

DRAFT OPERATIONAL REQUIREMENTS DOCUMENT (ORD)

MAINTENANCE SKILLS TUTOR (MST)

1. GENERAL DESCRIPTION AND OPERATIONAL CAPABILITY

a. Mission Area. Ask ACC.

b. Proposed System. The Maintenance Skills Tutor (MST) is a personal-computer-based intelligent tutoring system (ITS) that will improve advanced troubleshooting skills for 5- and 7-level F-15 and F-16 maintenance personnel. MST courseware will be developed incrementally to support instruction in various areas such as engine maintenance, avionics maintenance, and hydraulics maintenance. The MST courseware will provide continuation training to proficient technicians to maintain the skills learned using the MST system. MST Courseware objectives will teach advanced troubleshooting through the use of ITS technology including the simulation of test equipment and A/C systems.

MST consists of a practice environment, enhanced through the use of multi-media, in which the student will be allowed to test and operate the simulated aircraft system in order to isolate a faulty component. The MST system will also provide the student with coaching if requested, or if deemed necessary by the tutor. After a problem has been completed, a student will be given the opportunity to review previous actions and compare them to those of a master technician. Using the practice, coaching, and reflection approach has been shown to increase troubleshooting frequency. **Pre-tests will be conducted and used to track the student's progress.**

(At this point, a brief summary of the MNS should be included)

c. Operational and Support Characteristics. MST Courseware will be designed to operate in ACC maintenance workcenters on standard ACC, stand alone, computer-based training hardware. **The MST user interface will be consistent with MST Style Guidance.** MST is designed for operation within Aircraft Maintenance Units (AMUs) on or near the flightline. This will allow the student to take part in training at any time.

Comment: Page: 1

Issue: While a pre-test is definitely a requirement, a post-test may not be. Will check this with Dr. Myers.

Comment: Page: 1

Issue: 1) Will probably need to change words concerning compliance with ACC Style Guidance, and 2) if removable hard disks are used there is no longer a need to interface with ICW software.

2. THREAT. Not Applicable.

3. SHORTCOMINGS OF EXISTING SYSTEMS. Currently, no Air Force Maintenance training exists which can provide troubleshooting skills improvement training for 5- and 7-level technicians. The technology incorporated in the MST tutors allows a trainee to become proficient at a much faster rate and also allows the technician to retain this knowledge over a longer period of time. Knowledge-based systems such as the MST tutors have been shown to show a distinct improvement over existing on-the-job (OJT) training techniques and require far less costly resources and time. MST will complement the maintenance skills training provided by the career development courses (CDCs) and interactive courseware (ICW) with troubleshooting skills training.

4. CAPABILITIES REQUIRED. ACC needs the capability to: 1) Train 5- and 7-level maintenance technicians advanced troubleshooting skills; 2) Track the progress of students; 3)

Track the usage of the MST system; and 4) Provide continuation training in advanced troubleshooting techniques.

Comment: 0Page: 2
Issue: Need to examine what type of tracking is required, especially if modem is not used to transfer this information to a central point.

a. System Performance. The system performance may be evaluated through the use of Pre-tests, track student progress, Metrics/Performance parameters???

Comment: Page: 2
Issue: Dr. Myers and I discussed this topic before and don't believe that continuation training is supportable due to finite set of problems.

b. Logistics and Readiness. R & M info MST S/W problems will have a Mean Time to Diagnose (MTD) of less than 45 days. HSC/YA will be responsible for all S/W maintenance and will maintain the Configuration Management of the system. If a S/W problem is diagnosed, the system(s) will be taken off line to repair the S/W deficiency. ACC will be responsible for maintenance and configuration management for all MST hardware. However, HSC/YA must be coordinated with on all changes to hardware or system H/W configuration.

Comment: Page: 2
Issue: Need to examine whether the system's performance or the student's performance is being evaluated.

c. Critical System Characteristics.

Comment: Page: 2
Issue: Could be very difficult to establish these factors and assign numbers.

(1) Mandatory Characteristics. Certain number of problems (controlled by amount of space on Bernoulli) instead of a time requirement. Each MST tutor course will provide a total of 20-40 hours of instruction. For example, the engine maintenance courseware should provide the student with a certain number of problems related to advanced troubleshooting skills training in the area of engine maintenance. This amount of instruction has been shown to be an appropriate amount of instruction in the designated area to enhance the trainee's skill level. Pre-tests will be conducted and used to track the student's progress and to aid in formulation of the student model. The MST System will provide the capability for tracking the usage of the system by students. Bookmark capability will be included in the MST software. This will allow the student to discontinue training at a logical stopping point if other duties do not permit him the opportunity to finish an entire problem in one session at the tutor. State our MST Style Guidance requirements (or adherence criteria) and ACC defined H/W platform philosophy here.

Comment: Page: 2
Issue: While it is likely that this operational requirement can be achieved, it needs to be reworded to define characteristics of the software (e.g., quality, reliability, maintainability).

Comment: Page: 2
Issue: Tutor content is based on the number of problems collected during CTA. The amount of instruction measured in time units will be difficult to establish. Do we give the problem ... [1]

(2) Security. ACC will be responsible for security of the system under existing COMPUSEC regulations and guidelines.

Comment: Page: 2
Issue: Same as #1.

(3) Electronic Counter-Measures (ECCM). Not Applicable.

Comment: Page: 2
Issue: Same as #3.

(4) Software Development. HSC/YA will develop a software engineering and management structure to reduce the risk involved in the S/W development. Enhanced software maintainability and reliability will be planned for throughout the development.

Comment: Page: 2
Issue: This requirement is probably worded appropriately. We'll have to be careful about any statements concerning how often bookmarking may occur ... [2]

(a) The acquisition strategy and plan will reflect an integrated systems engineering approach and will include management action to ensure timely acquisition of quality software. Rapid S/W prototyping and incremental software development (evolutionary delivery software acquisition) techniques will be specified as well.

Comment: Page: 2
Issue: Need to reword. YA will establish appropriate structure to manage program and will require contractor to establish appropriate mechanisms to develop ... [3]

Comment: Page: 2
Issue: Need to define what this requirement really means in terms of the TRD. ... [4]

(b) Formal S/W capability evaluation ????

Comment: Page: 2
Issue: Need to reword. The tutor development delivery order contains provisions for prototyping of user interface. Other forms of rapid SV ... [5]

(c) Contractors and subcontractors will be required to provide S/W management indicators and status data. Statistical process procedures will be used to assure high levels of software management and quality.

Comment: Page: 3
Issue: Not required by current SOW. Do we really want it?
Reword to state that the contractor will ensure quality within his S/W development processes.

(d) The MST system will transition to Ada as much as practicable, taking full advantage of inherent Ada software engineering features.

Comment: Page: 3
Issue: Need to reword to reflect Ada waiver. Ada could be used but is not mandatory is waiver approved. Smalltalk and its efficiencies. Reuse. NDI.

(e) System Documentation and quality assurance requirements will be specified in accordance with DOD-STD 2167A and DOD-STD 2168. Tailoring will be accomplished to eliminate redundant or excessive documentation.

5. INTEGRATED LOGISTICS SUPPORT (ILS).

- a. **Maintenance Planning.**
- b. **Support Equipment.**
- c. **Human Systems Integration.**
- d. **Computer Resources.**
- e. **Supply Support.**
- f. **Technical Data.**
- g. **Facilities and Land.** Not Applicable.
- h. **Logistics Support Analysis (LSA).**
- i. **Hazardous Materials.** Not Applicable.
- j. **Computer-Aided Acquisition Logistics Support (CALs).**
- k. **Supporting Command Requirements.**

6. INFRASTRUCTURE SUPPORT AND INTEROPERABILITY.

- a. **Command, Control, Communications, and Intelligence.**
 - (1) **Frequency Allocation.**
 - (2) **Electromagnetic Compatibility.** Not Applicable.

(3) Frequency Assignment.

b. Transportation and Basing.

c. Standardization, Interoperability, and Commonality. Need to comment on tutor-common characteristics, reuse, etc.

d. Mapping, Charting, and Geodesy Support. Not Applicable.

e. Environmental Support. Not Applicable.

7. FORCE STRUCTURE.

8. SCHEDULE CONSIDERATIONS. VERY IMPORTANT.

Page 2: [1] Comment

MU

Page: 2

Issue: Tutor content is based on the number of problems collected during CTA. The amount of instruction measured in time units will be difficult to establish. Do we give the problems to multiple users to establish length of training? What happens if the tutor contains less than 20 hours or more than 40 hours of training?

Page 2: [2] Comment

MU

Page: 2

Issue: This requirement is probably worded appropriately. We'll have to be careful about any statements concerning how often bookmarking may occur. Where the bookmark data is stored may also be an issue? Storage on the Bernoulli will be faster but could fill up available space quickly.

Page 2: [3] Comment

MU

Page: 2

Issue: Need to reword. YA will establish appropriate structure to manage program and will require contractor to establish appropriate mechanisms to develop tutors.

Page 2: [4] Comment

MU

Page: 2

Issue: Need to define what this requirement really means in terms of the TRD.

Page 2: [5] Comment

MU

Page: 2

Issue: Need to reword. The tutor development delivery order contains provisions for prototyping of user interface. Other forms of rapid SW prototyping and incremental software development are not defined in SOW and TRD.