

Tests: 125-hp Capri, 454 Corvette, V-8 Mercedes

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FORD PINTO



GORDON CHITTENDEN

Technical Analysis & Driving Impression

FORD PINTO

An American-English-German hybrid is Ford's bid to compete with the imported economy cars

BY RON WAKEFIELD ENGINEERING EDITOR

PRICES ARE NOT settled at the moment, but it appears that the Ford Pinto has been designed to meet VW head on, as contrasted to the Chevrolet Vega which is aimed at the first notch above the Beetle class. American car engineers often work with the "baseline" concept, setting targets for design and performance in terms of existing cars. For the Pinto the targets were, interestingly, the VW Beetle, Toyota Corolla and Opel Kadett. Chevrolet looked to VW for their economy target, but to the larger Maverick and Toyota Corona for performance and quietness standards; the Vega is almost certain to be more expensive than the Pinto.

A size comparison will put the Pinto into perspective:

	Wheel- base, in.	Length	Width	Height	Curb Weight, lb.
Toyota Corolla	90.0	151.4	58.5	54.3	1640
Datsun 1200	90.6	152.6	58.9	54.7	1585
Subaru Star	95.2	155.0	58.3	54.7	1590
VW Beetle	94.5	158.7	61.0	59.1	1850
Fiat 124S	95.3	158.7	64.0	55.9	2085
AMC Gremlin	96.0	161.2	70.6	51.8	2635
Opel Kadett 1.9	95.1	161.6	61.9	55.0	1790
Datsun 510	95.3	162.2	61.4	55.1	2130
Ford Pinto 1600	94.0	163.0	69.4	50.0	2015
Toyota Corona	95.5	164.0	61.8	55.1	2110
Ford Cortina	98.0	168.0	64.9	56.9	2030
Sunbeam Arrow	98.5	169.5	63.4	55.9	2060
Chevrolet Vega	97.0	169.7	65.4	51.2	2190
VW 1600 Fastback	94.5	170.9	63.2	57.9	2010
Ford Maverick	103.0	179.4	70.6	52.3	2560

The Maverick is included merely for perspective on the small sedan field, it being the smallest of the American sedans; the Gremlin's overall length is in the ball park but it's really a 2-seater and not a part of the field.

Ford engineers also had less time to do their Pinto than their GM counterparts—two years versus over three. This may or may not be the reason for the extensive use of Ford Europe components in the Pinto, but it does make use of European engines, transmission and steering whereas the Vega uses only gearboxes from a European subsidiary. The Pinto is also shorter (though wider), lower, lighter, lower-powered and mechanically simpler than the Vega.

Ford, like Chevrolet, chose a front engine-rear drive layout. Standard engine is the English Cortina 1600 unit, now rated at 75 bhp; optional is a brand new 2-liter sohc unit designed and built by Ford Cologne. Four-speed manual transmission is standard, a 3-speed automatic optional. Front suspension is by unequal lateral arms and coil springs; rear by a live axle on leaf springs. There is but one body type versus Vega's four: a coupe (Ford calls it a 2-door sedan but I disagree) that can be ordered with a fold-down rear seat to increase luggage capacity.

Body

FORD HAS concluded that unit bodies are right for their smallest cars, separate body-frame construction better for the bigger ones. At present the Torino-Montego "intermediates" are the largest unit-body models Ford builds and as these are doing the inevitable growth bit, they will become frame-body cars next time they're changed. Pinto's unit body departs from previous Ford practice in two respects: it has none of the "torque boxes" they have used in the past to increase torsional rigidity, and its roof structure is a "halo" affair, all one-piece, replacing conventional separate windshield and back window headers, inner roof rails and associated reinforcements. Ford claims reduced weight and better headroom.

The latest rustproofing techniques are used in finishing Pinto bodies. Primer is applied in a dip tank, the car body charged positively and the tank negatively so that the paint will find its way into all the nooks and crannies electro-

statically—but this is not done to the cars produced in California assembly plants. Galvanized panels are used for 22 parts especially subject to corrosion (like rocker panels), and finally the paint itself is applied by an electrostatic process in which there is a negative electrode in the paint gun, giving the paint particles a negative charge which draws them to the body and around the corners of doors and such.

Individual front seats are standard; they are among the thinnest I have seen, to make most efficient use of space. There is a bench rear seat. Ford claims 6 in. more front shoulder room than VW, which may or may not be important with the individual front seats. In the rear the claim is for slightly more head room and 5 in. more leg room, but the Pinto's rear seating is actually less satisfactory than the VW's because the impressive head and leg room dimensions were achieved by an overly low and short seat cushion—one's knees are way up in the air back there. That's the penalty extracted by Styling; as the table above shows, the Pinto is far lower than any of the imported sedans in the class, and that's why I call it a coupe.

Instrument panel is typically Ford and it's clean and simple; two round dials house absolutely minimum instrumentation. Heater controls are nicely located in the center of the panel.

Total weight of the soundproofing package is only 12 lb, about a third of that used in the Vega. There is saturated felt along the driveshaft tunnel, on the floor and under the rear seat; resinated cotton with polyethylene film behind rear seat and on the roof; a 0.75-in. resinated cotton pad with plastic coating for the firewall; and several other small pads and spray-on deadeners.

Air for interior ventilation comes in through a cowl intake; dash outlets give face-level ventilation and there are foot-level vents as well. There is no built-in provision for flow-through ventilation, pushout rear quarter windows serving that purpose. Optional air conditioning is fully integrated into the heater ductwork and utilizes fresh air—quite unusual for this class car, as the units for most imports are essentially hang-on.

Engines

STANDARD ENGINE for the Pinto is the familiar 1599-cc crossflow-head, pushrod four used in the Cortina and Capri, developing 75 bhp @ 5000 rpm in its latest emission controlled version. With about the same displacement as the current VW Beetle, it develops 18 bhp more, which should more than offset the additional weight; however, it's not

likely to be as lively as the 1640-lb, 73-bhp Toyota Corolla. Ford claim over 26 mpg in city-suburban driving with the 3.55:1 axle ratio which was settled upon because it gave nearly one mpg more than the originally chosen 3.82:1 with little performance loss. The 1600 engine now has a compression ratio of 8.0:1 so that it can use 91-octane fuel.

The optional engine is a brand-new one, designed not only for the Pinto but for European Fords as well. Like the 1600 it has crossflow manifolding; like the Vega it has a belt-driven single overhead camshaft, making it Ford's first production ohc engine. Short-stroke design comes as no surprise because of the European design; a long stroke is helpful for emission control but not for wide-open running on European highways.

Valve operation, unlike that of the Vega engine, is by camshaft over rocker arms with the rockers ball-stud mounted and mechanically adjustable at 6000-mi intervals. With an 8.6:1 compression ratio this engine supposedly also runs on 91-octane (unleaded or low-lead) fuel. Output is 95 bhp @ 5700 rpm and the redline is 6500 rpm for the unit in its present state of tune. A 2-throat Weber carburetor with automatic choke is used. Construction is cast-iron throughout—the Ford thinwall variety—and the engine weighs 326 lb with clutch and bell housing, 4 lb lighter than the larger-displacement Chevy aluminum engine. Emission control is by the usual spark advance and carburetor trickery, including a perverse deceleration control valve which supplies extra fuel and air (!) during deceleration to get better combustion. An intriguing item concerning testing and development of the 2-liter: it had to survive 300 hours at maximum torque and 300 at maximum power, a standard test for Ford Cologne engines that is three times as severe as what Ford Dearborn engines must endure. Again, the influence of the lack of speed limits at work.

Transmissions & Drive Train

A 4-SPEED manual gearbox, also made by Ford Cologne and used in the V-6 Ford 20M, is standard with either engine. The clutch pressure plate also comes from Germany, though the rest of the clutch is produced in Dearborn. The gearbox is a recently designed unit featuring a single-rail shift linkage which puts all the shift works inside the box and obviates adjustments; ratios are 3.65, 1.97, 1.37 and 1.00:1 and the shift lever is floor-mounted.

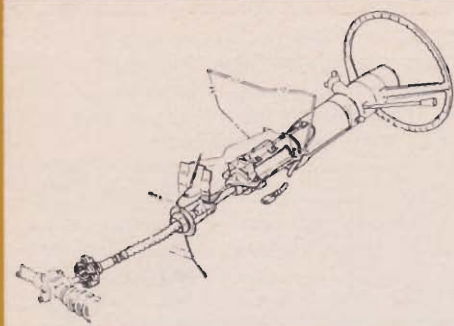
The automatic transmission is the 3-speed, torque converter unit from Ford used with engines up through the small V-8s; its gear ratios are 2.46, 1.46 and 1.00:1 and the

Instrument panel is simple, typically Ford. Shown here are optional tunnel-mounted cubby and automatic selector.

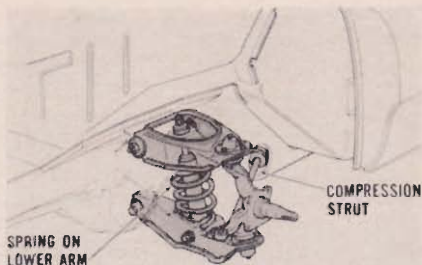


Also optional is a fold-down rear seat that increases effective luggage capacity from 5.6 cu ft to over 38.

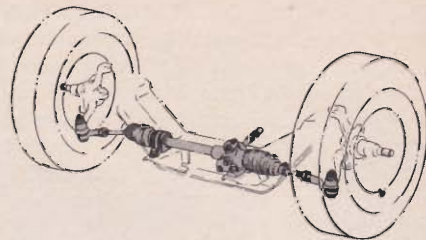




Mini-column terminates well short of steering rack, has flexible section.



Simple lateral strut and compression strut make up lower front suspension.



Rack-and-pinion steering gear from Capri is used in the Pinto system.

FORD PINTO

10.25-in. converter multiplies torque 2.6:1 at stall. Only a recalibration to suit the small car distinguishes the automatic from that used in the big cars, so it should last forever. In early Pinto production all 2-liters will have the automatic and the 4-speed will come along later.

A 2.75-in. driveshaft with two lubed-for-life universal joints takes the drive to the live rear axle, a unit produced by Ford's Transmission and Axle Division at Livonia, Mich. Wheels and tires come in two sizes: 13 x 4-in. stamped steel wheels and 6.00-13 bias tires, or optionally 13 x 5 wheels and A70-13 tires. A new specification the tire maker must meet is that the tires must consume no more than 2.8 hp at 70 mph—a limitation Ford imposes in the interest of fuel economy.

Suspension & Steering

FORD DEPARTED from previous practice with unit bodies by not mounting the front coil springs high in a tower, mainly in order to get maximum space around the engine for servicing. Instead, the spring is down between the lower and upper suspension arms. The Dearborn engineers apparently gave little consideration to the MacPherson strut front suspension used in European models.

The geometry is unequal-arm. A simple lower I-arm combines with a "compression strut" which provides longitudinal compliance through rubber (a drag strut does the same thing on larger Fords and other cars, but Ford wanted to feed these loads into the firewall area to take advantage of structure there and save weight), and an A-arm is the upper link. No anti-roll bar is provided nor is one optional. Ride rate is 93 lb/in., considerably softer than what Chevrolet chose for Vega; 3.5 in. of jounce travel and an equal amount of rebound are provided.

Rear suspension is of the simplest variety: multi-leaf springs, live axle. Ride rate at the rear is 118 lb/in., again much softer than the Vega even considering the weight difference, and the shocks are staggered (one behind axle, one ahead) à la recent Detroit practice to discourage axle tramp under power. Jounce travel is 3.5 in., rebound 4 in. No anti-roll bar here either. Early in chassis development the engineers found that it was particularly important to isolate driveline vibration from the body with a 4-cyl engine and so increased the front spring-eye bushings from 1.5 to 2.0 in. and added rubber iso-clamps between the axle and springs. But the resulting combination didn't really solve the 4-cyl "boom" problem; it would take a 3-joint driveshaft as on the Capri to do it and that would be too costly for the Pinto.

Steering, surprisingly, is rack and pinion; the unit from the Capri. Thus Pinto is the only American car with this system, which is favored by sports-car enthusiasts for its lack of free play at the center. As installed in the Pinto the

gear requires 4 turns lock-to-lock for a tidy 31.5-ft circle with its 22.0:1 overall ratio. That's a R&T steering index of 1.26, which compares with other sedans like this:

VW Beetle	.....0.83	Opel Kadett	.....0.94
Toyota Corolla	.....0.90	VW 1600	.....0.98
Subaru Star	.....0.90	Toyota Corona	.....1.24
Datsun 1200	.....0.91	Ford Pinto	.....1.26
Datsun 510	.....0.94	Ford Cortina	.....1.35
Fiat 124S	.....0.94	Chevrolet Vega	.....1.45

The smaller the index, the quicker the steering. Pinto's steering column is unusual and interesting: called a Mini-Column, it stops well behind the rack, leaving about a foot of flexible steel cable to damp out the comparatively large transmission of road shock from a rack and pinion and buy some extra space for crash collapse.

Brakes

IN A DAY when disc front brakes are accepted practice on 1.5-liter sedans, Ford has stayed with duo-servo drums. The 9.0-in. drums are similar to those on Maverick and Mustang but not interchangeable, having narrower linings front and rear. No vacuum assist is needed or available, and Ford claims an average life of better than 30,000 miles before relining. But I wouldn't expect the performance of these brakes to be top-notch.

Shortly after production begins, an optional disc front system will be available, the Bendix floating-caliper design with 9.3-in. ventilated rotors. This is the kind of disc that I think will eventually outmode drums completely because of its simplicity and economy. A single hydraulic piston does all the work, the floating caliper allowing the pad on the side opposite the piston to be pulled against the rotor as the pad on the piston side is pushed against it. Again, no vacuum assist is used and Ford engineers claim pedal efforts fall between typical-for-class assisted and unassisted disc/drum systems. The parking brake operates on the rear drums, naturally, and it is adjustable from inside the car—a nice touch for easy servicing.

Evaporative Emission Control

FOR 1971 evaporative emission control, required only in California in 1970, is mandatory nationwide: the Pinto's system is simplified from that introduced on the Maverick last year. It consists of a tank revised to provide for vapor collection in the top and to limit the fill so that spillover due to fuel expansion is impossible; a vapor-liquid separator on top of the tank; a carbon canister which stores vapors until the engine is started, at which time they're drawn in and consumed; internal carburetor venting for the same purpose; and a fuel filler cap like a radiator cap, with pressure blowoff and vacuum relief. Like a crankcase emission system, the fuel evaporation control does its job nearly 100%—would that exhaust controls could work so well with so few problems.

Driving Impressions

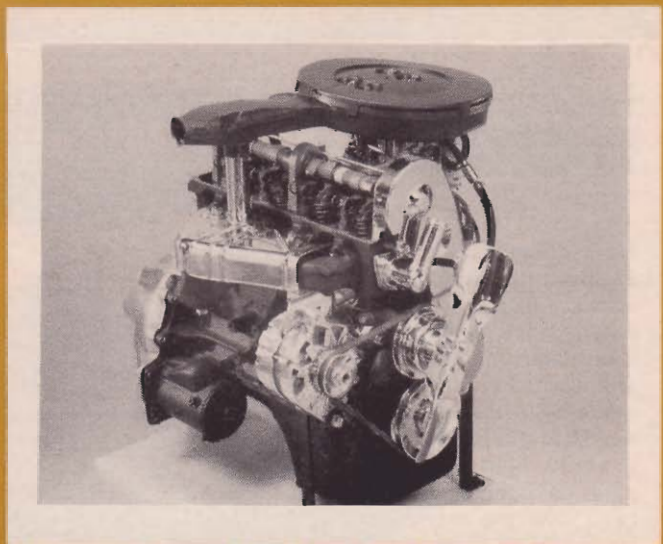
1600: The driving position is pleasant, though one is rather low relative to the hood and windowsill—thus the hood looks high, long and Maverick-like. A very low rear window limits rear vision. Seats, of the "throne" variety, offer fair lateral support. In the rear, one sits on thin padding with knees up in the air—most unpleasant—and as the seat is definitely split by the driveshaft becoming the rear axle there's no chance of that great body width accommodating a third passenger. This is a 2+2, not a full 4-seater.

The engine sounds just like it does in the Cortina—not very quiet or smooth, even for a four. Gearshift lever is in the right place and it works very nicely; I'd like some marks on the speedometer to tell me when to upshift as I'd be using maximum performance a good deal of the time with this engine. Ride is similar to Maverick, perhaps a tiny bit stiffer; the steering effort is moderate and it feels precise. Handling feels close to neutral and the body roll is moderate; on a skid pad at steady speed (about 30 mph) the tail slides when the steering wheel is twitched—good, smooth final oversteer.

There was a Capri on hand for the Lincoln-Mercury festivities and I tried it for comparison. It's more expensive, of course, but some things are worth nothing: the same engine in the Capri makes far less racket—presumably because of the 3-joint driveshaft and more sound deadening. The Capri also handles much better.

2000: This one has the automatic, which may account for the fact that its engine is even noisier than the 1600—very obtrusive at high revs and a lot of fan noise, though at 70-mph cruising speed it's not so noticeable. I must say that in spite of the rack-and-pinion steering the car still has a thoroughly American feel about it.

I tried the brakes on this one, on the concrete straightaway at Ford's Romeo proving ground, and got quite a drama out of them: the rear wheels hop up and down badly in an anchors-out stop. It looks as if the staggered shocks



Cam cover is removed from engine here to reveal valve gear. Exhaust manifold stove provides warmed intake.

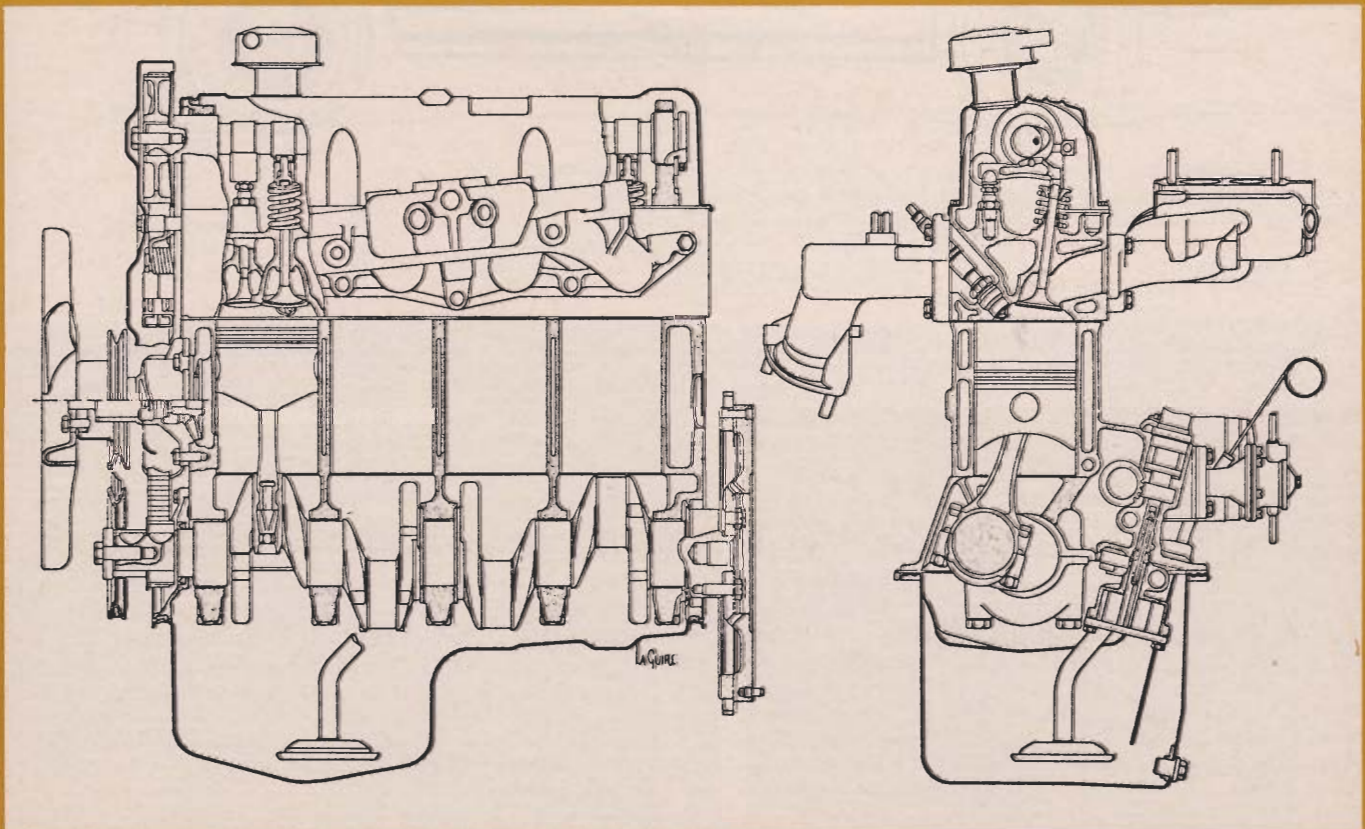
haven't solved the problems here.

Conclusion

PINTO IS as American as apple pie, but it's small and light as well as very attractive to look at. I would say that the stylists had too much say in the body layout and that the engineers skimmed on brakes, but otherwise it looks like a good competitor in the liter-and-a-half sedan class though the Vega appears to be both sportier and more practical. Hopefully some of the problems I noted in the driving impressions will be solved by the time production begins, and for that reason R&T will wait for a production model before doing a complete road test.



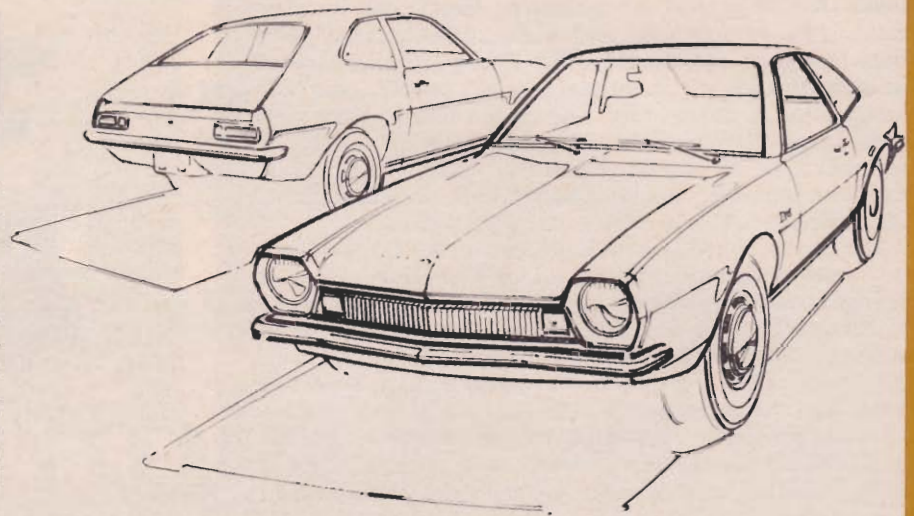
Side section of 2-liter sohc engine, left, shows that cylinders are mostly surrounded by coolant. Cross section, right, shows ball stud-mounted rockers and adjustment arrangement as well as so-called crossflow manifolding.



Pinto

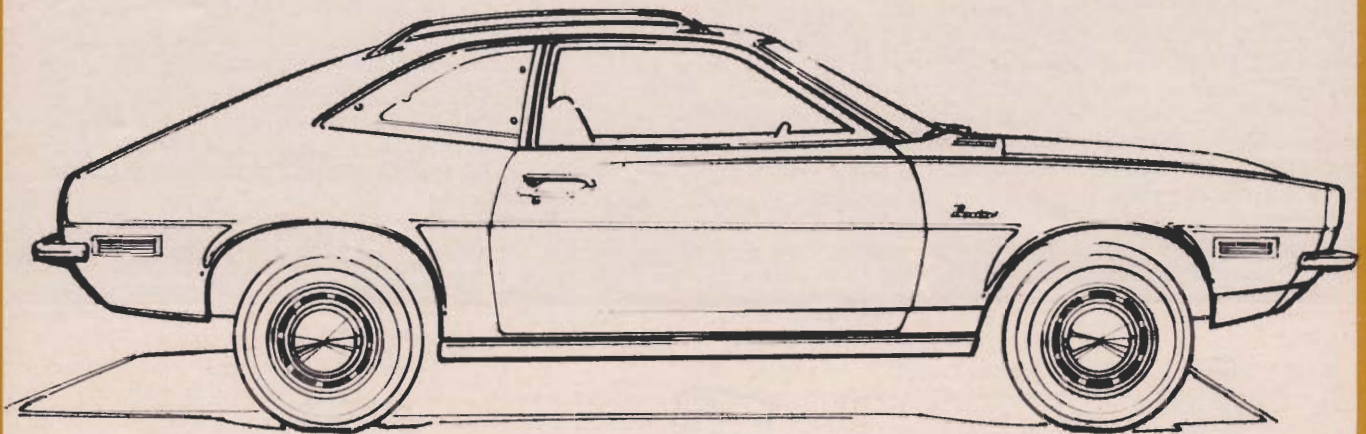
STYLING ANALYSIS

The styling philosophy behind the Pinto is apparently that of an all-American car scaled down. It's Ford's best design since the 1961 Continental—both handsome and rational. No real attempt at a European image has been made, with the sportier, more expensive Capri filling that role for Ford; but the crisp, light look of the Pinto compares favorably with the best imported cars. With the exception of its crude front end, it is an example of good contemporary design.



These two views of Pinto show its best and worst features. Overall form is excellent, particularly the blending of roof and lower body, and is especially satisfactory from the rear three-quarter aspect. But the Maverick-like treatment of the headlights, grille and forward edge of hood is unimaginative and cheap-looking—unfortunate with such a good basic design. Wheels and tires look small, but fender width encourages fat-tired performance option.

DRAWINGS BY STEWART REED
CRITIQUE BY JONATHAN THOMPSON



Ford's best-looking car. Side view of Pinto is handsome, with good distribution of masses. Subtle blending of horizon break with wheel arches is more successful than one would expect. Roof and rear quarter window are attractive, with a slight penalty in vision to the rear. Bumpers and side marker lights are more carefully studied than they are on Vega. Roof rack shown here adds a jaunty, "weekend" quality to the Pinto. Door handles look a bit dated, as though from an existing parts bin.

FORD PINTO SPECIFICATIONS

Engine:

Standard: type 4 cyl inline, ohv
Bore x stroke, mm 81.0 x 77.6
Equivalent in 3.19 x 3.06
Displacement, cc/cu in 1599/97.5
Compression ratio 8.0:1
Bhp @ rpm 75 @ 5000
Torque @ rpm lb-ft 91 @ 2800
Carburetion one Autolite (1V)
Emission control engine mods
Optional: type 4 cyl inline, sohc
Bore x stroke, mm 91.0 x 77.0
Equivalent in 3.58 x 3.03
Displacement, cc/cu in 2003/122
Compression ratio 8.6:1
Bhp @ rpm 95 @ 5700
Torque @ rpm, lb-ft 120 @ 3600

Carburetion one Weber (2V)
Emission control engine mods
Drive Train:
Transmission 4-speed manual (std) or
3-speed automatic (opt)
Gear ratios see text
Final drive ratio 3.55:1
Chassis & Body:
Body/frame unit steel
Brake type: drum; 9.00 x 2.00-in. front,
9.00 x 1.38-in. rear
Swept area, sq in 197
Wheels steel disc, 13 x 4
Optional 13 x 5
Tires bias, 6.00-13
Optional A70-13

Steering type rack & pinion
Overall ratio 22.1:1
Turning circle, ft 31.5
Front suspension: unequal-length lateral
arms, lower compression strut, coil
springs, tube shocks.
Rear suspension: live axle on longitudinal
leaf springs; tube shocks.

General:

Curb weight, lb (1.6 engine) 2015
Wheelbase, in 94.0
Track, front/rear 55.0/55.0
Overall length 163.0
Width 69.4
Height 50.0
Fuel tank capacity, U.S. gal 11.8