

Last updated 12OCT26

Engine originally built by Mike Bell at Dayton Performance ~2008

Rebuilt by HPP Racing ~2016

Engine:

- Dart IE 331 neutral balanced
- 3.250" Sonny Bryant Billet Crankshaft with 2" journals (internal balance crank)
- 5.4" Oliver I-beam billet rods with "bolt upgrade"
 - o Tech at Oliver stated "the bolts are worth more than the rods," even though the rods are top of the line
 - o 7/16" bolts on the rods good for well over 8k rpm (8k rpm would be safe for the lesser bolts)... It was the 3.5 ARP 7018 stamped on head (really expensive \$1,853 new) – see ARP manual
- CP custom pistons
- clevite H-series main/rod bearings
- I roughly measured to ~25cc dishes
- Compression Ratio
 - o Requested: ~ 8.5:1
 - o Calculated
 - Assumptions:
 - 54cc head (after Mike's milling)
 - 25cc dish piston
 - 4.1 gasket bore
 - .039 gasket thickness
 - 0 deck-height
 - Would yield ~8.77:1
- TFS R intake with box upper, ported by Matt Moss. Left a $\leq 1/8$ " shelf that needs correction
- AFR 205cc "renegade" race heads. Also known as competition.
 - o I believe valve seals or guides leak causing smoke
 - o AFR Part # 1450
 - o 58cc Combustion chambers.
 - o Mike tried an o-ring and had to mill, but don't know how much milling
 - o Might require a thinner lower intake gasket such as the 1262R1 or 1262R2, but currently running a standard 1262
 - o lower intake was milled to correct angle, but not necessarily to compensate for head milling
 - o 16-point ARP chrome-moly header studs
- Probe 1.6:1 shaft rockers
- Cometic MLS HG
- Ed Curtis custom cam lift: .604"/.573" Duration (.050"): 228/224 LSA: 114
- Link-bar lifters
- Canton 7qt
- No EGR. No PCV. Crankcase vented to atmosphere from each valve cover via Vibrant Gen III catch can.
- Accessory belt: (BEST OPTION: Goodyear gatorback (now Continental Elite) 4060690: 69")

- o Consider the Continental Elite "Poly-V Stretch" Belt next time.
- Solid motor mounts

Cooling:

- Ron Davis single pass radiator & overflow tank with twin fans (I think 2x13" spal)
- looked up 13" spal fan that indicated 1777 CFM on 12V systems.
- DCC S70 (70 amp) Pulse-width modulation controller with temperature probe in Radiator.
 - o Consider swapping this one for the FK95 in Black Jack. I think the twin spalls pull more amps than the single Mark VII in BJ.

Fuel:

- 120# trick flow injectors (1,225cc)
 - o Low impedance ~2.2 ohm, though I measured 2.8 ohm on one.
 - o p/n 89120
 - o see Manufacturer injector inputs sheet for voltage offset & everything else
 - o Base FP: 43.5psi
- Trick Flow AFPR
- Weldon DB2025A fuel pump (AN -12 in, AN-10 out)
 - o 10 micron and 40 micron cellulose filters (don't run E85)
 - o need to determine what filter sizes are before ordering.
 - o Dayton Performance indicated a 40 micron filter before and 10 micron after. This is backwards from Weldon's recommendations. I think 100 micron filter should replace the 40, since it's the only one available in Stainless Steel (needed for E85).
- Weldon "14000" fuel pump controller
- Behind bars race cars tank
 - o Rear bungs are 3/4-14 NPT → adapter → -8AN (3/4-16 UNF threads) Earl's ball valve → -8AN cap or...
 - o Fuel Drain system:
 - Earl's -8AN output → 1/2" Barb & Hose → 1/2" Barb to 1/2" NPT adapter → 3/4" Garden Hose thread adapter → 3/4" Barb → 3/4" Hose → Risk Racing EZ5 gallon fuel tank w/ as of yet unknown thread size/pitch o-ringed cap that looks to be ~1" with ~14 TPI... candidates from most to least likely: -10 ORFS, 1"-14 straight thread (ORFS is this, I think), G3/4 BSPP, or 3/4 NPSM
 - The EZ5 can use a M16x2.0 spout cap, which could also be adapted for connection

Electronics:

- Battery Cutoff behind license plate
- Convertible Top Switch opens/closes 3.5" QTP exhaust Cutout
- Fog light switch datalogs/records data in BS3
- BS3 DAE2 stand alone (so no MAF)
- MSD Digital 7+ (PN: 7531)
- HVCII Coil (82613) Black
- MSD Billet Distributor (PN: 8456) (might consider going with the cam position sensor next time)
- Spark Plugs: NGK Spark Plugs R5671A-8/4554

- o Accel 9000 plug wires. (PN 9022C)
- Driveshaft Speed Sensor:
- Racepak Split Collar & Magnet Assembly 1.875" I.D. 8MAG
 - o (BS3 manual recommends Mark Williams' 4-mag wheel. I have saved a link to it in the 'cars' chrome bookmarks. Instructions say 1,2,4, or 40 mag wheel)
- MSD 8159 sensor + wire modified IAW BS3 documents (check file). Might have screwed this up.
- PA Performance 200 amp alternator
 - o March Alternator bracket and adjustment rod
 - o 1.69" pulley (overspins, but helps keep voltage up at idle) (?)
 - o Correct gauge wiring from PA Performance
 - o See more details in electronics folder
- O2 Sensors
 - o GM part number 12575657
 - o Bosch: 17018
- Northstar (\$300) group 34 Battery (1050 CA, 880 CCA, RC 133)

Forced Induction & Exhaust:

- GT42/80R 82/87 9-blade (ball bearing). 1.15 A/R:

GTR 42/80

-Cover Coating Options-: Polished [+\$225.00]

Cartridge Material: Cast Bearing Housing/Billet Backplate [+\$100.00]

Turbine Size: 87/82 Gen 3 (9 Blade) [+\$99.00]

Exhaust Housing AR: 1.15 T4

Gaskets: Feed/Drain Gaskets + Manifold Gasket [+\$19.99]

SKU: GTR42-80

- HP Racing Stage III hot and cold side for the turbo set up and 3.5" downpipe).
- 50mm Tial BOV
- 46mm Tial Wastegate (old version. Still F46, according to Chat GPT)
- ~13psi large Blue WG spring
- Dual 3" Y-pipe
- 3" Dynomax Super Turbo WLK-17744 (restrictive muffler to quiet it down on street)
- 3.5" QTP Electric cutout (QTP-10350, QTP-QTEC35)
- Intake filter:
 - o 5" turbo flange for filter mounting
 - o Turbo Guards:
 - Turbo-Guard MAXX for racing.
 - Turbo-Guard SF+ as an option on the street, but even better:
 - o Filter: AFE power 21-91130
 - Inlet Flange Inside Diameter (in.): 5.00
 - Air Filter Length (in.): 3.50
 - Air Filter Top Measurement: 4.500 in. diameter
 - Air Filter Bottom Measurement: 5.750 in. diameter

Drivetrain:

- Promotion Custom T56 (2.98 or 2.97 1st gear with 0.63 6th gear) (Use Synergen Syngear fluid except 1 quart of amsoil supershift)
- Quicktime Bellhousing RM-8031 with ¼" spacer b/w it and T56 (needed for twin disc), apparently the bearing retainer/input shaft sleeve could be shortened by the same to keep it off of the rear disk/PP
- See more details in the transmission build doc
- QTI-RM-199
 - o Transmission Bellhousing Spacer, 0.250 in. Bellhousing to Transmission, 6061-T6 Aluminum, Natural, T56 Magnum Bellhousing Spacer
- McLeod "Original Street Twin" disc clutch MCL-6330107 (157 tooth flywheel, aluminum flywheel)
- Pro 5.0 shifter
- Team-Z Minitub
- Team-Z Outlaw Fabricated 9" housing
 - o Narrowed. Team-Z said something about 2" each side, but after a quasi-measurement from flanges to back ridge on center of housing and adjusting by a suspected 4" depth to the flange measurements, I believe the rear is
 - ~47.76 +/- 0.35" from outer flange face to face.
 - Measurements
 - o 25 3/16 Passenger inner flange face to centerline back of housing
 - o 22 3/4 Driver's side inner flange face to centerline back of housing
 - o Flange thickness from inner flange face to outer: 1/4"
 - o Centerline back of housing to flange measurement point estimated maybe 4" depth. (using Pythagorean theorem to estimate overall length of total housing: 47.76" +/- 0.35"
 - That indicates, in comparison to a 54 1/8 – 54 ¼ stock housings, The rear is actually ~3.3" narrower per side.
 - o Takes standard petroleum 85W-140 **without friction modifier and NO SYNTHETIC**
 - o Takes 2.5 quarts-ish
 - o 35 Spline Strange axles
 - o Strange S-trac Differential
 - o 3.70 gear (37 ring, 10 pinion)
 - o Custom driveshaft (Team-Z sourced)
 - Yoke: Sonnax T3-3-3931HP.
 - Chrome-Moly, 30 spline,
 - (4.760" splines – longest Walt could find).
 - Material: Forged Chromoly
 - Counter Bore (Y/N): N
 - Spline Type: Full
 - U-Joint Series: 1350
 - Weight: 2.930lbs
 - CL to End Length: 6.630"

- Length: 7.510"
- Spline Tooth Count: 30
- Journal Dia.: 1.680"
- Barrel Length: 4.760"
- U-Joints: 1330 Driveshaft side/ 1350 yoke side

Wheels:

- Front:
 - o Torque spec: 85 ft-lbs front (1/2" studs)
 - o Street:
 - 17x8 Weld S71 fronts
 - 245/45/17 (Michelin Pilot Super Sports)
 - o Drag:
 - 26x4.5x17" M&H Racemaster (MTT-017)
 - Tubes: Coker86105?
- Rear:
 - o Torque Spec: 140 ft-lbs rear (5/8" studs) (per Weld **high** recommendation)
 - o Street:
 - 17x12 rears (6.4" BS) (7120A65A) 71LB7120A65A Weld S71 anodized
 - 325/45/17, 28" tall (M&H Racemaster Drag Radials)
 -
 - o Drag Strip:
 - 15x11.33 RT-S S71 Beadlock (medium pad, black anodized beadlock & Center)
 - 7.5" backspacing with a 1" spacer (should have gone 6.5" back spacing, but wheel may not exist)
 - Wheel Stud: 5/8" x 4.5" long studs (Strange Engineering, I think)
 - They have a flat shelf/knurl(?)
 - Tire 28x10.5x15W* (stiff sidewall) (3055L (or '1?'))
 - 13.1 Section width
 - 10.9" tread width
 - 28.1" height
 - Expansion guess: 1.5" (maybe less due to stiffwall)
 - Tubes: MTT9555 or Coker8610534

Suspension:

Front:

- UPR K-member & a-arms
- Mark Menscer Double-adjustable struts/coil overs (front)
- Spring: Menscer 2.5-12-175 (8/22)
- Motorcraft-remanufactured (by Ford) '99-'04 SN95 Steering Rack (2R3Z-3504-CARM / STG-104)
 - o Maximum Motorsports steering knuckle with appropriate SN95 rack triangular adapter (MMST-13)

Rear:

- Strange Double-adjustable shocks with Team-Z valving (S5006TZ)
- Team-Z 4-link rear, including upper (believe relocated) & lower Control Arms & anti-roll bar
- Solid spherical everything.
- Spring: Hypercoil 125# springs, 12" free length, 2.5" I.D.
- Want ~ -2* pinion angle (pointed to ground) & see "Rear End" file for stringing chassis
 - o Reconsider this. May only need ~0.5* with all the solid spherical stuff
- Wheelie bar mounts

Chassis:

- Subframe connectors
- 12-point custom Chrome-moly cage with removeable door bars. & parachute-lever hoop
- Welded Torque box reinforcements upper & lower (want to add the LCA washer)
- Rear tubular bumper w/ parachute mount through rear bumper panel & opening under license for parachute cable.

Brakes:

Legacy Baer "Track Kit"

- Front: PBR 2-piston calipers with 13"x1.1" cross drilled slotted rotors)
 - o Same as Cobra 2 pistons 40mm/40mm
- Rear: PBR 1-piston caliper with 12" cross drilled slotted rotor
 - o Brackets are specific to the 9" housing, but still from Baer
 - Per discussion with Rick Elam
 - [New Style/Torino ends](#)
 - [2.5" Standoff](#)
 - [5.9" axle flange diameter](#)
 - [2.778 Axle register/pilot diameter](#)
 - o Per conversation with Melvin (?) at Baer on 20SEP16
 - Same as 93-97 Camaro, except 5x4.5" lug pattern
 - After looking them up, 93-97 camaros seem to have had 11.54" rear rotors.
 - o Stoptech rotors ordered (re-check these – believe they're more for '93 cobra and don't have proper 'hat' depth.)
 - 126.61045SR – front right
 - 126.61044SL – front left
- Proportioning valve adjustments:
 - o Clockwise adds pressure to rear, counterclockwise decreases pressure to rear
 - o With Michelin Pilot Super Sports in front and M&H racemaster 325/45/17s in back, it likes, after backing out (counter clockwise) 2.5 clockwise turns.

Interior:

- BS3 mounted under passenger floor
- RacePak Dash for BS3
- K-Dezines Rear Seat Delete (custom fit to cage)
- Battery & MSD 7531 Boxes mounted under Rear seat delete with overhead access panel
- Convertible top switch opens 3.5" electric exhaust cut-out

Exterior:

- Cervini Heat-Extractor hood

- Engine bay painted & smoothed
- '93 Cobra fascia all-around
- PPF Capital PPF (?). Norm & Shara Schilling. Sanford, NC
 - o PPF brand: Suntek
 - o Entire front bumper
 - o Entire hood
 - o Top half of front fenders
 - o Bottom half front fenders behind front tires
 - o Entire rear bumper & "Splash panels" behind rear tires (for burnout protection)
 - o 10-yr life... remove at that point before it becomes difficult
 - o Use McGuire's Gold spray wax, not normal wax, at least near any PPF lines to avoid white residue lines.

Maintenance:

Oil has been 0W-40 to this point. Thinking the clearances may want a 30-weight

Rear Gear oil is 85W-140 (non synthetic & no friction modifier)

Fuel filters: cellulose 10 micron & 40 micron (best guess AN -12 on both. Should measure diameter and length on removal). Use stainless steel so can be used with Ethanol in the future. Might need 100 Micron to replace 40 if 40 is not offered with SS).

Future plans/Notes:

It was so satisfying to delete about 1.5 pages of plans because only the following remain (261011):

- Fix driveshaft speed sensor (ensure there are enough input ports remaining on BS3)
 - o Mike Moran or Patrick Barnhill may have said that 8 mag doesn't work
- After DSS fixed, fix Cruise Control!
- Tune 7531 box with Slew Rate control!
- Keep trying for tail-pipes from current exhaust system (no room, really... maybe remove bottom wheelie bar mount under the 9" housing?)
- Sound deadening in doors
- Stop idle smoke! (Tune? Heads?)
- Washer welded on front of LCA mount to protect thin frame rail
- professional chassis balance/weight/settings
 - o carefully center rear wheels & ensure slick expansion doesn't hit the body
- Seal leak in 9" housing's 3rd member
- Front ball-joint passenger side is torn. Time to replace?
- 2-piece brake rotors for easy ring replacement
- Buy parachute and rig up
- Maybe solid roller and more appropriate cam for the new 80mm turbo?
 - o Maybe get backpressure readings first.
- Gather oil pressure data and reconsider Oil viscosity