Equipment Technician

Purpose and Standards

The purpose of establishing an Equipment Technician contest for the California Association of Future Farmers of America (FFA) is to foster the development of technical skills and knowledge among students in the field of agricultural mechanics. This contest aims to:

1. **Enhance Practical Skills**: Provide hands-on learning opportunities that enhance students' proficiency in diagnosing, repairing, and maintaining agricultural equipment.
2. **Promote Career Readiness**: Equip students with industry-relevant skills that prepare them for successful careers in agricultural mechanics and related fields.
3. **Encourage Innovation**: Inspire innovative thinking and problem-solving abilities through real-world applications and challenges.
4. **Strengthen Industry Connections**: Build strong connections between students, educators, and industry professionals to facilitate mentorship, internships, and job placements.
5. **Highlight the Importance of Agricultural Mechanics**: Raise awareness about the critical role of agricultural equipment technicians in ensuring the efficiency and productivity of the agricultural sector.
6. **Foster Teamwork and Leadership**: Encourage teamwork, leadership, and communication skills by engaging students in collaborative projects and competitions.
7. **Recognize Excellence**: Acknowledge and reward outstanding student achievements and technical expertise in agricultural mechanics.

Foundation Standards: Mathematics Algebra 10, 12, 13, 15 and Geometry 8, 10, 11, Listening and Speaking 1.8, 2.3, Technology 4.1, 4.2, 4.6, Problem Solving and Critical Thinking 5.1, 5.2, 5.3, Health and Safety 6.2, 6.4, 6.5, Ethics and Legal Responsibilities 8.3, Leadership and Teamwork 9.1, 9.2, 9.3.

Ag Mechanics Pathway Standards: Safety B 1.0, Engines and Machinery B 10.0, B11.0.

Contestants

The contest team will be made up of three or four members. The scores of the three highest team members shall be used for the team score. All team members are eligible for individual awards. Each member will compete in Identification, Theory, Pre-Delivery Inspection & Technical Skill areas. The top ten teams based on the combined scores of Identifications, Theory, PDI and Technical Skill areas, will compete in the team Troubleshooting activity.

Classes

|  |  |  |
| --- | --- | --- |
| **Class** | **Individual Points**  | **Team Points** |
| Identification | 50 | 150 |
| Theory Test | 100 | 300 |
| Pre-Delivery Inspection (PDI) | 100 | 300 |
| Technical Skills | 200 | 600 |
| Troubleshooting |  | 500 |
| Total | 450 | 1850 |

Tiebreaker

1. Individual and team ties will be broken by individual’s/team’s scores on technical skills test.
2. If a tie persists it will be broken by score on theory test.
3. If a tie persists it will be broken by score on Pre-Delivery Inspection.
4. If a tie persists it will be broken by score on identification test.
5. If a tie persists it will be broken by team troubleshooting score.

Ties in the individual sub-contests will be broken by the highest individual overall score. Team sub-contests will be broken by the highest overall team score. Sub-contest Awards

Sub-contest Awards

Sub-contest ribbons will be awarded to the top five individuals and teams in Identification, Theory Test, Pre-Delivery Inspection and Technical Skills, as well as the top five teams in Troubleshooting.

Requirements of the Host Institution

The sponsoring institution will indicate the equipment brand, model and type to be used, and provide all service publications and scoring rubrics for troubleshooting by January 1 prior to state finals.

Rules

The contest is made up of the following areas:

1. IDENTIFICATION (Time: 30 minutes-50 points Maximum-50 items)
	1. Identification of engine parts, tools, electrical components, hydraulic components, and machine parts. 50 items at 1 point each (50 points). Names of parts will be based on the current year’s troubleshooting machines manufacturer.
2. THEORY (Time: 30 minutes-100 points Maximum-50 questions)
	1. Test questions will be derived from the following Reference Materials:
		1. Diesel Engine Technology by Mack, Daniels, Dehart, Norman G-W Publisher
		2. Heavy Equipment Power Trains & Systems by Timothy Dell G-W Publisher
		3. Hydraulic Systems for Mobile Equipment by Timothy Dell G-W Publisher
	2. The questions on this test will be theoretical in nature and will not include any references to exact equipment specifications that should be looked up in technical manual.
	3. A copy of the current year’s written test will be provided to coaches at the conclusion of the State Finals Contest.
3. PRE-DELIVERY INSPECTION (PDI): (Time: 60 minutes) (100 points)
	1. Pre-Delivery Inspection tests the contestants’ ability to inspect Tractors, Implements, or Machinery and determine maintenance needs, adjustment problems, and visible faults and safety hazards. Common and visible faults are to be used. Implements may be set on the ground, in transport position, or in working field position.
	2. The host institution will select four of the following pieces of equipment to be used on the day of the contest:
		1. Skid Steer Loader
		2. Agricultural Tractor
		3. Wheel Loader
		4. Swather (Windrower)
		5. Harvest Equipment (Forage, Grapes, Cotton, Nuts)
		6. Combine
		7. Excavator
		8. Backhoe Loader
		9. Tree Shaker
		10. Track Type Tractor/Bulldozer
		11. Telehandler
		12. Lift Truck (Forklift)
		13. Motor Grader
	3. A sample PDI form will be provided in Appendix II.
	4. The PDI exam forms may be True/False or Multiple Choice.
* Please note that PDI test forms will be equipment specific.
1. TECHNICAL SKILLS: (Time: 60 minutes) (200 points)
	1. Technical Skills shall be made up with a minimum of 5 and no more than 20 “hands-on” skill Stations.
	2. **Competitors will need to be equipped with the following:**
		1. Digital Multimeter
		2. Safety Glasses
		3. Tape Measure
	3. Each station will be equipped with the following:
		1. The specific components needed for the exercise.
		2. Tools needed to perform the task at the station except for a digital multimeter (Individual contestants must provide their own)
		3. Technical manual pages and reference sheets.
		4. A list of all specifications needed to complete the exercise.
	4. Examples of “hands-on” exercises for Technical Skills are, but not limited to:
		1. Using a micrometer.
		2. Using a hole gauge and micrometer--measure valve guides, connecting rod journals, piston pin journals.
		3. Using a Dial Bore Gauge
		4. Using a dial indicator
		5. Using a feeler gauge.
		6. Using a Battery Load Tester
		7. From displays of tools select those items needed for: removing and installing bearings; testing hydraulic pumps, disassembling electrical connectors, etc.
		8. From displays of engine components: identify correctly assembled connecting rods and caps, Turbos, emission system components, etc.
		9. Use of a billing statement and the calculations involved for parts and labor.
		10. Use of a digital multimeter to measure voltage, voltage drops, & resistance
		11. Interpreting Schematics (Hydraulic & Electrical)
		12. Use of specialty diagnostic tools such as a flowmeter, pressure gauges, tachometer
2. TROUBLESHOOTING (500 points possible awarded to the team and no individual points to be awarded).
	1. Top 10 teams from Theory Test, Identification, Pre-Delivery Inspection, and Technical Skills will be allowed to move onto the team Troubleshooting portion of the contest.
	2. Teams will then have a 30 minute “Diagnostic Period” as a group to analyze and review Repair Request on equipment in need of repair. Students will have access to all technical materials needed to plan a path to repair.
	3. The equipment used for troubleshooting will be announced by January 1st prior to the contest each year.
	4. At the conclusion of the diagnostic period, students will have 1 hour to make repairs and complete reports. All documents must be submitted within the 1-hour time limit.
	5. Once repairs are made, teams are to operate equipment on the “equipment operation course” within the 1-hour repair period. See equipment operation scoring in Appendix II. Failure to operate equipment within 1 hour time limit will result in a zero scored in the equipment operation section of the judges scored card. Equipment operation course layout will be presented to teams prior to the start of troubleshooting.
	6. Scoring for troubleshooting will be based on the following:
		1. Repair Request Sheet
		2. Safety
		3. Tools and Parts
		4. Pre-Operational Inspection
		5. Repair Methods
		6. Equipment Operation
		7. Completed Work order to be turned into the judge.
3. TOOLS – Each team’s toolbox should include tools commonly used in the repair and maintenance of Heavy Equipment - NO BATTERY OR AIR POWERED TOOLS
	1. Suggested Tools: (refer to current year’s Equipment)
		1. 3/8” socket set Metric M8-M24
		2. 3/8” socket set SAE 1/4 to 1 ¼”
		3. 1/2” socket set Metric M8-M24
		4. 1/2” socket set SAE 1/4" to 1 ¼”
		5. ¼” Drive Socket Set – SAE and Metric
		6. 2 - SAE wrench sets – 1/4 to 1 ¼”
		7. 2 - Metric wrench sets –M8-M24
		8. Tubing wrenches
		9. Flex handle ratchet- 1/2" drive
		10. Extensions
		11. Ratchet - 3/8” & ½” drive
		12. Allen wrench socket set – Metric and SAE
		13. Ball Peen Hammer
		14. Drift and Pin punch set
		15. Brass Drift Punch
		16. Calculator
		17. Container to drain fuel and/or oil into
		18. Flashlight
		19. Flat feeler gauge set
		20. Torque wrenches – Foot-lb and Inch-lb
		21. Pliers set
		22. Pencil
		23. Safety Glasses (1 pair per member)
		24. Soft faced mallet or dead blow hammer
		25. Oil Filter Wrench
		26. Sockets, Torx – 3/8" drive - T-15, T-20 and T-30
		27. Wire Stripper
		28. Wire Crimper
		29. Rags
		30. Diagonal Cutter
		31. Funnels
		32. Liquid-filled 0-5,000 psi / 0-35,000 kPa dual-scale dial gauges Flow Meter
		33. O-ring Pick Set
		34. Pry Bars – Angled and Rolling Head

APPENDIX I-Repair Request, Work Order, Troubleshooting Score Card

Equipment Technician Contest

Repair Request

|  |  |  |
| --- | --- | --- |
| Team: | Customer Name: | Serial: |
| Type of Equipment: | Equipment Brand: | Equipment Model: |

Customer Comments/Reason for Service

|  |
| --- |
| **The following is a sample scenario of an example repair request that could be used in a contest:***The customer brought in his Massey Ferguson 4710 tractor, explaining that he couldn’t get it to start. He mentioned that he tried turning the key multiple times, but the engine wouldn’t even crank, almost like there was no power getting through. He said, "It just doesn’t want to turn over at all. I checked the battery and fuses, and they seem fine, but it still won’t start." He also noted that this issue came out of nowhere and left him stranded in the field.**In addition, the customer reported that the PTO was constantly running, even when the switch was turned off. He expressed concern, saying, "The PTO just stays on, and I’m worried it could cause more damage if I keep using it." Lastly, he mentioned that the 3-point hitch wasn’t responding, stating, "It’s like it’s stuck or something. I can’t lift or lower it, no matter how much I mess with the controls." He emphasized that these issues had made the tractor completely unusable and needed fixing urgently.* |

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| --- |
| Identification of Repairs Needed: (25 points possible)1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| Suspected Faulty Components-List Error Codes Below: (125 points possible) 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**California Equipment Technician Contest Work Order**

**(Must be turned into the judge within the one-hour time limit.)**

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| --- | --- | --- | --- | --- |
| **Team Name** |  |  | **Judge’s Name** |  |
|  |  |  |  |  |
|  |  |  |  | **Judges Use Only!** |
| Machine Make | Machine Number | Machine Model |  | Possible | Awarded |
| Serial # | Hour Meter  | Machine Type | 10 pts |  |
| **Pre-Operation Checks**: Circle one (2 pts ea.) |  |  |  |
| 1. **Oil Level OK Needs Attention**
 |
| 1. **Fuel Level OK Needs Attention**
 |
| 1. **Coolant Level OK Needs Attention**
 |
| 1. **Hydraulic Level OK Needs Attention**
 |
| 1. **Safety Equipment/ROPS OK Needs Attention**
 |
| 1. **Tires/Tracks OK Needs Attention**
 |  | 12 pts |  |
| **Work Performed:** List each task performed  |  | 50pts |  |
| **Labor Description** |
|  |
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|  |
| **Part #** | **Description** | **Qty.** | **Unit Price** | **Total Price** |  | 20 pts |  |
|  |  |  |  |  |
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|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Parts Total & Tax calculated from actual Parts Ordered | **Parts Total** |  |  | Math Check Only8 pts |  |
| **Tax (8%)** |  |  |
| Labor Charge is $125.00 per hour/technician for work performed. | **Labor Total** |  |  |
|  | **Grand Total** |  |  |
| If any portion is not legible, no points will be awarded.  |  |  |  |
| Judge’s Signature:**Total Team Points Awarded** |  | 100 pts |  |

|  **Equipment Technician Troubleshooting Score Sheet** |
| --- |
|  Team Name: |  Judge’s Name: | Possible | Earned |
|  **Points in these categories are variable**  |
|  **Safety** – Deduct 1 point for each infraction up to the maximum points in each line item. |
| 1. Wipes up oil and fuel spills as they occur
 | 0 to 5 |  |
| 1. Maintains safe work practices
 | 0 to 5 |  |
| 1. Each member wears safety glasses at all times
 | 0 to 5 |  |
| **Total** | **15** |  |
|  **Tools and Parts – Deduct 1 point for each infraction up to the maximum points in each line item.** |
| a. Uses proper tool for the job  | 5 |  |
| b. Mishandling parts – (Parts kept clean, organized, emphasis on contamination control, etc.)  | 5 |  |
| c. Parts and Hardware installed correctly  | 5 |  |
| d. Uses proper torque specifications and patterns | 5 |  |
| **Total** | **20** |  |
|  **Pre-Operational Inspection (Points are all or nothing in this category. NOTE: Steps “a” through “f” can be done in any order.)** |
| a. Checks for proper oil level | 5 |  |
| b. Checks Fuel Level | 5 |  |
| c. Checks Coolant Level  | 5 |  |
| d. Checks Hydraulic Oil Level  | 5 |  |
| e. Inspects R.O.P.S and Safety Equipment (Guards and Shields) | 5 |  |
| f. Checks Tires/Tracks e. Customer Complaint Verified (Tried to start the engine to verify the complaint prior to making repairs.) | 5 |  |
| **Total** | **30** |  |
| **Repair Method: Each fault, service work order/ owner operator statement & recommended service shall be communicated to judge. Please see “Repair Method Rubric” for judges scoring details.** | **Circle Pts** |  |
| **Fault #1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Repair Request/Customer Statement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Recommended Service Procedure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Judges’ Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  **30****20****10****0****NA** |  |
| **Fault #2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Repair Request/Customer Statement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Recommended Service Procedure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Judges’ Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  **30****20****10****0****NA** |  |
| **Fault #3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Repair Request/Customer Statement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Recommended Service Procedure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Judges’ Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  **30****20****10****0****NA** |  |
| **Fault #4: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Repair Request/Customer Statement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Recommended Service Procedure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Judges’ Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  **30****20****10****0****NA** |  |
| **Fault #5: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **Repair Request/Customer Statement: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Recommended Service Procedure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****Judges’ Comments: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  **30****20****10****0****NA** |  |
| **Equipment Operation: Equipment must be moving within repair time limit. Please see “Tractor Operation Rubric” for scoring details.** | **Circle** |  |
| **Noted Equipment Operating/Safety Infractions****1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_****3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **35****25****15****0** |  |
| **Troubleshooting Repair Total** |  |  |

**Troubleshooting Total Score**

Repair Request: \_\_\_/150

Troubleshooting Repair Scoresheet: \_\_\_/250

Team Work Order: \_\_\_/100

**Troubleshooting Grand Total:** \_\_\_/500

APPENDIX II-Sample Rubrics/PDI

1. The Rubrics for scoring the team portion of the contest will be sent out to teams on January prior to state finals of that year.
	1. Below is a sample of how the rubrics will be set up for judging of Troubleshooting/Team Events.
	2. A Sample PDI is provided below.
2. Repair Method Scoring
	1. 30 pts- Used appropriate tools/equipment, systematic procedure, good workmanship, and malfunction is corrected.
	2. 20 pts- Used inappropriate tools/equipment, did not follow systematic procedure (skipping steps or troubleshooting procedures), or malfunction partially corrected.
	3. 10 pts- Used inappropriate tools/equipment, trial and error approach used, and malfunction is partially corrected.
	4. 0 pts- Malfunction was not located and/or not corrected.
	5. Faults marked “NA” (no fault) will receive full credit for each fault
3. Equipment Operation Scoring
	1. 35 pts- No safety or operation errors noted
	2. 25 pts- One safety error is noted
	3. 15 pts- Two safety errors are noted
	4. 0 pts- 3 or more safety errors noted or does not operate
		1. Errors and safety guidelines shall arise from the following operation procedures.
			1. The operator shall be in the seat of the tractor/equipment when attempting to start the engine.
			2. The transmission controller shall be placed in neutral or park and the clutch disengaged before attempting to start the engine.
			3. The operator shall assure that all team members are in a clear, safe position prior to engaging the starter motor or attempting to start the engine.
			4. The starter motor shall not be engaged for over 30 seconds at a time. If the starter motor is engaged for over 30 seconds, a minimum of 1 minute cool down period shall be allowed before it is engaged again.
			5. All actions taken during testing, adjusting, repair, and operation of the tractor/equipment shall be completed in a prudent manner and in compliance with the manufacturer’s recommendations.
			6. All guards, shields, cowlings, etc. removed from the tractor for repair must be reinstalled before tractor can be driven.
			7. The operator shall wear the seat belt during the test drive.
			8. Flashers and running lights shall be on when the tractor/equipment is being driven on test course.
			9. Tractor motion shall be started smoothly by releasing the clutch in a slow, smooth manner.
			10. The appropriate gear and r.p.m. for driving the test course will be announced and the tractor shall be operated in or below the designated gear and at or below the designated r.p.m.
			11. The operator shall not enter the test course unless a safe distance is available ahead of an approaching tractor. Tractors on the test course have right-of-way.
			12. The tractor shall be driven in a safe manner, and a safe following distance of at least three (3) tractor lengths shall be maintained if following a tractor on the test course.
			13. The operator shall not pass another tractor on test course, unless instructed to do so by the event traffic director. If a tractor is operating poorly and/or not maintaining appropriate speed, the event traffic director may permit faster traveling tractors to pass the slow-moving tractor.
			14. Upon completion of the test drive, the tractor shall be stopped in a smooth manner, gearshift placed in neutral or park position, brakes set, tractor key turned off, and the operator shall dismount in a safe manner.

Pre-Delivery Inspection

|  |  |
| --- | --- |
| Equipment | Skid Steer Loader |
| Model | 246C |

Answer (A) for true, (B) for false

1. All lights are in operable order
2. Bucket blade bolts are loose, damaged, or missing.
3. Hydraulic fluid is in operable level and condition
4. No warning lights are present
5. Insufficient amount of DEF
6. Tires and/or tracks are in operable condition
7. Battery terminals show signs of corrosion
8. Battery disconnect is in the off position
9. Undercarriage is free of debris
10. All covers and guards are in place
11. Radiator is free and clear of debris
12. Condenser is free and clear of debris
13. Tilt cylinders show signs of hydraulic leakage
14. Lift cylinders show no signs of hydraulic leakage
15. All grease zerks are clean and free of dirt and debris
16. Oil leaks present within engine compartment
17. Safety decals are present and legible
18. Engine oil within operable levels
19. Attachments are correctly attached
20. High side and Low Side AC service caps installed
21. Air filter is missing
22. Safety bar is in operable order
23. Lift arm support is not present on the machine
24. Hydraulic hoses are free of damage
25. Lift cylinder controls are in proper operation