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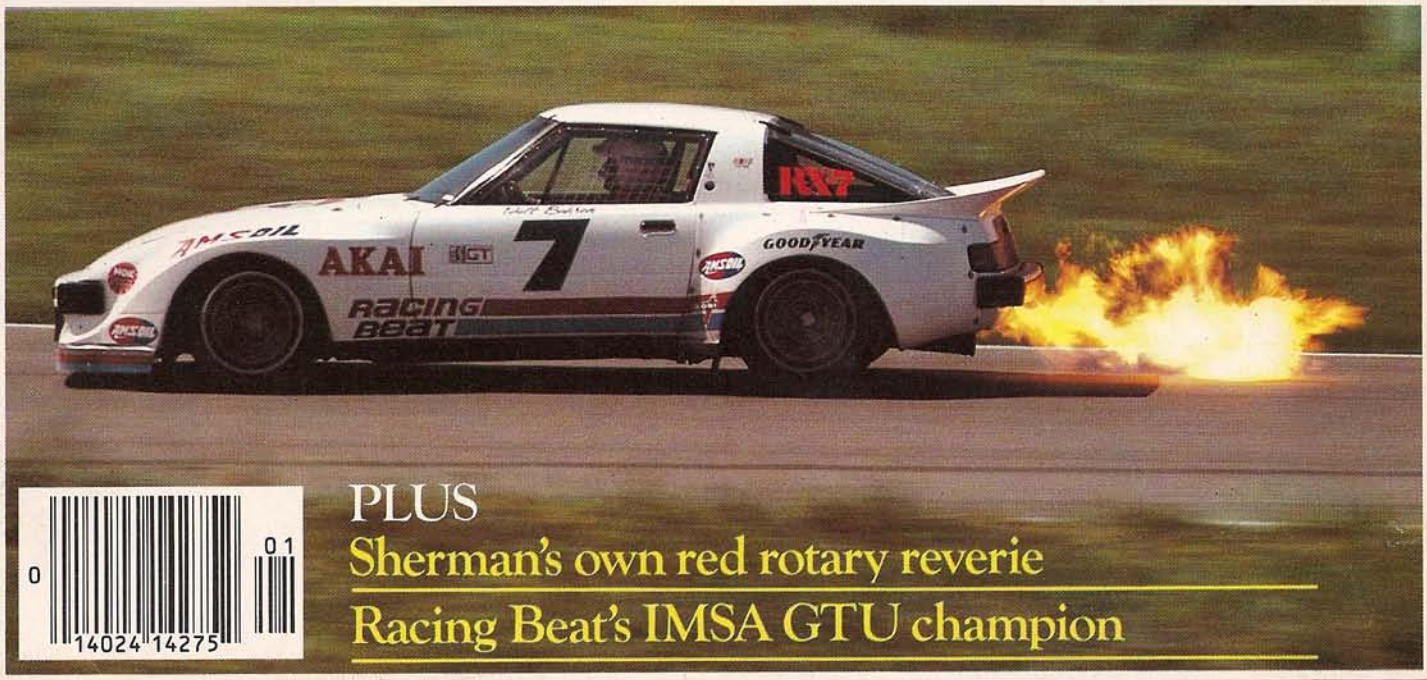
RX-7 HEAVEN!

First Test: 1981 Mazda RX-7 GSL



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PLUS

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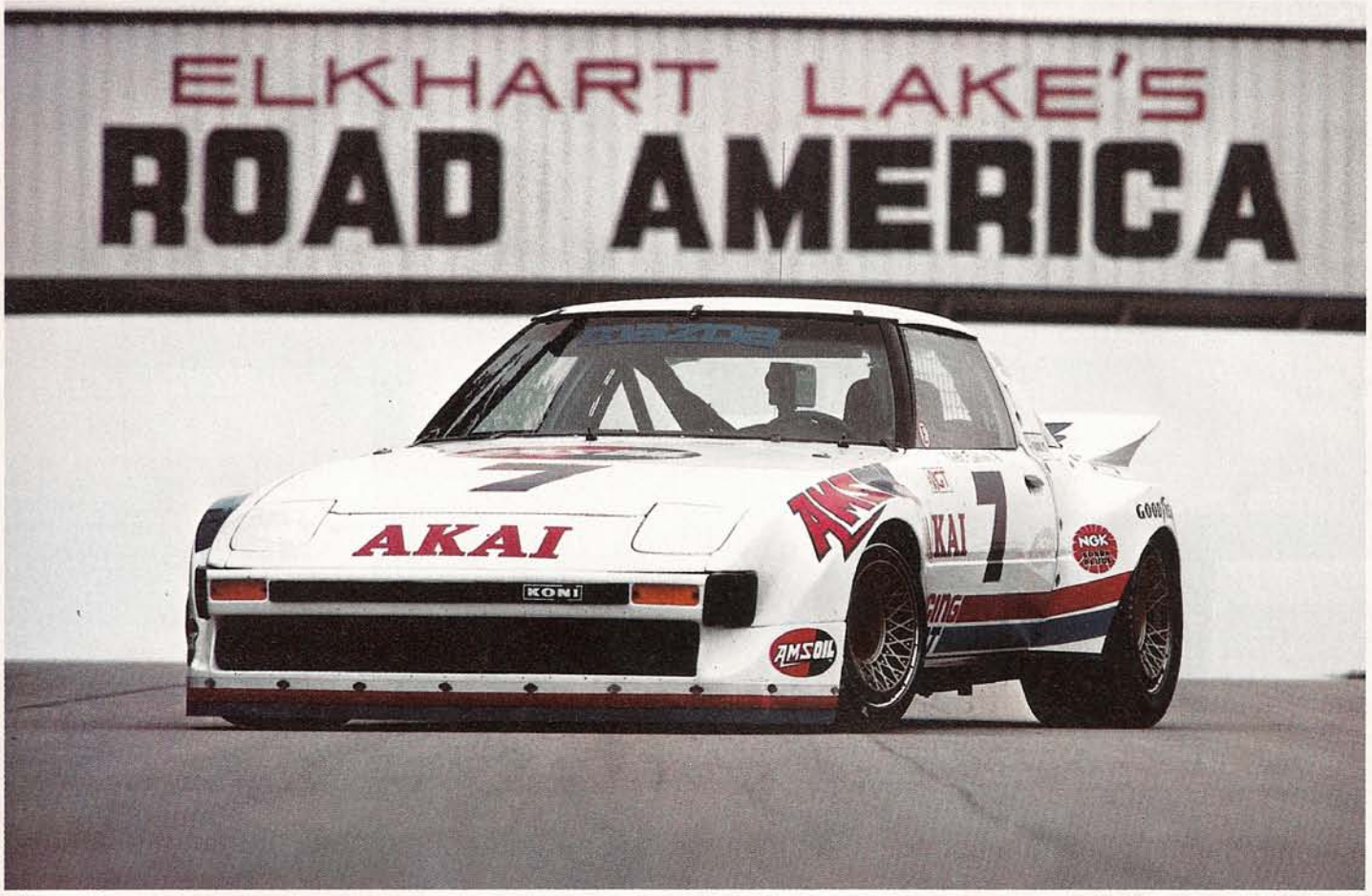

Amsoil/Akai Mazda RX-7

Just your average fire-breathing, ear-splitting, championship-winning RX-7.

• The last time this full-battle-regalia RX-7 graced the pages of *Car and Driver* was after the 1979 Daytona 24 Hours. Although that was its competitive debut, it was hardly a shy debutante—it breathed fire with every shift and filled the air for miles around with its strident battle cry. Unfortunately, the race was, on one level, a public display of the car's immaturity. The differential fried itself, the rotary engine's sandwich construction fell apart, and the live rear axle became a bit too lively when it split in two 21 hours into the race, finally sealing the car's fate. Although the weaknesses were hammered home, the rotary racer's potential was also evident. The brakes were outstanding, flat-out horsepower was abundant, and the car handled better than most of the all-conquering Porsche 935s.

About eighteen months have passed since then, and the Amsoil/Akai/Racing Beat Mazda RX-7 has since devastated the competition on the road courses of America to win the 1980 IMSA GTU (under 2.5-liter) championship, with the team drivers, Walt Bohren and Jeff Kline, placing first and second in the drivers' standings. It has accomplished this despite having additional weight heaped on it to slow it down. The original weaknesses have been ground off, and the strengths honed to a razor's edge. In the process, standard RX-7 parts have been systematically eliminated or modified, to the point where there are virtually none left.

A prime example is the rear axle, a component responsible for two major breakdowns in the initial foray. The original axle was a stock unit reworked to accommodate a factory limited-slip differential, rear disc brakes, full-floating hubs, and optimized suspension pickup points. The current rear axle has no stock parts in it whatever. The entire center section has been replaced with a Halibrand unit with transfer gears that can be changed in about ten minutes. It also has no hypoid drive, thereby reducing friction and improving durability. Amsoil synthetic lubricant, supplied by one of Racing Beat's sponsors, also helped, dropping operating temperatures ten to fifteen degrees. The axle tubes are custom fabrications that bridge the gap between the special center section and the disc-brake and hub carriers. They house high-strength axles and are externally braced with tubing to increase bending stiffness and forestall breakage.

The location of the rear axle is stock in conception, but extensively reworked in execution. There are still two trailing links per side, but the pickup points are different, the lengths are adjustable, and the pivots are deflection-free spherical rod ends. Lateral location is achieved with a compound Watt linkage, which is symmetrical about the axle's center, eliminating the catawampus motions allowed by the stock, asymmetrical arrangement. The rear sway

PHOTOGRAPHY BY AARON KILEY

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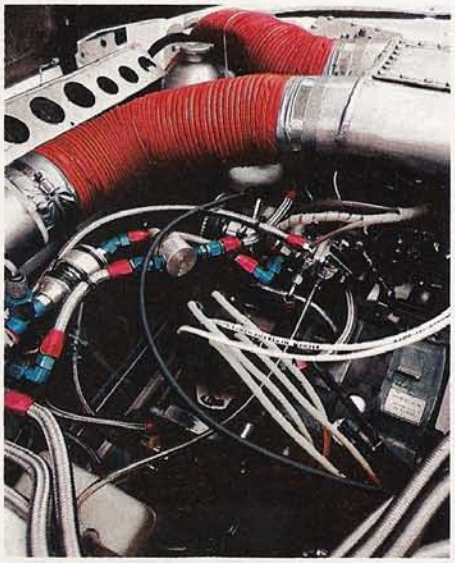
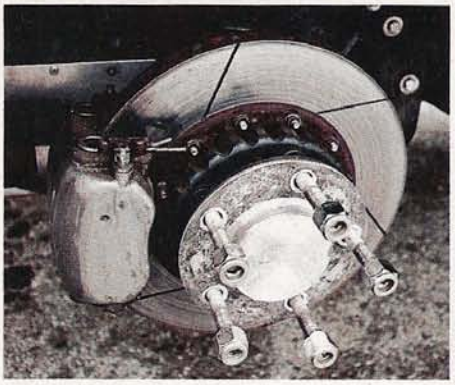




bar is quite massive (typically 32mm in diameter with very hefty lever arms) and pivots in low-friction, non-binding ball bearings. Koni jounce-and-rebound-adjustable racing shocks dampen axle motion.

Konis are also used in front, but are in single-adjustable, wet-strut form. The wet strut allows a larger shock absorber than an insert type would. Again, all pivots and bushings are of the solid variety, and a beefier competition steering box with the stock ratio has replaced the standard item.

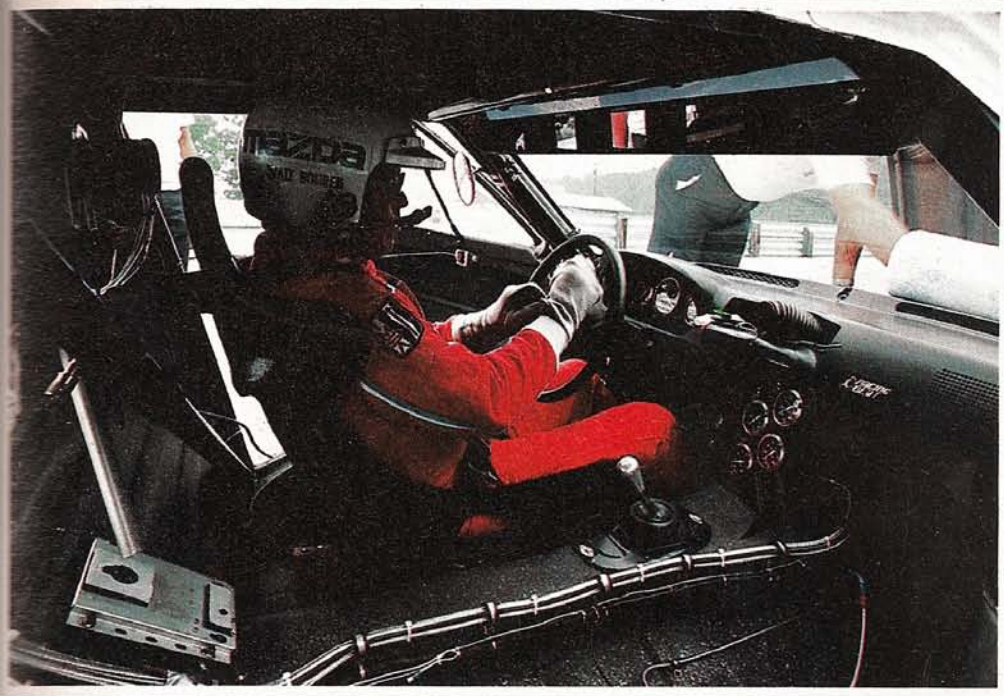
Tying this assortment of suspension parts together is a collection of large-diameter steel tubes, sheetmetal fabrications, and some of the stock unitized body and chassis. The rear bumper, the vertical tail panel, the roof, the firewall, the front floorpan, and the cowl are the only stock pieces left. The fenders have been widened, recontoured, and molded in fiberglass, as have the doors, the hood, and the front bumper. The floorpan is new from the doors back to accommodate the wide tires, the fuel cell, and the motions of the bulkier rear axle with its locating accouterments. The front inner fenderwells are formed from the remains of the original spare-tire well, and all of the transparent panels, save the windshield, are plexiglass.

The passenger compartment follows in the same vein. The steering wheel and the upper dash panel are the only stock parts that are up to the rigors of racing. The left seating position is now occupied by a Recaro racing shell; the right, by a fire-extinguisher bottle, two Hitachi ignition black boxes (actually gold-colored and probably gold-plated, judging by their $1000 cost), the transmission-oil pump, the engine-oil reservoir, and the large, IMSA-ordained lead weight. An overhead switch panel offers easy access to the necessary switches, and the rev-limiter control box is located between the seat and the doorsill.

Motivating this assemblage of state-of-the-art racing hardware is your basic Mazda 1.1-liter, 280-horsepower rotary race motor. It differs from the stock engine in basic design by having peripheral intake ports and narrower, low-mass, aluminum-impregnated-carbon apex seals, providing improved breathing and sealing at five-figure rotational speeds. The intake and exhaust systems are highly tuned, for they hold the key to much of the rotary's power. In 1980 the factory replaced the large Weber carburetor with Lucas timed fuel injection, greatly improving throttle response and mid-range torque. A special racing front cover, also new for the 1980 season, drives the dry-sump pumps, the twin ignition, and the fuel-injection metering pump. The power density of this engine is a continuing source of amazement and one of its great advantages. The basic unit is about one cubic foot in size and shape, allowing it to be located low and toward the rear for good weight distribution and a low center of gravity. The reliability of the engine has been excellent; there have been no recurring fundamental problems. Nary a race has been lost because of engine failure.

The energy that the engine pours into the car under acceleration is dissipated during braking by four Formula 1–class Lockheed four-piston alloy calipers. They clamp the large-diameter, internally angle-vented, grooved rotors. The BBS turbine wheel covers generate enough hurricane flow to obviate the need for additional scoops or ducts for brake cooling at most tracks.

An extensive developmental program at Ohio's Transportation Research Center tied all of this hardware into a cohesive unit. Subtle changes were evaluated for their aerodynamic effects, resulting in flush side windows, the removal of



AMSOIL/AKAI MAZDA RX-7

Vehicle type: front-engine, rear-wheel-drive, 1-passenger race car

Price as tested: $65,000 (season-end sale)

ENGINE

Type: 2-rotor Wankel, aluminum rotor housings, cast-iron end plates
Rotor radius x width x eccentricity: 8.27 x 2.76 x 1.18 in, 210 x 70 x 30mm
Displacement ..... 70 cu in, 1150cc
Compression ratio 9.4:1
Fuel system ..... Lucas mechanical fuel injection
Valve gear ..... 1 peripheral intake and 1 peripheral exhaust port per chamber, rotor-controlled
Power (SAE net) ..... 260 bhp @ 9500 rpm
Torque (SAE net) ..... 160 lbs-ft @ 8000 rpm
Redline ..... 9500 rpm

DRIVETRAIN

Transmission 5-speed
Final-drive ratio 5.67:1

Gear	Ratio	Mph/1000 rpm	Max. test speed
I	2.34	5.4	51 mph (9500 rpm)
II	1.70	7.5	71 mph (9500 rpm)
III	1.28	9.9	94 mph (9500 rpm)
IV	1.00	12.7	121 mph (9500 rpm)
V	0.88	14.4	137 mph (9500 rpm)

DIMENSIONS AND CAPACITIES

Wheelbase ..... 95.3 in
Track, F/R ..... 61.0/62.0 in
Length ..... 170.1 in
Width ..... 75.0 in
Height ..... 46.0 in
Curb weight ..... 2250 lbs
Weight distribution, F/R 49/51%
Fuel capacity ..... 29 gal
Oil capacity ..... 10.0 qt
Water capacity ..... 8.0 qt

SUSPENSION

F: ..... ind, MacPherson strut, coil springs, anti-sway bar
R: ..... rigid axle, 4 trailing links, compound Watt linkage, coil springs, anti-sway bar

STEERING

Type ..... recirculating ball
Turns lock-to-lock 2.4

BRAKES

F: ..... 12.0 x 1.1-in vented disc
R: ..... 11.8 x 0.8-in vented disc
Power assist ..... none

WHEELS AND TIRES

Wheel size ..... 11.5 x 16 in
Wheel type ..... BBS 3-piece modular, spun-aluminum rims and cast-aluminum center
Tire make and size ..... Goodyear Bluestreak Sports Car Special, F: 22.0 x 10.5-16; R: 25.5 x 12.5-16
Test inflation pressures, F/R ..... 20/22 psi

PERFORMANCE

Zero to	Seconds
30 mph	2.4
40 mph	3.5
50 mph	4.3
60 mph	5.6
70 mph	6.8
80 mph	8.3
90 mph	10.9
100 mph	13.1

Standing ¼-mile ..... 14.1 sec @ 106 mph
Top speed (Daytona gearing) ..... 165 mph
Roadholding, 282-ft-dia skidpad ..... 1.04 g
Typical racing fuel economy ..... 6 mpg

rain gutters, and optimal body rake. The suspension and aerodynamic forces were then harmonized on the various-diameter skidpads, yielding balanced low- and high-speed handling. Finally, at Laguna Seca, the drivers matched their techniques to the car with the help of Akai videotape equipment.

The resultant machine not only wins races, but also blares out the most excruciating ruckus ever heard from a race car. The noise level has been measured at 133 dBA at a 50-foot distance. Inside, it's much louder. It has the sharp, piercing quality of a racing two-stroke motorcycle, but while the motorcycle merely pummels the eardrums, the rotary seems to bore directly through one's cranium. Racing Beat uses a small, clip-on muffler in the pits to reduce the noise to tolerable levels.

With this machine, Racing Beat has shattered any doubts about its ability with rotary road racers. It has truly attained the always desired, seldom achieved overdog status, and it's a good bet that Mazda will continue its sponsorship next year to keep the RX-7 onslaught rolling. But Racing Beat is ready for more ambitious rotary possibilities. In the GTO class, the larger, 1.3-liter engine with some combination of lower weight, fuel injection, and turbocharging might be just the ticket. GTP is another possibility, but high minimum weight and large minimum frontal area could offset the rotary's inherent advantages. Rumors are afloat, however, of a midship-engined pure race car with two rotary noise generators. They would provide enough horsepower, and four fire-breathing nostrils would make it the fastest dragon around. The red and yellow inks at our printing plant are ready and waiting. —*Csaba Csere*

1980 RACING BEAT TEAM RESULTS

	Car 17	Car 7
Daytona 24 Hours	DNF (JK, WB, DA)	
Atlanta	4th (JK)	1st (WB)
Riverside	DNF (JK)	8th (WB)
Laguna Seca	6th (JK)	1st (WB)
Lime Rock	DNF (JK)	3rd (WB)
Brainerd	1st (JK)	9th (WB)
Daytona	2nd (JK)	1st (WB)
Sears Point	4th (JK)	1st (WB)
Portland	2nd (JK)	1st (WB)
Mosport	1st (JK, WB, JM)	DNF *(WB)
Elkhart Lake	2nd **(JK, WB)	
Atlanta	1st (JK)	

* car destroyed in crash while leading
** carried 7 after Mosport
JK = Jeff Kline; WB = Walt Bohren;
DA = Dennis Aase; JM = John Morton