Turbine Car Test Drive
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Mopar Muscle Magazine

Rarely, if ever is someone given the opportunity to step back into the past. Sure, you can read about it, but to actually relive history; experience a segment of time long forgotten by most, is a rare occurrence.

That's the feeling Turbine Car (there were I had as I prepared to test drive the 1964 Chrysler cars built in both 1963 and 1964) at Chrysler's 4,000-acre Chelsea Proving Ground facility. This was an opportunity to enter a 25-year time warp. So what's the big deal, you might ask? People drive 1964 vehicles all the time. The big deal is this: the 1964 Chrysler Turbine Car was (and is) one of the most revolutionary advancements in automotive engineering since the horse was put out to pasture. It marked a total departure from the standard means of propulsion it was produced in quantity (as opposed to one-off prototypes), and stands today as an engineering marvel of no small measure. And was about to drive it.

Turbine History 101

A Chrysler engineering study done in the late 1930's there was significant potential for the gas turbine engine indicated that as an automotive powerplant. The problems were that neither existing materials nor current manufacturing technology would allow for further development of the project at that time.

After World War II, Chrysler develop a turboprop engine was awarded a contract by the Navy to for aircraft applications. The contract ran from 1945 through 1949 and resulted in the development of a turboprop engine with fuel economy nearly as efficient as (then current) piston-driven aircraft engines. The promising results of the project led Chrysler to again explore the possibilities of the turbine in an automotive application.

Through the early 50s, experimental gas turbines were operated in dynometer testing and, on a very limited basis, in test cars. Research and development progressed to such a degree that in the fall of 1953, a 1954 Plymouth Belvedere hardtop was fitted with a turbine engine for "on road" testing and evaluation. On June 16, 1954, the turbine-powered Belvedere was demonstrated to the public at the dedication of the Chelsea Proving Ground! No other automobile company had attempted such a venture. That first turbine produced 100 shaft horsepower and solved the two major problems of a turbine engine: poor fuel economy and extremely high exhaust gas temperatures.

For 1955 a Plymouth Belvedere was again chosen to receive the turbine engine (this time a four-door sedan) and although never publicly announced, it was the first turbine car to be driven and tested on public streets as it traveled in and around Detroit. Enough data and experience was obtained that in 1956 another turbine-powered Plymouth Belvedere left the Chrysler Building in New York City on March 26, and arrived at the Los Angeles City Hall on March 33. The turbine car had traveled 3,020 miles in four days. There were only two minor breakdowns (neither of which was to the turbine unit) and the car averaged 13 mpg on a mixture of unleaded gasoline and diesel fuel. Equipped with an automatic transmission, the turbine car drove much the same as a conventional family sedan with an internal combustion gasoline engine.

With all of the test information and the results of further research and development, Chrysler engineers developed a Second Generation turbine engine. Operating efficiency of the compressor, burner and regenerator were all significantly improved as was the metallurgy of the turbine's components. Still, the costs for materials and tooling were prohibitive and the available supply of the needed alloys restricted any thoughts of mass production at that time. However, a Second Generation turbine was installed in a 59 Fury four-door hardtop for a 576-mile test from Detroit to New York and showed a significant improvement in fuel economy.

Turbine engine development continued as a high priority item at Chrysler. Encouraged by what they were seeing from the testing of both engines and cars, the engineers were constantly striving to improve both design

and efficiency. On February 28, 1961, a Third Generation turbine, the CR2A, was introduced to the news media in three separate vehicles: an experimental Turboflite show car, a 1960 Fury four-door hardtop and a Dodge 2 1/2-ton stake-body truck.

The Third Generator engine was also installed later in a 1962 Dodge Turbo Dart. The Turbo Dart would be the first of the turbine cars to receive any significant styling changes to differentiate them from standard production modes. Minor trim differences were the only distinguishing marks of previous cars. The Turbo Dart was also used for a coast-to-coast engineering run, this lime through sub-zero, snow and freezing rain conditions. t made the 3,100-mile trek in five days. Fuel economy exceeded that of a conventional traveling companion and the turbine showed minima wear at the end of the trip. Odd weather performance well exceeded engineering expectations.

One of the most significant differences in the Third Generation unit was a “variable second-stage turbine nozzle” which allowed for better performance economy and engine braking. The varying nozzle acted as a “shutter’ to direct the angle of the jet stream to the power turbine blades The nozzle angle varies with accelerator position to provide optimum gas flow direction at all times. This is the very same technology as that of the VNT (variable nozzle turbo) Chrysler is using today; the turbine engine used it stating in 1959. Engine braking was provided by simply reversing the angle of the nozzle blades as the accelerator pedal is released. The Turbo Dart, and a sister car, the Turbo Fury, toured the country testing consumer reaction at roughly 90 dealerships potential customers were asked, ‘if this car were offered for sale to the motoring public, do you think you would buy one?” Of those surveyed, 30 percent said they would definitely buy one while 54 percent said they would seriously consider it. The turbine concept had overcome the biggest hurdle of all — pubic acceptance!

The Fourth Generation turbine was installed in the ‘64 Turbine Car, and we'll get to that later. The Fifth Generation turbine was slated for installation in a limited production run of 500 1966 Chargers. Little more than a modified version of Generation Four, number five would never see the light of day. Economic conditions at the time and problems with getting the burner system to conform to ever-tightening emissions standards kept number five on the shelf. It was during this period of limbo that a Sixth Generation was developed.

The body of choice for this engine was a stock-appearing 1966 Coronet 500 hardtop. The car was never seen by the public and was utilized strictly for engineering evaluation from ‘66-73. Number six delivered 150 horsepower, was lighter than a conventional V-8 and could burn a multitude of fuels. Performance was on a par with a conventional passenger car V-8 engine of approximately 380 cubic inches. Active R&D work on number six fell off drastically in 1969 as priorities for the automakers changed to a full-blown commitment to emission controls for conventional passenger car engines. Although the effort was somewhat downgraded, the work continued toward getting a turbine engine certifiable for emissions testing

Knock Knock! ... It’s Big Brother

This ongoing effort and commitment was rewarded when in November 1972 Chrysler was awarded a United States Government contract (both Ford and GM were bidding for the same award) to build a test vehicle for the Environmental Protection Agency to evaluate. This marked the first time in history that the EPA had awarded a contract for development of an advanced, alternative power system. Three intermediates (Coronet/Satellite) were built and equipped with a Sixth Generation turbine.

As with many bureaucratic projects, the EPA evaluation was not handled properly and the Chrysler vehicles came off looking bad because of it. Drivers doing evaluations were required to furnish their own fuel, and to conserve on their personal cash outlay they would often put less gas in the car than they needed, run out of gas and let the car sit. Here was a car clearly marked as an EPA/Chrysler Turbine test vehicle, sitting along the side of the road, broken down to all outward appearances. Not a very good slice of PR for the project.

All during this time, developmental work continued on a Seventh Generation engine. That engine found its way into two ‘76 Aspens. A planned third car was cancelled as the handwriting on the wall was beginning to appear, sounding the death knell for the needed funding. That same Seventh Generation engine later was installed in a modified ‘77 LeBaron and an ‘80 Mirada. A planned Eighth Generation turbine would have been adaptable to Chrysler’s new commitment to front wheel drive cars, but that engine would never leave the drawing boards before the program was terminated.

George Stecher, our host for the test drive and one of the few remaining people left who was involved with the entire turbine program, has some very definite thoughts concerning the death of the project. ” ... in early 1981, about March or April, we were funded by the Department of Energy, and this is strictly my opinion now. Mr. Reagan took office and appointed a Secretary to the Department of Energy with instructions to dissolve/terminate the Department of Energy in one year. At that time I was Support Engineer/Liaison Officer between Chrysler, Williams Research, NASA-Lewis and the Department of Energy, so I was spending a lot of time in Washington. I could see these people looking over their shoulder, making phone calls and saying hey, have you got any openings in your area?” In my opinion, I think somebody got the brainstorm that said, “Why don’t we terminate Chrysler’s contract with the Department of Energy because they might be going under anyway.” So our program was terminated. Chrysler could not afford to continue on alone at that point. That’s my opinion.” George feels that had the program not been terminated, turbine driven cars would be commonplace today. Development would have made the material and tooling costs in mass production very competitive with conventional engines.

The Ghia Turbine Car

On May 14,1963, all the development and testing work would bear fruit. Chrysler unveiled its totally new Turbine Car to the press in New York City. Included in the program was a 2 1/2-mile test drive at Roosevelt Raceway. The following day, the Metropolitan New York Chrysler dealers were introduced to the car at the Waldorf-Astoria Hotel. These events marked the kick-off of Chrysler’s plan to place 50 cars in the hands of the public for everyday evaluation.

Each of the 55 cars (50 were built for consumer testing while five were retained for Chrysler Engineering to do its own evaluation) was a hand-built car. Body panels were not interchangeable from one car to the other and the hood and deck lid were aluminum. The styling of the car carries a “bladed turbine theme,” both inside and out, with a full-length center console highlighting that theme on the interior.

The cars were designed and assembled by Chrysler, although the actual building of the bodies was done by Ghia of Italy. All of the 50 cars for consumer testing were painted Turbine Bronze with a black vinyl roof and bronze leather interior. Of the five engineering cars; two were identical to the 50, one was all Turbine Bronze with no vinyl roof, one was Turbine Bronze with a black vinyl top and black leather interior and the fifth car was all white with black interior. All of the cars were equipped with a very plush, deep pile, shag carpeting.

The car was a four-passenger sport/luxury hardtop. Power steering, power (pressure assisted, not vacuum assisted) brakes, power windows and modified TorqueFlite automatic transmission were all standard equipment. The automatic transmission was somewhat different than the norm in that it did not have a conventional locking sprag in the “park” position. In its place was an “idle” mode on the gear selector quadrant. In the idle mode, both the forward and reverse bands were engaged. Lift the gear selector and place it in drive and the reverse band would disengage. Place the selector in reverse and the forward band would disengage. Racers use the same principle on a “Trans-brake.” The TorqueFlite featured a modified valve body and had no torque converter.

Production on the cars ran through October 1964 with the cars being built at the rate of one per week.

Going Public

Chrysler's plan for the 50 cars was both ambitious and resourceful. It was also a tremendous financial risk for the corporation. Simply put, the plan was to place the cars in the hands of 203 pre-selected motorists for a three-month test drive, on a rotating basis, over a period of two years. The program ran from Oct. 29, 1963, to Oct. 28,1965. The last user completed her test period on Jan. 28,1966. To qualify for testing, a candidate must own a car or be a member of a family in which the head of household owned a car and must have a valid driver's license. There were 30,000 applicants for the privilege of being selected.

The lucky few were chosen from 128 major population areas in the then 48 states, plus Washington, D.C. A cross-section of the population was chosen without regard to make of car they owned. The user had only to maintain the appearance of the car, exercise reasonable care over it and furnish Chrysler with an evaluation at the end of the 90-day period. Such a deal. Total mileage collectively was 1,111,330, average was 5,474, highest mileage was 14,046 and the low was 1,025. Of the 203 test motorists, 180 were men and 23 were women. Age range was 21 to 70 years of age. 60 percent owned Chrysler vehicles and 40 percent owned other makes.

At the end of the testing program the cars were found to have been very reliable. Service problems arid breakdowns were of a minor nature and most were attributable to driver misuse rather than equipment failure. The only design flaw noted was a tendency for the shift cable to kink.

With advances in metallurgy, the use of ceramics and the reduced costs associated with mass production (as opposed to one-off prototypes) the turbine engine could have been a commonplace power source today. The Japanese are known to be conducting their own experiments into turbine power and could very well bring it to market somewhere in the foreseeable future.

After 25 years of development and testing and an investment of over $100 million by Chrysler alone, the program was terminated with one stroke of a government pen. It deserved a far better fate.

The Feel Behind The Wheel

The first time I ever saw a Turbine Car, other than a picture, it was traveling in the opposite direction on the Pennsylvania Turnpike. I was in the Navy and somewhat cut off from mainstream America. I wondered what it was lo and later found out. My second sighting would come roughly 25 years later, at a much closer range. Chrysler trotted the Turbine Car out for viewing at the 1990 new car showing. I was more enthused (sorry Chrysler) with it than the new cars we were being shown. I wondered what it would be like to drive this piece of history, and if it would even be possible to get the chance. I conveyed my thoughts to Tom Kowaleski at Chrysler, told him my reasons for wanting a test-drive and lo and behold, the wheels were set in motion. I would return to the proving ground at a later date to fulfill a dream.

The first glance at the Chrysler Turbine Car elicits a mixed reaction. The car is, with all of its chrome, adornment and overall styling, a mid-Sixties car. However, that same styling has held up well through the years and is by no means dated by today's standards.

The interior is both sporty and luxuriously plush for a Sixties car. Chrome trim continues to dominate, even the interior, but it's tastefully done. With the hood open the turbine engine more resembles a boiler than an automotive powerplant.

Standing beside the car as George is about to start it, I'm not sure just what to expect — I've never heard it run. As George turns the key the car emits a whistling noise, in ever-increasing volume, followed by a rumbling, whirling whoosh. All within about two seconds. I find myself surprised at how quickly and smoothly the turbine starts and runs. At idle the unmuffled turbine sounds much like a jet engine, also at idle. Yet the decibel level seems no higher than that of an idling Sixties musclecar. Standing at the rear of the car as George slips the

transmission into gear and accelerates slightly there is a noticeable amount of heat coming from the exhaust. Nothing intolerable —just noticeable.

The Detroit weather was not being kind to our plans. The entire week had been clear and sunny — today the rain was playing an on-again-off-again game, just enough to tease our plans. George was undaunted by the rain and readily agreed to let us continue with the car test. Watching as he backed the car out of the garage, I couldn't help but think to myself, “If I were Chrysler, I wouldn’t be letting me do what I’m about to do.” Here is a car worth more than mere money —and they’re going to let some magazine-type behind the wheel.

Sitting in the car (as a passenger so far) the noise almost seems to be coming from somewhere other than the car, as if off in the distance a 727 were taxiing up to the terminal! It’s almost spooky. You feel somewhat detached from the car. We head for the gas pumps to top off the tank (George says he doesn’t trust the accuracy of the 25-year-old gauges and the car exhibits its soft luxury car ride, contradictory to the sporty appearance. When the key is shut off the turbine takes a good 15 seconds to totally wind down, and the whistling sound just becomes faint as it loses rpm. George puts five gallons of No. 2 diesel fuel in the tank then pulls up to the unleaded pump for five gallons of gas to mix with it The No. 2 is a poorer grade of diesel necessitating the unleaded gasoline mixture.

There are some quirks to the Turbine Car: the heater operates on at air-to-air system (providing instant heat to the passenger compartment 35 the car has no liquid cooling system; it’s not equipped with air conditioning as the Fourth Generation turbine was not designed with accessory drive systems. Later designs would have provided for all common accessories. Familiar as I am with mid-Sixties Chrysler cars, I see not ing that is familiar to me; not the gauges; not even the radio/headlight gar lighter knobs. Everything was a unique design for this one car. Even the rear-view mirror mounting post has a turbine-finned design

The Moment Of Truth

George drove from the pumps to the banked oval test track. He the stopped the car on the banking, opened his door and, as he exited the car, announced that it was now my turn.

Sitting behind the wheel now I realize — I’m nervous. I don’t want to hurt this car! The first order of business is to familiarize myself with the instrumentation and operating controls. The far left instrument pod house the turbine inlet temperature gauge which reads 1,100 degrees at idle. At the far right is the tachometer, registering from 0-60 in thousands — not thousandths, idle speed is 22,500 rpm. Redline on the engine is 44,610 rpm. Oil pressure is 92 psi at idle. That should be sufficient! The odometer shows 42,300 miles. Good — the cars broken in. Aside from the previously mentioned sounds, I notice a very slight vibration in the seat, however, there is none in the steering wheel.

George is determined to see that I experience all there is to the car. He has me shut it off, wait for the turbine to come to a complete stop and then restart. Turning the key to the start position is a conventional drill. Almost immediately though, a red light illuminates on the dash signifying “we have ignition’ as the turbine comes to life. The key must be released immediately upon illumination of the red light. Oil pressure and rpm come up and I slip the car into drive. As we accelerate slowly, the tach begins to climb, as does the turbine inlet temperature gauge. In fact, the gauge responds to the throttle much the way an undampened, full mechanical oil pressure gauge would: give it the slightest throttle and the inlet temperature begins to climb, release the throttle and it tails immediately. At 43 mph the tach reads 30,000 rpm and inlet temperature is 1,350 degrees. By now road noise has completely drowned out any turbine sounds and the car gives an illusion of coasting, even under light acceleration. Road noise and feel are a bit more than I had expected, most likely a combination of the short wheelbase, 25-year-old suspension bushings and shocks and the low-tech, non-performance tires. Having driven Mopars of all years and models, an aspect of the car I personally feel very at home with is the standard Chrysler

issue “three sizes too large” steering wheel of the Sixties, To those familiar with it, it ceases to be a minus and fits like a comfortable old shoe.

Once under way, acceleration is fairly brisk. From 50-75 mph it feels about equal in this range to a ‘65 Chrysler with a 383 two-barrel. I refrained from doing any hole-shot acceleration runs as a concession to the value and age of the car. George says the cars were good for about a 12 1/2-13 second 0-60 lime when new. Whether a performance application for the turbine would have ever been feasible is doubtful. Design characteristics just don’t lend a turbine to quick acceleration.

At 75 mph the inlet temperature has risen to 1,500 degrees and rpms are at 32,000. Bumping the speed to 80 mph approaching the banking, it feels as though we’re going much slower. Ride is smooth without being soft (love that torsion bar suspension), firm without being harsh. As the banking looms closer, George is the ideal passenger and overall, a good sport not at all the nervous mother. He hasn’t said a word about my speed, but common sense tells me to slow down, feel the car through the banking for the first lap, and adjust accordingly. Through the banking at 65 mph it feels very comfortable, very quiet and very stable, and I can’t help but think of the proving ground test track and car as two old friends getting together for a reunion. Accelerating out of the banking I push the car to 85 mph down the back straight. It gains speed quietly and effortlessly. Approaching the opposite banking I hit the brakes for the first time and realize how sensitive they are. George explains that a turbine produces no vacuum, thus the brakes are assisted by a compressor/air storage tank system. The other power-assist system, the steering, is as most Sixties Chrysler products were more power than steering, but road feel is a bit better than most I’d driven before.

For our next lap I turned the car around to run the course in a clockwise direction. The rain had stopped but the track was still wet, limiting our speed to 70 mph on the first pass. At that speed I could feel the tires just hinting at losing adhesion. During the new car showing I was able to put a 1990 Daytona, shod with high-tech Goodyear Eagle tires, through the same turn doing 85 at the apex and 95 out the chute before the tires felt like they were ready to lose grip with the dry pavement. So 70 mph on the Turbine Car, on wet pavement, wasn’t too shabby. The 4,100 pound weight did help hold it to the track.

The sheer size of the proving ground dictates a fairly long drive from one test area to another and then back to the main garage area. The return trip took us over a series of two-lane paved roads much like you would find in most of rural America. With Tom Glatch and Sandy Pie (our photo crew) in the back, the car felt the same as it had with just George and I on board. Ride, handling and power didn’t seem affected.

Pulling the car back into the garage I felt a little sad that it was all over. Yet I was elated that I had had this opportunity. Looking back, I don’t really know what I was expecting of my Turbine Car test drive, but it wasn’t what I had anticipated. The feel behind the wheel was not what I had prepared myself for, whatever that was. Driving the Chrysler Turbine Car feels like, well, sort of like, driving a car. And that was a bit of a surprise.

To sum up the experience, I had fulfilled a fantasy. I had driven the single most unique car in 20th century automotive history. And it was a very pleasant experience, and one that will never be forgotten.

George F. Stecher - Our Test Drive Host

Today, George F. Stecher holds the title of Vehicle Development Specialist/Advanced Engine Systems Development. But during the era of the Turbine Car he was chief mechanic on the test vehicles.

Although there are several people left who were involved in the turbine program, George believes he is the only one still at Chrysler who has been there through the entire program. His area of responsibility was primarily one of research and development. Since the 50 test cars were done at a different plant, George was involved with the remaining five only.

George served as one of the drivers on the transcontinental run in 56 and did all of the Turbine Car stunt driving (the white engineering car) for James Darren in the 1964 movie The Lively Set.

The Turbine Car is Georges baby, and he was our gracious host for the test drive.

Footnote, George F. Stecher passed away in April of 1999, he is missed!