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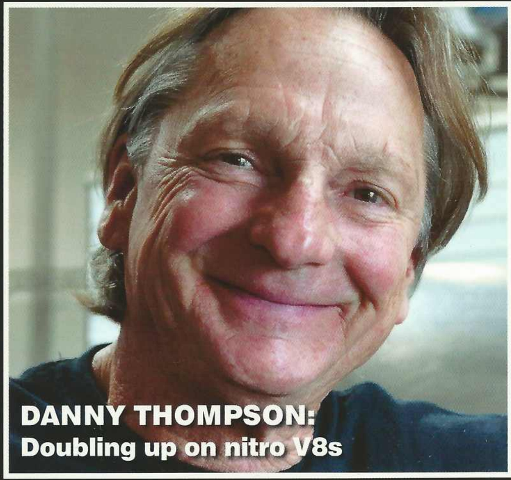

DANNY THOMPSON:
Doubling up on nitro V8s

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The Challenger 2.5 land speed record streamliner is the exact chassis used by Mickey Thompson in 1968 when he tried to set the mark for a wheel-driven, piston-powered car at the Bonneville Salt Flats. His attempt was rained off (Photos: Anne Proffit)

Like father, like son

Anne Proffit talks to Danny Thompson about his bid to follow in his father's footsteps and try to set a new land speed record

There's always unfinished business in racing. For Danny Thompson, son of the late entrepreneur and motorsport innovator Mickey Thompson, his is a long-time desire to take his father's Challenger 2 streamliner to the Bonneville Salt Flats to notch up speeds of more than 400 mph in a piston-powered, naturally aspirated wheel-driven racecar purpose-built for record-breaking runs. "We're looking for 430-450 mph," Thompson says, "and we'll go faster if the car really hooks up."

The Challenger streamliner has been in storage since 1968, when its sole record attempt was rained off; the following year, sponsor Ford pulled out of racing and Challenger (having run 390 mph in practice) began its long sleep. Danny Thompson roused the beast a few years ago and began to turn the streamliner into Challenger 2.5.

Where the father tried to tame the salt by using a pair of single overhead cam Ford V8 engines – at the rear a 1200 hp blown unit, at the front a 600 hp naturally aspirated one – the son will be making his runs using a pair of Hemi-style nitromethane-burning, naturally aspirated V8s that make an estimated 2000 hp each. Whereas Mickey Thompson was trying to beat the 409 mph record set in 1965, son Danny is aiming at the current 439 mph mark as he too sits between two engines.

Like his father, Danny Thompson's preparatory work on Challenger 2.5 is taking place in Southern California, specifically Huntington Beach, an area filled with resources for the land speed record crowd and particularly for Thompson, who over the years has built up a network of willing partners who are actively assisting him in making his record attempt. Thompson has the network but, like most land speed racers, he still needs more funding, so he's set up a Kickstarter online money-raising campaign.

Thompson realised early on that he needed to tap modern technology to complete the speed record attempt. A pair of sohc Ford V8s was no longer the optimal solution, particularly having an engine with a supercharger at the rear and a naturally aspirated unit at the front.

His father chose the 427 cu in Ford V8 engines because that was the best combination Ford had at the time, his son says. "Unfortunately, Mickey had to supercharge the rear engine in order to make more power, which meant the two engines were unbalanced [he couldn't add a front supercharger; there was no room]. That led to a bunch of crazy compromises, including a split gas pedal, which he operated basically via intuition." The current combination gives Danny a lot more power and allows him to run a balanced, more reliable combination that doesn't require added cooling.

The Challenger 2.5 houses a pair of 90º V8s, whose bore and stroke are 4.375 by 4.150 in, for a swept area marginally over 499 cu in. The aluminium blocks and heads are sourced from Brad Anderson Enterprises (BAE), using the Fat Head Stage 8 set-up BAE produces for blown alcohol/AA Fuel engines. The steel crankshaft is made by Sonny Bryant, a favourite of the drag racing crowd. There are five main bearings (Clevite) and the aluminium con rods come from Bill Miller Enterprises (BME).

The oil pump is sourced from Missile, a small company in Michigan. The pump bolts are in a stock location on the block of the rear engine and eliminate the need for a secondary belt to drive off the crankshaft, as it drives from the camshaft.

This oil pump installation is quite tidy on the back engine. For the front engine, there is a belt-drive system that makes the engine's profile longer but doesn't interfere with the car's firewall.

Hemi engines these days are wider than the Fords originally used in Challenger – by about 5.5 in – making packaging one of the bigger challenges faced by Thompson, aided by former Top Fuel driver/aerodynamicist Tim Gibson and his two full-time fabricators, Frank Hanrahan and Lou Anderson. Because of this width discrepancy from nearly 50 years ago, Thompson says, "We cut 2.75 in off the frame rails because that was the only way to get the engines to fit in there."

As is customary, engines (and mock-ups) have been in and out of the Challenger chassis "at least 100 times," Thompson says, as the team works on fitment heading into the racing season in Utah. Engine preparation began in June of this year.

Thompson's engine group is led by bottom-end assembler Richard Catton, from neighbour RC Performance; then there's Jerry Darien, of Azusa, California, who is working on the valvetrain and who is responsible for prepping all of John Force's daughters for their careers in NHRA Funny Car and Top Fuel competition – Darien's team prepared and ran NHRA Top Alcohol Dragsters for Ashley, Courtney and Brittany before they moved up to Funny Car (Ashley and Courtney) and Top Fuel.

The team initially intended to run a 10.5:1 compression ratio, but testing with a similar engine forced a decision to change to 12.5:1; they needed the extra power to achieve the hoped-for 4000 hp on the pair of engines. "We observed a dyno test with the same engine combination we originally planned to use, and it did not make enough horsepower at 10.5:1," Thompson says. "In order to make the horsepower we needed, that combination had to run 90% nitro, and we'd really prefer not to put that kind of stress on the engines, at least not initially.

"Jerry Darien calculated the changes and determined that bumping the compression ratio up by two points would better suit our needs," he says. "We'd prefer to run closer to 50% nitro if possible; this way though, we have the option to go to 90% if we aren't making enough power."

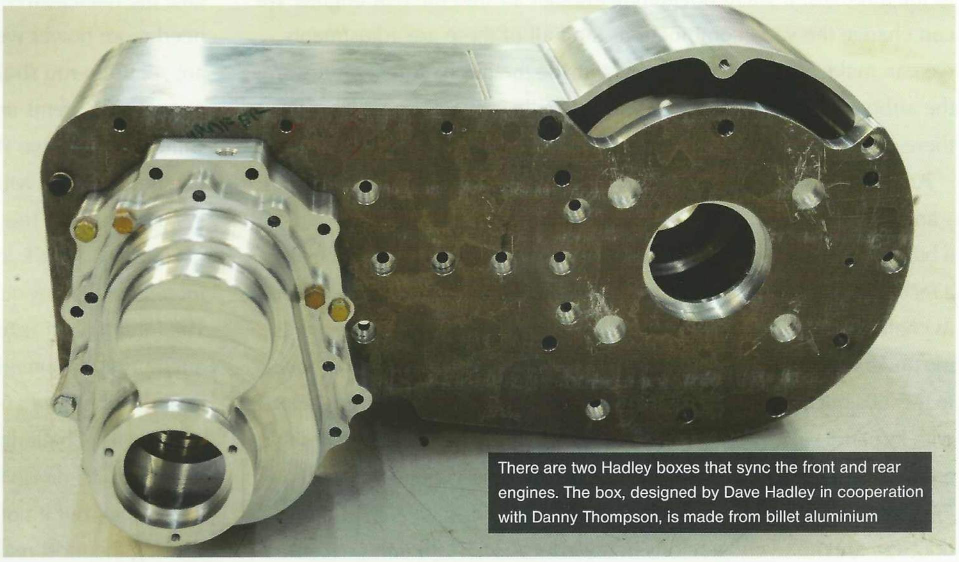
The team put new pistons into the engines the first week of July this year and then had to rebalance the crank because the new pistons are taller and weigh more than the 10.5:1 pistons. Thompson says the BME three-ring pistons (Bill Miller furnishes all ancillaries to the piston as well) have a dome and also valve pockets. "That's what you have to do to get the piston far enough into the cylinder head to get the compression ratio high enough [for his needs]."

Among the more notable characteristics of this dry-sump engine is the front intake on the front engine, which has to be quite low to fit within the confines of the height-constrained engine compartment. "It can't be tall because then it's in the way of my vision," Thompson says. "I have to see over the top of the engine in this car."

In order for the front and rear engines to remain in sync, Hadley boxes were constructed by Dave Hadley of S-K Specialties, a machine shop in Fallbrook, California. The rear engine drives the rear wheels in the normal manner while the front engine is reversed so that it can drive the front wheels ahead of it. A Hadley box is fitted between each engine's bellhousing and its transmission. The two boxes are then linked via a three-piece driveshaft that runs alongside both engines, to the left of them. Inside each Hadley box there are two pulleys that are connected via a Gates 14 mm Poly Chain blower belt. The inner pulley runs off the transmission input shaft and the outer pulley hooks up to a short shaft that in turn connects via a U-joint to the driveshaft.

Each of the two Hadley boxes is about 17 in long and 8 in tall. Driving each Hadley box is a 4 in belt, making each unit about 5.5 in wide. Made from a solid piece of billet aluminium, the front Hadley box is reversed so that the front engine is in sync with the rear engine. "We're trying to make this as simple as possible, but we also want to retain the integrity of the original car that dad ran," Thompson says.

When we spoke in the second week of July, Challenger 2.5 was just about ready for header fitment, and Thompson's team had just completed building the driveshaft that hooks the two Hadley boxes ▶



There are two Hadley boxes that sync the front and rear engines. The box, designed by Dave Hadley in cooperation with Danny Thompson, is made from billet aluminium

CHALLENGER 2.5 – LAND SPEED RECORD CAR TWIN V8S

(Everything to be multiplied by two)
90° V8
4.375 x 4.150 = 499 cu in
Naturally aspirated
Nitromethane (percentage to be determined) and methanol
Aluminium block and heads
Cast-iron liners
Five main bearings, plain
Steel crankshaft, four pins
Aluminium con rods
Light alloy pistons; three rings
Pushrod; gear-driven single camshaft
Two valves/cylinder, two plugs
Splayed valves (20° intake; 23° exhaust)
2.375 in intake; 1.900 in exhaust
Analogue electronic ignition
Fuel injected
12.5:1 compression ratio
Maximum rpm, 7500

KEY SUPPLIERS

Heads: BAE
Block/crankcase: BAE
Liners/bore coating: BAE
Oil pan: Moroso
Crankshaft: Bryant
Camshafts: Bullet
Timing drive components: RCD
Auxiliary drives: RCD
Pushrods: IRC
Tappets: RCD
Rockers: BAE
Pistons: BME
Rings: BME
Piston pins: BME
Circlips: BME
Con rods: BME
Big-end bearings: Clevite
Main bearings: Clevite
Camshaft bearings: Durabond
Seals: RCD
Fasteners: ARP, Coast Fabrication
Valves: Manley
Valve seats: Manley
Valve guides: Manley
Valve springs: Manley
Gaskets: BAE
Ignition system: MSD
Spark plugs: NGK
Distributor: MSD
Fuel injectors: in-house
Engine management system: RacePak
Sensors: RacePak
Data acquisition: RacePak
Throttle: Accufab
Oil pumps: Missile
Exhaust: Hedman
Airbox: in-house
Intake manifold: Hogan
Fluid lines: BMRS
Wiring loom: RacePak
Fuel pump: Waterman
Fuel: VP
Oil: to be decided

together. Once the header installation is complete in mid-July, one of the engines was set to go to the RC dynamometer for function testing before final installation and a shakedown run at Bonneville to make sure Thompson's theories all work.

Another interesting aspect of engine fitment is the work by Accufab on the throttle bodies. While the rear engine can have its throttle bodies on top of the engine, the front engine needs to have them at the front, sitting atop the bellhousing and transmission-Hadley box combination. The air comes in through a nose intake and is fed back through 7 ft of ducting to the engine airbox. The rear engine gets its air from behind the driver's cockpit using flat scoops.

"We'll have to monitor airbox pressure to see how efficient it is and whether we're getting air," Thompson says. "As we're producing the rear airbox, we're also making a couple of different vane combinations in the airboxes. If we're not getting enough air into the rear engine, we can change the vane combinations, and all of these are adjustments we can make at the salt." The vanes inside the airbox direct air towards the airbox. Unlike a NACA duct, the air inlet is straight on each side; there is no taper.

An athlete who has prepared and driven both on- and off-road vehicles – and who has the scars resulting from three broken backs and a broken neck, among other trophies – Danny Thompson has built many a racecar in his 64 years, but nothing like this. The engine in particular has its challenges. "The biggest challenge of putting these engines together is me understanding them," he says. "I used to drag race with my dad back in the '60s but things have changed so much – especially the fuel system with its barrel valves and the dash-20 lines to feed it. I'm used to ones that are 3/8 in, so I'm trying to understand everything that's going on.

"It's Jerry's [Darien] combination because he runs an A Fuel dragster, and he's very gracious in my education. I still don't have it all figured out but by the time we get it all together I should be okay," he says. While Top Alcohol runs methanol with a blower and an A Fuel dragster runs nitro without a blower, the two race each other in the same class. Thompson is using the A Fuel Fat Head engine combination from BAE.

Thompson says the starting system in particular could be very tricky. "We're going to start on alcohol only. The engines each have four nozzles per cylinder, with two of the nozzles in the cylinder head – one in the intake manifold and the other in the intake for starting only. It'll be gravity-fed to warm up the engines on straight alcohol." Once the start procedure has been completed, Thompson will receive radio communication to turn on the Waterman fuel pumps and switch over to nitromethane from that point.

"We're going to start off running 50% nitro," he says. "If the salt will take the horsepower, and if we can put the power down, then if we need more power we have another 40% nitro we can run. The engines are set up to run straight nitro if we want to." The intention is to make certain all systems in the car are functioning and that the transmissions shift. There are two B&J three-speed transmissions, one for each engine, and they will be shifted simultaneously. "We're working on a system for that," Thompson says.

So it's all a work in progress – and that progress is happening incrementally but quickly as the racing season begins to take hold. The initial meeting for the SCTA, which sanctions land speed record attempts at Bonneville, is in August, and there are two more meetings in September and another in October. Thompson's original intent was to take Challenger 2.5 to Bonneville in August but, he said when we spoke, "It doesn't look too realistic. We're going to try to make September, but if not we've got October – that's our back-up and is looking the most realistic." ■