which to evaluate the suitability of candidate tests, c) a review of existing DoD proprietary tests to determine the extent to which they measure the SAOCs identified and to pinpoint deficiencies and gaps in measurement, and d) where necessary, recommendations to modify existing tests or develop new tests. Subsequent tasks will involve test battery development, data collection, and psychometric

evaluation, which will include validation and scoring algorithm development. These tasks will be addressed in future reports.

METHOD

UAS/RPA Job/Task Analysis Review

The first step of the SUPer effort was to gather relevant materials regarding entry-level SAOCs required for UAS/RPA operators. A literature search was conducted using DTIC and other web databases; additional information was assembled by the SMEs. A bibliography of these materials is presented in Appendix A. Nine of these references were deemed particularly relevant to the current effort and are marked with an asterisk in Appendix A. Appendix B consists of a comprehensive list of the SAOCs identified in these sources compiled and entered into a spreadsheet. The list was reviewed to identify overlap between the studies; SAOCs that were clearly duplicates were eliminated. Some SAOCs mentioned in general job analysis literature (e.g., Fleishman, Quaintance, & Broadling, 1994), but not in the UAS/RPA-specific SAOC reviews were removed from further analysis. For example, Explosive Strength appeared in the general literature but was not mentioned in any of the nine UAS/RPA-specific primary references, nor was it considered relevant for this context, so it was removed. The SAOC of situation awareness (SA) was removed because it was felt that even though it was highly rated, it could not be easily measured. SA also typically develops with training and experience, as opposed to existing as an entry-level SAOC.

The resulting SAOC list was distributed to five team members, all with expertise in UAS/RPA operations and/or job/task analysis techniques. Each SME rated each SAOC on its importance as

an attribute for UAS/RPA AVOs on a 5-point scale: 1 = Not Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Highly Important, and 5 = Extremely Important.

After individual ratings were completed, team members met to discuss any discrepancies in ratings and SAOC definitions. Items were moved to separate spreadsheet sections if they were determined to be primarily medical (e.g., color vision, physical strength), or were predominantly training-related and would not be expected in ab initio trainees (e.g., communications procedures). After reviewing the definitions again as a group, SAOCs that significantly overlapped with others on the list were removed to eliminate redundancy. The final list of 115 SAOCs is presented in Appendix C. No minimum importance rating for inclusion was set for these items, so all rated SAOCs appear in Appendix C. In addition, the SMEs also rated six UAS/RPA work preference factors identified by the Air Force Personnel Center from interviews with UAS/RPA pilots and by a factor analysis of the experimental USAF RPA Work Interest Inventory data (WII; Barron, 2014); these work preferences are also presented in Appendix C.

Identification of Candidate Tests and Gaps in Measurement

Next, the SMEs reviewed several service, DoD, and private sector tests to identify potential measures of the critical UAS/RPA SAOCs. Team members familiar with military and private sector tests recommended seven existing tests as potential candidate measures (see Table 1). In addition to those seven tests, the SMEs also recommended consideration of the USAF RPA Work Interest Inventory (WII) as an eighth test. The WII is an experimental test designed to measure work preferences and person-environment fit (PE-Fit), versus measuring traditional SAOCs. While the U.S. Army's Tailored Adaptive Personality Assessment System (TAPAS) was also considered, it was excluded because the SMEs felt it did not measure any personality

traits not covered by current Navy tests (Navy Computer-Adaptive Personality Scales [NCAPS] or the Naval Aviation Trait Facet Inventory [NATFI][5]). Descriptions of the tests and their subtests are provided in Appendix D.

Table 1. Recommended Proprietary Source Tests

Test	Source	Number of SAOCs covered with at least a "Moderately Important" Rating
Aviation Selection Test Battery /Performance Based Measures (ASTB/PBM); includes NATFI	Navy	43
Self-Description Inventory (SDI+)	Air Force	30
Navy Computer Adaptive Personality Scales (NCAPS)	Navy	27
Multi-Tasking Test (MTT)	Air Force	8
Test of Basic Aviation Skills (TBAS)	Air Force	7
Armed Services Vocational Aptitude Battery (ASVAB)	DoD	3
Air Force Officer Qualifying Test (AFOQT)	Air Force	1
USAF RPA Work Interest Inventory (WII)	Air Force	*

* The six WII items were rated separately from the 115 SAOCs. Five of the six WII items received mean importance ratings of "Moderately Important" or above (see Appendix C).

The SMEs completed the spreadsheet matrix in Appendix C, indicating which SAOCs were covered by existing tests. Where available, information on psychometric properties (e.g., predictive validity, fakeability), ease of procurement, and administration (i.e., suitability for computer administration, test length) was collected for each test (see Appendix E). The SMEs also weighed the psychometric properties of reliability, discriminability, and subgroup differences in recommending candidate tests. Also considered was the feasibility of integrating each of the existing tests into the Navy's Automated Pilot Examination (APEX) system, the web-

[5] The NATFI is a subtest of the Navy Aviation Selection Test Battery (ASTB).

based system used to administer the ASTB/PBM. Compatibility with APEX was an ONR-specified requirement.

RESULTS AND DISCUSSION

Examination of Appendix C shows that most of the UAS/RPA SAOCs considered to be important are measured by one or more existing military tests. There were 78 items with an average rating of 3.0 or higher (a rating of 3 corresponded to "Moderately Important"). Of these items, 57 (73%) were judged to be measured by at least one of the existing military tests listed in Table 1. The ASTB/PBM, which includes the NATFI personality inventory, measures 43 SAOCs, followed by the SDI+ (30), and NCAPS (27). The NCAPS did not assess any UAS/RPA-related characteristics not covered by the NATFI or SDI+; these latter two tests together cover 52 of the 78 (66.7%) SAOCs with ratings of 3 or higher. With the exception of the USAF RPA WII, the remaining tests (AFOQT, ASVAB, Multi-Tasking Test, and Test of Basic Aviation Skills) measure ability and knowledge. Although these tests assess relatively few SAOCs, this does not mean they are not important indicators of UAS/RPA aptitude. The Air Force MTT assesses eight SAOCs, four of which (Time Sharing, Organization, Time Management, and Memorization) were not covered by any other test. The USAF RPA WII is the only measure of RPA-related work preferences and PE-Fit. Finally, of the SAOCs listed in Appendix C, the AFOQT covered only "Perceptual Speed and Accuracy," but as seen in Appendix E, some of its subtests had fairly strong correlations with some of the most relevant criterion measures (i.e., performance measures in RPA/UAS training).

The SMEs compiled a list of SAOCs that were <u>not</u> explicitly or adequately measured by existing military tests. These SAOCs, along with their definitions and importance ratings, are shown in

Table 2. The table also includes some SAOCs where it was determined measurement could be improved with modifications to existing tests (e.g., Task Prioritization, Oral Comprehension). Several of the SAOCs in Table 2 (Critical Thinking, Judgment/Decision Making, Learning Ability, Long-Term Memory, Problem Solving, and Reasoning) are related to general mental ability. Although these specific cognitive abilities are not explicitly measured by the existing tests (AFOQT, ASTB, and ASVAB), general mental ability is well-measured by them. As a consequence, it is expected that little benefit would result from the development of measures to assess these cognitive abilities. However, we believe that consideration should be given to identifying existing tests or developing new tests to measure some of the SAOCs not covered by current DoD tests, to include Oral Expression, Speech Clarity, and Leadership.

Table 2. SAOCs not Adequately Covered by Current DoD Proprietary Tests

SAOC	Definition	Mean Importance
Task Prioritization[6] (Cognitive)	To perform multiple tasks in order of their importance; to direct attention to tasks when they change priorities (e.g., emergencies)	**4.8**
Oral Comprehension	To understand spoken English words and sentences (e.g., information, ideas, or instructions).	**4.6**
Oral Expression	To speak English words or sentences so others will understand; to express information or ideas clearly.	**4.4**
Vigilance[7]	To stay alert and be attentive to one's surroundings over long periods of time, including small details; to recognize hazards and threats within one's environment; to perform repetitive tasks effectively.	**4.4**
Problem Solving	To recognize problems, their potential causes and solutions, and when they are likely to occur; to create effective and innovative solutions to problems.	**4.2**
Critical Thinking	To analyze the strengths and weaknesses of specific actions or decisions.	**3.8**

[6] Although Task Prioritization and Oral Comprehension are measured to some extent by existing tests (ASTB/PBM, MTT), improvements need to be made to better assess these constructs.

[7] Vigilance and other SAOCs (e.g., Decisiveness) have both a cognitive and personality component. Although the personality component may be covered by existing tests, the cognitive component is not.

Learning Ability	To be willing and able to acquire new skills quickly and easily; to quickly understand new concepts, ideas, or facts.	**3.8**
Occupational Interest	To possess a sense of duty as a war fighter. Realistically understands and intrinsically appreciates RPA platform. Critical to retention: Enjoys duties of the position and contribution to daily operations in theater, strong intrinsic interest in advanced and emerging avionic RPA technology. Strong interest in advancing national interests and mission objectives.	**3.8**
Safety Consciousness	To be aware of safety hazards; to take steps to protect oneself and others from harm; to avoid risky behavior that could lead to accidents.	**3.8**
Work in Confined Spaces	Ability to tolerate small/confined spaces for long periods of time.	**3.8**
Decisiveness	To make decisions in real time, under pressure, and within operational deadlines. Operationally patient in making the right decision and committing to a course of action.	**3.6**
Flexibility of Closure/ Pattern Recognition	To identify or detect a known pattern (e.g., a numerical code); to combine and organize different pieces of information into a meaningful pattern quickly.	**3.4**
Information Ordering	Ability to correctly follow a rule or set of rules to arrange things or actions in a certain order. The rule or sets of rules used must be given. The things or actions to be put in order can include numbers, letters, words, pictures, procedures, sentences, and mathematical or logical operations.	**3.4**
Initiative	To initiate difficult tasks without excessive procrastination; to work independently and accomplish tasks without constant supervision; to take personal responsibility for completing work tasks.	**3.2**
Leadership: Motivation	To motivate crewmembers to perform effectively under difficult circumstances.	**3.2**
Leadership: Performance Management	To monitor crewmember performance and take action when performance is substandard.	**3.2**
Leadership: Provide Feedback	To provide performance feedback and coaching to crewmembers as necessary; able to effectively inform crewmembers of mistakes or potential problems.	**3.2**
Listening Skills	To actively listen to and understand others; to attend to verbal and nonverbal cues (e.g., body language, eye contact).	**3.2**

Long-Term Memory	To retain and recall information (e.g., words, numbers, pictures, and procedures) after long time periods.	**3.2**
Self-Regulation	Tendency to keep oneself focused on a task/work even when external factors make it difficult to do so.	**3.2**
Speed of Closure	The degree to which different pieces of information can be combined and organized into one meaningful pattern quickly. It is not known beforehand what the pattern will be. The material can be visual or auditory.	**3.2**
Risk Perception/Assessment	Ability to evaluate situations and risk potential.	**3.0**

In some instances a test was identified to measure a particular SAOC, but it was determined improvements could be made. For example, although various tests (e.g., NCAPS, NAFTI, and SDI+) provide coverage of critical personality characteristics, some effort is needed to improve reliability and reduce fakeability (i.e., impression management). Another recommendation is that the USAF Multi-Tasking Test be revised to better assess the ability to prioritize tasks based on dynamic changes in relative task importance. For example, the number of points awarded for completing a specific task (e.g., Task 1 vs. the other 3 tasks) could be varied through the test session (and communicated to the examinee in real-time), rather than based solely on the ability to complete concurrent tasks of presumed equal priority level within time constraints. It is also recommended that the USAF RPA WII and Army Work Preference Assessment (WPA) be further evaluated to determine their suitability for measuring occupational interest and P-E Fit. In particular, the USAF RPA WII should be further evaluated and potentially refined to focus on preferences that more uniquely distinguish job satisfaction for UAS/RPAs from manned piloting jobs. This is especially important since the large demand for UAS/RPA AVOs is driving reassignment of manned aircraft pilots into unmanned piloting jobs, which may result in poor P-E Fit.

Other Potential Measures

Two recent USAF studies examined the predictive utility of measures originally designed to assess suitability for manned aircraft training for selection of UAS/RPA pilots (Carretta, 2013; Rose, Barron, Carretta, Arnold, & Howse, 2014). In both studies, the predictive validity of the Air Force Officer Qualifying Test (AFOQT) Pilot composite and the Pilot Candidate Selection Method (PCSM) for UAS/RPA training was comparable to that for manned aircraft training. Both the AFOQT Pilot and PCSM composites assess SAOCs not included in the UAS/RPA job/task analyses reviewed for this effort, but are predictive of UAS/RPA performance. The AFOQT includes measures of pilot job knowledge (Aviation Information, Instrument Comprehension) and the PCSM composite includes a measure of prior flying experience. Similar measures are available on the Navy ASTB.

A final suggestion is the development of a test that focuses on understanding complex verbal instructions or exchanges (more similar to the general ACT Work Keys) rather than solely listening for a single known/predictable piece of information (as on current USAF Multi-Tasking call sign listening task). Oral comprehension was highly ranked by the SMEs, and at first glance, appears to be covered by the ASTB/PBM and TBAS. However, these tests present fairly simple listening tasks, as compared to the oral comprehension/listening skills required in the very complex UAS/RPA communications environment, and scores on these tests conflate listening with psychomotor performance (typing speed and joystick tracking). Therefore, it is recommended that consideration be given to the development of a DoD-owned oral comprehension/listening test that focuses on the comprehension of messages similar in complexity to those that must be processed by UAS/RPA AVOs.

Summary of Recommendations

1. Use a combination of currently-available US military proprietary tests (or portions of them) listed in Table 1. Note that the ASTB/NATFI and the SDI together cover most of the SAOCs rated as moderately important or higher, and the ASTB and PBM are already hosted on APEX.
2. Identify or develop measures for the SAOCs presented in Table 2.
3. Improve existing military personality trait tests (e.g., NAFTI, SDI+, and NCAPS) to reduce fakeability and increase reliability.
4. Of the tests considered here, the MTT uniquely measures Time Sharing, Organization, Time Management, and Memorization. The first three of these received importance ratings of 4.2 or above. If chosen for SUPer purposes, efforts should be made to improve the MTT's assessment of the ability to reprioritize tasks based on dynamic changes in relative task importance, since these types of "on-the-fly" changes are common in UAS/RPA operations.
5. Work preference instruments like the USAF RPA WII and the Army WPA should be evaluated for potential improvements in their ability to determine occupational interest and P-E Fit for UAS/RPA AVOs.
6. Develop DoD-owned oral comprehension/listening tests that focus on understanding complex verbal instructions or exchanges rather than listening for a single, low-uncertainty piece of information.

These recommendations, and the methods and materials used to generate them, will be forwarded to and discussed with representatives from Georgia Tech and Georgia Tech Research Institute (GT/GTRI), who will serve as the leads on test battery development. Joint-service

SMEs who worked on this project will support and work with GT/GTRI on that effort, keeping in mind that the ultimate goal of SUPer is to provide the best possible selection tool for entry-level military UAS/RPA AVOs.

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Appendix A

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APPENDIX B KSAO'S with 9 key references

	Biggerstaff et al. (1998); external pilots	Barnes et al. (2000); internal pilots *	Bruskiewicz et al. (2007) *	Chappelle et al. (2010)	Chappelle et al. (2011); pilots	Paullin et al. (2011); pilots and SOs	Barron (2014) Holloman AFB interviews; RPA SMEs	Carretta et al. (in press); pilots and SOs	Mangos et al. (2012); pilots and SOs	**Total Occurrences**
Skills/Abilities										
Adaptability/Flexibility			14	x		x		x	x	**5**
Arm-hand steadiness		19								**1**
Attention				x	x					**2**
Attention allocation and control									x	**1**
Auditory attention	x	38							x	**3**
Category flexibility		33								**1**
Cognitive proficiency				x	x					**2**
(Cognitive) task prioritization			18	x		x	x	x	x	**6**
Communication procedures			7					x		**2**
Control precision	x	15	64		x	x		x	x	**7**
Deductive reasoning/ Analytical ability		6	52	x		x				**4**
Depth perception		32							x	**2**
Divided attention			17							**1**
Dynamic flexibility										**0**
Dynamic strength										**0**
Estimation of time to contact	x									**1**
Explosive strength										**0**
Extent flexibility		41								**1**
Far vision		16		x					x	**3**
Finger dexterity		18			x					**2**
Flexibility of closure/ Pattern recognition	x	13				x			x	**4**
Fluency of ideas		30								**1**
General health				x						**1**
General hearing		40							x	**2**
Glare sensitivity		27								**1**
Gross body coordination										**0**
Gross body equilibrium										**0**
Hand-eye coordination/Psychomotor								x	x	**2**
Inductive reasoning/ Analytical ability		21	52	x		x				**4**
Information management skills									x	**1**
Information ordering		8		x		x				**3**
Judgment/Decision making/Problem solving			16			x			x	**3**
Listening skills									x	**1**
Manual dexterity		35							x	**2**
Map reading									x	**1**
Mathematical reasoning		23	70						x	**3**
Mechanical comprehension			69						x	**2**
Memorization		5								**1**
Memory				x	x					**2**
Mental rotation									x	**1**
Multilimb coordination	x	34	68		x				x	**5**
Navigation skills									x	**1**
Near vision		31							x	**2**
Night vision		14							x	**2**
Number facility		36	70			x			x	**4**
Oral comprehension		1	10			x	x		x	**5**
Oral expression		2	27			x	x		x	**5**
Organization/Time management			29						x	**2**
Originality		28								**1**
Perceptual speed and accuracy		11	46	x		x		x	x	**6**
Peripheral vision		20								**1**
Photo interpretation										**0**
Physical conditioning			75							**1**

Problem sensitivity		4		x				
Rate control		29	43	x	x	x		
Reaction time		37	26		x			
Reasoning				x	x			
Response orientation (choice RT)		17	38					
Selective/Focused attention		10	30			x		
Situational awareness			4	x		x		
Sound localization		42						
Spatial orientation		7	56	x		x		
Spatial processing	x			x	x			
Speech clarity								
Speech hearing								
Speed of closure		24		x		x		
Speed of limb movement		26						
Stamina								
Stamina (2)				x				
Static strength	x							
Systems comprehension								
Technical troubleshooting								
Time sharing	x	12				x		
Trunk strength				x				
Vigilance			12					
Visual color discrimination		25						
Visual perception				x	x			
Visualization		22	56	x		x	x	
Wrist-finger speed		39						
Written comprehension		3	58			x		
Written expression		9	72					

Other attributes

Accountability							x	
Achievement striving			48	x				
Adaptability				x	x	x	x	
Affinity for planning and logic	x			x				
Affinity for uncertainty	x							
Assertiveness			40	x		x		
Attention to detail			20				x	
Cohesiveness				x				
Composure/ Emotional control				x	x			
Conscientiousness				x	x			
Control (self-efficacy)			65					
Cooperation						x		
Critical thinking						x		
Decisiveness				x	x		x	
Deliberation			57				x	
Dependability			19				x	
Disengagement							x	
Dutifulness			33					
Energy								
Excitement-seeking/Adventure-seeking			74					
Extraversion					x			
Followership			31					
Handling crisis/emergency situations							x	
Helpfulness			59					
Humility				x	x			
Initiative			32			x		
Integrity			28					
Interpersonal skills			50	x				

Judgment					x					**1**
Leadership: Delegation			66							**1**
Leadership: Motivation			35						x	**2**
Leadership: Performance management			39					x	x	**3**
leadership: Provide feedback			34					x	x	**3**
Leadership: Resolving conflicts			49							**1**
Learning ability									x	**1**
Learning orientation			62							**1**
Long term memory			54						x	**2**
Management of stressors			51	x			x	x	x	**5**
Moral interest				x	x					**2**
Occupational interest				x	x					**2**
Perseverance			55	x	x					**3**
Planning			47						x	**2**
Resilience				x	x					**2**
Resourcefulness			60							**1**
Responsibility			21							**1**
Risk perception/assessment								x		**1**
Risk-tolerance			73							**1**
Rule-abiding									x	**1**
Safety consciousness									x	**1**
Self-confidence			36	x			x		x	**4**
Self-discipline			13	x			x		x	**4**
Self-regulation			22							**1**
Self-certainty				x	x					**2**
Self-control						x				**1**
Smell									x	**1**
Straightforwardness			45							**1**
Stress tolerance			41			x	x	x	x	**5**
Success oriented				x	x					**2**
Team-oriented					x					**1**
Teamwork			6			x		x	x	**4**
Touch									x	**1**
Work ethic			23	x						**2**
Work in confined spaces			8							**1**
Work motivation									x	**1**
Working memory			44			x			x	**3**

* numbers represent importance rankings (low numbers are more important)

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Appendix C

List of SAOCs

Note: SAOCs shaded in blue were judged to have a personality component

Included SAOCs	Definition	Mean Rating	Prospective test coverage						
			ASTB + PBM	SDI	MTT	NCAPS	TBAS	AFOQT	ASVAB
(Cognitive) Task Prioritization	To perform multiple tasks in order of their importance; to direct attention to tasks when they change priorities (e.g., emergencies)	**4.8**	X		X				
Conscientiousness	Deliberate, methodical, and organized. Self-disciplined.	**4.6**	X	X		X			
Management of stressors	Recognize and cope with stress in self and others.	**4.6**	X	X		X			
Oral Comprehension	To understand spoken English words and sentences (e.g., information, ideas, or instructions).	**4.6**	X				X		
Spatial Orientation	Ability to tell where you are in relation to the location of some object or to tell where the object is in relation to you.	**4.6**	X				X		
Time Sharing	Ability to shift back and forth between two or more sources of information.	**4.6**			X				
Attention to Detail	To pay close attention to the details of one's work; to ensure work is accurate and complete; to carefully review and scrutinize one's work.	**4.4**	X						
Dependability	To be responsible, reliable, and punctual; to follow through on commitments.	**4.4**		X					
Oral Expression	To speak English words or sentences so others will understand; to express information or ideas clearly.	**4.4**							
Vigilance	To stay alert and be attentive to one's surroundings over long periods of time, including small details; to recognize hazards and threats within one's environment; to perform repetitive tasks effectively.	**4.4**		X		X			
Attention	Vigilance to multiple sources of visual and auditory information (situational awareness). Sustained and divided attention to visual and auditory information.	**4.2**	X		X				

Deductive Reasoning/ Analytical Ability	The ability to apply general rules to specific problems to produce answers that make sense.	**4.2**	X						
Judgment/Decision Making	To make effective, confident decisions in a timely manner; to use sound, informed reasoning and avoid bias when making decisions.	**4.2**							
Organization	To schedule and organize one's work activities, materials, tools, and equipment in order to complete tasks efficiently; to keep one's work space neat and tidy.	**4.2**			X				
Problem Solving	To recognize problems, their potential causes and solutions, and when they are likely to occur; to create effective and innovative solutions to problems.	**4.2**							
Reasoning	To apply rules to come up with logical answers to problems; to combine separate pieces of information to form general rules or conclusions; to recognize patterns or trends and anticipate outcomes.	**4.2**							X
Selective/Focused Attention	To maintain high levels of performance on a task in distracting or repetitive conditions; to maintain focus despite interruptions.	**4.2**	X						
Stress Tolerance	Tendency to maintain composure in challenging and threatening situations.	**4.2**	X	X		X			
Time Management	To manage one's own time and the time of others to accomplish work goals.	**4.2**			X				
Visualization	To form a mental image of a pattern or figure; to visualize how an object would look after certain changes are made (e.g., when it is moved around or when its parts are rearranged).	**4.2**	X						X
Working Memory	To hold information in memory while processing other information.	**4.2**	X						
Adaptability/Flexibility	To adjust easily to changing situations or unexpected events; to flexibly change one's actions in response to changing task priorities.	**4**	X	X		X			
Attention Allocation and Control	To flexibly switch attention across different tasks; to attend to multiple, potentially conflicting sources of information.	**4**	X		X				
Handling Crisis/Emergency Situations	To remain calm, analyze the situation, act appropriately, and make quick, accurate decisions in emergency situations.	**4**	X				X		
Integrity	Tendency to behave in a moral or ethical manner.	**4**		X		X			
Perceptual Speed and Accuracy	To perceive or compare information (e.g., letters, numbers, symbols, or patterns) quickly and accurately; to notice or compare details about things quickly and accurately.	**4**	X					X	
Responsibility	Tendency to assume responsibility and accept consequences of own decisions and actions.	**4**	X	X		X			
Self-Discipline	To perform difficult, repetitive, or boring tasks while avoiding distractions or alternate activities.	**4**	X	X		X			

Spatial Processing	Spatial analysis and orientation. Spatial reasoning and construction (manipulation of 2-diminesional information into 4-dimensional mental imagery).	**4**	X						X
Work Ethic	Tendency to strive for competence in one's work; willingness to work long hours when appropriate; tendency to reliably complete one's work in a timely fashion and complete the mission.	**4**	X	X		X			
Assertiveness	To take charge and make decisions; to be persuasive, influential, and direct when dealing with others.	**3.8**	X	X		X			
Composure/ Emotional Control	To control one's emotions in stressful situations; to avoid feelings of anxiety, insecurity, depression, or worry.	**3.8**		X		X			
Control Precision	To control the motion of a machine, vehicle, or piece of equipment (e.g., joystick or yoke) quickly and accurately; to make fine, precise movements or adjustments.	**3.8**	X				X		
Critical Thinking	To analyze the strengths and weaknesses of specific actions or decisions.	**3.8**							
Learning Ability	To be willing and able to acquire new skills quickly and easily; to quickly understand new concepts, ideas, or facts.	**3.8**							
Memory	Visual and auditory memory (working, immediate, and delayed). Spatial memory (working, short-term, and delayed).	**3.8**	X						
Occupational Interest	To possess a sense of duty as a war fighter. Realistically understands and intrinsically appreciates RPA platform. Critical to retention: Enjoys duties of the position and contribution to daily operations in theater, strong intrinsic interest in advanced and emerging avionic RPA technology. Strong interest in advancing national interests and mission objectives.	**3.8**							
Perseverance	Tendency to stick with a task until completion in spite of obstacles.	**3.8**		X		X			
Safety Consciousness	To be aware of safety hazards; to take steps to protect oneself and others from harm; to avoid risky behavior that could lead to accidents.	**3.8**							
Speech Clarity	Ability to communicate orally in a clear fashion understandable to the listener.	**3.8**							
Work in Confined Spaces	Ability to tolerate small/confined spaces for long periods of time.	**3.8**							
Work Motivation	To take a genuine interest in work tasks; to be willing to go above and beyond normal role duties; to be hard-working and ambitious.	**3.8**	X	X		X			
Accountability	To consider oneself responsible for one's actions; to take corrective actions after making a mistake.	**3.6**	X	X		X			
Cognitive Proficiency	General cognitive ability. Speed and accuracy of information processing.	**3.6**	X						

Decisiveness	To Make decisions in real time, under pressure, and within operational deadlines. Operationally patient in making the right decision and committing to a course of action.	**3.6**							
Dutifulness	Tendency to adhere to one's set of ethical principles and to strictly follow rules and regulations.	**3.6**	X	X		X			
Mental Rotation	To accurately rotate an object (e.g., a map) in one's imagination while maintaining an accurate sense of direction.	**3.6**	X				X		
Rate Control	Ability to adjust an equipment control in response to changes in the speed and/or directions of a continuously moving object or scene. The ability involves timing these adjustments in anticipating these changes. This ability does not extend to situations in which both the speed and direction of the object are perfectly predictable.	**3.6**	X				X		
Resilience	Emotional stamina and hardiness in response to monotony, confined workspace, and high pressure situations.	**3.6**	X	X		X			
Rule-Abiding	To respect authority; to follow instructions and orders; to adhere to military rules, standards, and procedures.	**3.6**	X	X		X			
Self-Confidence	To believe that one is capable of performing tasks in a wide variety of situations; to have confidence in one's skills and abilities.	**3.6**	X	X		X			
Success Oriented	Self-motivated and driven to succeed. Committed to self-improvement.	**3.6**	X	X		X			
Teamwork	To coordinate with others in a team setting to accomplish group goals; to assist team members who are overwhelmed; to offer and receive feedback.	**3.6**	X	X		X			
Control	Belief that one has high levels of control over what happens in one's life and the rewards and punishments one receives.	**3.4**	X	X		X			
Cooperation	To avoid interpersonal conflicts; to reach solutions to problems in a cooperative manner; to avoid upsetting others.	**3.4**		X		X			
Flexibility of Closure/ Pattern Recognition	To identify or detect a known pattern (e.g., a numerical code); to combine and organize different pieces of information into a meaningful pattern quickly.	**3.4**							
Inductive Reasoning/ Analytical Ability	Ability to combine separate pieces of information, or specific answers to problems, to form general rules or conclusions/	**3.4**	X						
Information Ordering	Ability to correctly follow a rule or set of rules to arrange things or actions in a certain order. The rule or sets of rules used must be given. The things or actions to be put in order can include numbers, letters, words, pictures, procedures, sentences, and mathematical or logical operations.	**3.4**							
Learning Orientation	Tendency to seek out and acquire new knowledge; natural curiosity about how things function in one's environment.	**3.4**		X		X			

Achievement Striving	Tendency to set ambitious goals for oneself and to work hard to attain a high level of work proficiency.	**3.2**	X	X	X		
Auditory Attention	To focus on a sound in the presence of other distracting and irrelevant auditory stimuli; to tell the direction from which a sound came.	**3.2**	X	X	X		
Initiative	To initiate difficult tasks without excessive procrastination; to work independently and accomplish tasks without constant supervision; to take personal responsibility for completing work tasks.	**3.2**					
Leadership: Motivation	To motivate crewmembers to perform effectively under difficult circumstances.	**3.2**					
Leadership: Performance Management	To monitor crewmember performance and take action when performance is substandard.	**3.2**					
Leadership: Provide Feedback	To provide performance feedback and coaching to crewmembers as necessary; able to effectively inform crewmembers of mistakes or potential problems.	**3.2**					
Long Term Memory	To retain and recall information (e.g., words, numbers, pictures, and procedures) after long time periods.	**3.2**					
Self-Certainty	Clear sense of self-confidence. Clear sense of role as war-fighter. Maintains confidence during performance feedback.	**3.2**	X	X	X		
Self-Control	To maintain composure and keep emotions in check, even in very difficult situations; to quickly refocus attention on the primary task after making an error or witnessing an emotionally disturbing event.	**3.2**	X	X	X		
Self-Regulation	Tendency to keep oneself focused on a task/work even when external factors make it difficult to do so.	**3.2**					
Speed of Closure	The degree to which different pieces of information can be combined and organized into one meaningful pattern quickly. It is not known beforehand what the pattern will be. The material can be visual or auditory.	**3.2**					
Written Comprehension	To read and understand written English words and sentences.	**3.2**	X				
Affinity for Planning and Logic		**3**		X			
Affinity for Uncertainty		**3**	X	X	X		

Interpersonal Skills	To get along and interact effectively with a variety of people; to be tactful and diplomatic; to build and maintain effective working relationships with others.	**3**		X					
Memorization	Ability to remember information, such as words, numbers, pictures, and procedures. Pieces of information can be remembered by themselves or with other pieces of information.	**3**			X				
Reaction Time	To respond quickly and accurately to one signal with a manual (hand or foot) or verbal response.	**3**	X						
Risk Perception/Assessment	Ability to evaluate situations and risk potential.	**3**							
Excitement-Seeking/Adventure-Seeking	To prefer tasks that may involve danger or risks (e.g., high speeds); to avoid boring or routine activities.	**2.8**							
Number Facility/Mathematical Ability	To add, subtract, multiply, and divide accurately.	**2.8**	X					X	
Resourcefulness	Tendency to use one's resources both creatively and effectively to accomplish tasks.	**2.8**							
Risk-tolerance	Willingness to accept risk and engage in activities that involve a lack of certainty or fear of failure, but without being reckless.	**2.8**	X	X		X			
Straightforwardness	Tendency to be frank, sincere, and genuine.	**2.8**							
Cohesiveness	Values the role and supportive of other personnel. Participates in morale building exchanges.	**2.6**							
Deliberation	To be careful, thoughtful, and calculating when planning actions; to avoid impulsive actions; to imagine the possible outcomes of one's actions before acting.	**2.6**							
Energy	To feel excitable and energetic; to show enthusiasm when performing work activities.	**2.6**		X		X			
Mechanical Comprehension	To understand how machines, tools, and mechanical equipment work; to understand how physical forces affect mechanical components.	**2.6**	X					X	
Estimation of Time to Contact	Time Estimation Test (TET) performance	**2.4**							
Hand-eye Coordination/Psychomotor	To make precise, coordinated movements based on visual information.	**2.4**	X				X		
Leadership: Delegation	Preference for assigning tasks and giving orders to others.	**2.4**							

Leadership: Resolving Conflicts	Resolve conflict among crewmembers; to foster an environment of teamwork and camaraderie.	**2.4**							
Manual Dexterity	To make skillful, coordinated movements of the hands; to grasp, place, move, or assemble objects using hand movements.	**2.4**	X						
Mathematical Reasoning	To reason through math problems to determine the operations that can be performed and possible solutions; to apply mathematical formulas to problems.	**2.4**	X						
Moral Interest	Motivated to save lives and protect U.S. and coalition forces. Personal beliefs and world views (spiritual, religious) support combat operations.	**2.4**							
Response Orientation	To choose between two or more possible responses quickly and accurately when two or more different signals are given.	**2.4**							
Category Flexibility	Ability to produce many rules so that each rule tells how to group a set of things in a different way. Each different group must contain at least two things from the original set of things.	**2.2**							
Finger Dexterity	Ability to make skillful coordinated movements of the fingers of one or both hands and to grasp, place or move small objects. This ability involves the degree to which these finger movements can be carried out quickly.	**2.2**							
Followership	Tendency to follow requests or orders; to accept suggestions and guidance from other crewmembers without being defensive.	**2.2**	X						
Helpfulness	Tendency to have an active concern for others' welfare; expressed through generosity, consideration of others, and a willingness to assist others in need of help.	**2.2**	X	X		X			
Extraversion	Open and accepting of critical feedback from peers, subordinates, and others. Shares credit for success, accepts responsibility for mistakes. Receptive and approachable. Socially engaging and outgoing; fosters positive relations. Understands and effectively responds to emotional states of others.	**2**		X		X			
Multi-limb Coordination	Ability to coordinate movements of two or more limbs (e.g., two arms, two legs, or one leg and one arm), such as in moving equipment and controls. Two or more limbs are in motion while the individual is sitting, standing, or lying down.	**2**	X						
Sound Localization	Ability to identify the direction from which an auditory stimulus originated relative to the observer.	**2**							

Arm-hand Steadiness	Ability to keep the hand or arm steady. It includes steadiness while making an arm movement as well as while holding the arm and hand in one position. This ability does not involve strength or speed.	**1.8**							
Disengagement	To avoid disruptive thoughts after making an error; to quickly refocus attention on a task after a disturbing situation.	**1.8**							
Fluency of Ideas	Ability to produce a number of ideas about a given topic.	**1.8**							
Humility	Effectively recognizes the need and asks for help. Seeks and accepts performance feedback from others.	**1.8**	X						
Originality	Ability to produce unusual or clever ideas about a given topic or situation. It is the ability to invent creative solutions to problems or to develop new procedures to situations in which standard operating procedures do not apply.	**1.6**							
Stamina	Ability of the lungs and circulatory systems of the body to perform efficiently over long time periods. This is the ability to exert oneself physically without getting out of breath.	**1.6**							
Touch	To feel heat, vibration, or textures; to feel differences or changes in heat, vibration, or textures.	**1.6**							
Wrist-finger Speed	Ability to make fast, simple repeated movements of the fingers, hands and wrists. It involves little, if any, accuracy or eye-hand coordination.	**1.6**							
Speed of Limb Movement	Involves the speed with which a single movement of the arms or legs can be made. This ability does not include accuracy, careful control, or coordination of movement.	**1.4**							
Dynamic Strength	Ability of the muscles to exert force repeatedly or continuously over a long time period. This is the ability to support, hold up or move the body's own weight and/or objects repeatedly over time. It represents muscular endurance and emphasizes the resistance of the muscles to fatigue.	**1.2**							
Extent Flexibility	Ability to bend, stretch, twist, or reach out with the body, arms or legs.	**1.2**							
Static Strength	Ability to use muscle force in order to lift, push, pull or carry objects. It is the maximum force that one can exert for a brief period of time.	**1.2**							
Trunk Strength	Involves the degree to which one's stomach and lower back muscles can support part of the body repeatedly or continuously over time. The ability involves the degree to which these trunk muscles do not fatigue when they are put under such repeated or continuous action.	**1.2**							

Explosive Strength	Ability to use short bursts of muscle force to propel oneself or an object. It requires gathering energy for bursts of muscle effort over a very short time period.	**1**								
	Note: SAOCs above shaded in blue were judged to have a personality component									

USAF RPA Work Interest Inventory (WII)	**Definition**	
Embracing Responsibility to Team	Actively seeking working as part of a team; willingness to accept unpleasant work conditions to serve larger team mission	**4.2**
Preference for Stressful Work	Actively seeking work involving time pressure, many simultaneous tasks, and critical work consequences under emergency conditions	**4**
Preference for Long Time on Task	Actively seeking involvement on work projects from beginning to end; preference for logging many hours in pursuit of same goal/target	**3.8**
Preference for Cutting Edge Career	Actively seeking work in emerging career field, involving new technology, and new mission	**3.6**
Active Willingness to Use Lethal Force	Actively seeking work providing opportunity to use lethal action against enemy targets when authorized	**3.6**
Non-Prioritization of Workplace Socializing	Willingness to rarely work with the same co-workers or to have limited opportunities to get to know co-workers outside of work	**2.8**

Redundant Items Removed		
Divided Attention	Pay attention to multiple tasks occurring at the same time.	**4.2**
Team-Oriented	Comfortable leading, working with enlisted personnel as a team. Competitive disposition but does not jeopardize group and mission goals for individual goals. Interest in teaching others and promoting morale. Trusting of other aircrew and military personnel.	**3.6**
Stamina (2)	Physical stamina for sitting and sustaining vigilance for extended periods. Postural strength and endurance. Resilience to physical and cognitive fatigue.	**1.8**

Training Items		
Situational Awareness	Accurately perceive self, others, and aircraft in relation to the environment.	**4.8**
Information Management Skills	To perform research and gather information necessary to solve specific problems; to identify and locate important sources of information (e.g., technical manuals).	**3.6**
Planning	To carefully plan out the sequence of actions needed to meet short- and long-term work goals.	**3.4**
Technical Troubleshooting	To use technical information to identify the source of a problem and potential solutions.	**3.2**
Navigation Skills		**3**
Problem Sensitivity	Ability to tell when something is wrong or is likely to go wrong. It includes being able to identify the whole problem as well as the elements of the problem	**3.4**
Systems Comprehension	To understand a system as a whole and the relationships among its components; to anticipate how changes in one component will affect the system as a whole.	**3**
Written Expression	To write English words or sentences so others will understand; to spell correctly; to write clearly and use language appropriate for the audience.	**2.6**
Communication Procedures	Radio, data, intercom operation; system display indicator operation; tactical report transmission; crew coordination.	**2.6**
Map Reading	To understand a visual representation of an area; to use information from a map to aid in navigation.	**2.4**
Photo Interpretation		**2.4**
Physical Conditioning	Tendency to be active and participate in sports, exercise and physical activity.	**1.6**
Medical Items		
Speech Hearing		**3.8**
Visual Perception		**3.4**
Visual Color Discrimination		**3.2**
Near Vision		**3**
General Hearing		**2.8**
Night Vision		**2.5**
General Health		**2.4**

Peripheral Vision		**1.8**
Far Vision		**1.6**
Glare Sensitivity		**1.6**
Depth Perception		**1.5**
Dynamic Flexibility		**1.4**
Gross Body Equilibrium		**1.4**
Gross Body Coordination		**1.2**
Smell		**1.2**

Appendix D

Test Descriptions

Air Force Officer Qualifying Test (AFOQT) Subtest Descriptions	
Verbal Analogies	The test measures the ability to reason and see relationships among words. Examinees must choose the word that best completed the analogy presented.
Arithmetic Reasoning	This test assesses the ability to solve arithmetic problems.
Word Knowledge	This test measures knowledge of words and their meanings. Examinees are presented with a target word and must choose the closest synonym from a list of five alternatives.
Math Knowledge	This test assesses knowledge of mathematical principles and terminology.
Instrument Comprehension	This test measures the ability to determine the position of an airplane in flight from reading instruments showing its compass heading, amount of climb or dive, and degree of bank to the right or left.
Block Counting	This test measures spatial reasoning. A 3-dimensional pile of blocks is shown. Examinees must determine how many blocks are touched by a designated block.
Table Reading	This test measures the ability to read a table quickly and accurately.
Aviation Information	This test measures aviation knowledge and principles.
Physical Science	This test assesses knowledge of scientific principles.
Self-Descriptive Inventory	This test measures the Big Five personality domains of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness and several of their underlying facets.
Reading Comprehension	This test measures the ability to read and understand written material. Examinees are presented with a passage followed by a series of multiple-choice questions regarding its content. Examinees are instructed to choose the option that best answers the question based solely of the passage content.
Situational Judgment	This test measure examinees' judgment in responding to interpersonal situations similar to those likely to be encountered as an officer. Responses are scored relative to the consensus judgment of experienced US Air Force officers.

Test of Basic Aviation Skills (TBAS) Subtest Descriptions	
3 Digit Listening (3 DIG)	Examinees are presented with numbers and letters via headphones; must respond to three specified target numbers.
5 Digit Listening (5 DIG)	Examinees are presented with nu1nbers and letters via headphones; must respond to five specified target numbers.
Airplane Tracking (ATT)	Examinees use a control stick to keep a gun sight on an airplane as it moves at a constant rate. The airplane changes directions randomly during the task.
Horizontal Tracking (HTT)	Examinees use rudder pedals to keep a box over an airplane as it moves horizontally at the bottom of the screen.
ATT and HTT	Examinees simultaneously perform the Airplane Tracking and Horizontal Tracking tasks.
ATT, HTT, and 3 DIG	Examinees sin1ultaneously perforn1 the Airplane Tracking, Horizontal Tracking, and 3 Digit Listening tasks.
ATT, HTT, and 5 DIG	Exa1ninees sin1ultaneously perform the Airplane Tracking, Horizontal Tracking, and 5 Digit Listening tasks.
Emergency Scenarios	Examinees simultaneously perforn1 the Airplane Tracking and Horizontal Tracking tasks while responding to an emergency situation presented by an audio signal.
UAV Test	A UAV is shown flying in a given direction with a map view of the ground. Examinees must identify targets indicated on the map.

Aviation Selection Test Battery (ASTB)/Performance Based Measures (PBM) Test Descriptions	
Math Skills (MST)	Measures the examinee's ability to: •Apply mathematical processes to solve equations •Understand basic concepts related to arithmetic, algebra, geometry, and data analysis
Reading Comprehension (RCT)	Measures the examinee's ability to: •Extract information from text passages •Analyze written information and form logical conclusions
Mechanical Comprehension (MCT)	Measures the examinee's ability to: •Perceive and understand the nature of physical relationships •Solve practical problems related to mechanical principles
Aviation and Nautical Information (ANIT)	Measures the examinee's ability to recall terminology and concepts relevant to Naval service and aviation.
Naval Aviation Trait Facet Inventory (NATFI)	Measures specific personality traits shown to predict success in aviation at various stages throughout an aviator's career. The list of traits is proprietary and controlled by the Navy Medicine Operational Training Center.
Performance Based Measures Battery (PBM)	A battery of processing speed, dexterity and divided-attention-driven tests measuring: •Spatial orientation aptitude •Dichotic listening aptitude •Ability to perform tracking tasks with a stick-and-throttle set •Ability to perform several of the aforementioned tasks at the same time
Biographical Inventory with Response Validation (BI-RV)	Assesses the examinee's previous experiences & background related to success in aviation.

http://www.med.navy.mil/sites/nmotc/nami/Pages/ASTBOverview.aspx

Armed Services Vocational Aptitude Battery (ASVAB) Test Descriptions	
General Science (GS)	Measures the examinee's knowledge of physical and biological sciences.
Arithmetic Reasoning (AR)	Measures the examinee's ability to solve arithmetic word problems.
Word Knowledge (WK)	Measures the examinee's ability to select the correct meaning of a word presented in context and to identify best synonym for a given word.
Paragraph Comprehension (PC)	Measures the examinee's ability to obtain information from written passages
Mathematics Knowledge (MK)	Measures the examinee's knowledge of high school mathematics principles.
Electronics Information (EI)	Measures the examinee's knowledge of electricity and electronics
Auto and Shop Information (AS)	Measures the examinee's knowledge of automobile technology and knowledge of tools and shop terminology and practices.
Mechanical Comprehension (MC)	Measures the examinee's knowledge of mechanical and physical principles.
Assembling Objects (AO)	Measures the ability to determine how an object will look when its parts are put together.

http://official-asvab.com/docs/asvab_fact_sheet.pdf

Navy Computer Adaptive Personality Scales (NCAPS) Definitions of Personality Characteristics	
Achievement (AV)	Likes to set and achieve challenging goals, work hard, persist in the face of significant obstacles, strive for excellence, perfectionism; confident in ability to perform well.
Adaptability/Flexibility (ADF)	Willing to change his/her approach to tasks and projects; able to work effectively with many different types of people in many different types of situations and/or with differing organizational constraints.
Attention to Detail (ADL)	Is exacting, precise, accurate, neat, and thorough; spots minor imperfections or errors; is meticulous in hes/her approach to tasks.
Commitment (COM)	Is psychologically and emotionally attached to the Navy; identifies with, is involved in, and enjoys being in the Navy; views own values as congruent with Navy values; feels sense of obligation toward the Navy; believes that staying in the Navy is the right thing to do.
Dependability (DEP)	Reliable, well organized, orderly and planful; not easily distracted or bored by routine task; does not procrastinate, even when tasks are unpleasant or unexciting.
Dutifulness/Integrity (DUT)	Has a strong sense of duty and moral obligation; try to do what is right and ethical; accepts authority and follows rules and regulations; fulfill their obligations and commitments; accept the consequences of their actions.
Empathy (EMP)	Recognizes and understands other's states of mind or emotions; demonstrates compassion toward others; takes care of others in need; provides sympathy and comfort; helps others.
Initiative (INI)	Takes action at one's own discretion; willing to take on responsibilities and challenges; persists in the face of obstacles and overcomes barriers; volunteers for tasks outside one's regular duties.
Innovation (INN)	Able to come up with new ideas for, and answers to, work-related problems; does not stick to old, less effective or inefficient approaches simply because things have always been done that way.
Leadership Orientation (LDR)	Willing to lead, take charge, offer opinions and direction, and take responsibility for guiding others' actions; able to mobilize others to act; is confident and decisive.
Perceptiveness/Depth of Thought (PER)	Interested in pursuing topics in depth; enjoys abstract thought and has a need to understand how things work; enjoys searching for patterns in data and understanding the "big picture;" knowledgeable about many things; perceptive and insightful.
Positive Self-Concept (PSC)	Feels good about self, mentally and physically; self-assured; optimistic about the future; believes that one controls one's own fate.
Self-Control (SCN)	Thinks through possible consequences before taking action; does not act on the "spur of the moment;" has no difficulty controlling emotions and behavior he/she knows to be inappropriate.

Self-Reliance (SRL)	Self-sufficient, resourceful, and able to make own decisions when appropriate; does not become dependent on others to get things done.
Social Orientation (SO)	Outgoing, sociable, warm, likable, cooperative and participative; likes to work with others rather than alone; likes and accepts people readily and values connections with others; establishes and maintains friendships easily.
Stress Tolerance (ST)	Maintains composure and retains ability to think clearly and take effective action when confronted with stressful situations; can readily put aside worries to get the job done.
Tolerance for Ambiguity (TOL)	Handles uncertain and unstructured situations effectively and with confidence; prefers unpredictable work environments in which the problems (and potential solutions) are ill-defined.
Vigilance (VIG)	Constantly scans the environment for things that require attention, even when no action may be required for long periods of time (e.g., staying alert to possible safety hazards).
Willingness to Learn (WTL)	Demonstrates an interest in and willingness to learn,(e.g., in a classroom environment or on the job, or in general, and to apply that material in new situations; learns from mistakes, takes useful advice, and asks questions when unsure about something).

Self-Description Inventory (SDI+) Test Description	
The Self-Description Inventory (SDI+) is a measure of the Big Five personality domains of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness (Manley, 2011). It also includes a Machiavellianism scale. AFOQT Form S included an experimental 220-item version of the SDI+. Validation studies have examined the predictive validity of SDI+ scales for use in regression models to predict training performance in officer specialties such as pilot, RPA pilot, and cyber with mixed results. AFOQT Form T includes an expanded version of the SDI+ which assesses more facets.	
Personality Domains	
Neuroticism	Emotional stability, anxiety, sadness, and irritability.
Extraversion	Activity and energy level traits, sociability and emotional expressiveness.
Openness	Breadth, Complexity, and depth of an individual's life.
Agreeableness	Altruism, trust, modesty, prosocial attitudes.
Conscientiousness	Impulse control, goal directed behavior.

Manley, G. G. (2011). Development of domain and facet-level scales for the Self-Description Inventory (AFCAPS-TR-2011-0007). Randolph AFDB, TX: Air Force Personnel Center
http://homepages.rpi.edu/~verwyc/BIGFIVEOH.html

Multi-Tasking Test (MTT) Test Description
The USAF Multi-Tasking Test, based on a test originally sponsored by the US Navy, assesses cognitive multitasking independent of psychomotor ability. Examinees must perform four cognitive tasks requiring them to monitor, shift attention across, and respond to multiple sources of information. Designed to assess key cognitive skill areas (e.g., "situational awareness, "tunnel vision avoidance," "task saturation coping")

RPA Work Interest Inventory (WII) Test Description
Based on site visits to Creech AFB, psychologists identified key features (both positive and negative) of the RPA work environment (based on the Predator platform). These characteristics were then modified based on review by SMEs including 8 Air National Guard SMEs (4 RPA pilot, 4 sensor operators) at Mesa AFB, and 36 Active Duty SMEs (21 RPA pilot, 15 sensor operators) at Creech AFB. These RPA characteristics were developed into the WII, a brief (approximately 5-10 minute administration) 37 item measure of P-E fit, such that potential applicants identify the desirability of each RPA characteristic on five-point Likert-type scale.

APPENDIX E Test Comparison Table

		CRITERION MEASURE												
Test/Measure	Sub Test	API NSS	NFO Primary NSS	Pilot Primary NSS	Pilot Primary Attrition	RFS Pass-Fail	RIQ - Academic Grades	Peer Ratings (Unit-Weighted Overall Performance Composite)	Peer Ratings (Global Overall Potential Rating)	Supervisor Ratings (Unit-Weighted Overall Performance Composite)	Fakability	Practicality, Logistics*	Test Length (Time limit)	Average Time
ASTB	Aviation & Nautical Information Test (ANIT)	0.18	0.08	0.31	0.13						N/A	Very Favorable	15	7
ASTB	Mathematical Skills Test (MST)	0.35	0.12	0.14	0.01						N/A	Very Favorable	40	26
ASTB	Mechanical Comprehension Test (MCT)	0.32	0.01	0.20	0.04						N/A	Very Favorable	15	12
ASTB	Reading Comprehension Test (RCT)	0.26	0.16	0.08	0.02						N/A	Very Favorable	30	25
ASTB	Airplane Tracking Test (ATT)	0.15	0.09	0.31	0.16						N/A	Very Favorable		
ASTB	Dichotic Listening Test (DLT)	0.17	0.11	0.10	0.06						N/A	Very Favorable		
ASTB	Directional Orientation Test (DOT)	0.23	0.18	0.24	0.13						N/A	Very Favorable	40	40
ASTB	Emergency Scenario Test (EST)	0.16	0.02	0.20	0.06						N/A	Very Favorable		
ASTB	Vertical Tracking Test (VTT)	0.13	0.11	0.24	0.14						N/A	Very Favorable		
ASTB - NATFI	Dimension 1 **		-0.03	0.04	0.01						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 2 **		0.04	0.12	0.05						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 3 **		0.06	0.01	0.00						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 4 **		0.10	0.10	0.06						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 5 **		0.14	0.13	0.07						Moderate?	Very Favorable	35	15
ASTB - NATFI	Dimension 6 **		0.07	0.01	-0.01						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 7 **		-0.02	0.15	0.12						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 8 **		0.00	-0.05	-0.05						Moderate?	Very Favorable		
ASTB - NATFI	Dimension 9 **		0.07	0.12	-0.03						Moderate?	Very Favorable		
AFOQT	Arithmetic Reasoning					0.21	0.26				N/A	Favorable		
													30	
AFOQT	Aviation Information					0.21	0.28				N/A	Favorable	9	
AFOQT	Block Counting					0.27	0.28				N/A	Favorable	6.5	
AFOQT	General Science/ now Physical Science					0.10	0.02				N/A	Favorable	11	
AFOQT	Hidden Figures					0.24	0.20				N/A	Favorable	10	
AFOQT	Instrument Comprehension					0.33	-0.01				N/A	Favorable	8	
AFOQT	Math Knowledge					0.15	0.21				N/A	Favorable	23	
AFOQT	Rotated Blocks					0.24	0.10				N/A	Favorable	15	
AFOQT	Table Reading					0.25	0.33				N/A	Favorable	9	
AFOQT	Verbal Analogies					0.10	0.12				N/A	Favorable	9	
AFOQT	Word Knowledge					0.08	0.22				N/A	Favorable	6	
Flying Hours	Pilot Applicant Flying Hours (0 -9 code)					0.35	0.29				N/A	Favorable		
SDI+	Achievement-Striving					0.11	0.23				Mod/High	Favorable		
SDI+	Considerate					-0.06	0.02				Mod/High	Favorable		
SDI+	Creative					-0.01	-0.04				Mod/High	Favorable		
SDI+	Cultured					-0.02	-0.07				Mod/High	Favorable		
SDI+	Dominance					0.02	0.00				Mod/High	Favorable		
SDI+	Envious					0.12	0.01				Mod/High	Favorable		
SDI+	Helpful-Altruistic					-0.09	-0.06				Mod/High	Favorable		
SDI+	Hyper-Competitive					-0.02	-0.10				Mod/High	Favorable		
SDI+	Individualistic					-0.12	-0.12				Mod/High	Favorable		
SDI+	Order					0.07	0.02				Mod/High	Favorable		
SDI+	Pleasant					-0.10	0.01				Mod/High	Favorable		
SDI+	Reflective					-0.08	-0.32				Mod/High	Favorable		
SDI+	Scientific Interest					-0.04	-0.11				Mod/High	Favorable		
SDI+	Self-Serving					-0.10	-0.05				Mod/High	Favorable		
SDI+	Sociable					-0.08	-0.04				Mod/High	Favorable		
SDI+	Stress-Under-Pressure					-0.13	-0.18				Mod/High	Favorable		
SDI+	Team player					0.11	0.16				Mod/High	Favorable		
SDI+	Temperamental					-0.08	-0.18				Mod/High	Favorable		
SDI+	Unassertive					-0.01	-0.09				Mod/High	Favorable		
SDI+	Worry					-0.11	-0.11				Mod/High	Favorable		
TBAS	Directional Orientation Test (DOT)					0.32	0.21				N/A	Favorable		
TBAS	Joystick Redirects (Airplane Tracking Test)					0.18	0.00				N/A	Favorable		
TBAS	Rudder Redirects (Horizontal Tracking Test)					0.26	0.20				N/A	Favorable		
TBAS	TBAS MultiTasking (Combination Joystick and Rudder Test)					0.25	0.00				N/A	Favorable		
NCAPS	Adaptability/Fakability							0.16	0.15	0.14	Mod/High			
NCAPS	Attention to Detail							0.32	0.34	0.23	Mod/High			
NCAPS	Achievement							0.35	0.38	0.48	Mod/High			
NCAPS	Dependability							0.26	0.23	0.32	Mod/High			
NCAPS	Dutifulness							0.18	0.16	0.12	Mod/High			
NCAPS	Social Orientation							0.18	0.15	0.3	Mod/High			
NCAPS	Self-Reliance							0.04	0.15	0.07	Mod/High			
NCAPS	Stress Tolerance							0.28	0.23	0.25	Mod/High			
NCAPS	Viligance							0.22	0.24	0.18	Mod/High			
NCAPS	Willingness to Learn							0.09	0.07	0.26	Mod/High			

* e.g., probablility that test will be released to us, cost, ease of implementation into APEX

Green = r >.10

API NSS = Aviation Preflight Indoctrination (Ground School) Navy Standard Score
NFO Primary NSS = Naval Flight Officer (back seater) flight grades

RFS = RPA Flight Screening; n = 170
RIQ = RPA Instrument Qualification; n = 110

** The ASTB - NATFI Dimensions are controlled by the Navy Medicine Operational Training Center

Hidden Figures was in Form S; removed from Form T.

Rotated Blocks was in Form S; removed from Form T.

Not applicable

The entire AFOQT Form TSSDI+ is 220 items with a 40 minute time limit. The Form T version is 240 items ans a 46 minute time limit.

The entire TBAS battery requires about 45 minutes. Although some of the individual tests are timed, they are administered as a group as the modules build in complexity.