

**C-17 ATS
SYSTEM SPECIFICATION
FOR THE
C-17 AIRCREW TRAINING SYSTEM PROGRAM**

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Prepared By:
ASC/YWMA
Training Systems Product Group
Department of the Air Force
Aeronautical Systems Center
Wright-Patterson AFB, Ohio 45433-7249

Maintained By:
The Boeing Company
McDonnell Douglas Training & Support Systems
P. O. Box 516
St. Louis, MO 63166-0516
M/C S106-4735

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FOREWORD

At the Governments request, the contractor is assigned the responsibility for maintenance of the C-17 Aircrew Training System (ATS) System Specification.

REVISION LOG

REVISION NUMBER	CHANGE NUMBER	DESCRIPTION OF ACTION	DATE OF INCORPORATION
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SPECIFICATION CHANGE NOTICE STATUS LOG

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1.0 SCOPE

This specification establishes the requirements for the C-17 Aircrew Training System (ATS). The C-17 ATS is a system of academics, aircrew training device(s) (ATDs), and flight training to include airland, airdrop, air refueling, primary nuclear airlift forces (PNAF), special operations, and other training required to maintain the qualification of C-17 pilots and loadmasters. The ATS shall also support engine run training for aircraft maintenance personnel. The goal of the C-17 ATS is to optimize the integrated use of academics, aircrew training devices, and the C-17 aircraft, to provide the most effective and efficient training for the crewmember. Qualification levels for each crewmember reflect the progression from entry status through upgrade to instructor and/or flight examiner, with various intermediate qualification requirements. Crewmember level of entry into the training system is dependent on previous experience and training, and currency status. Qualification levels are defined in this document. Functional requirements and minimum performance requirements for the ATS are also established within this document. Training provided by the ATS shall be of sufficient quality to guarantee student attainment of appropriate qualification levels based on Air Force (AF) conducted evaluations. The C-17 ATS configuration shall also guarantee and support all student throughput requirements, specified herein.

2.0 APPLICABLE DOCUMENTS

2.1 Compliance Documents

The following government and non-government documents form a part of this System Specification. The latest published documents at the time of contract award are required. In event of conflict between this System Specification and any documents referenced herein, the requirements of this System Specification shall govern:

- AETCI 36-2203, Technical and Basic Military Training Development (Chapter 6)
- AETCI 36-2205, Formal Aircrew Training Administration and Management
- AFI 11-401, Flight Management
- AFI 11-2C-17 V1, Flying Operations
- AFI 11-202 V1, Aircrew Training
- AFI 11-202 V2, Aircrew Standardization/ Evaluation Program
- AFI 11-202 V3, General Flight Rules
- AFI-36-2251, Guide for Management of Air Force Training Systems
- AFJI 13-210, Joint Airdrop Inspection Records, Malfunction Investigations, and Activity Reporting
- AFM 36-2236 Guidebook for Air Force Instructors
- AFPD 36-22, Military Training
- AFSSI 5024v1, Certification and Accreditation Process
- AFSSI 5024v2, Certifying Official Handbook
- ISO 9001, Quality Management Systems Requirements
- MIL-STD-882C, System Safety Program Requirements
- Department of Transportation, Federal Aviation Administration Advisory Circular 120-40B, Change 1
- Aerial Refueling Airplane Simulator Qualification, Change 1

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2.2 Reference Documents

The following documents are to be considered as reference material for the purpose of interpreting the requirements of this System Specification.

- AFCAT 36-2223, USAF Formal Schools (Education & Training Course Announcements Web-Site)
- AFH 11-203 V1, Weather for Aircrews
- AFH 36-2235 Vols. 1-11, Information for Designers of Instructional Systems
- AFI 10-707, Spectrum Interference Resolution Program
- AFI 11-201, Flight Information Publications
- AFI 11-218, Aircraft Operation and Movement on the Ground
- AFI 11-219, Nuclear Airlift Operations
- AFI 11-231, Computational Air Release Point Procedures
- AFI 13-201, Air Force Air Space Management
- AFI 13-217, Assault Zone Procedures
- AFI 91-301, Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program
- AFI 91-302, Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program
- AFJI 11-204, Operational Procedures for Aircraft Carrying Hazardous Materials
- AFJMAN 24-204, Preparing Hazardous Materials for Military Air Shipments
- AFM 51-9, Aircraft Performance
- AFM 51-40, Air Navigation
- AFMAN 11-217, Instrument Flight Procedures
- AFMAN 36-2234, Instructional System Development
- AFMAN 36-2236, Guidebook for Air Force Instructors
- AFR 2-50/FM 100-27, US Army/USAF Doctrine for joint Airborne and Tactical Airlift Operations
- AMCI 11-207, AMC Tactics Program
- AMCI 11-208, Tanker/Airlift Operations
- AMCI 36-2204, AMC Major Command Mission Training Program
- AMCR 50-16, Nuclear Weapons Airlift Training
- AMCH 11-214, Aircrew Hazardous Materials Handbook
- AFI 11-2C-17, Addenda A – Configuration and Mission Planning
- TO 13C7-1-5/FM10-500, Airdrop of Supplies and Equipment, General Information for Rigging Airdrop Platforms

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TO 1-IC-1-35, Air Refueling C-17

TO IC-17A-1, Flight Manual

TO IC-17A-1-1, Flight Manual, Performance Data

TO IC-17A-1-2, Flight Manual - Mission Computer

TO IC-17A-1-3, Flight Manual - Automatic Flight Control System

TO IC-17A-1-4, Flight Manual - Integrated Radio Management System

TO IC-17A-1CL-1, Pilot's Abbreviated Flight Crew Checklist

TO IC-17A-1CL-2, Loadmaster's Abbreviated Flight Crew Checklist

TO-IC-17A-2-12JG-28-1, Refuel/Defuel

TO-IC-17A-2-10JG-70-1, Ground Handling Mission Reconfiguration - Cargo Compartment

TO-IC-17A-3, Mission Computer

TO-IC-17A-5, Basic Weight Checklist and Loading Data

TO IC-17A-9, Loading Instructions

TO-IC-17A-16-1, Loading and Air Transport of Nuclear Weapon Cargo (Non-Palletized)

TO-IC-17A-16-2, Loading and Air Transport of Nuclear Weapon Cargo (Palletized)

C-17 Aircrew Master Task Listing & Evaluation Standards Document (MTL/ESD) and revisions

MIL-STD-498, Software Development and Documentation

MDTS Document #S5006, Weapon System Trainer Prime Item Development Specification WST 1 – 7

MDTS Document C-17 ATS-Spec-703A, Weapon System Trainer Prime Item Development Specification WST 8 – 13

MDTS Document PIDS-0254-C17ATS, Weapon System Trainer Prime Item Development Specification WST 14 – 15

MDTS Document #S5007, Cockpit Systems Simulator Prime Item Development Specification

MDTS Document #S5008, Cargo Load Model Prime Item Development Specification

MDTS Document #S5009, Cargo Compartment Trainer Prime Item Development Specification

MDTS Document PIDS-0255-C17ATS, Cargo Compartment Trainer #2 Prime Item Development Specification

MDTS Document #S5010, Training Support System Prime Item Development Specification

MDTS Document PIDS-0261-C17ATS, Reconfigurable Desktop Simulator Prime Item Development Specification

MDTS Document #S5011, Weapon System Trainer Prime Item Product Fabrication Specification, WST 1- 7

MDTS Document #S5012, Cockpit Systems Simulator Prime Item Product Fabrication Specification

MDTS Document #S5013, Cargo Load Model Prime Item Product Fabrication Specification

MDTS Document #S5014, Cargo Compartment Trainer Prime Item Product Fabrication Specification

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MDTS Document #S5027, Audio/Video Prime Item Product Fabrication Specification

MDTS Document #S5028, Animation/Graphics Prime Item Product Fabrication Specification

MDTS Document #S5029, Media Support System Prime Item Fabrication Specification

MDTS Document #S5030, Courseware Support System Prime Item Product Fabrication Specification

MDTS Document #S5031, Training Management System Prime Item Product Fabrication Specification

STD-730-1516, IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA)

STD-730-1984, IEEE Standard for Software for Quality Assurance Plans

3.0 SYSTEM

3.1 Aircraft Mission

The C-17 ATS shall provide training consistent with both wartime and peacetime C-17 aircraft operations. Training provided by the C-17 ATS shall particularly emphasize that training required to successfully fulfill the missions and their scenario variations as described in the following paragraphs.

3.1.1 Airland

The C-17 weapon system will perform single ship, direct delivery missions in tactical environments. Direct delivery is the strategic air movement of cargo or personnel from an airlift point of embarkation to a point as close as practicable to the customer's specified final destination. The C-17's air refueling capability extends range and payload capacity for direct delivery. These missions include operations into, on, and out of Assault Landing Zones (ALZ) using high and low level tactics. This mission will be performed in day and night, visual and adverse weather; with and without existing route structures or external navigation aids; and cruise at airspeeds up to 350 knots indicated airspeed (KIAS)/limiting mach from sea level to the service ceiling. Airland missions may involve Engines Running On/Off loads (ERO), reverse taxi, and combat offloads. The C-17 weapon system will perform receiver in-flight refueling. These missions include normal and silent air refueling operations from low level (3,000 ft. above ground level (AGL)) up to the maximum formation altitude. Airland refueling missions will be performed as a single ship during day and night, visual and instrument conditions.

3.1.2 Airdrop

The C-17 weapon system will perform airdrop missions on marked and unmarked drop zones of personnel, equipment, container deliver system (CDS), Dual Row Airdrop (DRA), combinations of personnel and equipment, and high altitude airdrops. The C-17 will operate in formations of up to 100 C-17 aircraft, or combinations of C-17 and other Air Mobility Command (AMC) aircraft, in visual and Station Keeping Equipment (SKE) formations. These missions include formation air refueling; and ingress/egress at airspeeds up to 350 KIAS/limiting mach, from sea level to the service ceiling. These missions will be performed during day and night, visual and instrument conditions, and in adverse weather.

3.1.3 Prime Nuclear Airlift Force (PNAF)

The C-17 weapon system will perform worldwide nuclear weapons airlift missions.

3.1.4 Special Operations

A number of C-17s may be required to support special operations missions, primarily in the contingency and crisis response roles. They will be capable of all delivery methods (airdrop and airland) previously mentioned as well as delivery to clandestine landing zones and drop zones. Airdrop operations may be conducted to blacked out or covertly lit drop zones. C-17 special operations aircraft will conduct non-precision approaches and landings to blacked-out, prepared, or semi-prepared landing zones under instrument meteorological conditions (IMC). Throughout the approach and especially during the critical final phase, both pilots must be capable of independently determining the aircraft barometric and radar altitude, indicated airspeed, ground speed, descent rate, heading, and course deviations while using night vision devices (if available). Enroute, approach, and landing will be accomplished without displaying any overt external lighting (may use only night vision goggle-compatible lighting, if available). The aircrew will be capable of safe, rapid, loading and unloading of personnel, equipment, vehicles, helicopters, and other

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cargo. During ground operations and loading phases, the aircrew can perform all normal duties with minimum intensity overt lighting in the cargo compartment. C-17 aircraft will conduct blacked-out hot refueling operations as either a tanker or receiver.

3.2 Training Requirements

The following paragraphs delineate the AMC training requirements and establish the overall capacity required of the C-17 ATS to provide training. The basing/mission planning factors in paragraph 3.2.6.1 shall be used as a baseline for training system design which shall be capable of handling a student throughput surge of 15 percent (for each course or any combination of courses) with no increase in training equipment. The system shall be capable of handling a 5 percent surge (for each course or any combination of courses) in student throughput within 30 days of notification by the AF contracting officer, expanding to a 15 percent total throughput increase within 90 days. System level performance shall meet or exceed all training requirements. These training requirements shall be used to derive lower level system/subsystem requirements, as defined in this specification and the critical item development specifications. Traceability shall be maintained from all training requirements to the functional and/or performance requirements of these specifications.

3.2.1 Guaranteed Qualification

The contractor shall assure the quality and effectiveness of training provided by the ATS meets the requirements of this specification and the contractor prepared Statement of Work (SOW). The contractor shall also guarantee each crewmember's and maintenance engine run (MER) specialist's satisfactory completion of all training to required qualification levels specified herein. Included in the concept of guaranteed trained students are all aspects of student training and management. The contractor shall, using the ATS, provide qualified aircrew and MER personnel, maintain or upgrade their qualification levels, and assure their progression throughout qualification continuums, i.e., from initial qualification through flight examiner, to include continuation training. Continuation training shall provide all required training for qualified crew members to maintain the required qualification level. If an aircrew member is unable to achieve, progress, or maintain qualification level and requires remedial training, it shall be documented in training record(s) or on AF Form 8. Identified deficiencies shall be remediated by the contractor at no additional cost to the government and without displacing student throughput. This includes all remedial ground training for previously qualified crew members at each site. The contractor shall retrain that student until deemed qualified by an Air Force evaluator or the student is eliminated from training by cognizant Air Force authority. Air Force determination of whether or not the student meets standards shall be final and is not subject to question under the contracts disputes clause.

3.2.2 Types of Training

The C-17 ATS shall be based on individualized instruction and proficiency advancement. The system shall provide for all the course materials required to support the contractor provided ground training and AF conducted inflight instruction. The system shall provide for the following types of training, to be developed by the contractor.

3.2.2.1 Airland

The minimum level of qualification training that includes all the instruction necessary to enable aircraft commanders, copilots, and loadmasters to safely and as an effective crew, complete worldwide C-17 missions. This training includes the major areas of normal and emergency aircraft procedures; foreign and domestic flight procedures; mission planning and threat analysis for a low to medium threat environment (including principles for the current AMC program for combat aircrew training); crew coordination and disciplines (including principles from the current AMC program for aircrew coordination training); strategic and theater command and control; aeromedical evacuations; aircraft loading & load planning, ERO; reverse taxi; combat offload; short field landings and operations at assault landing zones; navigation to include time control and low-level flight; mission execution in a combat environment; and flight hazards to include low-level visual illusions. Instruction necessary to enable airland aircraft commanders and copilots to operate the C-17 as a singleship receiver. The major areas of air refueling training are normal and emergency air refueling procedures; including refueling operations with a 2-ship formation of tankers (1 on 2).

3.2.2.2 Airdrop

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Instruction necessary to enable aircraft commander, copilots, and loadmasters to operate the C-17 for air delivery of cargo and personnel in formation and single ship, and to conduct formation air refueling. The major areas of airdrop training are normal and emergency airdrop procedures; personnel and heavy equipment airdrop procedures; DRA, CDS procedures; high altitude airdrops; visual (including all geometries) and SKE formation flight (up to 100 aircraft); IMC airdrop procedures (SKE drops); detailed threat analysis, mission planning and flying tactics for a medium threat environment; low level navigation; single ship operations to minimally marked/lit and unmarked drop zones; aircraft loading, aircraft configuration, inspection of airdrop platforms, rigging, CDS, and DRA in accordance with AFJI 13-210; inflight hazards to include low-level illusions; use of night vision goggles (NVGs); and command and control (including interfaces with ground commanders). The airdrop qualification course will include the principles from the current AMC programs for aircrew coordination training, and combat aircrew training.

3.2.2.3 Prime Nuclear Airlift Force

Ground instruction necessary to enable selected airland aircraft commanders, copilots, and loadmasters to regularly operate the C-17 to airlift nuclear weapons. The major areas of PNAF training are normal and emergency procedures; mission planning; aircraft loading and rigging, and courier procedures.

3.2.2.4 Special Operations

Instruction necessary to enable selected airdrop aircraft commanders, first pilots, and loadmasters to operate the C-17 in support of special forces for worldwide employment. The major areas of special operations training are detailed threat analysis; mission planning, and flying tactics for a medium threat and covert environment; normal and emergency procedures in a minimum illumination environment; short field landing on airfields with covert or minimum lighting; airdrop procedures for covertly lit and unlit drop zones; visual and SKE formation flight while on night vision goggles; low-level navigation and contour flying in a minimum illumination environment; inflight hazards to include low-level illusions while on NVGs; command and control (including interfaces with ground commanders); ground hot refueling procedures; use, care, and limitations of NVGs; and crew coordination.

3.2.2.5 Instructor/Flight Examiner Training

Provide instruction necessary to enable aircraft commanders and loadmasters to effectively instruct and evaluate other aircrew members. Training for instructors includes principles of instruction, more in-depth knowledge of aircraft systems and procedures, all applicable training regulations, safety principles and take-over of duties procedures, crew resource management for instructors. Training for flight examiners includes methods for evaluating examinees.

3.2.2.6 Continuation Training

All ground and flight training necessary to maintain skills and knowledge gained during initial training. As a result, this training enables aircrew members to perform safely and proficiently in their present crew position and to maintain qualification level.

3.2.2.6.1 Contractor Continuation Training Events

The contractor shall be responsible for the instruction of other ground events specified by the syllabus and shall recommend flying currency events required to reinforce initial training skills and knowledge. The contractor shall be responsible for providing Air Force Spectrum Interference Resolution (AFSIR) program academic continuation training. The design of the ATS shall accommodate AFSIR program and special operations classified training. The contractor shall vary quarterly continuation training scenarios on an annual basis. The contractor shall provide linked crew resource management and combat mission oriented simulator training scenarios for pilots and loadmasters.

3.2.2.6.2 Instrument Refresher Course (IRC)

The contractor shall maintain courseware and provide qualified IRC Instructors at each of the designated locations.

3.2.3 Flying Hour Requirements

The contractor shall assure that the training provided by the ATS provides an adequate mix of ground based and aircraft based instruction.

3.2.4 Maintenance Engine Run Training Requirements

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This training shall thoroughly familiarize maintenance personnel with aircraft system operation, indicators, and limitations, and shall train them to identify normal and abnormal operations and respond correctly to malfunctions and emergency conditions by taking necessary corrective actions to prevent damage to equipment and injury to personnel. The trained student shall be able to perform the entire engine run task, without error, for an AF certifying official.

3.2.5 Qualification Levels

The ATS, as a minimum, shall provide training to the levels specified in the following paragraphs and for the throughput rates required by paragraph 3.2.6. Each crewmember and maintenance engine run qualification level shall meet or exceed the levels of performance specified in the contractor generated and AMC approved evaluation standards documents.

3.2.5.1 Aircraft Commander

Aircraft commander training shall be provided for the following aircrew levels.

3.2.5.1.1 Airland Courses

Provides students with leadership and management skills in preparation to command C-17 airland missions.

3.2.5.1.2 Airdrop Course

Provides student training to perform airdrop duties in the C-17 aircraft during airdrop missions.

3.2.5.1.3 Prime Nuclear Airlift Forces Course

Trains pilots in PNAF operations.

3.2.5.1.4 Special Operations Course

Prepares pilots for worldwide employment in support of special operations forces in a minimum illumination environment.

3.2.5.1.5 Instructor Course

Trains aircraft commanders to fly and instruct from both seats of a C-17 aircraft. instructional techniques.

3.2.5.1.6 Flight Examiner Course

Provides knowledge of standards of evaluation and all applicable regulations for conducting evaluations.

3.2.5.1.7 Senior Officer Course

Introduces senior officer pilots to the C-17 aircraft, systems, and procedures.

3.2.5.1.8 Continuation Training Course

Maintains pilot knowledge and skills and meets C-17 requirements in airland and airdrop with the Phase 1-4 continuation training.

3.2.5.1.9 Requalification Course

Prepares pilot requalification students for all pilot airland operations in the C-17 aircraft.

3.2.5.1.10 Aircraft Commander Initial Qualification

Prepares pilot students for all aircraft commander operations in the C-17 aircraft.

3.2.5.2 Copilot

Copilot training shall be provided for the following aircrew levels.

3.2.5.2.1 Airland Courses

Prepares pilot students for all copilot airland operations in the C-17 aircraft.

3.2.5.2.2 Airdrop Course

Provides pilot training to perform C-17 airdrop duties during airdrop missions. The course requires airland proficiency and concentrates on airdrop procedures.

3.2.5.2.3 Prime Nuclear Airlift Force Course

Trains pilots in PNAF operations.

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3.2.5.2.4 First Pilot Course

Builds judgment skills and knowledge to prepare pilots for position of aircraft commander.

3.2.5.2.5 Special Operations Course

Prepares pilots for worldwide employment in support of special operations forces in a minimum illumination environment.

3.2.5.2.6 Continuation Training Course

Provides training to maintain pilot knowledge and skills and meet C-17 currency requirements in airland and airdrop.

3.2.5.2.7 Copilot and First Pilot Requalification Course

Prepares pilot requalification students for all pilot airland operations in the C-17 aircraft.

3.2.5.3 Loadmaster

Loadmaster training shall be provided for the following aircrew levels.

3.2.5.3.1 Airland Course

Trains students for all C-17 loadmaster airland operations.

3.2.5.3.2 Airdrop Course

Trains loadmasters for all C-17 airdrop operations.

3.2.5.3.3 Prime Nuclear Airlift Force Course

Trains loadmasters in PNAF operations.

3.2.5.3.4 Special Operations Course

Prepares loadmasters for worldwide employment in support of special operations forces in a minimum illumination environment.

3.2.5.3.5 Instructor Course

Provides training to ensure students are qualified for instructor duties.

3.2.5.3.6 Flight Examiner Course

Provides students with knowledge of standards of evaluation and all applicable regulations for conducting evaluations.

3.2.5.3.7 Continuation Training Course

Provides training to maintain loadmaster knowledge and skills and meet C-17 currency requirements in airland and airdrop.

3.2.5.4 Maintenance Engine Run Technician

3.2.5.4.1 Initial Qualification Course

Provides training to ensure students are qualified for C-17 maintenance engine operation.

3.2.5.4.2 Continuation Training Course

Provides training to maintain maintenance engine run knowledge and skills and meet C-17 currency requirements.

3.2.5.4.3 Maintenance Engine Run Certifier Course

Provides training to ensure students are qualified for instructing and certifying C-17 maintenance engine run technicians.

3.2.6 Student Throughput Requirements

The C-17 ATS shall meet the annual throughput requirements (contract section J). Student throughput shall be determined using the planning factors/assumptions provided in the following paragraphs.

3.2.6.1 Basing/Mission Planning Factors

The system shall provide the training necessary to support the student throughput, based on the factors contained in Table I. The following base specific planning factors/assumptions should be used to determine baseline student throughput requirements:

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- a. Charleston AFB, SC; McChord AFB, WA; McGuire AFB, NJ; Elmendorf AFB, AK, and Travis AFB, CA will employ the associate reserve crew concept. (The 5.0 crew ratio will consist of a 3.0 active duty crew ratio and a 2.0 associate reserve crew ratio.) Jackson ANG, MS will employ the ANG crew concept (3.0 crew ratio). March AFB, CA will employ the AFRES crew concept (5.0 crew ratio). Hickam AFB, HI will employ the associate ANG crew concept (5.0 crew ratio will consist of a 3.0 active duty crew ratio and a 2.0 ANG crew ratio).
- b. Only Altus AFB, OK; Charleston AFB, SC, and McChord AFB, WA will be assigned an airdrop mission.
- c. McChord AFB, WA will be assigned the PNAF mission.
- d. Charleston AFB, SC will be assigned the special operations mission.

Table I

Crew Ratio and Overhead Factors

Crew Ratio	Active	Reserve	Guard	
Charleston AFB	3	2		
McChord AFB	3	2		
Jackson ANG			3	
McGuire AFB	3	2		
March AFB*		5		
Hickam AFB	3		2	
Elmendorf AFB	3	2		
Travis AFB	3	2		
Altus AFB	4			
Dover AFB*	3	2		
<u>Airdrop/PNAF/Special Operations Crews (Exclusive of overhead)</u>				
Charleston AFB, SC	30	Airdrop		
Charleston AFB, SC	12	Special Operations		
Altus AFB, OK	50%	Instructors airdrop qualified		
McChord AFB, WA	15	PNAF		
McChord AFB, WA	30	Airdrop		
* no WST				
Note: 10 percent of basic airdrop crews from Associated Reserves.				
Overhead Rates	AC Active	AC Reserve	LM Active	LM Reserve
Charleston AFB, SC	19%	6%	10%	5%
Altus AFB, OK	36%		36%	
McChord AFB, WA	20%	6%	10%	5%
Jackson ANGB, MS		10%		10%
Note: Crew overhead is additional to the basic crew manning obtained from the crew ratio.				

3.2.6.2 Qualification Training Planning Factors

The following planning factors/assumptions should be used to determine baseline student throughput requirements for qualification courses.

- a. All pilots will be qualified in air refueling. No air refueling training is required for loadmasters.
- b. All special operations crews will be airdrop qualified.
- c. Approximately 10 percent of the line assigned pilot crew force and 10 percent of the line assigned loadmasters will be flight examiner qualified. The distribution of the 10 percent will be proportional

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- so that 10 percent of the aircrew members qualified in each mission (e.g. airdrop, special operations) will also be flight examiner qualified.
- d. Approximately 15 percent of the active-duty line assigned pilot crew force (15 percent of the AFRES/ANG pilot crew force) and 15 percent of the active-duty line assigned loadmasters (15 percent of the AFRES/ANG loadmasters) will be instructor qualified. This 15/15 percent is in addition to the 10 percent of flight examiners. The distribution of the active-duty 15 percent will be proportional so that 15 percent of the aircrew members qualified in each mission (e.g., airdrop, special operations) will also be instructor qualified.
 - e. All C-17 crewmembers assigned to the airlift squadron at Altus AFB will be instructor or flight examiner qualified. These training unit instructors/flight examiners will be in addition to the 15 percent/10 percent of the active-duty operational force identified above.

3.2.6.3 Personnel Turnover Planning Factors

The following personnel turnover planning factors/assumptions should be used to determine student throughput requirements to maintain the developing C-17 crew force.

- a. The turnover rate for active duty C-17 pilots will be 4.0 years.
- b. The turnover rate for active duty C-17 loadmasters will be 6.0 years
- c. The turnover rate for AFRES and ANG C-17 pilots will be 7.0 years and 8.0 years for loadmasters.
- d. The turnover rate for active duty MER technicians will be approximately two years.
- e. The turnover rate for AFRES and ANG MER technicians will be approximately 10 years.

3.3 System Definition

3.3.1 System Level Characteristics

The C-17 ATS definition shall satisfy the overall general functional characteristics specified below. In addition, the C-17 ATS shall exhibit specific characteristics by functional areas, defined in paragraph 3.3.1.2.

3.3.1.1 General Characteristics

The C-17 ATS shall exhibit the following overall characteristics independent of functional area:

- a. The training system shall provide the Air Force with visibility into the daily operations of the ATS (e.g. monitoring of contractor tests, monitoring of contractor instruction and courseware development).
- b. The training system shall meet the operational concept of the C-17 for aircraft commanders, copilots, loadmasters, and MER technicians.
- c. The training system shall ensure that continuity and order exists among the subject matter taught in academics, practiced in training devices, and flown in the aircraft.
- d. The training system shall require students to demonstrate their comprehension, retention, and task proficiency in controlled, realistic practice situations for normal, abnormal, and emergency conditions.
- e. The training system shall ensure that retention, comprehension, and performance are evaluated against realistic and well-defined training objectives which are stated in measurable and observable terminology. Any objectives requiring subjective evaluation shall be accompanied by procedures sufficient to conduct the evaluations. In addition, success criteria shall be provided to adequately measure and assess student achievement. All lesson objectives must be completed in accordance with the MTL/ESD and syllabus.
- f. The training system shall progressively confirm that the student is attaining the knowledge, skills, and task performance required to meet the guaranteed aircrew qualification levels. Evaluation instruments to evaluate student performance and diagnose student deficiencies shall include

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- objectives, tests, evaluation standards, training mission and exercises, procedures, policies, and evaluation guides. Student evaluations shall be sufficient to diagnose student deficiencies and prescribe proper remedial instruction.
- g. The training system shall optimize the available training time in addition to meeting the overall system availability of paragraph 3.3.1.6. Training elements such as instructional delivery time, study, preparation and planning skills practice and feedback shall be combined into efficient units of instruction.
 - h. Training provided shall be self-paced, proficiency or competency based, mastery or criterion referenced, and shall be incorporated into all courses requiring guaranteed student performance.
 - i. Training provided by courses and their associated lessons, exercises, and evaluation instruments shall be built on an existing foundation of student knowledge and skills acquired from prerequisite training courses.
 - j. The training shall ensure content standardization for any cross-course or cross-crew position utilization.
 - k. The training system shall provide training in safety-of-flight, crew coordination, crew resource management, checkride preparation, and time task prioritization exercises prior to performance and/or evaluation in the aircraft.
 - l. The training system shall ensure that students are adequately briefed prior to each session in the training device(s). For those sessions where student performance is evaluated and critiqued, student strengths, weaknesses, and errors shall be identified, diagnosed, explained and documented in the students' training records. Remediation training shall be prescribed as necessary.
 - m. Training events shall be organized to maximize retention and minimize loss of proficiency between exercises, especially when mastery has not been confirmed or when transition from training device to aircraft is required.
 - n. The training system shall provide student training materials to achieve the qualification level described herein. Lesson plans, instructor guides, and any other applicable material shall also be provided to support AF conducted training on the aircraft.
 - o. Training equipment, media, learning centers, etc., shall be available for individual study when not required for scheduled instruction. Instructors shall be available at predetermined time blocks for student assistance when not conducting instruction or performing related duties.
 - p. Training system instructors shall be proficient in evaluating, diagnosing, and critiquing student performance; identifying learning difficulties; recognizing objectives not accomplished; and prescribing and conducting remedial instruction.
 - q. The training system shall include sufficient ability for student instructor candidates and flight examiners to practice and refine the use of evaluation standards and criteria in accordance with the syllabus.
 - r. A system operational training concept of 16 continuous hours per day, seven days per week, shall be the basis for the sizing of the ATS, excluding surge. Non-training days shall include all federal holidays, an additional 10 days at Christmas, and times mutually agreed upon by the wing/group commander and the contractor. A normal student week shall be five days. No one student shall be scheduled for ground based training in excess of eight hours per day. Maximum classroom lecture/computer aided instruction will be six hours per day per student. Maximum ATD training time shall be 8 hours. On days with flying training, crews will be dedicated to only activities associated with the flight, e.g. prebriefing and debriefing, all of which must be within a 12-hour limit.
 - s. The contractor shall provide Air Force usage time up to 25 cumulative hours per device per month, per site, (not to exceed 75 hours per site) for AMC to use the training equipment (i.e., safety of flight

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research, procedures development, VIP tours, SIMCERT). AMC shall coordinate this schedule with the contractor when required. The training equipment shall be available and fully operational; and contractor operators shall be available to operate the training equipment as required during this period. Additionally, unscheduled training devices (during the normal scheduled duty day) may be utilized by AMC at no additional cost to the government.

- t. The training system shall support mission rehearsal within 48 hours of notification IAW C17 ATS Mission Rehearsal Operating Instruction. This task may include receipt, generation, storage, and use of classified data.
- u. The system shall have the capability to generate 3 RDS data bases per year. These data bases shall cover a 25 NM radius around an AMC identified airfield with 5 meter resolution.

3.3.1.2 Functional Area Characteristics

The training support system shall contain the functional areas with characteristics as described in the following paragraphs. The stand alone Training System Support Center (TSSC) shall be located at the formal training base.

3.3.1.2.1 Administration and Management

The training system shall perform all administrative and management functions necessary for the day-to-day operation, maintenance, scheduling, and management of the student training and training system components. The Training Management System (TMS) shall effectively support the student, the instructor, and all training resources in accordance with requirements established by the course syllabus.

In addition, the ability shall be present to generate, compile, and maintain analysis data which can be used by instructors, flight examiners and wing/squadron/ATS schedulers and managers to facilitate student and course management. This system shall encompass maintenance of student demographic data; crewmember performance data for all phases of training, including continuation training; training performance on all devices and media, including the aircraft; and all other statistical data, records, and reports relating to the C-17 ATS daily operation. This system shall include sub-functions with the specified capabilities as described in the following paragraphs.

3.3.1.2.1.1 Student Management

The ability shall exist to perform the following functions.

- a. Maintain records of student performance, training, and instructor recommendations for each course.
- b. Generate student training reports.
- c. Identify and track student training deficiencies and prescribe satisfactory recommendation for correction of these deficiencies.
- d. Analyze student data, establish meaningful trends, and develop summary reports for use in revising curricula or performance of training devices/media.
- e. Provide for efficient transfer of student records to unit of assignment.
- f. Ensure that students cannot modify student records or access other privileged system files.
- g. Provide for government access of all data.
- h. Identify students by Air Force Programmed Flying Training (PFT) class numbering system.
- i. Identify students in Duty Not Including Flying (DNIF) status.

3.3.1.2.1.2 Training Management

This capability shall provide the following functions.

- a. Perform student and equipment scheduling for all school training. Perform timely scheduling and tracking of students, instructors, and training resources.
- b. Provide timely updates to baseline schedules, including remedial training events.

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- c. Provide TMS access with the capability to review and update student records via a web enabled capability.

3.3.1.2.1.3 Evaluation and Diagnostics Ability

The training system shall include evaluations and diagnostics that accurately assess the performance of the training system to train students to the qualification levels specified. This function shall incorporate an organized and structured approach to evaluation at the overall system level, as well as the subsystem level (training device, media courseware, etc.). The function shall monitor, measure, assess, and provide feedback regarding performance of the training system on a course-by-course and individual student basis. Course evaluation and validation activities shall be in accordance with the contractor prepared SOW and shall be based on the specified performance objectives and student proficiency advancement. The student evaluation shall be in accordance with requirements specified herein. The system shall perform the following functions:

- a. Ensure that all training components are tested and integrated to support system/subsystem validation and evaluation.
- b. Ensure all test and evaluation activities will not adversely affect the day-to-day training of the student.
- c. Provide data on all training components to accurately assess that system level evaluation criteria have been met.
- d. Provide data and analysis of data to support ongoing validation and curriculum revision.
- e. Provide data to assess student accomplishment of performance objectives and support changes to the ATS.
- f. Ensure that evaluation records are maintained, test deficiencies on ATS performance are tracked, and corrections to deficiencies are implemented.
- g. Ensure data is collected to determine total system efficiency and effectiveness.
- h. Allow over-the-shoulder monitoring by USAF personnel.

3.3.1.2.2 System Support

System support will support and maintain the daily operation of the ATS, including all delivery media such as training devices and training aids, TSSC equipment, logistics support package assets (non-recurring support assets that include support equipment, spares, and special tools and test equipment) and the technical documentation that defines the hardware, software, and courseware baselines. The support shall include all of the necessary resources to provide and maintain the effective life cycle support of the ATS. The support function shall include but not be limited to the following.

- a. This function shall ensure the reliability, maintainability, and logistics supportability of the training components meets the total system requirements for operational availability.
- b. This function shall ensure that all personnel including instructors, technicians, training specialists, etc., and their resources are available and trained to meet system demands.
- c. This function shall ensure that all scheduled and unscheduled maintenance actions are accomplished in a timely manner to meet system demands.
- d. This function shall ensure that resources are available and employed to provide the timely update/modification of system components/documentation, as approved by the contracting officer.
- e. This function shall provide for courseware authoring, modification, and maintenance. It will ensure only the most recent government approved courseware is provided for Air Force use.
- f. This function shall ensure the capability to design, acquire/fabricate, modify, inspect, assemble, integrate, test, and validate computational resources including the associated software to support the training devices.

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- g. This function shall manage and accurately track all support system assets including but not limited to the location, condition, status, source of repair and resupply, and cost and lead time data. This shall include expense assets provided under the operations, maintenance, and support contract options.
- h. This function shall ensure and employ the capability to track and record all maintenance actions, spare and repair parts maintenance consumption and labor consumption by device and by site.
- i. This function shall maintain currency of each course of instruction, including all training material, media and courseware, to provide a guaranteed student trained and qualified with the most up-to-date information and aircraft configuration.
- j. This function shall make changes and updates as a result of emergency, operational, safety supplements, and interim message changes within 2 working days of receipt of changes at the TSSC. All other regulatory changes shall be made within 30 days. For these interim changes, the contractor shall prepare Training Information Files (TIFs) reflecting the change before the next presentation of instructional material affected.

3.3.1.2.2.1 Configuration Management

The system support function shall perform the system configuration management tasks required to maintain the hardware, software, and courseware current with the government approved baseline descriptions. This function shall ensure the timely update of all hardware, software, and courseware baseline documentation, due to either internal or external changes (e.g., aircraft mods etc.). This function shall ensure that a current and validated training configuration for each course of instruction is maintained without disruption of student throughput or jeopardizing student attainment of the guaranteed qualification levels. The system support function shall ensure that configuration management is designed and employed in such a manner as to effectively support change activity across the diversified elements that comprise the ATS. The support function shall ensure timely and accurate changes are implemented during the time phased deployment of the system to multiple training locations. Further, the support function shall perform the following contractual requirements.

- a. Establish and maintain an accurate, current, and traceable ATS hardware, software and courseware baseline configuration.
- b. Ensure changes to the ATS system components as a result of changes to the training requirements and/or changes to the aircraft are documented in accordance with established procedures.
- c. Provide for government access to all data.
- d. Maintain records of all changes that have been implemented and validated on the ATS training system.

3.3.1.2.2.2 Change Management

The C-17 ATS shall acquire and analyze data describing proposed and contracted changes to the aircraft for possible impacts to the C-17 ATS. Change Management shall provide an impact assessment by analyzing each aircraft change activity for potential changes to the C-17 ATS hardware, software and courseware to meet retro-training requirements. Change Management shall have writing and planning responsibilities and work in concert to provide an accurate analysis of proposed aircraft changes in the production of change proposals and vendor related SOWs. In addition, this function shall provide AMC-directed CONOPS (draft).

3.3.1.3 Student Evaluation

The training system shall include evaluation instruments (objectives, tests, evaluation standards, training mission and exercises, procedures, policy, evaluation guides, etc.) for the evaluation and diagnosis of student performance. The training system shall progressively confirm that the student is attaining the knowledge, skill, and task performance required to meet the requirements established by the guaranteed aircrew qualification levels. The results of student evaluations shall be used to diagnose student

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deficiencies and prescribe remedial instruction. Successful accomplishment of a comprehensive examination on aircraft systems and aircrew procedures shall be a prerequisite to qualification.

3.3.1.4 Component Reliability

All components of the C-17 ATS shall achieve reliability adequate to support the student guarantee and AMC dedicated device hours.

3.3.1.5 Component Maintainability

All components of the C-17 ATS shall achieve maintainability adequate to support the student guarantee and AMC dedicated device hours.

3.3.1.6 System Availability

System availability is defined as the degree to which the training system is in a fully operable and committable state, maintaining all specific student throughput and system performance abilities as defined within this specification. System availability is dependent upon the operating state of all components and all availability, maintainability, and logistic supportability factors necessary to sustain the system and supports an operational capability of 0.95 when operated 20 hours per day, 360 days per year.

3.3.1.6.1 Training Device Availability

Maintenance Availability - Each ATD shall have a maintenance availability objective of 0.95 when operated for 20 hours per day, 7 days per week. Availability shall be calculated as follows:

$$\% \text{ Availability} = ((\text{Scheduled training time} - \text{Downtime}) \div \text{Scheduled training time}) \times 100$$

3.3.1.7 Traceability to Training Requirements

The training system shall trace and track the final system configuration baselines back to training requirements. These baselines shall include all hardware, software, and courseware elements and consist of all discrete requirements necessary to generate system components with specific training characteristics. The training requirements shall include the sum body of information directed or derived through instructional system development (ISD) analytical techniques. The system shall provide traceability from a specific design characteristic of a system component back to the training requirements and, thereby, verify its need for existence.

3.3.1.8 Safety

The C-17 ATS shall minimize safety hazards to all personnel using or maintaining the equipment, while in an operative or non-operative state. In addition, materials used in the construction of the equipment shall not support the propagation of flame. Hazards associated with the generation of toxic or noxious gases shall be minimized and controlled.

3.3.2 General Characteristics of the Training System Components

3.3.2.1 Definition of System Components

Major training system level components are defined as any hardware, software, courseware or personnel elements within the training systems whose absence from the system would significantly jeopardize the guarantee of a specified aircrew member qualification level. System components span the functional categories of instruction, skill development and maintenance, administration and management evaluation and supportability. Types of system components include training devices and equipment, major support equipment, training media (hands-on and academic) instructors. Examples of major system components are Weapon System Trainer (WST), Cockpit Systems Simulator (CSS), Cargo Compartment Trainer (CCT), Cargo Load Model (CLM), computer-aided instruction (CAI), Reconfigurable Desktop Simulator (RDS) etc. Subsystem level components are defined as those subsystems contained within the major system level components. As an example, the WST includes the following subsystems: motion, visual, computational, instructor station, etc.

3.3.2.2 Compliance with Training System Requirements

The major system/subsystem components shall be configured to satisfy all training and performance requirements within this specification, the configuration item specification(s), and the contractor prepared SOW. These components shall be employed using an integrated system engineering and instructional system development process. Resultant system/subsystem components shall be traceable from the

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various analyses from which they were derived to the training requirements which these components were designed to fulfill. These components shall further be related back to the master task listing(s) and performance objectives. Major interfaces between system level components shall be maintained for maximum compatibility, consistency and correlation between system and subsystem level components.

3.3.2.3 Compliance with Airplane Simulator Qualification Requirements

All flight simulators shall satisfy, as a minimum, all Federal Aviation Administration (FAA) Level C performance and evaluation requirements as defined in the Department of Transportation, FAA Advisory Circular (AC 120-40) and all aerial refueling performance and evaluation requirements as defined in the Aerial Refueling Airplane Simulator Qualification (ARASQ), or as further specified in the applicable Prime Item Development Specification (PIDS). For purposes of this evaluation, the AF or an AF designated agency will act as the FAA or certifying agency. This applies to all simulator standards, performance tests, functional tests, and automated test routines defined in the appendices necessary to fulfill Level C requirements, and all simulator standards, performance tests, functional tests, and automated test routines defined in ARASQ.

3.3.2.4 Design Flexibility

New and upgraded equipment within the ATS shall be designed and configured with the maximum of flexibility to allow for a minimum number of design changes to the system and subsystem level components. The flexibility shall provide for alternate training methods that maintain overall system training effectiveness and efficiency. New and upgraded equipment within the ATS shall have 50% expansion capability, particularly from the computational system resources of spare processing time, memory, and input/output (I/O) capacity. The computational system resources on existing ATDs shall be monitored and action taken when it drops to 25% spare capacity. This allows for system changes with minimum impact on system operation, maintenance, and student training.

3.3.2.5 Design Life

Major system level components, including refurbishments, shall be designed and fabricated for a useful operating life of at least 15 years.

3.3.3 Specific Description of System Components

3.3.3.1 Functional Characteristics

3.3.3.1.1 Weapon System Trainer

WST shall be used to teach those portions of the pilot, copilot, and maintenance engine run technician's curricula demanding a visual scene simulation system and a motion system and shall include the necessary equipment/capabilities specified within the following specifications:

MDTS Document S5006, WST Prime Item Development Specification WST 1 – 7

MDTS Document C-17 ATS-Spec-703A, WST Prime Item Development Specification WST 8 - 13

MDTS Document S5011, WST Prime Item Product Fabrication Specification, WST 1- 7

MDTS Document C-17 ATS-PIFS-703, WST Prime Item Product Fabrication Specification, WST8- 13

MDTS Document PIDS-0254-C-17 ATS, WST Prime Item Development Specification, WST 14- 15

3.3.3.1.1.1 Distributed Mission Training (DMT)

The C-17 ATS shall train C-17 formation airdrop missions, to include air refueling, in a networked environment at selected locations. DMT initiative implements linked, selected mission-level simulation training for AMC aircrews. DMT will provide a distributive network that allows networked federates to conduct mission training across geographically dispersed locations.

3.3.3.2.1.1.2 General Description of Operational Ability

Selected WSTs shall support C-17 formation airdrop missions, to include air refueling, with a goal of operations for the full range of C-17 employment options in a distributed mission training environment. The selected WSTs shall be fully interoperable with other training devices through the DMT environment.

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3.3.3.2.1.1.3 Distributed Mission Training Requirements

The C-17 ATS shall facilitate and enhance aircrew training in a distributive environment as listed below.

- a. DMT shall be optimized for C-17 formation airdrop missions to include air refueling. An objective of the C-17 WST in the DMT environment shall be to simulate operations across the full range of C-17 roles and missions.
- b. The C-17 WST shall be compliant with the policy/practices of the Joint Technical Architecture and High Level Architecture (JTA/HLA) standard. An objective of the DMT program is full compliance with the DMT operations and integration standards.
- c. The C-17 WST shall include a selectable state in which C-17 WSTs at the same site are fully integrated and interoperable through a local DMT network, for training.
- d. The designated mission primary instructor in the C-17 WST shall centrally monitor, measure, and manage the C-17 simulation and its results during a DMT event.
- e. The C-17 WST shall operate in either stand-alone mode or DMT mode. The mode shall be selectable by the instructor.
- f. The C-17 WST training and performance fidelity shall not be reduced or degraded when operating in the DMT mode.
- g. The WSTs are expected to operate day-to-day in an unclassified mode; however, the architecture shall incorporate future multi-level security methods appropriate to the C-17 ATS and mission training or real world tasking objectives. The system shall be certified and accredited for protection against INFOSEC threats in accordance with the requirements of Air Force Special Security Instruction 5024 and complete the checklist in same.

3.3.3.1.2 Cockpit Systems Simulator

The CSS shall be used to teach integrated aircraft system operation to the pilot and copilot. It shall also be used to teach power-on and -off procedures to loadmasters and engine run procedures to MER technicians. The CSS shall include the necessary equipment/capabilities specified within the following specifications:

MDTS Document S5007, Cockpit Systems Simulator Prime Item Development Specification

MDTS Document S5012, Cockpit Systems Simulator Prime Item Product Fabrication Specification

3.3.3.1.3 Computer-Based Training System

The CBT system shall be used to teach pilot, copilot, loadmaster, and MER trainees' basic operating theory and procedures and required systems knowledge. The CBT shall include the necessary equipment/capabilities specified within the following specifications:

MDTS Document S5030, Courseware Support System/CIP Trainer Prime Item Product Fabrication Specification

3.3.3.1.4 Cargo Compartment Trainer

The Cargo Compartment Trainer (CCT) is a full-scale replication of the C-17 cargo compartment, ramp, and cargo door and shall include the necessary equipment specified herein. The CCT shall be used to provide loadmaster trainees with hands-on experience at accomplishing airland and airdrop tasks, managing and securing loads, and operating the cargo door, ramp, rails, and winching components.

The CCT shall include the necessary equipment/capabilities specified within the following specifications:

MDTS Document S5009, Cargo Compartment Trainer Prime Item Development Specification

MDTS Document S5014, Cargo Compartment Trainer Prime Item Product Fabrication Specification

MDTS Document PIDS-0255-C-17 ATS Cargo Compartment Trainer #2 Prime Item Development Specification

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3.3.3.1.5 Cargo Load Model

The Cargo Load Model (CLM) is a one-tenth scale replication of the C-17 cargo compartment, ramp, and cargo door and shall include the necessary simulated cargo and additional equipment. The CLM shall be used to provide loadmaster trainees with three-dimensional experience in the aircraft constraints directly related to the C-17 in the areas of load planning, loading, and unloading, necessary to support the airland missions of the aircraft.

The CLM shall include the necessary equipment/capabilities specified within the following specifications:

MDTS Document S5008, Cargo Load Model Prime Item Development Specification

MDTS Document S5013, Cargo Load Model Prime Item Product Fabrication Specification

3.3.3.1.6 Training Support System

The Training Support System (TSS) shall be used to provide comprehensive support to the ATS. This support shall include configuration/concurrency management, software update and generation, courseware (both instructor and computer-based) update and generation, hardware depot functions, maintenance of logistics support (including analysis) records, training publications update and library storage, and a TMS to provide complete scheduling, test record keeping, evaluation, and student management capabilities. The TSS shall include the necessary equipment/capabilities specified within the following specification:

MDTS Document S5010, Training Support System Prime Item Development Specification

MDTS Document S5029, Media Support System Prime Item Fabrication Specification

MDTS Document S5027, Audio/Video Prime Item Product Fabrication Specification

MDTS Document S5028, Animation/Graphics Prime Item Product Fabrication Specification

MDTS Document S5030, Courseware Support System/CIP Trainer Prime Item Product Fabrication Specification

MDTS Document S5031, Training Management System Prime Item Product Fabrication Specification

3.3.3.1.7 Courseware

Courseware shall be used to provide trainees at each site with instructor and computer based instruction in C-17 theory, procedures, and systems knowledge. Courseware shall consist of printed materials, instructor and student guides, instructor based training lesson plans, interactive CBT lessons, and training device exercises. The contractor shall provide and maintain validated training configurations for each training course. The contractor shall perform, as a part of normal operations, courseware changes resulting from student comments, results of surveys and test data analysis changes to technical orders, safety supplements, training change proposals (TCPs), Air Force instructions (AFI), manuals, and regulations that are required for curriculum currency. These changes shall be incorporated into the next quarterly update cycle, or sooner. All courseware shall be reviewed/updated annually. All changes to training configurations shall be submitted to the government for approval no later than two weeks prior to release. The contractor shall ensure only the most recent government approved courseware is provided for Air Force use. The contractor shall plan for and support periodic government reviews of courseware to ascertain quality, currency, and completeness. Printed courseware shall be compatible with and supportive of the classroom lecture or training device session with which it is associated. Interactive computer based lessons shall be compatible with delivery on the CBT System described in 3.3.3.1.3. All courseware, whether printed or computer based, will be approved by the government prior to release. Training device courseware shall support the requirements of the syllabus.

3.3.3.1.8 Portable Flight Planning Software (PFPS)

The C-17 ATS courseware shall provide trainee instructions on Portable Flight Planning System (PFPS) for the C-17 weapon system. The PFPS provides advanced automation tools for aircrews to perform pre-mission planning using an unclassified laptop and software which can be used enroute or at home station. It provides for loading of flight plan information and navigation database to the C-17 weapon system mission computer.

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3.3.3.1.9 Core Integrated Processor (CIP) Trainer

The Core Integrated Processor (CIP) Trainer is a PC based work station that emulates the C-17 Mission Computer (MC), Mission Computer Display (MCD), Mission Computer Keyboard (MCK), Multifunction Control (MFC), Multi-function Displays (MFD), and the Automatic Flight Control Panel (AFCP) in various aircraft block configurations. The CIP Trainer is an advanced part-task training tool that familiarizes aircrews with C-17 mission computer pages and functions relating to mission planning, navigation guidance, takeoff and landing data computations, airdrop, rendezvous and air refueling, and other flight operations. The CIP Trainer shall include the necessary equipment/capabilities specified within the following specification:

MDTS Document S5030, Courseware Support System/CIP Trainer Prime Item Product Fabrication Specification

3.3.3.1.10 Reconfigurable Desktop Simulator (RDS)

The RDS provides a realistic multi-position training capability on all aircraft configurations in the Air Force inventory starting with Block 10. The RDS enables the aircrews to train and maintain proficiency on a fleet with multiple aircraft block configurations and includes a visual presentation, avionics controls and displays, throttle and control stick. The RDS configuration provides the capability to train different block configurations as well as for the pilots to train together or separately. The students are able to train in a non-supervised environment or have instructor input in the scenarios.

MDTS Document PIDS-0261-C-17 ATS, Reconfigurable Desktop Simulator, Prime Item Development Specification

3.3.4 Interface Definition

3.3.4.1 Facility/Environmental Interface

The C-17 ATS shall be physically and functionally compatible with the Government facilities in which it is installed. The C-17 ATS shall be compatible in the areas of heating/air conditioning, cooling water, electrical power, space and layout, safety barriers and interlocks, floor loading, automatic fire protection, and electromagnetic compatibility with the environment as further defined in the facilities design criteria. The C-17 ATS shall provide protection against damage to ATS equipment, interruption of training, and loss of training data due to facility/environmental factors.

3.3.4.2 Internal System Interfaces

The functional areas of the training system shall be interfaced to form a totally integrated C-17 ATS producing a guaranteed qualified student.

3.3.4.3 External System Interfaces

Functional interfaces shall consider the Government regulatory, policy and decision procedures, evaluation standards, wing/base management organizations, scheduling of aircraft for training, use of AF manpower (managers, instructors, technicians, etc.) and other resources.

3.3.4.3.1 Air Force Instructor Interface

The C-17 ATS shall allow the AF instructor to interface with his student prior to the student's first aircraft flight. The purpose of this interface is to allow AF instructors an "over-the-shoulder-view" of the student's performance prior to beginning inflight training.

3.3.5 System Integration/Deployment

The C-17 ATS shall allow for the most efficient, effective, and timely integration of system components and training requirements. System integration shall support the AF operational deployment and organizational concepts. Aircraft availability, use, and operational deployment at each base shall be considered during system integration. In addition, the integration of the training system shall not interfere with the progression of student training. Integration of the system shall allow independent and/or simultaneous training of AFRES and/or ANG crewmembers. System integration shall consider both aircrew and maintenance engine run training requirements.

3.3.5.1 Air Force Reserve and Air National Guard Unique Training Requirements

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Integration of the C-17 ATS shall support AFRES and ANG unique training requirements including personnel availability and travel constraints. System integration shall allow for the tailoring of AFRES and ANG training to block times conforming to training periods such as active duty training, unit training assembly, and additional flying training period.

3.3.6 Compatibility with System Evaluation Methods

The methods of training provided by the C-17 ATS shall be compatible with the established AF methods of student evaluation.

3.3.6.1 Air Force Conducted Training

All flight training will be conducted by AF flight instructors. AF instructors may monitor portions of the ATS training programs.

3.4 Contractor Personnel Training

The C-17 ATS shall include necessary personnel to efficiently produce, operate, maintain, and support the total training system. All personnel shall be trained and qualified to meet the specific job requirements. Formal school instructors must meet minimum requirements (must have an Associates Degree) to preserve Community College of the Air Force accreditation. The contractor shall conduct all ground-based aircrew training and support all in-flight training as specified herein. Contractor personnel shall be responsible for the complete administration, management, and daily operation of the C-17 ATS. Contractor instructors will participate in flights as specified in AFI 11-2C-17 and AFI 11-401.

4.0 QUALITY FACTORS

4.1 Scope

Quality activities shall include both evaluations of the training system and evaluations of students. The C-17 ATS evaluation shall verify that the requirements of this specification are met. This evaluation shall also validate that the system components integrated into the system are capable of providing effective training to the qualification levels specified. Student evaluations shall verify the students have accomplished the necessary training to qualify at their specified level.

4.1.1 Responsibility for System Evaluation

The contractor shall be totally responsible for the planning, conduct, and successful completion of operational evaluation. AF involvement in system level and subsystem level evaluations is delineated in this specification and the SOW.

4.1.1.1 Verification Cross Reference Index

The Verification Cross Reference Index shall record the method of verification to be used for each requirement listed in Section 3.0 of this document. Considering the transition of the program from TSA I to TSA II with the same contractor, the validation process is complete, except for the new items added into this system specification. The completed verification is shown shaded with a bold "n/a". The new items that require verification will not be shaded. Verification shall be accomplished by inspection, analysis, demonstration, or test, or a combination thereof, as defined below:

- a. Inspection is defined as a visual verification that the system element conforms to the documentation to which it was designed.
- b. Analysis is defined as verification that a specification requirement has been met by evaluation of equations, charts, reports, reduced data and/or representative data displays.
- c. Demonstration is reserved for verifications that are subjective in nature and have no measurable or quantifiable results (i.e. feel, sound, perception). Demonstration method of verification shall exercise performance capabilities in representative and worst case scenarios to verify specification requirements using the approved detailed procedures.
- d. Test is defined as any verification which is objective in nature and has measurable, quantifiable or expected results. Specific pass/fail criteria are established for each specification requirement under all appropriate conditions using the approved detailed procedures.

Table II
Verification Cross Reference Index

Section 3 Requirement	Verification Method(s)				
	Inspection	Analysis	Demonstration	Test	Not Applicable
3.0					X
3.1	X	X	X	X	X
3.1.1					X
3.1.2					X
3.1.3					X
3.1.4					X
3.2	X	X			X
3.2.1	X	X			X
3.2.2	X	X			X
3.2.2.1	X	X			X
3.2.2.2	X	X			X
3.2.2.3	X	X			X
3.2.2.4	X	X			X
3.2.2.5	X	X			X
3.2.2.6	X	X			X
3.2.2.6.1	X	X			X
3.2.2.6.2	X	X			X
3.2.3		X			X
3.2.4	X	X			X
3.2.5		X			X
3.2.5.1		X			X
3.2.5.1.1					X
3.2.5.1.2					X
3.2.5.1.3					X
3.2.5.1.4					X
3.2.5.1.5					X
3.2.5.1.6					X
3.2.5.1.7					X
3.2.5.1.8					X
3.2.5.1.9					X
3.2.5.1.10					X

Table II
Verification Cross Reference Index

Section 3 Requirement	Verification Method(s)				
	Inspection	Analysis	Demonstration	Test	Not Applicable
3.2.5.2.4					X
3.2.5.2.5					X
3.2.5.2.6					X
3.2.5.2.7					X
3.2.5.2.8					X
3.2.5.3	X	X			X
3.2.5.3.1					X
3.2.5.3.2					X
3.2.5.3.3					X

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3.2.5.3.4					X
3.2.5.3.5					X
3.2.5.3.6					X
3.2.5.3.7					X
3.2.5.3.8					X
3.2.5.3.9					X
3.2.5.4					X
3.2.5.4.1					X
3.2.5.4.2					X
3.2.5.4.3					X
3.2.6		X			X
3.2.6.1		X			X
3.2.6.2		X			X
3.2.6.3		X			X
3.3					X
3.3.1	X	X	X	X	X
3.3.1.1	X	X	X	X	X
3.3.1.2	X	X			X
3.3.1.2.1	X	X	X	X	X
3.3.1.2.1.1	X	X	X		X
3.3.1.2.1.2	X	X	X		
3.3.1.2.1.3	X	X	X	X	X
3.3.1.2.2	X	X	X		X
3.3.1.2.2.1	X	X	X		X
3.3.1.3		X			X
3.3.1.4		X			X
3.3.1.5		X			X
3.3.1.6		X			X
3.3.1.7		X			X
3.3.1.8	X	X			X
3.3.2					X
3.3.2.1					X
3.3.2.2	X	X	X	X	X
3.3.2.3	X	X	X	X	X
3.3.2.4		X	X	X	X
3.3.2.5		X			X

Table II
Verification Cross Reference Index

Section 3 Requirement	Verification Method(s)				
	Inspection	Analysis	Demonstration	Test	Not Applicable
3.3.3					X
3.3.3.1					X
3.3.3.1.1		X	X		
3.3.3.1.1.1		X	X		
3.3.3.1.2		X	X		X
3.3.3.1.3		X	X		X
3.3.3.1.4		X	X		
3.3.3.1.5		X	X		X
3.3.3.1.6		X	X		X
3.3.3.1.7	X	X	X		X
3.3.3.1.8		X	X		X
3.3.3.1.9		X	X		X
3.3.3.1.10	X		X	X	
3.3.4					X
3.3.4.1	X	X			X
3.3.4.2		X	X		X
3.3.4.3		X			X
3.3.4.3.1		X			X
3.3.5		X			X
3.3.5.1		X			X
3.3.6		X	X		X
3.3.6.1		X			X
3.4		X			X

4.1.2 Responsibility for Student Evaluation

The AF shall perform the student evaluations by using qualified flight examiners. These evaluations shall validate the contractor guarantee to meet the appropriate student qualification levels and satisfy student throughput requirements.

4.2 Training Media Test and Evaluation

4.2.1 Aircrew Training Device Test and Evaluation

All flight simulators shall satisfy, as a minimum, all FAA Level C performance and evaluation requirements as defined in the Department of Transportation FAA Advisory Circular (AC) 120-40 and ARASQ. The contractor shall plan for and conduct all tests and evaluations of the training system and test its system components to verify compliance with the contractor prepared SOW and system specification in accordance with contractor prepared acceptance test procedures (ATP), including approval test guides (ATG) for FAA Level C type certification of WSTs and aerial refueling certification. All requirements of the FAA AC 120-40 and ARASQ shall apply to full force and effect, as appropriate for the C-17 ATS. This applies to all simulator standards, automated test routines, performance tests and functional tests defined in the FAA AC 120-40 appendices, and all simulator standards, automated test routines, performance tests and functional tests defined in ARASQ. Certification of a WST to ensure that it satisfies all FAA Level C performance and evaluation requirements as defined in the FAA AC 120-40 will be performed by the Air Force with contractor assistance. For purposes of FAA evaluations, the Air Force will act as the FAA. Contractor activities shall include the conduct, support, data reduction, and reporting for his system test and evaluation process, to include FAA Level C type and aerial refueling

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certification of flight simulators. The contractor shall manage, track, and correct discrepancies identified during testing.

4.2.2 Contractor Engineering Verification Testing

Contractor engineering verification testing of all training devices shall be conducted in accordance with contractor developed ATPs. The contractor shall make provisions for AF monitoring of all contractor engineering verification testing of training equipment.

4.2.3 Government Testing

The contractor will make provisions for Air Force first article acceptance testing of training equipment using ATPs and ATGs to ensure that they satisfy performance and evaluation requirements.

4.2.4 Formal Acceptance Testing

The Air Force shall accomplish formal acceptance testing using jointly selected portions of the ATPs and the ATGs. The contractor shall support all formal acceptance testing.

4.2.5 Simulator Certification (SIMCERT) Testing

Aircrew Training Devices (AVS, LS, CSS, and CCT) are tested for compliance with the applicable advisory circular. The Air Force acts as the certifier for purposes of initial and recurring evaluation of all devices. The contractor supports the government in all tests and evaluations. All ATS training devices are certified annually. Tests are accomplished on a semiannual basis with part of the functional and performance tests run each time. Only certified devices will be used for training.

4.2.6 Other Training Media Test and Evaluation

In addition to ATDs, the contractor shall plan and conduct appropriate evaluation of C-17 ATS training media.

4.3 Support System Test and Evaluation

The contractor shall plan for and conduct appropriate evaluations of all new ATS support systems and subsystems including, but not limited to TSSC, TMS, MSS, courseware support system, and depot hardware and software to verify compliance with the system specification and SOW. The contractor shall conduct acceptance testing of all new support systems in accordance with contractor ATPs. The contractor shall make provisions for AF monitoring of acceptance testing of support systems.

4.3.1 Operational Evaluation

The contractor shall conduct an Operational Evaluation process for the C-17 ATS. This process shall continue throughout the life of the contract and shall include: assessment of student learning to meet established objectives, measurement of student learning rates, internal and external feedback across the entire training spectrum, identification and resolution of discrepancies and deficiencies, ability to meet operational requirements, and training system currency with the weapon system.

4.4 Quality Assurance Guidelines

The contractor shall implement a quality assurance program using ISO 9000 standards as a guide.

4.5 Product Assurance

The contractor shall establish and implement internal policies, practices, and procedures, in accordance with the specified quality assurance guidelines (reference paragraph 4.4), to insure an effective interface and working relationship among all functions necessary for the ATS. The contractor shall develop measurable process and product indicators that demonstrate the product conforms to System Specification requirements.

5.0 PREPARATION FOR DELIVERY

C-17 ATS equipment and support items shall be preserved, packaged, handled, transported, and delivered safely in accordance with best commercial practices.

6.0 NOTES

6.1 Changes from Previous Issue

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The margins of this specification shall be marked with a | to indicate where changes (additions, modifications, corrections, deletions, etc.) from the previous issue were made.

6.2 Definitions

6.2.1 Glossary

- a. Courseware - Instruction materials required to support training across all media including academic media and the aircraft. Courseware may reside in a variety of media which may include CD-ROM video/audio cassette, floppy diskette, video disc, and course documents/material.
- b. End Item – The final production product when assembled, or completed, and ready for delivery/deployment.
- c. Guaranteed Student Performance - Performance such that the graduate can pass a prescribed USAF evaluation and maintain qualification.
- g. Simulator Certification - A program conducted by the Air Force with contractor assistance for evaluating and certifying ATD simulation and performance fidelity of AF training devices.
- h. Assault Landing Zone (ALZ) - An assault landing zone (ALZ) has a prepared (paved) or semi-prepared (compacted gravel, sand) runway and limited taxiways and parking areas.
- i. Turnover Rate - Normally expressed in years; loss rate for the entire crew force or part of a force (aircrew or maintenance). (For example, a turnover rate of three years means that it takes three years to lose the entire force or there is a loss rate of 33% each year.)

6.3.2 Acronyms

AC	Aircraft Commander
AC	Advisory Circular
AETCI	Air Education and Training Command Instruction
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFJI	Air Force Joint Instruction
AFJMAN	Air Force Joint Manual
AFM	Air Force Manual
AFMAN	Air Force Manual
AFMSS	Air Force Mission Support System
AFOSH	Air Force Occupational Safety and Health
AFPAM	Air Force Pamphlet
AFPD	Air Force Policy Directive
AFRES	Air Force Reserve
AFS	Air Force Specialty
AFSIR	Air Force Spectrum Interference Resolution
AFSSI	Air Force Special Security Instruction
AGL	Above Ground Level
ALZ	Assault Landing Zone
AMC	Air Mobility Command
AMCI	Air Mobility Command Instruction
AMCR	Air Mobility Command Regulation
ANG	Air National Guard
ASC	Aeronautical Systems Center
ATD	Aircrew Training Device
ATG	Approval Test Guide
ATP	Acceptance Test Procedure
ATS	Aircrew Training System
CAI	Computer Aided Instruction
CBT	Computer-Based Training

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CCT	Cargo Compartment Trainer
CD-ROM	Compact Disk Read Only Memory
CDS	Container Delivery System
CIP Trainer	Core Integrated Processor (CIP) Trainer
CLM	Cargo Load Model
CSS	Cockpit Systems Simulator
DMT	Distributed Mission Training
FAA	Federal Aviation Administration
FAA AC	Federal Aviation Administration Advisory Circular
FM	Field Manual
FOV	Field of View
HLA	High Level Architecture
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers
IMC	Instrument Meteorological Conditions
INFOSEC	Information Security
ISD	Instructional System Development
ISO	International Standards Organization
JTA	Joint Technical Architecture
KIAS	Knots Indicated Airspeed
LM	Loadmaster
MDTS	McDonnell Douglas Training Systems
MER	Maintenance Engine Run
MIL	Military
MPS	Mission Planning System
MSS	Media Support System
MTL/ESD	Master Task List/Evaluation Standards Document
NVGs	Night Vision Goggles
OK	Oklahoma
PCMCIA	Personal Computer Manufacturer Computer Interface Adapter
PFPS	Portable Flight Planning System
PNAF	Primary Nuclear Airlift Forces
RDS	Reconfigurable Desktop Trainer
SAAF	Small Austere Airfields
SC	South Carolina
SIMCERT	Simulator Certification
SKE	Station Keeping Equipment
SME	Subject Matter Expert
SOW	Statement Of Work
STD	Standard
TCP	Training Change Proposal

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TEMPEST	Transient Electromagnetic Pulse Standard
TIF	Training Information Files
TMS	Training Management System
TO	Technical Order
TSS	Training Support System
TSSC	Training System Support Center
USAF	United States Air Force
VIP	Very Important Person
WA	Washington
WST	Weapon System Trainer
YWMA	Training Systems Product Group C-17 Aircrew Training System Directorate