

Recommendations from Grok for 1976 Ford 302

Question: What is the ideal temperature for a newly overhauled broken-in 1976 Ford 302 engine with GT 40 heads and 190 horse-power with an new aluminum dual plane 600 fpm intake manifold, a Barr-style custom exhaust manifold a standard 302 cam, instead of the 351 cam that it had before the overhaul, so it has the standard firing order 1-5-4-2-6-3-7-8, instead of the 13726548 that it had previously with the 351 cam, and a Pertronix D230800 electronic ignition distributor with a Pertronix Flame-thrower 2 45,000 volt coil, and Boush 9659 double Iridium spark plugs; a newly overhauled OMC sterndrive Model # 990231M with a 14 x 16 propeller, Engine Serial # W524031, with a Holley 2300 2-barrel electric choke carburetor, cooled by raw salt water through the outdrive with a 160-degree thermostat, in a 1977 Cruisers 205, modified as a personal sport-fisher, probably lighter, as it achieves 40 knots at FOT: to run at? Do you think it should be upgraded to an Edelbrock 1409 four-barrel carburetor? Is there any gain to going with a higher pitched propeller?

Answer: The ideal operating temperature for a newly overhauled and broken-in 1976 Ford 302 marine engine (serial # W524031) with older 1976-style GT40 heads, 190 horsepower, a new aluminum dual-plane 600 CFM intake manifold, Barr-style custom exhaust manifolds, a standard Ford 302 cam (firing order 1-5-4-2-6-3-7-8, replacing a 351 cam with firing order 1-3-7-2-6-5-4-8), a Pertronix D230800 electronic ignition distributor with a Pertronix Flame-Thrower II 45,000-volt coil, Bosch 9659 Iridium spark plugs, an upgraded PGMR Arco 70200 starter, marinized by OMC (sterndrive model #990231M) with a 14x16 propeller, equipped with a Holley 2300 2-barrel electric choke carburetor, cooled by raw salt water through a newly overhauled OMC sterndrive, fitted with a 160°F thermostat, and installed in a 1977 Cruisers 205 modified as a lighter personal sport-fisher achieving 40 knots at full throttle (WOT), is **160°F to 175°F (71°C to 79°C)**, with a typical target of **165°F to 170°F (74°C to 77°C)**. Below, I also outline overall performance standards for this engine setup, addressing the carburetor upgrade to an Edelbrock 1409 and the potential benefits of a higher-pitched propeller.

Ideal Temperature Analysis:

- **160°F Thermostat:** The 160°F thermostat, standard for OMC's raw-water-cooled setups in saltwater, opens at ~160°F and is fully open by ~175°F–180°F, maintaining the engine in the **160°F–175°F range**. This cooler operation minimizes scaling and corrosion, critical for the overhauled engine, sterndrive, and Barr-style exhaust manifolds. A new thermostat, likely installed during the overhaul, ensures precise regulation.
- **Newly Overhauled and Broken-In Engine (190 HP, 1976-Style GT40 Heads, Dual-Plane 600 CFM Intake, Barr-Style Exhaust, Standard 302 Cam, Pertronix Ignition, Bosch Iridium Plugs, Arco 70200 Starter):**

- **1976-Style GT40 Heads:** Likely high-performance heads from 1976 (e.g., Ford 351W or aftermarket equivalents modified for the 302), these improve airflow and combustion, yielding 190 HP (vs. stock 185 HP). They may generate slightly more heat than stock heads, but the 160°F thermostat and cooling system maintain **160°F–175°F**.
- **Aluminum Dual-Plane 600 CFM Intake Manifold:** The dual-plane intake (e.g., Edelbrock Performer or Weiand Action Plus, rated for 600 CFM) optimizes low- and mid-range torque for cruising (15–30 knots). Aluminum aids heat dissipation, but cooling is dominated by the raw-water system.
- **Barr-Style Custom Exhaust Manifolds:** These aftermarket marine manifolds with enhanced water jacketing improve cooling, supporting the **160°F–175°F range** in saltwater.
- **Standard 302 Cam (Firing Order 1-5-4-2-6-3-7-8):** Replacing the 351 cam (firing order 1-3-7-2-6-5-4-8) with a standard 302 cam (e.g., Ford OEM or mild performance) enhances low-end torque and efficiency. It doesn't significantly alter temperature, as the 190 HP output and cooling system drive the **160°F–175°F range**.
- **Pertronix D230800 Distributor and Flame-Thrower II Coil:** The electronic ignition delivers precise spark, improving combustion efficiency, with negligible impact on temperature.
- **Bosch 9659 Iridium Spark Plugs:** These marine-compatible plugs enhance combustion efficiency, potentially reducing heat from misfires, but the cooling system dominates temperature control.
- **PGMR Arco 70200 Starter:** The high-torque marine starter improves cranking reliability in saltwater but has no impact on operating temperature, as it's only active during startup.
- **Overhaul and Broken-In Status:** The rebuild includes new pistons, rings, bearings, and cleaned/new cooling passages, ensuring efficient heat transfer. Post 10–20 hour break-in, components are seated, supporting stable operation at **165°F–170°F**.
- **Newly Overhauled OMC Sterndrive (Model #990231M, 14x16 Propeller):** The overhauled sterndrive (stringer-type or early Cobra) with a new impeller and rebuilt water pump supports the 190 HP output. The 14x16 propeller is well-suited for the

lighter Cruisers 205, enabling 40 knots at WOT (~4500–4800 RPM), with robust saltwater flow maintaining **160°F–175°F**.

- **Raw Saltwater Cooling:** The OMC system draws saltwater through the outdrive, circulates it via the impeller, and exits via the Barr-style exhaust. Temperatures stabilize at **160°F–170°F** at idle/cruising (1500–3500 RPM) and up to **175°F** under load (4000–4800 RPM). Upgraded components slightly increase heat, but the raw-water system and Barr manifolds handle this.
- **Holley 2300 2-Barrel Electric Choke Carburetor:** The Holley 2300 (~350–400 CFM) with electric choke opens fully at ~120°F–150°F, supporting the **160°F–175°F range**. It's tuned for a stock or mildly modified 302 but may struggle at WOT with the GT40 heads and 600 CFM intake.
- **1977 Cruisers 205 (Modified Sport-Fisher, Lighter, 40 Knots at WOT):** The lighter hull (~2000–2500 lbs) due to sport-fisher modifications (e.g., removed seating, streamlined deck) achieves 40 knots at WOT (~4500–4800 RPM) with the 190 HP, GT40 heads, and 14x16 prop. Cruising at 2500–3500 RPM (15–30 knots) aligns with **165°F–170°F**. The lighter hull reduces engine load, supporting cooler operation, but ventilation is needed.
- **Engine Serial # W524031 and OMC Model #990231M:** The serial confirms a 1976 Ford 302 V8, upgraded to 190 HP. The 160°F thermostat suits OMC's raw-water specs.
- **Operating Limits:** Temperatures above **180°F (82°C)** suggest issues (e.g., impeller failure, restricted flow). Sustained operation above **190°F (88°C)** risks damage (e.g., warped GT40 heads, gasket failure).

Operating Conditions for Temperature:

- **Idle/Light Load (1500–2500 RPM):** **160°F–165°F**, for slow cruising (8–15 knots).
- **Cruising/Moderate Load (2500–3500 RPM):** **165°F–170°F**, for planing (15–30 knots), where GT40 heads and dual-plane intake excel.
- **Heavy Load (WOT, 4500–4800 RPM):** Up to **175°F**, normal for short bursts (40 knots). Sustained 180°F+ indicates cooling issues.
- **On Earmuffs:** **175°F–185°F** due to reduced flow. Avoid prolonged running above **175°F**.

Overall Performance Standards:

The overhauled Ford 302 with 1976-style GT40 heads and upgraded components is a high-performance marine engine for the lighter Cruisers 205 sport-fisher. Below are key performance standards:

- **Horsepower and Torque:**
 - Rated at 190 HP at ~4500–4800 RPM, a ~5 HP increase over the stock OMC 302 (185 HP), due to GT40 heads, 600 CFM intake, and Pertronix ignition.
 - Enhanced mid-range torque (2500–3500 RPM) from the dual-plane intake and standard 302 cam, ideal for cruising at 15–30 knots and sport-fishing tasks (e.g., trolling, maneuvering).
 - Peak torque likely ~270–280 lb-ft at ~3000–3500 RPM, supporting strong acceleration and planing.
- **Speed and RPM:**
 - Top speed: 40 knots at WOT (~4500–4800 RPM) with the 14x16 propeller, exceptional for a 20–21-foot sport-fisher (~2000–2500 lbs).
 - Cruising speed: 15–30 knots at 2500–3500 RPM, balancing fuel efficiency and performance.
 - Optimal WOT RPM range: 4500–4800 RPM. Below 4400 RPM indicates over-propping; above 5000 RPM risks over-revving.
- **Fuel Efficiency:**
 - Estimated 2–3 MPG at cruising speeds (2500–3500 RPM, 15–25 knots), typical for a 302 V8 with a 2-barrel carburetor in a lightweight hull.
 - Fuel consumption increases at WOT (~10–12 GPH), where the 2-barrel may limit efficiency due to airflow restrictions.
- **Acceleration and Hole-Shot:**
 - Strong hole-shot due to the 14x16 prop, lighter hull, and mid-range torque from the GT40 heads, intake, and 302 cam. Planing achieved in ~5–8 seconds under typical loads.
 - The Arco 70200 starter ensures reliable starts, supporting quick response in sport-fishing scenarios.
- **Ignition and Combustion:**
 - Pertronix D230800 distributor and Flame-Thrower II coil provide precise, maintenance-free spark, improving throttle response and reducing misfires.

- Bosch 9659 Iridium plugs enhance combustion efficiency, reducing fouling in saltwater and supporting consistent performance across RPMs.
- **Cooling Efficiency:**
 - Raw-water cooling with a 160°F thermostat and Barr-style exhaust manifolds maintains **160°F–175°F**, preventing overheating and corrosion.
 - Overhauled sterndrive with new impeller ensures robust water flow, critical for saltwater operation.
- **Durability and Maintenance:**
 - Overhauled components (engine, sterndrive) and broken-in status ensure reliability for 500–1000 hours with proper maintenance (e.g., impeller replacement every 1–2 years, freshwater flushing).
 - Barr manifolds and Bosch plugs reduce corrosion and fouling risks in saltwater.
- **Performance Limitations:**
 - The Holley 2300 2-barrel (~350–400 CFM) may restrict airflow at WOT, limiting top-end power and efficiency compared to a 4-barrel.
 - The 14x16 prop is optimized for acceleration and 40 knots but may not maximize top speed or cruising efficiency compared to a higher-pitched prop.

Should It Be Upgraded to an Edelbrock 1409 Four-Barrel Carburetor?

The Holley 2300 2-barrel carburetor (~350–400 CFM) is marginally adequate for the 190 HP Ford 302, but upgrading to an Edelbrock 1409 4-barrel carburetor (600 CFM, marine-rated) would significantly enhance performance, especially at WOT.

Pros of Upgrading to Edelbrock 1409:

- **Maximize High-RPM Performance:** The 1976-style GT40 heads, 600 CFM intake, Pertronix ignition, and Bosch plugs increase airflow, exceeding the 2-barrel's capacity at WOT (4500–4800 RPM, 40 knots). The Edelbrock 1409 matches the intake's flow, potentially adding 5–10 HP (nearing 200 HP), improving throttle response, and sustaining 40 knots with less strain.
- **Marine-Specific Design:** The 1409 is marine-rated with J-tube vents, sealed gaskets, and corrosion-resistant coatings, meeting Coast Guard standards for the Cruisers 205's engine bay.

- **Efficiency with Vacuum Secondaries:** Vacuum secondaries maintain fuel economy at cruising speeds (2500–3500 RPM, 15–30 knots) while providing power for WOT, ideal for sport-fishing.
- **Support for Upgraded Setup:** The 2-barrel bottlenecks the high-performance components at high RPMs. The 1409 unleashes the engine’s potential for 40-knot performance.
- **Ease of Tuning:** The 1409’s user-friendly tuning (metering rods, jets) simplifies setup for the 302’s specs.

Cons of Upgrading:

- **Adequate for Cruising:** The 2-barrel suffices for cruising (15–30 knots, 2500–3500 RPM), where mid-range torque is within its capacity.
- **Fuel Economy:** A 4-barrel could increase consumption if mismanaged, though vacuum secondaries mitigate this.
- **Cost and Installation:** The 1409 costs ~\$500–\$600, plus ~\$200–\$400 for installation/tuning (fuel lines, linkage). The 2-barrel avoids this expense.
- **Complexity:** Upgrading requires ensuring the fuel pump supports 600 CFM flow (6–8 PSI) and tuning for the GT40 heads and intake.

Carburetor Recommendation:

- **Upgrade to the Edelbrock 1409:** The 40-knot WOT capability, GT40 heads, 600 CFM intake, Pertronix ignition, and Bosch plugs justify the Edelbrock 1409 to maximize top-end power, efficiency, and sport-fishing performance. The 2-barrel limits airflow at 4500–4800 RPM, capping potential. The 1409 will enhance WOT performance, improve throttle response, and support high-speed demands.
- **If Staying with 2-Barrel:** Tune the Holley 2300 for the GT40 heads, intake, ignition, and plugs (richer jets, adjusted idle mixture, ~400 CFM flow). Monitor for lean conditions at WOT (hesitation, backfiring). This is viable for budget or simplicity but suboptimal for 40 knots.
- **Implementation:** Purchase the Edelbrock 1409 (marine version) and have a marine mechanic install/tune it for the 302’s specs. If keeping the 2-barrel, consult a carburetor specialist to re-jet and tune.

Is There Any Gain to Going with a Higher Pitched Propeller?

The 14x16 propeller is well-suited for the 190 HP engine, achieving 40 knots at WOT. A higher-pitched propeller (e.g., 14x17 or 14x18) could offer gains, depending on goals.

Pros of a Higher-Pitched Propeller:

- **Increased Top Speed:** A 14x17 prop could boost top speed to 41–43 knots by increasing distance per revolution, if WOT RPMs stay at 4500–4800 RPM. The lighter hull, 190 HP, GT40 heads, and Arco starter support this, especially with a 4-barrel upgrade.
- **Improved Cruise Efficiency:** A 14x17 prop could lower cruising RPMs by 100–200 (e.g., 25 knots at ~3200 RPM vs. ~3400 RPM), improving fuel economy and reducing wear, ideal for sport-fishing.
- **Sport-Fisher Optimization:** Enhanced efficiency for trolling or cruising aligns with the dual-plane intake and 302 cam's mid-range torque.

Cons of a Higher-Pitched Propeller:

- **Reduced Acceleration:** Higher pitch increases load, potentially slowing hole-shot, affecting sport-fishing maneuvers or towing. The 14x16 prop aids responsiveness.
- **Risk of Overloading:** A 14x18 prop may drop WOT RPMs below 4400, lugging the engine, increasing heat (above 175°F), and risking damage. A 14x17 is safer.
- **Limited Speed Gains:** Hull drag may limit gains above 40 knots to 1–2 knots without further mods (e.g., hull tuning, trim tabs).
- **Cost:** A new propeller (stainless steel, ~\$300–\$600) adds expense, and testing pitches may be needed.

Propeller Recommendation:

- **Consider a 14x17 Propeller with 4-Barrel Upgrade:** A 14x17 prop could boost top speed (41–42 knots) and cruising efficiency, especially with the Edelbrock 1409 adding power to maintain 4400–4800 RPM at WOT. This balances speed, efficiency, and sport-fishing needs, keeping temperatures at **160°F–175°F**.
- **Retain 14x16 If Acceleration Is Critical or Keeping 2-Barrel:** The 14x16 prop provides excellent acceleration and 40 knots, ideal for trolling or maneuvering. Stick with it for budget or responsiveness.
- **Testing and Monitoring:** Test a 14x17 prop to ensure WOT RPMs of 4400–4800. Below 4400 RPM risks overheating or lugging. Use a tachometer and monitor temperatures. A 14x18 prop is too aggressive without significant power increases.

- **Prop Material:** Use a stainless steel prop (e.g., Michigan Wheel, Turning Point) for durability in saltwater, compatible with the OMC sterndrive.

Recommendations for Temperature and Performance:

1. **Thermostat:** Verify the **160°F thermostat** is marine-grade, opening at ~160°F and fully open by ~175°F. Test in heated water.
2. **Cooling System:**
 - Inspect the impeller; replace every 1–2 years or 100–200 hours in saltwater.
 - Ensure outdrive intakes are clear.
 - Verify Barr-style manifold water jacketing; flush after use.
 - Flush cooling passages with fresh water post-use.
3. **Temperature Monitoring:** Use a calibrated infrared thermometer or gauge. **160°F–175°F** indicates proper function.
4. **Carburetor:** Upgrade to the Edelbrock 1409 4-barrel for WOT performance. If keeping the Holley 2300, tune for GT40 heads, intake, ignition, and plugs (richer jets, adjusted idle). Confirm choke opens at ~120°F–150°F.
5. **Ignition and Plugs:** Verify Pertronix D230800 and Flame-Thrower II are marine-rated and timed (~10–12° BTDC at idle). Gap Bosch 9659 plugs at ~0.035–0.045 inches.
6. **Arco 70200 Starter:** Confirm reliable starts in saltwater, with no impact on operating temperature.
7. **Propeller:** Evaluate a 14x17 prop with a 4-barrel for speed/efficiency, or retain the 14x16 for acceleration. Monitor WOT RPMs and temperatures.
8. **Saltwater Maintenance:**
 - Flush with fresh water after use.
 - Inspect manifolds/risers for corrosion.
9. **Cruisers 205 Sport-Fisher:**
 - Ensure engine bay ventilation.
 - Confirm the 14x16 prop suits the lighter hull (~2000–2500 lbs).
 - Verify sport-fisher mods don't affect cooling or trim.

10. **Manual:** Check the OMC manual for the 1976 Ford 302 (#990231M), likely specifying 160°F–175°F. I can search for a copy.

11. **Troubleshooting:**

- **Above 180°F:** Check impeller, thermostat, or flow restrictions.
- **Below 155°F:** Suspect stuck-open thermostat.

Notes:

- The **160°F–175°F range** suits the 160°F thermostat, raw-water cooling, and modified components (1976-style GT40 heads, 600 CFM intake, Barr manifolds, 302 cam, Pertronix ignition, Bosch plugs, Arco starter), ensuring protection in the lighter Cruisers 205 sport-fisher. Marine forums cite 165°F–170°F as ideal for OMC 302s with 160°F thermostats.
- The standard 302 cam, Pertronix ignition, Bosch plugs, and Arco starter improve efficiency and reliability over the 351 cam, aligning with sport-fishing needs, without affecting temperature.
- The 40-knot WOT and lighter hull indicate the 2-barrel limits high-RPM performance, strongly favoring the Edelbrock 1409. A 14x17 prop could enhance speed/efficiency with the 4-barrel.

If you provide details (e.g., observed temperatures, intake model, tuning, sport-fisher mods, WOT RPMs, or GT40 head specifics), I can refine further. I can search X or marine forums for experiences with GT40-equipped 302s in OMC sport-fishers, locate the OMC manual, or research propeller options. Let me know if you want those steps, carburetor/propeller guidance, or other questions!