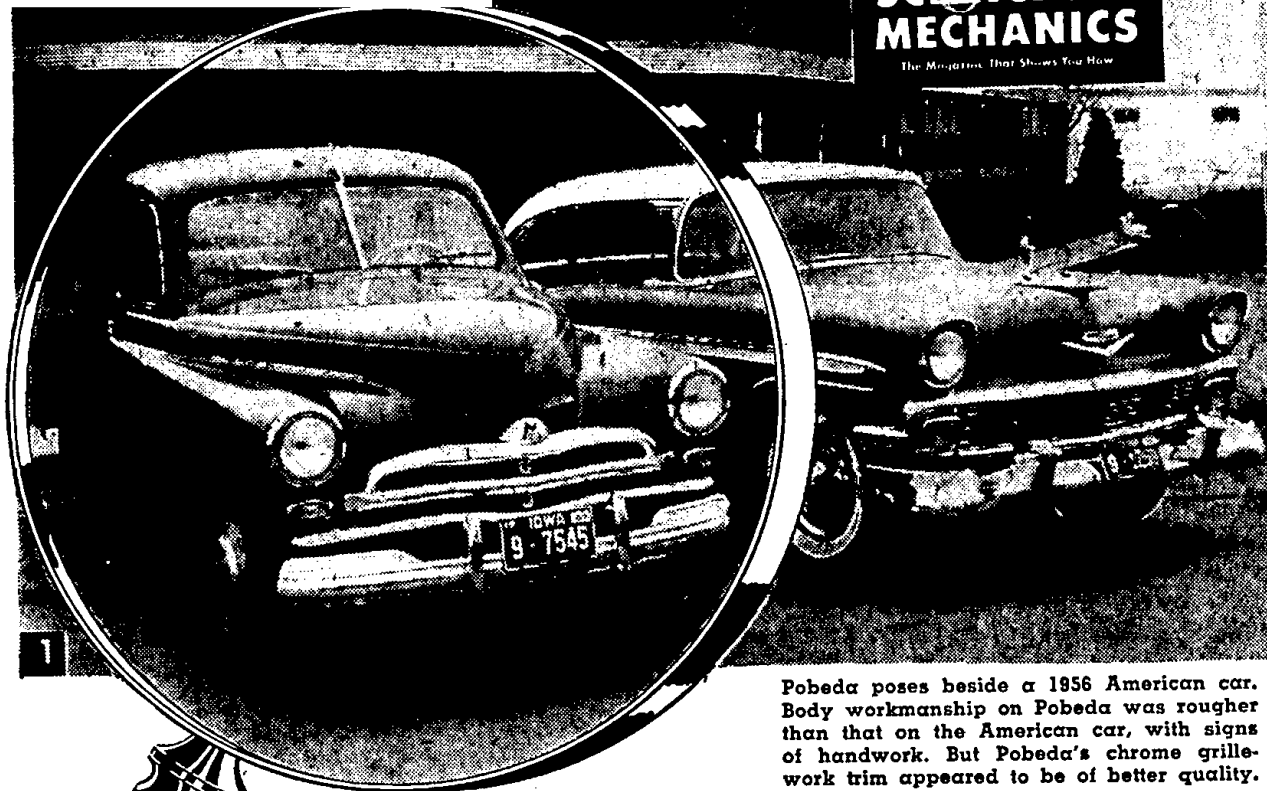


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**SCIENCE and
MECHANICS**

The Magazine That Shows You How



Pobeda poses beside a 1956 American car. Body workmanship on Pobeda was rougher than that on the American car, with signs of handwork. But Pobeda's chrome grille-work trim appeared to be of better quality.

How the **RUSSIAN Pobeda** Compares with **American Cars**

... and What It Reveals About Russian Know-How

ANY attempt to measure the strength of Russia's red heart should start with an examination of the sinews—the products which reveal Russia's ability to compete as an industrial nation.

This Pobeda is one such product. Not a "show-piece" jet plane or secret missile, it's true. It is, however, a piece of everyday transportation that Russia has manufactured for years in some quantity. As such, it should show us whether the Russians really know how to design and build a good automobile.

When compared with current American automotive standards, this 1956 car leaves a lot to be desired. By Russian standards, however, the Pobeda does a job, and does it well.

Red Copycats. Is that a credit to the designing ability of Russian engineers? Well, they seem to know how to copy what they want. From its styling skin to its mechanical core, the Pobeda is largely patterned after—not so much our present day cars—but parts and pieces of cars we made years ago. If you want to compare styling, go to the nearest junkyard, search out a 10 to 15 year old Plymouth, Ford, Chevrolet, and Nash, blend them together in your mind's

eye, and you'll have something that looks like a Pobeda.

Or dig a bit deeper. Open the hood or put this Pobeda up on a lift rack, and you'll find: a Jeep-like engine turned end for end with the carburetor on the right side; a rear end similar to that on a Model A Ford; a front end that also looks like a Jeep's; a transmission that might be a modified copy of a 1932 Model B Ford transmission. With enough time (and enough junkyards), you could probably locate the original versions from which Soviet engineers copied all but a few parts of this car and its accessories.

Frozen Models. Nor did the Russians, once they decided to copy our immediate pre- and post-war cars, bother with a yearly model change. The 1946 Pobeda is almost a twin brother to the 1956 Pobeda, not only in styling, but also in engine and body specifications.

Table A shows the kind of performance the Russians obtain from this sampling of old designs. You'll note that the Pobeda is a placid plodder with very little get-up-and-go, yet with somewhat better fuel mileage than our 1957 models.

Clearly, this middle-price range Russian car,



which sells for \$1890 F.O.B. Helsinki, Finland, would have a hard time finding customers in the free American market. But for the Russian market (and those captive satellite markets tied to Russia with apron strings of steel), the Pobeda is just what the Kremlin ordered. It is a sturdy piece of transportation, designed for slow speed operation over rough roads.

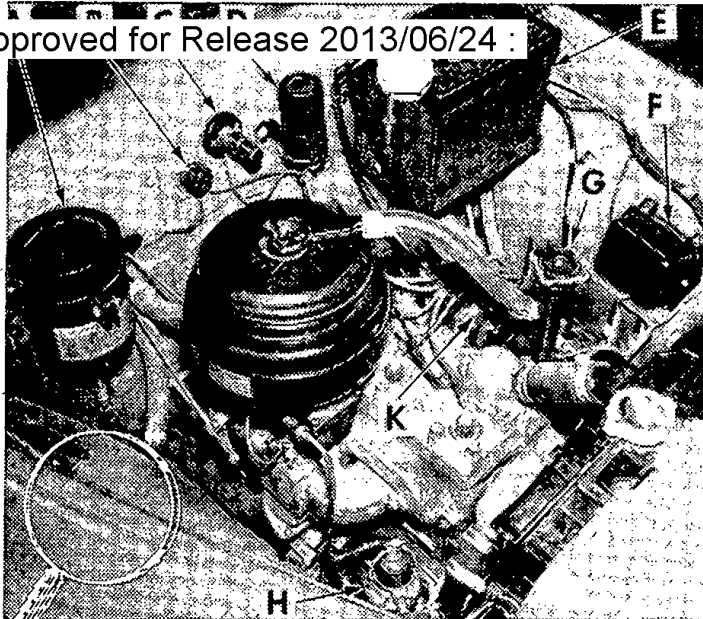
Not that Russia has no surfaced highways. They have about 50,000 miles of paved roads, usually of asphalt and concentrated in thoroughfares between major cities. But the far more numerous country roads are not surfaced, and become either lakes of mud or beds of dust, depending on the weather. In this environment, the slow-moving Pobeda might do as well as any other transportation, short of a four-wheel drive Jeep. Or a determined horse.

Military Meaning? Far more important to the Kremlin planners is the fact that the Pobeda will operate on low quality, that is, low octane gasoline.

This low octane requirement might indicate that Russian oil refineries are geared to produce jet fuels for fighter and bomber aircraft, rather than high octane gasoline for high performance automobiles (see the discussion on this point in the Tech Talk accompanying this article).

In contrast, most fuel production in the United States is high octane gasoline, produced in a cracking process. And this fuel cannot be used in our jet aircraft. In other words, the major effort of our refineries is geared for automobile, not jet aircraft production, and any sudden conversion to major wartime demands might take time that we could ill afford. If their fuel production effort is indeed geared for jet aircraft, the Russians would not have this particular problem. (But they would have others, as we shall see.)

There is a remarkably elaborate crankcase scavenging system on the Pobeda, with both the sturdy oil filler pipe and the tappet cover plate vented into the carburetor intake (Fig. 2). This means that gas getting into the crankcase past the piston



(Left) Running 52 hp Pobeda on a dynamometer showed that horsepower delivered at the rear wheels was 34. (Right) Closeup of that Pobeda engine. Note venting of oil filler pipe back to carb through large air cleaner. Other parts are: (a) "fine" fuel filter (there's another "coarse" one); (b) plug in for extra trouble light; (c) engine compartment light; (d) coil; (e) 12-volt battery; (f) large-size voltage regulator; (g) oil filler pipe; (h) fuel pump.

rings is scavenged into the carburetor. But the real justification for such an elaborate system would be the dusty roads of Russia. By venting the oil filler pipe and tappet cover plate back into the carb intake, crankcase breathing is essentially sealed off from incoming dust and dirt that would increase engine wear.

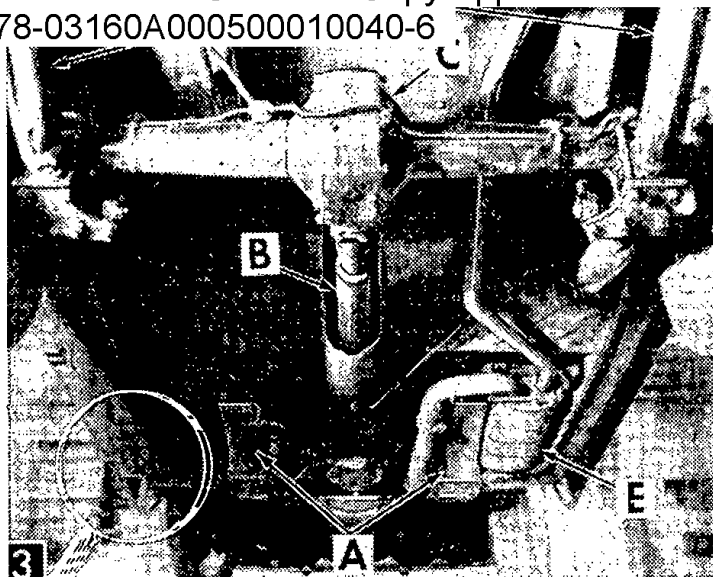
The same rough Russian roads (and the hills of Finland, which buys many Russian cars), may have determined the 5.125 to 1 axle ratio used in this Pobeda. That's not very far from some of the ratios our cars have in *second* gear, which is a good gear to use on heavily rutted roads or hills at slow speeds. The small size of the engine in relation to the car's weight also accounts for the high axle ratio used.

There are other clues which confirm the fact that this car is intended for operation under

TABLE A—HOW THE POBEDA COMPARES WITH U. S. CARS

FUEL ECONOMY	POBEDA	AVERAGE FOR AMERICAN CARS*
Best Level Road	23.1 mpg at 35 mph	20 mpg at 30 mph
Driving in Traffic (22 mph average)	14.2 mpg	11 mpg
Driving in City-Country (33 mph av.)	18.7 mpg	15 mpg
Overall Fuel Mileage (includes traffic and city-country driving, stop and starts, etc.)	15.5 mpg	11.6 mpg
ACCELERATION		
0-30 mph	9.27 sec.	4 sec.
0-60 mph	39.6 sec.	11 sec.
20-40 mph	19.1 sec.	5 sec.
Curb Weight	3125 lb.	3200-4500 lb.
Weight distribution on front wheels	51%	55%
Rear-axle ratio	5.125	3.2
Octane Number Requirement	60-70	85-95
Lateral sway on curve	4°	4-4½°
Frontal dip on braking	3°	3°
Torque, high gear, at 30 mph	405 lb-ft	630 lb-ft
Horsepower available	40 hp	200 hp
Top speed	70 mph	100+ mph
Engine rpm at 60 mph	3690 rpm	2400 rpm
Cubic feet of mixture at 60 mph	138 cfm	220 cfm
Engine hp per ton of car (advertised)	33 hp/ton	130 hp/ton

* Based on averages for domestic 1956 and 1957 cars we have tested.



3 Worm's-eye view of Pobeda. (Left) Looking at underneath from the rear to show: (a) short frame pieces (rest of frame is made up of the body itself); (b) driveshaft; (c) spiral bevel gear differential; (d) boot-covered leaf springs; and (e) muffler. Note that both pipes go into back of muffler and it would be hard for rough roads or rocks to "bang up" any vital parts of this well covered underbody. (Right) View of sturdy front suspension.



rugged conditions with few maintenance facilities (service stations are 70 to 100 miles apart in most of Russia, and the scarce replacement parts can only be obtained with official permission).

Mud Hooks. The Pobeda has two frame-mounted towing rings for hauling you out of the mud (Fig. 6). Behind the grille and in front of the radiator are louvers (like the old Pines Winterfront!), which can be opened or shut from the driver's seat. Not only should that help the Pobeda stand off the severe Russian winters, but

vibrations of all these panels at speeds of 37 mph (60 KPH) and up, is enough to give anyone a headache. Drive slowly, though, and you'll find the ride relatively serene, no matter how rough the road surface.

Springing is rugged, too, with heavy coils in front and massive, but flexible, rear leaf springs covered with rubberized fabric boots (Fig. 3). The Jeep-like front end uses no spacers or shims, while we are doing more and more shimming on American models, to reduce initial production costs. The eccentric pin for camber and caster is substantially made. Shocks are double acting. Brake drums are composite steel and cast iron, and linings are hard and riveted. Wheel bearings appear to be precisely ground from quality steel.

The tires have a diamond tread which would be effective on wet roads. This design tread should wear well enough at low speeds, but poorly at high speeds. Once again, there's that emphasis on the Pobeda being intended for low speed operation.

(There's no doubt the Russian drivers prove they're patient.)

And, once again, when you examine the Pobeda's engine, you get the picture of either trying to avoid maintenance by using heavy, apparently sturdy construction, or encouraging the car owner to do it himself.

Double Trouble Lights. Servicing points are readily accessible, and there are two trouble lights (Fig. 2). The car comes equipped with almost enough repair tools (Fig.

TECH TALK

Adequate Engine? The Pobeda's power plant, while badly over-taxed by American standards, is adequate for slow speed operation. For example, many American cars can barely develop 180 lb-ft of torque at 2000 rpm, yet they must propel a 4000 lb. car with an axle ratio of around 3.5. This means $180 (3.5) = 630$ lb-ft of torque available in high gear.

The Pobeda would have about 79 lb-ft of torque times a 5.125 axle ratio or 405 lb-ft. of torque available in high gear. Thus it would be 35% deficient in pulling power, from American values. This is a much smaller margin than the wide difference in horsepowers (say 200 hp for the American car and 40 hp for the Pobeda) would seem to indicate.

Determining Octane Requirement. An engine's octane number requirement is increased by high compression ratios, deposits, and by spark advance. Modern American cars have their maximum octane number (ON) requirements of 85 to 95 at relatively low speeds of 20 to 40 mph.

The Pobeda's "octane requirement" was found by accelerating in high gear at wide open throttle and listening for trace knock or border-

line knock at each speed (see Test Chart diagram). With a 60 octane number (ON) blend, no knock was audible at any speed. Upon changing to a 58 octane number (ON) blend, trace knock occurred at 70 kph; upon changing to a 55 ON blend, trace knock occurred at 60 and at 82 kph (and a heavier knock at 70 kph).

From the standpoint of engine knock alone, the Pobeda would operate on kerosene (jet engine fuels are essentially kerosene) without objectionable knock. However, a fuel must not only avoid knock, but must be volatile enough to start the engine, and to avoid washing down the walls of the cylinder with liquid gasoline.

The Pobeda requires a gasoline with about the same vaporization quality as ours, but with a much lower octane or knock rating, say a straight run gasoline from a plant designed primarily to produce jet fuels. All processed crude oil yields a small fraction of volatile fuel called natural gasoline, and another fraction called straight run gasoline. Such fractional by-product yields from a major jet fuel processing effort, might be enough to supply Russia's relatively small automotive requirements.

Science at the Wheel

Russian M-20 Pobeda

MODEL: Pobeda (Russian) M-20 4 cylinder; 2-door Sedan
TEST DATES: March 21 through April 6, 1957
GENERAL ROAD AND WEATHER CONDITIONS: Portland concrete generally smooth and level; cold, damp spring days; 29.25 to 29.95 in Hg; 35° to 54° F
MILEAGE AT START: 2120
MILES COVERED: 418
GAS: Regular; **OIL:** SAE 20W
CURB WEIGHT (with 10 gal gas): 3125 lb 51% on front wheels; 49% on rear wheels
TIRE PRESSURE: 28 psi front; 31 psi rear
SPARK SETTING: 4° bTC at Idle rpm
REAR AXLE GEAR RATIO: 5.125:1 (spiral-bevel)
TRANSMISSION: Manual shift, 3-speed with Synchromesh 2nd and 3rd gears. Ratios are 3.115 in 1st; 1.772 in 2nd; direct in 3rd; and 3.738 in Reverse

TEST DATA

GASOLINE MILEAGE (checked with fuel volume flow meter and 5th wheel. Temperature 40° F; relative humidity 80%; barometer 29.8 in. Hg)

LEVEL ROAD FUEL CONSUMPTION (carried weight 540 lb. Average of two or more runs made in opposite directions over same road):

True MPH KPH	True MPG	Odometer MPG	True Ton MPG
20 (32.2)	21.0	20.6	35.0
30 (48.2)	22.6	22.2	37.6
35 (56.3)	23.1	22.7	38.4
40 (64.3)	22.6	22.2	37.6
50 (80.5)	19.7	19.4	32.8
60 (96.5)	16.0	15.8	26.7

TRAFFIC FUEL CONSUMPTION (carried weight 520 lb): Simulated traffic pattern of city driving—stops, acceleration, braking:

True MPG	Odometer MPG	True Ton MPG	True Average MPH
14.2	14.0	25.8	22.7

CITY-COUNTRY FUEL CONSUMPTION (miles covered on 5 gal gas):

True Mileage	Odometer Mileage	True MPG	True Average MPH
93.3	91.6	18.7	33.1

OVERALL FUEL AND OIL consumed during test:

Total Mileage	Total Gal. Fuel	Total Oil	True MPG	Odometer MPG	Oil MPQ
418	26.8	5/6 qt.	15.5	15.3	501

OVERALL EFFICIENCY to move car's mass against road friction and air resistance, calculated from level road mpg, weight, and frontal area of car: 10.5% at 30 mph; 14.7% at 60 mph.

ACCELERATION—LEVEL ROAD (timed with 5th wheel; carried weight 450 lb; temperature 42° F; relative humidity 70%; barometer 29.7 in. Hg; spark 4° bTC; average of two or more runs in opposite directions over same road):

True MPH	Gear Range	Average True Time (sec.)
0-20	1st	4.80
0-30	1st to 20 mph 2nd to speed	9.27
0-40	1st to 20 mph 2nd to 35 mph 3rd to speed	15.6
0-50	"	26.5
0-60	"	39.6
20-40	Drive	19.1
20-50	"	30.0

SPEED AT END OF 1/4 MILE FROM STOP: 52 mph (true) in 27.6 sec

MINIMUM ACCELERATION time for 0-60 mph (true) over level road with no wind, best spark setting, premium fuel and driver alone: 36.2 seconds

ACCELERATION FACTORS:

True MPH	Gear	MPH/sec.	Ft./sec. ²
10	Lo	4.3	6.3
30	2nd	2.0	2.9
50	High	0.9	1.3

HILL CLIMBING (calculated from acceleration data with allowances made for rotational inertia):

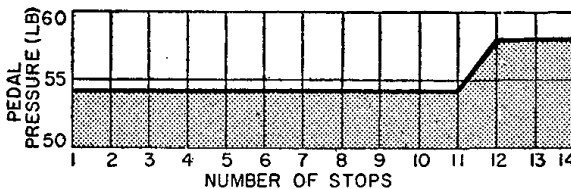
Approx. MPH	Gear	Grade %	Pull in lb.
15	Lo	27	925
40	Drive	6.7	240

SPEEDOMETER-ODOMETER CORRECTIONS: Odometer distance 16.00 km or 9.94 miles; true distance 10.10 miles; odometer error at 40 mph -0.16 miles. Multiplication factor and % of error 1.02 and -1.6%.

Speedometer KPH	True MPH	% Error	Engine RPM
20	13.0	+4.3	820
30	19.3	+2.9	1220
40	25.5	+2.7	1620
50	32.0	+2.8	2030
60	37.5	+0.8	2360
70	43.4	+0.23	2710
80	49.4	+0.41	3070
90	56.0	0.00	3470
100	62.2	0.00	3810
110	68.8	-0.57	4210

LATERAL SWAY TEST OF CORNERING ABILITY: At 40 mph on 285-ft radius circle, side tilt angle recorded was 4°

BRAKE FADE TESTS (repeated applications of brake from 45 mph to 30 mph at deceleration rate of 7 ft/sec²): As indicated below, pedal effort did not double in 14 test stops



LONGITUDINAL DIP ON BRAKING: At a deceleration rate of 21 ft/sec², body nose diving angle was 3°

PARKING BRAKE TEST: When brake was applied hard and suddenly from 20 mph true speed, car braking distance was 33 3/4 ft. Left wheel locked; right wheel locked

CHASSIS DYNAMOMETER HORSEPOWER (tests made by Clark Automotive Service, Chicago): Temperature 70° F; relative humidity 60%; barometer 29.6 in. Hg

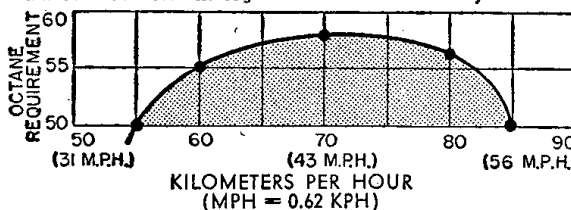
MPH True	Engine RPM	Horsepower
40	2500	34

HORSEPOWER AT REAR AXLE (values calculated from acceleration data with allowances made for efficiencies and rotational inertia):

MPH True	Engine RPM	Equiv. Engine Torque (lb ft)	Axle Horsepower
55	3400	63	41
43	2700	72	37
32	2000	79	30

Per cent of advertised engine horsepower supplied to rear wheels: 79%

OCTANE REQUIREMENT (Primary reference fuels; road rating). Temp. 60° F; Relative humidity 80%; Barometer 29.2 in. Hg



CERTIFICATION

I certify that the test results in this report are the actual findings obtained in tests, conducted in strict accordance with good engineering practice, on the automobile named and under the conditions specified.

Edw J Chert

Member, Society of Automotive Engineers, American Society of Mechanical Engineers, Director, Automotive Research Laboratories, Professional Engineering Consultants, 1204 Noyes Street, Evanston, Illinois.

6, right) to start a small hardware store. And there's an owner's instruction manual which contains 63 pages of detailed servicing instructions and drawings. It is translated into English for the Finns, whose secondary language is still English, rather than un-beloved Russian.

The engine itself is essentially a 1942 Willys engine with a shorter stroke crankshaft. It has cast-iron, replaceable cylinder liners and exhaust valve inserts, for long engine life. We use these in trucks and other vehicles where economical operation and reduced maintenance is important, but not on most of our new passenger cars. In some respects, our new car designers seem to be emphasizing the wrong word in the phrase, "dynamic obsolescence," which Harlow Curtice, the president of General Motors, indicated was a good target for our automotive industry.

The Pobeda engine also has very well made, closely fitted parts. So closely fitted, in fact, that when we tried to open up the throttle after break in, to get higher speeds than were intended for this plodder, a piston seized. A Plymouth piston, ground down to fit the metric bore, served as a perfect replacement.

PERFORMANCE FACTORS

(Calculated)

58 mph (true) at maximum advertised horsepower and 32 mph at max adv torque.

Engine rpm at 60 mph (also revolutions per mile) 3690 rpm.

Average piston speed at 60 mph (also, ft/mile) 2420 ft/min. Cu ft per minute of mixture at 60 mph (also, cu ft/mile) 138. Maximum engine horsepower (adv) per ton of car (curb weight) 33.3.

Maximum engine horsepower (adv) per cu in. displacement 0.40.

Power performance factor (a weighted average of CR, piston displacement, and curb weight): 61.



4
Cornering hard produced a tilt angle of slightly under 4°. Tilt angle on 1957 United States' cars we have tested has ranged from 4 to 4½°.

Forced lubrication is used to all crankshaft and camshaft bearings and tappets, with spray from a metering hole in the connecting rod, for the cylinder and cams. Such a system is common U.S. practice. Not so usual, however, is the fact that oil from the oil pump can follow two routes: (1) to a "fine" filter (replaceable cartridge) and back to the crankcase, or (2) to a "coarse", disc-type filter and thence to the bearings. The discs in the coarse filter are rotated slightly whenever you push the starter pedal.

Such an elaborate system for cleaning the oil again emphasizes the Russian intention to guard the life of the engine. But their designing is often haphazard and wasteful. Bolts and nuts are far larger than they need to be, and two water-bleed valves in the block appear to be made to last for a millennium. Also, despite the fact so many features on this Pobeda seemed to be designed for rough road operation, its 7½-inch ground clearance is not much greater than the ground clearances on our low-slung 1957

Driver's Observations—Russian M-20 Pobeda

ROADABILITY: Placid on bumps, curves and acceleration. Good for fough roads if you're in no hurry. Tracking excellent—as good as any we have tested. For its size very stable—perhaps because of weight and heavy springing. No guts to speak of on acceleration. Second gear seems particularly sluggish; high has more pep but too much weight to move.

Little sway on curves, but greater tendency to breakaway than we noticed with the Volkswagen and the Volvo. Valves hang up every now and then (she's a moody son of a gun) and car sometimes sounds like a lonesome steel saw at work. But we operated her at speeds she wasn't made for.

DRIVING AND RIDING COMFORT: Steering rapid but firm. Good ratio, and "feel" is neither too stiff nor too fussy. Shifting smooth when car is warmed up, though steering column mounting is placed higher than stick shifts we're accustomed to, and lever travel is too long for rapid shifts. When car has been sitting out in near freezing temperature, shift lever operation is quite stiff at first.

Seats fairly comfortable. Snug thigh

clearance between steering wheel and seat. Hatroom generous as on many imports. Rear seat legroom also generous. Center driveshaft hump even worse than it is on U. S. '57 models.

Little stooping and twisting needed to get in and out. Noise level through gears and at constant speed high by domestic standards, low by import standards. Many sporadic noises from various parts; a little insulation stuffed here and there eliminated many of these.

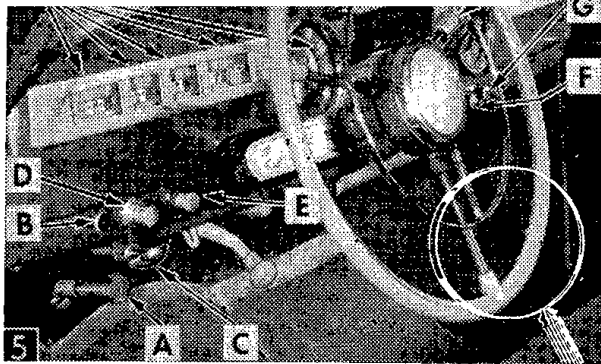
Braking action only fair with springy pedal. Vision forward poor by domestic standards, with side and center posts interfering. Rear vision terrible (see Fig. 9).

Vibration through floorboards considerable. Fumes from engine noticeable most of the time during which we operated the automobile.

INSTRUMENTS AND CONTROLS: Pedals closely spaced and brake and gas pedal set so far left it's easy to hit accelerator when you are trying to brake. Instruments fairly well placed and easy to read numbers, though lettering is Russian. Interior chroming minimum. Dash top shiny but small.

Turn signal is flip switch on dash, does not cancel itself, and click is faint. Antenna is like those on old Buick, folded down over windshield center post. Choke and hand throttle pull controls on opposite sides of dash. Starter really cranks up the shebang. Keys have hard time with very stubborn door locks. Window winding action smooth and easy (2¼ turns) though windows do not wind down flush into door. Q-vents well designed with easy action and little tendency to trap knuckles. Lineup of body door, hood and trunk seems fairly good. Doors sound solid but are hard to close, due to poor engagement of latches. Seat adjustment hard to reach with doors closed, and its operation is stiff. Glove compartment on far right modestly sized; latch works easily.

Sun shades are transparent plastic, but it's so dark, shades might as well be opaque. Blower roar on hi starts off like a muted siren—then settles down to less noisy level. Cigaret lighter in front. Ashtray in rear (for the Commissar?) but not in front (for his chauffeur?).



All interior trim is plastic. Upholstery is apparently of good grade woolen twill—synthetic fabrics are rarely seen in Russia, with the exception of nylon which has military applications. Note thick floor matting, lack of clearance between gas pedal and protruding drive shaft hump. Also note: (a) starter, (b) light to warn when radiator water is low, (c) handle to control louvers in front of radiator, (d) light switch, (e) throttle, (f) choke, (g) cigaret lighter, (h) left to right—amp meter, fuel gage, water temperature in degrees Centigrade; oil pressure; and speedometer; (i) electric wiper control; (k) turn signal switch; (l) shift lever.

models. Certainly, it's a far cry from, say, the 9-inch clearance on a Model A Ford.

These are important clues, along with such things as the unnecessarily massive construction throughout the car. They indicate that Russia's automotive industry either suffers from a lack of smart production planning, an inability to control production so that it can be made efficient, or else production is simply so low that efficient high volume production techniques are not justified.

Hodge-Podge Russian Designing. An equally important clue is the curiously mixed up selection of old and new features on the Pobeda. Headlamps are not the sealed beam type we adopted years ago, and which have appeared on some other Russian cars. This means, not only that the Pobeda's reflectors will tarnish more readily, but also that the Russians still make some headlight parts separately—a costly practice by our high volume production standards. The main jet on the carburetor has an adjusting needle, which is not such a bad idea. But it is a practice we started to abandon back in the Twenties, per-

haps because too many eager do-it-yourselfers loused up the adjustment. The rotation of the distributor with "octane selector" under the hood is similar to old Chevrolet practice. On the other hand, the Pobeda has a 12-volt electrical system with a coil resistor that cuts out when the starter pedal is depressed. This is a feature used on American cars only in recent years.

Definite signs of low-volume Russian production techniques show up in many other ways. The glass used in the Pobeda is not laminated safety glass, but thick plate (life is cheap in Russia!). The top edges of the windows are hand ground (the Soviets probably don't have enough equipment to machine finish glass edges for such low priority items as automobiles).

Although the doors are quite solid and seem to fit well, this Pobeda leaked badly during our water penetration tests. Body panels are well made of relatively heavy gage steel, but there is a lot of evidence of hammer and file hand work on the panels beneath the paint. It almost looked as if the panels were made from old stamping dies which had flawed or worn in places through heavy usage.

Anyone care to ask American car manufacturers who buys their old stamping dies when they are through with them?

The Pobeda's grille-work chrome is thicker, smoother, brighter and apparently of better quality than the chrome on our shiny new models. Yet on some accessories, such as the windshield wiper blades, the brightwork had already rusted. And although the car was finished with a priming coat plus baked enamel (a lively dark gray, of course), the finish was easily marred and scratches rusted very quickly.

Wasteful U.S. Designing. On those points where the Pobeda seems superior to many modern cars, such as better fuel mileage, more rugged construction, more repair tools, better chrome, and the like, the Russians deserve no particular credit. Because they copied very old U.S. models, they avoided designing into the Pobeda some of the disadvantages found in our newer models. A prime example of this would be the contortions that are in the driveshafts of our present cars, which have offset hypoid gears.

TABLE B—SOME OTHER RUSSIAN PASSENGER CARS

MOSKVITCH—originally an 1800-1900 lb., 4 cylinder, 158 in. wooden body station wagon or sedan built from pre-war Opel Cadet (German) dies. Rated at 23-24 hp at 3,400 rpm and supposedly capable of about 30 mpg and 55-60 mph top speed. Newer models follow more recent British designs, are reported to cost 9,000 rubles in Finland, 15,000 rubles in Russia. Production reported to be addicted to large share of "lemons" with faulty parts.

ZIL—1957 reports say this limousine is patterned after a late 1940 Cadillac and has automatic transmission. But Zils are hard to locate, and supposedly obtainable only on special orders. Earlier versions were called Zis, and were reported to look like 1940 to 1942 Packards, weigh about 5300 lbs., have 140 hp 8 cylinder engines, 12-volt system, pushbutton windows, sealed beam headlights, weak bumpers, poor tires, overly large tolerances, and fat price tags. But

the Zis might well have been the world's longest car at 231 inches. Supposed to do 0-60 in 26 seconds, and 10-11 mpg.

VOLGA—Five seater sedan with unitized construction, 70 hp engine, 80 mph top speed, slightly-wrapped around windshield, automatic transmission and styling like a vague blend of some more recent U. S. models.

BIELKA—Midget-size, beetle-like scoot-about that is supposed to get 50 mpg. Appears to have full wrap-around windows.

ZIM—No recent reports on this 212 inch, 3850 lb., 6 cylinder, 90-95 hp car which originally looked like postwar Buick, was made in a convertible model. Top speed reported to be around 80 mph and fuel mileage 12-15 mpg.

These permit the driveshaft to be closer to the road so the drive-shaft tunnel can be reduced and the car can be lowered. Along with the hypoids of necessity, came an extra universal in the drive shaft train.

In contrast, the Pobeda sticks to the simple drive train with relatively friction-free spiral-bevel gears, which we used to use before our designers went on their "longer-lower" styling kick.

Is the Pobeda a Typical Russian Car? Russia claims to manufacture about 40 different types of cars and trucks. The trucks, because of their importance to industry and the military machine, get the lion's share of the production. For example, in 1955 Russia produced about 500,000 trucks but only about 45,000 to 50,000 passenger cars.

Our test Pobeda, made in 1956, carried engine number 274,240. To our knowledge, only one other Pobeda has been brought to the United States, a model made in May 1952 which carried an engine number on the order of 160,000. If Pobeda engines are used only on cars, these clues might indicate that the Russians have been turning out about 28,000 Pobedas a year, and that the sale of Pobedas, while very low by American standards, might represent close to 50% of the total yearly Russian automobile sales.

Table B gives you a quick run-down on some other Russian cars. Note that the middle-range Pobeda has neither the economy of the smaller, lighter *Moskvitch*, nor the zip of the more powerful *Zil*.

The same predilection for copying other people's ideas (a smart way for engineers who are way behind to try to catch up in a hurry) seems to dominate the designs of these other

SPECIFICATIONS

ENGINE: 4 cylinder in line; L head (underhead valve). Bore 3.23 in.; stroke 3.94 in. Advertised maximum brake horsepower 52 at 3600 rpm. Taxable horsepower 16.7. Advertised maximum torque 90.4 lb ft and mean effective pressure of 105 psi at 2000 rpm. Compression ratio 6.2 to 1. Piston displacement 129.4 cu in. Fuel specified: 70 octane.

TRANSMISSION: 3-speed manual shift with synchromesh 2nd and 3rd gears. Rear axle ratio: 5.125.

STEERING: Turning circle 20.7 ft, curb to curb. Overall ratio 18.2 to 1. Torque to turn 12 lb ft static; 4 1/8 turns lock to lock.

EXTERIOR: Wheelbase 106 in. Overall length 184 in. Overall width 67 in. Overall height (unloaded) 64 1/2 in. Curb weight 3125 lb (with 10 gal gas, oil and water). Minimum road clearance 7 1/2 in. at U bolts, rear springs.

INTERIOR: Headroom: front seat 38 in. and rear seat 35 1/2 in. Legroom: front seat 41 in. Knee room: rear seat 11 in. to 15 in. plus 19" cushion depth. Hip room: front seat 56 in. and rear seat 56 in. Total front seat adjustment at floor: 4 in. forward or back; 3/4 in. up or down.

VISIBILITY: Windshield area 636 sq in. Rear window area 510 sq in.; from eye of 5 ft 8 in. driver and seat in best position, distance from driver's eye to road over left front fender is 19 ft 7 in. (or 12 ft 3 in. blind distance to car); over hood center 33 ft 5 in. (or 25 ft 7 in. blind distance to car); over right front fender 31 ft 3 in. (or 23 ft 9 in. blind distance to car).

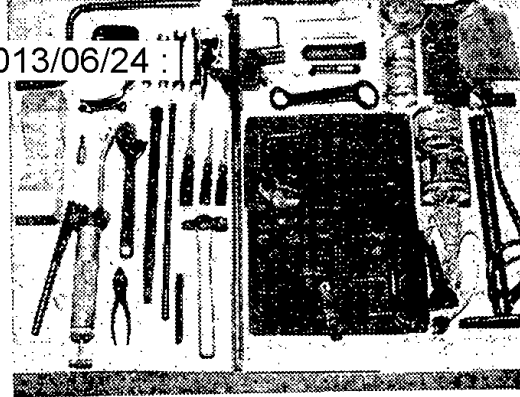
EQUIPMENT: Battery, 12-volt, 54-amp hours, located high on fire wall. Tires 6:00x16 4 ply; recommended pressure 28 1/2 psi front, 31 1/2 psi rear. Springing: front Coil, rear Leaf. Frame Under engine only—body unitized.

CAPACITIES: Fuel tank 14 1/2 gal. Crankcase 6 1/3 qt. Cooling system 11 qt. with heater. Differential 1.06 pt. Transmission 1.8 pt.. Luggage compt. will take two normal suitcases and tools.



6

(Left) Either the Russians don't trust the car or they know their roads. There are two of these frame-mounted hooks on the front of the Pobeda. (Right) You could almost make a car with this set of tools, instead of just repairing one. In addition to wrenches, pliers and the like, note crank (at upper left), wooden wheel blocks and grease gun (at left); trouble light and tire pump (lower right), and cans of touch-up paint and thinner (right).



7

Russian version of panic braking stop. Brakes showed practically no fade, but they could not be locked. Hence, from high speeds, stopping time was longer and stopping distances greater than with U. S. cars.

Russian cars. Recently, however, they have begun to copy more recent models. And instead of sticking to one basic model design year after year as they did on the Pobeda (and as the Germans have done so successfully on the Volkswagen), the Russians are showing signs of trying to do at least a yearly "face-lifting job" on some of their cars. Thus, when you compare a 1957 *Volga* with one made in 1956, you notice a complete change in front end grille and parking light design. The *Volga*, by the way, appears to be the car the Russians are grooming as a replacement for Pobeda. Not only is its styling far more modern but it sports an automatic transmission.

False Front? Before you assume that these innovations mean the Russian automotive industry is beginning to catch up with ours, let's note a strong caution. The Russians are plagued by an insistent inferiority complex and their leaders are quite aware that, in the production of most consumer products, they are a good 20 years behind us. To compensate, they may throw up a false front, that is, produce a more modern car which can be shown at trade shows for propaganda purposes. Yet a Russian might have a hard time finding a model of that "dream car" to buy.

Do the Russians Know How to Compete? What conclusions about Russian know-how can we draw after examining this Pobeda?

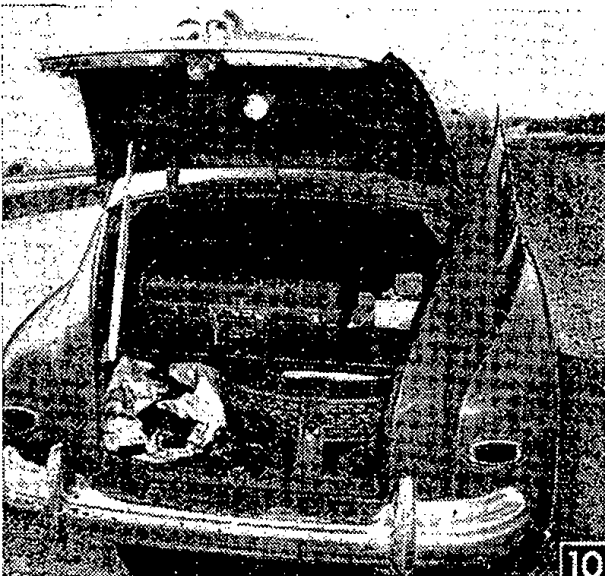
Russia copied most of it from cars we made at least 10 years ago, and never bothered to change basic models. Hence this car is a sorry clunker



Wiper arcs look good but there's no wraparound to contend with—only thick corner posts.

by modern American performance standards, yet it obviously suited the Russians. It had to. Russian customers, at least until very recently, were in no position to demand anything better, and couldn't afford to buy it anyhow. And the Kremlin planners wanted it that way, so they could concentrate their major production effort on military and heavy industry products. That's where they put their best technical, scientific and production talent, and the results show in such things as high-performance Russian jet aircraft that are reported to compete with our latest aircraft.

But behind this front of military strength and concentration on heavy machinery, are such examples of haphazard design and poor production control as this Pobeda (which was manufactured in 1956, mind you), Extensive hand work, unnecessarily heavy and oversize parts, second-hand solutions to design problems—this Pobeda is loaded with them. And the car that emerges from such a time- and materials-wasting production effort is a 3125-lb. heavyweight with a 4-cylinder engine that eats far more precious fuel than it should. Sure, its fuel mileage is somewhat better than that which most of our 1957 models can obtain, but ours are not intended to be economy cars. If it were properly designed for economy, a car the size of the Pobeda with a 4-cylinder engine would



Not much room for luggage, what with the spare tire and all those tools.



What a straight railroad track looks like viewed through the badly made plate glass rear window on the Pobeda.

save fuel like a Volkswagen or a Volvo (see page 73 of this issue). That would mean up to twice the number of miles-per-gallon of today's larger American models—the kind of fuel economy Russia would love to achieve if it could.

Can the Russians Do Better? Very probably they can. What they are reported to have done with H-bombs, atomic research equipment, jet aircraft and missiles suggests quality brain work and planning ability. And in the numbers game of counting up educated engineers and technicians, they are hot on our heels already.

But there's a hitch. The more they educate their people and pay better wages to these trained workers, the more these people start wanting something better—their own homes to live in, better clothes, better appliances—the list of needs is a long and hungry one.

Who knows, the average Russian might even start to want a really new car—like those shiny modern models with automatic transmissions Russia builds for the trade shows:

If he ever wants these things hard enough, there may be some important and far-reaching changes made at the Kremlin.—DON DINWIDDIE.

Can You Buy a Russian Car?

It's possible—if you are blessed with some American ingenuity! At least, that was the experience of a man so blessed, Mr. Vern L. Schield, a citizen of Iowa who is president of the Schield BANTAM Company. Thanks to Mr. Schield's ingenuity and talents as an engineer-inventor, his Waverly, Iowa company in just 10 years has become the world's largest producer of truck-mounted, power cranes and excavators.

As an industrialist intensely interested in world conditions and international business affairs, Vern Schield has traveled all over the world. In 1956 he visited Russia, to find out for himself what Russia was doing with all the scientific and engineering talent they claim to produce each year. At that time, it occurred to him that other Americans might be interested in seeing a typical Russian automobile, for purposes of comparing it with their own American cars.

That is why he purchased a Russian Pobeda and brought it back to Iowa, where it will be displayed at public shows as a general interest exhibit. That is also why he was kind enough to allow SCIENCE AND MECHANICS to test this Pobeda.

Prior to purchasing the car, Schield found out from the U. S. Department of Commerce in Washington that there was no objection to importing it. He then ordered the Pobeda through a dealer located in Helsinki, Finland, who in turn ordered the car by telephone from the Russian Automotive Industry showroom in Helsinki. The price was \$1890 F.O.B. Helsinki, including heater, tools, and spare wheel and tire.



MR. VERN L. SCHIELD