SYSTEMS REQUIREMENT DOCUMENT
FOR THE
AIR TRAFFIC CONTROL
COMMON SIMULATOR

Prepared For:
U.S. ARMY AVIATION AND MISSILE COMMAND
REDSTONE ARSENAL, ALABAMA 35898-5000

Prepared By:
AIR TRAFFIC CONTROL PROJECT OFFICE
REDSTONE ARSENAL, ALABAMA 35898-5000

APPROVED FOR USE AS

FUNCTIONAL BASELINE BY: ____________________________ DATE: 7 December 2012

LTC Mike Rutkowski
ATC Product Manager
ATC PMO

TABLE OF REVISION

Date	Revision	ECP Number	Title of Change
	-		Initial Release

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

1.0 SCOPE

1.1 Identification

1.2 System Overview

The Air Traffic Control (ATC) Common Simulator (ACS) is a system that replicates the ATNAVICS, and MOTS/TTCS systems as described in this performance work statement. The ACS mission is to maintain operator proficiency and improve functional understanding of joint Air Traffic Services (ATS) doctrine and procedures. It will provide virtual based training through the depiction of an electronic, visually controlled control tower, airport surveillance radar, and precision approach radar incorporating pseudo pilot to controller voice and audio interaction with and without the ATS system shelter in service. It will conduct tactical ATS scenarios, recordings of voice, radar representation, and playback of the entire operation so Soldiers can review and hone their skills. It will also allow the user to develop operator scenarios of emergency procedures, deployments, and other unique unit training requirements.

1.3 Document Overview

This format has been customized for the ACS in order to provide clarification of functions. Terms requiring definition have been identified with italicized font which indicates that this term can be found in Section 6.2 Glossary.

1.3.1 "Shall"

This document contains "shall" statements. The “shall” statements are requirements, are considered to be binding, and require verification.

2.0 APPLICABLE DOCUMENTS

2.1 General

The documents listed in this section are specified in Sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this PWS or recommended for additional information or as examples.

2.2 Government Documents

2.2.1 Government specification, standards, and handbooks

The following specifications, standards, and handbooks form a part of this document to the extent specified herein.

Document Number	Document Title
FCM-H1-2005	Surface Weather Observations and Reports
MIL-STD-130	DOD Standard Practice, Identification Marking of US Military Property
MIL-STD-810G	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-1472	DOD Design Criteria Standard: Human Engineering

2.2.2 Other Government documents, drawings, and publications

The following other Government documents, drawings, and publications form a part of this document to the extent specified herein.

Document Number	Document Title
29 CFR 1910	Occupational Safety and Health Standards
Field Manual (FM) 3-04.120	Air Traffic Services Operations
FAA Order JO 3120.4	Air Traffic Technical Training
FAA Order JO 7110.65	Air Traffic Control
FAA Order JO 7210.3	Facility Operation and Administration
Training Circular (TC) 3-04.81	Air Traffic Control Facility Operations, Training, Maintenance, and Standardization
DA Form 3479-11, 12, 13	Commander's Task List (ATS)

2.3 Order of Precedence

In the event of a conflict between the text of this specification and the references cited, the text of this specification takes precedence. Nothing in the specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3.0 REQUIREMENTS

3.1 Design Requirements

3.1.1 System Footprint

The ASC shall be fully operational when placed in an ATNAVICS and MOTS, and provide the controller(s) sufficient room to maneuver and complete the training simulations.

3.1.2 Modularity

3.1.2.1 The ACS components shall be able to be removed and replaced using standard Army tools issued to the Military Occupational Specialty (MOS) 94D, ATC Equipment Repairer using Tool Kit(TK)-105/AG.

3.1.2.2 The ACS shall not require any special tooling to:

- Disassemble
- Replace components
- Remove and replace cabling, both external and inter-component cabling
- Reassemble the system, subsystems, components and subcomponents

3.1.2.3 The ACS shall use industrial standard non-proprietary data links to connect modules in accordance with (IAW) Distributed Interactive Simulation (DIS) IEEE 1278.1A-1998.

3.1.3 Human Engineering

3.1.3.1 All ACS controls and displays shall precisely imitate replicated systems' controls and displays.

3.1.3.2 The ACS shall meet the safety criteria similar to paragraphs titled, "Labeling" and "Hazards and Safety" of MIL-STD-1472.

3.1.3.3 The use and maintenance of the ACS shall not present any health hazards to personnel IAW hazard and safety and electrical, mechanical, fluid, toxic, and radiation hazards similar to MIL-STD-1472.

3.1.3.4 The ACS shall allow operation and maintenance by the 5th percentile female to 95th percentile male.

3.1.4 Environmental Requirements

3.1.4.1 Operating Conditions

The ACS shall operate, as specified herein, in the operate mode with the following environmental conditions:

a. Temperature: 32° to 120° F (0° to 48.9° C)

b. Relative humidity: 5% to 95%

a. The ACS shall be operable inside a fully-functioning:

- Air Traffic Navigation Integration and Coordination System (ATNAVICS) shelter
- Mobile Tower System (MOTS) shelter
- field tent
- garrison office

3.1.4.2 Storage Conditions

The ACS shall operate, as specified herein, after storage in the following environmental conditions:

a. -60 degrees F to 160 degrees F

b. Relative humidity: 5% to 95%

3.1.4.3 Power Management

3.1.4.3.1 Power Distribution Subsystem

3.1.4.3.1.1 The ACS shall receive power from the replicated system.

3.1.4.3.1.2 The ACS shall receive power from the tactical quiet generator associated with each system (3Kw, 5Kw, 10kw 15Kw, 18Kw).

3.1.4.3.1.3 The ACS shall receive power from CONUS (60Hz)/OCONUS (50Hz) commercial power source.

3.1.4.3.2 Single Power Control Point

The ACS shall include a power distribution system that provides a power control point, with enough power outlets to control all the ACS components, which plugs into a single 110V outlet with a maximum 20 amp draw.

3.1.4.3.3 Computational System Backup Power

The ACS shall include a backup system to provide no less than 5 minutes of uninterrupted power to allow for controller shutdown.

3.1.4.4 Vibration

The ACS shall meet the requirements of this specification, following exposure to vibrations when in the storage container, similar to the requirements of the vibration section of MIL-STD-810G, Part 2 Section 514.6.

3.1.4.5 Shock

The ACS shall sustain no damage after drops of 24 inches onto concrete during handling similar to MIL-STD-810G, Part 2 Section 516.6.

3.2 Performance Requirement

3.2.1 Interoperability

The ACS shall be fair fight interoperable via Local Area Network (LAN).

The ACS shall be fair fight interoperable via Wide Area Network (WAN).

3.3 Functional Requirements

3.3.1 Common Functional Requirements

The ACS shall depict distances and bearings of the Visual Flight Rules (VFR) Reporting points, actual runway headings, frequencies, and layout of the airfield for the airspace prior to the start of each scenario.

3.3.1.1 Simulation

The ACS shall simulate and display the aircraft classes specified in Table 3.3.1.1A.

TABLE 3.3.1.1 - REPLICATED AIRCRAFT CLASSES

Aircraft Class
Commercial - Fast Approach
Commercial - Slow Approach
Military - Fast Approach
Military - Slow Approach
Military - Hovering

Aircraft Class
Military - Fast Climbing
Military - Slow Climbing
Military - Unmanned Aerial Systems (UAS)

3.3.1.1.1 The ACS shall simulate a control/advisory effort through all phases of flight, start to finish.

3.3.1.1.2 The ACS, while in the ATNAVICS mode, shall simulate the loss and re-acquisition of air tracks and aircraft.

3.3.1.1.3 The ACS, while in the ATNAVICS mode, shall simulate the full set of each tactical ATS Government approved system-specific menus.

3.3.1.1.4 The ATNAVICS simulator shall provide the requirement of interconnectivity/interoperability with the MOTS/TTCS simulator for realistic tower/radar coordination training.

3.3.1.1.5 The ACS shall allow the controller to direct the simulated aircraft verbally.

3.3.1.1.6 The ACS shall allow the supervisor to direct the simulated aircraft via manual or verbal inputs.

3.3.1.1.7 The ACS shall not require manual inputs to drill down more than two levels to complete commands.

3.3.1.1.8 The ACS shall have the ability to add VFR entry points, sector arrival charts (wagon wheel) overlays, and to develop unique traffic patterns.

3.3.1.1.9 The ACS shall have the ability to delete VFR entry points, and sector arrival charts (wagon wheel) overlays.

3.3.1.1.10 The ACS aircraft and ground vehicles shall initiate calls and respond to controllers verbal instructions.

3.3.1.1.11 The ACS shall allow both aircraft and ground vehicles to respond to verbal instructions, IAW FAA Order JO 7110.65 both relaxed and exact.

3.3.1.1.12 The ACS aircraft and ground vehicles shall initiate calls and respond to light gun signals.

3.3.1.1.13 The ACS shall automatically adjust aircraft flight path and vehicle direction in response to the controller verbal commands.

3.3.1.1.14 The ACS shall support collective training between the following ATC positions:

- MOTS Flight Data (FD), Ground Control (GC), and Local Control (LC)
- ATNAVICS Feeder Data Control (FDC) and Final Control (FC)

3.3.1.1.15 The ACS shall support collective training between the following positions:

- MOTS FD and ATNAVICS FDC
- MOTS FD and ATNAVICS FC

3.3.1.1.16 Each position shall provide independent training, select positions functioning or all positions functioning together for crew training. The system shall provide the capability for auto FD, auto GC, auto LC, auto FDC, or auto FC to provide individual or select position training.

3.3.1.1.17 The simulator shall provide one position to be used by the instructor. The instructor's position shall have controls and displays to create, initiate, and conduct training exercises.

3.3.1.1.18 At least one Pseudo Pilot position shall be provided for the tower simulator and one for the radar simulators. Additional positions may be requested by the Government. The Pseudo-Pilot stations shall allow the control of all aspects of an aircraft or vehicle as if done by the actual pilot or driver through the use of keyboard commands, mouse, GUI, voice or any combination thereof. The pseudo pilot shall be capable of responding to control instructions in a timely and realistic manner. A user defined macro capability shall be provided that will enable site defined response to control instructions.

3.3.1.1.19 The system shall allow tasks such as ground and air routing, aircraft take-off, piloting, flying in traffic patterns, formation control, recovery of objects on or near runway, light control, and adding an aircraft or vehicle during a simulation.

3.3.1.1.20 The ACS shall provide a Meteorological Event Triggering System (METS) pre-load function to allow controllers to pre-load METS data.

3.3.1.1.21 The ACS, while in the MOTS/TTCS mode, shall support night operations with and without Night Vision Goggle (NVG) simulation during VFR/Special VFR (SVFR)/Instrument Flight Rules (IFR) operations with visual representation of the changing weather.

3.3.1.1.22 The ACS software shall portray frontal system movement:

- fog
- dust
- blowing sand
- rain equal to 1/4" per hour
- rain equal to 1" per hour
- snow
- blowing snow
- cloud-to-cloud lightning
- cloud-to-ground lightning
- in-cloud lightning
- Wind phenomena, including but not limited to crosswinds, wind shear, wind shifts.

3.3.1.1.23 The ACS software shall portray the following cloud formations:

- stratoform clouds yielding steady, light precipitation
- cumuliform clouds yielding showers and thunderstorm conditions

3.3.1.1.24 The ACS wind instrumentation displays shall allow supervisor manipulation to assess proper runway selection and alternate landing decisions.

3.3.1.1.25 The ACS shall simulate, display, and comply with instrument meteorological conditions (IMC) under IFR.

3.3.1.1.26 The ACS shall simulate, display, and comply with visual meteorological conditions (VMC) under VFR.

3.3.1.1.27 The ACS shall replicate and display:

- day
- dawn/dusk
- night
- reduced visibility
- precipitation conditions

3.3.1.1.28 The ACS, when in the ATNAVICS mode, shall develop and display maps using commands provided in the tactical ATS system-specific mapping feature.

3.3.1.1.29 The ACS shall allow the operator to select voice and data communications IAW Table 3.3.1.1.24.

TABLE 3.3.1.1.24 - SIMULATED COMMS, WEATHER, & TIME DATA

Communication	Data Displayed and/or Controlled
Radios (each Radio)	Purpose or frequency Label Transmit Monitor Off Flash when transmission received
Telephone/wireline (each Line)	Purpose or number label Flash when ringing Activate Hold Deactivate/off Push-to-talk feature for each individual telephone/wireline

Communication	Data Displayed and/or Controlled
MMS	Wind (in digital degrees and knots) Direction Speed Gusts Altimeter setting (local barometric pressure reading) measured in inches of mercury and millibars Temperature in digital Fahrenheit and Celsius Density Altitude, based upon field elevation and current temperature
Clock	Time (hours, minutes, and seconds in digital, operator-adjustable,24-hour format): Zulu Local time
Intercom	Intercom status (each or all workstation): Purpose or position label Flash when ringing Activate Hold Deactivate/off

3.3.1.1.30 The ACS, when in the ATNAVICS mode, shall provide for creation of simulated air tracks for depiction and control on the display screens.

3.3.1.1.31 The ACS shall allow the operator and supervisor to speed up forwards or backwards to a specific point in the simulation.

3.3.1.1.32 The ACS shall allow the operator and supervisor to repeat simulation and or recorded simulation segments in slow motion.

3.3.1.1.33 The ACS shall replicate the following runway conditions IAW FCM-H1-2005:

- light precipitation
- heavy precipitation w/ puddling
- icing snow
- construction
- airfield damage during attack

3.3.1.1.34 The simulator software shall provide a comprehensive aircraft database of current U.S. military aircraft (including military fixed wing) in the inventory and a comprehensive database of civilian aircraft that controllers would typically be exposed to while performing their duties. The simulator system shall have at least 90 percent of the DoD current aircraft inventory with an objective of 100 percent of the inventory. At a minimum the following aircraft shall be accurately displayed: C-23, C-5, C-130, C-27, C-12, TUAS, SUAS, ERMP, AH-64A, AH-64D, CH-47D, UH-60L/M, OH-58D, C-17, CV-22, AH-1W Marine Corps, CH-46E Marine Corps, MH-47, F-14, F-15, F-16, F-18, B-1, B-2, B-52H, Shadow UAV, KC-135, KC-10, A-10, HH-65, AH-6J, C-9, 747, 757, 737, MD-80, A300, A320, A380. The simulator shall display calibrated aircraft visual recognition characteristics that the controller trainee can recognize at one mile. Aircraft performance characteristics shall be affected by wind speed and direction both on the ground and in the air. The simulator shall meet the requirement to display the majority of aircraft that a controller would be exposed to and provide realistic aircraft performance characteristics.

3.3.1.1.35 The system software shall provide a database of commercial and military vehicles that are commonly seen in the airfield environment by air traffic controllers. As a threshold, the system database shall contain the following 13 vehicles: pick-up, follow-me vehicle, barrier maintenance and airfield lighting vehicles, airfield fire response vehicles (ambulance, fire truck, pickup), runway sweeper, snow plow, sedans, pavement maintenance vehicles, step van mowers and TOW vehicle. System software shall allow vehicle recognition at one mile.

3.3.1.1.36 The system software shall meet the requirement to program military aircraft performance, speed characteristics, and profiles. These are to include VFR patterns for small aircraft, helicopters, civilian aircraft performance standards that controller trainees are normally exposed to, such as parachute operations, formation flights and flight break-ups, 360 degree overhead pattern, rectangular patterns, re-entry patterns, straight-in approaches, and simulated flameout operation (SFO) procedures for jet aircraft (straight-in, high-key entry, low-key entry). It will also have the approximate speeds specified in aircraft specifications for the appropriate airframe. The system shall simultaneously display 100 moving objects (aircraft and vehicular) within the Local and Ground Controller’s total field of view.

3.3.1.1.37 The MOTS/TTCS simulator shall provide a visual display with field of view (FOV) of 45 degrees vertical by 120 degrees horizontal. The visual display shall be visual horizontally through 360 degrees and plus or minus 90 degrees vertically. In addition to the slew capability the system shall also provide a minimum of 5 instantaneous programmable alternate views. There are situations that require another control position to view a different area of the airport without disrupting the out the window view. The system shall provide an additional visual display with a selectable horizontal field of view of at least 45 degrees. The resolution of this display shall allow the controller to identify aircraft and ground vehicles moving or parked within the confines of the airfield. The Field of View (FOV) shall be visual through 360 degrees horizontally and plus or minus 90 degrees vertically.

The system software shall accurately depict/portray local airfield hazards to flight, to include: bird activity, UAS, gliders, or para-drops, major construction on airfield, lighting, hazardous material area, and pavement repair/replacement. As a minimum threshold, presentation of a local airfield hazard shall include UAS activity, airfield lighting, para-drops, bird activity, major construction on airfield, and pavement repair/replacement with an objective of depicting all areas. Hazards shall be accurately represented to portray realism in order to provoke a user response and/or relate exact occurrences of non-response.

3.3.1.1.38 The system shall provide visual and corresponding instrumentation representation and programmable levels of weather phenomenon characteristic of the control tower geographical location that includes the following:

3.3.1.1.38.1 The software shall accurately portray frontal systems moving across the airfield and all associated weather phenomena, e.g, dust, blowing sand, rain squalls, snow, blowing snow, etc., cloud formations and typical conditions associated with various cloud configurations, e .g., stratoform clouds yielding steady, light precipitation, and cumuliform clouds yielding showery and thunderstorm conditions. The simulator will include all types of inclement weather elements due to cloud formations, e.g., cloud-to-cloud lightning, cloud-to-ground lightning, and in-cloud lightning.

3.3.1.1.38.2 The system shall accurately display cloud ceilings at programmable intervals above ground level (AGL). The system shall display two ceiling layers simultaneously. The system will display variable ceilings at all altitudes and the capability to display clear, scattered, broken and overcast sky conditions.

3.3.1.1.38.3 The system shall accurately display varying levels of visibility components to complement changing cloud conditions. As a minimum, software shall display low visibility to include: fog, smoke, haze, rain, snow, smoke and haze (smog), drizzle, sleet, hail, dust, dust storms, sandstorms and any likely combination of the above. The system shall allow selectable levels of visibility ranging from 0 to unlimited.

3.3.1.1.38.4 The system shall simultaneously depict different sector visibility

3.3.1.1.38.5 The system shall depict variable vertical visibility to reflect a difference between on ground level and tower level.

3.3.1.1.38.6 The software shall depict rapidly changing weather elements such as altimeter falling or rising rapidly, cloud ceiling, visibility and/or wind speeds rising and falling rapidly, with the objective of programming wide fluctuations in rate of accumulating precipitation such as that associated with snow squalls, thunderstorms and frontal passages.

3.3.1.1.38.7 The simulator system shall represent wind information in association with visual references. Modeled wind elements shall include wind direction and speed, wind gusts/shifts, and wind shear in the lowest 2000 feet of elevation above ground level. The objective is to include microburst wind conditions and tornado/waterspout activity.

3.3.1.1.39 The software shall accurately portray runway conditions and other surface conditions on movement areas during inclement weather and, aircraft and ground vehicles should, when requested, transmit a braking action report rating braking action as Good, Fair, Poor, or Nil.

3.3.1.1.40 The system shall accurately emulate tower radar display information as related to an airport or airfield. The radar representation shall be scalable from 2-60 NM miles in range, provide alpha-numeric representation of aircraft information (in-flight and pending), and provide local airfield radar map information. The radar display shall provide weather processing display information in accordance with the National Weather Service (NWS) six calibrated levels of intensity.

3.3.1.1.41 The system shall accurately portray a full diurnal cycle for any time of year for the local environment including the display of varying levels of daylight, moonlight, and shadows. The simulator shall be able to replicate the full range of airport and tower lighting situations, to include simulation of "pull down shades."

3.3.1.1.42 The system shall provide a variety of airport and environmental status display options to be available continuously and include:

a. Wind indicators (digital), to indicate airdrome prevailing winds.

b. Altimeter display, to indicate current altimeter settings in concurrence with changing weather conditions.

c. Runway light panel suite to include approach lights and varying levels of intensities, runway lighting and intensity levels, sequencing flashing lights (SFL), taxiway lights, visual approach slope indictor (VASI)/precision approach path indicator (PAPI) lighting to applicable runways, applicable obstruction lighting, and remote traffic light control switch as required.

d. Shall provide a weather display to receive and display the local weather observation provided by local airport or base weather service.

3.3.1.1.43 The system shall provide a binocular view accessible to each control position. The simulator shall simulate a binocular view for the purpose of verifying situations that are not easily recognizable to controllers (e.g., aircraft wheels down, FOD on runway, etc.). The binocular view shall have variable zoom capability. The binocular view may be an inset (picture-in-picture) on a view screen or display. The binocular view shall not utilize a full channel of the visual display. The binocular zoom capability will be 7x50 comparable to the Army issue binocular Model M19A1.

3.3.1.2 Training Scenarios

3.3.1.2.1 The ACS shall allow operators to pre-load customized training scenarios.

3.3.1.2.2 The ACS shall present wind information in association with visual references out the window and with a digital format to simulate current wind indicator systems.

3.3.1.2.3 The ACS shall emulate aircraft using precautionary (emergency) landings. As a minimum, the system shall emulate an aircraft conducting a precautionary landing and stopping in realistic distances, emergency operations such as engine fires, smoke in the cockpit, and landing gear failures. Aircraft encountering an emergency shall respond and act appropriately to the specific emergency to include declaring the emergency on the assigned frequency.

3.3.1.2.4 The ACS shall record training sessions for both audio and video scenario playback during training AAR's. The system shall have recording and playback for all oral and visual communications between controllers and users of ATC services. Recording capability shall be sufficient to record, playback, and store all scenarios for future use. Playback shall allow stop, rewind/replay and fast forward capability from any desired point in time. The system shall be capable of storing at least 500 scenarios with a capability of at least 250 targets in each scenario.

3.3.1.2.5 The ACS shall record how many errors were made by the controller during the scenario and identify where the errors were made in both real time and during playback.

3.3.1.2.6 The system shall provide the user with a scenario generation/graphics modification tool for dynamic scenario generation and modification. The scenario/graphics tool shall be user-friendly to permit adaptation by personnel, with little or no computer knowledge. The simulation system shall include a scenario development function that allows the developer to build training scenarios.

3.3.1.3 Interfaces

3.3.1.3.1 The ACS shall provide interconnectivity/interoperability with the Tactical Airspace Integration System (TAIS) Airspace Work Station Embedded Stimulator for realistic preparation, and training.

3.3.1.3.2 The ACS shall interface with other aviation simulations including Air Traffic Tower at Fort Rucker and Fixed Base PAR Simulator (ATTAFS), Aviation Combined Arms Tactical Trainer (AVCATT), and Virtual Battlespace 2 (VBS2) to provide real-time, interactive training.

3.3.1.3.3 The ACS shall allow for connection to larger visual displays (computer monitors, televisions, or projectors) via VGA and/or HDMI connections.

3.3.1.4 Voice

3.3.1.4.1 The ACS shall provide a voice recognition system that translates speech into keyboard characters compatible with the hardware architecture.

3.3.1.4.2 The ACS voice system shall offer a gender selection.

3.3.1.4.3 The ACS voice recognition shall recognize ATC phraseology requirements IAW FAA Order JO 7110.65 both exact and relaxed.

3.3.1.4.4 The voice recognition system shall translate student speech to keyboard characters compatible with the hardware architecture. The voice recognition system shall operate independently of the simulation software. The voice recognition shall not require the controller to train the system on the individual voice pattern. Voice recognition shall meet the requirement of translation and adherence to ATC phraseology requirements IAW FAAO 7110.65 to include ground–to-air and air-to-ground communications recognition. Voice recognition shall meet a single attempt 98 percent accuracy rate of acceptance with controllers using correct doctrinal phraseology. The system shall operate in continuous speech mode, not requiring a pause between words or phrases. The simulator shall automatically adjust aircraft flight path and vehicle direction in response to the controller commands, even if wrong commands are given e.g. "make short approach, extend downwind, turn right at X-ray, etc." The system shall meet the requirement to function and train students without the use of pseudo pilots. All simulated aircraft and ground vehicles shall have synthetic voice capability. Aircraft and ground vehicles shall initiate calls and respond to controllers realistically and appropriately. The synthetic voice system should offer a selection of gender and a range of accents.

3.3.1.4.5 The voice communication system shall be multi-person capable and provide for pseudo-pilot operation. The system shall provide at least 4 changeable channels (2 per control position). The system shall also allow the return to computer control when required.

3.3.2 ATNAVICS

3.3.2.1 The ACS, when in the ATNAVICS mode, shall have a display update rate minimum of one (1) time every three (3) seconds for moving objects.

3.3.2.2 The ACS, when in the ATNAVICS mode, shall have scenarios that accommodate up to 25 aircraft at a time with a minimum of 500 additional aircraft in queue, 360° out to 45 NM for an Airport Surveillance Radar (ASR) approach.

3.3.2.3 The ACS, when in the ATNAVICS mode, shall complete a radar simulation for a no-gyro approach.

3.3.2.4 The ACS, when in the ATNAVICS mode, shall conduct simultaneous ASR and PAR operations.

3.3.2.5 The ACS, when in the ATNAVICS mode, shall have a constant training load capability that will accommodate up to 2 aircraft at a time on final approach (2 final controller configuration) with a minimum of 50 additional aircraft sequenced in the feeder controller queue, 360 degrees out to 10 NM for a Precision Approach Radar (PAR) approach.

3.3.2.6 The ACS, when in the ATNAVICS mode, shall complete a radar simulation for ASR and PAR approaches.

3.3.2.7 The ACS, when in the ATNAVICS mode, shall provide virtual based training through the depiction of an electronic ASR and PAR scenario.

3.3.2.8 The ACS, when in the ATNAVICS mode, shall allow for operator-developed scenarios of emergency procedures, deployments, and mission rehearsals.

3.3.2.9 The ACS, when in the ATNAVICS mode, shall provide viewing and controlling a 45 NM radius from the physical radar location on an ASR approach.

3.3.2.10 The ACS, when in the ATNAVICS mode, shall provide viewing and controlling a 60 NM radius from the radar antenna location on a Secondary Surveillance Radar (SSR) approach.

3.3.2.11 The ACS, when in the ATNAVICS mode, shall consist of ASR and PAR positions that replicate the displays in ATNAVICS.

3.3.2.12 The ACS, when in the ATNAVICS mode, shall simulate tracks coasting.

3.3.2.13 The ASR final approach segments shall have the functionality to simulate the exact course and glide slope (PAR final) and course (ASR final) as found in the ATNAVICS.

3.3.2.14 The ACS shall depict and control at least six extended runway centerlines on the ASR display as part of the mapping capability.

3.3.3 MOTS/Tactical Terminal Control System (TTCS)

3.3.3.1 The ACS, when in the MOTS/TTCS mode, shall allow vehicles and aircraft to pass each other in a movement area.

3.3.3.2 The ACS, when in the MOTS/TTCS mode, shall simulate ground movement of vehicles and aircraft.

3.3.3.3 The ACS, when in the MOTS/TTCS mode, shall allow all simulated aircraft and ground vehicles to have synthetic voice.

3.3.3.4 The ACS, when in the MOTS/TTCS mode, shall provide an out the window view.

3.3.3.5 The ACS, when in the MOTS/TTCS mode, shall provide a simulated out-the-window view of 120° horizontally and 45° vertically, scroll horizontally through 360° and ± 90° vertically through the field-of-view (FOV).

3.3.3.6 The ACS, when in the MOTS/TTCS mode, shall simultaneously display 100 moving objects (aircraft and vehicular) within the Local and Ground Controller’s total FOV.

3.3.3.7 The ACS visual system, when in the MOTS/TTCS mode, shall refresh at a minimum of 60Hz non-interlaced.

3.3.3.8 The ACS, when in the MOTS/TTCS mode, shall provide an update function to allow operators to update movement areas.

3.3.3.9 The ACS, while in the MOTS/TTCS mode, shall support day operations during VFR/Special VFR (SVFR)/Instrument Flight Rules (IFR) operations with visual representation of the changing weather.

3.4 System Quality Factors

3.4.1 Reliability

The ACS shall have a minimum Mean Time Between Failures (MTBF) of 750 hours.

3.4.2 Maintainability

3.4.2.1 Mean Time to Repair

The ACS shall require a Mean Time To Repair (MTTR) of no more than 30 minutes for unscheduled on-site maintenance to the 90th percentile.

3.4.2.2 Maintenance Crew

The ACS shall be maintainable by one 94 D.

3.4.2.3 Software Updates

The ACS shall allow the controller to install all software and software updates.

The ACS shall be provided with a portable media device which allows the controller to reload the software in the event of a system failure.

3.4.3 Availability

3.4.3.1 Operational Availability Calculation

The ACS availability shall be calculated as follows:

Availability (%) = ((Required Availability - Downtime)/Required Availability) x 100

Where Required Availability is the time that the device is contracted to be fully operational and available for training, and Downtime is the total time that the device is not fully operational or down for maintenance/repair.

3.4.3.2 Expected Utilization

The ACS shall provide training services for no less than 5 days per week for 52 weeks per year.

3.4.3.3 Standard Training Day

The ACS shall operate for a minimum of 18 simulator hours per day.

3.4.3.4 Training Day Surge

The ACS shall provide for surge requirements for 24 simulator hours per day.

3.4.3.5 Expected Surge Utilization

The ACS shall provide training services at surge of no less than 7 days per week for a duration of no more than 5 weeks without a maintenance stand-down.

3.5 Design and Construction

3.5.1 Safety

3.5.1.1 Risk Reduction

The ACS shall not present hazards, risk of injury, or equipment damage during normal use.

3.5.1.2 Electrical Connections

The ACS shall include electrical connections that prevent electrical shock.

3.5.1.3 Electronic Equipment

3.5.1.3.1 Inadvertent Contact

The ACS shall include electronic equipment that incorporates safeguards to protect personnel from inadvertent contact with voltages capable of producing shock hazards.

3.5.1.3.2 Conductive Parts

The ACS's external electrically conductive part shall be at ground potential at all times during normal operation.

3.5.1.3.3 Noise Levels

The ACS shall operate without interruption to the voice recognition in environments where noise level may reach 75-dBA.

3.5.1.3.4 Electrostatic Shock

The ACS shall include measures that will prevent electrostatic discharge from occurring while operating the system.

3.5.1.4 Toxic Materials

The ACS shall be designed, maintained, tested, and supported without the use of highly toxic materials and carcinogenic materials as defined in 29 CFR 1910.

3.6 Identification and Markings

The ACS shall be marked IAW MIL-STD-130.

3.6.1 Connectors and Cables

The ACS shall include connectors and cables that are clearly identified and marked to identify where connections are made.

3.6.2 Warning Signs and Placards

The ACS shall include danger, caution, and warning signs that warn user personnel of specific hazards such as voltage, current, thermal, and lifting requirements.

3.6.3 Warning Sign Life

The ACS shall include warning signs and labels that last the life of the ACS system.

3.7 Software (SW)

3.7.1 The ACS shall have a modular SW development.

3.7.2 The ACS shall be synthetic environment core compliant.

3.7.3 The ACS shall be distributed interactive simulated (DIS) compliant.

3.7.4 The ACS shall be high level architecture (HLA) compliant.

3.8 Transportability

The ACS, when packaged in the shipping and storage container (SSC), shall be safely transportable as secured or loose cargo by highway common carrier, ships, rail, military wheeled and tracked vehicles, and military aircraft.

3.8.1 Shipping and Storage Container

3.8.1.1 The ACS SSC shall have a maximum physical footprint of 24" W x 24" D x 26" T.

3.8.1.2 The ACS SSC shall be provided with non-fixed (hinged or foldout) handles with a stop position for holding the handle perpendicular to the surface on which it is mounted. The handles shall allow being placed into carrying position by one gloved hand. The interior dimensions of the handles shall be equal to or greater than 2 in x 5 in.

3.8.1.3 The ACS shall be stored in a transit case which meets the requirements stated in this specification.

3.8.2 Weight

The ACS in its SSC shall not exceed the weights defined for safe handling in (84 lbs.) associated with a two man lift and carry.

3.9 Computer Resources

The ACS shall use existing COTS computer resources when available.

3.10 Training

3.10.1 The ACS shall meet existing ATC training standards set by the FAA Order JO 7210.3, FAA Order JO 3120.4, and Training Circular (TC) 3-04.81.

3.10.2 The contractor shall provide a New Equipment Training plan for initial unit training for government review and approval.

3.11 Military Operational Specialties (MOS)

The ACS shall be used to train and meet the requirements of the MOS 15Q Critical Task List (CTL) description provided in Appendix A.

3.12 Embedded Training

The ACS shall provide Electronic Training Manuals (ETMs) in the ACS for research and training.

3.13 Program Support

3.13.1 The contractor shall provide a follow-on maintenance and support package including coverage for all system hardware/software and technical support from initial fielding through one year beyond the completion of last production ACS.

3.13.2 The contractor shall propose a logistics support plan. This plan is intended to provide coverage on the software and hardware to ensure that the simulators purchased operate within expected parameters for a defined period of time. It shall apply to the correction of faults in the system software and include upgrades or enhancements of the software or to the addition/modification of hardware or software interfaces.

3.13.3 There are no unique logistics requirements identified at this time. Technical data and supporting documentation shall be procured to support logistics requirements. The system (its inherent materials as well as its support requirements) shall be supportable with regard to compliance with applicable federal, state, and local environmental and human health regulations. Strong consideration shall be given to the protection of human health and the environment when selecting material that will result in the lowest cost over the complete life cycle of the system.

3.13.4 The contractor shall provide a 1-800 Help line and a 3-day fix time to provide flexibility in mission requirements and operate on a standard system hardware configuration. ACS shall be designed so that system expansion or future enhancements can be easily incorporated without reengineering the hardware. Hardware shall be open-system architecture. The contractor shall provide for the complete supply support of the ACS. The contractor shall perform the logistics analysis to determine the complete range and depth of spares and repair parts required both at the sites and in central and/or regional depots. The contractor shall plan and procure these assets to support the 1-800 Help line, 3-day fix time. The contractor shall provide and maintain any required inventory of controller replaceable parts or assemblies.

4.0 VERIFICATION

4.1 Verification Methods

The minimum verification methods required to verify that the performance complies with the requirements of Section 3 of this performance work statement are contained in TABLE 4.5. Where multiple methods are indicated for a given requirement, a combination of the verifications may be used. The government retains final approval of all proposed verification methodology. Methods utilized to accomplish verification include:

4.1.1 Design reviews

An element of verification that utilizes technical reviews to report mathematical models or simulations, algorithms, charts, graphs, circuit diagrams, or other scientific principles and procedures used to provide evidence that stated requirements are being met. A systems requirements review (SRR) shall be conducted at the beginning of the project to insure understanding of the requirements. A preliminary design review (PDR) shall be conducted when at the breadboard stage of the system design. A critical design review (CDR) shall be conducted when the project reaches the brassboard stage of the system design. The notation “X” in “Verification Method” column “1” of TABLE 4.5 indicates requirement verification by design reviews.

4.1.2 Demonstration

An element of verification which generally denotes the actual operation, adjustment, or re-configuration of items to provide evidence that the designed functions were accomplished under specific scenarios. The items may be instrumented and quantitative limits of performance monitored. The notation “X” in “Verification method” column “2” of TABLE 4.5 indicates requirement verification by demonstration.

4.1.3 Examination

An element of verification consisting of investigation, without the use of special laboratory appliances or procedures, of items to determine conformance to those specified requirements which can be determine by such investigations. Examination is generally nondestructive and typically includes the use of sight, hearing, smell, and touch; simple physical manipulation; mechanical and electrical gauging and measurement; and other forms of investigation such as documentation of previous tests. The notation “X” in “Verification method” column “3” of TABLE 4.5 indicates requirement verification by examination.

4.1.4 Test

An element of verification that generally denotes the determination, by technical means, of the properties or elements of items, including functional operation, and involves the application of established scientific principles and procedures. The notation “X” in “Verification method” column “4” of TABLE 4.5 indicates requirement verification by test.

4.2 Verification Levels

4.2.1 Component Verification

Component level verification is used to demonstrate that sub-systems or lower level components of the system meet the requirements before being assembled into the system. The notation “X” in the “Verification Level” column C of TABLE 4.5 indicates a component level requirement verification.

4.2.2 System Verification

The System level verification is used to demonstrate that the complete assemblies of all components into a system meet the requirements. The notation “X” in the “Verification Level” column S of TABLE 4.5 indicates a system level requirement verification.

4.3 General Inspection Requirements

4.3.1 Functional Check

A functional check shall consist of booting the ACS and running programs to the extent necessary to verify proper function. As a minimum, the functional check shall be used prior to, during (as applicable), and after each environmental test to verify compliance with paragraph 3.1.4 requirements.

4.4 Detailed Inspection Requirements

4.4.1 Initial User Assessment

An initial user assessment shall be conducted after successful completion of the CDR. Two preliminary ACS systems shall be assessed by Army representative users to determine system suitability. After completion of the assessment, the contractor shall re-work any items not meeting the requirements of this PWS and prepare for system verificationFirst Article testing.

4.4.2 First Article Test (FAT) Operational Test

A test procedure shall be developed to verify that the ACS is fully operational and meets all the requirements of this PWS. This procedure shall detail the training scenarios and test set up to be used by Army operators. This procedure shall require procuring activity approval and shall be used to satisfy the verification requirements. This test shall, at a minimum, verify proper operation of the ACS hardware and software, the training scenarios, proper installation of operating system, all drives, all ports, accessories, and input devices. The contractor shall provide two production representative ACS systems for this test.

4.5 Environmental Conditions

4.5.1 Temperature, Operating

The requirements of paragraph 3.1.4.1 shall be verified by examination of previous test documentation/certification or by actual test. If previous test documentation/certification is not provided, then the test item shall be subjected to a constant temperature exposure of 120°F for the high temperature test and 32°F for the low temperature test. After temperature stabilization of the test item, it shall be operated for a period of 8 hours for each environmental condition. Humidity control is not required. The ACS shall operate normally after completion of tests.

4.5.2 Temperature, Non-Operating

The requirements of paragraph 3.1.4.2 shall be verified by examination of previous test documentation/certification or by actual test. If previous test documentation/certification is not provided, then the test item shall be subjected to a minimum 96 hours storage at 160°F and then at -60°F. Humidity control is not required. The ACS shall operate normally after completion of tests.

4.5.3 Transportation Vibration

The requirements of paragraph 3.1.4.4 shall be verified by examination of previous test documentation/certification or by actual test. If previous test documentation/certification is not provided, then the ACS shall be tested in a loose transport package tester similar in design to MIL-STD-810G, Method 514.6, ANNEX C, Category 5, Figure 514.6C-4. The tester shall operate at 300 rpm (circular synchronous mode) with a one inch orbital path (horizontal) The duration of this exposure shall be 20 minutes to simulate 150 miles of loose cargo transportation in a truck or trailer. The ACS shall be tested in its storage/transport container. The ACS shall pass the functional test after completion of the transportation vibration test.

4.5.4 Shock, Transit Drop

The requirements of paragraph 3.1.4.5 shall be verified by examination of previous test documentation/certification or by actual test. If previous test documentation/certification is not provided, then the ACS in its storage container shall be subjected to drops on each of 6 faces from a height of 24 inches onto ¾ inch plywood backed by concrete for a total of 6 drops. The drops shall be performed using a quick-release hook or drop tester. The test item shall be oriented such that a line from the struck corner or surface of the test item is perpendicular to the impact surface. As a minimum, functional and ACS operational checks shall be conducted after every 2 drops. Reference MIL-STD-810G, Part 2 Section 516.6.

4.6 Failure Criteria

Unsuccessful completion of the functional check, FAT, or any performance requirement as defined in paragraph 3 shall constitute a failure and shall be cause for rejection of the unit as applicable.

4.7 Requirements verification cross-reference.

TABLE 4.7 - VERIFICATION CROSS REFERENCE MATRIX

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION	LEVELS OF VERIFICATION
NA – NOT APPLICABLE 1- DESIGN REVIEWS 2 - DEMONSTRATION 3 - EXAMINATION 4 - TEST	C – COMPONENT VERIFICATION S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.0 Requirements	X							
3.1 Design requirements	X							
3.1.1 System footprint			X				X	4.1.2
3.1.2 Modularity	X							
3.1.2.1			X					4.1.2
3.1.2.2			X					4.1.2
3.1.2.3		X		X				4.1.1, 4.1.3
3.1.3 Human Engineering	X							
3.1.3.1			X	X			X	4.1.2, 4.1.3
3.1.3.2				X			X	4.1.3
3.1.3.3			X	X			X	4.1.2, 4.1.3
3.1.3.4			X				X	4.1.3
3.1.4 Environmental Requirements	X							
3.1.4.1 Operating Conditions				X	X	X		4.1.3, 4.1.4, 4.5.1
3.1.4.2 Storage Conditions				X	X	X		4.1.3, 4.1.4, 4.5.2
3.1.4.3 Power Management	X							
3.1.4.3.1 Power Distribution Subsystem	X							
3.1.4.3.1.1				X		X		4.1.3
3.1.4.3.1.2				X		X		4.1.3
3.1.4.3.1.3				X		X		4.1.3
3.1.4.3.2 Single Power Control Point				X		X		4.1.3
3.1.4.3.3 Computational System Backup Power				X		X		
3.1.4.4 Vibration			X	X	X	X		4.1.3, 4.1.4, 4.5.3
3.1.4.5 Shock			X	X	X	X		4.1.3, 4.1.4, 4.5.4
3.2 Performance Requirements	X							
3.2.1 Interoperability			X				X	4.1.2
3.3 Functional Requirements	X							
3.3.1 Common Functional Requirements			X				X	4.1.2
3.3.1.1 Simulation			X	X			X	4.1.2, 4.1.3
3.3.1.1.1			X				X	4.1.2

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION	LEVELS OF VERIFICATION
NA – NOT APPLICABLE 1- DESIGN REVIEWS 2 - DEMONSTRATION 3 - EXAMINATION 4 - TEST	C – COMPONENT VERIFICATION S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.3.1.1.2			X				X	4.1.2
3.3.1.1.3			X				X	4.1.2
3.3.1.1.4			X				X	4.1.2
3.3.1.1.5			X				X	4.1.2
3.3.1.1.6			X				X	4.1.2
3.3.1.1.7			X				X	4.1.2
3.3.1.1.8			X				X	4.1.2
3.3.1.1.9			X				X	4.1.2
3.3.1.1.10			X				X	4.1.2
3.3.1.1.11			X				X	4.1.2
3.3.1.1.12			X				X	4.1.2
3.3.1.1.13			X				X	4.1.2
3.3.1.1.14			X				X	4.1.2
3.3.1.1.15			X				X	4.1.2
3.3.1.1.16			X				X	4.1.2
3.3.1.1.17			X				X	4.1.2
3.3.1.1.18			X				X	4.1.2
3.3.1.1.19			X				X	4.1.2
3.3.1.1.20			X				X	4.1.2
3.3.1.1.21			X				X	4.1.2
3.3.1.1.22			X				X	4.1.2
3.3.1.1.23			X				X	4.1.2
3.3.1.1.24			X				X	4.1.2
3.3.1.1.25			X				X	4.1.2
3.3.1.1.26			X				X	4.1.2
3.3.1.1.27			X				X	4.1.2
3.3.1.1.28			X				X	4.1.2
3.3.1.1.29			X				X	4.1.2
3.3.1.1.30			X				X	4.1.2
3.3.1.1.31			X				X	4.1.2

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION | **LEVELS OF VERIFICATION**

NA – NOT APPLICABLE
1- DESIGN REVIEWS
2 - DEMONSTRATION
3 - EXAMINATION
4 - TEST

C – COMPONENT VERIFICATION
S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.3.1.1.32			X				X	4.1.2
3.3.1.1.33			X				X	4.1.2
3.3.1.1.34			X				X	4.1.2
3.3.1.1.38			X				X	4.1.2
3.3.1.1.36			X				X	4.1.2
3.3.1.1.37			X				X	4.1.2
3.3.1.1.38			X				X	4.1.2
3.3.1.1.38.1			X				X	4.1.2
3.3.1.1.38.2			X				X	4.1.2
3.3.1.1.38.3			X				X	4.1.2
3.3.1.1.38.4			X				X	4.1.2
3.3.1.1.38.5			X				X	4.1.2
3.3.1.1.38.6			X				X	4.1.2
3.3.1.1.38.7			X				X	4.1.2
3.3.1.1.39			X				X	4.1.2
3.3.1.1.40			X				X	4.1.2
3.3.1.1.41			X				X	4.1.2
3.3.1.1.42			X				X	4.1.2
3.1.1.1.43			X				X	4.1.2
3.3.1.2 Training Scenarios	X							
3.3.1.2.1			X				X	4.1.2
3.3.1.2.2			X				X	4.1.2
3.3.1.2.3			X				X	4.1.2
3.3.1.2.4			X				X	4.1.2
3.3.1.2.5			X				X	4.1.2
3.3.1.2.6			X				X	4.1.2
3.3.1.3 Interfaces	X							
3.3.1.3.1			X				X	4.1.2
3.3.1.3.2			X				X	4.1.2
3.3.1.3.3			X				X	4.1.2

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION

NA – NOT APPLICABLE
1- DESIGN REVIEWS
2 - DEMONSTRATION
3 - EXAMINATION
4 - TEST

LEVELS OF VERIFICATION

C – COMPONENT VERIFICATION

S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.3.1.4 Voice	X							
3.3.1.4.1			X				X	4.1.2
3.3.1.4.2			X				X	4.1.2
3.3.1.4.3			X				X	4.1.2
3.3.1.4.4			X				X	4.1.2
3.3.1.4.5			X				X	4.1.2
3.3.2 ATNAVICS	X							
3.3.2.1			X				X	4.1.2
3.3.2.2			X				X	4.1.2
3.3.2.3			X				X	4.1.2
3.3.2.4			X				X	4.1.2
3.3.2.5			X				X	4.1.2
3.3.2.6			X				X	4.1.2
3.3.2.7			X				X	4.1.2
3.3.2.8			X				X	4.1.2
3.3.2.9			X				X	4.1.2
3.3.2.10			X				X	4.1.2
3.3.2.11			X				X	4.1.2
3.3.2.12			X				X	4.1.2
3.3.2.13			X				X	4.1.2
3.3.2.14			X				X	4.1.2
3.3.3 MOTS	X							
3.3.3.1			X				X	4.1.2
3.3.3.2			X				X	4.1.2
3.3.3.3			X				X	4.1.2
3.3.3.4			X				X	4.1.2
3.3.3.5			X				X	4.1.2
3.3.3.6			X				X	4.1.2
3.3.3.7			X				X	4.1.2
3.3.3.8			X				X	4.1.2

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION

NA – NOT APPLICABLE
1- DESIGN REVIEWS
2 - DEMONSTRATION
3 - EXAMINATION
4 - TEST

LEVELS OF VERIFICATION

C – COMPONENT VERIFICATION
S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.3.3.9			X				X	4.1.2
3.4 System Quality Factors	X							
3.4.1 Reliability			X	X			X	4.1.2, 4.1.3
3.4.2 Maintainability	X							
3.4.2.1 Mean Time to Repair			X	X			X	4.1.2, 4.1.3
3.4.2.2 Maintenance Crew			X				X	4.1.2
3.4.2.3 Software Updates			X	X	X			4.1.2, 4.1.3
3.4.3 Availability	X							
3.4.3.1 Operational Availability Calculation				X			X	4.1.3
3.4.3.2 Expected Utilization				X			X	4.1.3
3.4.3.3 Standard Training Day				X			X	4.1.3
3.4.3.4 Training Day Surge				X			X	4.1.3
3.4.3.5 Expected Surge Utilization				X			X	4.1.3
3.5 Design and Construction	X							
3.5.1 Safety	X							
3.5.1.1 Risk Reduction		X		X			X	4.1.1, 4.1.3
3.5.1.2 Electrical Connections				X		X		4.1.3
3.5.1.3 Electronic Equipment	X							
3.5.1.3.1 Inadvertent Contact		X		X		X		4.1.1, 4.1.3
3.5.1.3.2 Conductive Parts		X		X		X		4.1.1, 4.1.3
3.5.1.3.3 Noise Levels		X	X			X		4.1.1, 4.1.2
3.5.1.3.4 Electrostatic Shock		X	X			X		4.1.1, 4.1.2
3.5.1.4 Toxic Materials		X		X		X		4.1.1, 4.1.3
3.6 Identification and Marking				X		X		4.1.3
3.6.1 Connectors and Cables				X		X		4.1.3
3.6.2 Warning Signs and Placards				X		X		4.1.3
3.6.3 Warning Sign Life				X		X		4.1.3
3.7 Software	X							
3.7.1			X	X		X		4.1.2,4.1.3

TABLE 4.7
REQUIREMENT/VERIFICATION CROSS-REFERENCE MATRIX

METHOD OF VERIFICATION	LEVELS OF VERIFICATION
NA – NOT APPLICABLE 1- DESIGN REVIEWS 2 - DEMONSTRATION 3 - EXAMINATION 4 - TEST	C – COMPONENT VERIFICATION S – SYSTEM VERIFICATION

SECTION 3 REQUIREMENT	VERIFICATION METHOD					VERIFICATION LEVEL		SECTION 4 VERFICATION
	NA	1	2	3	4	C	S	
3.7.2			X	X		X		4.1.2,4.1.3
3.7.3			X	X		X		4.1.2,4.1.3
3.7.4			X	X		X		4.1.2,4.1.3
3.8 Transportability	X			X			X	4.1.3
3.8.1 Shipping and Storage Container	X							
3.8.1.1				X		X		4.1.3
3.8.1.2				X		X		4.1.3
3.8.1.3				X		X		4.1.3
3.8.2 Weight		X		X			X	4.1.1, 4.1.3
3.9 Computer Resources		X		X		X		4.1.1, 4.1.3
3.10 Training	X							
3.10.1		X	X				X	4.1.1, 4.1.2
3.10.2		X	X				X	4.1.1, 4.1.2
3.11 Military Operational Specialties		X	X				X	4.1.1, 4.1.2
3.12 Embedded Training		X	X				X	4.1.1, 4.1.2
3.13 Program Support	X			X			X	4.1.1, 4.1.3
3.13.1		X		X			X	4.1.1, 4.1.3
3.13.2		X		X			X	4.1.1, 4.1.3
3.13.3		X		X			X	4.1.1, 4.1.3
3.13.4		X		X			X	4.1.1, 4.1.3

5.0 NOTES

5.1 Acronyms

Acronym	Meaning
AC2	Airspace Command and Control
ACO	Airspace Control Order
ACP	Airspace Control Plan
ACS	ATC Common Simulator

Acronym	Meaning
AIC	Airspace Information Center (FM 3-04.120)
ALE	Adaptive Learning Environment
AOD	Air Operations Directive
APG	Aviation Procedures Guide
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATNAVICS	Air Traffic Navigation Integration and Coordination System
ATS	Air Traffic Services
AVCATT	Aviation Combined Arms Tactical Trainer
AWS	Airspace Work Station
BFT	Blue Force Tracking
BIT	Build-in Test
BITE	Built-in Test Equipment
CBT	Computer Based Training
CDT	Chargeable Downtime
CFR	Code of the Federal Register
CLS	Contractor Logistics Support
CPU	Central Processing Unit
CSCI	Computer Software Configuration Item
CTL	Critical Tasks List
DACT	Dynamic Airspace Collaboration Tool
DIS	Distributed Interactive Simulation
ECWCS	Extended Cold Weather Clothing System
FAA	Federal Aviation Administration
FC	Final Control
FD	Flight Data
FF	Flight Following
FM	Field Manual
GC	Ground Control

Acronym	Meaning
GFE	Government-Furnished Equipment
HLA	High Level Architecture
IAW	In Accordance With
IETM	Interactive Electronic Technical Manual
IFR	Instrumentation Flight Rules
IMC	Instrument Meteorological Conditions
IMI	Interactive Multimedia Instruction
JIIM	Joint Interagency Intergovernmental Multinational
JTA	Joint Technical Architecture
LAN	Local Area Network
LRU	Line Replacement Unit
MC	Mission Command
MDT	Maintenance Downtime
METL	Mission Essential Task List
METS	Meteorological Event Triggering System
MOPP	Mission-Oriented Protective Posture
MOS	Military Occupational Specialty
MOTS	Mobile Tower System
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
NCDT	Non-Chargeable Downtime
NCM3	Non-Rated Crew Member Manned Module
OMS/MP	Operations Mode Summary/Mission Profile
OSA	Open System Architecture
PAR	Precision Approach Radar
PM	Program Management
PMC	Partially Mission Compatible
RFI	Ready-for-Issue
ROMO	Range of Military Operation

Acronym	Meaning
SDD	System Design & Development
SE	Synthetic Environment
SPINS	Special Instructions
SSC	Shipping and Storage Container
SSR	Secondary Surveillance Radar
STT	Scheduled Training Time
SW	Software
TADSS	Training Aids, Devices, Simulators and Simulations
TC	Training Circular
TTCS	Tactical Terminal Control System
UPS	Uninterrupted Power Supply
WAN	Wide Area Network
VBS2	Virtual Battlespace 2
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

5.2 Definitions

Accurate Simulation - Simulation that includes fidelity required for the controller to interpret information correctly and execute the proper responses required for system/subsystem analyses.

The ACS, as described in this document, is a system that replicates the ATNAVICS, and MOTS/TTCS systems

Analysis - The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results or test by similarity

As a Guide - The contractor and all vendors shall abide by the requirements of this document. If not, the contractor or vendor shall notify the Government which ones were not used and explain why they were not used.

Benign - Standard configuration for normal operations of complete system setup in its operable configuration

Built-In Test (BIT) - The term BIT includes detection of the fault, accommodation of the fault (how the system actively responds to the fault), and logging of the fault to warn of possible effects and/or aid in troubleshooting the faulty equipment.

Built-In Test Equipment (BITE) - BITE is characterized primarily as a passive fault management and diagnosis built into airborne systems to support the maintenance process.

Chargeable Downtime (CDT) - Portion of downtime not designated Non-Chargeable Downtime (NCDT). CDT does not include Partially Mission Compatible (PMC) time.

Degradation, Degraded Operations - System not fully functional, but does not yet meet the conditions listed within the Controller's Manual defined as "emergency procedures."

Fail Safe - Capable of compensating automatically for a failure.

Fair Fight Interoperable - Fair Fight is obtained when the systems are interoperable and the system performance capabilities of the simulators are complimentary for a given task throughout the simulation environment. Fair Fight is also task dependent and includes items such as similarity in the equality made in use of the synthetic environment features, automated force behaviors, etc. Equality of use is determined within pre-determined tolerances.

FC (ATNAVICS) – The radar position that controls aircraft while on the final approach path.

FD (MOTS) – ATC position that coordinates with other facilities and outside agencies passing flight plans, arrival, and departure times.

> Ground Control: Tower position that controls aircraft on the taxiways and movement areas of the airfield.
>
> Local Control: Tower positions that controls aircraft on the runway in use, and airborne with within the Class D surface area.

FDC (ATNAVICS) – The radar position that makes positive radar ID on the aircraft within the surveillance coverage area. Radar and vectors the aircraft to the final approach gate.

Hostile Climatic Environment - Temperature: 5° F (-15° C) to 160° F (+71° C)

Normal Climatic Environment - Temperature: 5° F (-15° C) to 122° F (+50° C)

Inspection - The visual examination of CSCI code, documentation, etc.

Mission Scenario - Comprehensive training and evaluation outline, and exercise concepts and related training management aids to assist field commanders in the planning and execution of effective unit training. It provides units a clear description of "what" and "how" to train to achieve mission proficiency.

Maintenance Downtime (MDT) - Portion of Scheduled Training Time (STT) when a qualified controller is not available and/or when the supervisor is declared not operationally ready for training.

Non-Chargeable Downtime (NCDT) - Portion of downtime that the contractor is not held responsible based on one or more of the following conditions:

Facility power outage or other facility problems not caused by contractor negligence

Fire when not caused by contractor negligence

Negligence on the part of Government personnel

Natural disaster (flood, windstorm, etc.)

Criminal acts by persons not employed by the contractor

Delay in supply (or other Government delay) for items of Government responsibility. Downtime designated non-chargeable under this condition will commence upon Government receipt of written documentation or Government Furnished Equipment (GFE) parts request by the contractor and will terminate upon requested item delivery to the contractor by the Government. If requested, the contractor will pick up the requested item at the designated local base supply point. This does not apply if the contractor fails to maintain spare/repair parts in a Ready-for-Issue (RFI) condition, to maintain proper inventory levels, or to order/procure items in a timely manner.

Non-serviceability of equipment and software systems that are solely the responsibility of the Government

Systems undergoing Government installed modifications

PMC condition which consists of degraded operation that still permits meaningful training or alternative training to be accomplished.

Non-Operational Maintenance Mode - Maintenance performed in the process of disassembly, preparation for shipment, and corrective/preventive maintenance at a repair facility.

Operating State - Defined by the following modes in accordance with the OMS/MP as follows: (1) Setup, calibration, and Built-In Test (BIT) mode are defined as power-on setup of the simulation, avionics, and visual software and testing systems for malfunctions; (2) Training mode is the operation of the simulator with pilot(s)-in-training at the controls; (3) Training mode cues are real-time visual and physical cues; (4) Training mode capabilities include record and playback training sessions.

Operational Maintenance Mode - Means to detect and correct problems including minor maintenance and Line Replaceable Unit (LRU) replacement.

Reconfigurable -

Simulation - Static, dynamic, visual, and auditory representation of the system or subsystem.

Scheduled Training Time (STT) - Amount of time the trainer is scheduled for training. STT may be adjusted by the scheduling authority which may be dictated by operational necessity.

Tactical Scenario - Ordered arrangement and maneuver of units in relation to each other and/or to the enemy in order to use their full potentialities.

Training Scenario - Structured, sequenced training designed to train a student pilot to perform identified learning objectives to a prescribed standard. The training may be presented by advanced technology, such as computers; by conventional methods, such as conference using trained instructors; by distance learning techniques, such as distributed print or interactive multimedia instruction courseware modules; or by a combination of these.

Test - The operation of the CSCI, or a part of the CSCI, using instrumentation or other special test equipment to collect data for later analysis.

This page intentionally left blank.

APPENDIX A

Critical Task List
For The
Air Traffic Control Operator
15Q Skill Level 1-4

Task Number	TOWER/TTCS
011-143-0012	Process Pilot Reports (PIREPS)
011-143-0014	Process Flight Progress Strips
011-143-0015	Control Aircraft, Vehicle, and Personnel by ATC Light Gun Signals
011-143-0017	Control the Flight of SVFR Arrival/Departure Aircraft
011-143-0018	Provide Traffic Information/Advisories
011-143-0019	Select Runway for Use
011-143-0022	Provide Emergency Assistance
011-143-0023	Issue Airport Condition Information
011-143-0024	Perform Assumption of Duty Requirements
011-143-0028	Control the Flight of IFR Arrival/Departure Aircraft
011-143-0038	Control the Flight of VFR Arrival/Departure Aircraft
011-143-1021	Communicate Using Interphone Procedures
011-143-1022	Decode Aircraft Identification Symbols, Service, and Mission Prefixes
011-143-5055	Record ATC Facility Daily Activities
011-143-5057	Communicate Using Radio Communications Procedures
011-143-5060	Control Aircraft Taxi
011-143-5063	Decode METAR Weather Reports
113-610-2006	Navigate using the Defense Advanced Global Positioning System (GPS) Receiver (DAGR)
	Conduct Controller Training
	Assign Controllers To Operating Positions
	Manage Shift During Or After An Aircraft Accident Or Incident
	Retain Records, Logs, And Recorder Media
	Perform the Responsibilities of an Facility Chief During or After an Aircraft Accident or Incident at an Airfield
	Integrate Unmanned Aircraft System (UAS) Operation

Task Number	RADAR
	Process Terminal Instrument Procedures (TERPS) Data Packet
011-143-0012	Process Pilot Reports (PIREPS)
011-143-0014	Process Flight Progress Trips
011-143-0018	Provide Traffic Information/Advisories
011-143-0022	Provide Emergency Assistance
011-143-0023	Issue Airport Condition Information
011-143-0024	Perform Assumption of Duty Requirements
011-143-0028	Control the Flight of IFR Arrival/Departure Aircraft
011-143-0038	Control the Flight of VFR Arrival/Departure Aircraft
011-143-0100	Transfer Radar Identification
011-143-1021	Communicate Using Interphone Procedures
011-143-1022	Decode Aircraft Identification Symbols, Service, and Mission Prefixes
011-143-1038	Provide Radar Approach Information
011-143-1039	Provide Airport Surveillance Radar Approach
011-143-1040	Provide Precision Approach Radar Approach
011-143-1043	Provide Non-Radar IFR Service
011-143-1044	Identify Aircraft Using Radar Procedures
011-143-1045	Provide Radar Separation
011-143-5055	Record ATC Facility Daily Activities
011-143-5057	Communicate Using Radio Communications Procedures
011-143-5063	Decode METAR Weather Reports
113-610-2005	Navigate using the Defense Advanced Global Positioning System (GPS) Receiver (DAGR)
	Conduct Controller Training
	Assign Controllers To Operating Positions
	Manage Shift During Or After An Aircraft Accident Or Incident
	Retain Records, Logs, And Recorder Media
	Perform the Responsibilities of an Facility Chief During or After an Aircraft Accident or Incident at an Airfield
	Prepare Minimum vectoring Altitude (MVA) Chart
	Integrate Unmanned Aircraft System (UAS) Operation
	Evaluate Minimum Vectoring Altitude (MVA) Chart

APPENDIX B

FIELDING LOCATIONS

Unit	Location	ACOM
2-130th AOB	Fort Bragg, NC	NG
1-58th AOB	Fort Rucker, AL	FORSCOM
2-58th AOB	Fort Rucker, AL	USAR
F/7-101st ATS	Fort Campbell, KY	FORSCOM
F/6-101st ATS	Fort Campbell, KY	FORSCOM
F/3-10th ATS	Fort Drum, NY	FORSCOM
F/3-82nd ATS	Fort Bragg, NC	FORSCOM
F/2-3rd ATS	Hunter AAF, GA	FORSCOM
F/2-1st ATS	Fort Riley, KS	FORSCOM
F/2-501st ATS	Fort Bliss, TX	FORSCOM
F/2-227th ATS	Fort Hood, TX	FORSCOM
F/2-4th ATS	Fort Carson, CO	FORSCOM
3-58th AOB	Illesheim, FRG	USAREUR
F/5-158th ATS	Katterback, FRG	USAREUR
4-58th AOB	Camp Humphreys	EUSA
F/3-2nd ATS	K-16, Songnam	EUSA
F/3-25th ATS	Wheeler AAF, HI	USARPAC
F/1-52nd ATS	Fort Wainwright, AK	FORSCOM
F/1-189 ATS	Camp Ripley, MN	NG
F/3-238 ATS	Camp Atterbury, IN	NG
F/3-126 ATS	Otis ANGB, MA	NG
F/2-104 ATS	Ft. Indiantown Gap, PA	NG
F/1-111 ATS	Edgewood, MD	NG
F/1-107th AOB	Smyrna, TN	NG
2-111th AOB	Jacksonville, FL	NG
2-185th AOB	Southhaven, MS	NG
2-244th AOB	Esler Field, LA	NG
F/2-149 ATS	San Antonio, TX	NG
F/2-211 ATS	Little Rock, AR	NG
1-245th AOB	Lexington, OK	NG
F/1-168 ATS	Phoenix, AZ	NG
MOS 94D School	Fort Gordon, GA	TRADOC
MOS 15Q School	Fort Rucker, AL	TRADOC
	Redstone Arsenal, AL	