



Chapter 03: Maintenance Operations

05. Unscheduled Repair and Troubleshooting

Diagnose and repair unscheduled maintenance issues to restore aircraft to airworthy condition efficiently and safely.

Purpose

Establish systematic procedures for diagnosing, troubleshooting, and repairing unscheduled maintenance issues that arise during aircraft operations. This process ensures rapid problem resolution while maintaining safety standards and regulatory compliance throughout the repair process.

Roles and Responsibilities

Client Service Representative:

- Manage client communications and service requests
- Process documentation and billing
- Obtain client authorizations and approvals
- Coordinate scheduling and aircraft availability
- Maintain professional client relationships

Process Steps

Initial Problem Assessment

- **Document reported problem** - Record detailed description of reported malfunction, symptoms, and operational circumstances when problem occurred
- **Conduct preliminary inspection** - Perform visual examination of affected systems and components to identify obvious problems or safety concerns
- **Review aircraft maintenance history** - Examine previous maintenance records for similar problems, recent work, or recurring issues affecting current malfunction
- **Establish safety priorities** - Determine if problem affects flight safety and establish appropriate precautions for troubleshooting activities

Systematic Troubleshooting Process

- **Research troubleshooting procedures** - Review manufacturer maintenance manuals, service bulletins, and technical publications for systematic troubleshooting guidance
- **Perform systematic testing** - Execute troubleshooting procedures in logical sequence to isolate problem to specific components or systems
- **Document troubleshooting steps** - Record all tests performed, results obtained, and components eliminated during diagnostic process
- **Identify root cause** - Determine specific component failure, system malfunction, or operational issue causing reported problem

Repair Planning and Authorization

- **Develop repair plan** - Create detailed repair procedure including required parts, tools, labor time, and regulatory compliance requirements
- **Research approved repair methods** - Verify repair procedures comply with manufacturer specifications, FAA regulations, and approved maintenance practices
- **Prepare cost estimate** - Calculate total repair costs including parts, labor, and any required inspections or certifications
- **Obtain client authorization** - Present repair plan, cost estimate, and timeline to client for written approval before proceeding with repair work

Repair Execution and Testing

- **Execute approved repairs** - Perform repair work according to approved procedures using qualified technicians and appropriate tools and materials
- **Install replacement components** - Install new or overhauled parts according to manufacturer specifications with proper torque values and safety procedures
- **Conduct operational testing** - Verify proper system operation and performance following repair completion through ground testing and functional checks
- **Perform final inspection** - Complete systematic inspection of repair work to ensure compliance with specifications and quality standards

Documentation and Return to Service

- **Document repair actions** - Record detailed descriptions of all repair work, parts installed, and testing performed in aircraft maintenance logbooks
- **Complete regulatory compliance** - Ensure all required inspections, certifications, and approvals are obtained for completed repair work
- **Prepare return to service entry** - Complete required logbook entries certifying repair completion and

aircraft airworthiness

- **Coordinate aircraft delivery** - Schedule aircraft return with client and provide detailed explanation of completed repair work and any follow-up recommendations

Process Mapping

Flowchart to show sequential steps

Tools and Resources

- Manufacturer troubleshooting guides and technical service bulletins
- Aircraft maintenance manuals and wiring diagrams
- Diagnostic equipment and specialized testing tools
- Parts catalogs and emergency parts procurement procedures
- Regulatory compliance database and approved repair procedures
- Documentation forms and maintenance logbook entry templates
- Client communication templates and authorization forms
- Quality control checklists and inspection procedures

Success Metrics

- **Completion Time:** Problem diagnosis completed within 4 hours; repair completion within 24 hours of authorization.
- **Quality Standard:** 100% accuracy in problem diagnosis and repair effectiveness.
- **Safety Standard:** Zero safety-related issues or repeat failures following repair completion.
- **Client Satisfaction:** 90% client approval rating for repair quality and communication throughout process.

Common Issues and Solutions

- **Issue:** Intermittent problems that are difficult to reproduce during troubleshooting
- **Solution:** Implement systematic testing procedures, use data logging equipment when available, and coordinate with client for operational pattern information

Issue: Parts availability delays for unusual or obsolete components

Solution: Maintain relationships with specialized parts suppliers, consider approved alternate parts when

available, and communicate delays immediately to clients

Issue: Complex problems requiring specialized expertise or equipment not available in-house

Solution: Maintain relationships with specialized repair facilities, consider contracted expertise, and coordinate with manufacturer technical support when needed

Safety Considerations

⚠ WARNING: Never attempt repairs beyond technician qualifications or without proper tools and equipment

⚡ CAUTION: Ensure all troubleshooting activities are conducted safely with appropriate precautions for electrical and mechanical hazards

i NOTE: All unscheduled repairs must be properly documented and inspected before aircraft return to service

✅ BEST PRACTICE: Use systematic troubleshooting procedures to avoid unnecessary parts replacement and ensure accurate problem diagnosis

Regulatory References

- **14 CFR Part 43** - Maintenance, Rebuilding, and Alteration
- **14 CFR Part 43.13** - Performance Rules (General)
- **14 CFR Part 91.405** - Maintenance Required
- **AC 43-9C** - Maintenance Records
- **AC 43.13-1B** - Acceptable Methods, Techniques, and Practices
- **AC 20-62E** - Eligibility, Quality, and Identification of Aeronautical Replacement Parts