What future for the auto?

Hearings raise fundamental questions about the problems caused by cars in urban America

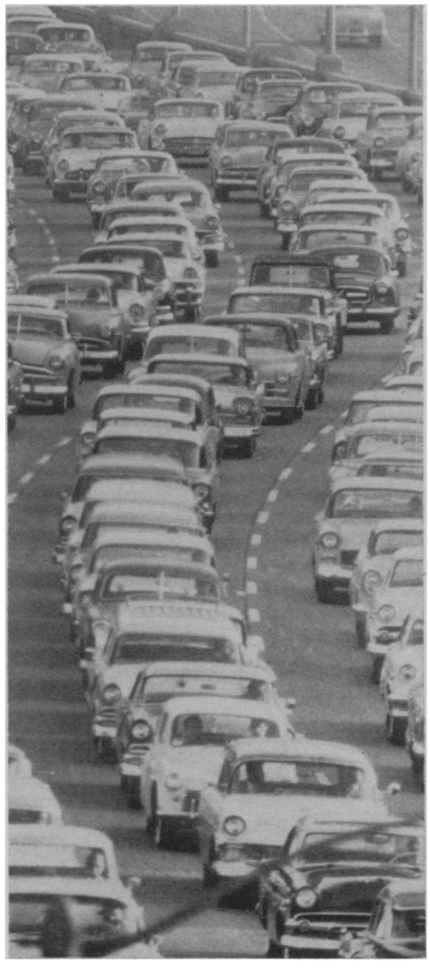
Americans often are said to have a "love affair" with the automobile. But the evidence is piling up that this love affair has become a marriage contract increasingly restrictive, binding and painful. In fact, the main thing holding the marriage together may be the cosmetic allure of annual style changes and advertising. A new contract providing a partial divorce may be inevitable one day soon as Americans (and, for that matter, Europeans and Japanese) become more disillusioned.

The aggravated problems of the automobile were pointed up sharply last week as the Environmental Protection Agency held two days of hearings to determine if the automobile industry is making "good faith" efforts to meet 1975 and 1976 emission standards required under the 1970 clean air amendments. It strongly appears the companies are making such efforts. But it also appears that meeting the standards, even if this goal can be accomplished, which is in doubt, will not do the job of making urban air safe for breathing.

For one thing, experience to date with new automobiles that meet current emission standards is that it is often difficult to make them meet the standards after they have been driven a few thousand miles. Another problem is that automobiles proliferating at today's rate, even with emission controls that meet the 1975 and 1976 standards, will cause the urban air in 1985 to be as polluted as it is today. Thus it may turn out that ambient air standards required by the 1970 amendments—which set absolute maximums for major air pollutants in ambient air, based on public health criteria—may be far more important than the much-ballyhooed emission standards.

It became clear at the hearings that all possible emission control systems which will enable the internal-combustion engine (ICE) to meet the new standards will be costly and fragile, and that if the systems manage to reduce one kind of emission they likely will increase another. S. L. Terry, a Chrysler vice president, said, for instance, that a catalytic converter for oxidation of exhaust hydrocarbons and carbon monoxide—the main approach by the companies to these pollutants—could easily be damaged by excessive heat from unburned fuel from the nonfiring of a single spark plug. Burning of the fuel in the converter would overheat the catalyst.

Chrysler is aiming at a maximum of 10 percent increase in fuel consumption from emission controls. (Environmentalists concur with this target because of the ecological problems of increased petroleum production.) Terry listed the technological changes necessary to achieve the goal and at the same time meet the standards: engine modification for 91-octane, unleaded fuel; either improved carburetors with fast-acting choke, or electronic carburetor control; fully electronic ignition systems; supplementary exhaust-air systems; partial exhaust manifold reactors, and oxidation catalysts (with temperature controls to avert the spark plug problem). "It is readily apparent that the system is extremely complicated and costly," said Terry.



EPA

But this is by no means the end of the problems. Nitrogen oxide standards for 1976, not yet set, are likely to be stringent. Says Terry (with other manufacturers agreeing): Successful control of CO and hydrocarbons will increase NO_x emissions. To cope successfully with all pollutants, the manufacturers and many scientists agreed, would result in seriously impaired fuel economy and "driveability."

Auto executives at the hearings generally agreed that the emission controls for the ICE would be difficult and delicate to maintain; they also agreed that the average motorist probably would not be willing or able to get the work done. (Here there is sharp disagreement between the companies, which stress the "willing," and environmentalists, who stress the "able." The companies claim the average motorist is not motivated to keep his auto well-tuned; environmentalists claim commercial maintenance facilities, many of them controlled by the auto companies, are notoriously unreliable.) And the only way to enforce maintenance would be to set up elaborate state or Federal inspection systems. Even if instruments of the necessary sensitivity were available (they are not yet) the cost would be immense—about $4 billion, one witness estimated.

Numerous solutions to the emission control problem were proposed. One witness suggested easing CO standards so that NO_x emissions (a major component of photochemical smog) could be better handled. Another suggested easing NO_x standards so that CO emissions could be reduced. But the most obvious alternative appeared to be the substitution of simpler steam or gas turbine engines for the ICE. Representatives of companies working on such alternatives said an all-out effort might make them feasible in time to meet the standards or shortly thereafter. But auto company witnesses were pessimistic. Among the many problems: NO_x emissions from gas turbines, the high power factor required for the turbines and the lack still of a feasible automated control system for steam engines.

The problems of air pollution from the automobile may be nearly insolvable. Environmentalists suggest that although efforts to solve them should continue, a far broader approach may be necessary. The broader approach: largely do away with the automobile in urban areas (while recognizing its cross-country, small town and rural appropriateness). A truly inclusive systems analysis of the urban effects of the automobile—social and demographic, as well as ecological—would show, the environmentalists say, that it is an increasingly destructive machine.

They say it takes no elaborate behavioral study to demonstrate, for instance, that driving in modern urban traffic increases the already heavy load of human hostility. The garish commercial strips that have grown up in suburbia since World War II are an obvious product of the automobile—as is the urban sprawl which denies many human beings, especially the poor, the elderly and children, any real sense of community (SN: 3/20/71, p. 198). Freeways, cutting either through the urban ghetto or through green countryside, are another liability.

Some more subtle liabilities might be turned up by a behavioral study of automobile company advertising, which may encourage hostility with its image of aggressive manhood (and which, circularly, defines the "driveability" factor the auto executive mentioned so frequently). In an aside at the hearings, one auto executive cynically asked, in reply to such arguments, "Should we go back to the horse?" Environmentalists retorted that the technology for public transport is available and that EPA might find fruitful an alliance with the Urban Mass Transit Administration—along the lines of EPA's recent entente with the Army Corps of Engineers to solve water pollution problems.

If this should be EPA's course of action, the ambient air standards, not the emission standards, will be the lever. EPA Administrator William D. Ruckelshaus said two weeks ago that he means to enforce the ambient air standards. □

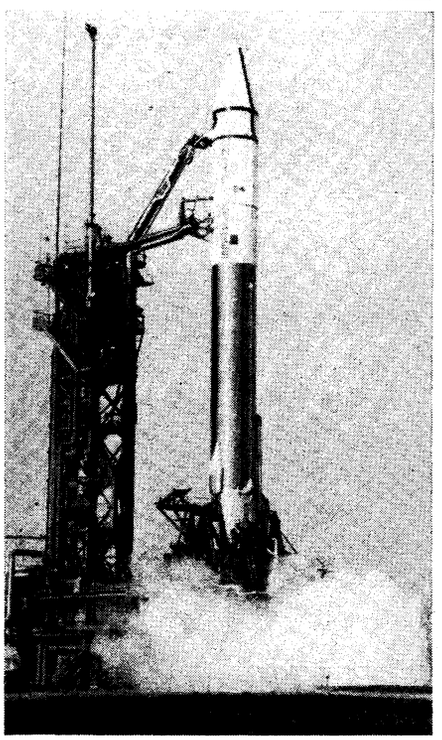
MARS ORBITER LOST

. . . then there was one

"We are GO for the planet Mars," boomed the loud speakers moments before the Atlas-Centaur rocketing the first Mars orbiter lit up the Florida night sky with a spectacular pink glow. All appeared normal up to four and a half minutes into the launch. Suddenly the signals being displayed on the flight control screens showed the vehicle deviating from the proper attitude. "It appears we have a problem with the telemetry." A few minutes later all signals stopped. Eleven minutes after the launch a hushed audience was told "the Mars mission has not succeeded."

Two hours of poring over yards of data narrowed the point of failure to the electronics in the pitch channel of the Centaur's autopilot. (The Atlas stage had already shut down.) Failure occurred in a component in the electronics between the rate gyro and the amplifier. The rate gyro senses the motions of the Centaur and relays the information to the amplifier which in turn signals the engines to fire in a certain direction to compensate for the motions. Since the signals were not being sent, the oscillations built up, Mariner H began tumbling out of control, and the Centaur engines shut down. The Mars orbiter reentered the atmosphere 900 miles down range and plunged into the ocean about 250 miles north of Puerto Rico.

The loss of the $77 million Mariner H, the first attempt to place a spacecraft in orbit around another planet, was the second failure of a high-priority unmanned science mission in six months. The destruction of the $97 million Orbiting Astronomical Observatory in November was also due to an Atlas-Centaur failure (SN: 12/5/70, p. 427).



NASA

The felled Mariner H before launch.

But the greater loss was of the knowledge that might have been gained by having two spacecraft orbiting Mars at the same time in different orbits.

Originally the Mariner Mars '71 program envisioned two craft, both with the same mission. The second craft would be a back-up in case of failure. Through the years, however, "we tended to get caught up in the program," says Robert S. Kraemer, director of planetary programs at the National Aeronautics and Space Administration headquarters. The two identical missions evolved into separate ones as a way to get the most science from two craft (SN: 9/12/70, p. 227). Mariner H was to orbit Mars every 12 hours mapping 70 percent of the planet. Its orbit of 750 by 10,000 miles would have had an inclination of 80 degrees to the Martian equator. Meanwhile, an identical spacecraft with an identical science package, Mariner I, would be orbiting the planet at 530 by 20,500 miles every 20 and a half hours. This would have allowed the two television cameras and three sensing experiments to record repeatedly selected areas of Mars in order to observe seasonal changes such as the "wave of darkening," dust storms and other surface and atmospheric variations.

"To say we are a bit disappointed is an understatement," said Kraemer after the Mariner H failure.

But all is not lost. If the problem is not inherent to the Centaur's autopilot, Mariner I will be launched to Mars no earlier than May 20, although a launch is still possible until June 3. The spacecraft, then to be called Mariner 8, will travel 287 million miles to a target spot of only 435 square miles, where it will go into orbit around Mars. Scientists and engineers have until November to decide the best orbit and inclination. Some optimistic engineers predict that 70 percent of both A and B mission objectives can be accomplished.

The two top priorities for Mariner 8, however, will be to map the planet and find at least two "nice, low, warm, damp spots," for the Viking Mars craft to land in 1976. Such spots would be the most likely to have life forms if any life does exist on Mars. "The probability of finding life as we define it on earth, however, is small," emphasizes Earl W. Glahn, program manager at NASA headquarters.

This week as the second spacecraft was being mated to another Atlas-Centaur, the Mars '71 program was in high gear. At the Lewis Research Center in Cleveland where the Atlas-Centaur is managed, Director Bruce T. Lundin appointed two investigative teams—one to examine and simulate the failure of H and the second to determine a remedy, if needed, for Mariner I. And at the Jet Propulsion Laboratory in Pasadena, the managers of the Mariner missions were looking at the alternatives for the remaining orbiter.

While NASA was looking at ways to