

# Understanding Gearboxes and Marine Transmissions

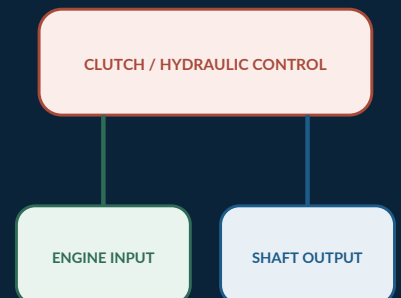
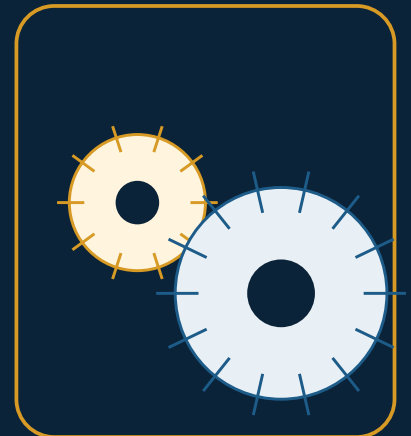
An owner's guide to reduction, clutches, controls, lubrication and driveline reliability

A gearbox does more than select forward and reverse.

It matches engine speed and torque to the entire propulsion system.

**Absolute Marine**

Commercial thinking for private cruising.



REDUCE | REVERSE | ENGAGE

GUIDE OVERVIEW

# What a marine transmission is designed to do

A marine gearbox matches engine speed and torque to the propeller, provides ahead and astern operation, and allows the driveline to be engaged or disengaged under controlled conditions.

|       |                                                                                                                                                                                                                                                                               |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCOPE | This guide focuses on reduction and reversing gearboxes used with conventional shaft-driven yacht propulsion. V-drives, down-angle units, trolling valves, PTO/PTI and hybrid arrangements are included at owner-awareness level. Manufacturer instructions remain essential. |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

By the end of this guide, you should be able to:

- Explain reduction ratio, clutch engagement and the gearbox's place in the propulsion chain.
- Identify the casing, oil system, cooler, controls, couplings, mounts, sensors and service points.
- Recognise delayed engagement, clutch slip, harsh shifting, overheating, oil contamination and alignment clues.
- Understand why propeller load, towing, freewheeling and emergency operation are manufacturer-specific.
- Ask better questions during purchase, survey, sea trial, maintenance and offshore preparation.

|                |                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CORE PRINCIPLE | A gearbox is both a mechanical reduction unit and a hydraulic control system. Reliable propulsion depends on correct oil, cooling, pressure, command logic, alignment and propeller load. |
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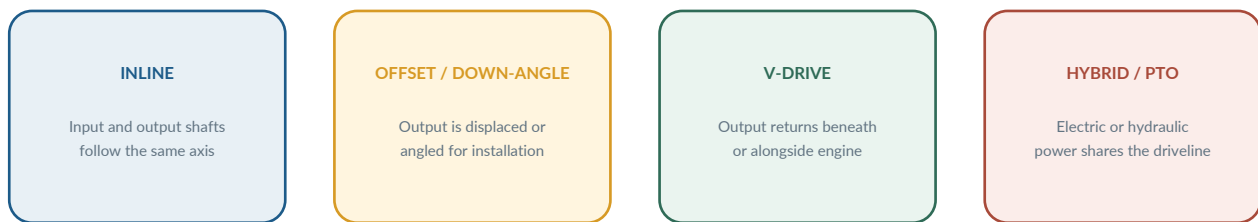
Safety

Transmission shafts, couplings and clutches can rotate without obvious warning. Keep guards fitted, isolate starting and control systems before work, and never approach an exposed coupling or shaft while movement is possible.

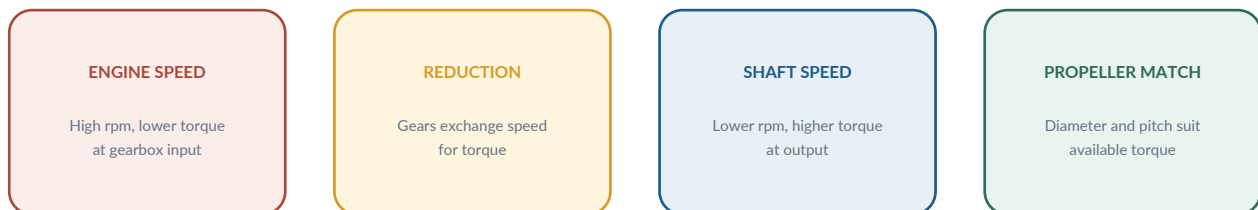
## SYSTEM ARCHITECTURE

# Transmission types, reduction ratios and direction

Different gearbox layouts solve installation problems, but each must match the engine duty, propeller shaft speed, rotation, thrust arrangement and available machinery-space geometry.



Reduction ratio, direction, duty rating and installation geometry must all match the engine, shaft and propeller.



A ratio such as 2.5:1 means the engine turns about 2.5 revolutions for one output-shaft revolution.

## Important terms

- **Reduction ratio:** The relationship between engine-input speed and gearbox-output speed.
- **Ahead and astern ratio:** Some units use different reduction ratios in forward and reverse.
- **Input rating:** Permitted engine power, torque, speed and duty cycle at the gearbox input.
- **Offset or down-angle:** The output shaft is displaced or angled to suit the shaft line.
- **Direction of rotation:** Input, output and propeller rotation must agree with the transmission and installation design.
- **PTO / PTI:** A power take-off removes power for another system; a power take-in adds power to the driveline.

### RATIO CHANGES THE WHOLE DRIVELINE

A different gearbox ratio may require a different propeller, shaft-torque assessment, cooler capacity and engine-loading review. It is not a simple like-for-like component change.

MAIN COMPONENTS

# What owners should be able to identify

A clear installation should allow the owner to trace power, oil, cooling and command paths from the engine through the gearbox to the shaft coupling.



Oil pressure, cooling, controls, mounts and alignment support every mechanical stage of the power path.

| Component or area                | Function                                                                         | Owner focus                                                                         |
|----------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Gear casing and gear train       | Supports shafts and bearings and provides the selected reduction ratio.          | Cracks, corrosion, fasteners, sound, oil leakage, breather and repair history.      |
| Ahead and astern clutches        | Lock the selected gear train to the input under hydraulic or mechanical control. | Engagement delay, slip, pressure, heat, friction material and contaminated oil.     |
| Oil pump and valve body          | Circulate oil and route pressure to lubrication and clutches.                    | Pressure readings, filters, solenoids, valves, internal leakage and service access. |
| Oil cooler and pipework          | Reject heat to seawater, engine coolant or another circuit.                      | Leaks, corrosion, hose condition, shared cooling and oil/water contamination.       |
| Input damper / flywheel coupling | Transfers engine torque while controlling torsional vibration.                   | Rattle, springs/elements, debris, fasteners and compatibility with engine rating.   |
| Output flange / coupling         | Transfers gearbox torque into the propeller shaft.                               | Bolt security, fretting, runout, flexible element and alignment history.            |
| Controls and sensors             | Select direction and report pressure, temperature, speed or fault status.        | Local operation, wiring/cables, position feedback, alarms and manual override.      |

|                               |                                                                                                                                                          |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACCESS IS PART OF RELIABILITY | Oil level, filters, cooler connections, local selector, coupling and mounting bolts should be inspectable without unsafe work beside rotating equipment. |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

LUBRICATION AND HYDRAULIC OIL

# Correct fluid, level, pressure and condition

Transmission oil lubricates gears and bearings, removes heat and often applies the clutches. The wrong fluid or checking method can create real faults or misleading conclusions.



| Area                  | What can go wrong                                                                       | Owner focus                                                                           |
|-----------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Fluid specification   | Incorrect viscosity or friction characteristics alter lubrication and clutch behaviour. | Use only the current manufacturer-approved fluid for the exact model and duty.        |
| Level-check procedure | Reading may differ hot/cold, stopped/running or after oil drains from cooler and pipes. | Follow the specified temperature, engine state, selector position and timing.         |
| Low oil level         | Pump draws air, pressure falls and clutches or bearings lose supply.                    | Leaks, foaming, delayed engagement, pressure alarms and top-up quantity.              |
| Overfilled oil        | Gears churn oil, causing foam, heat, leakage or unreliable level readings.              | Correct by measurement rather than accepting oil expelled from the breather.          |
| Contamination         | Water, coolant, fuel, wrong oil or wear debris changes performance.                     | Colour, smell, cloudiness, magnetic debris, laboratory analysis and cooler integrity. |
| Filter and strainer   | Restriction limits pump supply; bypass may circulate unfiltered oil.                    | Correct element, differential indication, debris inspection and service interval.     |

|                   |                                                                                                                                                                              |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OIL TELLS A STORY | Burnt smell, darkening, metallic debris, milkiness or rising level deserves explanation. Changing the fluid may remove the evidence without correcting the underlying fault. |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Oil analysis

Trend samples can identify wear metals, water and fluid deterioration, but results need model, oil type, oil hours, transmission hours and previous samples to be useful.

## TRANSMISSION COOLING

# Oil coolers, shared raw-water paths and overheating

Clutch slip, gear losses and bearing friction create heat. The cooler must reject that heat under sustained load, not only during a short dockside engagement test.



| Area                         | Common weakness                                                          | Owner focus                                                                  |
|------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Oil-to-seawater cooler       | Fouling, corrosion, blocked tubes, failed end seals or internal leakage. | Cleaning, pressure test, anodes, cooler order and seawater flow.             |
| Oil-to-coolant cooler        | Engine-coolant restriction or internal oil/coolant cross-leak.           | Coolant condition, gearbox oil level/colour and effect of engine overheat.   |
| Flexible oil hoses           | Heat, age, chafe, collapse or loose fittings.                            | Pressure rating, full-length access, support and replacement history.        |
| Thermostatic or bypass valve | Incorrect routing or sticking prevents effective cooling.                | Installed design, temperature trend and no undocumented modification.        |
| Temperature sender / alarm   | Faulty sensor or wiring hides real heat or causes nuisance alarms.       | Alarm test, independent comparison, location and normal loaded baseline.     |
| Shared raw-water supply      | One intake, pump or strainer serves engine and gearbox cooling.          | Understand cooler order and whether partial blockage affects one unit first. |

## HEAT CAN CONTINUE AFTER THE CAUSE IS REMOVED

Clutch material and oil can be damaged by one severe overheat. Restored cooling does not prove that the transmission has escaped internal damage.

## Loaded temperature matters

Record oil temperature after enough time at representative propulsion load. A normal reading at idle or immediately after leaving the berth provides little evidence of cooler capacity.

CLUTCHES AND ENGAGEMENT

# How ahead and astern drive is selected

Most hydraulic marine gearboxes use multi-plate clutches. Oil pressure compresses the selected clutch pack, locking a gear train to the input and transferring torque to the output.



| Behaviour                        | Possible cause                                                                                        | Why it matters                                                                      |
|----------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Delayed engagement               | Low oil, air, pump wear, leaking seals, valve delay, blocked filter or cold/wrong fluid.              | Clutch plates may slip while pressure builds, accelerating wear.                    |
| Clutch slip under load           | Low pressure, worn plates, contaminated fluid, overload or control fault.                             | Heat rises rapidly and propulsion may fail completely.                              |
| Harsh engagement                 | Excess engine rpm, sticky valve, pressure-control fault, cable adjustment or flexible-coupling issue. | Shock loads mounts, coupling, shaft, propeller and internal gears.                  |
| Drive remains engaged            | Sticking clutch, selector fault, residual pressure or mechanical damage.                              | Creates manoeuvring risk and may prevent safe engine starting or shutdown.          |
| Different ahead/astern behaviour | Separate clutch pack, valve path, ratio or propeller loading reveals a directional fault.             | Comparison helps localise the problem before both directions are lost.              |
| Trolling valve misuse            | Reduced clutch pressure creates controlled slip outside approved range or duration.                   | Heat and clutch wear can rise quickly; engine rpm and oil temperature limits apply. |

|                                         |                                                                                                                                                              |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DO NOT INCREASE RPM TO FORCE ENGAGEMENT | If drive is delayed or slipping, adding throttle can multiply heat and damage. Reduce demand and diagnose oil level, pressure, control and clutch condition. |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|

CONTROLS AND SHIFT LOGIC

# Cables, solenoids, electronics and local operation

A healthy gearbox can appear failed when the selector command does not reach it. Mechanical, hydraulic and electronic controls each need known neutral, ahead and astern positions.



| Area                       | What can fail                                                            | Owner focus                                                                                 |
|----------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Mechanical cable / linkage | Stretch, corrosion, lost travel, loose clamp or poor adjustment.         | Full lever travel, neutral detent, local lever position and spare cable/clevis strategy.    |
| Hydraulic remote control   | Leak, air, low pressure or failed control valve.                         | Reservoir, hoses, bleed procedure, local selector and shared hydraulic dependency.          |
| Electronic control head    | Loss of power, station-selection fault, lever sensor or network issue.   | Power supply, fault codes, emergency stop, station transfer and backup control.             |
| Shift solenoids            | Open circuit, sticking spool, connector corrosion or weak coil.          | Correct voltage, manual actuation only where approved, spare compatibility and cleanliness. |
| Neutral-start interlock    | Incorrect indication prevents starting or permits unsafe start in gear.  | Test normal and local stations; do not bypass without a controlled emergency procedure.     |
| Position feedback          | Helm display shows ahead/astern while valve or clutch remains elsewhere. | Confirm actual shaft response and local selector rather than trusting one display.          |

|                         |                                                                                                                                                                                                                   |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| KNOW THE LOCAL SELECTOR | Offshore resilience improves when the crew knows whether the gearbox can be selected locally after loss of a helm station, cable, network or control computer - and what communication is needed to do so safely. |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

MOUNTS, COUPLINGS AND ALIGNMENT

# Keeping the gearbox and shaft line on the same axis

The transmission is part of a moving structure. Engine mounts settle, hulls flex, bearings wear and couplings move. Alignment must be considered with the yacht afloat and in its normal condition.

ENGINE MOUNTS

Set height and absorb controlled movement

GEARBOX OUTPUT

Defines coupling face and shaft line

FLEXIBLE COUPLING

May absorb torsion, not major misalignment

SHAFT BEARINGS

Support shaft and control alignment

| Area                      | Common weakness                                                                     | Owner focus                                                                            |
|---------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Engine and gearbox mounts | Compression, oil contamination, cracking, loose fasteners or unequal adjustment.    | Height, load distribution, movement under torque and replacement/alignment history.    |
| Rigid flange coupling     | Face/offset misalignment, fretting, loose bolts or damaged fit.                     | Bolt torque, witness marks, coupling condition and measured alignment.                 |
| Flexible coupling         | Element wear, overheating, wrong stiffness, bolt failure or excessive misalignment. | Correct rating, age, inspection, spare element and torsional compatibility.            |
| Input damper plate        | Broken springs/elements, spline wear, fretting or heat.                             | Rattle at idle, debris, replacement history and access between engine and gearbox.     |
| Output flange and seal    | Runout, bearing wear or leakage at the gearbox output.                              | Radial/axial movement, oil leakage, coupling support and specialist measurement.       |
| Hull and shaft supports   | Bearing movement or hull distortion changes alignment after service.                | Check after launch, grounding, mount replacement, shaft work and major loading change. |

FLEXIBLE DOES NOT MEAN MISALIGNMENT-PROOF

A flexible coupling may absorb torsional vibration and small movement, but it should not be used to conceal poor static alignment or failing mounts.

## PROPELLER LOAD AND TORSIONAL VIBRATION

# Why gearbox condition depends on the rest of the driveline

The gearbox transmits every normal torque pulse and every abnormal shock from the engine, shaft and propeller. Incorrect propeller load or torsional behaviour can damage a gearbox that is otherwise correctly maintained.

**NORMAL LOAD**

Ratio and propeller match  
engine duty

**OVER-PROPPED**

Torque demand rises and  
engine cannot reach rpm

**IMPACT LOAD**

Grounding or rope strike  
creates shock torque

**TORSIONAL ISSUE**

Resonance damages damper,  
gears or coupling

| Condition                      | Effect on transmission                                                                   | Evidence to consider                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Over-propped or fouled vessel  | Higher torque and clutch load at lower engine speed; oil temperature rises.              | Failure to reach rated rpm, smoke, fuel burn, temperature and underwater condition.           |
| Propeller impact / rope strike | Shock load travels through shaft, coupling, gears and mounts.                            | New vibration, flange runout, oil debris, mount movement and shaft/propeller inspection.      |
| Torsional resonance            | Repeated cyclic load damages damper, gear teeth, splines, bearings or flexible coupling. | Narrow-rpm vibration/rattle, failed elements and engineering analysis after driveline change. |
| Rapid ahead-astern cycling     | High thermal and mechanical load on clutches and coupling.                               | Allow shaft speed to decay as instructed; avoid excessive engine rpm during shifts.           |
| PTO / hydraulic load           | Additional load changes input torque and cooling requirement.                            | Approved rating, clutch status, interlocks and simultaneous operating limits.                 |
| Mismatched replacement gearbox | Ratio, capacity, rotation or damper mismatch changes the entire driveline.               | Engineering confirmation, propeller review and loaded commissioning data.                     |

**MAXIMUM ENGINE  
SPEED IS USEFUL  
EVIDENCE**

If the engine cannot reach its specified loaded speed in suitable conditions, the cause may be propeller or hull load. Continuing to operate heavily loaded can shorten clutch, gear and cooler life.

TRAILING SHAFTS AND DEGRADED OPERATION

# Freewheeling, towing, sailing and emergency propulsion

When a propeller turns through the water with its engine stopped, the shaft may rotate the gearbox output. Whether this is permitted depends on how the exact unit lubricates and which components rotate.

LOCKED SHAFT

Propeller is prevented from turning

FREEWHEELING

Water turns propeller, shaft and gearbox

TOW / SAIL

Duration and speed may exceed lubrication limits

APPROVED MODE

Follow manufacturer rule for the exact gearbox

| Situation                       | Potential concern                                                                      | Questions to resolve                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Twin-engine yacht on one engine | The stopped-side shaft may freewheel continuously.                                     | May it rotate, must it be locked, and are speed/time limits or periodic engine runs required?     |
| Yacht under tow                 | Propeller speed may exceed normal stopped-engine lubrication conditions.               | Maximum towing speed, shaft-locking method and gearbox oil-pump arrangement.                      |
| Motor-sailer under sail         | Long-duration trailing can heat bearings or clutches in some units.                    | Manufacturer's sailing procedure, allowed selector position and oil-level/temperature monitoring. |
| Emergency local shift           | Local engagement may remove helm neutral or start interlocks.                          | Communication, engine rpm, guards and a controlled stop method before use.                        |
| Loss of oil pressure            | Some gearboxes cannot transmit drive safely without pump pressure.                     | Whether mechanical lock-up, emergency pressure or no-drive condition applies.                     |
| Get-home or wing engine         | Alternative propulsion may back-drive the main gearbox/shaft or impose unusual thrust. | Approved configuration, shaft isolation, propeller drag and commissioning test.                   |

|                                    |                                                                                                                                                                                     |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| THERE IS NO UNIVERSAL NEUTRAL RULE | Some transmissions permit freewheeling in neutral; others require shaft locking, periodic lubrication or specific limits. Use the instruction for the exact model and installation. |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## MONITORING AND WARNING SIGNS

# Learning what normal engagement and loading look like

Transmission condition is easier to judge from repeatable trends than one sea trial observation. Compare oil, pressure, temperature, sound and engagement in both directions.

**DELAYED ENGAGEMENT**

Pressure, oil, clutch or control issue

**SLIP**

Input speed rises without matching shaft speed

**HARSH SHIFT**

Pressure, control, rpm or mounting issue

**HEAT / NOISE**

Cooling, bearing, gear or alignment problem

| Observation                        | Possible interpretation                                                                       | Owner response                                                                        |
|------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Delayed ahead or astern engagement | Low/wrong oil, filter restriction, pump/valve wear, control delay or clutch leakage.          | Note oil temperature, direction and delay; avoid adding throttle to force engagement. |
| Engine rpm rises but speed falls   | Clutch slip, propeller loss/damage, coupling failure or severe cavitation.                    | Reduce load immediately and compare shaft speed, oil pressure and coupling condition. |
| Harsh engagement or clunk          | High engine idle, control adjustment, sticky valve, mount/coupling movement or internal wear. | Check engine rpm, local selector timing, mounts and driveline lash.                   |
| Oil temperature trends upward      | Cooling restriction, low/overfilled oil, clutch slip, overload or bearing friction.           | Reduce load and inspect oil level, cooler flow, pressure and propeller loading.       |
| New whine, growl or rattle         | Gear/bearing wear, damper, cavitation, alignment or torsional issue.                          | Record rpm/load/direction and whether sound changes in neutral or gear.               |
| Oil level rises or turns milky     | Cooler leak, water ingress or wrong-fluid contamination.                                      | Stop sustained operation and test the cooler and fluid before damage spreads.         |
| Oil at breather or seals           | Overfill, foaming, heat, blocked breather or internal pressure.                               | Correct the checking method and investigate why pressure or level changed.            |

**DO NOT NORMALISE IT**

A gearbox that takes several seconds to engage, regularly smells hot or behaves differently in astern has an unresolved defect even if it has not yet lost propulsion.

## MAINTENANCE STRATEGY

# Servicing, testing, records and realistic spares

Transmission maintenance should preserve oil quality, cooling, pressure, control accuracy and alignment. A fluid change alone does not prove the unit is healthy.

| Area                     | Good maintenance evidence                                                                      | Why it matters                                                   |
|--------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Fluid and filters        | Correct specification, quantity, check procedure, change interval and debris findings.         | Supports clutch friction, hydraulic pressure and bearing life.   |
| Pressure and temperature | Readings in neutral, ahead and astern at stated oil temperature and load.                      | Reveals pump, valve, clutch and cooler condition.                |
| Cooler and hoses         | Cleaning, pressure test, hose age, oil/water inspection and raw-water flow.                    | Prevents heat damage and cross-contamination.                    |
| Controls                 | Cable travel, solenoid/current, local selector and station-transfer tests.                     | Separates command faults from internal gearbox faults.           |
| Couplings and alignment  | Bolt checks, element condition, mount inspection and afloat alignment records.                 | Limits bearing, seal, spline and shaft-line load.                |
| Loaded sea trial         | Engagement, rpm, pressure, temperature, sound, vibration and maximum engine speed documented.  | Confirms the complete installation under realistic demand.       |
| Repair provenance        | Reason, measurements, parts, specialist, test result and warranty for overhaul or clutch work. | A rebuilt gearbox is only as credible as the evidence behind it. |

## Offshore spares and tools

- Correct transmission fluid, filter or strainer parts, cooler seals and selected hose/fitting spares.
- Control-cable ends, approved solenoid or relay, electrical protection and local-shift information where realistic.
- Flexible-coupling element or critical fasteners only where replacement and alignment are practical onboard.
- Oil-sampling kit, absorbent materials, clean transfer pump and labelled containers to prevent cross-contamination.
- Current manual, oil-check procedure, pressure/temperature limits, towing/freewheeling instructions and specialist contacts.

|               |                                                                                                                                                                                                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WORK TO REFER | Internal clutch or gear repair, hydraulic pressure diagnosis, cooler pressure testing, torsional analysis, shaft alignment and configuration of electronic controls should be handled by competent specialists. |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## FAILURE RESPONSE

# Protecting clutches, shaft line and manoeuvring options

A transmission fault can remove propulsion or leave the yacht unexpectedly in gear. The first objective is to reduce load, stabilise the vessel and avoid turning a control or oil problem into major internal damage.

**RECOGNISE**

Alarm, slip, heat,  
noise or no drive

**REDUCE LOAD**

Protect clutches and  
shaft line

**STABILISE**

Safe heading, speed  
and crew position

**ISOLATE / CHECK**

Oil, controls, cooler  
and coupling evidence

**REASSESS**

Use reduced mode,  
divert or seek help

| Evidence                       | Possible failure                                                                              | Immediate thinking                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| No drive in one direction      | Control command, shift solenoid/valve, clutch pressure or one clutch pack.                    | Confirm local selector and oil level/pressure; avoid repeated high-rpm engagement attempts.                        |
| No drive in either direction   | Low oil, pump failure, input damper/coupling failure, control supply or major internal fault. | Stabilise vessel, inspect external evidence and do not assume the engine is producing shaft torque.                |
| Slip or rising oil temperature | Low pressure, worn clutch, wrong oil, cooling loss or overload.                               | Reduce load promptly; continued slip can destroy friction material and contaminate the unit.                       |
| Gearbox remains engaged        | Sticking clutch/valve, control fault or mechanical damage.                                    | Prepare for continuing thrust; use engine stop or local control only within the approved emergency procedure.      |
| Sudden vibration / impact      | Propeller/shaft damage, coupling, mount, damper or internal gear/bearing fault.               | Reduce load or stop; inspect the complete driveline before re-engaging.                                            |
| Milky oil or rising level      | Cooler leak or water contamination.                                                           | Stop sustained use, protect remaining propulsion and obtain diagnosis before corrosion and clutch damage increase. |

**RESTART AND  
RE-ENGAGEMENT  
DECISIONS MATTER**

A gearbox may briefly regain drive after cooling or resetting, but recurring slip, low pressure or abnormal oil means the failure is unresolved. Use only the minimum operation needed to preserve safety and options.

## Twin-engine operation

After one transmission is disabled, consider the stopped shaft, steering response, remaining-engine load, cooling, manoeuvring limits and whether the failed-side propeller must be locked or allowed to freewheel.

## OFFSHORE READINESS

# Buyer questions and readiness checklist

An offshore-ready transmission has demonstrated clean engagement, stable oil pressure and temperature, correct ratio and loading, credible alignment and known procedures for local control and trailing-shaft operation.

| Area                    | Questions for purchase or survey                                                                                       |
|-------------------------|------------------------------------------------------------------------------------------------------------------------|
| Identity and rating     | Are model, serial number, ratio, rotation, duty rating and engine compatibility documented?                            |
| Oil and pressure        | Is the correct fluid used, with stable level, clean condition and pressure in neutral, ahead and astern?               |
| Cooling                 | Are cooler, hoses and shared seawater/coolant paths credible, with stable loaded temperature?                          |
| Engagement and controls | Does the unit engage promptly and consistently from all stations, including local operation where fitted?              |
| Alignment and driveline | Are mounts, damper, couplings, flange, shaft and propeller condition supported by records and sea-trial evidence?      |
| History and support     | Are oil changes, analysis, clutch/overhaul work, impact events, parts and diagnostic support documented?               |
| Degraded operation      | Are towing, freewheeling, shaft-locking, one-engine operation and emergency-shift procedures known for the exact unit? |

## Quick readiness check

|  | Readiness statement                                                                             |
|--|-------------------------------------------------------------------------------------------------|
|  | I can identify the gearbox model, ratio, rotation, duty rating and oil specification.           |
|  | Normal oil level, pressure, temperature, sound and engagement delay are known.                  |
|  | Ahead and astern engage cleanly without unresolved slip, harshness or repeated reset.           |
|  | Cooling, hoses, filters, controls, alarms, mounts and couplings are current and accessible.     |
|  | Loaded sea-trial performance supports the engine, ratio and propeller combination.              |
|  | Alignment, damper and flexible-coupling condition are documented after relevant work.           |
|  | Towing, freewheeling, shaft-locking and local-control instructions are available.               |
|  | More than one person knows the immediate response to no drive, slip, heat and stuck engagement. |

### KEY TAKEAWAY

A dependable marine transmission combines correct sizing and ratio with clean oil, stable hydraulic pressure, effective cooling, controlled clutch engagement, sound alignment, suitable propeller load and clear degraded-operation procedures.

## Guidance to consult

Use the installed engine, transmission, control, coupling and shaft-line manufacturers' current operating and service instructions, together with applicable flag-state, coding, class, insurance and yard requirements.

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### Understanding Gearboxes and Marine Transmissions

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