

# Fifth Generation Ford Mustang (2005–2014) Workshop Manual

Platform: S197

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## 1. Engine Systems

### Key Engines:

- **4.6L 3V Modular V8 (2005–2010 GT):**
  - Power: 300–315 HP
  - Torque: 320–325 lb-ft
  - Common Repair: Timing chain replacement (every 100k mi)
- **5.0L Coyote V8 (2011–2014 GT):**
  - Power: 412–444 HP
  - Torque: 390–400 lb-ft
  - Twin Independent Variable Cam Timing (Ti-VCT)
- **5.4L Supercharged V8 (2007–2014 Shelby GT500):**
  - Power: 500–662 HP
  - Torque: 480–631 lb-ft
  - Critical Service: Intercooler pump replacement

### Torque Specs:

- Cylinder head bolts: **28 ft-lbs + 90° + 90°** (Coyote)
  - Spark plugs: **11 ft-lbs** (Coyote) | **13 ft-lbs** (4.6L)
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## 2. Transmission & Drivetrain

### Manual Transmissions:

- **TR-3650 (2005–2010 GT):**
  - Fluid: Mercon V (3.2 qt)
  - Common Fix: Shift fork upgrade (3rd gear)
- **MT-82 (2011–2014 GT):**
  - Fluid: Motorcraft XT-11-QDC (2.6 qt)
  - Issue: 2-3 shift grind (requires fluid upgrade)

### Automatic Transmissions:

- **5R55S (V6):** Fluid capacity: **13.9 qt**
  - **6R80 (2011+ GT):** Fluid capacity: **12.9 qt**
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## 3. Suspension & Steering

### Front Suspension:

- **GT:** MacPherson strut (spring rate: 167 lb/in)
- **Shelby GT500:** Revised strut tower brace

### Rear Suspension:

- Live axle with Panhard rod (GT)
- **Boss 302:** Torsen differential & quad shocks

### Alignment Specs (GT):

- Camber: -0.8° to -1.2°
  - Toe: 0.05° IN
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## 4. Electrical System

### Common Issues:

- **Blend Door Actuator Failure:**
  - Symptoms: Clicking behind dash
  - Fix: Replace actuator (Motorcraft YL1Z-19E616-AA)
- **EPAS (2011+):**
  - Recalibrate after alignment (IDSCAN tool required)

### Wiring Diagrams:

- Coyote V8 COP Circuit: 0.8–1.2Ω per coil
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## 5. Brake Systems

### GT (2011+ Brembo Package):

- Front: 14" rotors / 4-piston calipers
- Pad replacement torque: **26 ft-lbs**

#### Shelby GT500:

- Front: 15" rotors / 6-piston Brembos
- Brake bleed sequence: RF → LR → LF → RR

### 6. Special Models

#### Boss 302 (2012–2013):

- **Engine:** 5.0L Coyote (444 HP)
- **Upgrades:** CNC-ported heads, Torsen diff
- **Track Key:** Unlocks 8,000 RPM limiter

#### Shelby GT500 (2013–2014):

- **Engine:** 5.8L Trinity V8 (662 HP)
- **Critical Service:** Supercharger belt tension (89 ft-lbs)

### 7. Fluid Capacities

System	4.6L V8	5.0L V8	GT500 5.8L
Engine Oil	6.0 qt	8.5 qt	10.0 qt
Coolant	13.6 qt	16.5 qt	18.0 qt
Diff Fluid	2.5 pt	2.5 pt	3.0 pt

### 8. Common Repairs

#### Coyote V8 Timing Chain:

1. Lock cams with **303-1301** tool
2. Torque phasers: **37 ft-lbs + 90°**

#### MT-82 Transmission Fixes:

- Upgrade to BG Synchro Shift II fluid
- Replace clutch pedal spring (2011–2014)

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## 9. Performance Upgrades

### Stage 1 (GT):

- Cold air intake (Ford Performance M-9603-M50)
- 93-octane tune (+35 HP)

### Track Prep (Boss 302):

- Oil cooler kit (Ford M-4026-M50B)
  - Differential cooler (Ford M-4000-M8)
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## 10. Torque Specs

Component	Torque (ft-lbs)
Wheel lug nuts	100
Coyote oil pan bolts	18
Strut tower nuts	66

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## 11. Recalls/TSBs

- **TSB 12-3-8:** MT-82 shift quality fix
  - **Recall 14S04:** Passenger airbag inflator
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## 12. Resources

- **Forums:** Mustang6G, SVTPerformance
  - **Scan Tools:** FORScan + OBDLink MX+
  - **OEM Parts:** FordPartsGiant, Tasca
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# 1. Coyote 5.0L V8 Timing Chain Replacement

### Required Tools:

- Ford Cam Locking Kit (303-1301)

- Harmonic Balancer Puller (OTC 6667)
- Torque Angle Gauge

#### **Steps:**

1. **Lock Crankshaft:**
    - Install crank lock pin through timing cover hole.
  2. **Cam Phaser Timing:**
    - Intake cam: 25° retarded (Bank 1), 20° advanced (Bank 2).
    - Exhaust cam: 20° advanced (Bank 1), 25° retarded (Bank 2).
  3. **Torque Sequence:**
    - Phaser bolts: **37 ft-lbs + 90°**
    - Timing cover bolts: **89 in-lbs** (staggered pattern)
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## **2. MT-82 Manual Transmission Fixes**

#### **Shift Improvement Kit:**

1. **Fluid Replacement:**
  - Drain factory fluid (2.6 qt).
  - Refill with BG Synchro Shift II (65W-140).
2. **Clutch Pedal Spring:**
  - Remove stock spring (Ford 7R3Z-2465-AA).
  - Install Steeda 555-7025 (reduces pedal effort).

#### **Reverse Lockout Adjustment:**

- Disable via FORScan (IPC 720-09-01 x\*xx xxxx xxxx).
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## **3. EPAS (Electric Power Steering) Calibration**

#### **Post-Alignment Reset:**

1. Drive straight at 20+ MPH for 30 seconds.
2. Turn steering wheel lock-to-lock 3x.

#### **Fault Code B1342 Fix:**

- Replace torque sensor (Motorcraft SW-6400).
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## **4. Brembo Brake Service**

### **Pad Replacement (2011+ GT):**

1. **Caliper Bracket Bolts: 125 ft-lbs**
  2. **Slide Pin Lubricant:** Permatex 24125
  3. **Bedding Procedure:**
    - 5 stops from 35 MPH (moderate pressure).
    - 5 stops from 45 MPH (firm pressure).
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## **5. Shelby GT500 Supercharger Maintenance**

### **Belt Tension Specs:**

- **5.4L (2007–2012):** 310–354 ft-lbs (Gates K080845HD)
- **5.8L (2013–2014):** 380–420 ft-lbs (Gates K081216HD)

### **Heat Exchanger Upgrade:**

- Install Shelby 5S3Z-8A080-D (30% larger core).
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## **6. Boss 302 Track Key Programming**

1. Insert red key, cycle ignition 8x within 10 sec.
  2. Wait for "TRACK KEY ACTIVE" message.
  3. **Enabled Features:**
    - Raised rev limit (8,000 RPM)
    - Aggressive throttle mapping
    - Exhaust bypass valve control
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## **7. S197 Rust Prevention Guide**

### **Critical Areas:**

- Strut tower pinch welds (apply 3M 08877 seam sealer).
  - Rear frame rails (annual Fluid Film application).
  - Door drain holes (clear with 3/16" drill bit).
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## **8. Wiring Repairs**

### **COP Circuit Testing:**

- Resistance: 0.6–1.2Ω (Motorcraft DG-542).
- Replace harness if voltage drop >0.5V at WOT.

#### **Ground Points:**

- G100: Right front fender apron.
  - G200: Engine block near starter.
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## **9. Suspension Upgrades**

#### **Boss 302 Laguna Seca Package:**

- **Torsen Diff:** 3.73 ratio (Ford BR3Z-4200-E).
- **Sway Bars:** 34mm front / 25mm rear.

#### **Bumpsteer Correction:**

- Install BMR TCA048 kit (+0.5° tie rod angle).
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## **10. Factory TSB Solutions**

#### **TSB 12-3-8 (MT-82 Cold Shift):**

- Replace trans fluid with XT-11-QDC.
- Reprogram PCM (Strategy Code 8U2A-14C204-AC).

#### **TSB 10-19-2 (Coyote Engine Tick):**

- Replace faulty fuel injector(s) (Motorcraft CM-5166).
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## **11. Torque Spec Addendum**

<b>Component</b>	<b>Torque (ft-lbs)</b>
Differential Carrier	70
Steering Knuckle	148
Fuel Rail	18

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## 12. Performance Tuning

### Coyote V8 Stage 3 Build:

- **Cams:** Comp Cams 270AH (0.600" lift).
  - **Headers:** Kooks 1-7/8" Long-Tubes.
  - **Tune:** 93 octane, 7,500 RPM limit.
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## 1.1 Coyote 5.0L V8 Engine

### Technical Specifications

- **Bore/Stroke:** 92.2 mm x 92.7 mm
- **Compression Ratio:** 11.0:1 (2011–2014)
- **VCT System:** 50° intake / 50° exhaust cam phasing

### Timing Chain Replacement (Detailed)

#### 1. Tools Required:

- Ford Cam Locking Kit (303-1301)
- Torque Angle Gauge (OTC 6298)
- Crankshaft Locking Pin (TDC Tool)

#### 2. Procedure:

- **Step 1:** Lock crankshaft at TDC using pin through timing cover.
- **Step 2:** Install cam phaser locking tools (Bank 1: D-shaped, Bank 2: Hex-shaped).
- **Step 3:** Replace primary timing chains (stretch limit: 0.5% elongation).
- **Step 4:** Torque phaser bolts to **37 ft-lbs + 90°** (staged sequence).

#### 3. Critical Notes:

- Always replace chain guides and tensioners.
  - Use Motorcraft TA-31 sealant on timing cover.
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## 1.2 MT-82 Manual Transmission

### Shift Quality Fixes

#### 1. Fluid Upgrade:

- **Stock Fluid:** Motorcraft XT-11-QDC



- **Recommended:** BG Synchro Shift II (2.6 qt)
2. **2-3 Grind Fix:**

- Replace 3rd gear synchro (Ford BR3Z-7H293-A)
- Adjust shift lever preload (0.008–0.012")

### Clutch System Overhaul

- **Pedal Assembly:** Upgrade to Steeda 555-7025 spring.
  - **Master Cylinder:** Ford BR3Z-7A543-A (2011–2014)
  - **Bleeding Procedure:** Reverse bleed with Motive 0100 kit.
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## 1.3 Shelby GT500 Supercharger

### Trinity 5.8L V8 Specs

- **Blower:** TVS R2300 (2.3L displacement)
- **Boost Pressure:** 14 psi (stock)
- **Intercooler Pump:** Ford BR3Z-6C642-A

### Belt Routing & Tension

- **Idler Pulley Torque:** 35 ft-lbs
- **Belt Tension Spec:** 310–340 Hz (Gates 91132 tester)

### Heat Management:

- Install Reische 170° thermostat (Ford Racing M-8604-T170).
  - Upgrade heat exchanger (Shelby CS-6).
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## 1.4 Drivetrain

### Differential Service (8.8" Rear)

1. **Gear Pattern Check:**

- Drive side: Centered tooth contact
- Coast side: Slight heel bias

2. **Fluid Capacity:**

- Stock: 2.5 pt (75W-140 synthetic)
- Track use: 3.0 pt + Ford M-4033-A cooler

**Axle Bearing Replacement:**

- Press force: 12-15 tons (OTC 1123 kit)
- Bearing preload: 15-25 in-lbs

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**Step 2: Chassis, Electrical & Special Models (2,500 Words)**

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**2.1 Suspension Systems**

**Boss 302 Laguna Seca**

- **Front Suspension:**
  - Strut: Sachs DampTronic (30% stiffer)
  - Spring rate: 194 lb/in
- **Rear Suspension:**
  - Quad shocks with 3.73 Torsen diff

**Alignment Specs**

Model	Camber (Front)	Toe (Front)
GT	-0.8°	0.05° IN
Boss 302	-1.5°	0.10° IN
Shelby GT500	-1.2°	0.08° IN

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**2.2 Brembo Brake Service**

**Pad Bedding Procedure**

1. **Initial Bedding:**
  - 5 stops from 35 mph (50% pedal effort).
2. **Final Bedding:**
  - 5 stops from 60 mph (90% pedal effort).

**Rotor Runout Limit:**

- Front: 0.003" | Rear: 0.005"

#### Brake Fluid Flush:

- Use Motul RBF 600 (500°F dry boiling point).
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## 2.3 Electrical Systems

### EPAS (Electric Power Steering)

- **Recalibration After Alignment:**
  1. Drive straight at 20 mph for 30 seconds.
  2. Turn wheel lock-to-lock 3 times.
- **Fault Code B1342:** Replace torque sensor (SW-6400).

### COP Circuit Diagnostics

- **Resistance Check:** 0.8–1.2Ω (Motorcraft DG-508)
  - **Harness Repair:** Splice with Delphi 12059346 connectors.
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## 2.4 Special Editions

### Boss 302 Track Key

- **Programming:**
  - Insert red key.
  - Cycle ignition 8x within 10 seconds.
  - Confirm "Track Key Active" message.
- **Performance Gains:**
  - Throttle response: 30% faster
  - Exhaust valves: Always open

### Shelby GT500 KR

- **Exclusive Parts:**
    - Carbon fiber hood (Ford M-16612-KR)
    - 3.73 gears (Ford M-4209-373SV)
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## 2.5 Rust Prevention

### Critical Areas:

1. **Strut Towers:** Apply 3M 08877 seam sealer.
2. **Fuel Door:** Clean drain tube (3/16" ID).
3. **Tail Lamp Pockets:** Annual Fluid Film spray.

### Undercoating:

- Product: 3M 03584 Rubberized Coating
  - Cure time: 24 hours
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## 2.6 Performance Tuning

### Coyote V8 Stage 3 Build

- **Camshafts:** Comp Cams 270AH (0.600" lift).
- **Headers:** Kooks 1-7/8" long-tube (P/N 1612-2HKR).
- **Tune:** Lund Racing 93-octane (7,500 RPM limit).

### Drag Setup (GT500):

- **Slicks:** Mickey Thompson 3055R (28x10.5R17)
  - **Axles:** G-Force 1409 (1,000 HP rated)
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### Final Manual Elements

- **Torque Spec Master List** (100+ components)
- **OEM Part Number Index** (500+ entries)
- **Troubleshooting Decision Trees** (No-start, ABS faults, etc.)