



MODULE 3

BASIC TROUBLESHOOTING AND REPAIR

Table of Content

I. Vehicle Check and Diagnosis

- A. Periodic Inspection

- B. General Inspection

II. Basic Vehicle Diagnosis and Countermeasure

- A. Engine

- B. Drivetrain

- C. Underchassis

I. VEHICLE CHECK AND DIAGNOSIS

A. Purpose of Vehicle Check and Diagnosis

- Identify what the problem is
- Identify who is responsible
- Identify how and why the problem occurred
- Identify how much the customer intends to pay

B. Procedures in Conducting Vehicle Check and Diagnosis

1. Periodic Inspection

- a. Check the vehicle to confirm the customer's request or problem.
- b. Write the result down to a reception memo, and read the key points aloud for confirmation.
- c. Check the driver's seat area and engine room even if the vehicle seems to have no problem.
- d. Explain politely to the customer about:
 - Daily handling.
 - Importance of periodical inspection
 - Use of genuine service parts and oil

B. Procedures in Conducting Vehicle Check and Diagnosis

2. General Inspection

a. Identification of the failure.

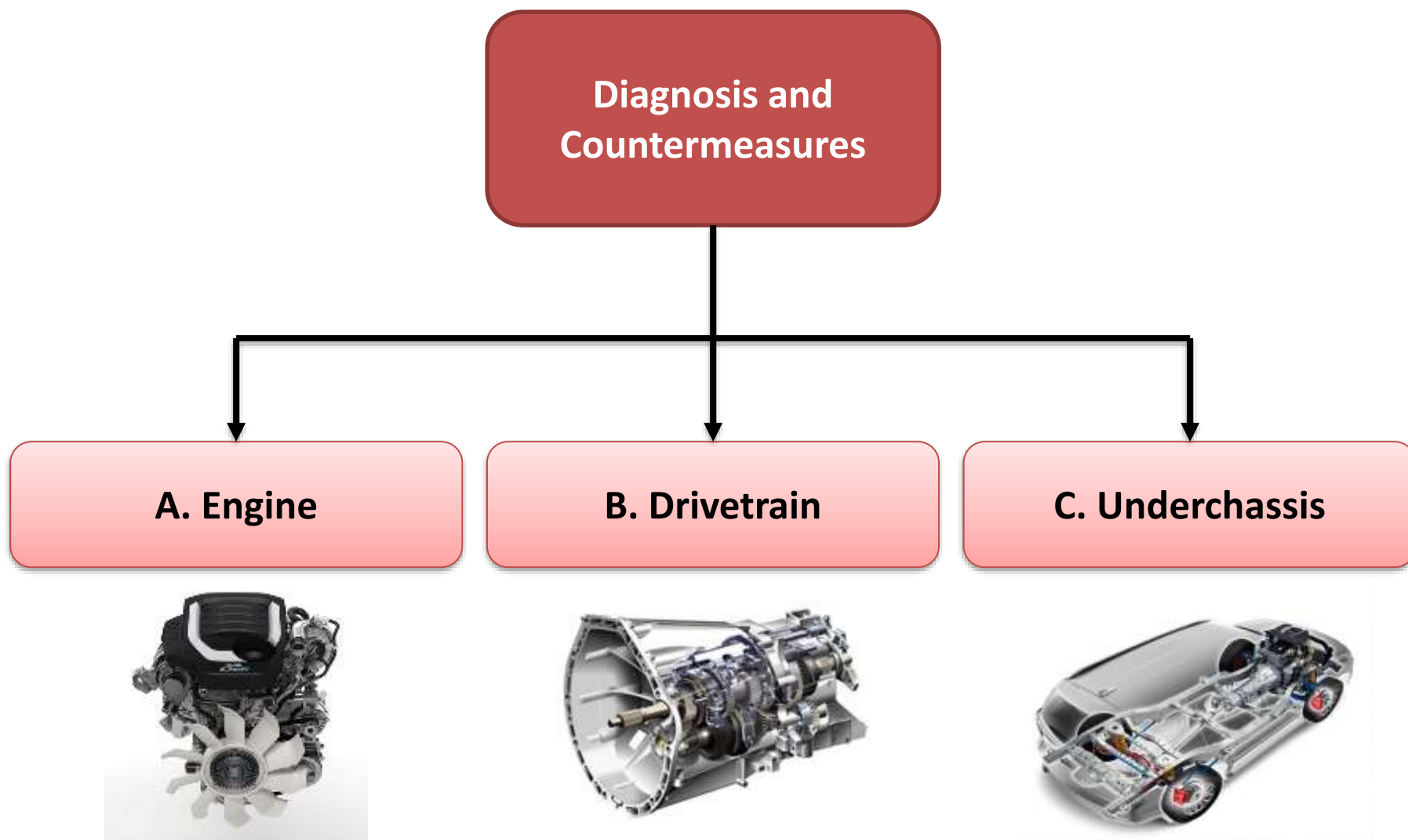
- Fully understand the normal condition of the vehicle and make diagnosis based on the Isuzu quality standards.
- When making diagnosis, determine:
 - i. Whether the phenomenon is really a failure.
 - ii. Whether the phenomenon is felt only by customer.
 - iii. Whether the customer is making an unreasonable quality demand.
- If phenomenon is purely sensuous, such as vibration/noise, get in the vehicle with customer and make a check.

b. Identification of the cause of the failure.

- If abnormal phenomenon exist, proceed to make diagnosis.
- If diagnosis takes time, usher customer to waiting room/area.
- Keep the vehicle to identify the true cause of the failure.
- Write concrete work instruction in the job order, and have the Job Controller assign jobs.

II. BASIC VEHICLE DIAGNOSIS AND COUNTERMEASURE

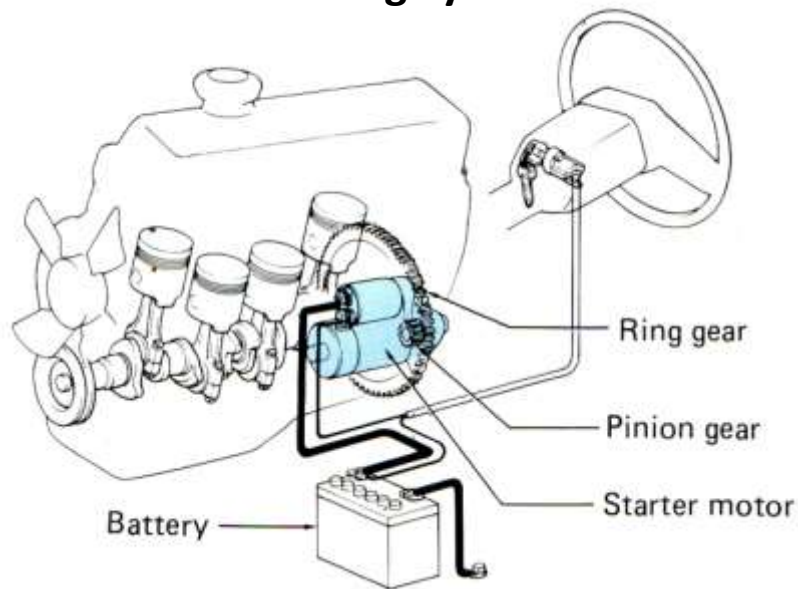
II. Basic Vehicle Diagnosis and Countermeasure



A. Engine

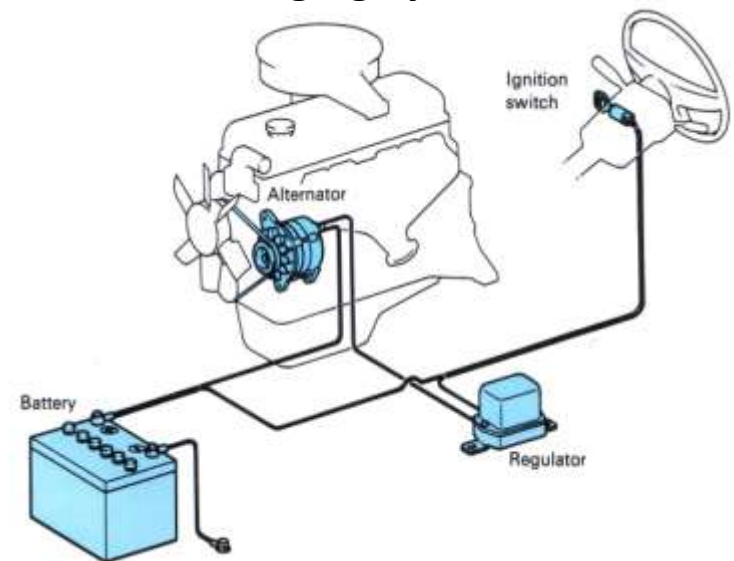
Starting and Charging System

Starting System



Starting system forces the engine to crank with an electric motor, and starts the engine.

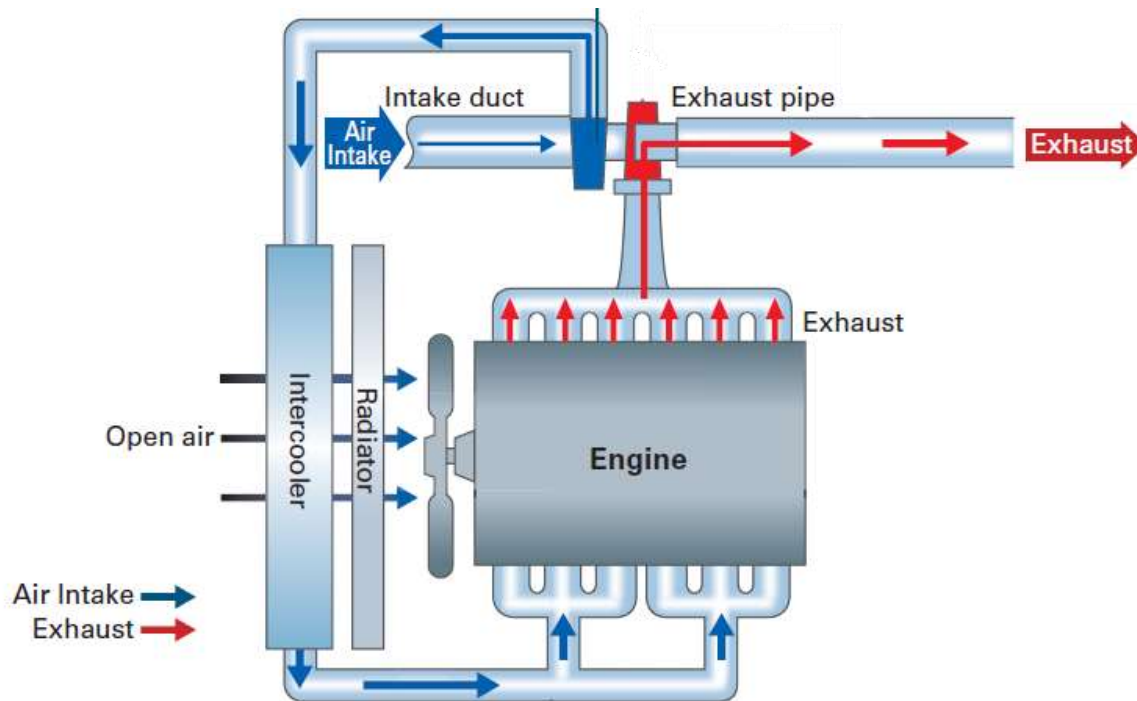
Charging System



Produces electricity to supply the electrical components with the amount of electricity required, and to charge the battery while the vehicle's body is in operation.

A. Engine

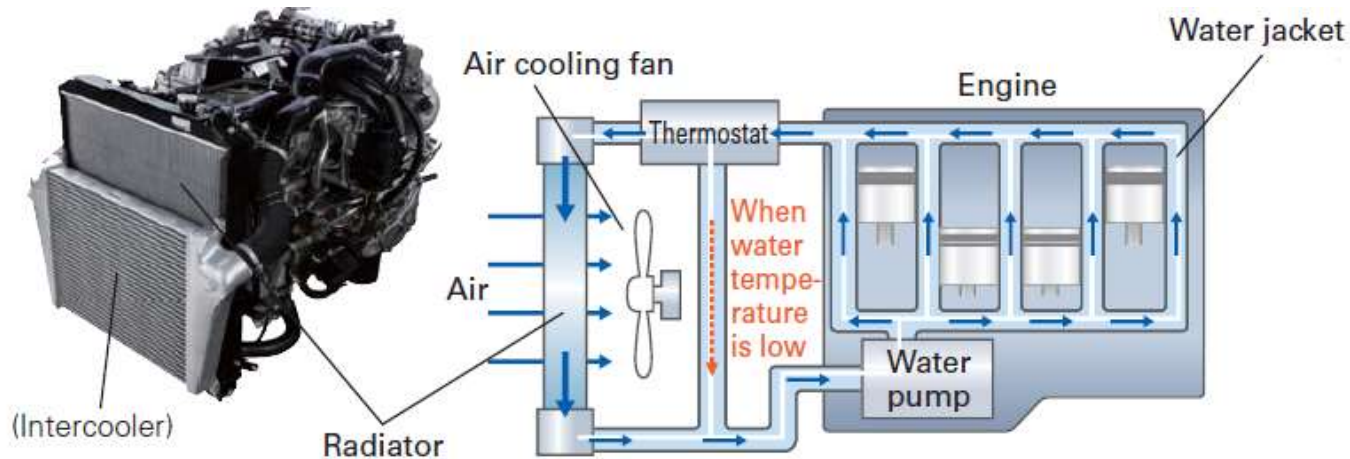
Intake and Exhaust System



These two systems are responsible for providing the needed air for combustion and passage for exhaust gas to be expelled from the engine and filter out pollutants from exhaust gases that may cause air pollution.

A. Engine

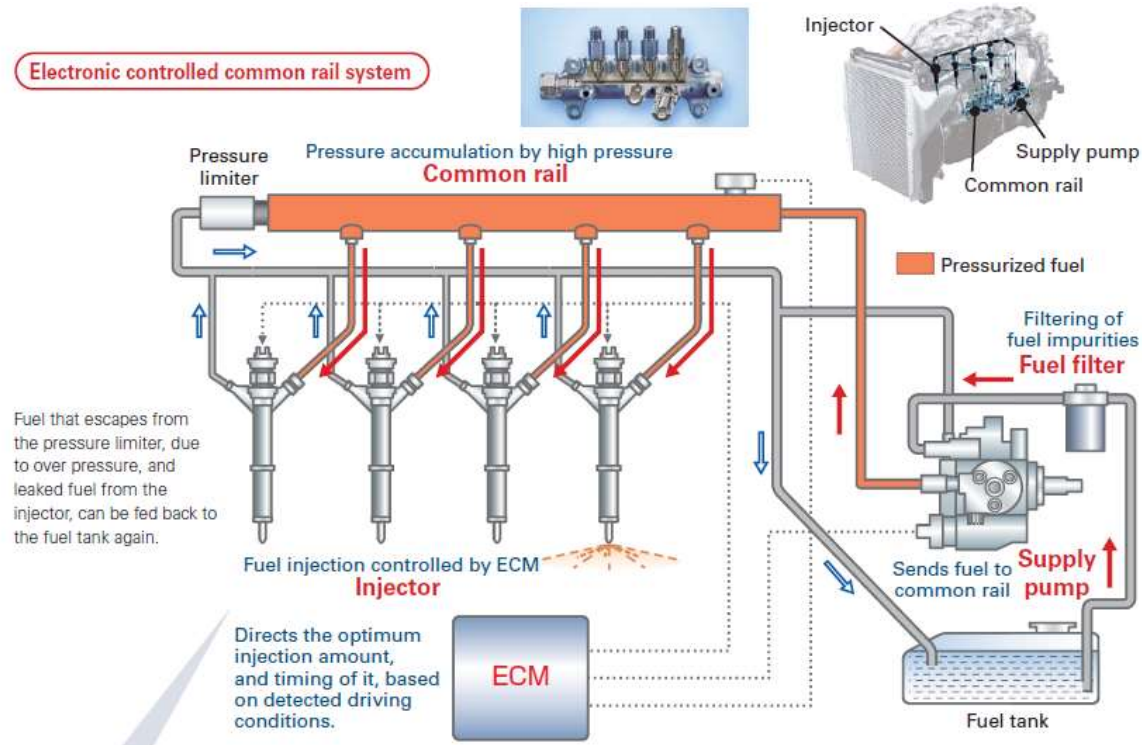
Cooling System



- The purpose of the cooling system is to circulate the coolant in order to absorb, dissipate and control the heat from fuel combustion and friction of moving parts.
- The cooling system keeps the engine at its most efficient temperature at any engine speed range and at varying ambient temperature

A. Engine

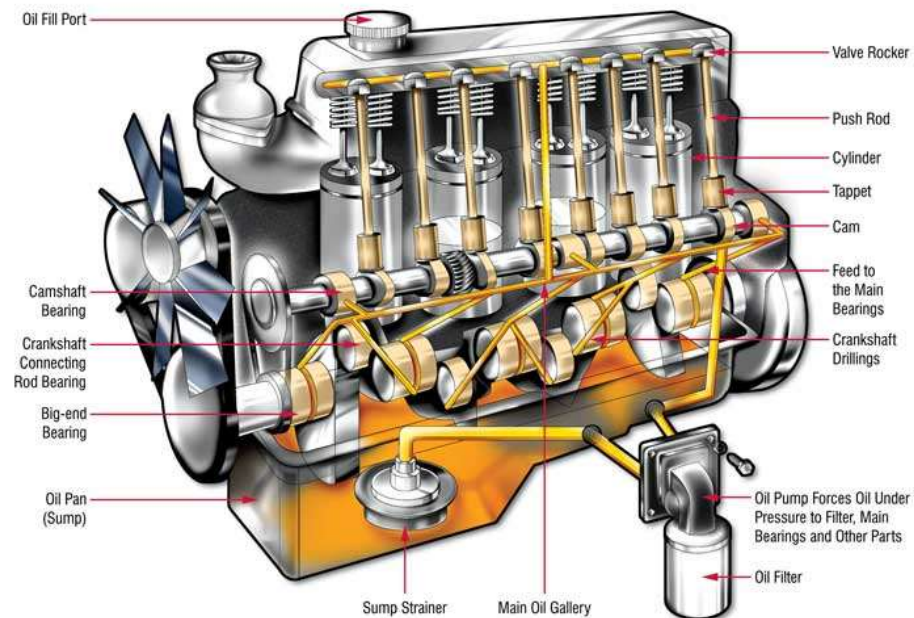
Fuel System



To supply the engine with proper amount of fuel that can be used during combustion process.

A. Engine

Lubrication System



The lubricating system keeps all moving parts inside the engine coated with layers of oil. This reduce wear on the parts and allows them to move freely with little power lost.

A. Engine

Engine Troubleshooting and Diagnosis



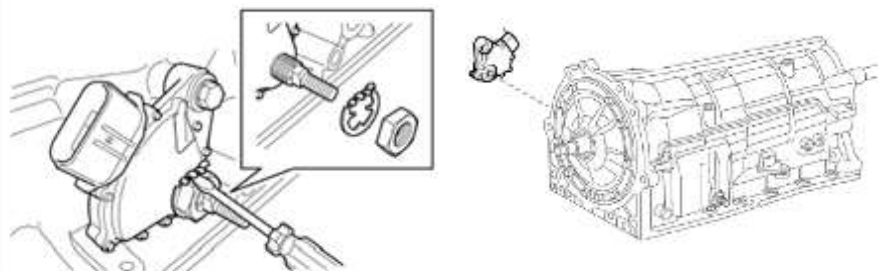
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graph TD; A[Engine Troubleshooting and Diagnosis] --> B[• Hard Starting<br/>• Unstable Idling<br/>• Insufficient Power<br/>• Excessive Fuel Consumption<br/>• Excessive Oil Consumption<br/>• Overheating<br/>• Dark Exhaust Smoke<br/>• Low Oil Pressure<br/>• Abnormal Noise];
```

- Hard Starting
- Unstable Idling
- Insufficient Power
- Excessive Fuel Consumption
- Excessive Oil Consumption
- Overheating
- Dark Exhaust Smoke
- Low Oil Pressure
- Abnormal Noise

A. Engine

HARD STARTING

1) Starter motor inoperative



Neutral Switch (for A/T Vehicles)



Battery



Fusible Link



Fuse

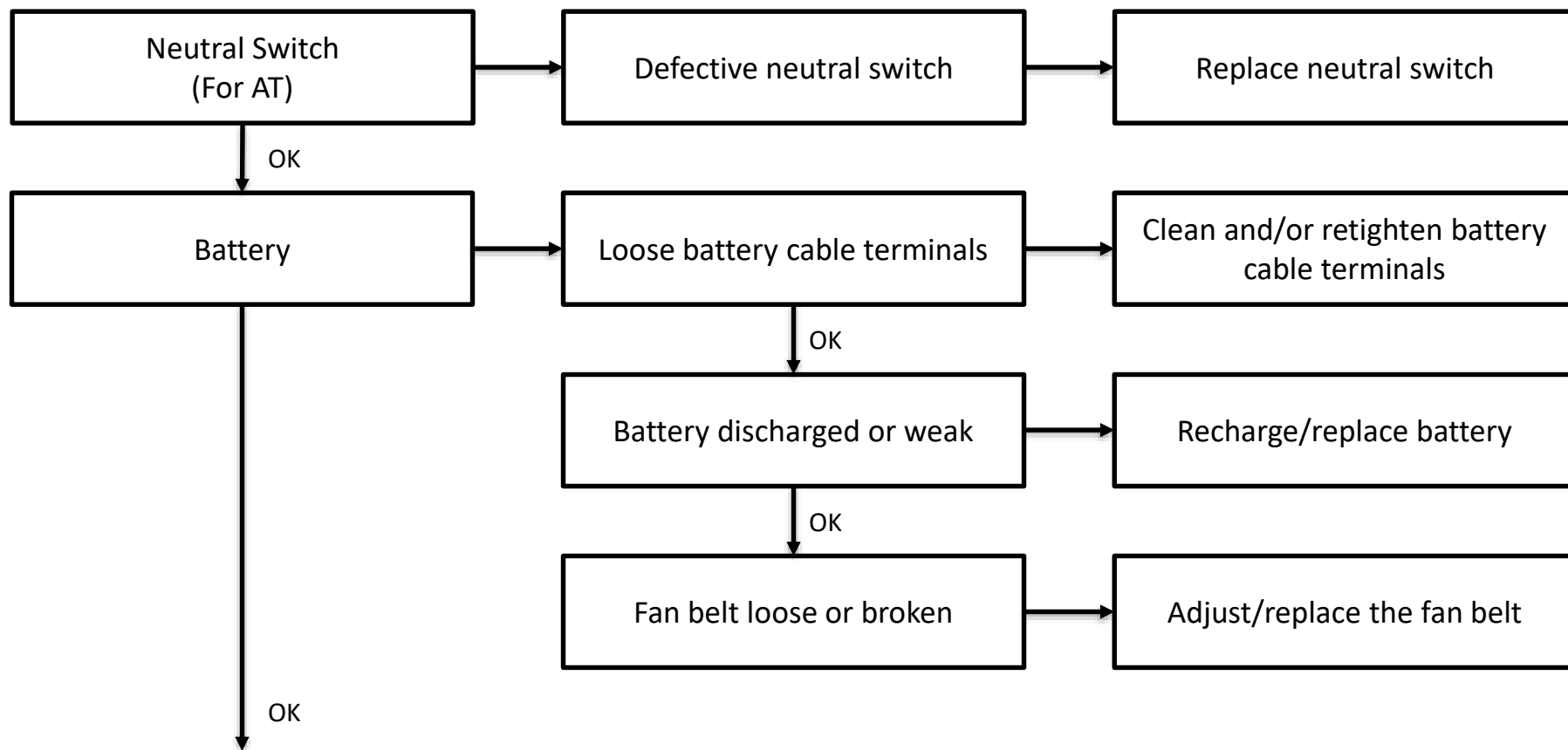


Starter Motor

A. Engine

HARD STARTING

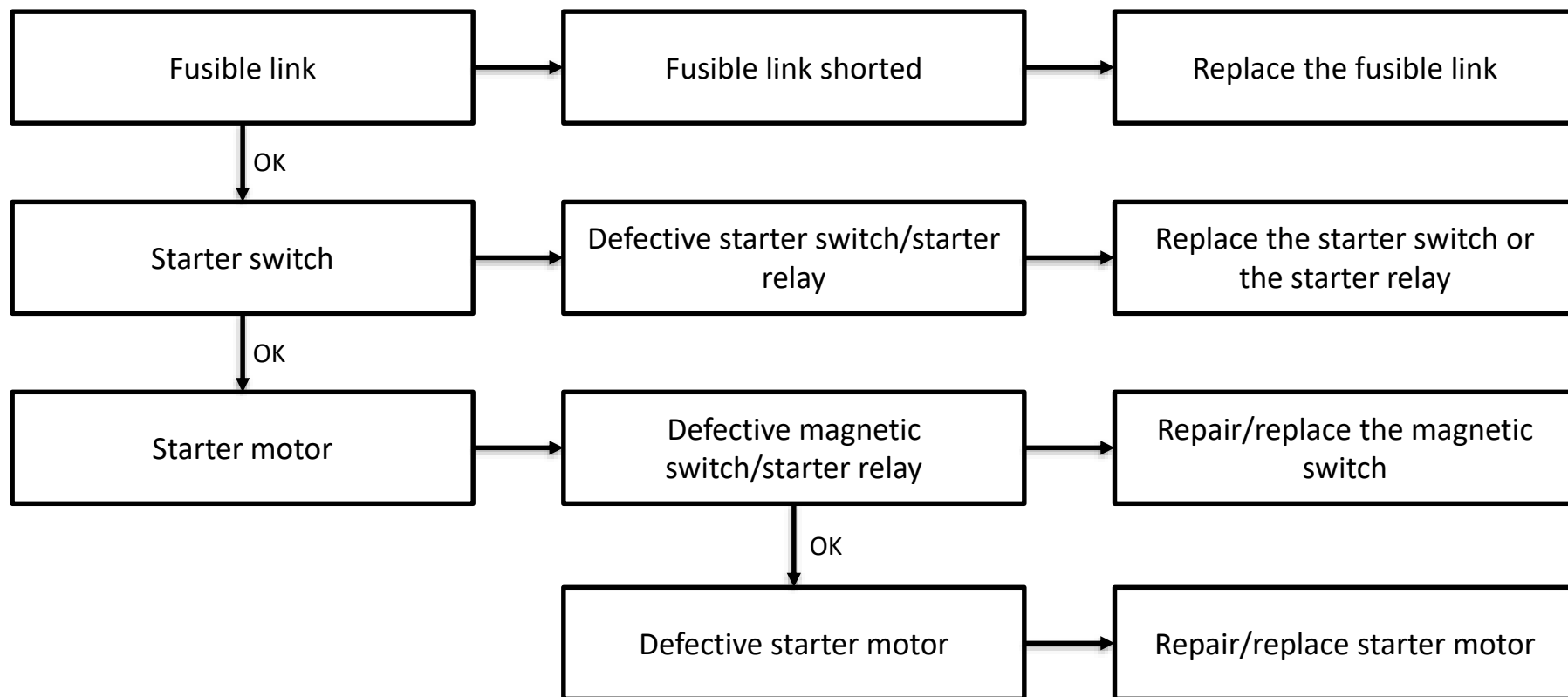
1) Starter motor inoperative



A. Engine

HARD STARTING

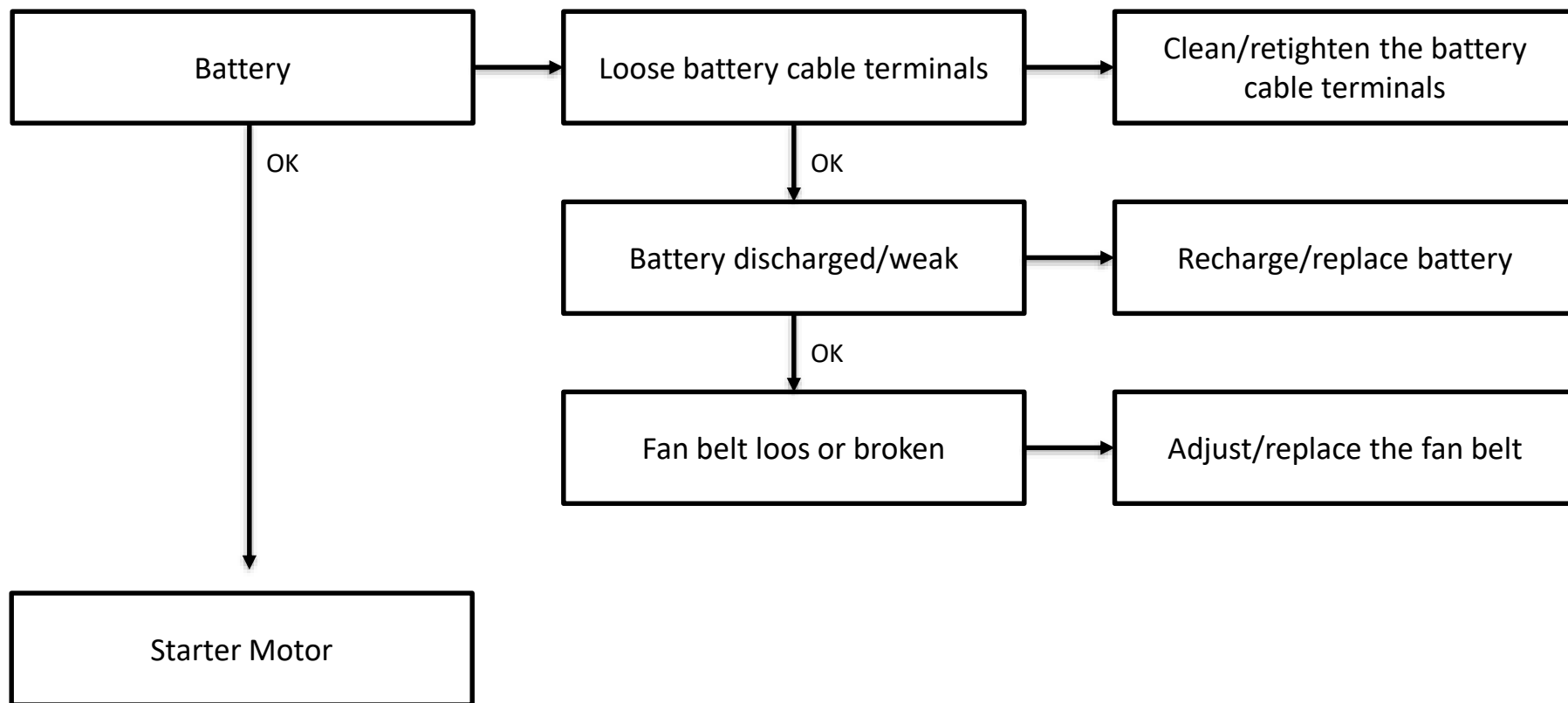
1) Starter motor inoperative



A. Engine

HARD STARTING

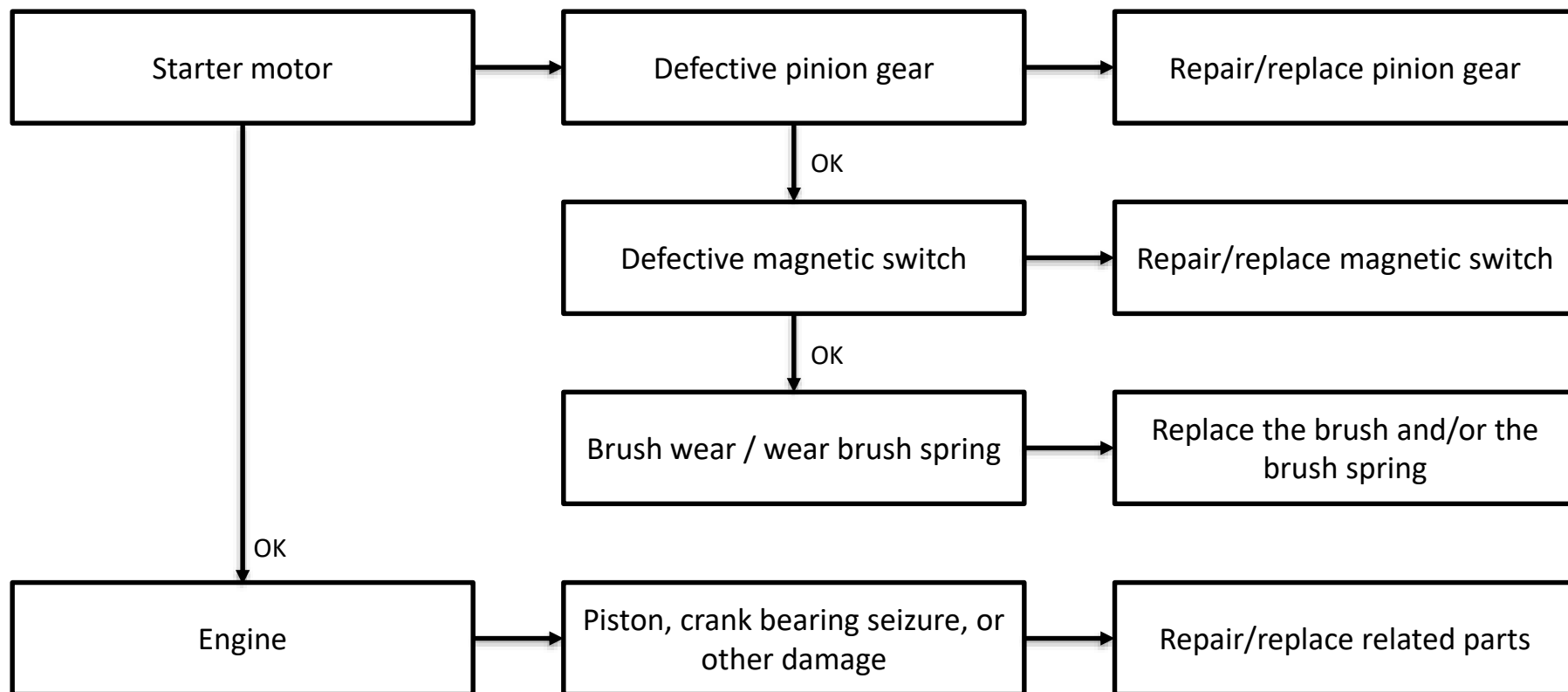
2) Starter motor operates but engine does not crank



A. Engine

HARD STARTING

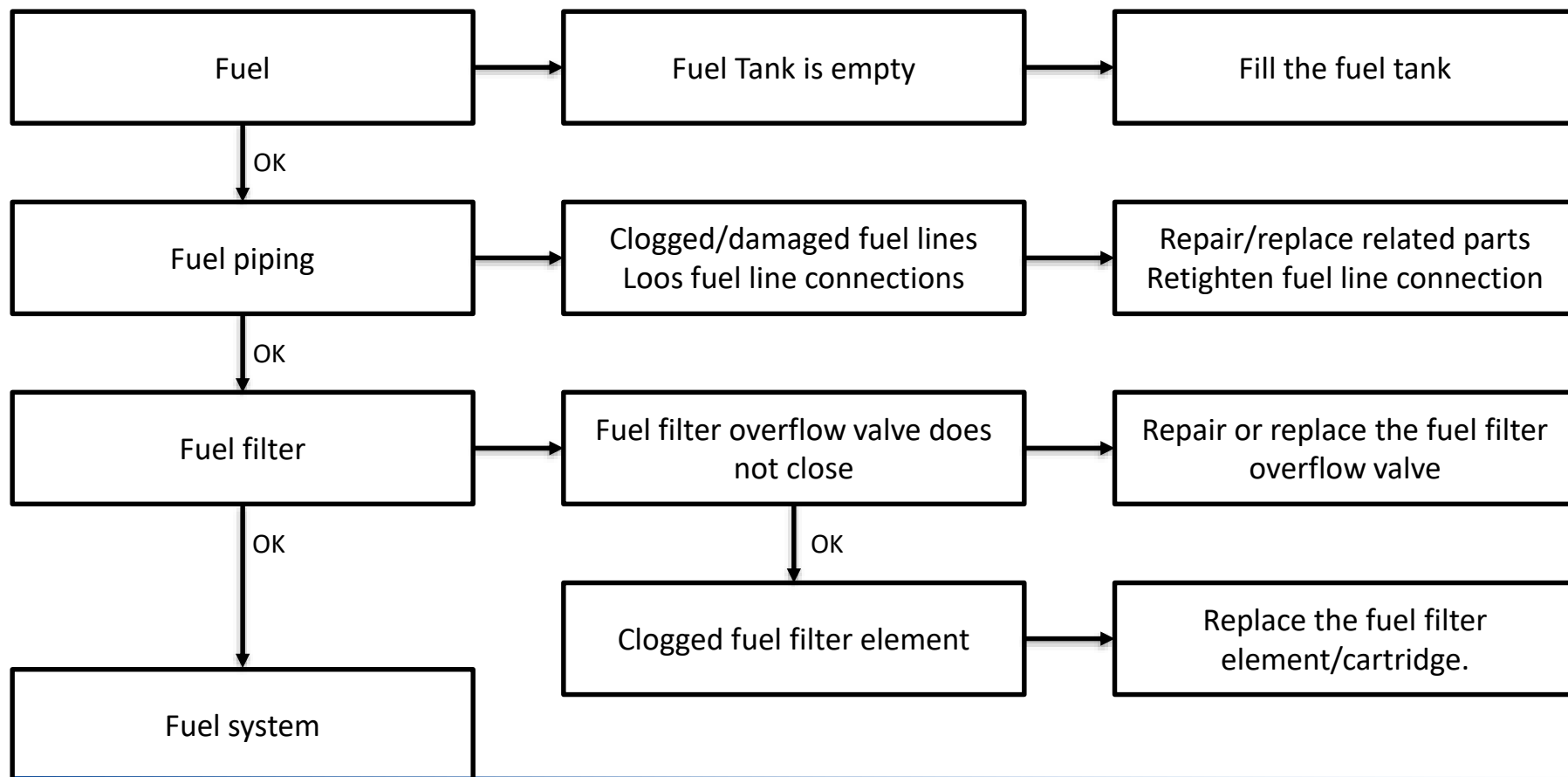
2) Starter motor operates but engine does not Crank



A. Engine

HARD STARTING

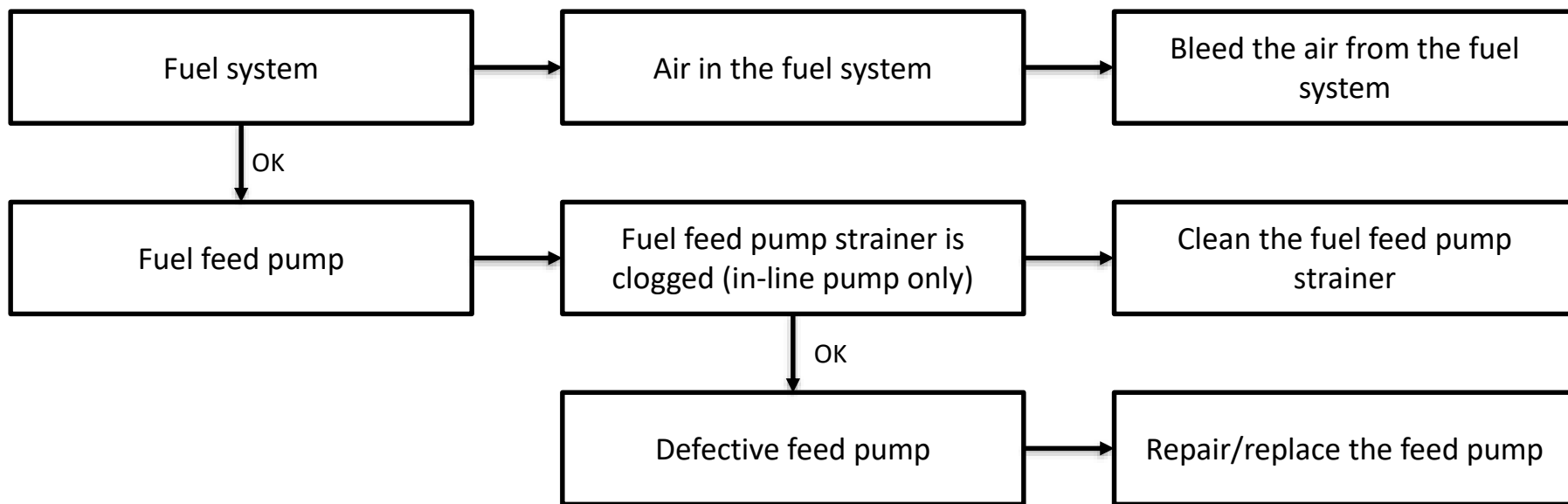
3) Fuel is not being delivered to the injection pump



A. Engine

HARD STARTING

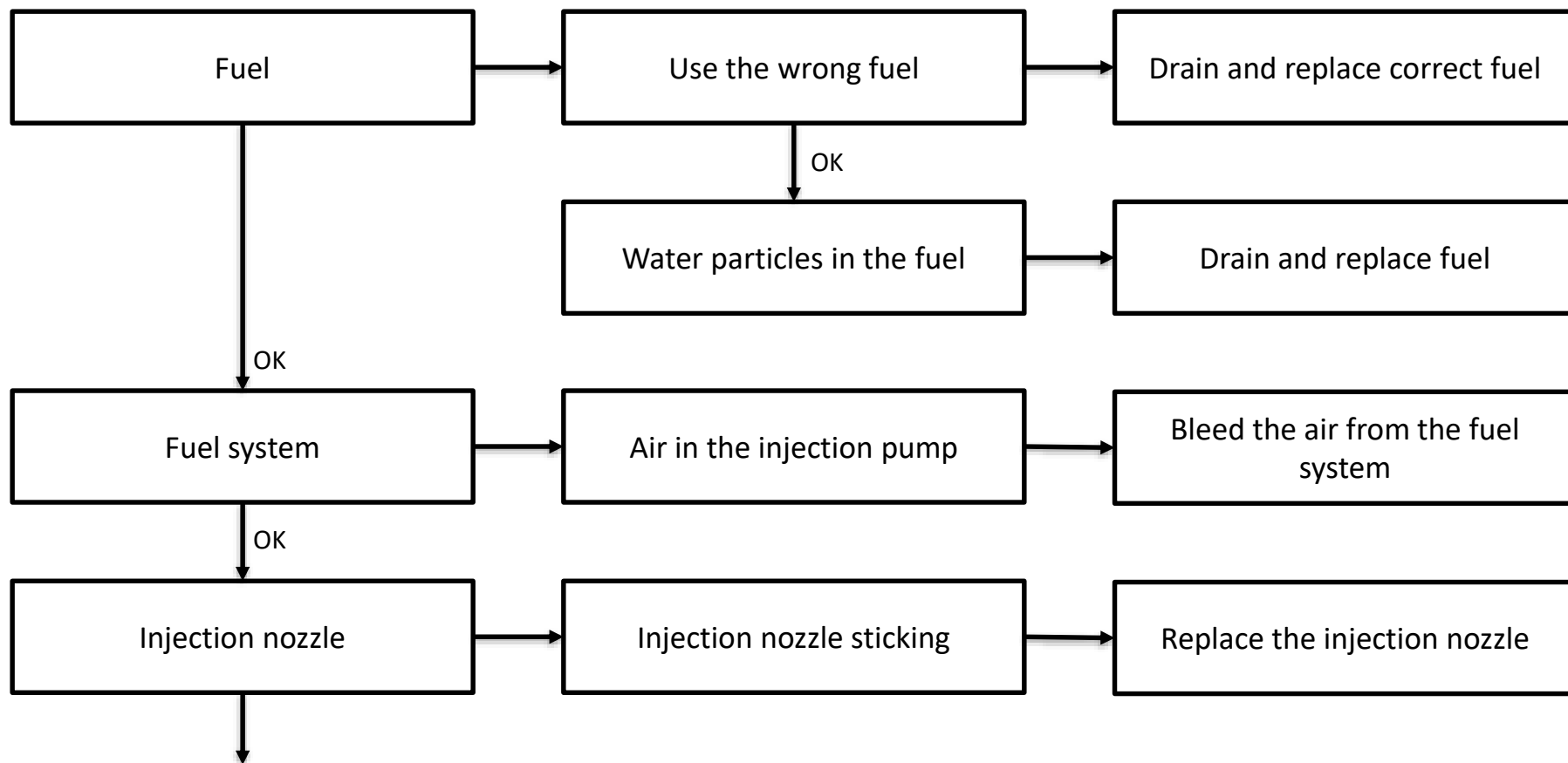
3) Fuel is not being delivered to the injection pump



A. Engine

HARD STARTING

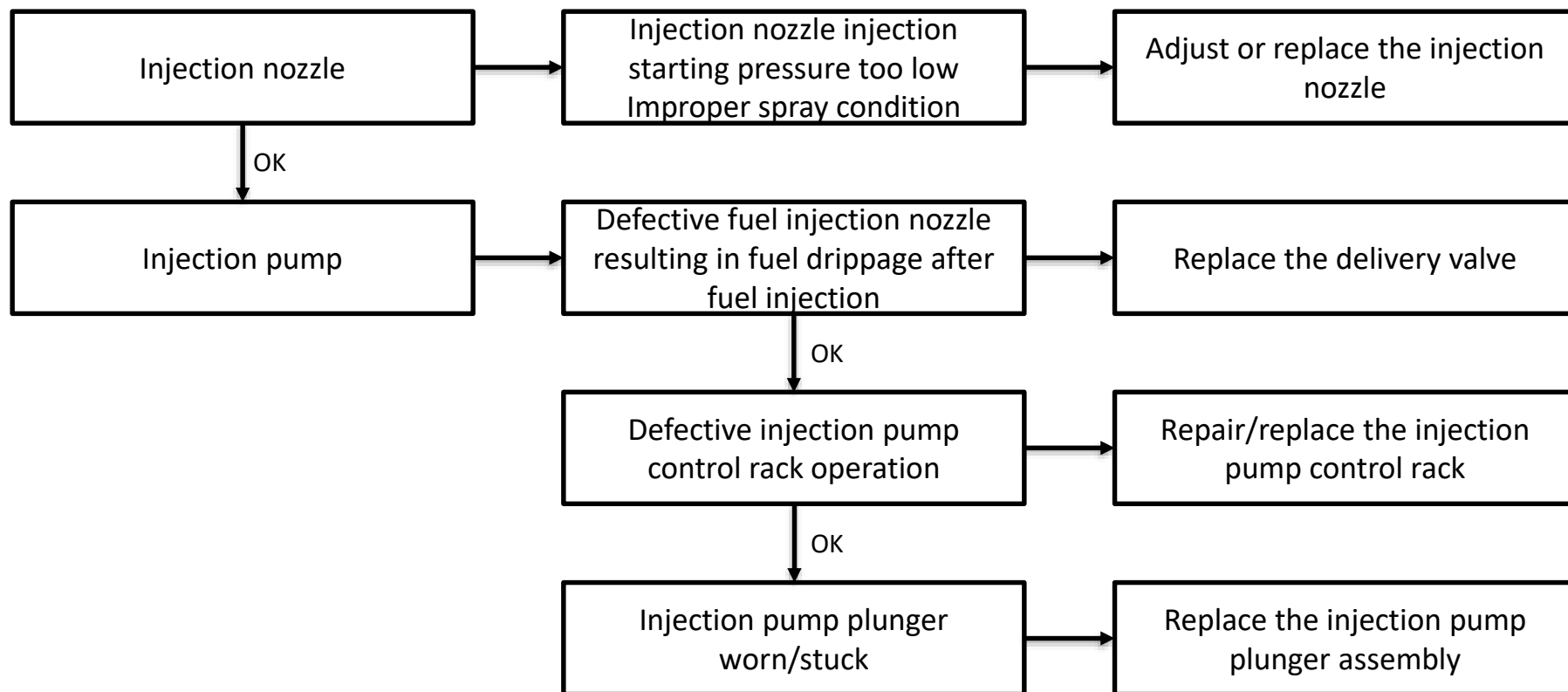
4) Fuel is being delivered to the injection pump



A. Engine

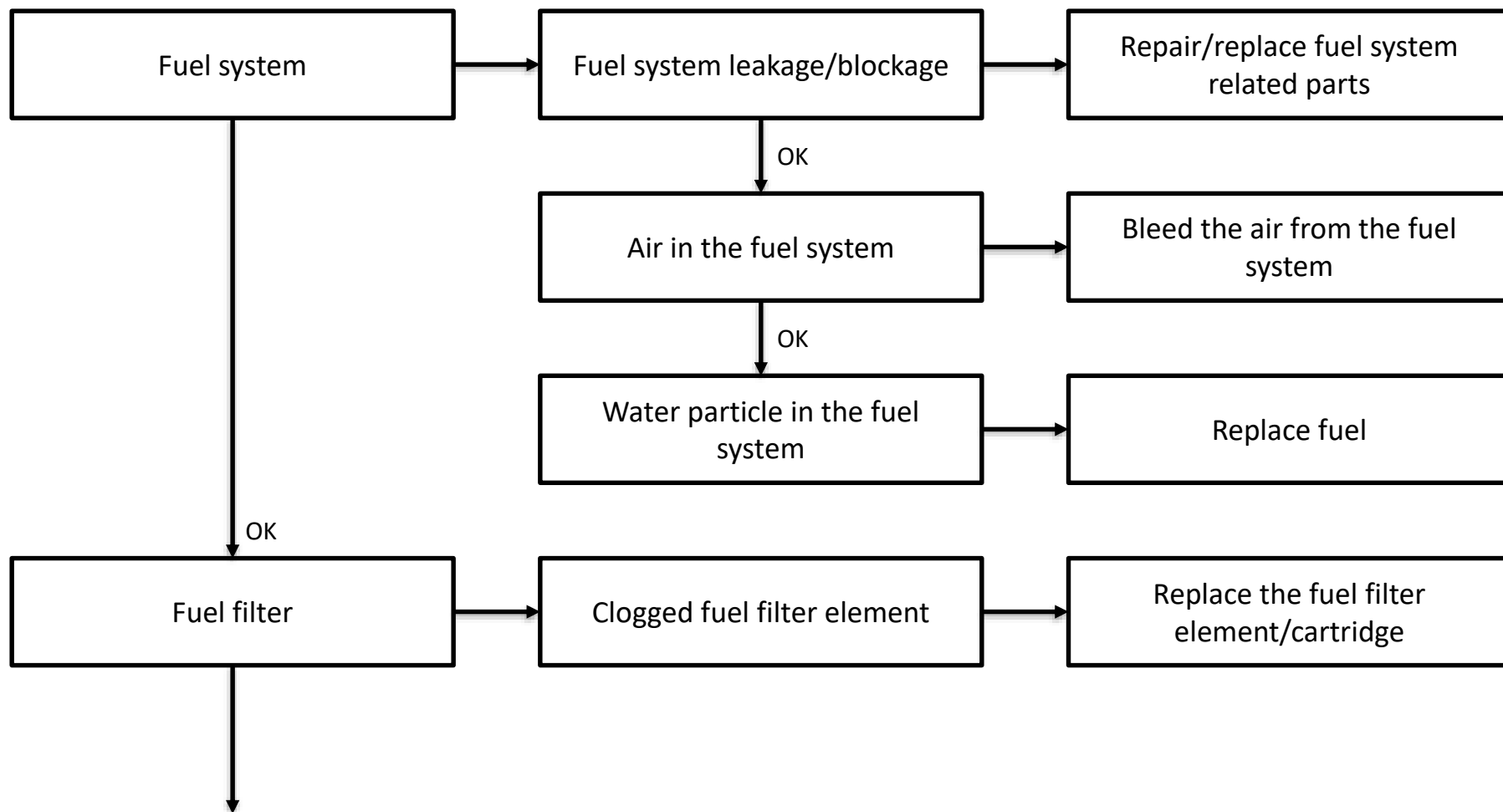
HARD STARTING

4) Fuel is being delivered to the injection pump



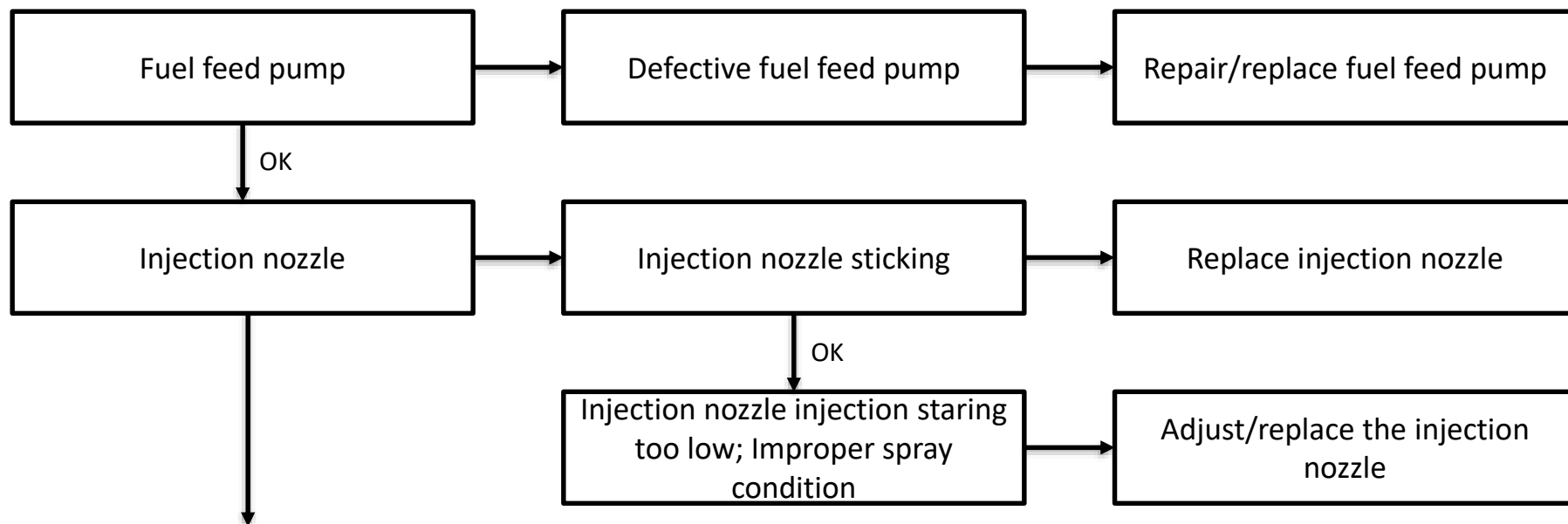
A. Engine

UNSTABLE IDLING



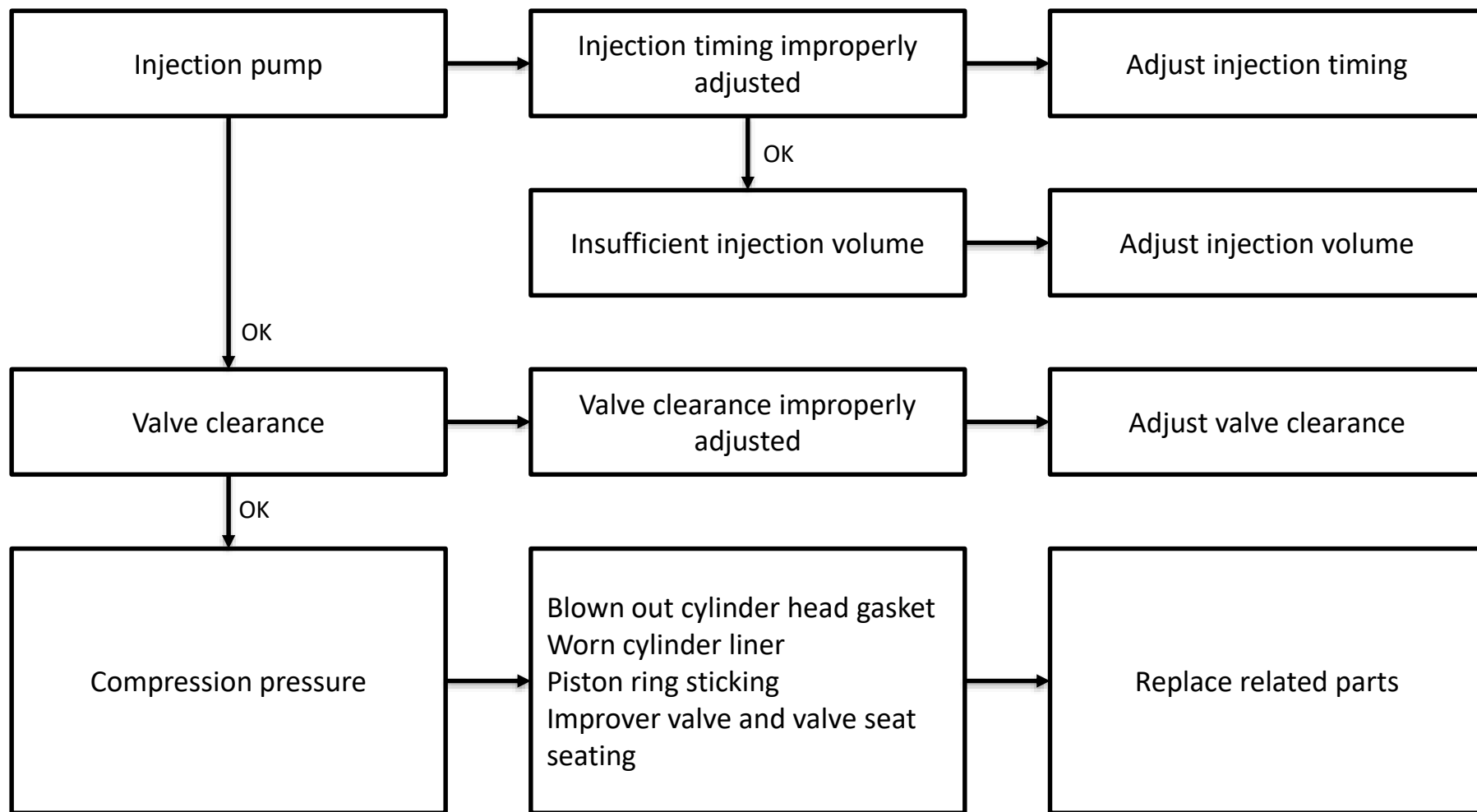
A. Engine

UNSTABLE IDLING



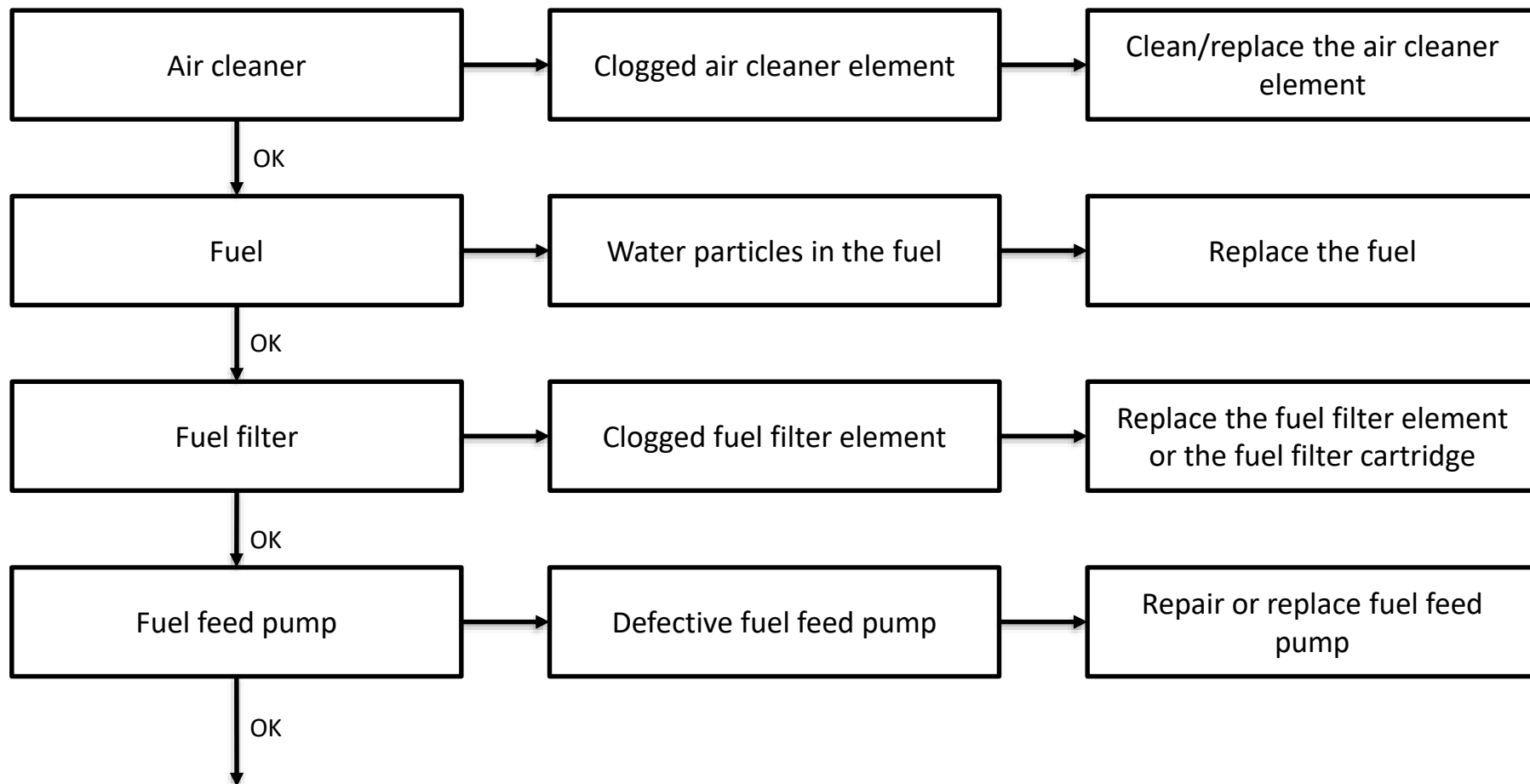
A. Engine

UNSTABLE IDLING



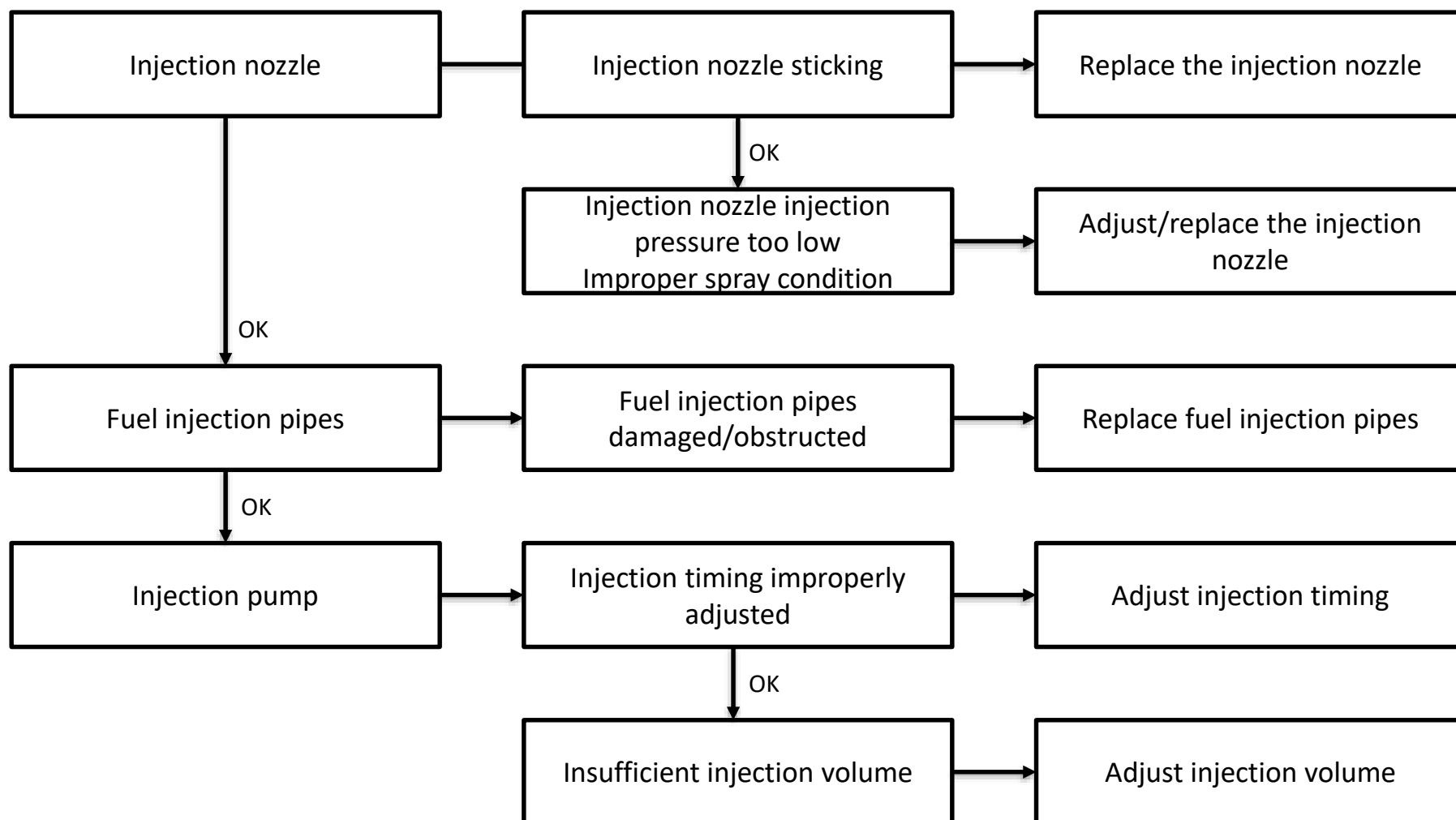
A. Engine

INSUFFICIENT POWER



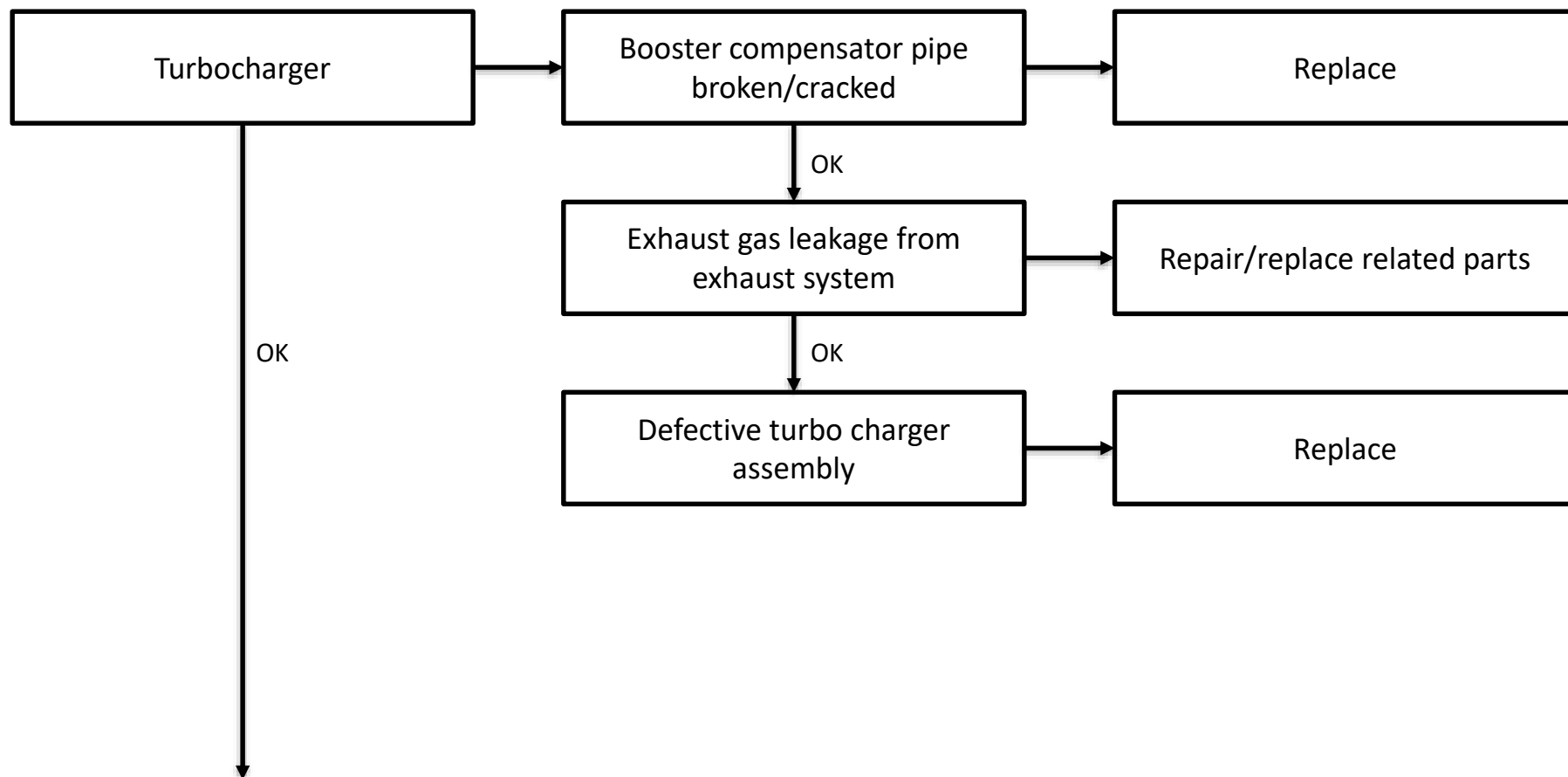
A. Engine

INSUFFICIENT POWER



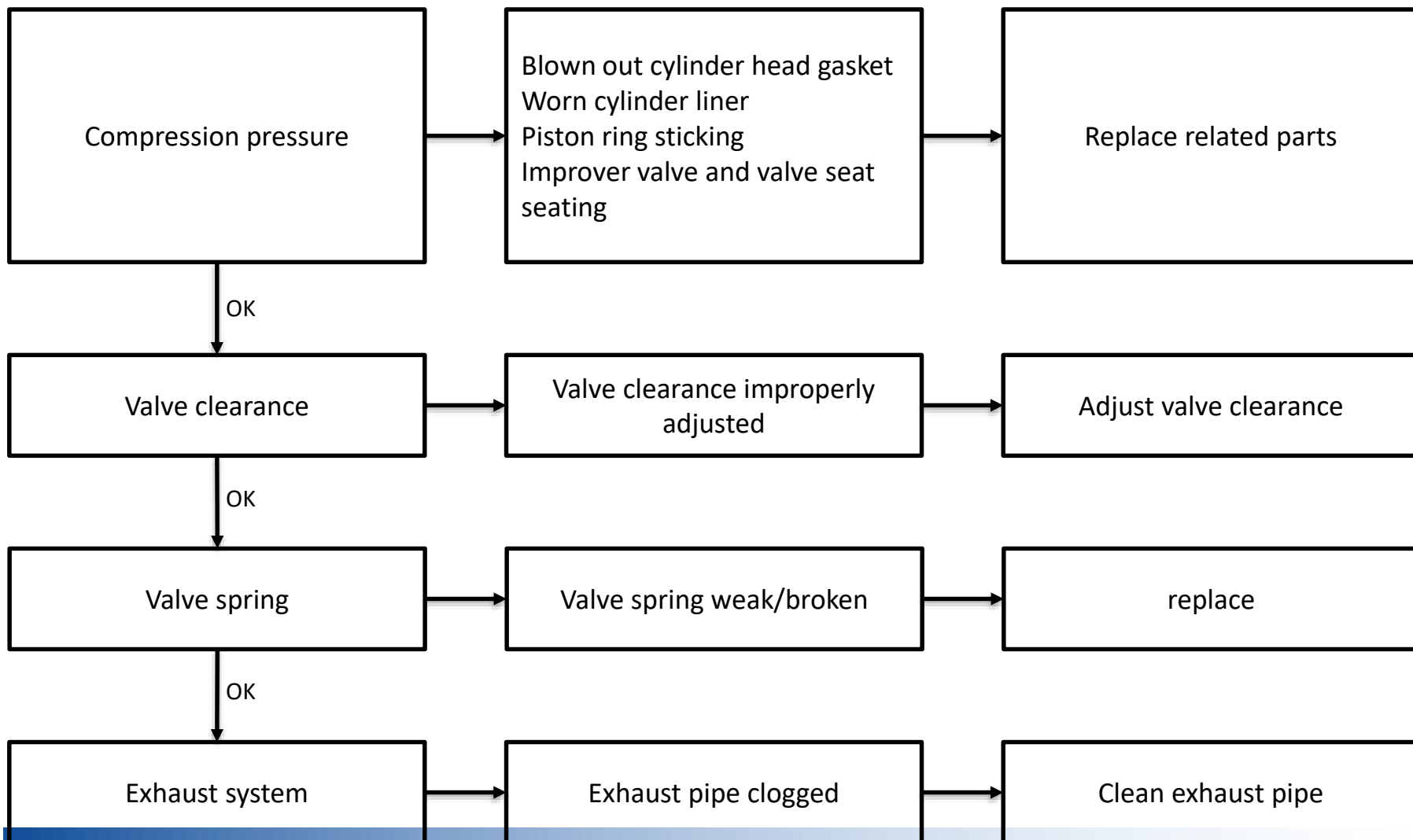
A. Engine

INSUFFICIENT POWER



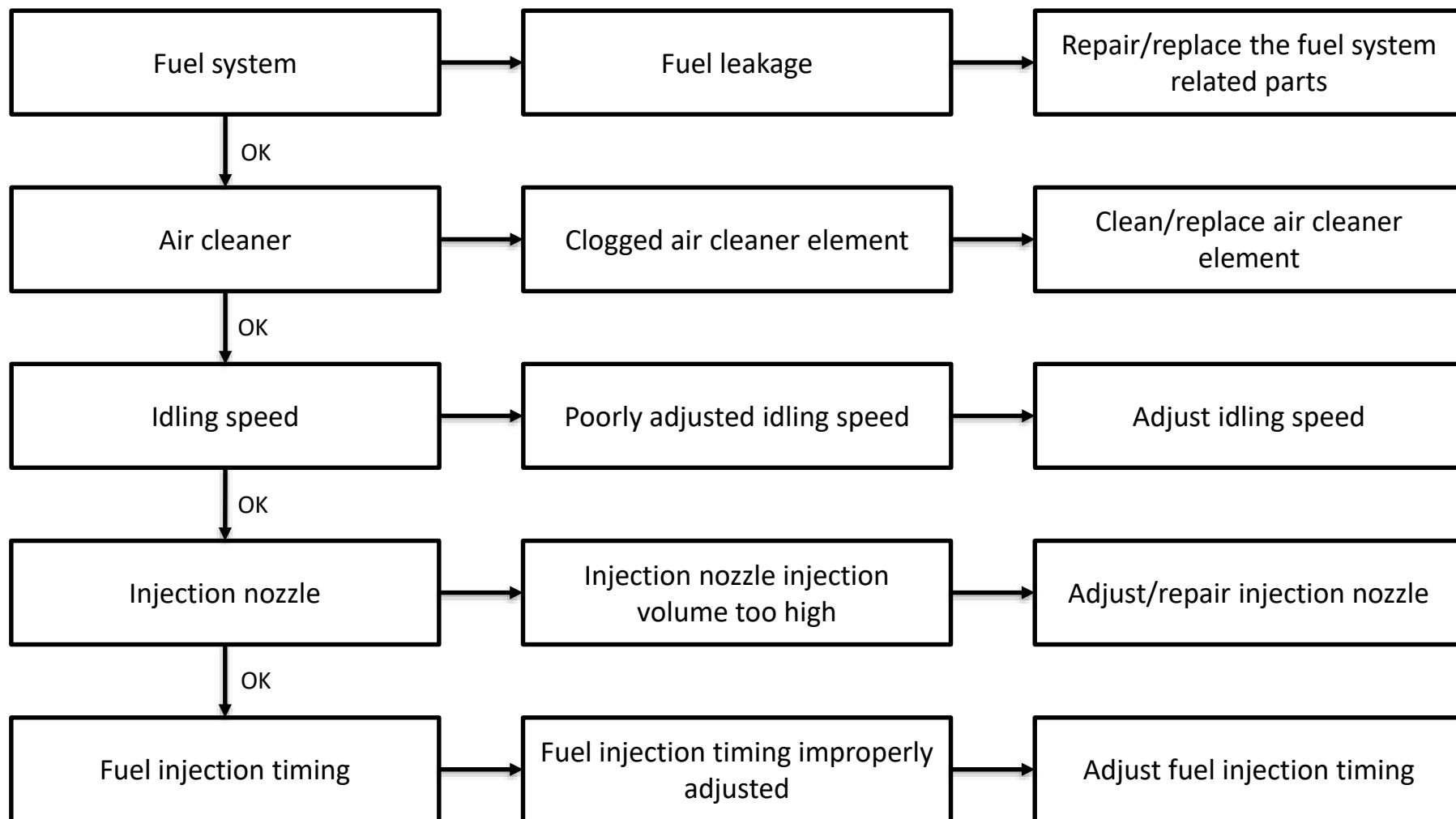
A. Engine

INSUFFICIENT POWER



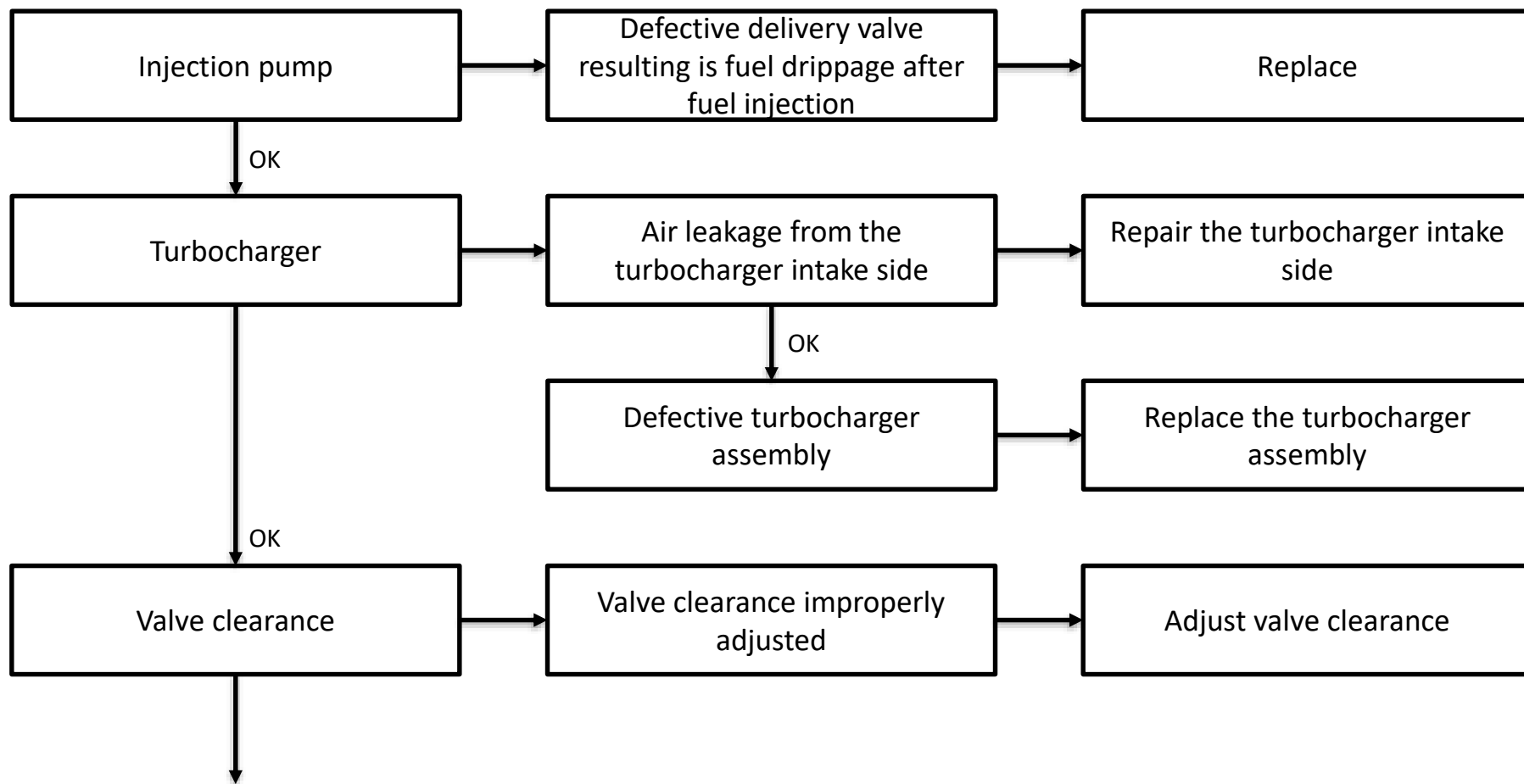
A. Engine

EXCESSIVE FUEL CONSUMPTION



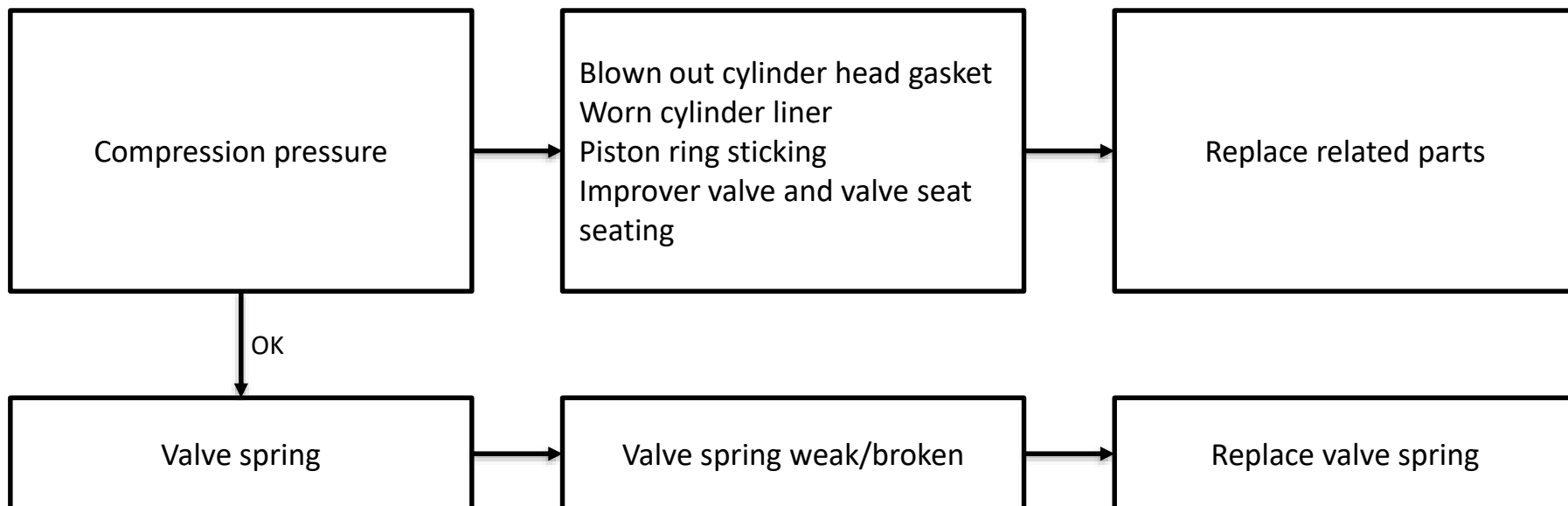
A. Engine

EXCESSIVE FUEL CONSUMPTION



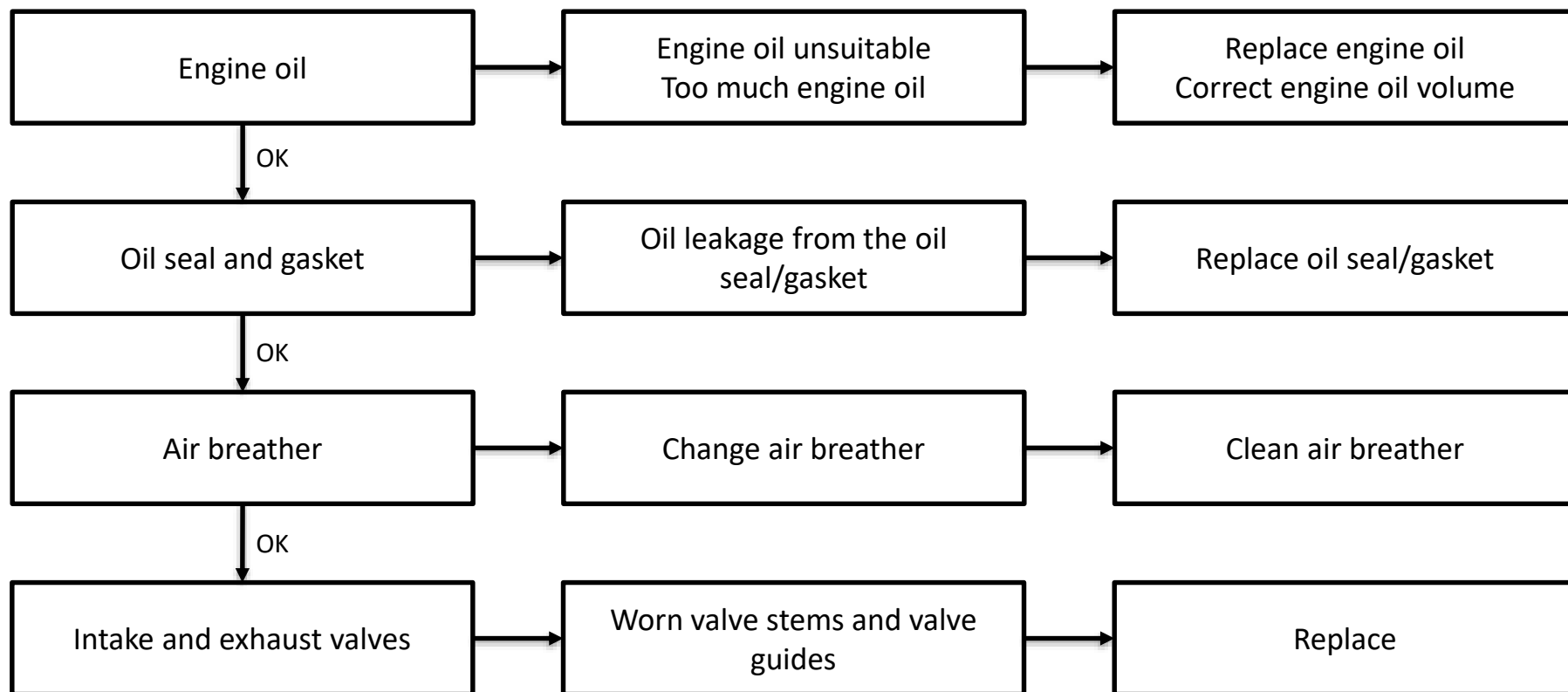
A. Engine

EXCESSIVE FUEL CONSUMPTION



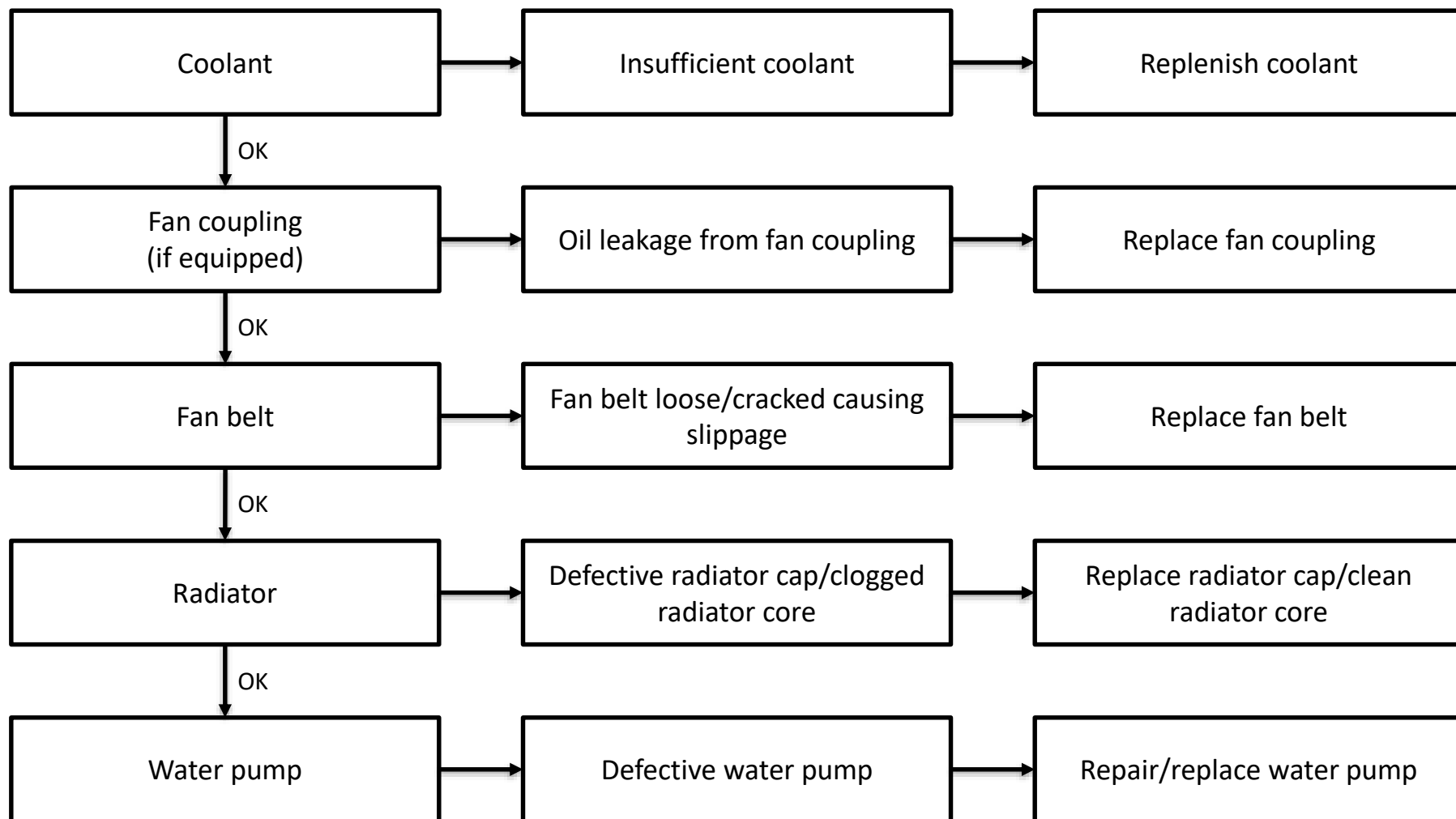
A. Engine

EXCESSIVE OIL CONSUMPTION



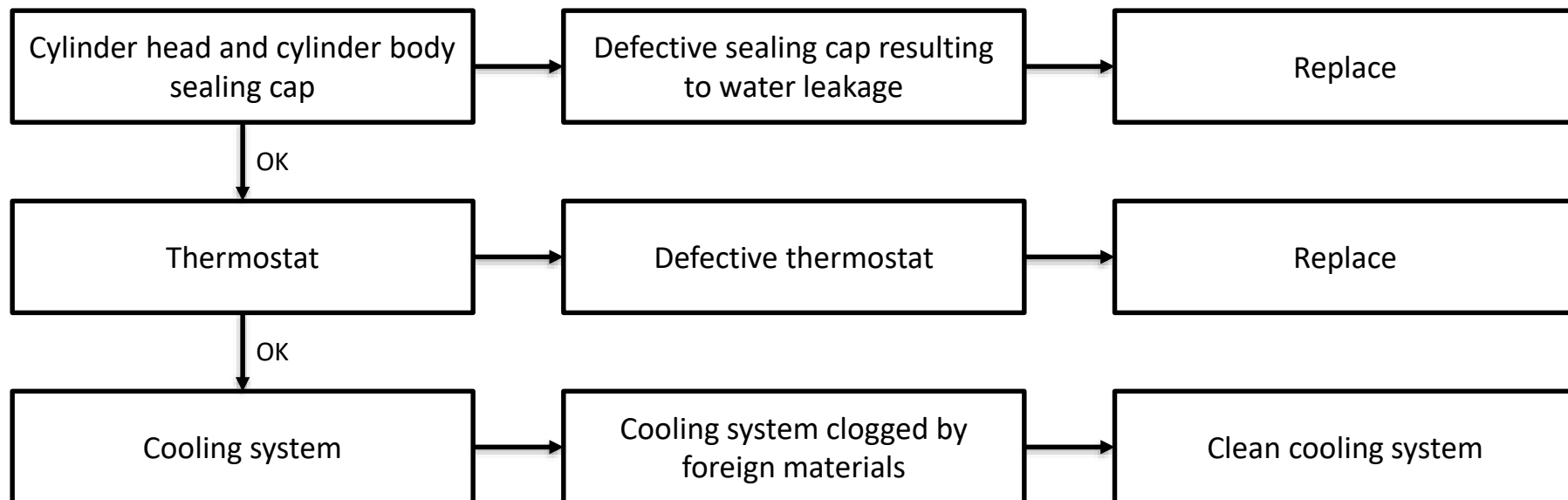
A. Engine

OVERHEATING



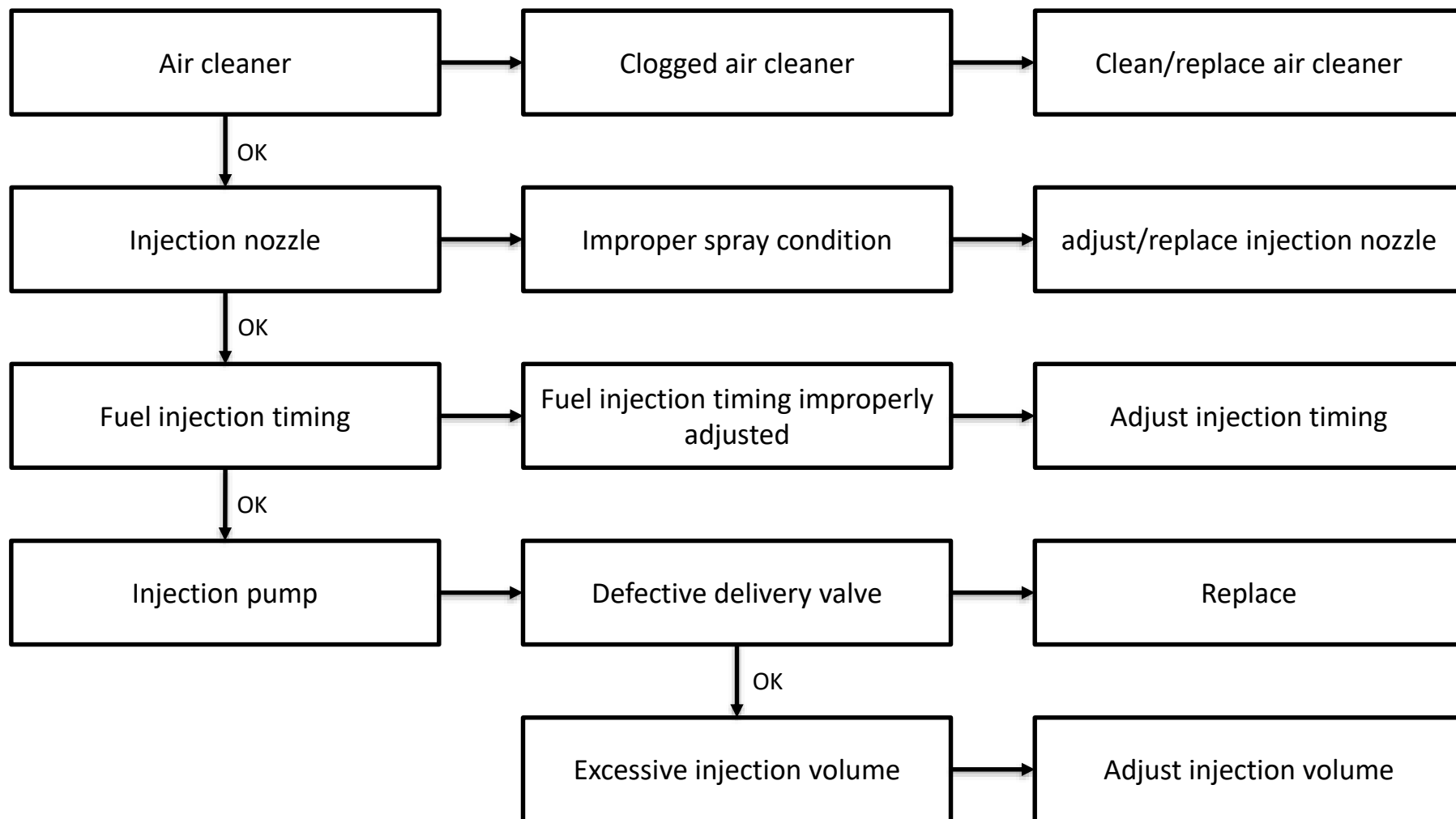
A. Engine

OVERHEATING



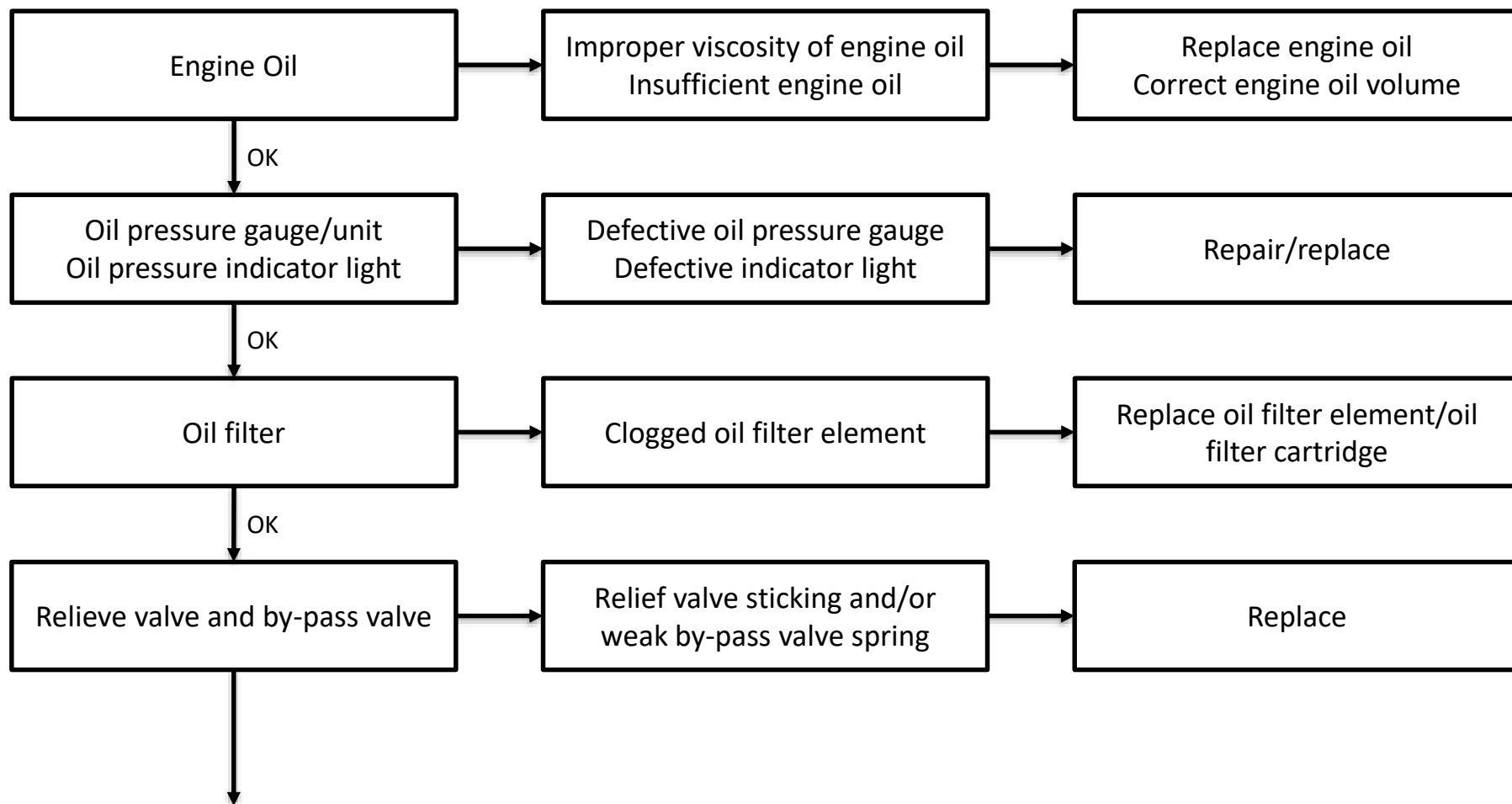
A. Engine

DARK EXHAUST SMOKE



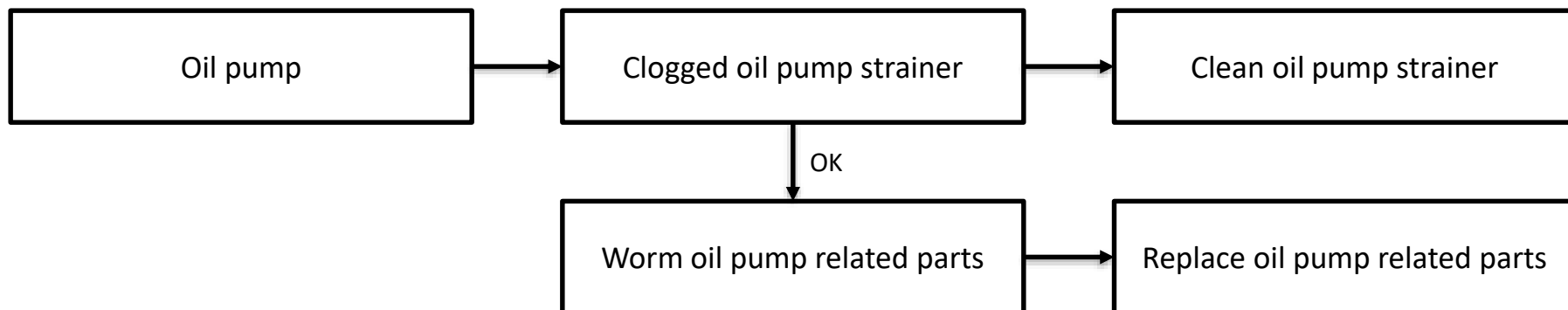
A. Engine

LOW OIL PRESSURE



A. Engine

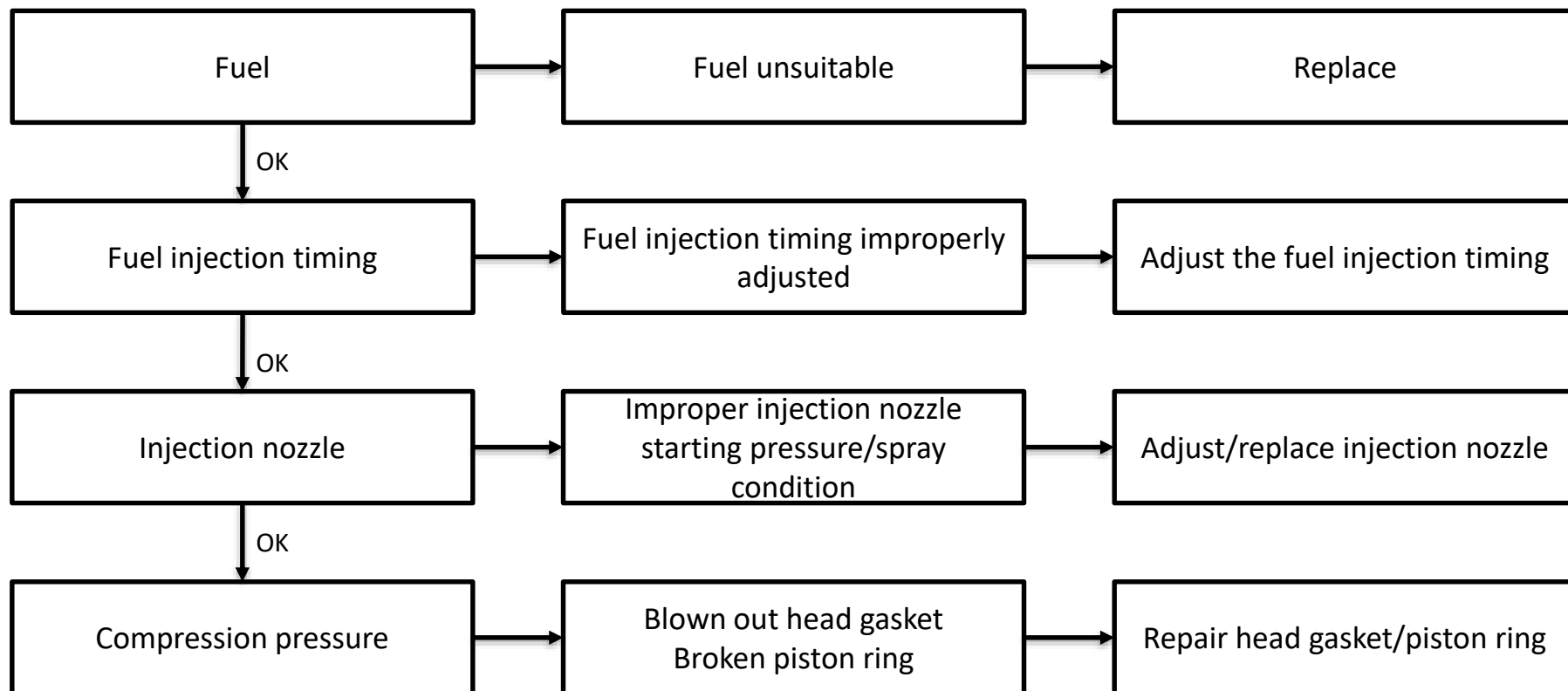
LOW OIL PRESSURE



A. Engine

ABNORMAL ENGINE NOISE

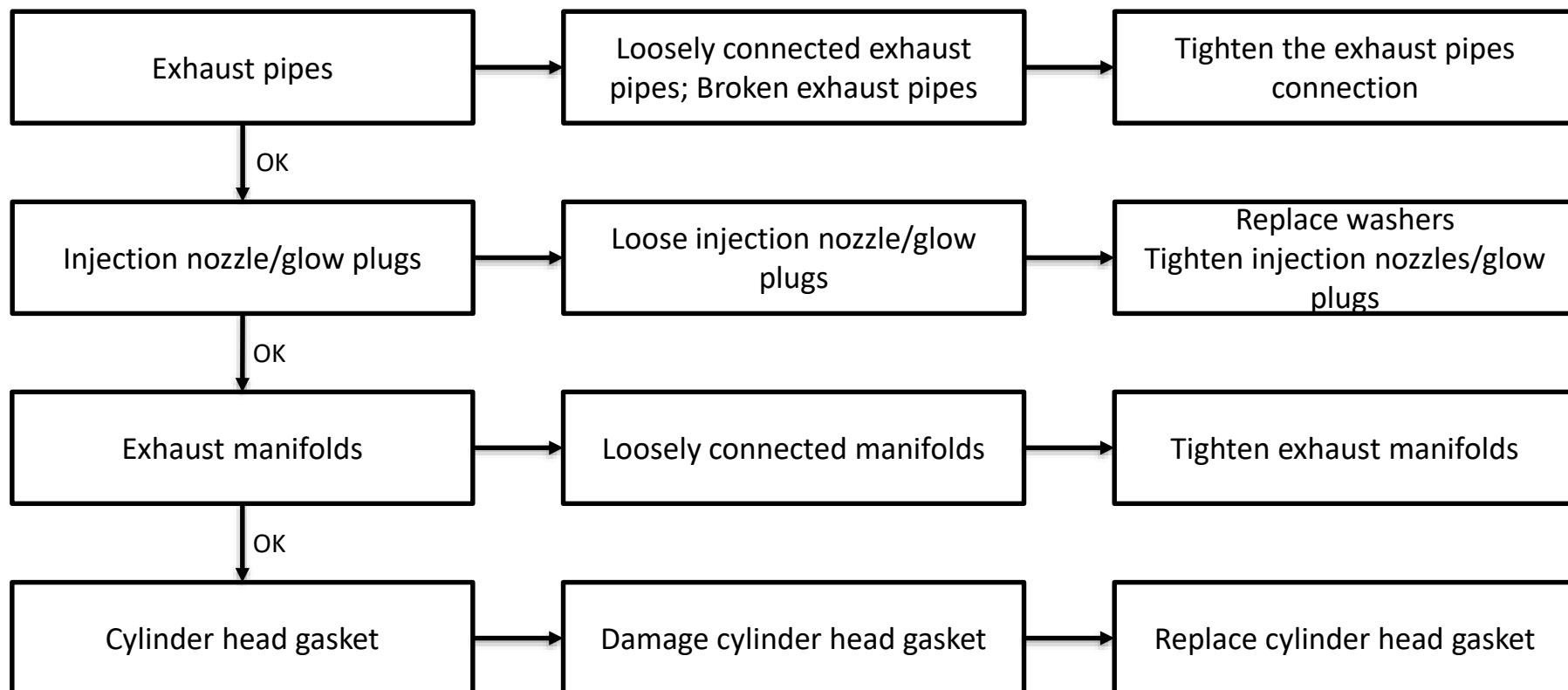
1) Engine knocking



A. Engine

ABNORMAL ENGINE NOISE

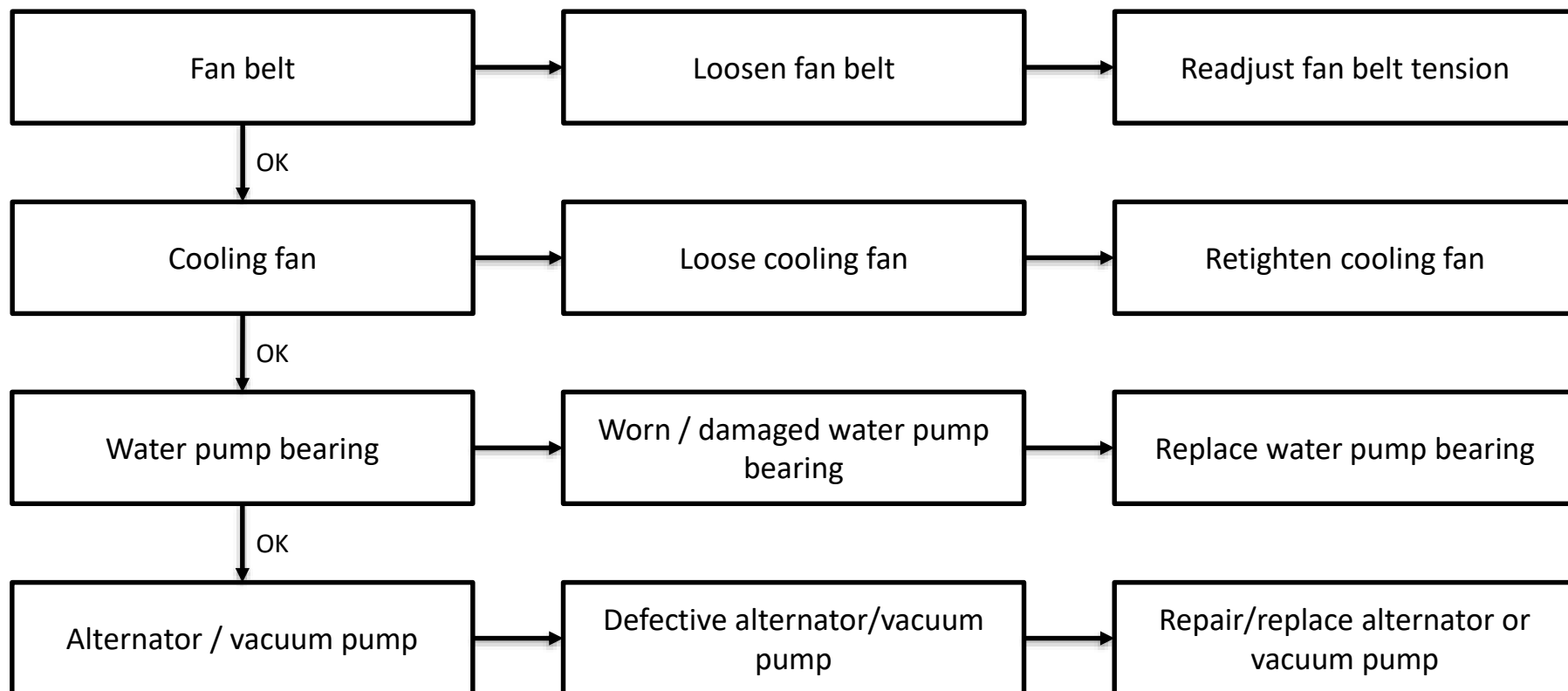
2) Gas leakage noise



A. Engine

ABNORMAL ENGINE NOISE

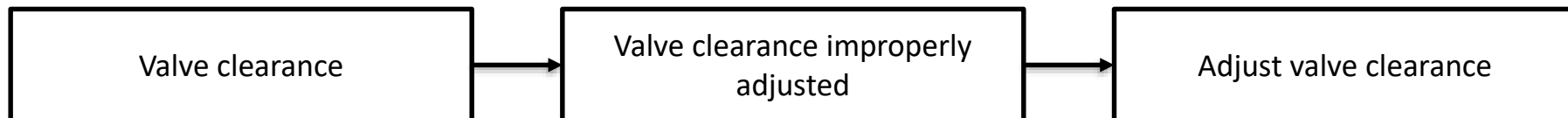
3) Continuous noise



A. Engine

ABNORMAL ENGINE NOISE

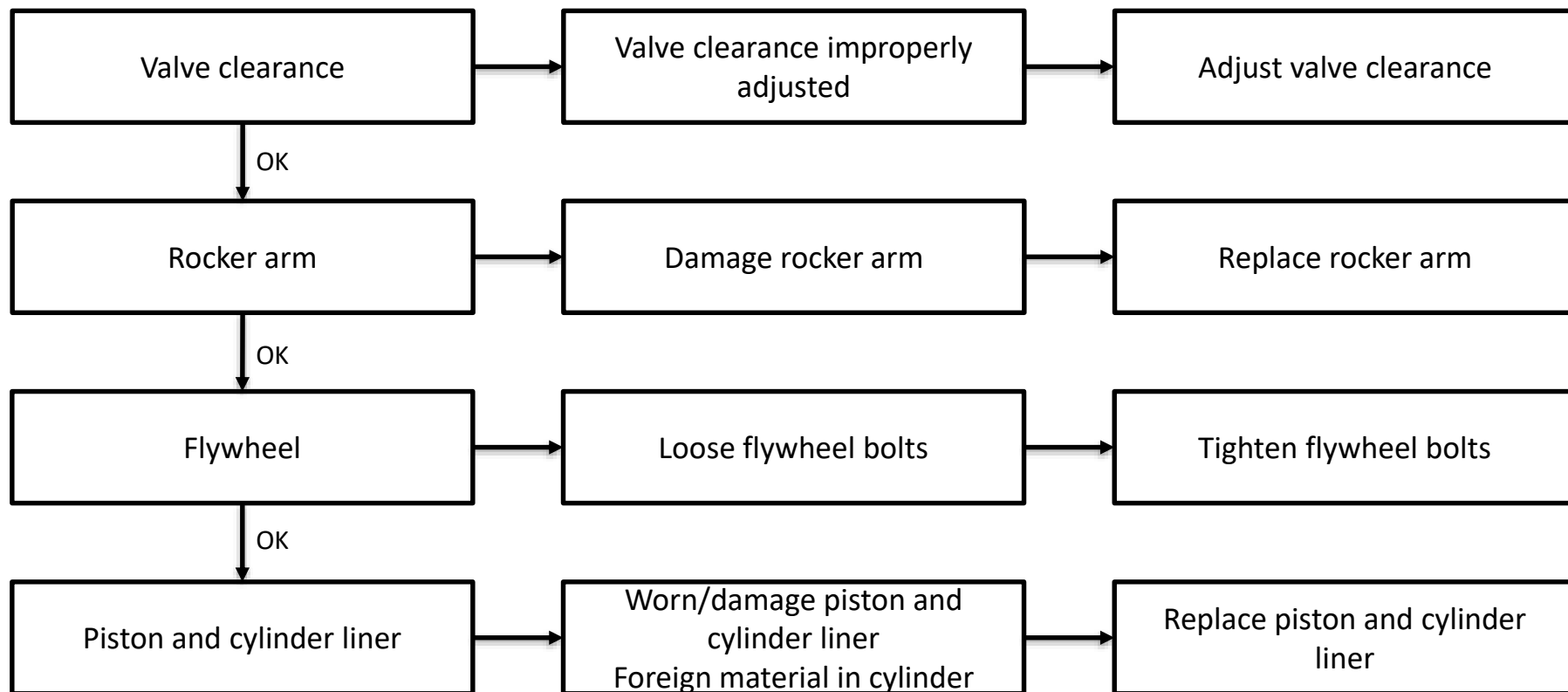
3) Continuous noise



A. Engine

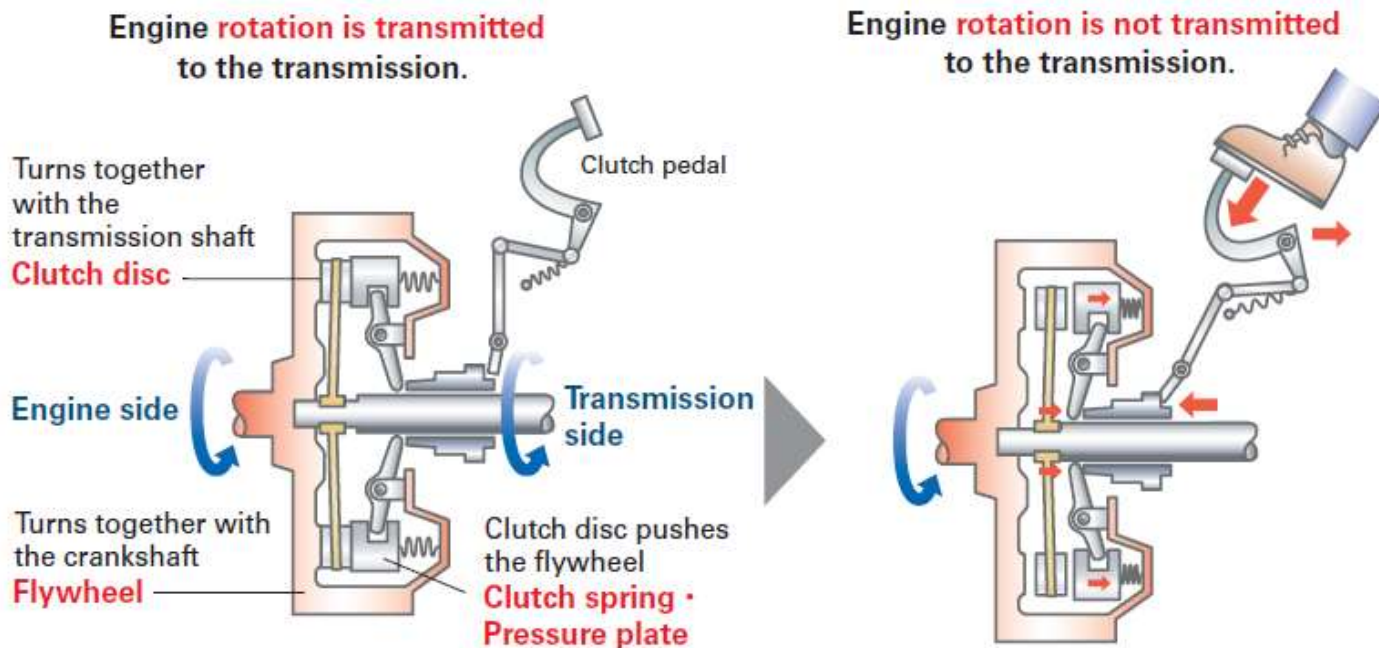
ABNORMAL ENGINE NOISE

4) Slapping noise



B. Drivetrain

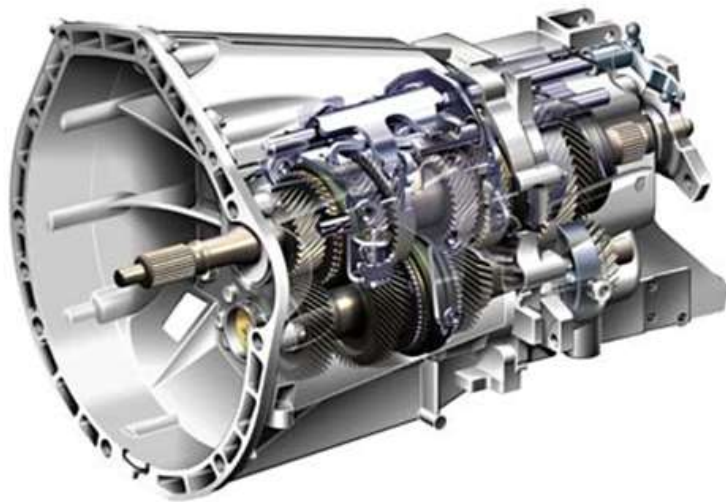
Clutch



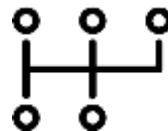
- Used to engage and disengage the engine to the transmission for smooth changing of gears.
- Used to transmit power produced by the engine to the transmission without slipping.

B. Drivetrain

Transmission



Manual Transmission



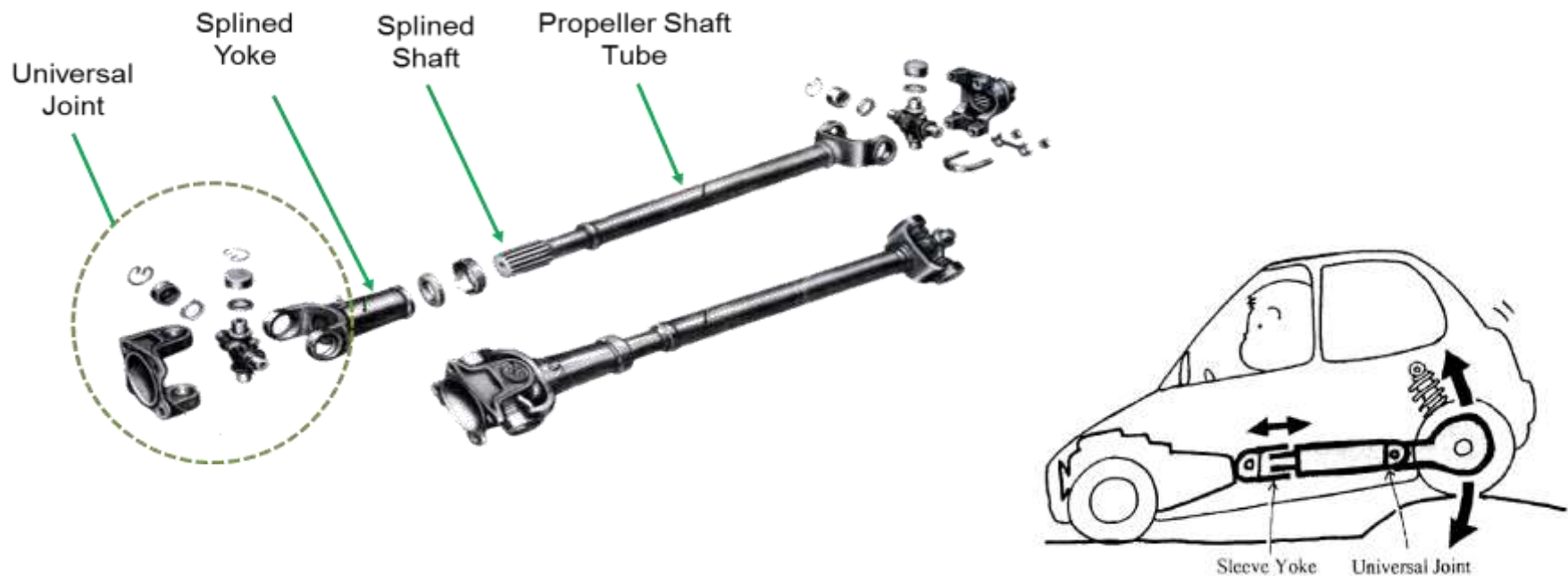
Automatic Transmission



- Used for easy start and acceleration.
- Used to generate driving force appropriate for road surface conditions.
- Provide a reverse gear for backward movement.

B. Drivetrain

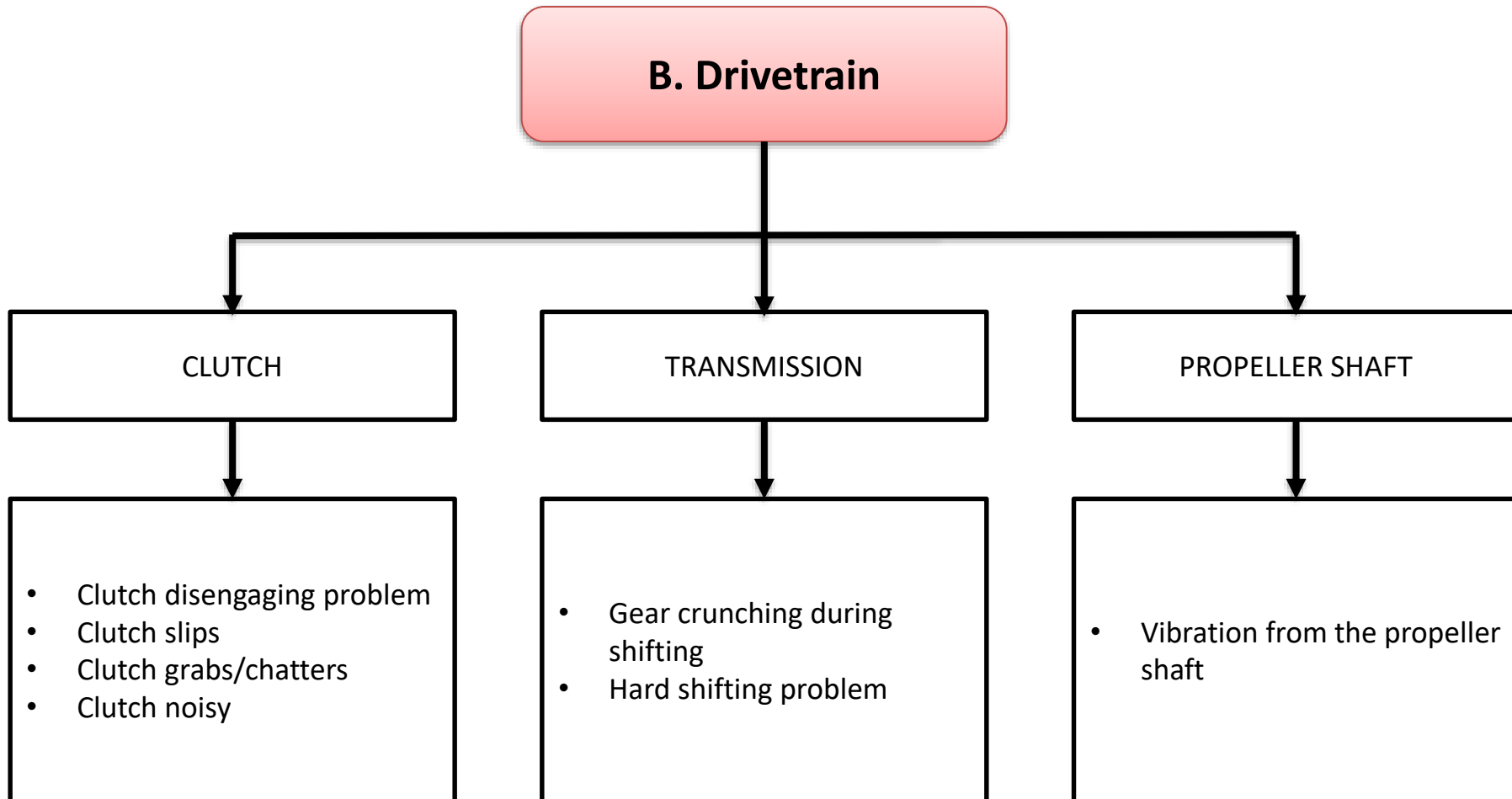
Propeller Shaft



A torque transmitting component (*shaped like a tube*) that connects the transmission and differential. It is used to transmit torque generated by transmission going to the differential.

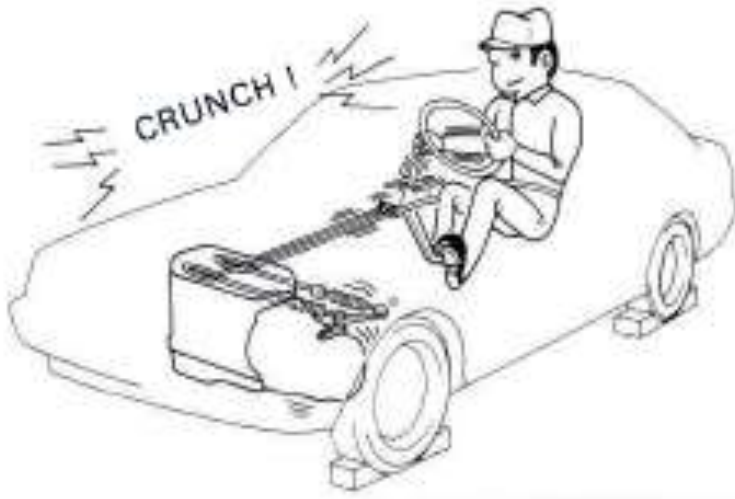
B. Drivetrain

Drivetrain Troubleshooting and Diagnostics



B. Drivetrain

On-vehicle Inspection for Clutch System



Clutch Disengaging Problem

1. Put Stoppers under the wheels.
2. Fully set the parking brake .
3. Depress the brake pedal and start the engine.
4. Release the clutch pedal with the shift lever in neutral position.
5. Shift the lever slowly and gently to the reverse position without depressing the clutch pedal, and wait for the gears to clash.
6. When the gears clash, depress the clutch pedal slowly.

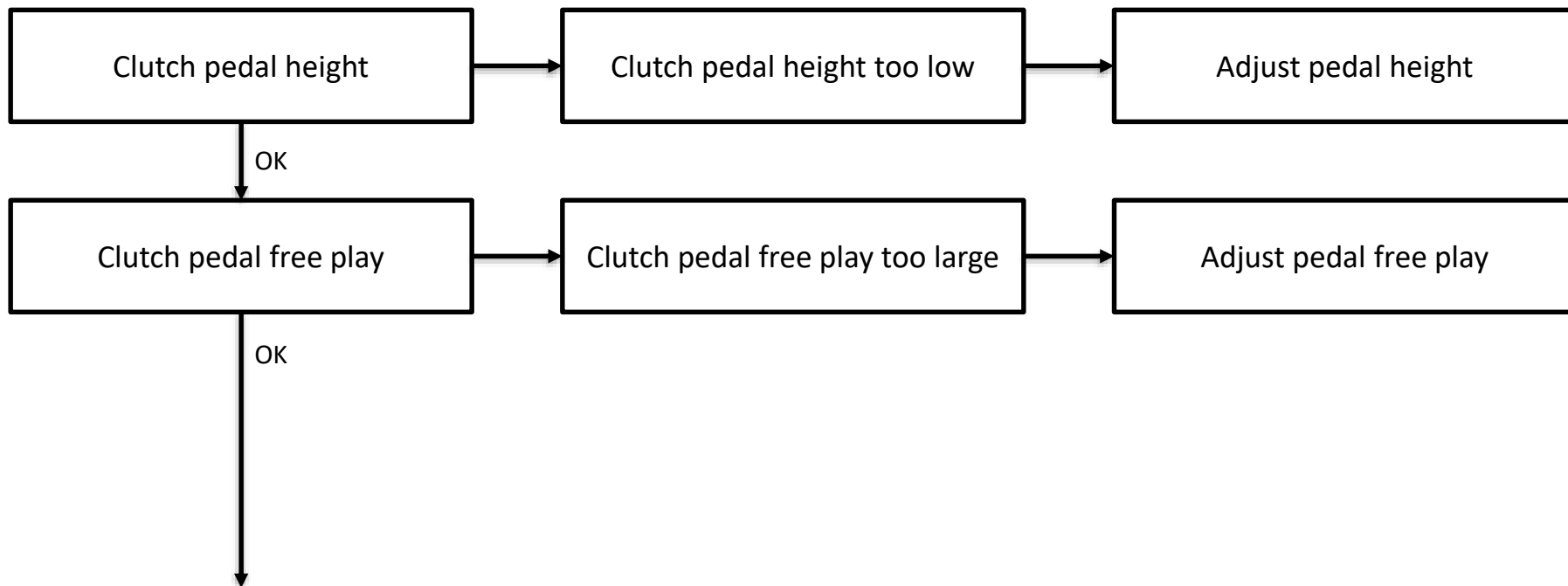
HINT: If the gear clashing stops as the pedal is further depressed and the gears shift smoothly, you may conclude that the clutch has no disengaging problem.

B. Drivetrain

1. Clutch

Clutch Disengaging Problem

(Hard to Shift/will not shift)

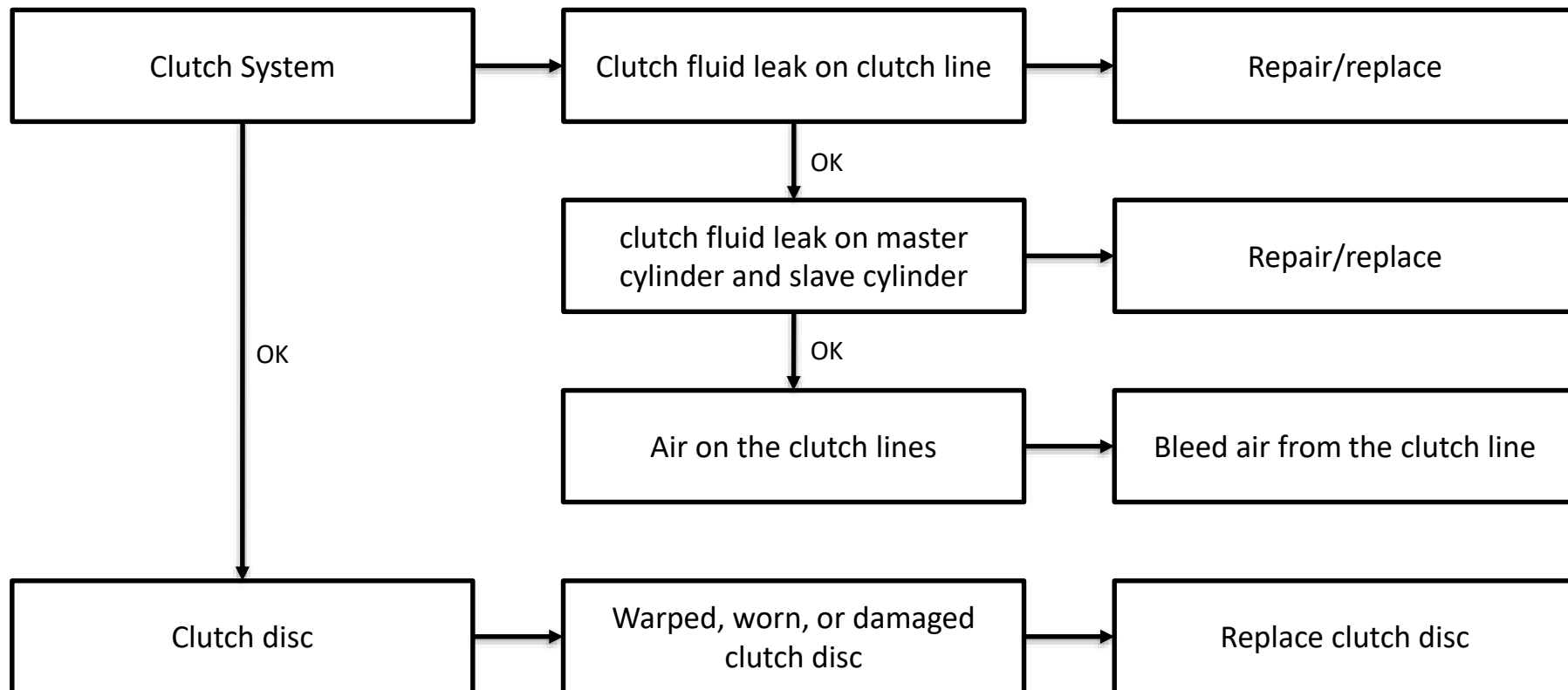


B. Drivetrain

1. Clutch

Clutch Disengaging Problem

(Hard to Shift/will not shift)



B. Drivetrain

On-vehicle Inspection for Clutch System



Clutch Slips

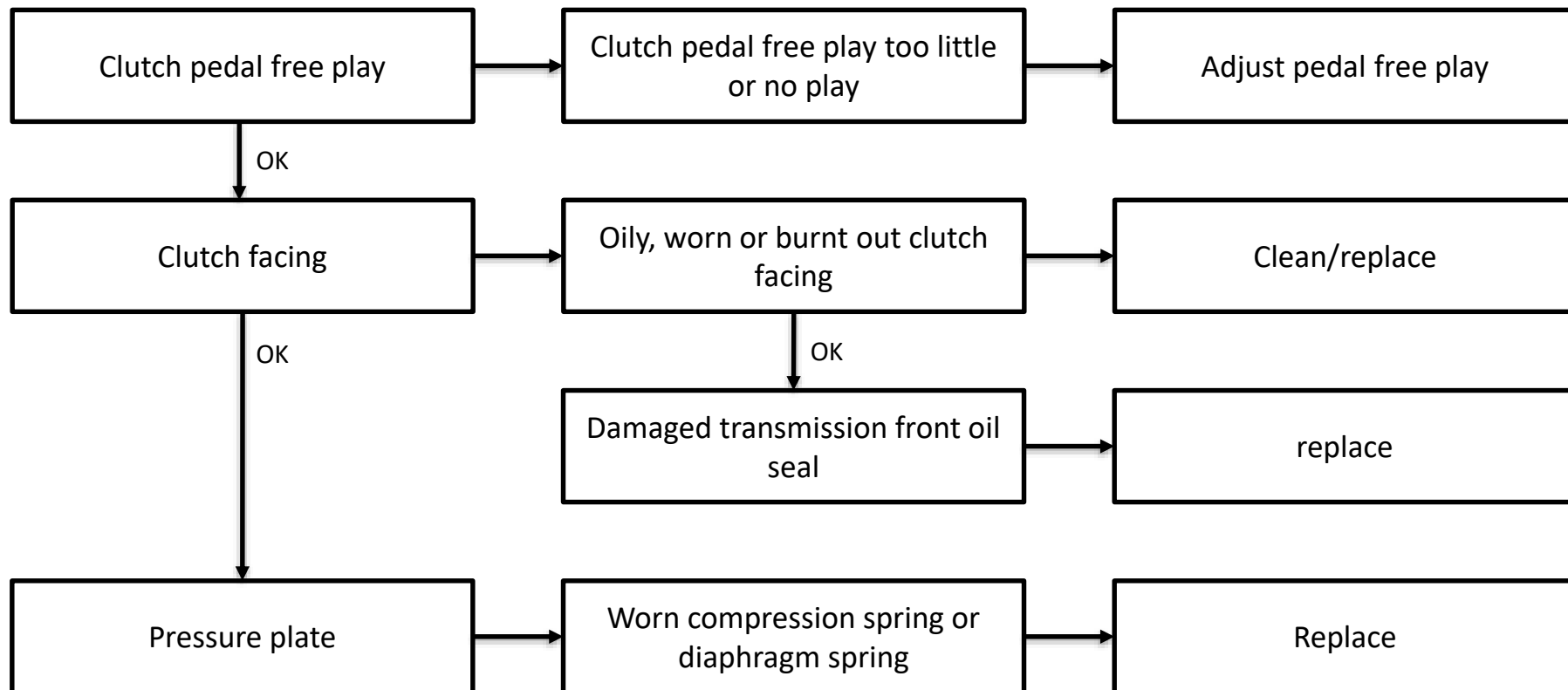
1. Put Stoppers under the wheels.
2. Fully set the parking brake .
3. Depress the brake pedal and start the engine.
4. Set the shift lever in the highest gear (5th gear)
5. Increase the engine speed gradually and release the clutch pedal slowly.

HINT: If the engine stalls (stop) you may conclude that the clutch is not slipping.

B. Drivetrain

1. Clutch

Clutch Slips



B. Drivetrain

On-vehicle Inspection for Clutch System



Clutch engaging problem

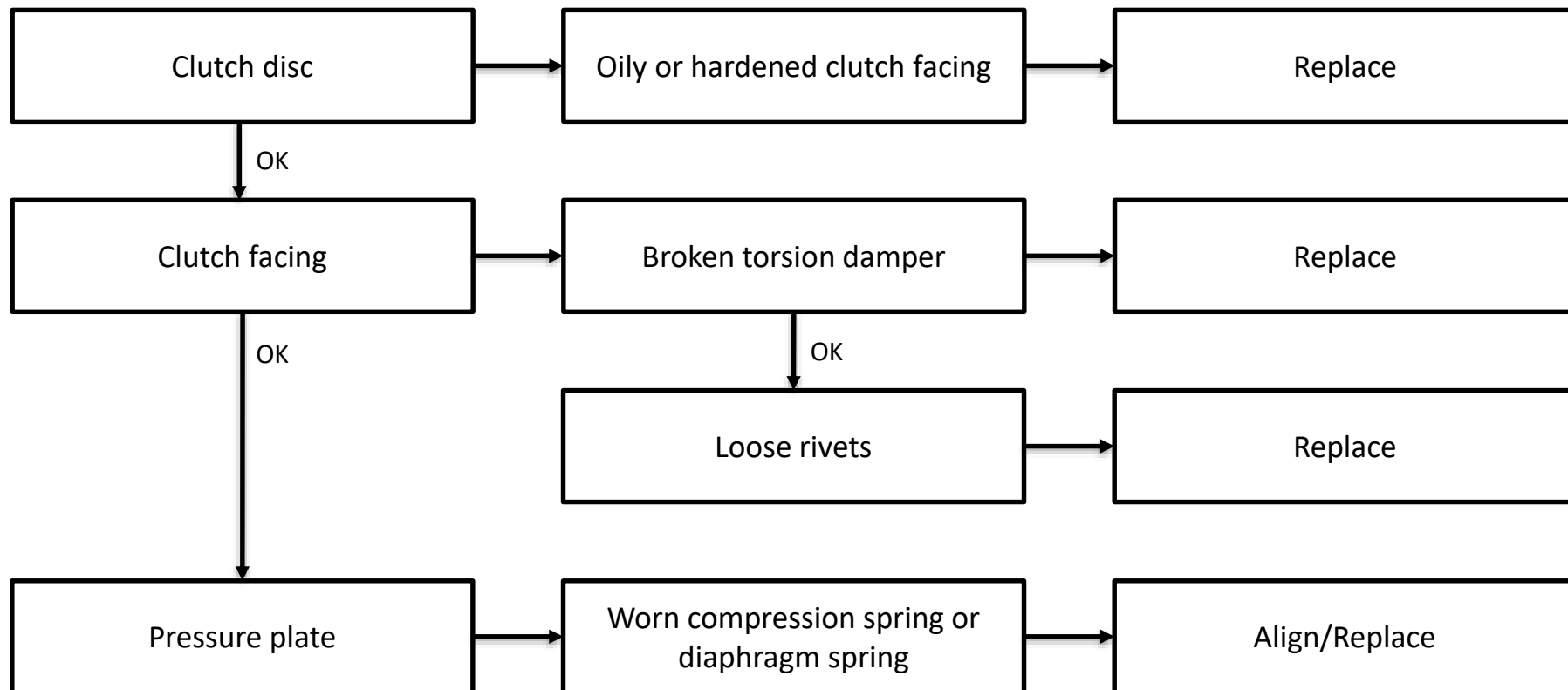
1. Remove the wheel stopper, and put the shift lever in low gear.
2. Engage the clutch, and start the car slowly

HINT: if the vehicle moves off without unpleasant vibrations, the clutch has no engaging problem.

B. Drivetrain

1. Clutch

Clutch Grabs/Chatters



B. Drivetrain

On-vehicle Inspection for Clutch System



Unusual sounds or noise from the clutch

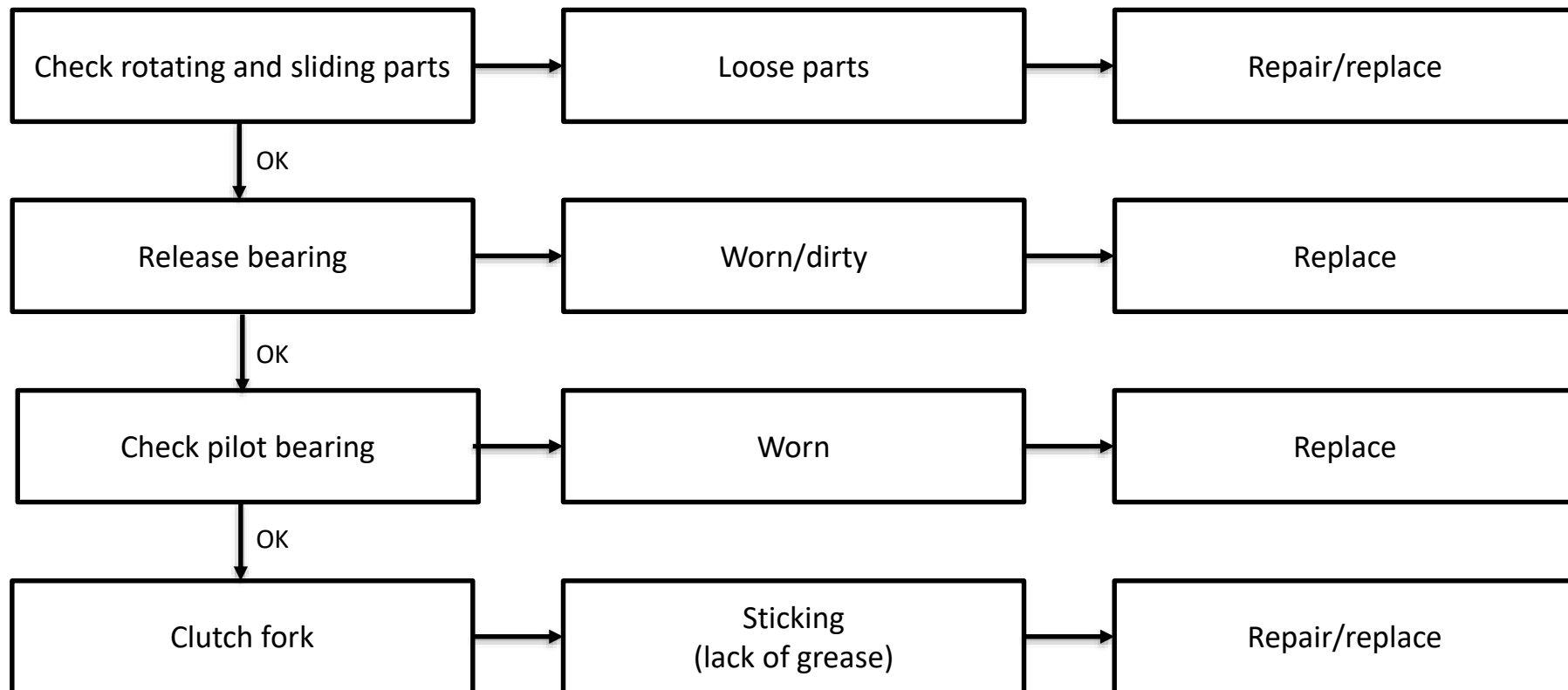
1. Put stoppers under the wheels.
2. Depress the clutch pedal, and start the engine.
3. Release the clutch pedal, with the shift lever in the neutral position.
4. Depress the clutch pedal again completely.

HINT: Repeatedly depress and release the pedal, both quickly and slowly, to check for unusual sounds from the clutch.

B. Drivetrain

1. Clutch

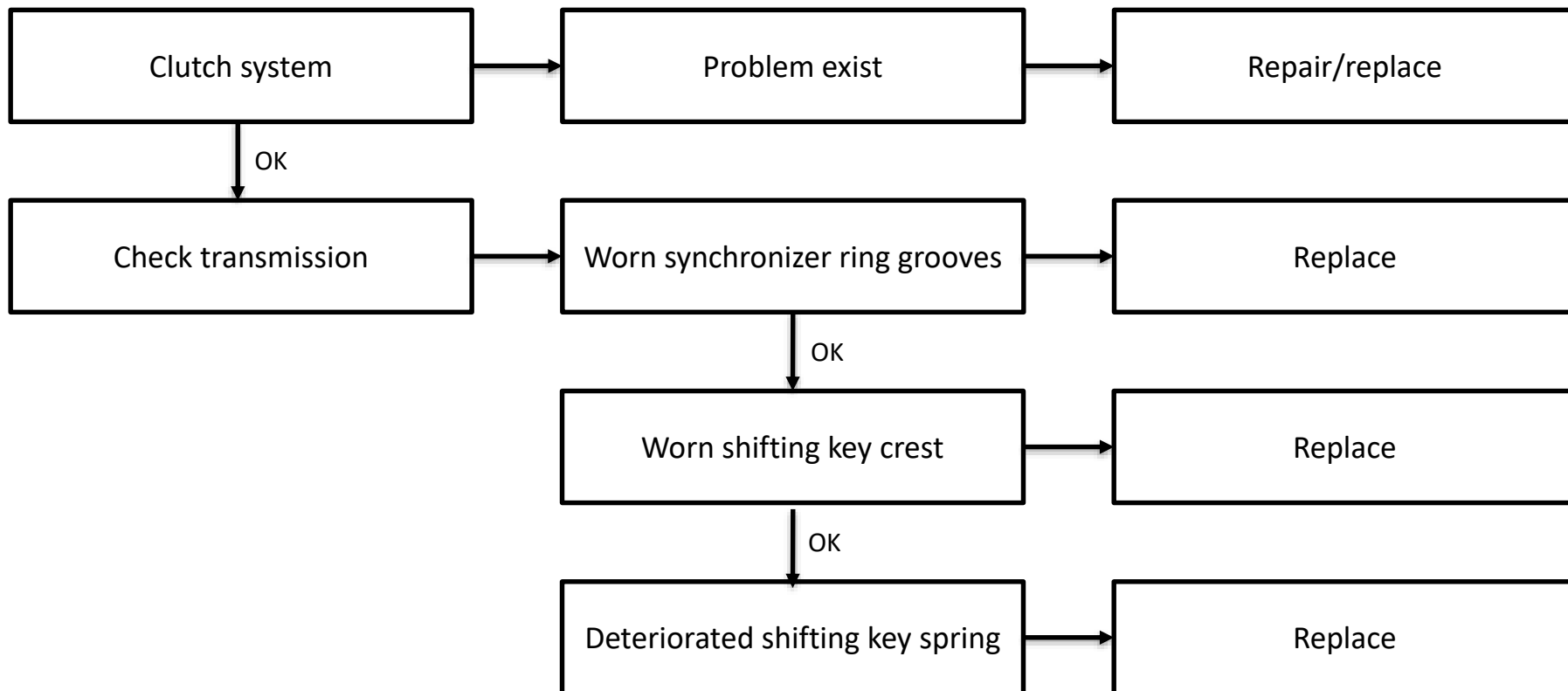
Clutch Noisy



B. Drivetrain

2. Transmission

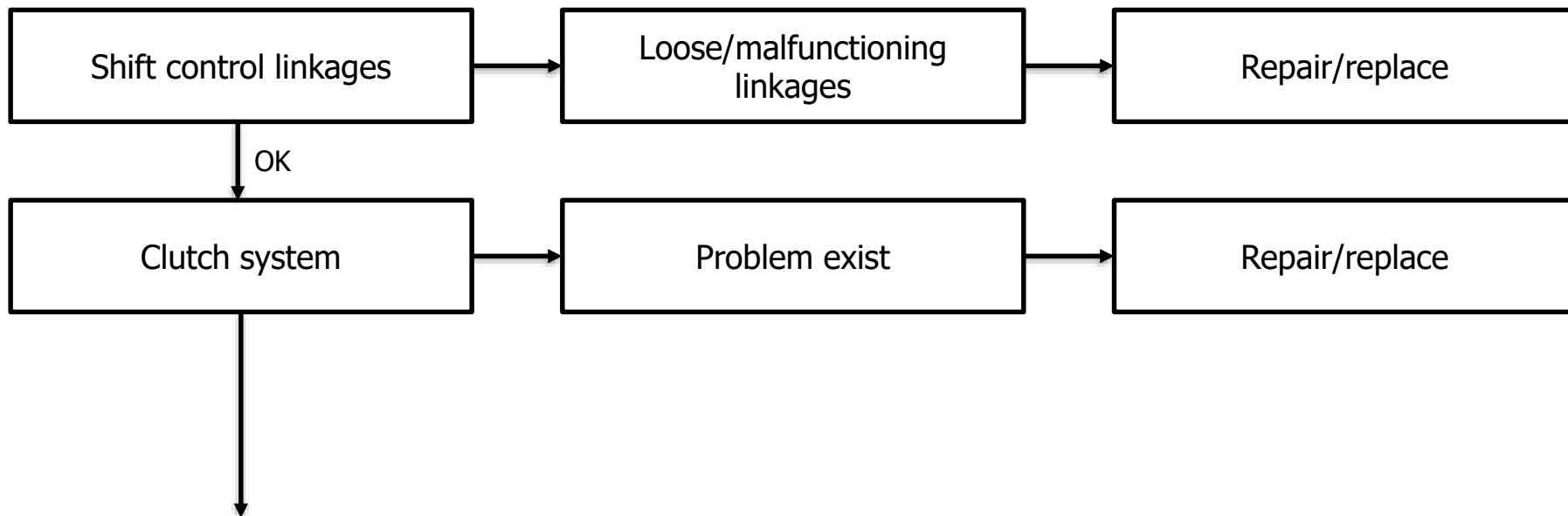
Gear crunching during shifting



B. Drivetrain

2. Transmission

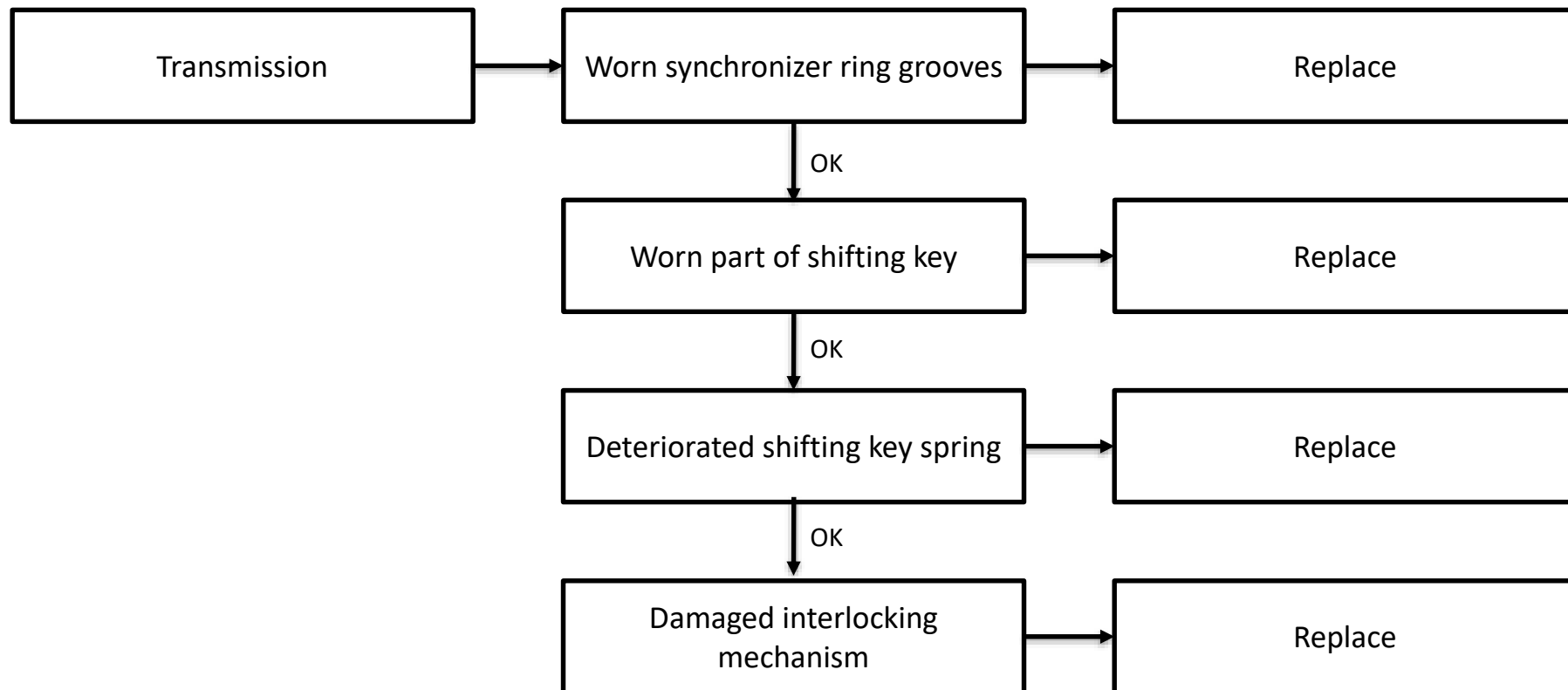
Hard shifting problems



B. Drivetrain

2. Transmission

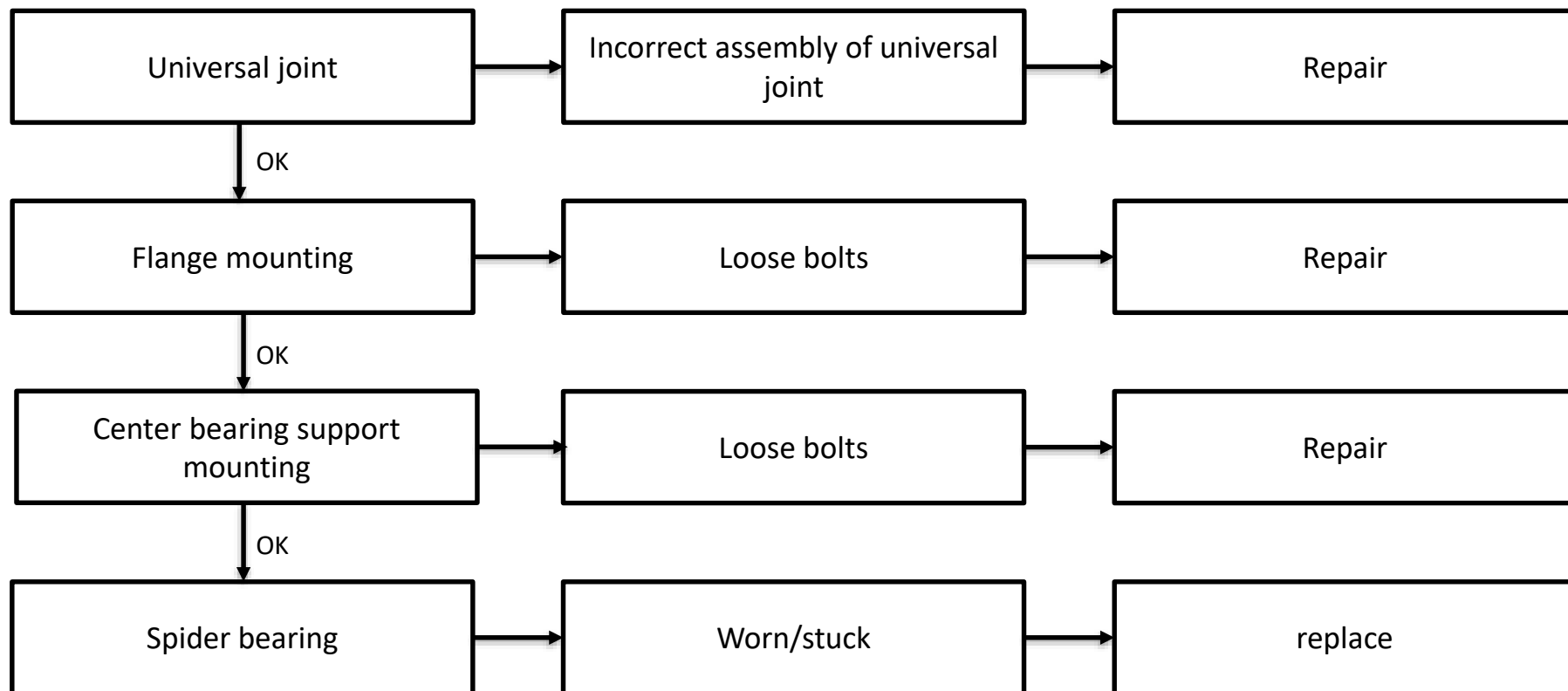
Hard shifting problems



B. Drivetrain

3. Propeller shaft

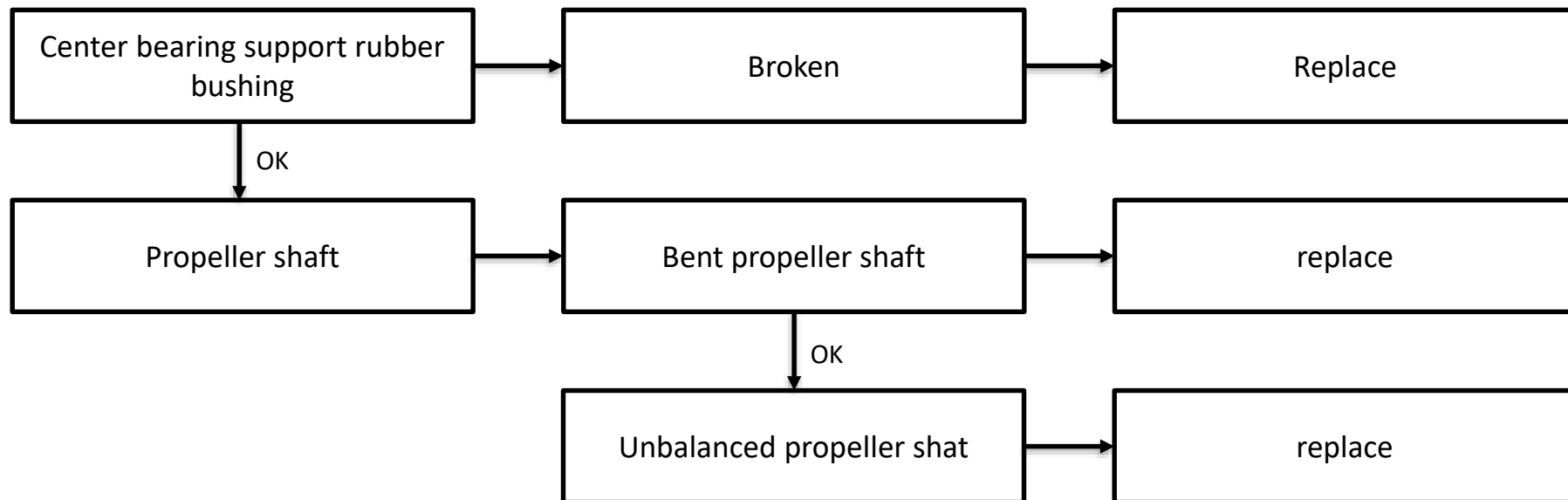
Vibration from the propeller shaft



B. Drivetrain

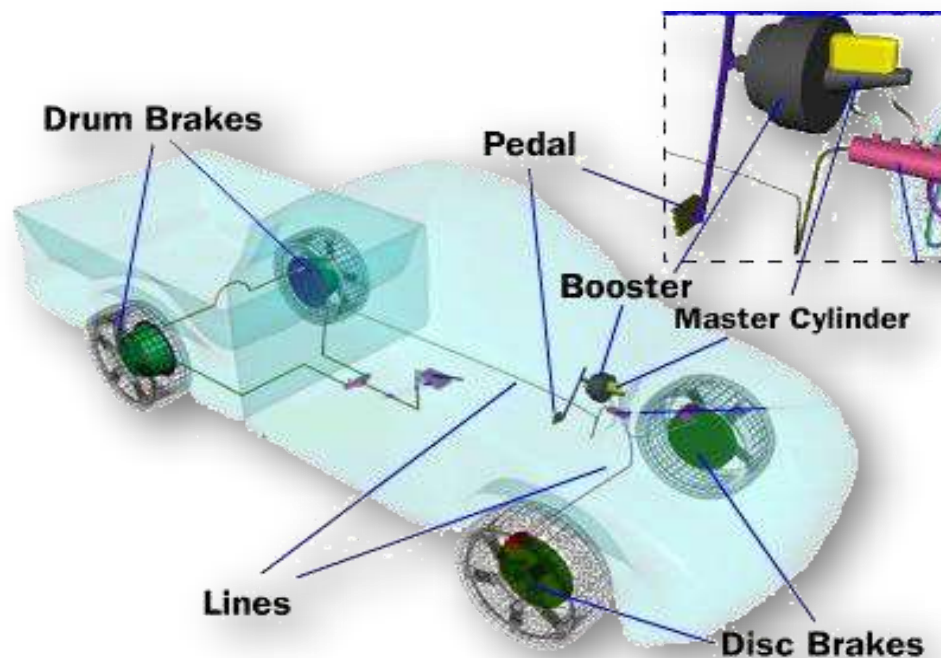
3. Propeller shaft

**Vibration from the
propeller shaft**



C. Underchassis

Brake System



The brake system is the most fundamental safety feature on a modern automobile. It must be able to bring the vehicle to a safe and controlled stop, regardless of road surface and condition.

C. Underchassis

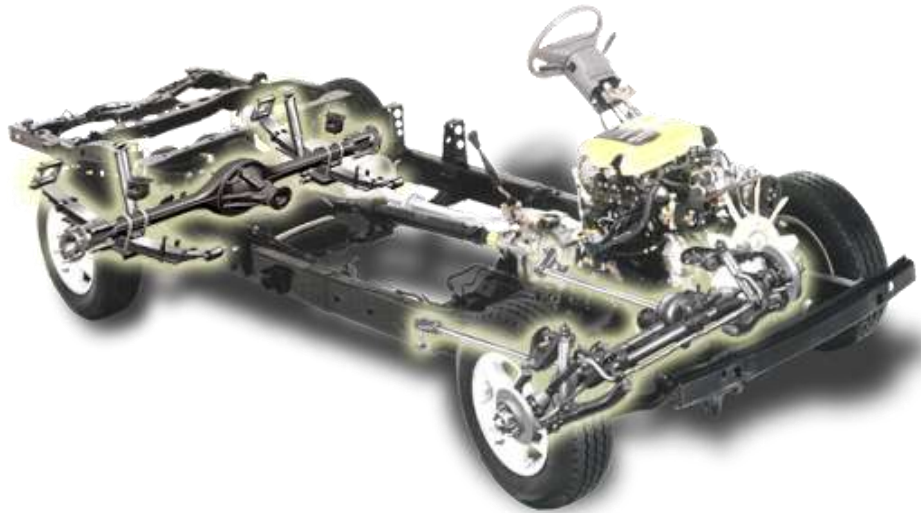
Steering



The steering system is a group of parts that transmit the movement of the steering wheel to the front, and sometimes the rear, wheels. The primary purpose of the steering system is to allow the driver to guide the vehicle.

C. Underchassis

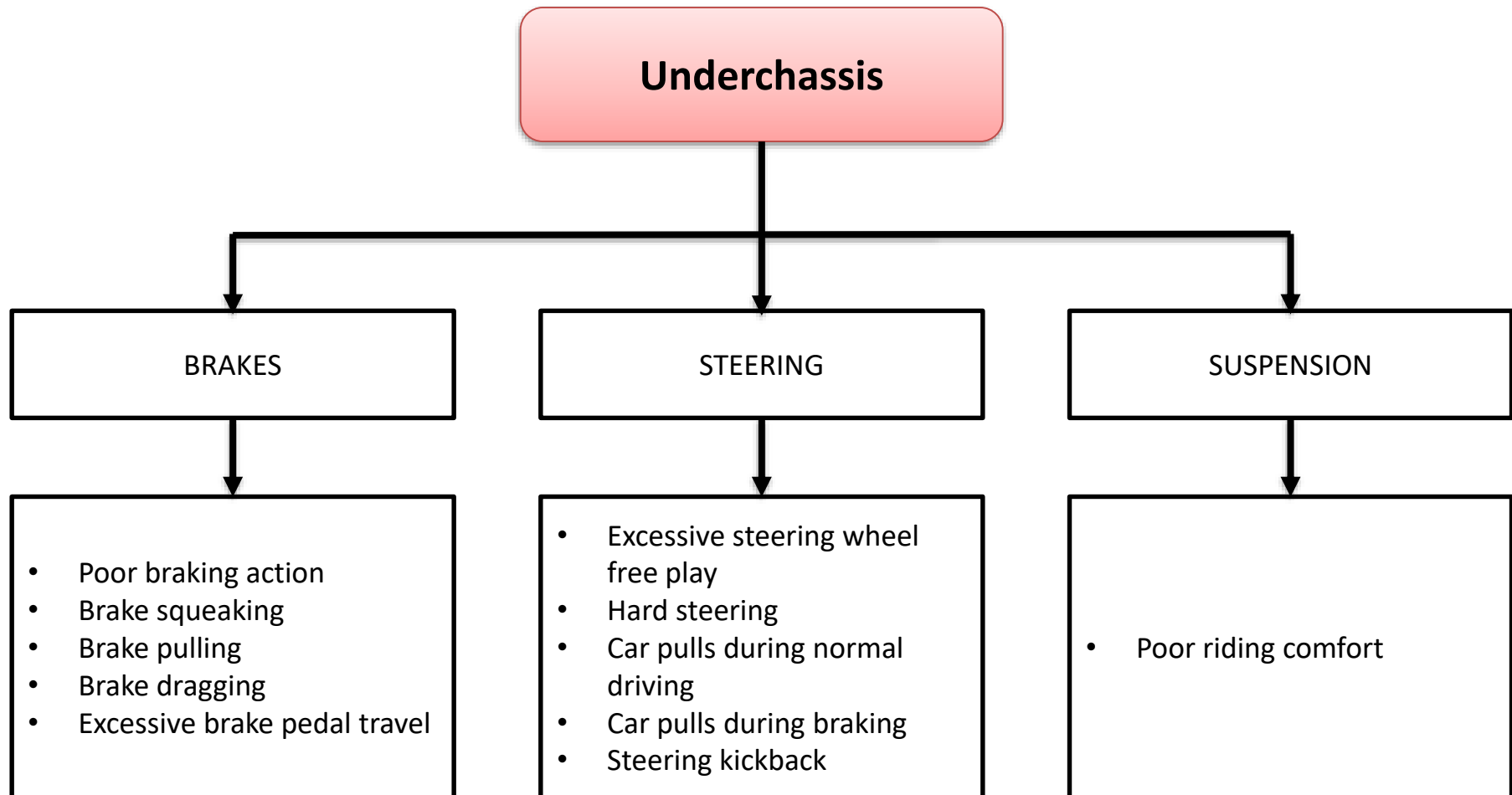
Suspension



- Support the weight of the vehicle.
- Cushion bumps and holes in the road.
- Maintain traction between the tires and the road.

C. Underchassis

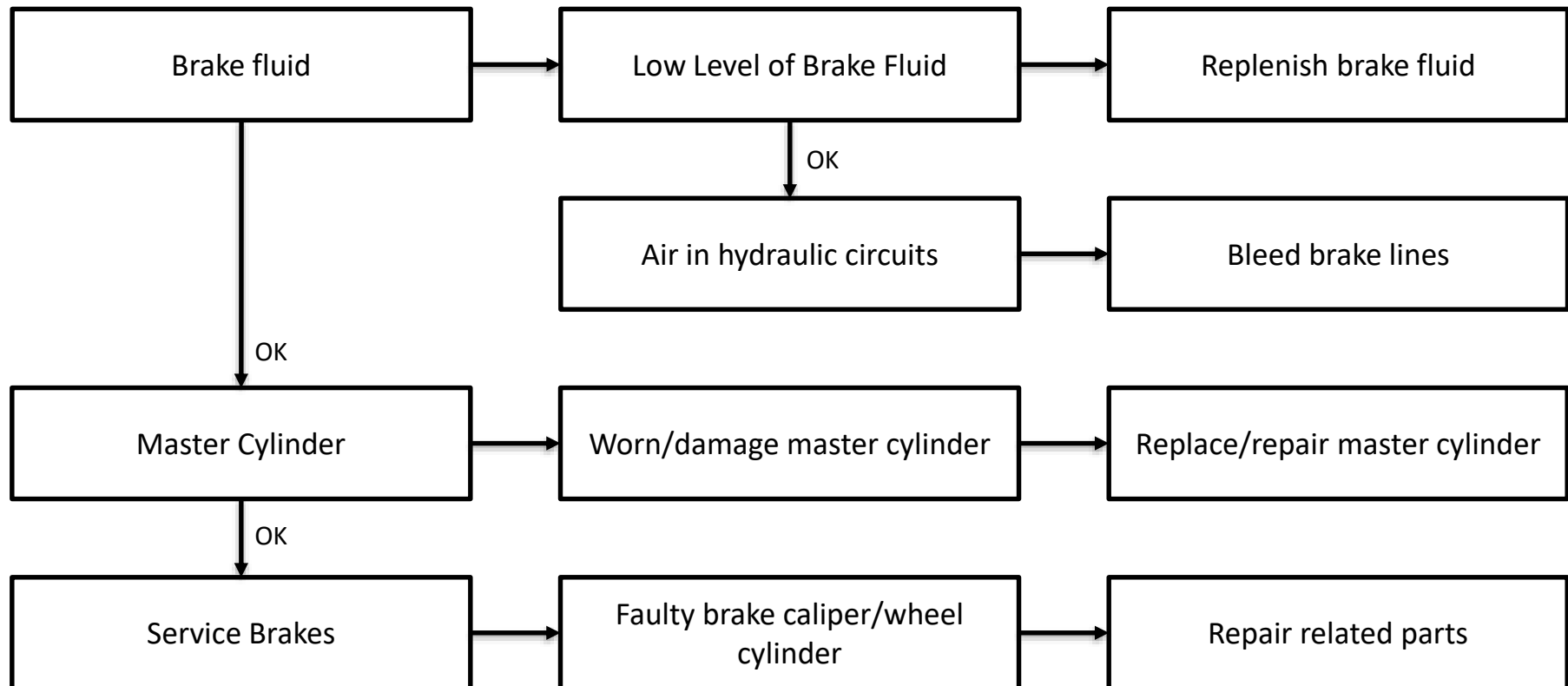
Drivetrain Troubleshooting and Diagnostics



C. Underchassis

1. Brake System

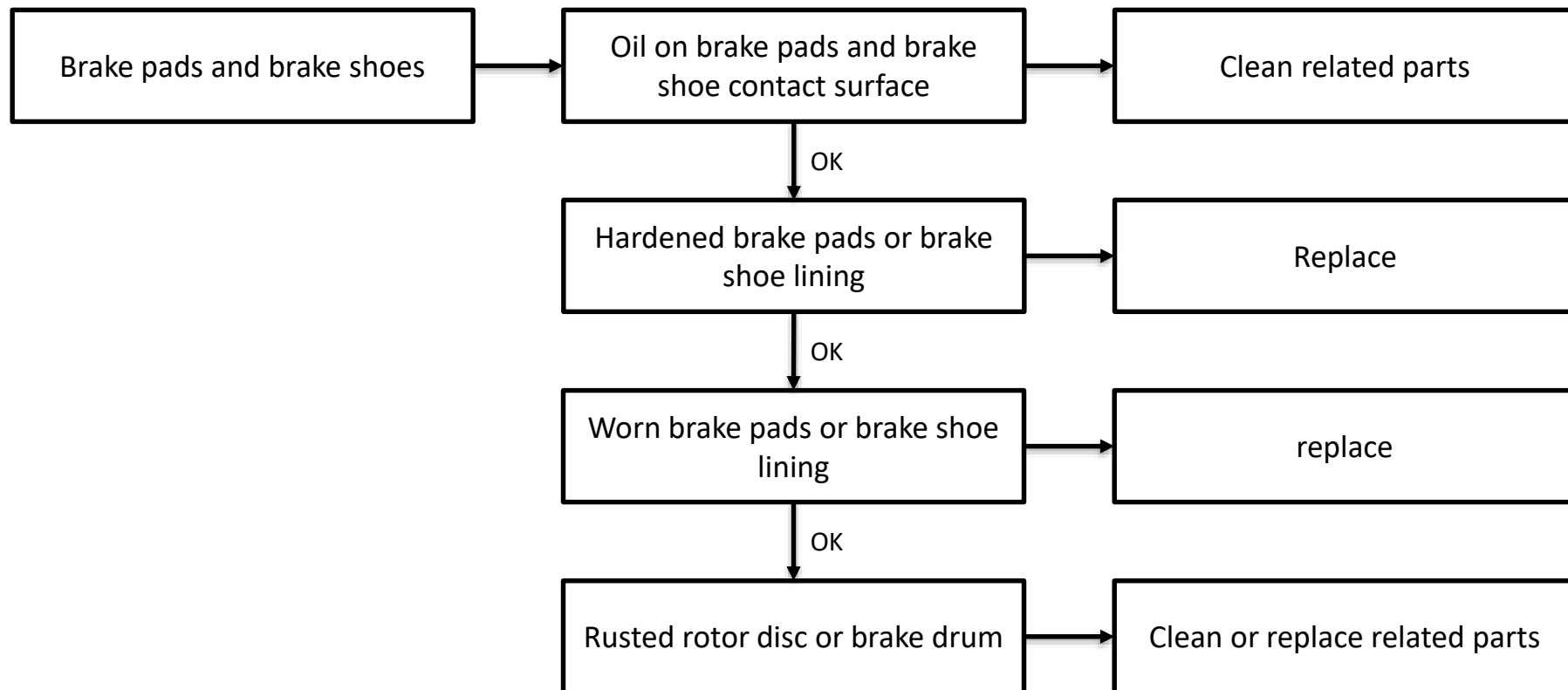
Poor Braking Action



C. Underchassis

1. Brake System

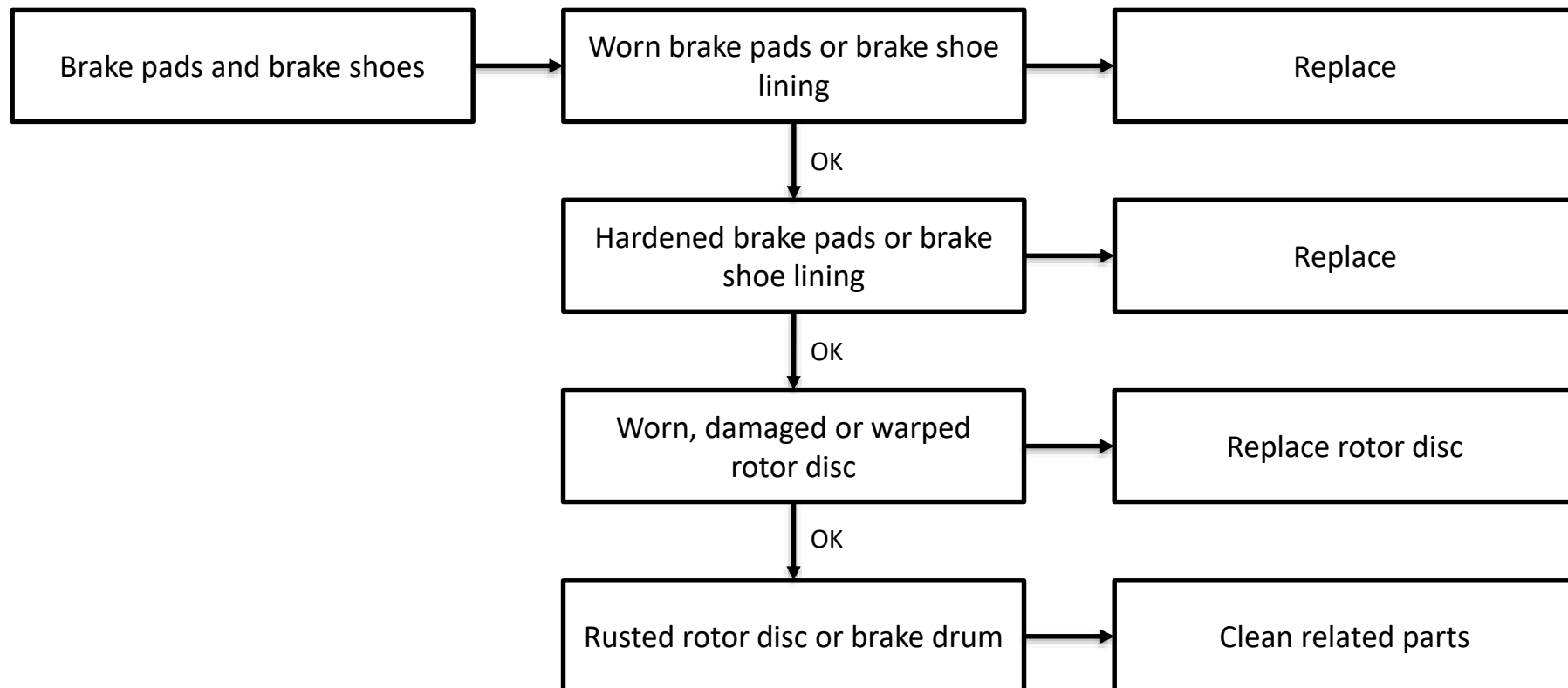
Poor Braking Action



C. Underchassis

1. Brake System

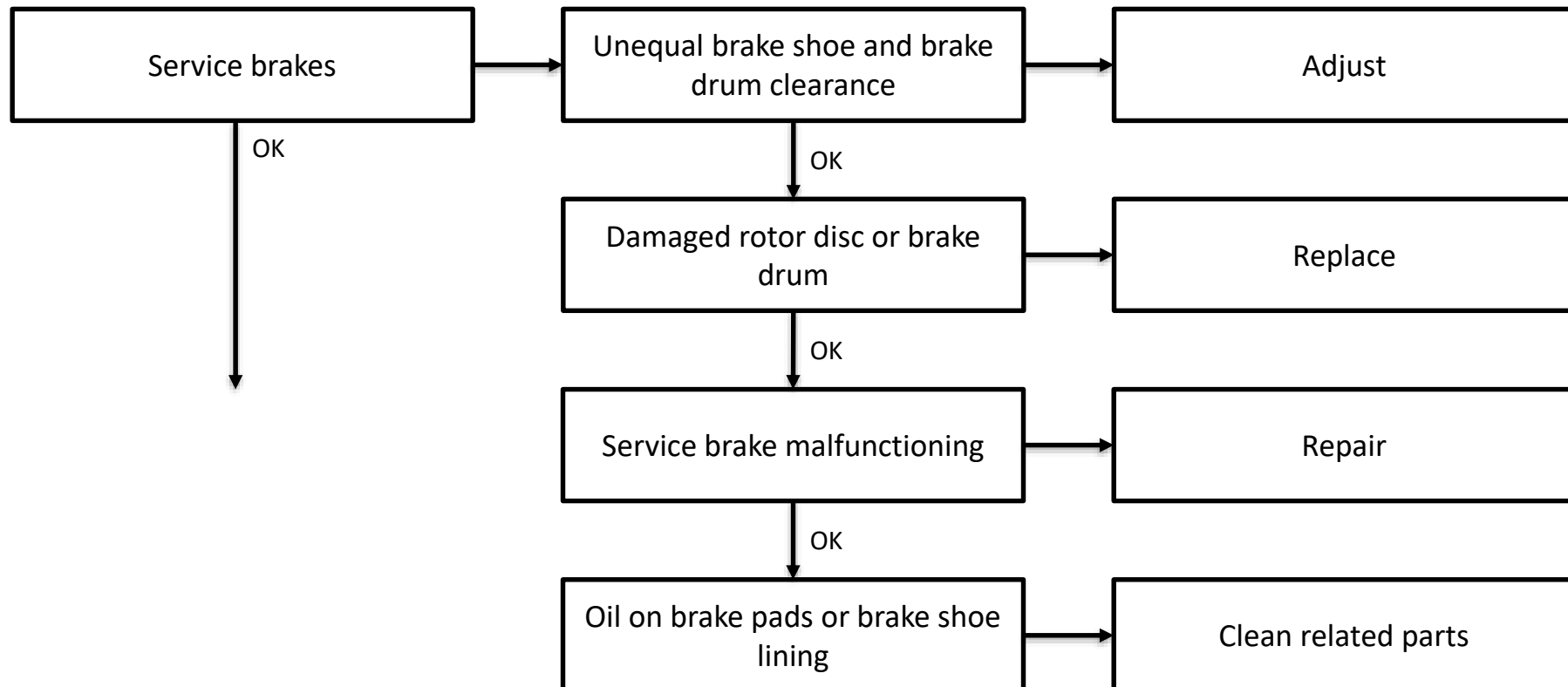
Brake Squeaking



C. Underchassis

1. Brake System

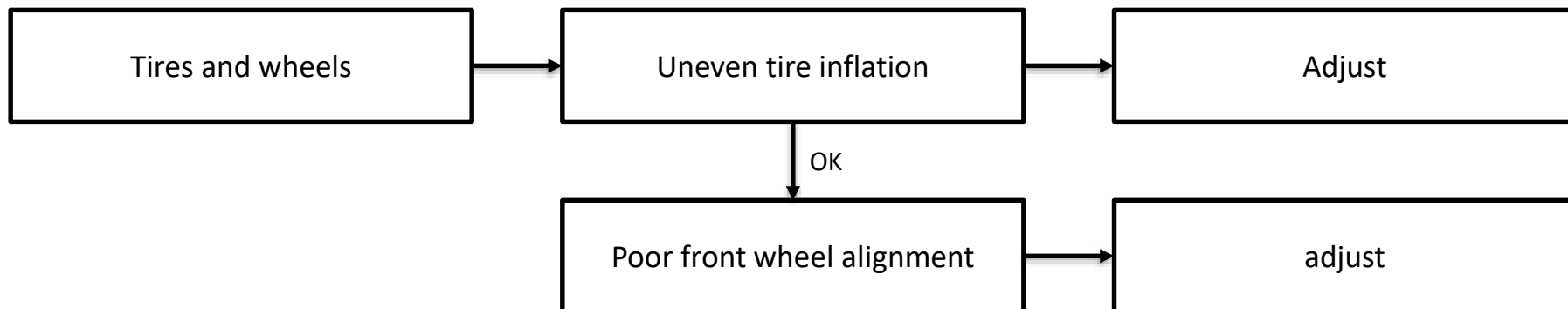
**Brake pulling
(left/right)**



C. Underchassis

1. Brake System

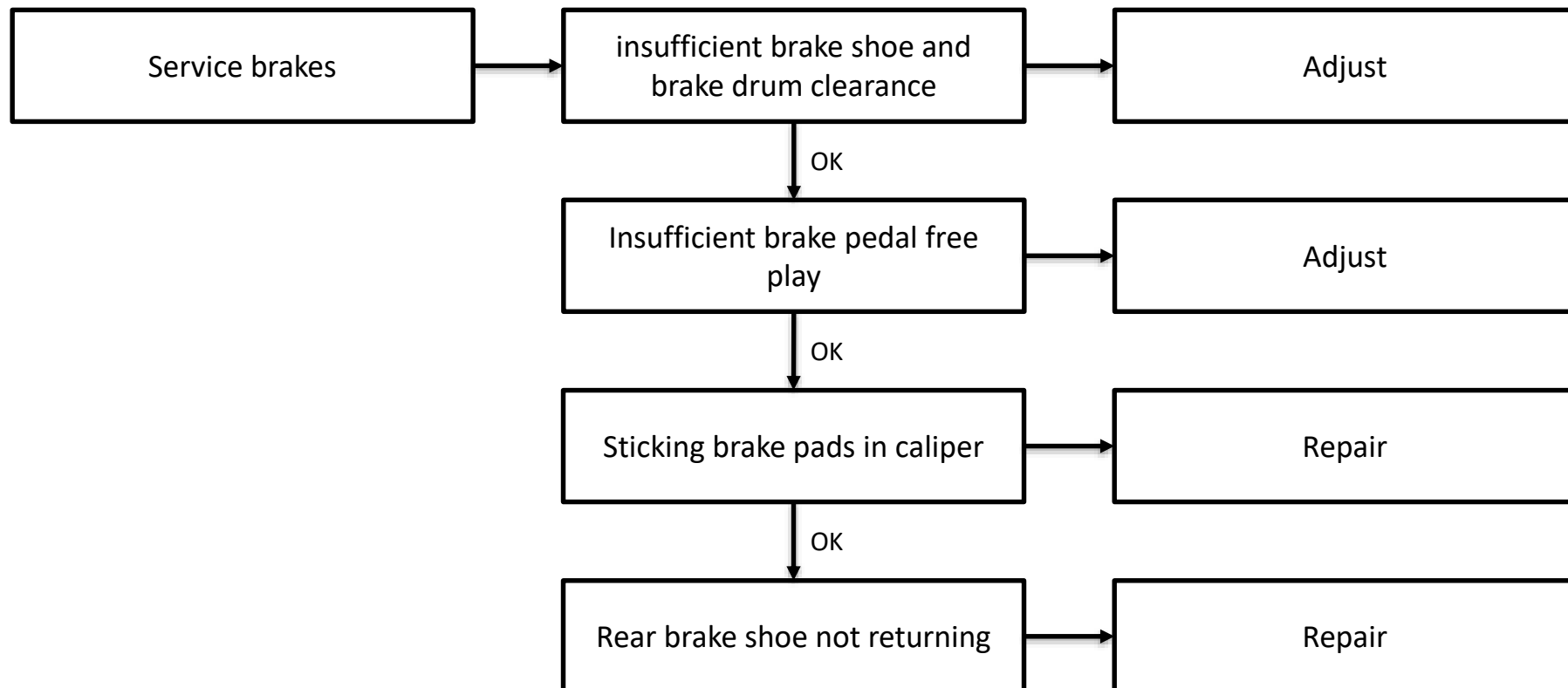
**Brake pulling
(left/right)**



C. Underchassis

1. Brake System

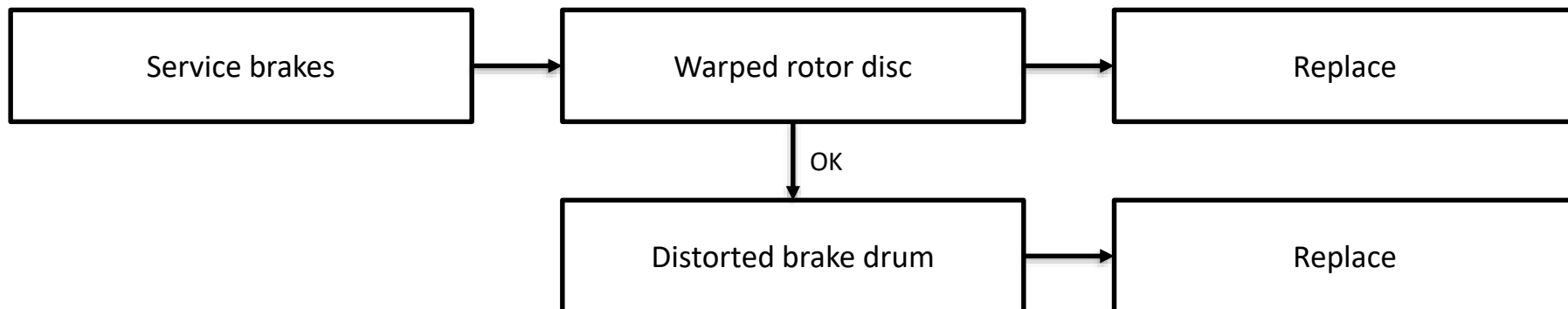
Brake dragging



C. Underchassis

1. Brake System

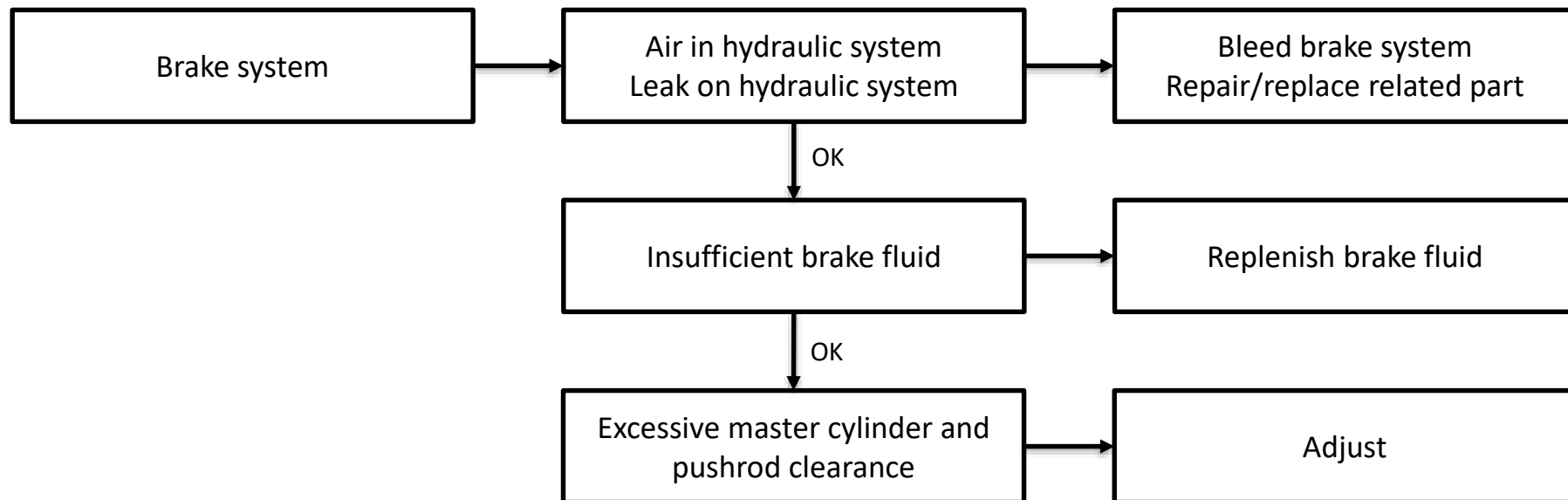
Brake dragging



C. Underchassis

1. Brake System

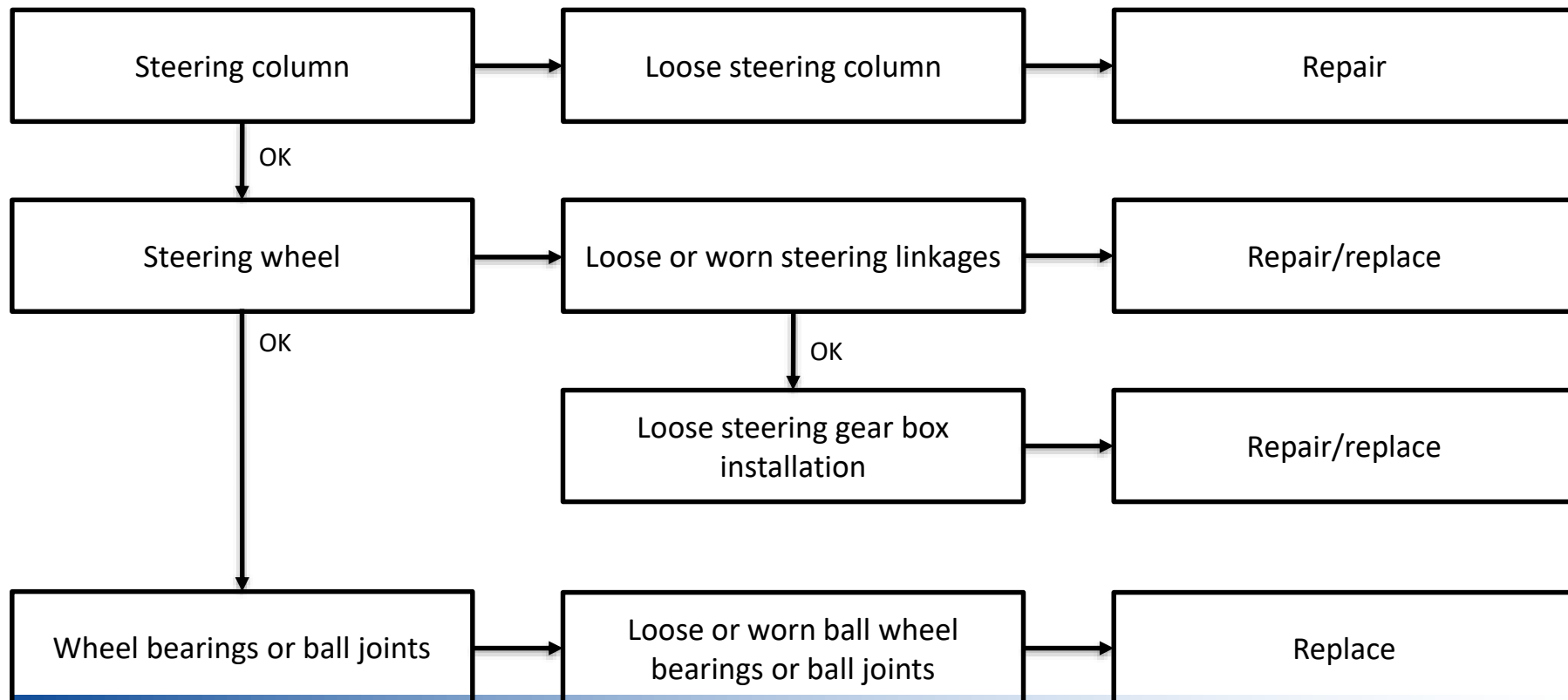
Excessive brake pedal travel



C. Underchassis

2. Steering System

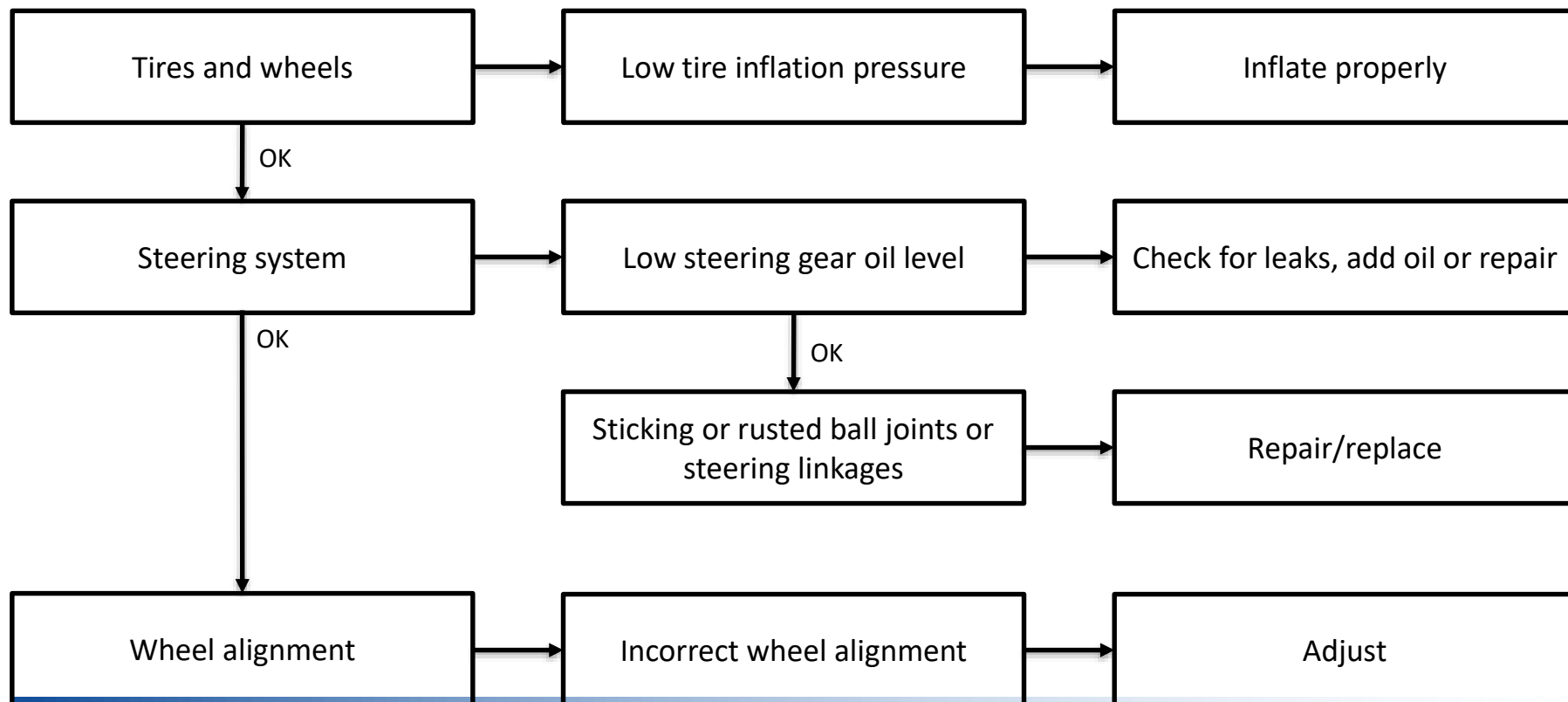
Excessive steering wheel play



C. Underchassis

2. Steering System

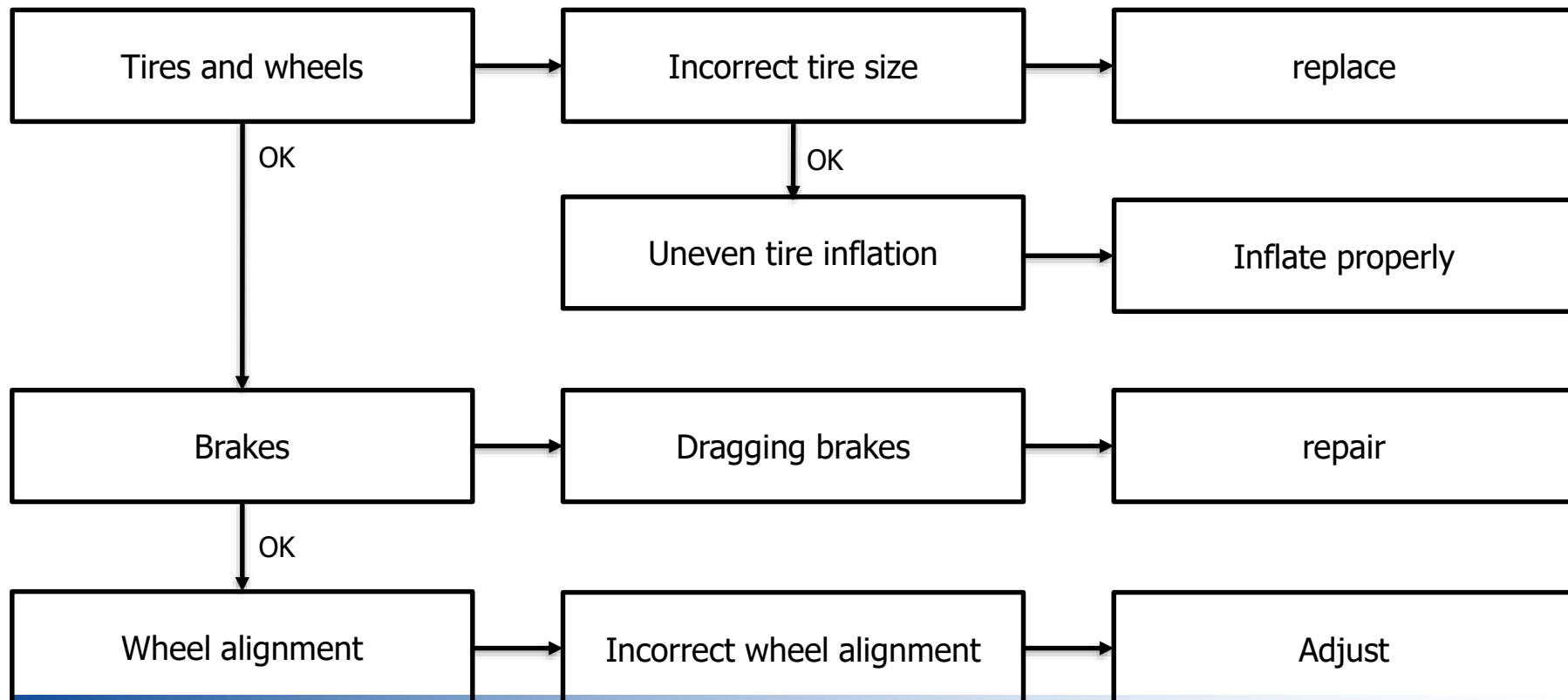
Hard Steering



C. Underchassis

2. Steering System

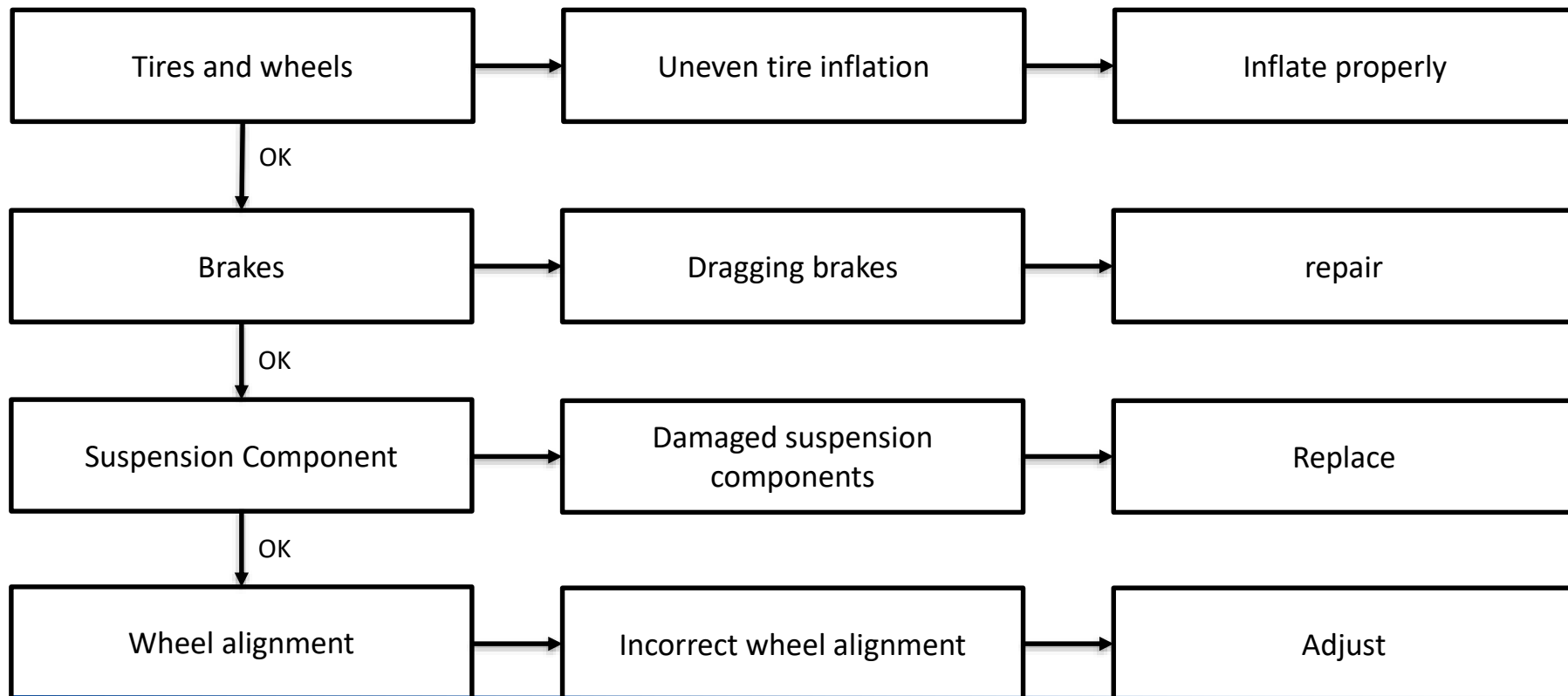
Car pulls to one side during normal driving



C. Underchassis

2. Steering System

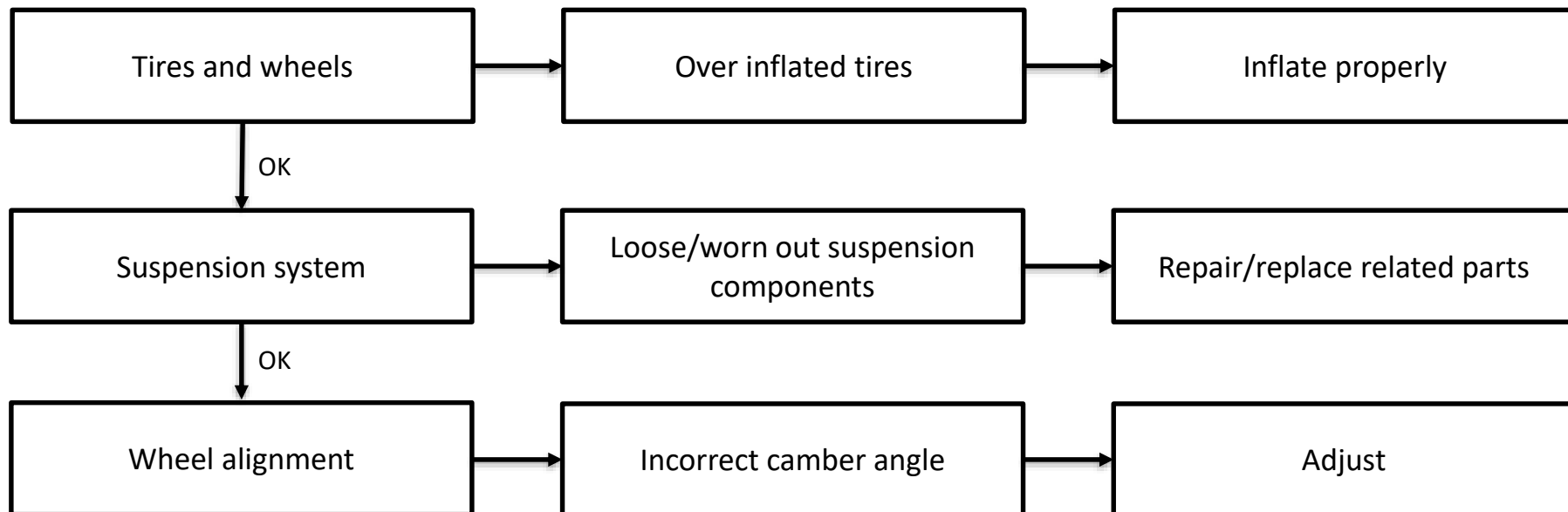
Car pulls to one side during braking



C. Underchassis

2. Steering System

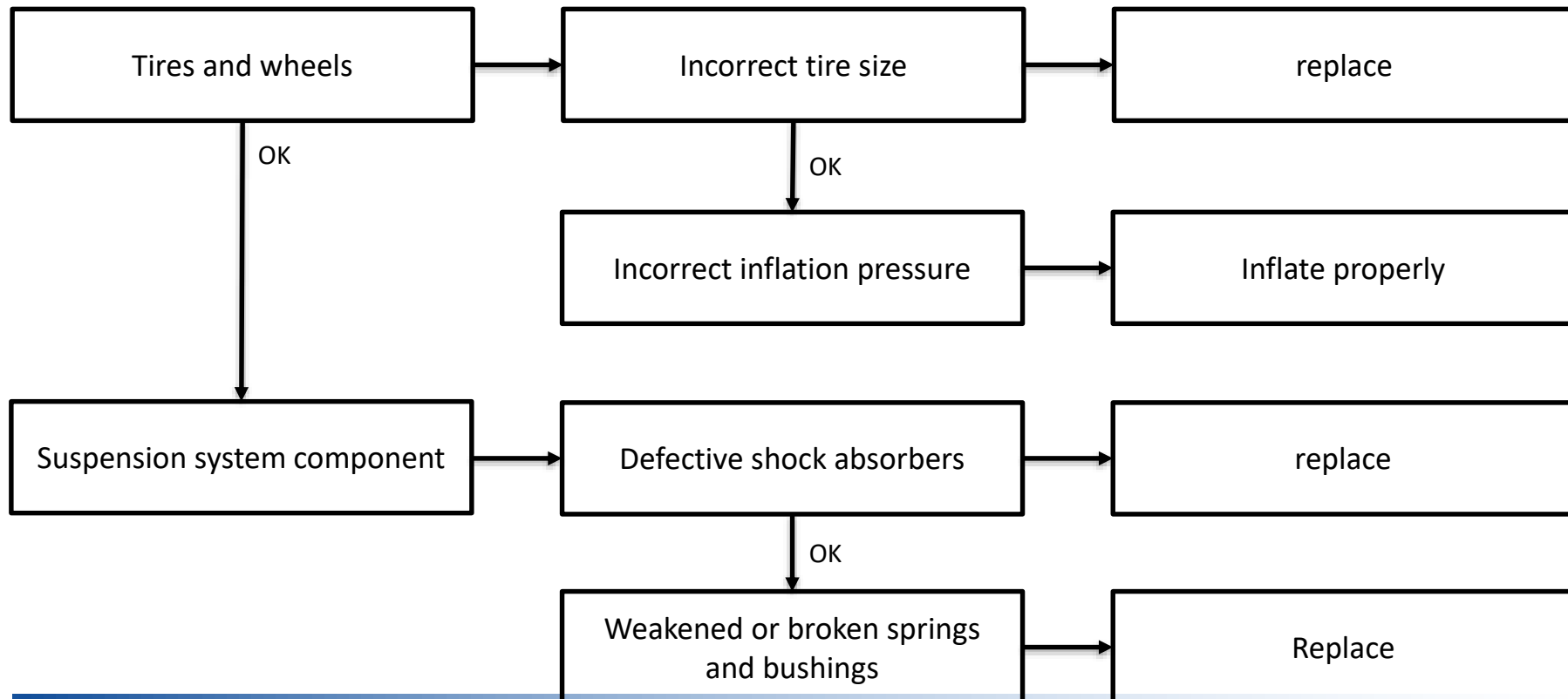
Steering kickback



C. Underchassis

3. Suspension System

Poor Riding comfort



THE END