PRAG 304L: Electrical Diagnostics for Farm Machinery Lab
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Lab 5: 12 V Battery tests for Tractors and Vehicles using a Multimeter and Battery Testers

1. Overview

Students will perform tests on vehicle batteries using appropriate tools and specifications. The goal is to determine whether the batteries meet operational standards or require servicing or replacement.

2. Objectives

- Learn Tool Usage: Understand and use diagnostic tools for battery testing.
- Battery Testing: Conduct diagnostic tests to evaluate battery health.
- Field Diagnosis: Develop practical skills to diagnose batteries with minimal tools.

3. Materials and Equipment

- **Multimeters**
- **Battery Load testers** (Digital ones and Analog one)
- Safety gloves and goggles
- Notebook or digital device for recording results
- Two John Deere Gators XUV835M
- Two Bobcat tractors UV34
- Two batteries on the table

4. Procedure

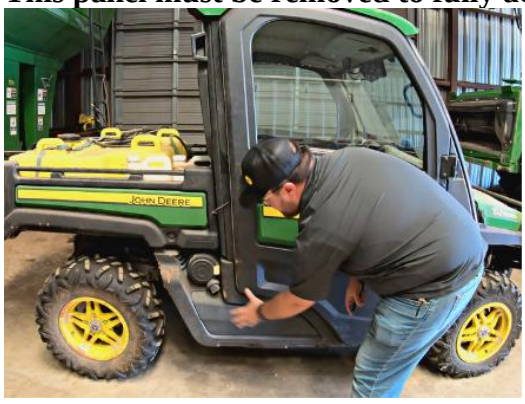
Step 1: Safety Preparation

1. Wear safety gloves and goggles.
2. Ensure the workspace is free from flammable materials.
3. Verify that tools are functioning properly.

Step 2: Battery Access

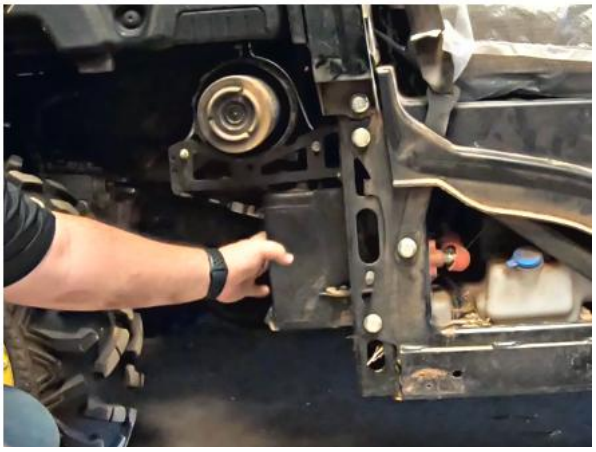
1. **JD XUV835M can be accessed from the passenger side.**

- **Locate the Battery**
  1) **The battery is on the passenger side of the John Deere UXV 835M Gator, behind a gray panel.**
  2) **This panel must be removed to fully access the battery.**



- **Remove the part of the Panel**
  1) **Push down the tab under the filter housing to remove the inner panel**
- **Access the Battery**

1) **With the panel removed, the battery is now visible.**
2) **Set the panel in a safe place for reinstallation.**



Watch video: https://youtu.be/nM4FrU6eINs?si=zDMDvKxxZdS5DmX5

2. **Bobcat XU34 can be accessed under passenger seat.**

- **Watch video:** https://www.youtube.com/watch?v=Ccc8unEuw7w

Step 2: Battery Inspection

1. Visually inspect the battery and record for physical damage, corrosion, or leaks, if possible.
2. Record the battery's specifications (e.g., nominal voltage, Ah, Type, CCA), if possible.

Step 3: Voltage Testing with a Multimeter

1. Set a multimeter to 20 V DC
2. Measure the Voltage at the terminals and record it in the sheet.

Step 4: Vehicle Battery (#1-#4) Testing with a Multimeter

1. Connect the digital load tester to the battery terminals.

Step 5: Vehicle Battery (#1-#4) Testing with a Digital Battery Tester

1. Connect the digital battery tester to the battery terminals.
2. Select Battery on the screen.
3. Select In-Vehicle.
4. Select Standard Test.
5. Select correct Battery Type.
6. Select Input Standard as CCA (Cold Cranking Ampere).
7. Set CCC according to battery label.
8. Select before/after charging based on situation.
9. Record SOH, Voltage, CCA, and Power.
10. Document findings and propose a diagnosis.

5. Evaluation Criteria

1. **Accuracy in using diagnostic tools.**

2. **Ability to interpret test results against specifications.**
3. **Proper documentation of findings and recommendations.**

6. Data Recording Template

#1 Vehicle Test Parameter	Measured Value	Specification	Pass/Fail
Voltage at the Terminals (Multimeter)		**12 V**	
SOH (State of Health) (Battery tester)		**50%**	
Voltage at the Terminals (Battery tester)		**12 V**	
CCA (Battery tester)		**200 CCA**	
Power		**50%**	
Comments: inspection, CCA, Ah, type, CCA, etc.			

#2 Vehicle Test Parameter	Measured Value	Specification	Pass/Fail
Voltage at the Terminals (Multimeter)		**12 V**	
SOH (State of Health) (Battery tester)		**50%**	
Voltage at the Terminals (Battery tester)		**12 V**	
CCA (Battery tester)		**200 CCA**	
Power		**50%**	
Comments: inspection, CCA, Ah, type, CCA, etc.			

#3 Vehicle Test Parameter	Measured Value	Specification	Pass/Fail
Voltage at the Terminals (Multimeter)		**12 V**	
SOH (State of Health) (Battery tester)		**50%**	
Voltage at the Terminals (Battery tester)		**12 V**	

#3 Vehicle Test Parameter	Measured Value	Specification	Pass/Fail
CCA (Battery tester)		**200 CCA**	
Power		**50%**	
Comments: inspection, CCA, Ah, type, CCA, etc.			

#4 Vehicle Test Parameter	Measured Value	Specification	Pass/Fail
Voltage at the Terminals (Multimeter)		**12 V**	
SOH (State of Health) (Battery tester)		**50%**	
Voltage at the Terminals (Battery tester)		**12 V**	
CCA (Battery tester)		**200 CCA**	
Power		**50%**	
Comments: inspection, CCA, Ah, type, CCA, etc.			

# Station Test Parameter	Measured Value	Specification	Pass/Fail
Voltage at the Terminals (Multimeter)		**12 V**	
SOH (State of Health) (Battery tester)		**50%**	
Voltage at the Terminals (Battery tester)		**12 V**	
CCA (Battery tester)		**200 CCA**	
Power		**50%**	
Analog battery test results (100 A only):			
Electrolyte level:			
Comments: inspection, CCA, Ah, type, CCA, etc.			

7. Post-Lab Discussion

- **Discuss challenges faced during field diagnosis with limited tools.**
- **Compare results with peers to identify discrepancies and potential errors.**