

Important Information

Section 1C - Troubleshooting

**1
C**

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Troubleshooting Charts

Precautions For Troubleshooting

WARNING

Moving parts can cause serious injury or death. Wear eye protection and keep hands, hair, and clothing away from moving parts when performing tests or checking adjustments on an operating engine.

WARNING

Performing service or maintenance without first disconnecting the battery can cause product damage, personal injury, or death due to fire, explosion, electrical shock, or unexpected engine starting. Always disconnect the battery cables from the battery before maintaining, servicing, installing, or removing engine or drive components.

WARNING

Fuel is flammable and explosive. Ensure the key switch is off and the lanyard is positioned so that the engine cannot start. Do not smoke or allow sources of spark or open flame in the area while servicing. Keep the work area well ventilated and avoid prolonged exposure to vapors. Always check for leaks before attempting to start the engine and wipe up any spilled fuel immediately.

WARNING

Improper installation of brass fittings or plugs into the fuel pump or fuel filter base can crack the casting, causing a fuel leak and possible fire or explosion. Always install fittings and plugs correctly, and do not tighten with power tools.

WARNING

Fuel leakage is a fire or explosion hazard, which can cause serious injury or death. Periodically inspect all fuel system components for leaks, softening, hardening, swelling, or corrosion, particularly after storage. Any sign of leakage or deterioration requires replacement before further engine operation.

WARNING

Performing tests with the engine running may cause the propeller to rotate and result in serious injury or death. Use caution when performing a test that requires the engine running, and remove the propeller to avoid injury.

WARNING

Leaving the helm unattended while performing tests with the boat in the water may result in loss of boat control causing serious injury or death. Ensure someone is at the helm at all times, unless the boat is secured to a dock.

CAUTION

Failure to release pressure from the fuel system will result in fuel spraying out, which can cause a fire or explosion. Allow the engine to cool completely and release all fuel pressure before servicing any part of the fuel system. Always protect eyes and skin from pressurized fuel and vapors.

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

NOTICE

Operating the engine out of the water at high speeds creates suction, which can collapse the water supply hose and overheat the engine. Do not operate the engine above 1400 RPM out of the water and without sufficient cooling water supply.

Poor Boat Performance, Poor Maneuverability, or Both

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Symptom	Cause
Bow too low	Improper sterndrive trim angle
	Improper weight distribution
	Boat is underpowered
	Permanent or power hook in boat bottom
	False bottom full of water
	Improperly adjusted trim tabs (after planes)
Bow too high	Improper sterndrive trim angle
	Propeller pitch too great
	Dirty boat bottom (marine growth)
	Poor running engine
	Improper weight distribution
	Rocker in boat bottom
	False bottom full of water
	Improperly adjusted trim tabs (after planes)
Propeller ventilating	Sterndrive installed too high on transom
	Dirty or rough boat bottom
	Damaged propeller; pitch too small; diameter too small
	Keel located too close to propeller or too deep in the water
	Water pickup or accessories located too close to propeller
	Hook in boat bottom
	Propeller fouled by debris

Improper Full Throttle Engine RPM

RPM TOO HIGH

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Operation	Sterndrive trimmed up (out) too far
Propeller	Damaged
	Pitch too low
	Diameter too small
	Propeller hub slipping
Boat	Water pickup or accessories mounted too close to propeller (ventilation)
	Keel located too close to propeller and/or too deep in the water (ventilation)
	Sterndrive installed too high on transom
	Wrong gear ratio
Engine coupler	Slipping or damaged and must be replaced

RPM TOO LOW

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. See **Section 5F—Troubleshooting the ECS system** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Operation	Sterndrive trimmed down (in) too far
Propeller	Damaged
	Pitch too great
	Diameter too great
Boat	Dirty or damaged bottom
	Permanent or power hook in bottom
	False bottom full of water
	Drive installed too low
	Excessive boat load

Engine Cranks Over But Will Not Start or Starts Hard

ELECTRICAL

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Battery, electrical connections, damaged wiring, Lanyard Stop Switch	Check all circuit breakers and fuses. Repair as needed.
Ignition switch	Refer to Section 4D .

FUEL SYSTEM

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. See **section 5F—Troubleshooting the ECS system**, for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Empty fuel tank	
Fuel shut off valve closed (if equipped)	
Low grade, stale fuel, or water in fuel	
Fuel waxing or frozen water separator (cold weather)	
Plugged fuel suction line or filter	
Air leaks, suction side fuel line or water separator	Sucks air into fuel system reducing fuel volume.
Plugged or pinched fuel line	
Fuel tank vent plugged	Engine will start initially. After a short time running, engine will stall and will not restart for a period of time. Can verify if it is a vent problem by running engine with filler cap loose. Filler cap will act as a vent.
Fuel pump actuator	Refer to Section 5—Fuel System section.
	Check lanyard stop switch operation.
High pressure fuel pump	Low pump pressure. Refer to Section 5—Fuel System in this manual for diagnosis.

MISCELLANEOUS

Cause	Special Information
Low grade or stale fuel.	
Water in fuel.	
Incorrect starting procedure.	Refer to the Owners Manual .
Internal mechanical damage (bent rods, etc.).	
Low compression.	Worn valves, rings, cylinder or head gasket.
Valve timing incorrect.	Timing gears improperly installed or cam slipped in drive gear.
Restricted or plugged exhaust.	

Engine Will Not Crank Over or Starter Inoperative

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Remote control lever not in neutral position.	
Battery charge low, damaged wiring, loose electrical connections	
Circuit breaker tripped	
Defective (blown) fuse	
Defective ignition switch	
Defective starter solenoid	
Internal mechanical damage	Bent rods
Failed starter	Inspect starter and electrical connections for rust or corrosion.

Charging System Inoperative

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Loose or broken serpentine belt	
Engine RPM too low on initial start	Rev engine to 1500 RPM.
Loose or corroded electrical connections	
Faulty battery gauge	Verify with multi-meter and replace if necessary.
Battery will not accept charge	Low electrolyte or failed battery
Faulty alternator or regulator	Replace alternator or regulator.
Refer to Section 4BCharging System for complete diagnostic procedures	

Noisy Alternator

Cause	Special Information
Loose mounting bolts	Tighten fasteners if undamaged. Refer to Section 4B—Charging System .
Serpentine belt	Replace belt if worn or frayed. If loose, inspect automatic tensioner.
Loose drive pulley	Tighten fastener if undamaged. Refer to Section 4B—Charging System .
Worn or dirty bearings	Replace alternator. Refer to Section 4Charging System .
Faulty diode trio or stator	Replace alternator. Refer to Section 4B—Charging System .
Faulty armature	Rubbing, broken wire or replace alternator. Refer to Section 4B—Charging System .

Engine Operates Poorly at Idle

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System**, for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Clogged air cleaner	
Plugged fuel suction line or filter	
Air leaks: suction side fuel line, water separating fuel filter or loose intake manifold	
Water in fuel	
Low grade or stale fuel	
Fuel waxing or frozen water separating fuel filter (cold weather)	
Valve timing	Cam slipped in drive gear
Restricted or plugged exhaust	
Injectors not functioning properly	

Cause	Special Information
Low compression	Also check for defective (blown) head gasket
Water leaking into cylinders	Defective head gasket, exhaust manifold, cracked head or aftercooler
Loose or broken engine mounts	
Refer to Section 5—Fuel System for complete diagnostic procedures	

Engine Operates Poorly At High RPM

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System, for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Refer to Section 5 for complete diagnostic procedures for the fuel injection system.	
See Poor Boat Performance and Poor Maneuverability troubleshooting in this section.	
Crankcase overfilled with oil	Check oil level with boat at rest in the water.
Plugged fuel tank vent	Loosen filler cap to act as a vent and operate engine to verify.
Low fuel supply	
Clogged fuel filter	Replace fuel filters.
Low grade of fuel or water in the fuel	Drain fuel tank, refill with proper fuel. Drain or replace fuel filters.
Obstructed or kinked fuel lines	
Injectors not functioning properly	Refer to Section 5D—Fuel Injectors .
Engine overheating	See Engine Overheat troubleshooting in this section.
Low compression	Worn valves, rings, cylinders, etc.
Restricted or plugged exhaust	Verify exhaust system is open and clear of debris.
Valve clearance or valve springs weak or broken	Adjust valve clearance or repair worn or damaged valve components.
Insufficient engine compartment ventilation	Increase engine compartment ventilation.
High pressure fuel pump	Worn or damaged fuel pump internal components. Repair or replace pump.
Turbocharger	Boost compensator hose broken or disconnected, intake or exhaust leaks, defective wastegate device, defective turbocharger.

Poor Fuel Economy

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System, for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Fuel leaks	
Operator habits	Prolonged idling; slow acceleration; failure to cut back on throttle once boat is on plane; boat overloaded; uneven weight distribution.
Engine laboring	Bent, damaged, or wrong propeller. Water test boat for proper operating RPM at WOT.
Clogged air cleaner	

Cause	Special Information
Engine compartment sealed too tight	Not enough air for engine to operate properly.
Boat bottom	Dirty (marine growth), hook, rocker.
Turbocharger malfunction	
Improper fuel	
Crankcase ventilation system not working	
Engine operating too hot or too cold	
Plugged or restricted exhaust	
Engine	Low compression.
Injectors not functioning properly	Refer to Section 5D—Fuel Injectors .

Engine Smoking

BLACK SMOKE

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Overload	
Restricted air filter, intercooler, or both	
Excessive fuel delivery	Refer to Section 5—Fuel System .
Faulty injector, or injectors	Refer to Section 5—Fuel System .
Restricted or plugged exhaust	
Insufficient coolant temperature	Defective thermostat.
Excessive idle time (injector coking)	
Leaking head gaskets	
Worn piston rings	
Insufficient engine compartment ventilation	Increase combustion air supply to engine.
Low boost pressure	Check turbocharger and related parts.

BLUE SMOKE

Cause	Special Information
Worn piston rings	Check compression.
Sticking piston rings	Check compression.
Crankcase overfilled—incorrect dipstick reading	
Leaking head gaskets	
Turbocharger	High oil consumption caused by worn seals. Refer to section 7C—Turbocharger .

WHITE SMOKE

Cause	Special Information
Faulty injector or injectors	Refer to Section 5—Fuel System .
Low compression	
Plugged fuel suction line or filter	

Cause	Special Information
Air leaks: suction side fuel line or water separating fuel filter	
Questionable fuel quality	
Leaking head gaskets	
Engine overheating	Internal engine damage

Exhaust Gas Temperature

HIGH

Cause	Special Information
Excessive load	
Faulty wastegate	Refer to Section 7C—Turbocharger .
Faulty Injectors	Refer to Section 5—Fuel System .

LOW

Cause	Special Information
Excessive idling time or light loads	

Turbocharger

Cause	Special Information
Smoke from exhaust	Not enough air getting to engine air intake
	Clogged air filter
	Boost pressure too low
	See Engine Smoking—Black, Blue, or White of this section.
Loss of power due to turbocharger	Not enough air getting to engine air intake
	Clogged air cleaner
	Boost pressure too low
	Poor lubrication of turbocharger
	Defective wastegate valve. Excessive oil residue buildup in compressor turbine housing
	Rubbing of compressor or turbine impellers against housing
Unusual noises and vibrations at turbocharger	Air leaking from high-pressure side of turbocharger
	Poor lubrication of turbocharger
	Rubbing of compressor or turbine impellers against housing
Rubbing of compressor or turbine impellers against housing	Air leaking from high-pressure side of turbocharger
	Poor lubrication of turbocharger
	Low oil pressure at turbocharger
Oil leakage from compressor side	Defective bearings in turbocharger
	Clogged air cleaner
	Boost pressure too low

Engine Noise

WARNING

Moving parts can cause serious injury or death. Wear eye protection and keep hands, hair, and clothing away from moving parts when performing tests or checking adjustments on an operating engine.

No definite rule or test will positively determine the source of engine noise; therefore, use the following information only as a general guide to engine noise diagnosis.

1. Use a diagnostic strobe light to determine if noise is timed with engine speed or one-half engine speed. Noises timed with engine speed are related to crankshaft, rods, pistons, piston pins, and flywheel. Noises timed to one-half engine speed are valve train related.
2. The use of a stethoscope can aid in locating a noise source; however, because noise will travel to other metal parts not involved in the problem, caution must be exercised.
3. Try to isolate the noise to location in engine working from front to back or top to bottom. This can help determine which components are at fault.
4. Sometimes noises can be caused by moving parts coming in contact with other components. Examples are: flywheel or coupler, external exhaust flappers rattling against exhaust pipe, crankshaft striking (pan, pan baffle, or dipstick tube), rocker arm striking valve cover, and loose flywheel cover. In many cases if this is found to be the problem, a complete engine teardown is not necessary.
5. When noise is isolated to a certain area and component, removal and inspection will be required. Refer to proper sections of service manual for the required information for service.
6. If noise cannot be isolated in either the engine or drive unit, remove the drive from boat. Run a water supply directly to the engine and run the engine without the drive to determine if noise persists.

VALVE COVER AREA NOISE

Location	Possible Cause
Valve cover area, timed to one-half engine speed, noise could be confined to one cylinder or may be found in any multitude of cylinders	Rocker arm striking valve cover
	Defective hydraulic valve lifter
	Worn rocker arm
	Bent push rod
	Worn camshaft
	Sticking valve

CYLINDER AREA NOISE

Location	Possible Causes
Cylinder area, may be confined to one cylinder or found in more than one cylinder, timed to engine speed	Sticking valve
	Carbon build-up
	Connecting rod installed wrong
	Bent connecting rod
	Piston
	Piston rings
	Piston pin
Engine knocking	Cylinder worn
	Faulty injector (white smoke)
	Worn delivery valve
	Defective hydraulic valve lifter
	Tight piston pin

CAMSHAFT AREA NOISE

Location	Possible Causes
Camshaft area, front of engine, timed to engine speed	Camshaft timing gear
	Injection pump
	Fuel pump
	Valve lifter (camshaft wear)
	Cam bearings
Camshaft area, center of engine, timed to engine speed	Fuel pump
	Valve lifter (camshaft wear)
	Cam bearings
Camshaft area, rear of engine, timed to engine speed	Valve lifter (camshaft wear)
	Cam bearings
Camshaft area, throughout engine, timed to engine speed	Loss of oil pressure
	Valve lifter (camshaft wear)
	Cam bearings

CRANKSHAFT AREA NOISE

Location	Possible Causes
Crankshaft area, front of engine, timed to engine speed	Crankshaft timing gear
	Oil Pump
	Rod bearing
	Main bearing
Crankshaft area, center of engine, timed to engine speed	Crankshaft striking pan or pan baffle speed
	Rod bearing
	Main bearing

Location	Possible Causes
Crankshaft area, rear of engine, timed to engine speed	Loose flywheel cover
	Loose coupler or drive plate
	Loose flywheel
	Rod bearing
	Main bearing
Crankshaft area, throughout engine, timed to engine speed	Loss of oil pressure
	Rod bearings
	Main bearings

MISCELLANEOUS NOISE

Location	Possible Causes
Squeaks, squeals, hissing, or whistle	Leaking exhaust (manifold or pipes)
	Leaking air intake system
	Leaking head gasket
	Loose or leaking cylinder heads
	Dry or tight bearing in an accessory
	Drive belt slipping
	Defective turbocharger
	Parts rubbing together

Oil Pressure

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System, for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Item	Special Information
Incorrect engine installation angle	Verify correct engine installation angle. Incorrect engine installation angle can cause damaging oil pressure fluctuations.
Measuring oil pressure	Use a good automotive oil pressure test gauge rather than the oil pressure gauge in the boat.
Check engine oil level with boat at rest in the water	Oil level should be between the minimum and maximum marks
Oil level in crankcase above maximum mark	May cause loss of engine RPM, oil pressure gauge fluctuation, drop in oil pressure, and hydraulic valve lifter noise at high RPM
Oil level in crankcase below minimum mark	Low oil pressure, oil pressure gauge fluctuation; internal engine noise and/or damage
Change in oil pressure	This may be a normal condition. Oil pressure may read high in the cooler times of the day, and when engine is not up to operating temperature. As the air temperature warms up and engine is running at normal opening temperature, it is normal for oil pressure to drop.

Item	Special Information
Low engine oil pressure at idle	With modern engines and engine oils, low oil pressure readings at idle do not necessarily mean there is a problem. If valve lifters are not noisy at idle, there is a sufficient volume of oil to lubricate all internal moving parts properly. The reason for the drop in oil pressure is that engine heat causes an expansion of the internal tolerances in the engine and, also, the oil will thin out somewhat from heat.
Low engine oil pressure at idle after running at a high RPM	See <i>Change in oil pressure</i> and <i>Low engine oil pressure at idle</i> preceding.
Boats with dual engines	It is not uncommon to see different oil pressure readings between the two engines, as long as both engines fall within specifications. Differences in oil pressure can be attributed to differences in engine tolerances, gauges, wiring, senders, etc.
Boats with dual stations	

LOW OIL PRESSURE

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Incorrect engine installation angle	Verify correct engine installation angle. Incorrect engine installation angle can cause damaging oil pressure fluctuations.
Low oil level in crankcase.	Test gauge.
Defective oil pressure gauge and/or sender.	Verify with an automotive test gauge.
Thin or diluted oil	Oil broken down; contains water or fuel; wrong viscosity; engine running too hot or too cold; excessive idling in cold water (condensation).
Faulty oil pressure relief or bypass valve.	
Valve stuck open.	Replace or repair.
Oil pump.	Relief valve stuck open; pickup tube restricted; worn parts in oil pump; air leak on suction side of oil pump or pickup oil tube.
Oil leak can be internal or external.	Oil passage plugs leaking, cracked or porous cylinder block.
Excessive bearing clearance.	Cam bearings, main bearings, rod bearings.

HIGH OIL PRESSURE

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Incorrect engine installation angle	Verify correct engine installation angle. Incorrect engine installation angle can cause damaging oil pressure fluctuations.
Oil too thick	Wrong viscosity, oil full of sludge or tar
Defective oil pressure gauge and/or sender	
Clogged or restricted oil passage	

Cause	Special Information
Oil pump relief valve stuck closed	

IMPORTANT: Oil pressure slightly higher than normal does not always indicate a problem. Oil viscosity and weather conditions can cause high oil pressure.

Excessive Oil Consumption

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

Cause	Special Information
Incorrect engine installation angle	Verify correct engine installation angle. Incorrect engine installation angle can cause damaging oil pressure fluctuations.
Oil leaks	Clean bilge, run engine with clean white paper on bilge floor, locate the oil leak, or leaks.
Oil too thin	Oil diluted or wrong viscosity
Oil level too high	
Drain holes in cylinder head plugged	Oil will flood valve guides
Defective valve stem seals (if equipped)	
Worn valve stems or valve guides	
Defective oil cooler (if equipped)	Crack in cooler tubes
Defective piston rings	Glazed, scuffed, worn, stuck, improperly installed; ring grooves worn; improper break-in; wrong end gap
Defective cylinders	Out of round, scored, tapered, glazed; excessive piston to cylinder clearance; cracked piston
Defective turbocharger	Oil leaking into intake or exhaust

Water or Coolant in the Engine

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to Section 5F—Troubleshooting the ECS System for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

IMPORTANT: To begin diagnosis, identify the primary area of contaminating water (or coolant) accumulation.

IMPORTANT: For proper diagnosis, determine if the contaminating fluid is seawater or coolant. Test moderate sized samples of contaminating water for coolant with a propylene glycol tester. Small samples may require the use of an electronic, refractive tester.

Four common areas of water (or coolant) contamination are: on top of the pistons, in the crankcase oil, in the air intake system, and in the exhaust system.

Remove all water (or coolant) from the engine after identifying the nature of the contamination.

1. Remove all glow plug port plugs and injectors.
2. Disconnect the fuel pump actuator electrical connector at the back of the high pressure injection pump.
3. Crank the engine to expel contaminating water (or coolant) from the cylinders.
4. Connect the fuel pump actuator electrical connector at the back of the high pressure injection pump.
5. Change the engine oil and oil filter.

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

Start the engine and attempt to duplicate the contamination condition. If the problem can be duplicated, it is most likely a mechanical problem rather than the result of operator error or water ingestion. Rust and scaling in the intake or exhaust system is generally a sign of water ingestion contamination.

WATER OR COOLANT IN THE ENGINE OIL

Cause	Special Information
Water in boat bilge	Boat has been submerged or bilge water was high enough to run in through dipstick tube
Water seeping past piston rings or valves	Refer to Section 7B - Elbows, Risers, Intake and Exhaust Manifold of this manual.
Intake manifold leaking near a water passage	
Cracked or porous casting	Check cylinder head, cylinder block, and intake manifold
Oil cooler leaking	Inspect the oil cooler for cracks or damage
Engine running cold	Defective thermostat, missing thermostat; pro-longed idling in cold water

WATER OR COOLANT ON TOP OF THE PISTONS

Cause	Special Information
Rain water running onto air cleaner	Hatch cover
Backwash through the exhaust system	
Improper engine or exhaust hose installation	Refer to Exhaust Specifications in the appropriate installation manual.
Cracked exhaust manifold	
Improper manifold to elbow gasket installation	
Loose cylinder head bolts	
Blown cylinder head gasket	Check for warped cylinder head or cylinder block
Cracked or leaking aftercooler	Defective O-rings or tubes
Porous or cracked casting	Check cylinder heads, valve bridges, cylinder block, and intake manifold

Engine Overheat—Cooling System

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. Refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

IMPORTANT: Verify that the engine is overheating to quickly eliminate a faulty temperature gauge or sender.

Cause	Special Information
Seacock (seawater shut off valve) partially or fully closed (if equipped)	

Cause	Special Information
Low coolant level	If persistent, find and repair the source of any closed cooling system leaks.
Antifreeze incorrect type or not mixed properly	Use low silicate type with special additives.
Loose or broken drive belt	
Clogged or improperly installed sea strainer	
Loose hose connections between seawater pickup and seawater pump inlet	Pump will suck air; pump may fail to prime or will force air bubbles into cooling system.
Seawater inlet hose kinked or collapsed	Inlet hose must be wire reinforced to prevent collapsing, and positioned to prevent kinks or restrictions.
Seawater pickup clogged	
Obstruction on boat bottom causing water turbulence	Obstruction will be in front of seawater pickup, causing air bubbles to be forced into cooling system.
Defective thermostat	
Exhaust elbow water outlet holes plugged	
Insufficient seawater pump operation	Worn pump impeller
Obstruction in cooling system such as casting flash, sand, rust, salt, etc.	Refer to the Water Flow Diagram in Section 6—Cooling System for engine type being serviced.
Engine water circulating pump defective	
Heat exchanger core or tubes plugged	

Engine Overheat—Mechanical

IMPORTANT: Check for active fault codes at the beginning of any diagnostic process. refer to **Section 5F—Troubleshooting the ECS System** for engine control system (ECS) and SmartCraft diagnostic trouble codes (DTC).

IMPORTANT: Verify that the engine is overheating to quickly eliminate a faulty temperature gauge or sender.

Cause	Special Information
Engine RPM below specifications at wide open throttle (engine laboring)	Damaged or wrong propeller, growth on boat bottom, false bottom full of water.
Seawater pump impeller worn or slipping	Inspect the seawater pump impeller, refer to Section 6 - Cooling System .
Exhaust restriction	
Valve timing off	Jumped timing chain, or gears improperly installed.
Insufficient lubrication to moving parts of engine	Defective oil pump, plugged oil passage, low oil level.
Defective wastegate on turbocharger	Wastegate stuck closed causing excessive boost pressure.

Power Steering—Poor, Erratic, or No Assist

Cause	Special Information
Drive belt	Worn, broken, or out of adjustment.
Low fluid level	
Air in system	Air leak in lines, pump, or air from installation. Refer to Section 9—Power-assisted Steering System for bleeding procedure.

Cause	Special Information
Leaking hoses	Refer to Section 9—Power-assisted Steering System for bleeding procedure.
Steering cables and/or steering helm	Cable or helm partially frozen from corrosion or rust, cable over-lubricated, improper cable installation.
Binding in sterndrive	Refer to the appropriate Mercury MerCruiser Sterndrive Service Manual .
Restriction in hydraulic hoses	Causes a loss of pressure.
Control valve not positioned properly, not balanced properly, or the mounting nut is loose	
Mounting bracket adjusting screw loose or mounting tube is loose	
Faulty pump	Flow control valve may be sticking.
Worn piston ring or scored housing bore in cylinder	Causes loss of pressure
Leaking valve body or loose fitting spool	

Power Steering—Noisy Pump

Cause	Special Information
Drive belt	Check belt tension.
Low fluid level	
Air in fluid	Air leak in lines, pump, or air from installation.
Faulty pump	Use stethoscope to listen for noise in pump.
Restricted fluid passages	Kinks or debris in hoses or debris in passages.
Stop nut adjusted improperly	Refer to the appropriate Mercury MerCruiser Sterndrive Service Manual .
Incorrect or substandard steering cables installed that do not meet ABYC standards	Refer to the appropriate Mercury MerCruiser Sterndrive Service Manual .

Power Steering—Fluid Leaks

Cause	Special Information
Loose hose connections	Refer to Section 9A for bleeding instructions.
Damaged hose	
Oil leaking from top of pump	System overfilled, fluid contains water, fluid contains air.
Cylinder piston rod seal	
Faulty seals in valve	
Faulty seals in O-rings in pump	
Cracked or porous metal parts	

Seawater Pump—Insufficient Water Flow

Cause	Special Information
Drive belt	Loose, worn, or broken
Seawater shut off valve partially or fully closed	
Clogged or improperly installed sea strainer	

Cause	Special Information
Loose hose connections between seawater pickup and seawater pump inlet	Pump will draw in air, pump may fail to prime or will force air bubbles into cooling system.
Seawater inlet hose kinked or plugged	
Seawater pickup plugged	
Obstruction on boat bottom causing water turbulence	Obstruction will be in front of seawater pickup, causing air bubbles to be forced into cooling system.
Faulty seawater pump	Inspect the seawater pump impeller, see Section 6—Cooling System .

TM345A Transmission

Symptom	Cause	Solution
Too low oil pressure	Dirty bypass valve (74)	Remove valve and clean it
	Too low oil level	Restore oil level
	Failure in oil pump	Replace pump
	Broken O rings on clutch shaft (21)	Remove and replace them
Too high oil pressure	Dirty bypass valve (74)	Remove valve and clean it
Overheating	Excessive oil level	Bring oil down to required level
	Insufficient cooling water intake	Bring up to correct quantity
	Dirty or clogged exchanger	Remove and clean
	Clutch slipping	Check oil pressure in the transmission circuit. If the pressure is too low, proceed as indicated above. If pressure is normal, remove and replace clutch plates.
	Exchanger overload	Reduce propulsor power
	Incorrect bearing preloading	Reset shaft preloading (max 0.08 - min 0.02)
	Damaged bearing	Replace bearing