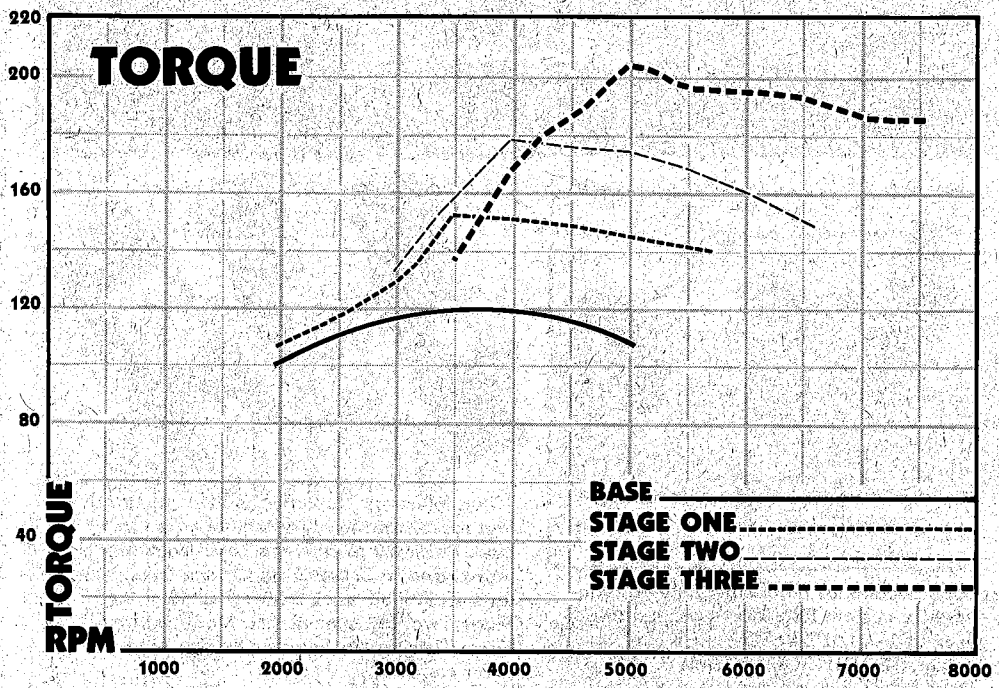
output peaked at 4000 rpm, where 178 ft.-lbs. were produced; horsepower continued to climb up through 6500 rpm, a peak fully 1000 rpm higher than Stage One. At this level the little motor was now putting out close to 190 hp.

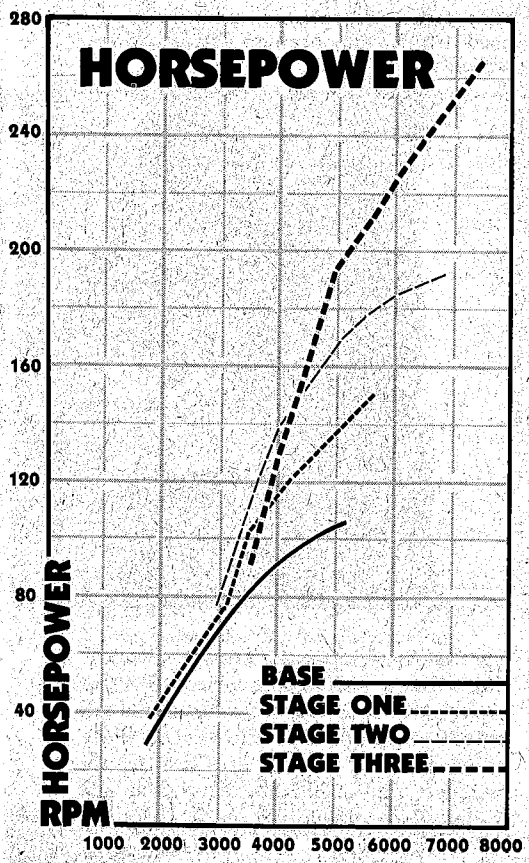
Stage Three (Blueprinted, High-Compression Engine)

Stage Three was designed for competition, so all the stops were pulled out. The two-bolt-main bottom-end needed help, so Ken designed a support kit (part No. MOE-7000-A) for the main caps. As befits an "off-highway" engine, the bottom-end was completely blueprinted. First the block was align-honed with the main caps and support kit torqued in place, then bored .030 over with a torque plate installed (for a total of 143 cubic inches) and finally honed on a Sunnen machine using a 400-grit stone to achieve a very smooth wall finish. The crank was Magnafluxed, straightened and indexed before being set onto the main journals using Ford turbo engine bearings. Equivalent to Clevite-type bearings, they carry part Nos. D9ZZ-6337-A and D9ZZ-6337-G for the upper and lower main center (thrust) bearing halves, respectively, and D9ZZ-6333-A for all the other main bearings. The mains are run with .0025 clearance; crank endplay should be .0055. Clevite-style Ford rod bearings (part No. D9ZZ-6211-A) are also run with .0025 clearance, and support Ford D7FZ-6200-A rods that were Magnafluxed, polished, shotpeened, sized for correct center-to-center length and drilled for pin oiling. Factory rod bolts are used, and so far have proven adequate.

Full-floating taperwall Venolia wrist pins .912 inches in diameter are run in the rod's small end with no bushing. They're retained by double .042-inch Spirolox on 12.2:1 Venolia pistons custom-made to Ken's specs. Once Ken receives the pistons, he massages the dome, rounding off the sharp edges and gently recontouring the areas near the spark plug for better flame propagation. The surface is then low-pressure glass-beaded to remove any scratches left by the hand grinder. Achieving a true 12.2:1 compression ratio required a -.006 deck, .042 compressed-thickness Ford turbo head gasket (part No. E0ZE-6051-AA) and (as in Stage Two) a .060 surfacing cut on the heads to bring their combustion chamber volume down from the stock 62cc to approximately 52cc. Piston-to-valve clearance was maintained at .110 on the intake valves and .120 on exhausts; piston-to-head clearance is .048 inch.

With these Venolia slugs, the piston-to-wall clearance should be .0075 (compared to the stock pistons' .003-.004). The piston has conventional 1/16-1/16-3/16 ring grooves that are fitted with Speed-Pro plasma-moly top, cast-iron second and 15-pound low-tension oil rings. This set (part No. R-9519+.065) is actually designed for a .060-over 283





Dyno Results

Fuel: V.P. Racing gas
Oil: AMS/Oil 20W-50 racing
Fuel pressure: 5 pounds
Oil pressure: 60 pounds average
Water temp: 180 degrees
Ignition timing: 38 degrees total @ 3000 rpm, with Ford electronic ignition

Baseline

Stock 9:1 2.3L Ford engine with turbo bottom-end, 2-barrel intake with Holley-Weber carb, Moroso plug wires, Champion RBN14Y plugs gapped at .042-inch.

Stage One

As above with Reed 4H 286 hydraulic cam, Offenhauser 6114-DP intake with Holley 0-6299 390-cfm vacuum secondary 4-barrel, Hooker headers (1⅛ o.d.x24 long primaries into 2½x8 collectors).

Stage Two

As above with competition valve job, head milled .060 to obtain 10:1 compression, Reed 4S 280/525 solid cam and necessary valvetrain mods to accept it (including Reed No. 2208 90 pound seat/195 pound open valve springs), dividers cut back ⅞ inch on Offy dual-port, carb jets increased to 61/67 on primaries and secondaries, Gap Engines multi-indexed cam sprocket (MOE-6256-A).

Stage Three

As above plus blueprinted .030-over short-block, Skladanek-reworked cylinder head with oversize Manley valves (No. 11543, 1.60 exhaust; No. 11592, 1.937-inch intake cut down to 1.800), 12.2:1 Venolia pistons with Speed-Pro R-9519+.065 rings, Gap crank windage tray (MOE-6687-A), Gap main support kit (MOE-7000-A), Gap 80 psi oil pump relief spring (MOE-6670-A), Offenhauser 6222-C single-plane intake with Holley 0-4412 500-cfm 2-barrel running No. 76 jets, Reed 4R 308 roller cam with Reed titanium retainers and Gap MOE-6564-A roller follower, Champion RZN12Y5 spark plugs gapped at .042.