CHEETAH

NEW GT PROWLER

Beware! Bill Thomas' GT coupe is a combination of proven Chevrolet performance components in a handsome new skin... and it's named after the Cheetah, fastest animal on earth

text and photos by Don Francisco

One of the more popular competition classes in sports car racing is the "Grand Touring" class. According to an official definition, a GT car is "...for customers looking for better performance and/or maximum comfort and not particularly concerned about economy." It must have two seats, a spare tire, a finished interior, space for one suitcase, and all the equipment required for highway driving, which includes headlights, taillights, stop lights, directional signals, windshield wipers, and a horn. One hundred of a particular model must have been built to make the model eligible for racing. Models of which less than one hundred have been built must compete in a prototype class. Examples of GT cars are Corvette, the Ford-powered Cobra, Ferrari Berlinetta, Maserati, etc.

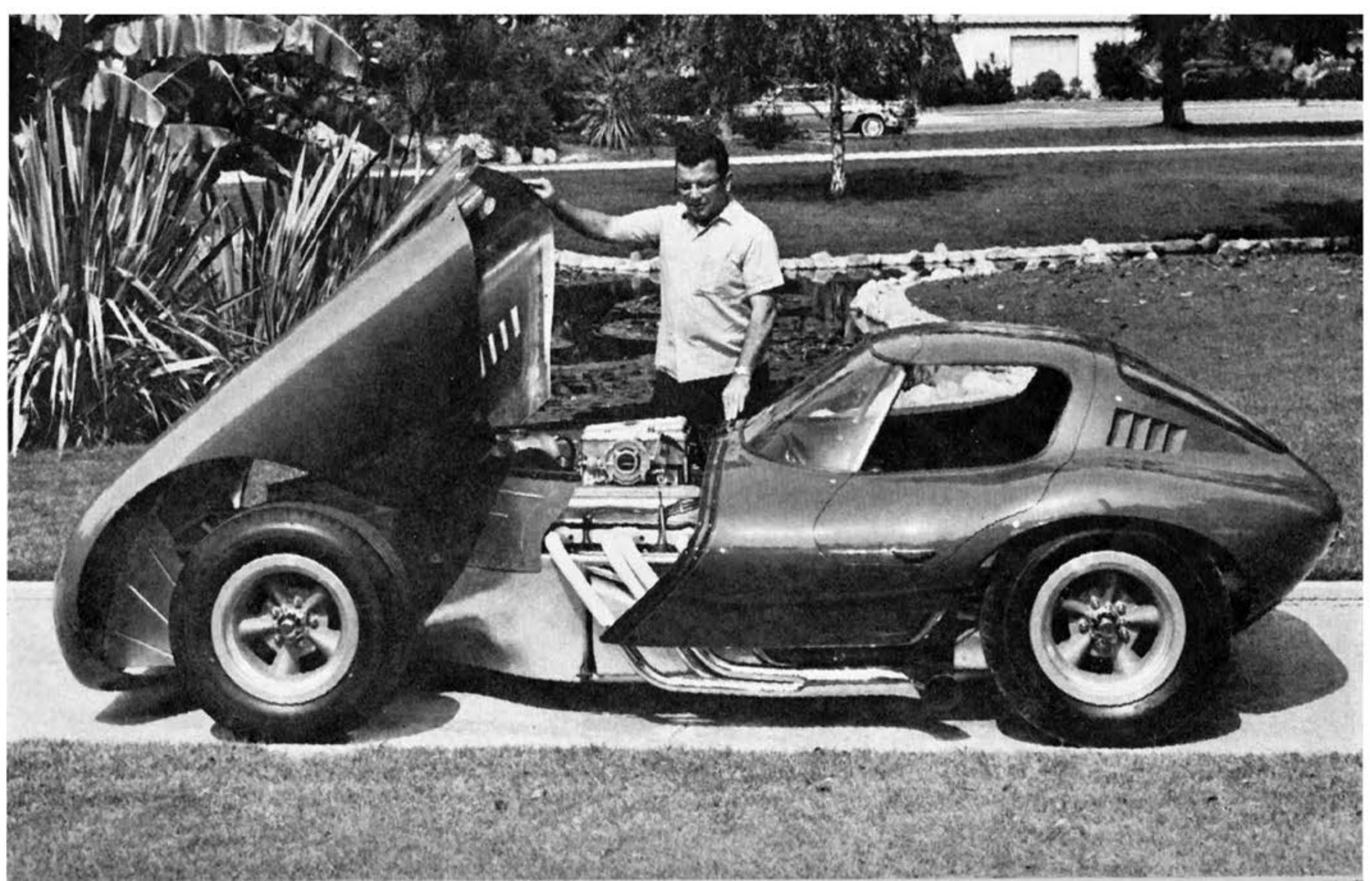
Some GT cars aren't what could be called hot performers but others are fast, good-handling cars capable of putting on a good race. A new member of the fast, good-handling group is the "Cheetah," a beautiful car built by Bill Thomas Race Cars in Anaheim, Calif. In addition to having the potential of an excellent performer, Cheetah is a handsome animal. If its performance were only ordinary, it would still have enormous appeal to anyone who likes wild cars.

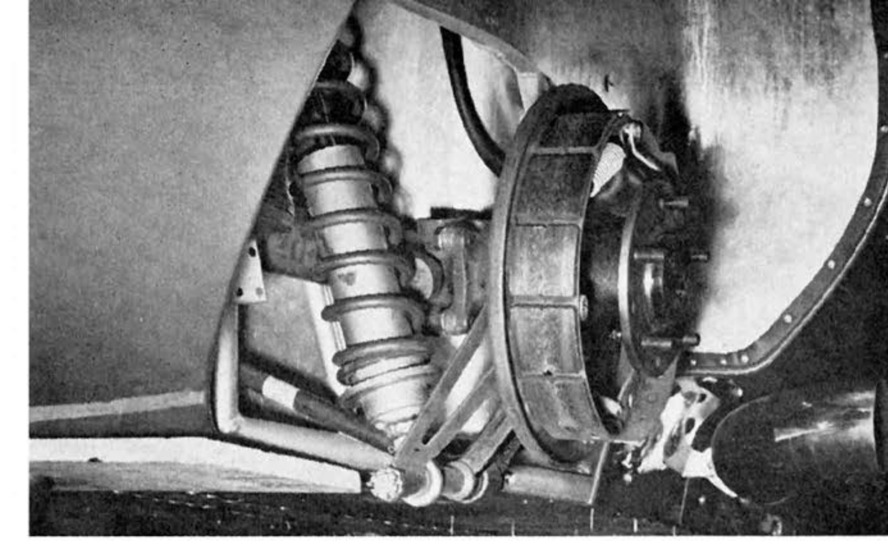
Cheetah is a combination of proven Chevrolet power train components with a special frame, front suspension, and body assembly built in Thomas' shop. Everything Thomas builds for the car is designed to be as light as possible but still have more than enough strength to take the beating that is a normal part of a race car's life. To combine strength with light weight requires good engineering and the use of the best available materials. Cheetah has both of these premium features.

Cheetah's design is such that its frame is its load-carrying member. Its body, which for the prototype car is aluminum but for production models will be fiberglass, doesn't add any structural strength to the car. The body is secured to the frame with six bolts and a handful of Dzus fasteners, which makes it easy to remove when work on the chassis is necessary.

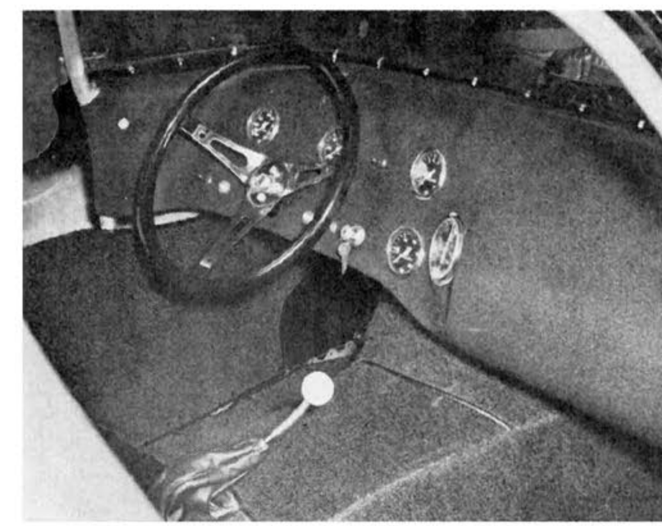
Don Edmunds, who is responsible for many of the special features in Cheetah's design and who did much of the actual work on the car, and Warren Williams, who also worked on the car from its inception, built a plywood mockup for the prototype body. Their only guides for the body's shape were a drawing and chassis dimensions. With the mockup as a pattern, California Metal Stamping, in Los Angeles, hammered .050-inch thick half-hard aluminum into thirty panels of the required shape for the body. Edmunds rough-welded the panels together to form the five pieces that comprise the finished body and then Don Borth took over to do the finish work. The result is outstanding.

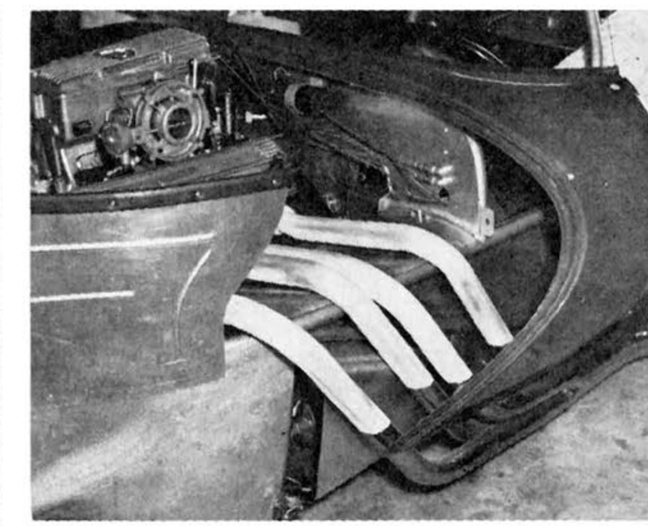
Thomas calls Cheetah's frame a "semi-space" type. It is a rigid structure of arc-welded 4130 chrome-moly tubing that has two main members on each side, one above the other and approximately 14 inches apart. At the frame's front end its two sides are separated approximately 21 inches but just ahead of the engine they curve outward almost to the body sides, to 46 inches, and then extend back to the rear suspension system, where they are 25 inches apart. *(Continued on page 72)*





RIGHT – Efficient braking is assured through use of Chevy's high-performance passenger car units which feature sintered metal linings, 11-inch drums.

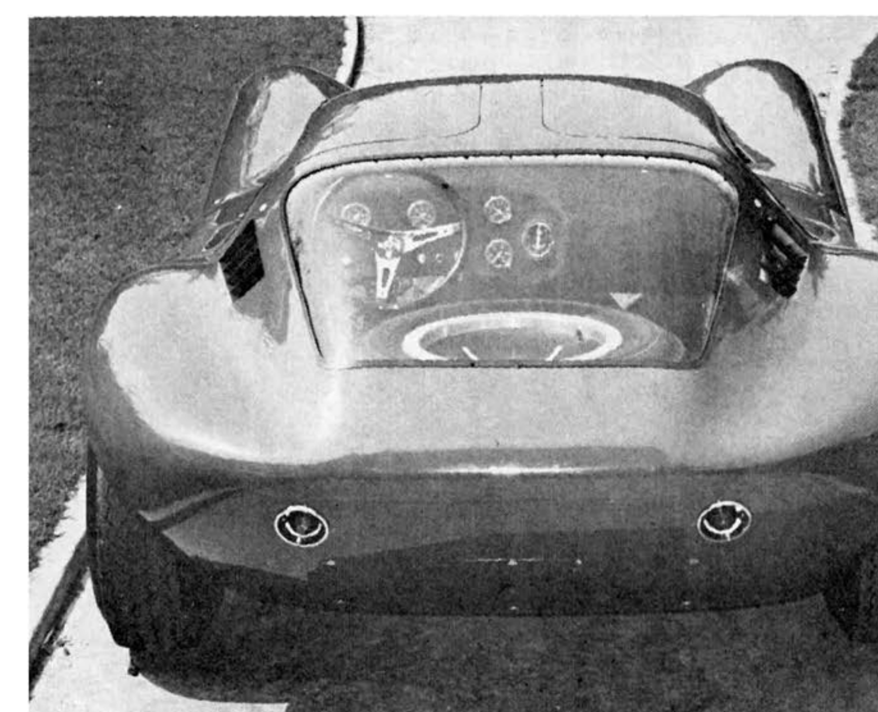




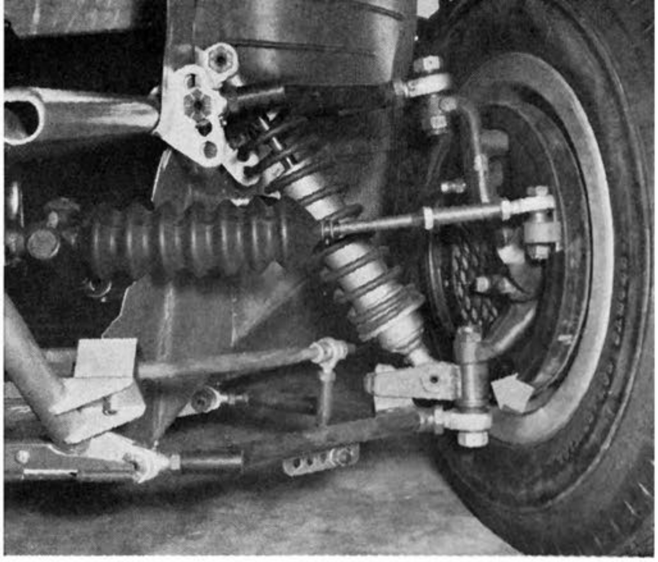
ABOVE – Only bare essentials are found in the cockpit; steering wheel is a Bell Auto product. Driver is protected by a fiberglass bellhousing scattershield and firewall of aluminum and chrome moly.

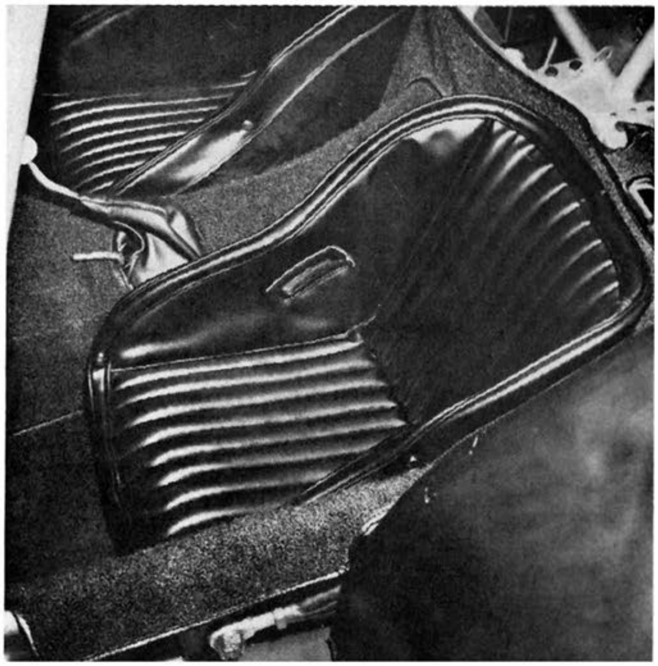
ABOVE RIGHT – Competition exhaust system is made up of four pipes per cylinder bank emptying into 4-in. collector.

LEFT – Well-composed styling and a choice of engines with potential for electrifying performance identify the new Cheetah as an exciting GT class sports car entry. Cheetah is shown here with Bill Thomas who's responsible for car's inception, production, and sales.



RIGHT – Production Cheetahs have fiberglass bodies; windows, except windshield, are of 3/16-inch Plexiglass. Panel at rear is the luggage compartment opening, side vents are functional outlets for air taken in at the front of car.





ABOVE – Unique styling features include clam-shell doors which provide wide opening for easy entry/exit. Don Edmunds, shown in car, assisted Thomas in initial car design.

ABOVE RIGHT – By connecting shock-spring assembly to a steel load-carrying member on the spindle (arrow), forces act on member's anchor bolt rather than on the Heim joint.

RIGHT – Naugahyde-foam rubber bucket seats are bolted in place, can be removed for access to rear end for gear swap.

CHEETAH *continued*

All main members have an outside diameter of 1¼-inch and a wall thickness of .063-inch. Secondary members have a diameter of 1-inch and a thickness of .063-inch. The roll bar, to comply with the requirements of all racing organizations, was formed from tubing that has an o.d. of 1¾-inch and a wall thickness of .125-inch. Because of its large diameter and thickness, this tubing is mild steel rather than chrome-moly. In all, there are approximately 150 feet of tubing in the frame.

All four wheels, which wear Goodyear 6.50-6.70 x 15 T6 tires and are suspended independently, are American Racing magnesium. They are 15 inches in diameter and rims are 7 inches wide. Because magnesium, unless it is specially treated, is porous and won't hold air, and also because of the side forces exerted on them under racing conditions, the tires are fitted with tubes. Five special American Racing lug nuts secure the front wheels to heavy-duty Chevrolet passenger car hubs that rotate on 1962 Chevy heavy-duty spindles. The rears are mounted on '63 Corvette hubs that are part of a '63 Corvette rear axle and suspension assembly that differs from standard by having different spring and radius rod arrangements.

Cheetah's front suspension system consists of upper and lower control arms fabricated from 1-inch o.d., .125-inch wall 4130 tubing and suspension members that are a combination shock absorber and spring arrangement. The control arms' inner ends connect to the frame with Heim joints. Heim joints in their outer ends are secured to the upper and lower ends of the Chevy spindles. The tapered bores in the spindle ends for the ball joints Chevy uses were drilled to make them round for the large bolts that secure the Heim joints.

The shock-spring assemblies are of the Monroe Load Leveler type. They consist of a tubular shock absorber in a coil spring. The spring supports the frame and tends to hold the shock in its extended condition. Monroe supplied the shocks, which have ½-inch diameter studs on their ends for Heim joints, and Thomas had the springs wound to his specifications. Shocks on the prototype car have 50-50 calibration and light passenger car valving. The valving makes the shocks rather stiff for Cheetah's weight. After test runs have been made, the resistance ratio and valving may have to be changed for handling and ride requirements.

In standard suspension systems that have spindles of the type used in Cheetah the vertical loads exerted by the frame's front end are supported by the ball joints that connect the lower control arms' outer ends to the spindles. With the type of ball joints used, this is entirely satisfactory, but with Heim joints, which are designed for thrust forces exerted at a right angle to the bolt through their bearing rather than parallel with the bolt, such an installation would result in short joint life. This problem was solved by designing Cheetah's suspension system so only side loads act on the lower joints.

Between each spindle's lower end and the upper side of its Heim joint is a steel load-carrying member that has a connection on its end closest to the car's center line for the lower end of the shock absorber-spring assembly. By connecting the shock-spring assembly to this load-carrying member rather than to the lower control arm, all loads transmitted from the frame to the member by the shock-spring assembly, or from the member to the frame, act on the large-diameter bolt that secures the Heim joint and the member to the spindle rather than on the joint itself. To enable the spindle and bolt to rotate in relation to the load-carrying member when the wheels are steered, the bore through the member for the bolt has a bronze bushing in which rotates a tubular steel spacer that fits snugly around the bolt and is clamped securely between the Heim joint and the spindle. The spacer is just long enough to permit it to rotate in the load-carrying member without allowing the member to move up and down. A steel guide on the control arm fits snugly in a slot in the load-carrying member to hold the member in its correct alignment with the arm at all times. In addition to relieving the lower Heim joints of vertical loads, this suspension arrangement also allows the shock absorbers to be mounted at a more advantageous angle.

A special rack and pinion gear assembly, short tubular tie rods fitted with Heim joints on their outer ends, and '63 Corvette steering arms steer the front wheels. The steering arms, which bolt to the spindles, have two holes for the tie rod connections to enable the steering ratio to be changed. The ratio requires approximately 2½ turns of the steering wheel to move the front wheels from lock to lock. A Bell Auto Parts 15-inch diameter three-spoke steering wheel on the upper end of the steering column, which is three lengths of round steel stock joined with universal joints, can be adjusted toward or away from the driver and up and down. These adjustments are fairly easy to make but wrenches are required to make them.

Rear axle assemblies for '63 Corvettes have a gear case that bolts to the frame, a pair of tubular axle shafts with

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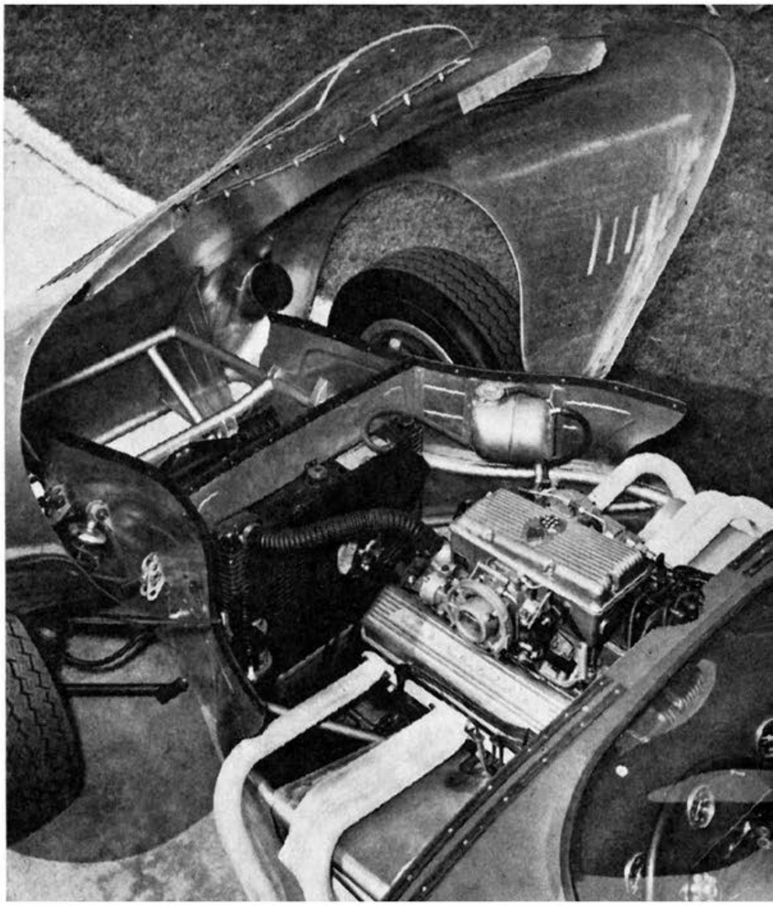
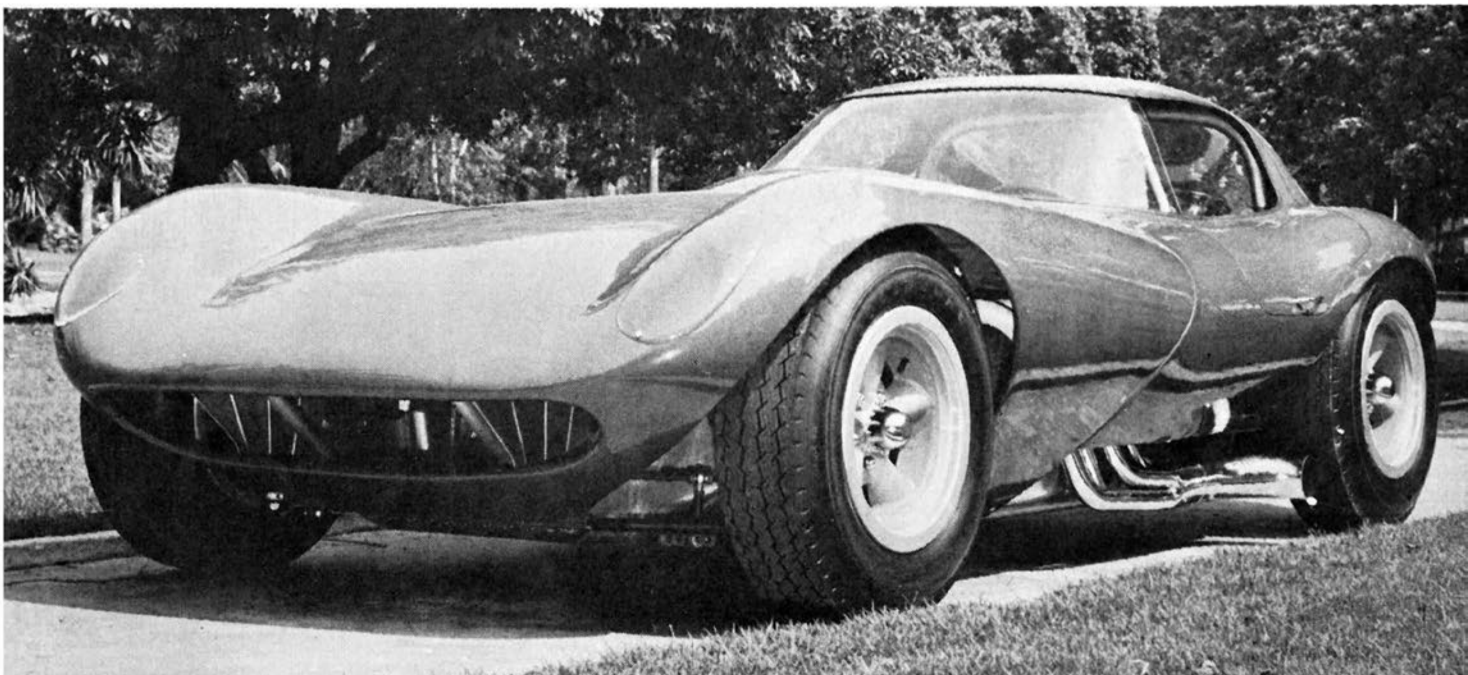
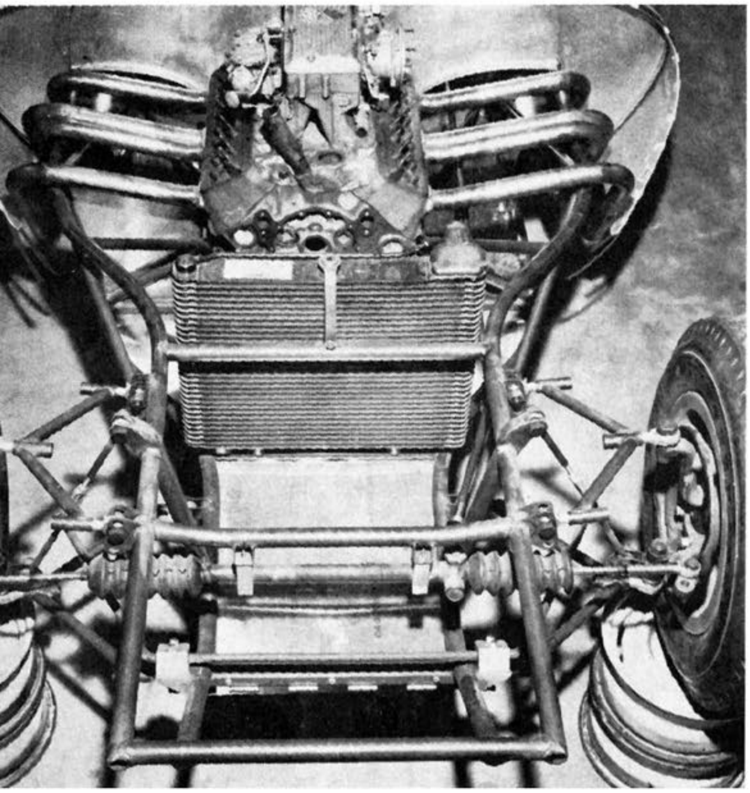


ABOVE – Cheetah engines are built around a Chevy 327 block in two displacements: standard 327 or 377-inch. Forged aluminum pistons, high-performance cam, ported heads, oversize valves, and heavy duty components are included in mills. Purchaser will have choice of Chevy fuel injection or carbs.

BELOW – Cheetah tips scales at a little over 1500 pounds, rides on Goodyear 6.50-6.70x15 tires, American Racing mags. Spindles are '62 Chevy, heavy duty; rear wheels mount on '63 Corvette hubs that are a part of 'Vette suspension.



universal joints at both ends, and a pair of housings that support a stub shaft for each wheel. Each stub shaft is rotated by its axle shaft and has a flange to which the wheel bolts. The axle shafts act as upper control arms for the stub shaft housings. A pair of tubular arms, each of which extends from a pivot point on the frame to an arm that extends down from the housing it controls, are the lower control arms. Fore and aft and rotational movement of the housings is prevented by a short, stamped-steel torque arm that extends forward from each housing to the frame. The middle of a transverse leaf spring bolts to a flange on the gear case and its outer ends are connected to the lower control arms with short links.



For Cheetah, special mounts were attached to the stub shaft housings for shock absorber-spring suspension members identical to those used in the front suspension system, and the stamped-steel torque arms were replaced with lighter arms fabricated from 1-inch o.d., ⅛-inch wall chrome-moly tubing. Also, for weight reasons, an aluminum gear case, made by Chevy, was used instead of the stock cast-iron case. Gears in the case are mounted on a Positraction limited-slip differential assembly. Their ratio can be one of several, starting at 2.72 to 1.

Tentative figures for wheel alignment are ½-degree negative camber for the fronts and 1-degree negative for the rears, 1/16-inch toe-in for the fronts and ⅛-inch toe-out for the rears, and 6 degrees caster for the fronts. These figures may have to be changed after experience is gained with the car. The reason the front wheels are toed-in and the rears are toed-out is that the fronts want to toe-out when the car moves forward under its own power because they are being pushed, and the rears want to toe-in because they are doing the pushing.

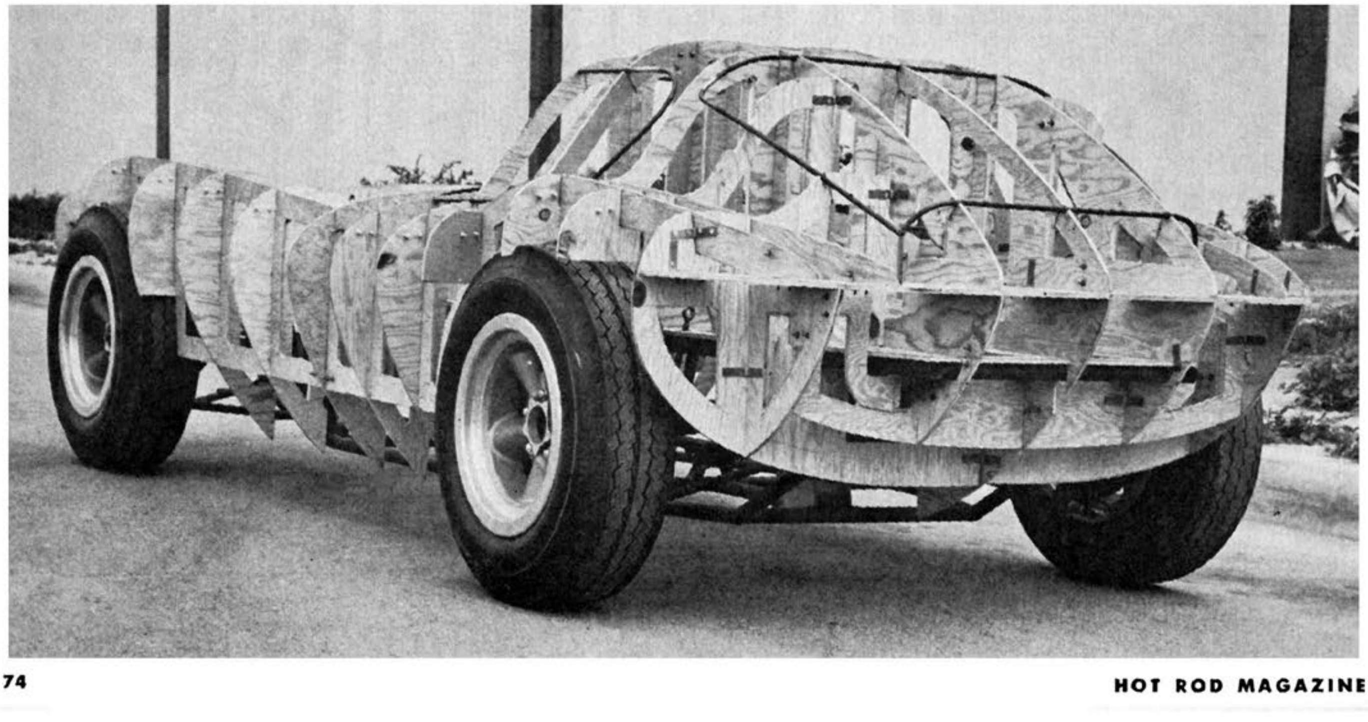
Geometry of the suspension arms for the front wheels is such that upward movement of the wheels in relation to the frame causes their negative camber to increase slightly, their toe-in to remain fairly constant, and their tread measurement to remain the same.

To minimize chassis roll in turns, each end of the frame has a transverse stabilizer bar. Bars on the prototype car are 11/16-inch in diameter for the front and ½-inch for the rear. These diameters may have to be changed later to give the correct degree of control. Aluminum bearing blocks secure the bars, which are made from a type of steel called "Hi-tuf," to the frame and their ends are linked to the suspension members with Heim joints.

Chevy high-performance passenger car brakes are used on all four wheels. They have 11-inch diameter drums and sintered metal linings. Shoes for the front wheels are 2¾

LEFT – Exposed front end reveals portion of "semi-space" type frame which is of arc-welded 4130 chrome moly tubing. Upper and lower control arms are fabricated from 1-inch o.d. .125-inch 4130 tubing, connect to the frame with Heim joints.

BELOW – Plywood mockup was used by California Metal Stamping of Los Angeles to build prototype aluminum body, made up of 30 panels rough-welded together, then finished. Fiberglass molds, in 5 sections, were then made from this.



inches wide and those for the rears are 2½ inches. They are actuated by a Girling dual master cylinder assembly that has a cylinder for the front brakes and another for the rears. An equalizer bar between the pedal and the cylinder rods equalizes pressure on the cylinder pistons and can be adjusted to cause one piston to receive more or less pressure than the other. Varying the pressure on the pistons changes the ratio of front to rear braking. This might be advantageous on some race courses.

The equalizer bar is designed so that in the event of complete failure of one master cylinder or of the brakes on one end of the car the other cylinder and brakes will function normally. This is an excellent safety factor.

Cheetah's dimensions are: wheelbase, 90 inches; front tread, adjustable from 57 to 59 inches; overall length, 140 inches; overall height, 42 inches; overall width, 68 inches; road clearance, to the full bellypan which is also the floorboard, 5½ inches. With the prototype aluminum body and full loads of water and oil but without gasoline tanks, weight was 1510 pounds. Of the total weight, 706 pounds, or roughly 47 per cent, were on the front wheels and 804 pounds, or 53 per cent, were on the rears. With a 170-pound driver, the front wheels gained 21 pounds and the rears gained 149. This changed the percentages to 43 for the fronts and 57 for the rears.

Standard engines will be built around a Chevy 327 cylinder block in two displacements, depending on the purchaser's choice. One will be the standard 327 inches and the other will be 377 inches. Bore and stroke dimensions will be 4.000 by 3.000 inches for the 327 and 4.000 by 3.75 for the 377.

Internal engine parts will include forged aluminum pistons, high-performance camshaft, heavy-duty bearing inserts, ported cylinder heads, oversize valves when necessary, and all the other parts and work a high-performance road or competition engine requires. The engine in the prototype car has a Chevrolet fuel injection setup but the type of carburetion on production cars will be either the fuel injection system or Weber carburetors, buyer's choice.

For competition, the exhaust system has an individual 1¾-inch o.d. pipe 37 inches long for each cylinder. The four pipes for each cylinder bank are joined by a 4-inch diameter collector pipe about 30 inches long that extends back to just ahead of the rear wheel and then curves outward to direct the exhaust gases away from the car.

A standard Corvette flywheel and 10½-inch diameter clutch drives the input shaft of a Corvette four-speed transmission. The clutch pressure plate assembly has coil springs that exert 2200 pounds pressure on the driven disc. It is of the non-centrifugal type. The transmission housing and the bellhousing are aluminum. Gears in the transmission have ratios of 2.2 to 1 for low, 1.68 to 1 for second, 1.31 for third, and 1 to 1 for fourth.

The engine and transmission assembly is supported on the conventional three points by standard Chevy motor-mount insulators. Its position in the frame is such that the front surface of the left cylinder head is 25 inches behind the centers of the front wheels. Placing the engine so far back in the frame left only enough space between the transmission's output shaft and the differential assembly's input

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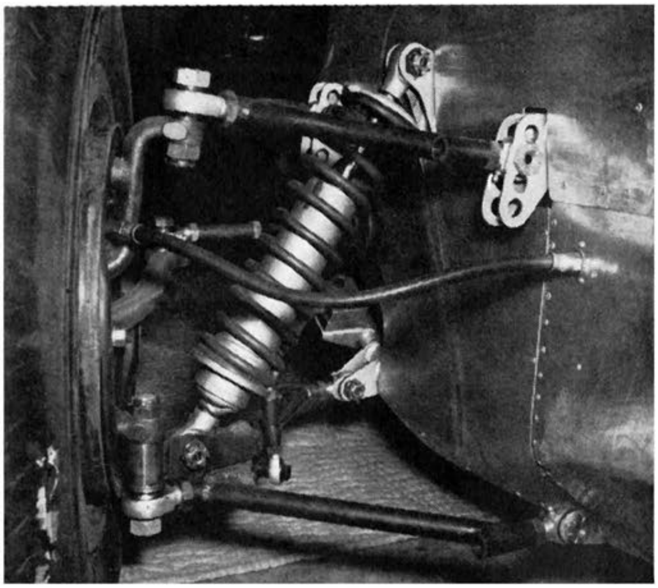

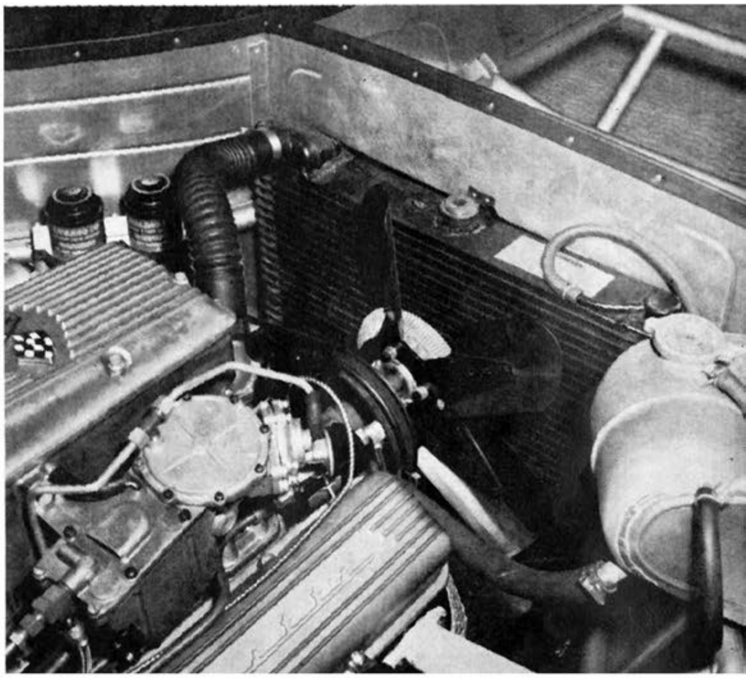

TOP – Shock-spring assemblies are of the Monroe Load Leveler type, consist of a tubular shock in a coil spring, use Heim joint mounting. Monroe supplied shocks, springs are special.

CENTER – Full-size Corvette aluminum crossflow radiator core is employed, along with reservoir (seen at right). A temperature-controlled fan aids low-engine-speed cooling.

RIGHT – A special gear assembly, short tubular tie rods fitted with Heim joints, and '63 Corvette steering arms comprise steering setup. U-joints connect column's three sections.

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shaft for a universal joint made up from the front yoke of a Chevy truck joint and a Corvette cross and bearing assembly. The truck yoke differs from one for a Corvette only by being longer.

A single universal joint can be used because both the differential assembly and the engine and transmission assembly are bolted to the frame. The engine-transmission unit can move within the limits allowed by the motormount insulators but this movement shouldn't be enough to cause difficulty from misalignment of the driving and driven shafts.

A Girling master cylinder and slave cylinder assembly actuates the clutch release linkage. In a car of this type, where the engine is positioned so far back in the frame, hydraulic cylinders are much easier to install than mechanical clutch linkage. Using a hydraulic release mechanism also enabled the release arm on the bellhousing to be moved from the housing's left side to its right side. This allowed the clearance between the firewall and bellhousing to be decreased so there would be more room for the driver's legs.

A standard water pump circulates water through the engine and a full-size Corvette aluminum crossflow radiator core. A temperature-controlled fan helps cool the radiator at low engine speeds. Water temperature and other engine conditions are shown by a water temperature gage, oil pressure gage, oil temperature gage, and fuel pressure gage on the instrument panel. A Jones-Motorola mechanical tachometer shows engine speed and a Stewart-Warner 160 mph speedometer shows car speed.

Pedals that actuate the brake and clutch master cylinders pivot at floorboard level and the complete assembly can be moved forward or backward to suit the driver. Making the pedals and the steering wheel adjustable enabled the Naugahyde and foam rubber upholstered bucket seats to be bolted solidly in place. To gain access to the rear axle gear housing for gear changes or other work, the seats are taken out by removing the four bolts that hold each of them in place and then a panel is removed from the body's floor pan.

Driver safety in the event of flywheel or clutch bursting or severe engine damage is provided by a fiberglass scattershield that fits tightly around the bellhousing. Also, on the driver's side of the firewall that fits around the engine and bellhousing is a ¼-inch thick aluminum plate faced with a ⅛-inch thick chrome-moly steel plate. The purpose of these precautions is to

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prevent pieces that might get out of the flywheel and clutch assembly or engine from reaching the driver.

Two gasoline tanks, one on each side of the body in the space between the lower sill for the door and the lower side of the body, are filled through a common large-diameter filler pipe at the rear of the body. Tanks in production cars will have a combined capacity of 37 gallons.

Cheetah has a twelve-volt electrical system that includes a small Autolite battery similar to those used in many small airplanes and that is carried behind and inboard of the right rear wheel, and a standard Chevy alternator. It has two headlights, each with a high and low beam, but the lights are of the small size used in four-light installations on standard passenger cars. Parking lights, which are also the front turn indicator lights, are above the headlights. A common Plexiglas cover covers both lights on each side of the car. Integral taillights and stop lights are blended into the rear of the body. The spare tire is carried in a compartment behind the driver's seat and there is also the required space in this compartment for a suitcase.

All windows, including the windshield, in the prototype car are Plexiglas. Cars licensed for street use will have to have a safety-glass windshield to comply with state laws but Plexiglas will be used in cars built strictly for racing. Plexiglas for windshields and rear windows is 3/16-inch thick and for the doors it is ⅛-inch thick. Door windows can be removed by opening the doors and sliding the windows forward.

If you think you'd like to have a Cheetah, Thomas-style, of your very own, your good luck is holding because Thomas isn't building the ten he now has under construction for a hobby. He'll be glad to part with any of them but as with so many men who build good things, the parting, for him, is going to be sweetened by the exchange of considerable hard, unromantic cash. Tentative prices at this time for fiberglass-bodied cars are $12,000 for a full-bore, hot-to-go competition model and $7,500 for a street model. If these prices seem high, remember you'll have a copy of a limited edition your racing competitor, or neighbor, may find hard to top. In this era of keen competition and status symbols this is something to make your trip to the bank a little less painful. ▪▪

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