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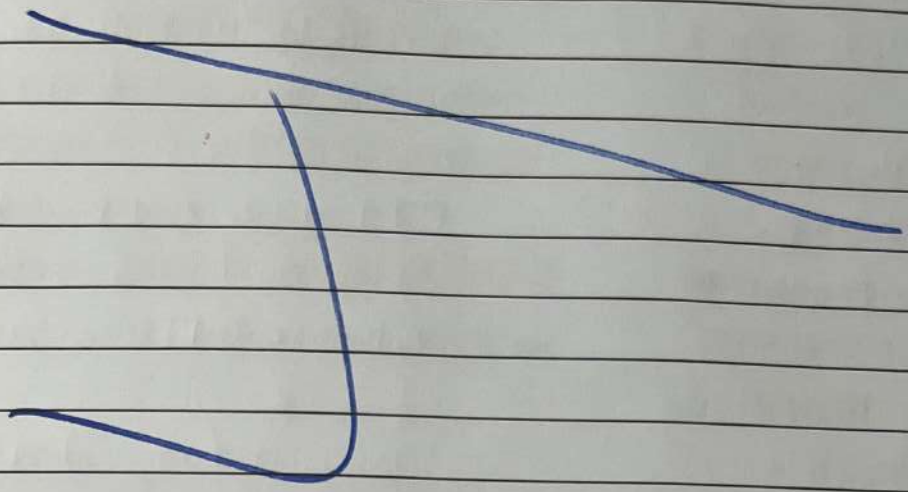

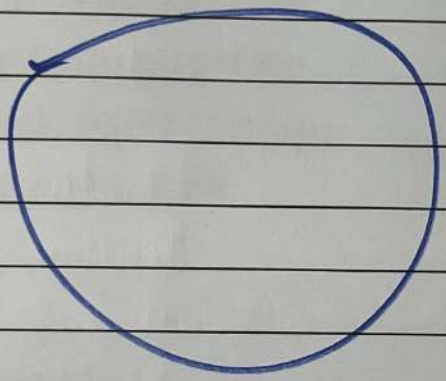

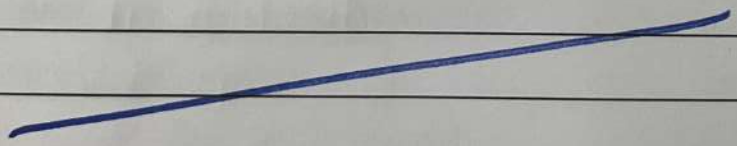

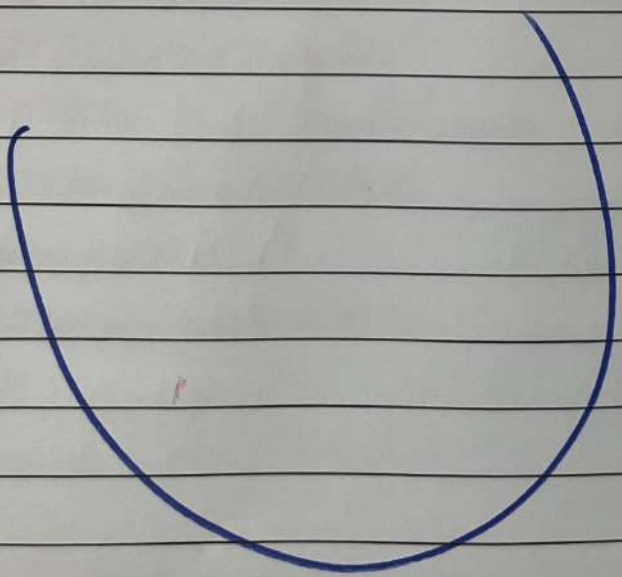

Trouble shooting Techniques

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Overview

1. most aircraft maintenance manuals include troubleshooting sections.
2. These section guides technicians through logical fault finding processes
3. Manuals organized by ATA specification codes have troubleshooting procedures and diagram in various chapter.

Troubleshooting process

1. Follow instruction in troubleshooting diagrams from top to the bottom
2. if no specific troubleshooting process is available, adopt to logical approach.

Typical thought process

Gather information

1. Collect all available information to expedite finding a solution
2. Source of information may include:
   - → Aircraft technical logbook
   - → Result from test (ground runs) exa:
   - → understanding how the item / system work.
3. Time spent gathering information is valuable.

Analyze information and Develop Strategy:

1. use gathered information to create strategy.
2. This will provide a starting point and may indicate the most likely cause of the problem.
3. Example: Fore nose wheel shimmy, changing the nose gear leg may solve the issuse but is not cost-effective

practical steps for problem solving:

1. Consult the Technical logbook
   - speak to the pilot to understand when and under what condition the problem occurs.
2. Check for troubleshoot charts
   - if available, apply the gathered information to identify the ~~process~~ possible causes.
3. logical inspection

if no chart exists, inspect the nose strut for obvious issues:

- → Check for worn wheel (exp: excessive play in torn nose-wheel configuration)
- → Looks for sign of lubrication or wear in torque links
- → Ensure the shimmy damper is secure and undamaged

4. investigate Likely causes
   - → start with the most probable cause of the defect.
   - → for example, check if the tire is worn or out of shape:
     - jack the nose up as per the maintenance manual
     - spin the wheel to check for shape and inspect bearing in torque links, shimmy damper, steering collar.

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→ If nothing is found, consider replacing the wheel or undercarriage leg.

→ Request further reports from the pilot to confirm if the issue is resolved.

5. Evaluate Results

→ If the aircraft returns without wheel shimmy, the problem is resolved.

→ If the issue persists, continue investigating until the problem is fixed.

→ Changing the strut should be a last resort, not the first step.

Conclusion:

→ All troubleshooting techniques follow similar logical patterns

→ A systematic approach helps in efficiency diagnosis and resolving issues.

General test equipment guidelines:

Testing / troubleshooting of aircraft components system usually involve using certificates test equipment This test equipments falls in to following:

→ Avionic

→ Electrical

→ Mechanical

Avionics

Vor meter → measure receive power

oscilloscope → measure phase relationship, amplitude and time

Time Domain Reflectometer → measure open and short circuit in transmission line

Pitot static tester → test pitot static system on aircraft.

Internal BITE → Aircraft based

Bonding tester → test resistance between earthing point both on ground and on the aircraft

Electrical

Multimeter V / I / R

Meggers Testing insulation

Wattmeter transmitted / reflected power.

Mechanical inspection

Borescope for internal parts and component exa: engine

pressure gauge used to measure hydraulic, pneumatic system pressure

NDT equipment use to measure internal / external damages to mechanical parts:

- X-ray
- Eddy current
- magnetic particle

Tenso-meter measure the tension of flight control cables and rigging

Serviceability of equipment

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Before using test equipment it is important to determine its serviceability:

following point should be carried.

1. check calibration label Correct is within calibration date.
2. check there is a serviceable label attached to test equipment
3. inspect test equipment is not damaged
4. if it has electrical fault inspect for any damage
5. conduct test and refer to standard operating procedures for operation.

General troubleshooting models:

Troubleshooting:

→ is to fix a system and test it to determine its serviceability

There are many different models and tools to support.

Internal / External test equipment is used to compare system operation

Troubleshooting diagram

There are three types of troubleshooting charts / diagram

Flow

if OK move in vertical up and down

if not OK move in horizontal left ~~and~~ to right

pick:

has 3 columns namely:

Column 1. nature of discrepancy

Column 2. possible cause

Column 3. correction action

Binary logic chart

→ used to troubleshoot based on logic. used in electronic, pneumatic or hydraulic

→ use 6 decision criteria called gates.

Schematic

→ used to show system information, operation and part

→ Complements a flow diagram

Troubleshooting CFDS BITE

The purpose of certificate Fault Display system (CFDS) is to make maintenance task easier by displaying fault messages in cockpit.

The CFDS has two levels of maintenance:

1. removal and replacement of equipment
2. Troubleshooting.

The CFDS includes BITE

Modern aircraft use BITE for most avionics and electronic controlled system

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BITE ~~monitor~~

=> monitor themselve and
=> display system fault
on the ECAM / EICAS
pages on the maintenance
computer.

CFDS includes

=> A central computer (CFDIU)
=> two 2 MSDU (multi purpose
control and display units)
=> one (1) printer.

Troubleshooting Navigation light

1. Consider navigation light
on the diagram.

It consist of following:

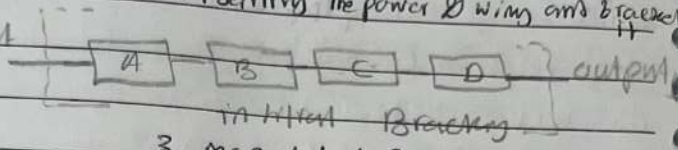
=> three lights (3)
=> one switch (1)
=> circuit breaker
=> power (bus)
=> wires
=> pings
=> Earth

Consider navigation light system

1. Verify that a problem actually
exists
2. Isolate the cause of the problem
3. Correct the causes of the problem
4. Verify that the problem has been
corrected
5. Follow up to prevent future
problem.

Right Navigation light

1. Navigation light is not work
2. identify the power & wiring and bracket it



in fault Bracketing

3. Inspect test & trouble shooting
4. Test total system
5. any damage of wire or part
shall be reparred and evaluate
for future problem

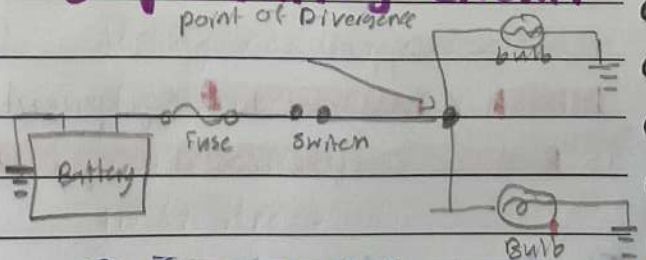
[1] Bracket only the Right Navigation
if left and center one working
correctly.

[2] Inspect check circuit breaker/
switch, inspect light, perform
continuity & resistance) checken
filament

[3] Test V mid point to determine
further bracketing

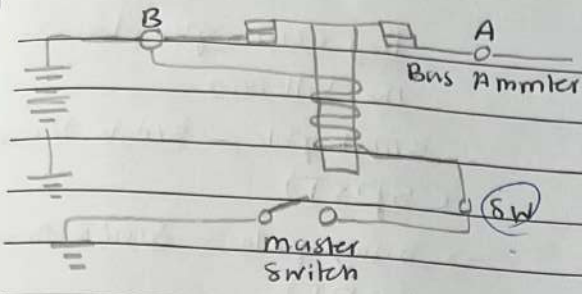
[4] Check V if no, then move towards
input/Bus
if yes, move towards output/light
navigation light

Simple battery Circuit

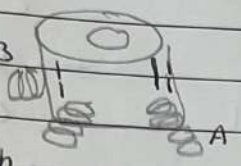


[1] if any bulb turn on when
operating the switch, then
everything up to ~~fault~~ point of
divergence must be serviceable

[2] Further bracketing toward the
point of divergence and the
faulty bulb



B => from Battery
A => to Ammeter
SW => to ground through master switch



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Solenoids

1. The main battery solenoid is connected in series between battery and bus.

To energize the solenoid:
The ground circuit for the coil is completed through aircraft master switch

When master switch is closed,
1. current flow through solenoid coil. → cause the contact to close and complete the circuit from battery to bus.
2. there is no V on main bus, check (you can) solenoid with voltmeter.
3. if solenoid is connected directly to battery, there should always be battery voltage at terminals B.

When master switch off.
1. there should be battery V at terminal SW
2. there should be no V between terminal A and ground.
3. if there is no V at SW, when master switch is off, there is possible of open coil

To find out if this is the problem,
1. disconnect wire at SW and with the battery disconnected
2. measure continuity between terminal B and SW with with ohmmeter.

if the coil is intact,
1. low R will be indicated
If there is infinite R reading The coil is open, and solenoid is defective.

When battery solenoid is connected in aircraft electrical system, small amount of I is needed to close the contact and supply power to bus.

When master switch is ON.
→ There should be no V at SW, since master switch connect the SW end of coil to ground
→ if there is V at SW, master switch on, there is a problem in master switch circuit with the coil energized.
→ relay closes and supplies battery V between A and ground.
→ if no V exists at A, there is a problem with relay.

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Relays

1. is electromechanical device consisting of solenoid and spring loaded armature connected to a set of contact points.

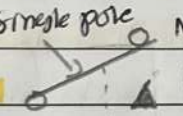
iron armature is pulled to the core where current flows through solenoid

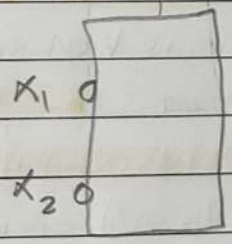
→ the action of moving armature activates the contact.

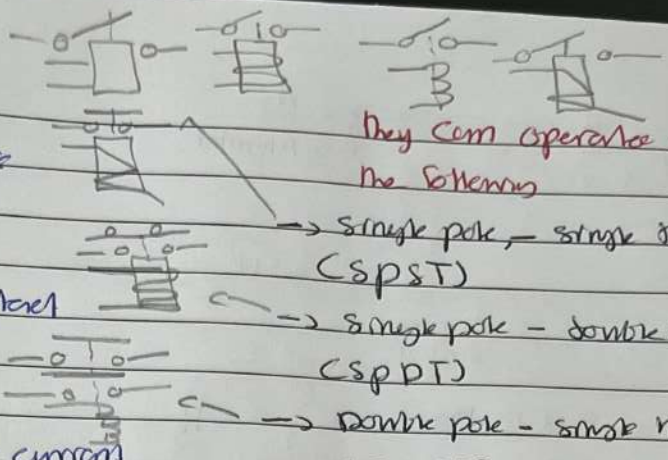
Relays are most often used for remote control of circuits carrying heavy current

small gauge wire can be used to activate the relay solenoid, while the relay contact switch high I.

→ this provide cost and weight saving.







they can operate as the following

→ single pole - single throw (SPST)

→ single pole - double throw (SPDT)

→ double pole - single throw (DPST)

→ double pole - double throw (DPDT)

when armature is pulled towards the core, it either makes close or breaks (open) the stationary contact.

→ The circuit connected through contact can be switched when coil is energized with small control V or I from a remote location.

Relay control circuit

1. can be used to control other circuit

in figure :

→ low V relay control circuit but allow the operator to safely activate and control high V motor circuit

→ the high V circuit consist

Relays are essentially remote switches, the same naming conventions are used for relay contact set as used for switches

can have contact but

→ are normally open (NO)

→ normally closed (NC)

of 1. high V supply.
2. motor
3. relay contact set

→ the low V control circuit consist of
1. switch controlling the power supplied to relay solenoid.

Testing Relays

There are several tests that can be carried out on relays and solenoid to check their serviceability. These tests are:
1. physical inspection
2. continuity test
3. operational test
4. millivolt drop test