LMF special

By JIM MOURNING

WHEN Jimmy and Winnie Williams became intrigued by sports cars, they knew exactly what they wanted. But one thing was obvious. There was nothing on the market that completely fulfilled their requirements. The cars that appealed to them aesthetically were too slow. Those that were fast enough were visually displeasing or impractical for use in the heavy Los Angeles traffic. The rare product that combined beauty, utility and high performance either failed to meet their demand for something distinctive or was too temperamental.

Today, as a result of their willingness to gamble, the Williams' own a sleek, streamlined coupe that will trundle docilely around town or bellow a gutty challenge through the canyons of the Santa Monica Mountains, leaving a litter of floundering production sports cars in its wake. Their solution, of course, was a custom-built special, called the LMF R-2. But this is a special with a difference. It is the prototype of a series of made-to-order cars soon to be available to enthusiasts with the money and the courage to buy something both distinctive and radical.

Actually, the car was not developed specifically for Williams. The plans were the result of nearly fifteen years of planning and testing by private experimenter and designer Larry Frazier. It wasn't until Williams ventured into his one-man shop, however, that Frazier had the money to start actual production work on the prototype. Sharing Frazier's scornful opinion of confining convention, Williams put up the capital for a car that others had refused to back because it was considered too unconventional to be successful.

As a first step, Frazier tossed out all the commonly accepted ideas of what a modern chassis should be. Obtaining FS-1, aircraft inspected magnesium stock with a rating of 48,000 psi, he fashioned a platform consisting of two four-by-twelve sheets, separated by vertically set strips of magnesium that had been crimped for added strength. In putting this frame together, $175 worth of spot welding was required to attach the strips to one sheet. The second sheet was then attached by a special combination nut and rivet, an item so new that it is not yet available commercially.

The result was a base with the strength of steel, but weighing only 26 pounds. On this was built a tubular superstructure.

When it came to suspension, Frazier was once again dissatisfied with what was available. So he sat down at his drawing board and designed a super light unit which he calls "neu-draulic." On a car noted for revolutionary features, it is the suspension that invariably creates the most excitement.

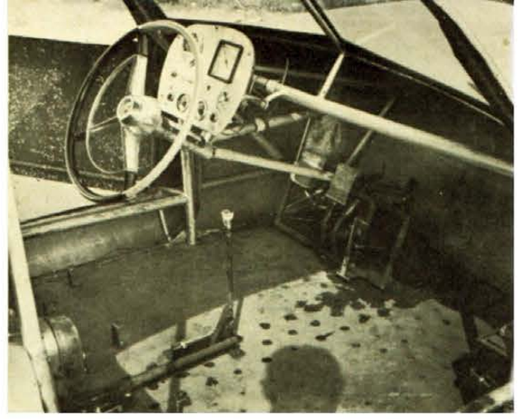
The suspension unit is a piston-cylinder arrangement, the chamber of which is filled with air over oil. This provides the springing action. Desired road clearance and anything from marshmallow to classic ride can be obtained by adding or releasing air. The oil is used to transmit the wheel movement to the air chamber, thus providing a fluid link between the road and the car. When in motion, the oil passes through a controlling orifice that provides damping action and eliminates cavitation under even the most severe conditions. Spring rate can be controlled by the quantity of oil used. The layout is very similar to that used on the Citroen DS 19.

Since neither oil nor water has a natural frequency, the wheel bounce and vibration common to other types of suspension on certain surfaces are completely eliminated.

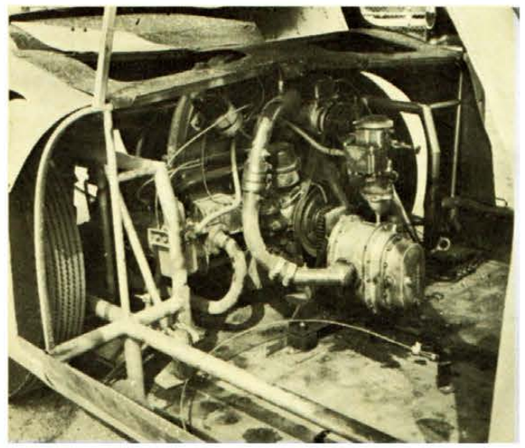
In the front, the units are anchored to the top and bottom of the chassis and provide the kingpins via sliding pillar construction. The rack and pinion steering is coupled directly to the unit, thereby eliminating springs, shock absorbers, A-arms and complicated steering mechanisms. The unsprung weight is confined to wheel and tire, hub, brake and spindle, the piston in the unit and one half of the steering stabilizer arm.

The steering arms do not follow the wheel motion on the LMF, as in a convential set-up, but lie in a fixed position when not being used to transmit positive steering motion. All road shock is absorbed in the neu-draulic unit and is not transferred to the steering gear.

Photos by Bob Rolofson



Unfinished interior of Special. Tubular frame on which accelerator, brake and clutch pedals are mounted can be positioned to precise leg length of driver for optimum comfort.



In order to give the impotent VW engine some adequate energy, Frazier had a Roots-type blower made up to his own specifications. Result: 80 hp at 4500 rpm.

This "neu-draulic" unit, anchored at the top and bottom of the chassis, acts as spring, shock absorber, and king pin for the front suspension. Rear suspension is similar.

Rear suspension is also by sliding pillar designed to eliminate both unsprung weight and what Frazier considers "the objectionable property of tread change at the road surface." With a wheel travel of nine inches, full bounce, the tires have only 1¾ inches of side creep as compared to the 5½ inches for conventional swing axles over a like track.

The power unit is more conventional, being a 1951 VW sleeved down to 974.22 cc and reversed in mounting to bring the engine weight in front of the rear axle. This, of course, necessitated reversing the transmission, a job easily managed since the transmission can be turned end for end and side for side without problems. The only modification required switching the ring gear from one side to another to prevent the car from being a rocket in reverse.

In order to produce the proper amount of urge from the low performance VW engine, Frazier had a Roots-type blower, supplying 15 pounds of boost, made up from his own specifications. Only other modifications are solid skirt magnesium pistons, the replacement of the Solex carburetor with a Stromberg 41, a dual exhaust system and a beefed-up clutch to handle the boosted power. The engine has been both statically and dynamically balanced.

As a result, the normally placid power plant turns out 80 hairy horses at the rear wheels at 4500 rpm (as tested on the Sterling Automotive dyno) with the peak revs not yet in sight. In a featherweight car (836 pounds dry, on the city scales), the resulting performance is definitely on the hackle raising side.

With the engine and supercharger mounted aft in this light car, achieving the normally sought after weight distribution would seem to present some sticky problems. But not for Frazier. He ignored the whole thing and distributed the car's approximately 1050 pounds of wet weight 20 percent front and 80 percent rear.

This weight distribution didn't just happen. One of Frazier's pet theories is that every tire supplies optimum adhesion under a specific weight. He believes that many builders of specials encounter handling difficulties because they demand maximum bite at a weight lighter or heavier than the tire was intended to operate under. Knowing the type of tire to be used (Seiberling 6.40 x 15), a little rapid calculation convinced him that 800 pounds should rest on the rear wheels, the remainder to fall where it might. Surprisingly enough, the idea is apparently as good in practice as it is in theory; the car has no tendency to swap ends because of its heavy hip pockets.

To see how far the LMF would really go without breaking loose, it was taken onto the parking strip at the Santa Barbara airport and put into a series of tight circles at speeds slightly over 60 mph. In ten complete circles, the car never threatened to come unstuck once, although it did throw clouds of rubber dust as high as 25 feet in the air.

The car is 170 inches long, 66 inches wide and from 48 to 52 inches high, depending on the adjustment of the "neu-draulic" units. The body is of two types of Fiberglas. The center section is a rigid material with a high crumble rate, while two feet of both the nose and the tail are of a softer substance, with a retarded crumble rate. This limits collision damage to the two-foot strips, even on severe impact, and any necessary body repair can be made with a minimum of time and money.

The interior of the prototype is strictly and harshly utilitarian, but will eventually contain a rolled and padded dash, complete leather upholstery and matching carpeting and head lining.

(Continued on page 61)

L. M. F.

(Continued from page 39)

The most fascinating feature in the interior was the solution to the problem of comfortable driving positions for various-sized people. The general practice of using an adjustable seat, which often puts the steering wheel under the chins of those with meagre underpinning, has been augmented by an ingenious pedal assembly. The entire unit may be moved to any desired position to fit the individual.

The test of any car, of course, is its performance on the road, not how it looks on paper or even parked in the driveway. Although there was no opportunity for a complete testing, a series of fast tours through the mountains surrounding Los Angeles produced some interesting information and impressions.

HANDLING

The main fault found in the handling was a tendency for the front end to float at speeds up to 20 mph when the accelerator was jammed to the floor. Above 20 mph, however, this tendency vanishes, as the aerodynamics of the body force it down when air pressure becomes great enough. Since the car is labeled a sports racing coupe, neither Frazier nor Williams considers this a drawback, as such extreme acceleration at low speeds will be required only in rare instances.

The steering itself gives the impression of being power assisted—which it is not—for there is virtually no resistance to turning and no feeling of road shock at the steering wheel. The ride is surprisingly soft under all conditions save those of extreme hard braking. Then the sensation is very akin to riding a horse that suddenly stiffens all four legs while at full gallop. But you stop—and right now!

In high speed bends, the car is nearly foolproof, the wheels absolutely refusing to turn any tighter than the car can handle. When the driver finds himself in over his head, he has but to hit the brakes hard, let the car slide six or eight feet sideways, then stand on it. A bit breath-taking, true, but the rear wheels will respond immediately and the car will resume speed.

Although no timed runs were possible, acceleration is considerably better than brisk.

With most of the major components now relatively well tested, a second model is on the drawing board. This will be a roadster with a dry weight of only 750 pounds. Called the LMF R-2 Competition, it will be powered by a blown four cylinder, two cycle engine displacing 1000 cc. #