



2009 Maintenance Skills Competition Criteria Handbook

General Rules

To enter the *AMTSociety* Maintenance Skills Competition as a member of a team you must be a licensed A & P Mechanic involved in, and/or supporting aircraft maintenance functions at any organization, company or corporation. Also, any currently enrolled student in an authorized Part 147 school may enter. US Military Personnel involved in the aircraft maintenance field are also eligible. A Maintenance Skills Competition Enrollment Form must be filled out completely and signed. The form must also be returned with payment and a General Release of Liability Form for each participant. All forms can be mailed or faxed to: *AMTSociety*, 801 Cliff Road East, Suite 201, Burnsville, MN 55337 – Fax: (952) 894-8252.

The purpose of the *AMTSociety* Maintenance Skills Competition is twofold. First, it gives teams of AMTs, both licensed A & P Mechanics, student A & P Mechanics and US Military Personnel involved in the aircraft maintenance field the opportunity to test their combined and individual abilities against their peers. This competition will help enable the constant upgrading of the standards by which today's skilled AMTs hold themselves to. The second purpose is to showcase the knowledge, skill and integrity that each and every AMT, both current and future, possesses. Showcasing these cornerstones of the AMT craft and profession will help raise awareness of the training and skill needed for today's AMT to carry the great responsibility of providing safe, airworthy aircraft.

The *AMTSociety* Maintenance Skills Competition will consist of 12 planned events for the Team Competition.

Team Competition

Each Team will be given different events to complete at each stage of the competition. Team Members will compete at assigned events. The Coach, if applicable, may offer advice to any Team Member during any event at all stages of the competition, but he/she may not assist physically. Each Team Captain will inform the MSC Committee as to which Team Member will compete in which event no less than **20 minutes** prior to the start of the MSC. Each event will be given a specific time frame to be completed in. At the end of the time frame given, the Team Member is to stop and put down any tool or test equipment. If a Team Member finishes his/her event before the allotted time, he/she may assist any other Team Member still performing their event.

Each event will have at least one judge. Each event will be scored upon total time used to complete the event plus any discrepancies assessed in the form of time penalties. The combined times from all 12 planned events will determine a team's final score.

The team with the lowest total time will win the MSC Team Competition's 1st Place Award. The Team with the second lowest total time will win the 2nd Place Award, and the third lowest total time will win the 3rd Place Award. These awards which are wall mount plaques will be presented at 1100 at the *AMTSociety* MSC booth on March 12, 2009.

The *AMTSociety's* Maintenance Skills Competition Committee reserves the right to remove any Team Member(s) competing in the Maintenance Skills Competition for behavior and/or actions not promoting the craft and profession of today's skilled, professional AMT.

The *AMTSociety's* Maintenance Skills Competition Committee reserves the right to alter the structure of the Maintenance Skills Competition but not before informing all Team Member participants of such changes.

An orientation conference will be held with all Team Member participants who enter the proper entry forms prior to the start of the Maintenance Skills Competition. This conference will enable all participants to ask any questions directly to the judges of the respective events making up the Maintenance Skills Competition, as well as ask questions to the Maintenance Skills Competition Committee Members. This conference will take place on Monday, March 9, 2009 at a time and location within the Las Vegas Convention Center, yet to be determined and will be forwarded to each Team's point of contact when this information is made available.

Events – [Map of "The Hangar"](#)

The *AMTSociety* Maintenance Skills Team Competition events will consist of the following events:

Table 1: Charles E. Taylor Exam

This written test consists of 20 questions relating to Charles E. Taylor's life. All questions are multiple choice. All answers can be found in the autobiography on Taylor titled: "Charles E. Taylor 1868 – 1956 The Wright Brothers Mechanician" written by Howard R. DuFour with Peter J. Unitt. This book can be purchased through Wright State University. Visit <http://www.libraries.wright.edu/special/publications/>. A total of 20 minutes will be given to complete this event. Each wrong answer will have 3 minutes added to the final time used. The AMTA will provide a judge for this event.

NOTE: The biography of Charles E. Taylor is currently going through reprint. If the book is not available at the time you place your order, please contact Dawne Dewey at dawne.dewey@wright.edu. Dawn will take your information and put your name on a list to purchase the biography when copies become available.

Table 2: Gulfstream IV Main Wheel/Brake Event

This event will test each team's ability to display the skill and speed necessary in removing, inspecting and reinstalling a Gulfstream IV main wheel & brake assembly. All required tools and support equipment will be provided to safely accomplish this task. Criteria that will be looked at will include, but not be limited to, proper use of support equipment and tools, control of FOD, correctly reinstalling the brake and wheel assemblies. This event will be given 20 minutes to complete. Alberth Aviation will provide the judge for this event.

Table 3: Hardware Identification

This event will test each participant's skill and speed to identify commonly used aircraft hardware. Knowing and understanding the correct strength, metallic alloy and size of an approved piece of hardware and when and where such hardware can be used on an aircraft enables today's AMT to ensure a safe, airworthy aircraft. A magnet, thread pitch gauge, 6" scale, vernier caliper and bolt guide will be provided. Twenty pieces of hardware that will be required to be placed in the correct container may be chosen from, but not limited to, the list below. A total of 20 minutes will be given to complete this event. Embry-Riddle Aeronautical University will provide the judge for this event.

AN310-3	AN3H-6A	MS20426AD5-5	MS24693C274
AN310C4	AN502-416-25	MS21044C3	MS246948104

AN315-3	AN525-10R8	MS21046C3	MS27039-1-15
AN320-3	AN526-1032R12	MS21060-08	MS35207-265
AN320C3	AN526-1032R8	MS21060-3	MS35266-61
AN320C5	AN73-6	MS24665-136	MS51958-65
AN320C6	AN73A-27	MS24665-155	MS9556-10
AN320C7	AN960-10	MS20365-1032A	NAS1801-3-12
AN320C8	AN960-10L	MS20426AD3-12	NAS1802-3-12
AN3-6	AN970-4	MS21045-3	NAS1804-5
AN3-6A	AN970-5	MS24665-231	NAS603-12
AN3C-10A	MS20426AD6-8	MS24665-302	NAS6203-6D
AN3C-6	MS16996-12	MS24665-370	MS24665-22
AN3C-6A	MS20364-1032A	MS24665-379	MS24694-S50
AN3H-11	MS20392-2C13	MS24693-31	NAS1103-6
AN3H-6	MS20392-3C73	MS24693C26	

Table 4: Regulatory and Maintenance Technical Publication Research Event

This event will test each team's skill and speed in locating and correctly interpreting regulatory and maintenance information used in a typical inspection and return to service. AMTs will be given a series of questions to research and answer using ATP NavigatorV(R) software and digital libraries. A total of 20 minutes will be given to complete this event. ATP will provide the judge for this event.

Table 5: Composite Damage Inspection Event

This event will test each participant's skill and speed in identifying composite material damage. AMTs will be given a composite sandwich panel with hidden damage to inspect, using a provided tap hammer. AMTs will document their results/findings by constructing a damage map and determine the extent of the damage (in square inches) by utilizing the constructed damage map. With the extent of the damage identified, the AMT will then determine the panel's overall serviceability utilizing the supplied serviceability standards.

Equipment provided for this event are: composite sandwich panel containing hidden damage, composite tap hammer, clear plastic masking material, felt tip marking pen, blank paper panel map, electronic calculator, ruler, masking tape, reference materials (panel serviceability standards and "Aviation Mechanics Handbook", Dale Crane, ASA, most current edition.) Tarrant County College will provide the judge for this event. A total of 15 minutes will be given to complete this event. Tarrant County College will provide the judge for this event.

Table 6: Safety Wiring Event

This event will test each participant's skill and speed while accomplishing a series of safety wire patterns. Scores will be based upon the time it takes to complete as many of the patterns given, as well as the quality and safety of the work performed, such as but not limited to tautness of the safety wire, closeness and tightness of the pigtail to the securing hardware, and negative safety. (Reference FAR 43.13) The only tools which will be allowed and provided for this event are safety wire pliers, wire cutters, needle nose/duck bill pliers, and 32/1000 safety wire. A total of 20 minutes will be given to complete this event. Embry-Riddle Aeronautical University will provide the judge for this event.

Table 7: Aircraft Lighting Systems Troubleshooting Event

This event will test each team's expertise in analyzing and identifying aircraft lighting system circuit faults. The circuits will include Navigation lights, Strobe lights, and Landing lights. The team will be presented with six (6) separate lighting system faults. The faults will range from a simple light assembly failure to broken wires to faulty control units. The team will be judged on how quickly all six faults are identified. When a fault

is identified, the technician notes it on the discrepancy sheet and notifies the judge. The judge will immediately clear the fault and insert a new fault. When the sixth fault is identified, the judge will stop the clock and verify the discrepancy report. A penalty of five (5) additional minutes of time will be added for each miss-identified fault. A total of 20 minutes will be given to accomplish this event. Nida Corporation will provide the judge for this event. Digital multimeters, extra male & female connector pins, operational check sheets, and circuit diagrams will be provided. Teams may use their own multimeters if desired. ([Click here to view schematic.](#))

Table 8: APU 400 Hour Combustor Assembly Inspection

This event will test each participant's skill and speed while accomplishing a 400 hour combustor assembly inspection on a mock Honeywell GTCP36-100 (E) Auxiliary Power Unit using the provided [Honeywell Maintenance Manual](#), 49-21-59. Scores will be based upon the time it takes to complete the procedures outlined in the APU M/M to properly carry out the instructions in performing a 400 hour periodic combustor assembly inspection. A total of 20 minutes will be given to complete this event. Dallas Airmotive, Inc. will provide the judge(s) for this event. The judge(s) will not be interested primarily on how well the AMT inspects each of the combustor assembly components but rather how each AMT:

- 1) Follows the criteria of the [Maintenance Manual](#)
- 2) Disassemble the combustor assembly.
- 3) Properly identify each part that requires inspection by holding the part in view of the judge(s) and name the subject component.
- 4) Reassemble of the combustor assembly.
- 5) Re-installation of the combustor assembly.

Tools to be provided will be:

- 1) 1/4" drive shallow and deep-well sockets, 1/4" – 1/2".
- 2) 1/4" drive speed handle or ratchet.
- 3) Open and box end wrenches, 1/4" – 9/16".
- 4) Hand-held flashlight.
- 5) Everest Video Scope.

NOTE: The M/M reference states to use Figure 202 Section 49-20-04. For purposes of this event you are to use Table 201 Section 49-20-04.

Table 9: Electrical Troubleshooting Event

This event will test each team's ability to assemble a GPS/Nav Lighting circuit. Some of the criteria that will be looked at and judged, but not limited to, in this event will be that grounds are kept as short as practical and ensuring all grounds have proper metal – to – metal bond to aircraft structure. All single and multi-connector wiring is MIL Spec MIL-W-22759/16 and MIL-C-27500 or equivalent. All wire is 22AWG unless otherwise noted. Wiring is to be installed IAW AC 43.13-1B CHG 1 Chap 11 Sec 9-13 & 15. A total of 20 minutes will be given to accomplish this event. Spirit Avionics will provide the judge for this event. All necessary material and tools needed to assemble this simple circuit will be provided. (See attached schematic.) These tools will be, but not limited to, wire, connector, pins, crimpers, relay, and solder gun.

Table 10: Electrical Troubleshooting Event

This event will test each team's ability to troubleshoot aircraft component faults on a computer based format. The AMT will be given an aircraft system's wire diagram and given a particular discrepancy. The AMT will then determine what the fault is and "replace" the suspect component. For each component "replaced" a dollar value will be given for that part. The goal of this event is to display the skills needed to repair a given "squawk" with as little cost as possible in finding the damaged component. There will be anywhere from 14 to 20 different discrepancies to accomplish. Total time used and total dollar value of parts used to repair the

system will be used for the judging criteria. This event will be given 20 minutes to complete. CAE will provide the judge for this event.

Table 11: Flight Control Rigging Event

This event will test each team's ability to rig a cable system for a flight control surface to the proper surface position in reference to a wing surface. The example to be used for this event will be similar to a B737-300 aileron system. The AMT will be given a mock-up of an aileron system with reference materials. Items to be judged for, but not limited to are: safe tying of turn-buckles with safety pins and safety wire, use of rig pins and correct control cable tension. There will also be control cable inspection for potential defects such as, but not limited to wear, corrosion and kinks. A work sheet will be provided for documentation of required data for the rig, rig tension, control surface position, size and type of cable (stainless or steel), plus other required items for the rig such as identifying cable damage and if damage is within limits. Maintenance Manual references will be provided. A total of 20 minutes will be given to complete this event. Continental Airlines will provide a judge for this event.

Event #1: Cable Damage Identification

1. Determine serviceability of cables 1 – 5 using AMM 20-20-31.
2. Using provided form note if cable is serviceable or unserviceable and why.
Cable is 1/8” 7 X 19 tinned Mil Spec W-83420 Type 1 Comp A TZ
Use Caution when examining cables, they may have damage!
Inspection of the control cable wire rope:
3. Perform a detailed visual inspection of the cable runs for incorrect routing, kinks in the wire rope, or other damage.
 - (a) Replace the cable assembly if:
 - 1) The individual wires in a strand appear to blend together (outer wires worn 40 to 50 percent) (Fig. 601).
 - 2) If a kink is found.
 - 3) If corrosion is found.
4. Perform a detailed visual inspection of the cable. To do a check for broken wires, rub a cloth along the cable. The cloth will identify broken wires by catching on them.
 - (a) Replace the 7 X 7 cable assembly if:
 - 1) There is two or more broken wires in 12 continuous inches of cable.
 - 2) There is three or more broken wires anywhere in the total cable assembly.
 - (b) Replace the 7 X 19 cable assembly if:
 - 1) There is four or more broken wires in 12 continuous inches of cable.
 - 2) There is six or more broken wires anywhere in the total cable assembly.

Event #2: Cable Rigging Event

TURNOVER: All damaged cables are replaced and routed properly and Part Numbers verified.

1. Continue cable installation from step 5. D. Ref. AMM 27-10-605.
2. Safety one turn barrel using pin method and one turn barrel using safety wire Ref. MM (Alternate method). {Brass safety wire will be used in place of stainless steel.}
3. Adjust aileron using MM.
4. “Do Not Operate” tags must be attached to control wheel during maintenance action, and removed after completion. (3 minutes added if not performed.)

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Current temperature is 70 degrees Fahrenheit.
Aircraft has been in a climate controlled hangar for 12 hours.

Aircraft should be ready for test flight when you are finished.
After successful rigging all flight tests pass.
All steps should be followed; missing steps will have time penalties.
Inspection required at steps noted in AMM – Cable Adjustment steps 11., 12. and 13. / Aileron Adjustment steps 8., 9. and 10.
Perform tool inventory upon completion, shadow board style.
Aileron Cable Replacement AMM 27-10-605 (Ref. Figure 101)

1. Install “DO NOT OPERAE” tag on control column.
2. Center Aileron Control wheel.
3. Install rig pins R-1 and R-2.
4. Install cable blocks to isolate cable to be replaced.
5. Replace cable.
 - A. Remove required pulleys.
 - B. Remove cable.
 - C. Route new cable as required.
 - D. Connect cables with turnbuckle.

6. Remove cable blocks.
7. Remove rig pins R-1 and R-2.
8. Tension cable to 2 times rig load. (Ref. table 501)
NOTE: !!! Not required if using pre-stretched cable.!!!
9. Rig per AMM 27-10-108

Special tools required: Provided by Continental Airlines.

Rig pins R-1 and R-2
Trammel bar T-56
6 inch scale
0 – 10 lb. push pull scale
Tensiometer 0 – 200 lb.
Cable blocks
Basic hand tools
.032 safety wire
Turnbuckle safety clips

Table 12: Turbine Engine Troubleshooting Events:

These two events will test each team's combined skill and speed while accomplishing an engine driven hydraulic pump removal and installation and a front accessory removal and installation on a JT8D-219 engine. All four team members will participate together and the team's Coach may participate as they do in the other MSC events. A total of 30 minutes will be given to perform both events together. Tools necessary to perform each event will be provided; as will the maintenance manual references which will be used to judge each event. American Airlines will provide the judges for both events.

Event #1: JT8D-219 Turbine Engine Driven Hydraulic Pump Removal and Installation Event ([Click here to view schematic](#))

Remove Pump:

1. The AMT's accomplishing this event must first inform the judge that they have pulled and collared the appropriate circuit breakers before beginning the removal of the hydraulic pump. Failure to make mention of this action will result in a penalty of 3 minutes.
2. The AMT's accomplishing this event will then inform the judge that they have closed the appropriate fire shutoff valve by pulling the fire control handle, located above the center instrument panel in the flight compartment, straight out to full aft position. Failure to make mention of this action will result in a penalty of 3 minutes.
3. The AMT's accomplishing this event will then place the main gear door ground maintenance bypass lever in the bypass position and open the main gear doors and install safety locks. After the installation of the main gear door locks the AMT's will inform the judge that they have depressurized the appropriate hydraulic system. Failure to make mention of this action will result in a penalty of 3 minutes.
4. Remove (if necessary) fire detector unit from engine.
5. Disconnect unloading valve and depressurization valve electrical connectors from pump.
6. Disconnect suction, pressure and case drain hoses from pump. Cap or plug open hoses.
7. Remove 2 safety screws and mounting clamp and remove pump.
8. Inspect the pump shaft to ensure that it is not sheared. If it is not sheared continue with the removal and installation process. Inform the judge of the condition of the pump shaft.

Install Pump:

1. Install "new" pump on mounting flange so that safety screw holes align and case drain hose connection is at approximately 45 degrees outboard of top center of pump; install mounting clamp but do not tighten.
2. Install and tighten 2 safety screws to 55 to 60 inch-pounds torque.
3. Tighten mounting clamp and torque to 50 to 60 inch-pounds.
4. Connect pressure, suction and case drain hoses to pump.
5. Connect unloading valve and depressurization valve electrical connectors; safety with 0.020 inch corrosion-resistant steel lockwire.
6. Install fire detector unit (if removed) on engine.
7. The AMT's accomplishing this event will next inform the judge that they have opened the appropriate fire shutoff valve in the flight compartment, fire control handle full forward position. Failure to mention this step will result in a 3 minute penalty.
8. The AMT's accomplishing this event will next inform the judge that they have removed the circuit breaker collars and closed the appropriate circuit breakers. Failure to mention this step will result in a 3 minute penalty.

9. The AMT's accomplishing this event will next inform the judge that they have removed the main gear door locks, closed the main gear door maintenance bypass lever and closed the main gear doors. This will signify that the AMT's are finished with this event. Failure to mention this step will result in a 3 minute penalty.

Note: It is assumed that the starting of the appropriate engine for the leak and ops. Check of the "replacement" hydraulic pump is successful.

Event #2: JT8D-219 Turbine Engine N1 Tachometer Generator Removal and Installation Event ([Click here to view schematic](#))

Remove N1 Tachometer:

1. The AMT's accomplishing this event must first inform the judge that they have pulled and collared the appropriate circuit breakers and tagged the appropriate throttle/thrust reverser lever "Do Not Use" before beginning the removal of the N1 tachometer generator. Failure to make mention of this action will result in a penalty of 3 minutes.
2. The AMT's accomplishing this event will then inform the judge that they have placed the appropriate thrust reverser control valve in the dump position and installed the safety pin. Failure to make mention of this action will result in a penalty of 3 minutes.
3. The AMT's accomplishing this event will then place a protective blanket inside the nose cowl to prevent damage to the perforated skin. Failure to make mention of this action will result in a penalty of 3 minutes.
4. Remove Nose Bullet (Refer to Figure 1).
 - A. Loosen captive self-locking nuts which attach inlet bullet to engine inlet accessory drive case.
 - B. Carefully pull bullet forward to disengage Pt2 fitting and remove bullet.
 - C. Place bullet on protective pad to prevent damage to Pt2 fitting. Retain inlet accessory drive case O-ring.
5. Remove N1 Tachometer Generator
 - A. Disconnect N1 tachometer generator electrical connector.
 - B. Remove N1 tachometer generator and place on place on table. Retain generator mount pad gasket.
6. Install N1 Tachometer Generator
 - A. Install old gasket on mounting pad.
 - B. Position generator on mounting pad studs, and install washers and nuts. Torque nuts to 50 to 70 inch pounds.
 - C. Connect electrical connector to tachometer generator. Safety connector with 0.20 corrosion resistant steel lockwire.

NOTE: Connector is properly installed when no relative motion exists between backshell and coupling ring.

7. Install Inlet Bullet (Refer to Figure 1)
 - A. Inspect Pt2 fitting O-rings for damage. If no damage is noted reuse O-rings. If damage is noted inform judge and continue to reuse O-ring.
 - B. Inspect old inlet accessory drive case O-ring for damage. If damage is noted inform judge and continue to reuse O-ring.
 - C. Position inlet bullet on inlet accessory drive case, carefully align Pt2 fittings and push bullet aft.
 - D. Tighten captive self-locking nuts to a torque of 100-140 inch pounds.
8. The AMT's accomplishing this event will next remove the protective mat from the engine inlet. Failure to accomplish this step will result in a penalty of 3 minutes.
9. The AMT's accomplishing this event will next inform the judge that they have unstowed the appropriate thrust reverser control valve by removing the lock out pin and securing the pin. Failure to mention this step will result in a 3 minute penalty.
10. The AMT's accomplishing this event will next inform the judge that they have removed the circuit breaker collars and closed the appropriate circuit breakers and removed the Do Not Use tag from the appropriate throttle/thrust reverser lever. This will signify that the AMT's are finished with this event. Failure to mention this step will result in a 3 minute penalty.

Note: It is assumed that the starting of the appropriate engine for the leak and ops. Check of the "replacement" N1 Tachometer Generator is successful.