**AERA/AERSCO**
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| TECHNICAL BULLETIN | | Mfg: |
|---|---|---|
| AERA ENGINE BUILDERS ASSOCIATION | July 2008 | Model: |
| | TB 1896R | Liter: |
| | | V I N: |
| | | Year: |

* Engine Balancing Updated As We Receive Information *

The AERA Technical Committee offers the following engine balancing information gathered over the years from various sources within the automotive industry. This Technical Bulletin was started in 2001 and will be updated as we receive additional information. Every effort has been made prior to printing to make this TB as useful as possible. Your input is greatly appreciated, if you have anything to add or comment on please fax to AERA toll free at 888-329-2372 attention Technical Dept.

Note: See legend at bottom for additional information when indicated.

| Manufacturer | Engine Type | Cubic Inches | Liters | Cyl Angle | Recip % | Rotating % | Legend |
|---|---|---|---|---|---|---|---|
| AJS | 1 cyl | | | | 61% | 100% | 3, 19 |
| AMC | V-8 | 290-304 | 4.7 -> 5.0L | 90° | 51% | 100% | 17 |
| Audi | L 5 cyl | | | | 50% | 100% | EXT |
| Benelli | 6 cyl | | | | | | 3,18,19 |
| BMW | Opposed street | | | | 60% | 100% | 3, 19 |
| BMW | Opposed race | | | | 50% | 100% | 3, 19 |
| Briggs | 1 cyl race | | | | 67% | 100% | 21 |
| Briggs | 1cyl stock | | | | 50% | 100% | 21 |
| Brush | 1 cyl | | | | 50% | 100% | |
| BSA | L-2 cyl | 650 cc | | | 75-80% | 100% | 19 |
| BSA | 1 cyl | | | | 61% | 100% | 19 |
| BSA | L-2 cyl street | | | | 60-70% | 100% | 19 |
| BSA | L-2 cyl race | | | | 50% | 100% | 19 |
| BSA | L-3 cyl | | | | 50% | 100% | 19 |
| Buick | V-6 | 181 | 3.0L | 90° | 36.6% | 100% | EXT |
| Buick | V-6 | 196 | 3.2L | 90° | 36.6% | 100% | EXT |
| Buick | V-6 race | 196 | 3.2L | 90° | 50% | 100% | EXT |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Buick | V-6 | 225 | 3.7L | 90° | 36.6 | 100% | EXT |
| Buick | V-6 | 231 | 3.8L | 90° | 36.6% | 100% | EXT |
| Buick | V-6 3800 1988 up | 231 | 3.8L | 90° | 50% | 100% | 46 |
| Buick | V-6 race + GN | 231 | 3.8L | 90° | 50% | 100% | EXT |
| Buick | V-6 | 252 | 4.1L | 90° | | | EXT |
| Buick | V-8 | 322 ->455 | | 90° | 50% | 100% | EXT |
| Cadillac | V-8 | 252 | 4.1L | 90° | 50% | 100% | EXT |
| Cadillac | V-8 | 350 | 5.7L | 90° | 50% | 100% | 24 |
| Cadillac | V-12 | 368 | 6.0L | 60° | | | INT |
| Capri | V-6 | 171 | 2.8L | 60° | 50% | 100% | 4, 22 |
| Capri | V-6 | 231 | 3.8L | 90° | 39% | 100% | EXT |
| Chevy | L-6 | 140 | 2.3L | | | | 6 |
| Chevy | V-6 | 173, 191&207 | 2.8, 3.1 &3.4L | 60° | 44-50% | 100% | EXT |
| Chevy | V-6 | 200 | 3.3L | 60° | 46% | 100% | INT |
| Chevy | V-6 | 229 | 3.8L | | 46% | 100% | INT |
| Chevy | V-6 | 262 | 4.3LSplit pin | 90° | 40% | 100% | INT |
| Chevy | V-6 race | 262 | 4.3LSplit pin | 90° | 50% | 100% | 25 |
| Chevy | V-6 | 262 | Odd fire | 90° | 50% | 100% | EXT |
| Chevy | V-6 | 262 | 4.3L | 90° | 50% | 100% | 26 |
| Chevy | V-6 | 262 | 4.3L | 90° | 46% | 100% | 27 |
| Chevy | V-6 | 262 | 4.3L | 90° | 50% | 100% | EXT |
| Chevy | V-6 | 305->478 | 5.0L->7.8L | 60° | 50% | 100% | EXT |
| Chevy | V-8 | 265->350 Sm Blk | | 90° | 50% | 100% | INT |
| Chevy | V-8 | 305->350 Sm Blk | | 90° | 50% | 100% | 25 |
| Chevy | V-8 | 379->397 Diesel | 6.2->6.5L | 90° | 50% | 100% | 45 |
| Chevy | V-8 | 400 Sm Blk | 6.6L | 90° | 50% | 100% | 7 |
| Chevy | V-8 | Duramax 403 Diesel | 6.6L | 90° | 50% | 100% | EXT |
| Chevy | V-8 | 396->502 Big Blk | | 90° | 50% | 100% | 5&42 |
| Chrysler | V-6 | 201&231 | 3.3L&3.8L | 90° | 50% | 100% | INT |
| Chrysler | V-6 | 238 | 3.9L | 90° | 50% | 100% | |
| Chrysler | V-8 | 273->318 | | 90° | 50% | 100% | |
| 23&73+22 | | | | | | | |
| Chrysler | V-8 | 340 Sm Blk | | 90° | 50% | 100% | 12&15 |
| Chrysler | V-8 | 360 Sm Blk | | 90° | 50% | 100% | 12 |
| Chrysler | V-8 | 361->440 BB | | 90° | 50% | 100% | 8&12 |
| Chrysler | V-10 | 488 | 8.0L | 90° | 50% | 100% | |
| Chrysler | V-10 | 505 | 8.3L | 90° | 50% | 100% | |
| DDC | V-53 | 318 | 5.2L | | 200% | 200% | 1 |
| DDC | V-71 | 426 | 7.0L | | 200% | 200% | 1 |
| DDC | V-92 | 552 | 9.0L | | 200% | 200% | 1 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Evinrude | V-6 | 156 | 2.6L | | 50% | 100% | 2&28 |
| Ferrari | V-12 | | | 60° | | 100% | |
| Ferrari | V-6 | | 2.7L | 60° | | | 18 |
| Ferrari GST | V-6 | Dino | | 56° | 50% | 100% | |
| Fiat | V-12 | | 2.4L | 60° | | | 18 |
| Ford | L-3 cyl | | | | Zero | 100% | |
| Ford | V-4 | 104 | 1.7L | 60° | 50% | 100% | |
| Ford | V-6 | 153 | 2.5L | 60° | 50% | 100% | |
| Ford | V-6 | 171 | 2.8L | 60° | 50% | 100% | EXT |
| Ford | V-6 | 177 | 2.9L | 60° | 50% | 100% | INT |
| Ford | V-6 SHO | 183 | 3.0L | 60° | 50% | 100% | INT |
| Ford | V-6 Duratec | 182 | 3.0L | 60° | 50% | 100% | INT |
| Ford | V-6 SHO | 183 | 3.2L | 60° | 50% | 100% | 20 |
| Ford | V-6 SHO | 207 | 3.4L | 60° | 50% | 100% | 20 |
| Ford | V-6 | 231 | 3.8L | 90° | 39.4% | 100% | 44/EXT |
| Ford | V-6 | 231 | 3.8L | 90° | 50% | 100% | 10 |
| Ford | V-6 | 256 | 4.2L | 90° | 50% | 100% | |
| Ford | V-8 | 221-239-255 | 3.6-3.9-4.2L | 90° | 50% | 100% | |
| FTHD Ford | V-8 | 221->351W Sm Blk | | 90° | 50% | 100% | 22 |
| Ford | V-8 | 332->428 Big Blk FE | | 90° | 50% | 100% | 14&29 |
| Ford | V-8 | 370->460 Big Blk 385 | | 90° | 50% | 100% | 11&14 |
| Ford | V-8 | 281 | Mod 4.6L | 90° | 50% | 100% | INT |
| Ford | V-8 | 330 | Mod 5.4L | 90° | 50% | 100% | 40 |
| Ford | V-10 | 413 | 6.8L | 90° | | | |
| Ford | V-8 | 475->534 | 7.8L&8.8L | 90° | 50% | 100% | EXT |
| GM | V-6 | 191 | 2.8,3.1& 3.4L | 60° | 44-46% | 100% | EXT |
| GEO | L-3 | 61 | 1.0L | | | 100% | EXT |
| Harley&Indian | V 2 street | | | | 52-56% | 100% | 19 |
| Harley | V 2 street hp | | | | 57% | 100% | 30 |
| Harley | V 2 race | | | | 66% | 100% | 19 |
| Honda | L-4 | | | | | | 18 |
| Honda | V-4 | | | | 50% | 100% | 19 |
| Isuzu | V-6 | | 3.5L | 75° | 50% | 100% | |
| Jaguar | V-12 | | | 60° | | 100% | |
| Jeep | V-6 | 225 | 3.7L | 90° | 50% | 100% | EXT |
| John Deere | H-2 | H 101 | | | 20-40% | 100% | |
| Kawasaki | L-4 | | | | | | 18 |



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Kawasaki L-6 18
Koehler 1cyl 50% 100%
Lincoln V-12 50% 100% 13
Maserati V-6 2.8L 90° 50%
Mazda V-6 153 2.5L 60° 50%
Mazda V-6 180 3.0L 50% 100% 40
Matchless 1cyl 61% 100% 19
Mercedes L-5 cyl 50% 100% EXT
Mercedes L-6 cyl 43
Mercury V-6 151 2.5L 30% 100%
2&16
Mercury V-6 race 151 2.5L 50% 100% 2&16
Mitsubishi V-6 153 2.5L 50% 100% 40
Mitsubishi V-6 181 3.0L 50% 100%
40&41
Moto Guzzi 2 cyl 750 cc 90° 51% 100% 19
Navistar V-8 304->392 5.0L->6.4L 90° 50% 100% EXT
Nissan V-6 168 2.8L 60° 50% 100% INT
Nissan V-6 181 3.0L 60°
Nissan V-6 181 3.0L 50% 100% 39
Norton V-2 str 60-70%100% 19
Norton Atlas L-2 75% 100%
Oldsmobile V-8 303-324 90° 50% 100%
Oldsmobile V-8 371-394 90° 50% 100% EXT
Oldsmobile V-8 307->455 5.0L-.7.5L 90° 50% 100%
EXT ONAN 2 cyl opposed racing 50% 100%
Perkins L-3 0% 50% EXT
Peugeot V-6 50% 100% INT
Pontiac V-8 326->455 5.4L&7.5L 90° 50% 100% 9,
EXT
Porsche I-4 F-4 F-6 NO-BOBWEIGHTS
Renault V-6 50% 100% INT
Saab V-4 104 1.7L 50% 100%
Subaru I-3 72 1.2L 50% 100% INT
Suzuki L-4 18
Tecumseh 1cyl 50% 100% 35
Tecumseh 1 cyl 60% 100% 36
Tecumseh 1 cyl 70% 100% 37
Tecumseh 2 cyl 81% 100% 38
Triumph 1 cyl 61% 100% 19



| **Reference:** | |
|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Triumph | L-2 street | | | | 60-70% | 100% | 19 |
| Triumph | L-2 race | | | | 50% | 100% | 19 |
| Triumph | L-3 cyl | | | | 50% | 100% | 19 |
| Volvo | V-4 | | | | 50% | 100% | INT |
| Volvo | L-5 cyl | | | | 50% | 100% | EXT |
| Volvo | V-6 | | | | 50% | 100% | |
| V W | V-6 VR6 | 170 | 2.8L | 15° | 20% | 100% | 34 |
| V W | L-5 cyl | | | | 50% | 100% | EXT |
| Yamaha | 1 cyl | | | | 61% | 100% | 19 |
| Yamaha | V-2 | | | 75° | 55-60% | 100% | 19 |
| Yamaha | V-2 | | | 75° | 60-65% | 100% | 19 |
| Yamaha | L- 3 cyl | | | | 50% | 100% | 19 |
| Yamaha | L-4 cyl | | | | | | 17, 19 |
| Yamaha | V-6 | | | | 30% | 100% | 31 |
| Yamaha | V-6 race | | | | 50% | 100% | 31 |
| Wisconsin | 4 cyl | 108 | 1.8L | 90° | 36% | 100% | 32 |
| Wisconsin | 4 cyl | 154 | 2.5L | 90° | 20% | 100% | 33 |

1. See AERA TB 135R for DDC complete information.
2. Marine
3. OEM specs.
4. German made version of Ford engines.
5. External balance on 454 + 502 cu" engines
6. Includes Corvair opposed flat six cylinders.
7. External 400 cu" engine.
8. 440-6 Pack external
9. Externally balance on the flywheel end of engine only.
10. Super Coupe internal balance steel crankshaft and also Windstar Van
11. 1979 and up is external uses a slide on counter weight behind the dampner.
12. External balance counter weight welded on the torque converter.
13. H series 1941
14. Steel 427 and 429 Boss cu" cranks with oil galleys in hollow rod pins add 15 grams. If not hollow rod pins use 4 grams.
15. Cast crank only is external
16. Requires serious amount of heavy metal to correct out of balance condition.
17. ALL V8s external from 1967 and up and some 290 mid year 1966
18. No bobweights required.
19. Motorcycle
20. Internal, use one rotating rod weight.
21. Mini bobweights

22. External balanced
23. Internal balanced
24. Internal 1942-46 L head
25. External balance flywheel end all with one piece RMB seal.
26. External with balance shaft
27. External with out balance shaft
28. XP Marine engine
29. External balance on 410/428 cu" engines.
30. 3000-4000 RPM operating range
31. 200 HP outboard
32. VH-4D
33. VG-4D
34. VR-6
35. Garden tractor
36. Go-cart
37. Operating range 7500-10,000 RPM
38. Operating range 10,000 RPM
39. VG-30
40. SOHC
41. DOHC
42. 427 HD tall block truck external
43. No additional balance is performed on some 6 cylinder crankshafts. All corrections are made on the flywheel and damper.
44. Truck and Lincoln require 39.4% rec. and 100% rotating, plus an additional 3.0 oz.-in at the damper end of the crankshaft. The weight is added right at the centerline of the counter weight at the damper.
45. Heavy metal required on each end to balance.
46. 1995-2005 3800 with balance shaft

The AERA Technical Committee