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wisconsin engineer



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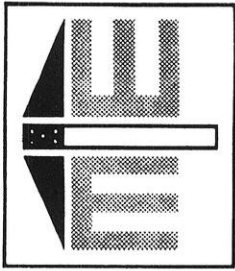
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wisconsin engineer

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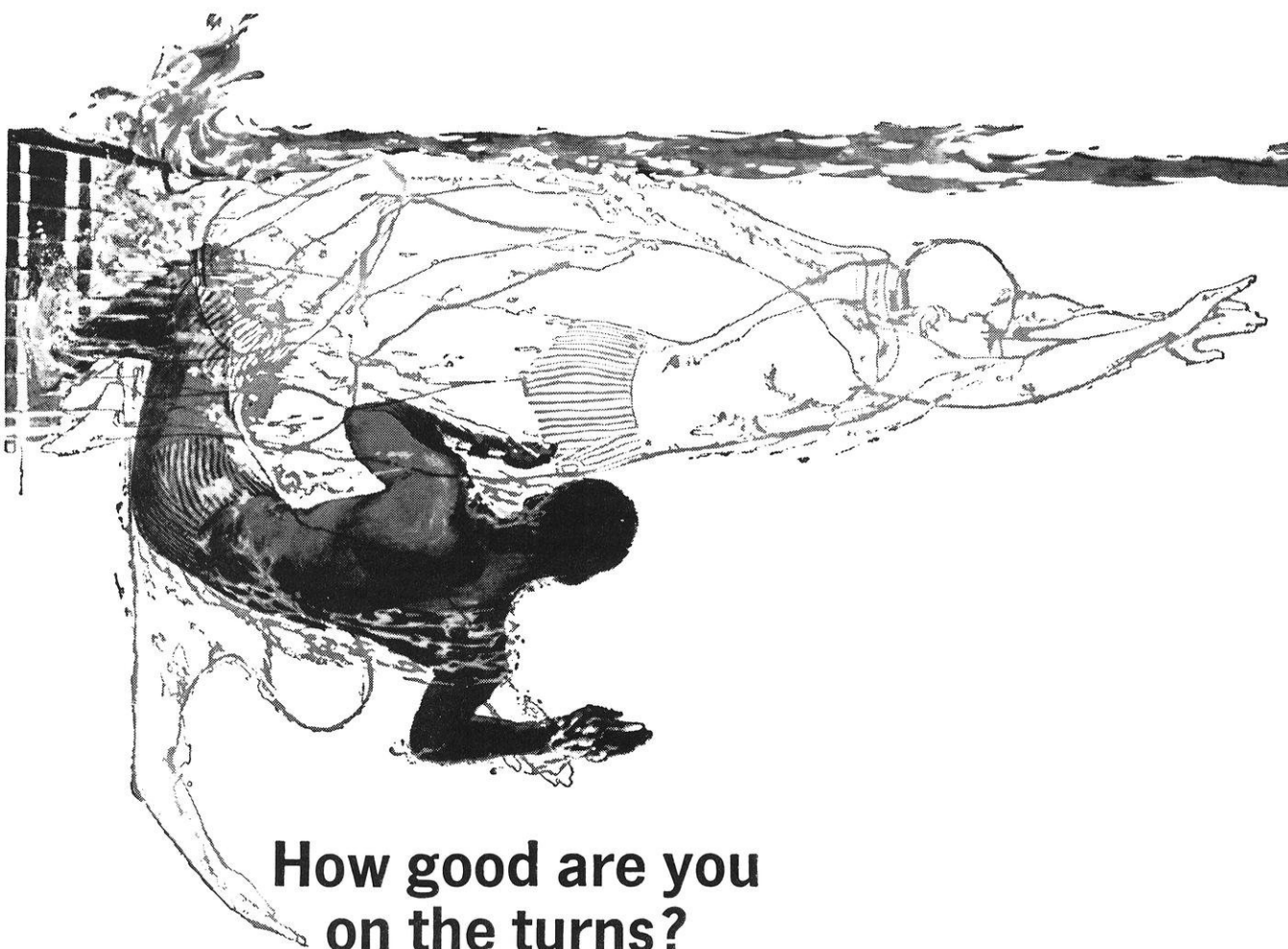
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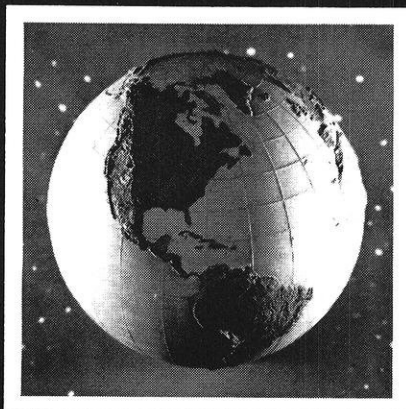
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The March of All Marches

The past march on Washington could have been billed as the March of all Marches. Not only was it the largest assemblage of people protesting United States government policy, but it also may have very well been the last national anti-war mobilization to meddle in the streets of Washington. There was a special sense of things this time around, a feeling that while much was attempted, little would be accomplished.

The anti-war movement has explored the gamut of tactics. It has written letters and burned draft files, it has fasted, vigiled, and prayed, and it has marched holes in its shoes. But once again, on November 15, over 250,000 people made their way to Washington to end the war. Once again they sang songs, carried signs, and marched. And still the war continues. Like a broken record, one became weary of the repetition, tired and bored of what was surely a fruitless act. One became preoccupied with events surrounding the march rather than the issues implicit in it. In short, people were frustrated and desperate — frustrated because the war would not end with another march on Washington (the President was watching the Purdue game), and desperate for another *effective* and hopefully (but improbably) nonviolent means of redress. As one sign read: "This is the last march — The Fire Next Time."

The tactical bankruptcy of the anti-war movement and its newfound liberal base is understandable. Most of those in Washington thought to end the war was a simple task; perhaps a mere presidential proclamation would Get Us Out. They believed that to be found in Washington was a savior who would speak the magic words, do the magic sign, and we would be out of Viet Nam. Rather, the savior was still laughing the magic laugh and, with his ear to the ground, forever listening for the silent American.

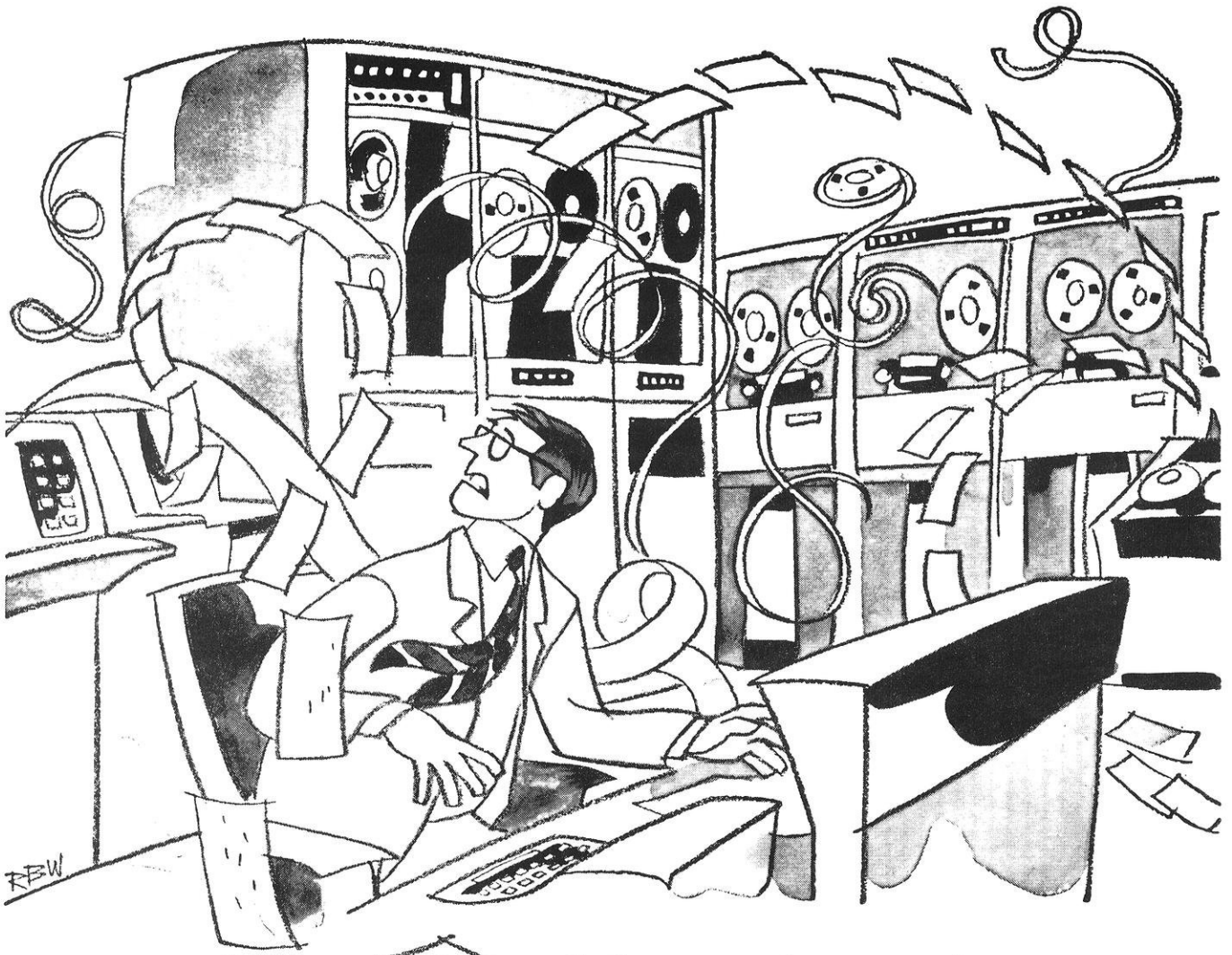
Many of those who went to Washington marched only against the war. They did not march against racism, oppression, militarism, or repression. They saw Viet Nam as a separate issue, unrelated to any of the many other foreign and domestic injustices perpetrated by the United States. They believed that after Viet Nam would be no more Viet Nam. In only two cases (one an action against the South Vietnamese Embassy, and the other a protest in support of the Chicago Conspiracy) were protests registered against the wider scope of injustices. And those actions were denounced by many fellow marchers as "militant."

The assumption behind much of the anti-war enthusiasm is that, after the United States gets out of Viet Nam, public pressure will prevent other future Viet Nams. Somehow, the government will have learned its lesson. But to believe that Viet Nam is the war to end all wars is as faulty as believing a march on Washington will end the war in Viet Nam. It won't. And there will be more Viet Nams. It is the nature of American foreign and domestic policy which dictates our presence in Viet Nam and will demand future American presence in other underdeveloped countries. The domestic business attitude is one of economic colonialism; American foreign policy accommodates those attitudes with counterinsurgency and intervention. Whenever the American dollar is threatened abroad by legitimate and indigenous social, political, and economic revolutions, American forces are there to shove democracy and the American dollar down the native throat. For that reason — because money, American money, takes precedence over self-determination — there will be more Viet Nams.

It doesn't all end there. American domestic policy bears a striking resemblance to American foreign policy. Social, political, and economic dissent is met with clubs, mace, and tear gas. In lieu of profit, change is suppressed.

The contradictions of the system are evident; we see them, feel them, and hear them every day. The air we breathe, the food we eat, and the voices we hear are not of a humanitarian system. They are of a system which holds death above life, sickness above health, and intolerance above tolerance (it tells us to love it or leave rather than stay and make it better). They are the sights, sounds, and stench of imperialism.

The anti-war movement, to become honest with itself, must understand fully the implications of imperialism. The movement must understand that, in the interests of business and Big Money, this government refuses to stop an illegal, immoral, and unjustifiable war. It prefers to beat heads. The movement must understand there will be more Viet Nams— uglier and bloodier — because the end of the war will not mean the end of imperialism. And if it takes a "militant" to understand imperialism, then "militant" we must be.



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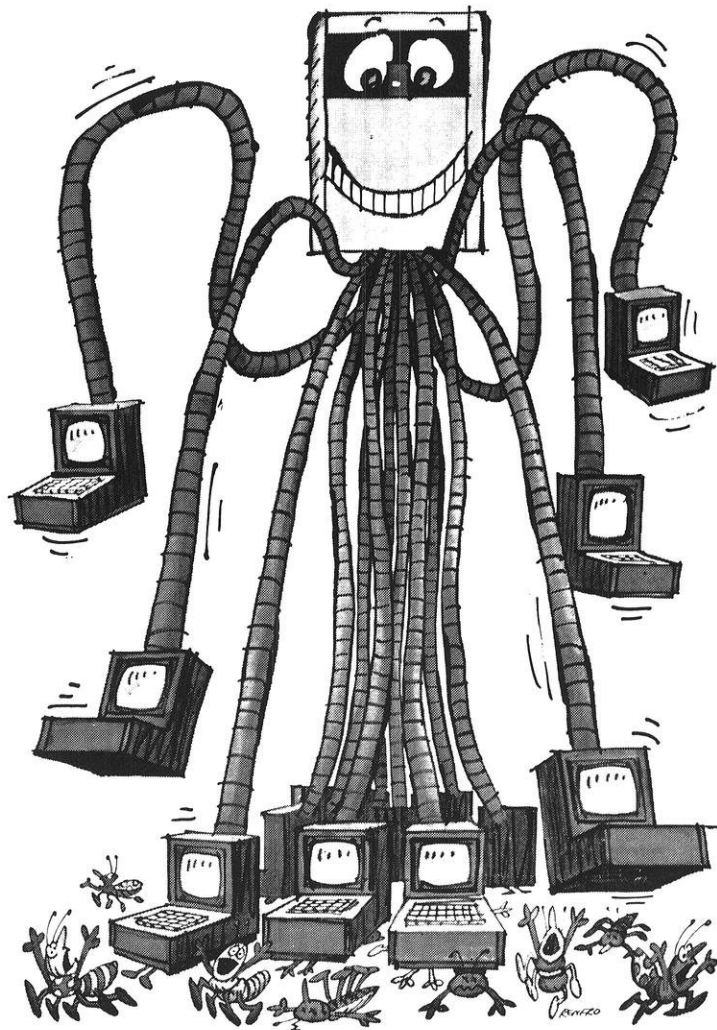
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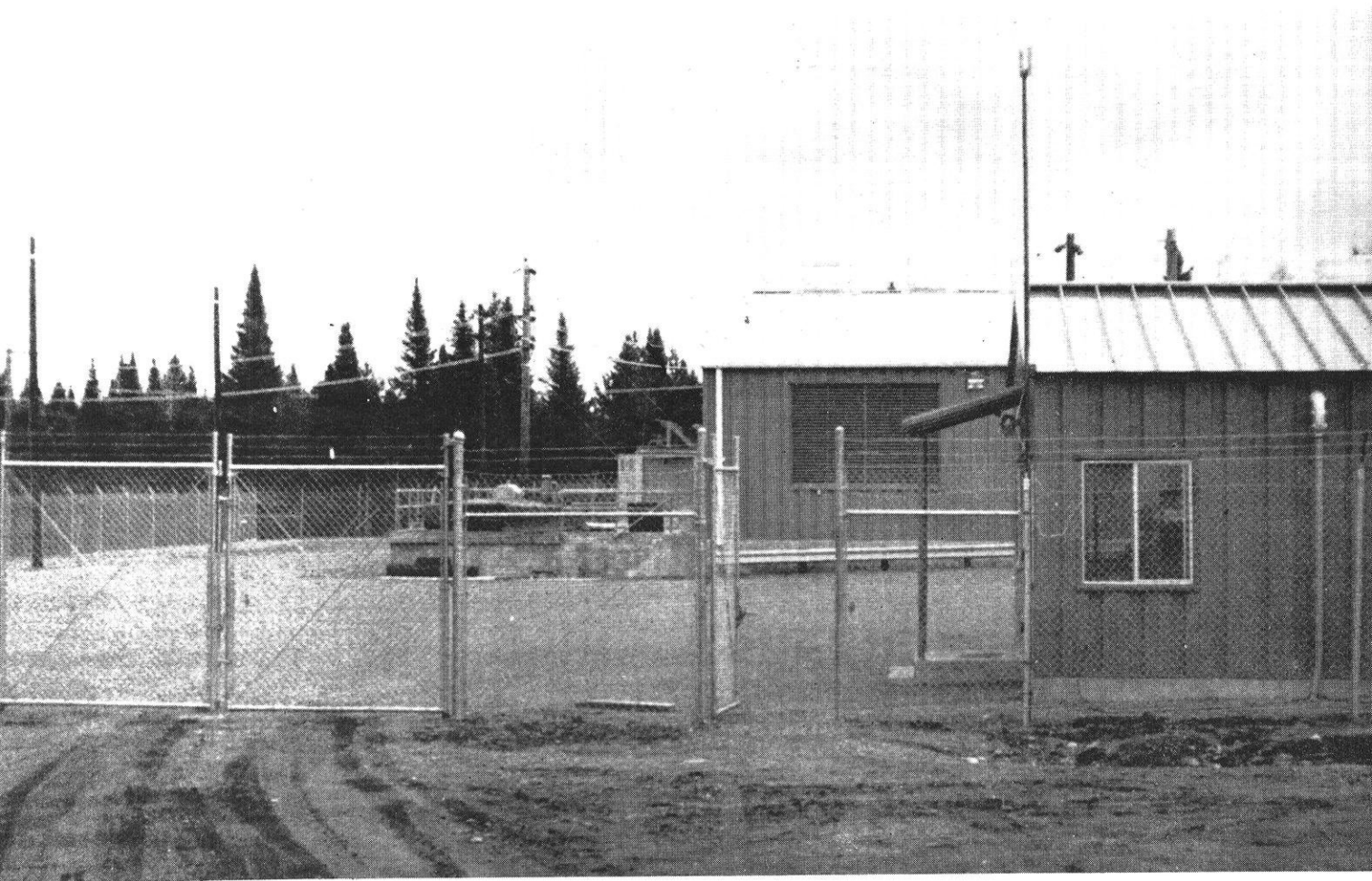
Of course, Octoputer does more than just slay bugs. It's a completely new kind of creature that does time sharing and regular computing together.

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is famous for. It puts Octoputer a generation ahead of its major competitor. It can put you ahead of yours. **RCA** COMPUTERS



PROJECT SANGUINE



This is the test site of Phase I of Project Sanguine. The obscured building behind the open (!) gate houses the test transmitter.

ROY JOHNSON

Once again the State of Wisconsin is being apportioned into two camps. Many of our state legislators have entered the fray and typically, the dispute is becoming clouded. Not that the rhetoric is approaching the oleomargarine debacle, but recent technological and economic developments have confused the numerous, smeared explanations of the problem.

The "problem" is Project Sanguine, an extra low frequency (ELF) communication system which would enable the Navy to send one way non-jamable radio signals around the world. The physics of the system requires a large area for the antenna which, for safety reasons, would be buried six feet underground. The immense subterranean

grid supposedly would be survivable in the event of a nuclear attack, hence it is a deterrent in that the United States could maintain positive communication links to mount a retaliatory strike.

Due to geological circumstances, northern Wisconsin has been chosen as the optimum site for Sanguine. The original antenna would have covered twenty-six counties in six by six mile grids. Due to a recent technological breakthrough announced earlier this month, the underground antenna would now cover only eight counties, principally in the Chequamegon (she-wam'-e-gun) National Forest and the Brule State Forest. The cost estimates of the ELF system are still in the range of \$1.5 billion, give or take a billion.

Sanguine proponents claim that the huge amount of money to be spent would bolster an economically depressed area by creating jobs and increasing revenues, even becoming a tourist attraction! The system would promote peace by enhancing national security and furthermore, the Navy has pledged that the system will not be built unless it is "in a manner entirely compatible with its surroundings."

The phenomena which governs the operation of an ELF system has been in the "surroundings" for eons. It wasn't until World War I though, that any relative evidence was even recorded. German ferrets had attempted to intercept French Army telephone conversations by crawling into no-man's-land and planting electrodes into the ground. The unexplainable noise they encountered resulted in the summoning of theorists familiar with electronics. The scientists attributed the interference to distant electrical storms, with the low frequency noise exhibiting a peculiar reinforcement or resonance at seven Hz (cycles per second). As with many other discoveries of future concern, this low frequency resonance was little more than a laboratory curiosity.

The directions of communication research could hardly warrant any further investigation. Experimentation had proved that higher frequencies propagated shorter wavelengths and that, in order to achieve efficiency, antennas should approximate the wavelength they transmit. Plots of attenuation, the amount of signal power dissipation with distance, were also shown to be frequency dependent. A graph of signal power versus frequency indicated that at values less than 10,000 cycles per second the attenuation increased (signal power dropped). Although lower frequency data was incomplete, it seemed logical to conclude that attenuation increased as frequency decreased.

The attenuation circumstances coupled with the economic prohibitions of large antennas precluded any further inquiries into ELF until the early fifties, when a German scientist, W. O. Schumann, began probing the physics of the atmosphere. Beginning in 1952, his published works concluded that a spherical resonant cavity is formed by the earth and the electrically charged upper atmosphere, the ionosphere. Radio waves traveling at 186,000 miles per second in a 25,000 mile cavity would meet in phase if broadcast at seven cycles per second. Resonance or reinforcement would occur.

Continued investigation of Schumann's findings have determined that in addition to the fundamental resonant frequency of seven Hz, there are harmonics at increments of six or seven. Contrary to an earlier "logical" conclusion, the attenuation curve is not an increasing function below 3000 Hz but instead, begins to approach zero. Below 100 Hz attenuation is almost negligible, allowing the radio signal to penetrate the earth's crust to unheard of depths. A low frequency signal of 100 Hz will reach approximately 400 feet, while the seven cycle per second resonant frequency will burrow about 1500 feet. Besides, a low frequency

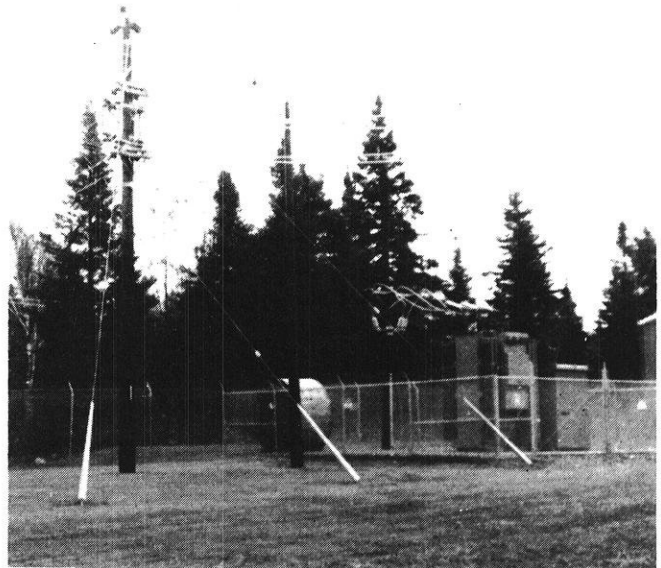
signal, once within the earth's crust, is not subject to the atmospheric disturbances which many times prevent high frequency communications.

Strangely enough, these "discoveries" greatly interested the United States Navy. A digital (Morse code type) system which is not subject to interference, essentially non-jamable, of global dimensions, and able to contact heretofore incommunicado nuclear submarines, places the ELF concept high on their hierarchy. The initial implementing steps were typical, \$27 million were appropriated back in 1958 under a "research and development" package. Civilian corporations, principally RCA and Westinghouse, were then awarded contracts to evolve a viable ELF system.

An interesting combination of antenna theory, geology, and economics led the Navy to choosing Wisconsin as the optimum location. When an antenna is grounded at its ends, as in the case of Sanguine, the electrons "flowing" through the wire try to complete the circuit in a loop through the earth. The amount of electron penetration, and subsequently the signal strength, is dependent upon the ground's conductivity; the lower the conductivity, the deeper the penetration, and the farther the signal will travel.

The principal geological factor controlling ground conductivity is moisture - wetter earth is less penetrable. Northern Wisconsin is situated on the tip of the Laurentian Shield, a two billion year old mass of extremely dry and non-conductive rock. Economics have been important in that this desired location is in the middle of the Chequamegon National Forest, sparsely populated federally owned land controlled by the Department of Agriculture.

About four miles south of Clam Lake, Wisconsin, is where the Navy has secured 450 acres of Chequamegon National Forest. This is the present test site of Phase I of Project Sanguine. The



The pole on the left collects the seven mile legs of the antenna. The small substation on the right belongs to Lake Superior Power Co. It supplies 4160 volts to operate the test facility.

majority of this land is for the thirty foot right of ways along two perpendicular fourteen mile legs of above ground antenna. At the hub is a ten acre test site, consisting of a solid state transmitter and associated buildings. Phase I testing will continue for a minimum of one year.

Part of the \$38 million thus far spent includes the following Phase I "mitigative" studies and test contracts:

1. \$175,000 to Hazleton Laboratories, Inc. of Falls Church, Virginia, to analyze "biological hazards" associated with the high energy levels of Sanguine. The following are some excerpts from their research proposal:

"The antenna will be enormous, and therefore, many people, domestic and farm animals, fish, insects, earthworms, birds, and indigenous plant life will be exposed to its field for very long periods of time, unless they are killed by it, are removed, or in the case of free ranging animals, are driven out by noxious effects."

"The potential hazard from temperature increases associated with antenna elements, after power is on, will similiarly be investigated only to a limited extent using plants."

"It is our opinion that such animals as ground-hogs are not of sufficient economic value to

be of concern. Few other animals would burrow deep enough to put themselves in jeopardy."

(What about the Badger?)

2. \$500,000 to the Radio Corporation of America to study fences and railroads, presumably to assure that no one gets electrocuted.

3. \$500,000 to Bell Labs, for assurance of no interference of telephone service. (The Wisconsin Public Utilities Commission has been promised that Sanguine will improve the State's system.)

4. \$100,000 to the Battelle Institute, part of Ohio State University, to check for advanced corrosion of underground pipe.

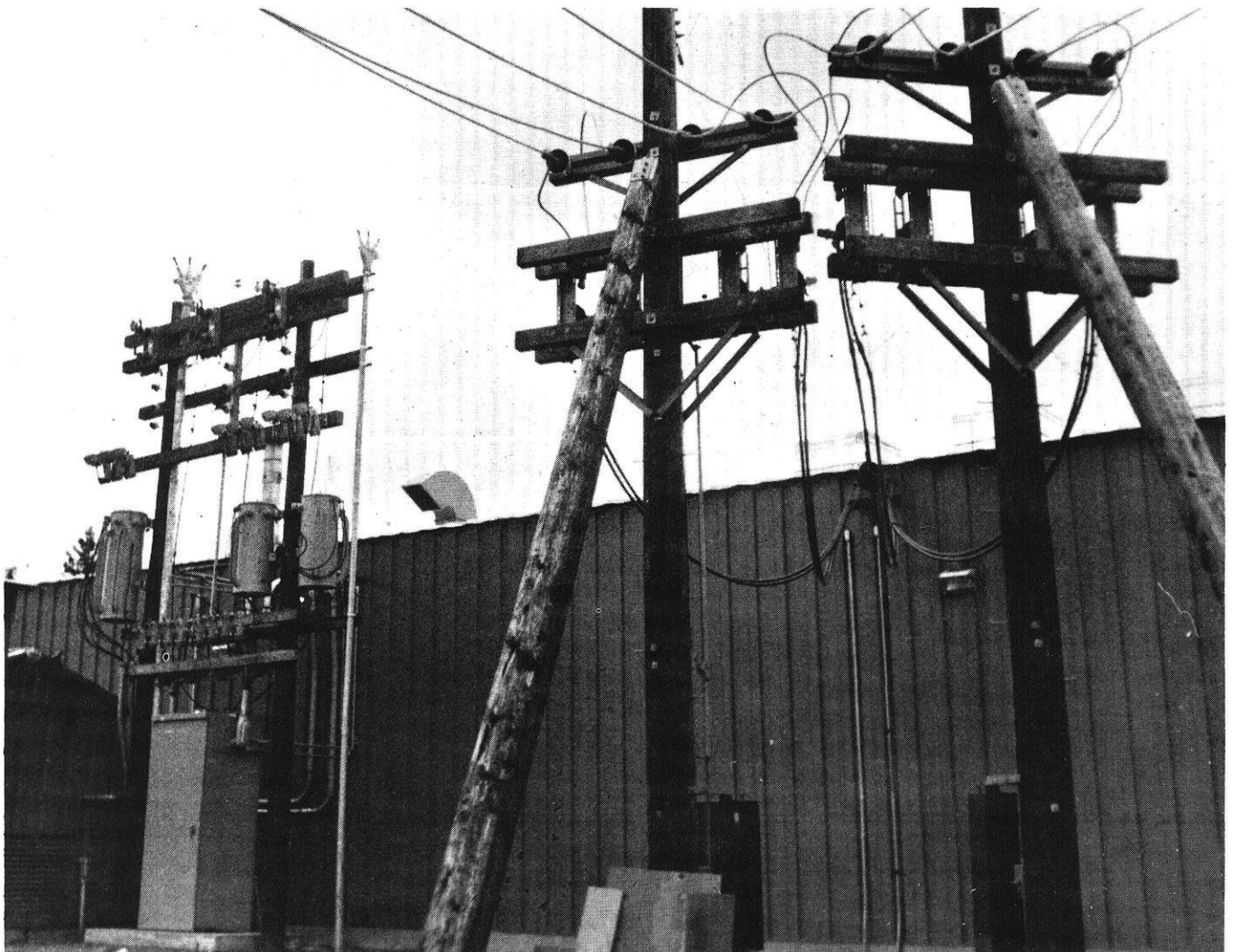
5. \$250,000 to the Great Lakes Shore Electronics Activity, for a mitigation study.

6. \$400,000 to the Illinois Technical Research Institute "to pull together" and check the "mitigation on interference" program.

Airplane navigation equipment will also be subject to mitigation studies by Boeing.

Federally employed project watchdogs include: the President's Science Advisory Council, the National Academy of Sciences, the United States

Power into the transmitter building is on the left, antennas coming out on the right. Two wires go to each of the four legs of the antenna.





Public Health Service, and a governmental advisory council on electromagnetic radiation.

The word from Navy spokesmen is that Phase II, the larger underground grid, is a least four years from completion. Originally, this grid would have been a whopping 150 by 150 miles, covering about forty percent of the state's total land area. It would have consisted of 6000 miles of underground cable, consuming 800,000,000 watts of electrical power (this is about half of what all the households in Wisconsin presently use). However, prior to an additional Congressional request for \$20 million, the Navy has announced a "technological breakthrough" which will allow them to build Sanguine - Phase II in less than one third the area previously required. There has been no elaboration on the new density of the grids, whether they are one, two, or ten miles square; no elaboration on the number of transmitter sites, originally set at 240; no elaboration on the amount of power now required. The only obvious claim is that the cost of Sanguine can now be reduced.

Despite the comprehensive test program, testing of testors, and the motivations surrounding the project, there are objections. They are voiced along three lines: ecology, people, and economy.

The ecological balance of the whole upstate area may very well depend on the results of Hazelton Laboratories. Wisconsin Senator Nelson is not only

This bank represents about 25% of the total number of the huge capacitors necessary to "tune" the antenna.

uncomfortable about the "unconcerned arrogance" of portions of the lab proposal but also that the Navy picked a lab with which it has contracted previously. (Hazelton Laboratories, incidentally, is a wholly owned subsidiary of TRW. TRW has been responsible for a large number of contracts with the Naval Electronic Systems Command ICBM projects.) Navy instructions to the laboratory under the heading of "Responsiveness to Navy Direction" include this paragraph:

"This task is not a grant to research topics in which individuals may be interested or competent. The task is intended to provide answers to questions posed by the U. S. Navy. In the course of the work, initial directions of study may prove fruitless and substantial changes may have to be made in the task. Evidence should be given that individuals assigned will subordinate their own interests and will take directions from Navy project managers who may have little knowledge of biological science."

(Continued on Page 16)

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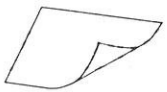
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Each antenna leg courses through the woods along thirty foot right of ways. If Phase II is implemented, the wires will be buried.

(Continued from Page 13)

The nuances of biological science are very much in question. One of the problems will be the relationship between the massive amounts of current flowing in the ground and the earthworm. It is believed that there will be an effect similar to the electric rods used by fishermen. Northland College Professor Kent Shifferd, chairman of the State Committee to Stop Sanguine, elaborates on the consequences of a wormless Wisconsin:

“Any biologist will tell you that the earthworm is a vital link in the production of fertile soil – without him the soil would become compacted, too hard to grow anything. The earthworm does another important thing – he pulls the leaves down that have fallen in the autumn, pulling them down underneath the ground and this helps to add a compost to the ground and keep it fertile.”

The electromagnetic radiation may also affect an organism’s circadian rhythms, those repetitive physiological functions which an organism is prone to do in the course of a day. Dr. F. A. Brown, professor of biology at Northwestern University, has concluded that a living creature is sensitive to electromagnetic waves. An excerpt from a published account dealing with geomagnetism:

“In contemplating the problem of how one might learn whether a living creature actually was sensitive to the earth’s magnetic field, the intimate apparent interrelationship be-

tween the biological ‘compasses’ and ‘clocks’ was recalled.The experiment should be of such a character that the organism could indicate its responsiveness by alterations in its activities either as a function of space or time. The method which was selected included the veering tendencies of organisms from different initial geographic directions as a function of time while continuously maintained in an unchanging pattern of illumination.”....

“Using the foregoing assay system, it was soon discovered that the organisms were highly sensitive to very weak magnetic fields. They could distinguish among compass directions without any obvious cues, and their compass sense could be misled by experimental directional changes in the horizontal magnetic vector.”

It would be difficult to generalize Brown’s conclusions to the various species with any reasonable accuracy. Even noting the consequences of circadian rhythm alteration of snails would be an immense task, considering the size of Brown’s sample – 34,000. Higher specie life patterns may undergo far more subtle changes.

Some not so subtle changes will be the temperature gradients due to the absorption of all the electrical power. Of all the energy put into the system, only a small fraction will become the actual signal wave, the rest will be conducted into the soil and water directly surrounding the antenna. It remains to be seen if these temperature gradients will be severe enough to adversely affect indigenous plant and animal life.

The immense power requirements will be supplied by one, possibly two, nuclear power stations. Although substantially more clean than fossil fuel, nuclear stations require twice the cooling water, contributing doubly to thermal pollution, and are subject to a sticky radioactive waste problem.

The Navy has admitted that the powerful currents running through the buried antennas will induce voltages into any conductors nearby. As an example, a 1,000 feet of wire 100 feet from an underground antenna will carry 52 volts, two miles from the antenna the same wire will carry 22 volts. (An electric cow fence only carries 12 volts.) The Navy proposes an insulation solution to this problem, in which all fences in the grid area are located and programed into a computer, the computer then figures cutoff distances. The job of finding and insulating every fence becomes paramount, should a small child or cardiac patient approach an unmitigated fence on a rainy day, when everything becomes abnormally conductive.

Besides the reality of electrocution, some individuals are queasy at the thought of being in the vicinity of the “doomsday button,” which certainly would be high on the list of our competitors “nuke” hierarchy. Expression of this fear to Defense Secretary Laird yielded this reply from the Assistant Chief of Naval Operations, Rear Admiral Francis J. Fitzpatrick:

“It is impossible to prove that a Sanguine system would not be a prime target. However, one way of discouraging such an attack would be by constructing it to be so survivable that it would prove too costly and ineffective an effort for an enemy to make such an attack.”

Survivability in military jargon is determined by four factors: dispersion, redundancy, hardness, and mobility. Originally Sanguine would have been really dispersed, now the antennas will be somewhat more condensed. If the 240 transmitters are retained and a percentage are “knocked out,” how many are required for minimum global coverage? Does six feet of ground constitute hardness? A buried antenna is hardly mobile.

The economic impact of Sanguine on the State's economy is questionable. Representative Alvin E. O'Konski has said that the system will create 5,000 new jobs. The Navy has said that Phase I of Sanguine has provided employment for 75 people and the operational system would employ perhaps 300. The huge sum of money would only benefit Wisconsin if Wisconsin contractors were awarded the construction contracts (The antennas of Phase I were strung by a firm from St. Paul, Minnesota.) The expensive solid state transmitters would probably be contracted by TRW or RCA, corporations located outside of state boundaries. The idea of Sanguine becoming a tourist attraction is absurd, who would travel miles to look at a buried antenna?

The Navy's primary motivation for Project Sanguine is that it will provide second strike capability by insuring one-way digital communication. Sanguine would be a purely retaliatory effort, providing attack code to our elusive Polaris fleet of 41 nuclear submarines.

In the face of advancing technology, how elusive is a Polaris submarine? Geoffrey Williams, an advisor to Britain's Defense Ministry, claims that American born Morris and Lola Cohen, working in Britain as spies eight years ago, passed intelligence to the Russians which empowers them to track and destroy our missile fleet. After two separate nuclear submarine losses the Navy had difficulty in their location attempts until, it is said, the Russians released the coordinates of their whereabouts. In addition, new American breakthroughs in antisubmarine warfare should not disavow competitive Russian development. When viewed in this manner the Polaris fleet is as invulnerable as the huge antenna.

A difficult to miss antenna, communicating with a susceptible missile fleet and still trying to maintain the defensive posture of second-strike capability is ridiculous. Sanguine can only qualify as an offensive weapon. Should the Russians be as frivolous, geology would allow them to build an ELF system capable of rendering Sanguine ineffectual. The urgent immediacy of improving the environment instead of desecrating it should prompt the use of the huge sum elsewhere.

[***]

FUTURES

Career opportunities unlimited in the Malleable castings industry.

Fatigue Life Analysis. Eutectic Cell Size. Carbon Equivalent Determinations. Those titles represent just a few areas of current investigation by Malleable foundries into methods of improving their product and its method of production. Research has produced literally volumes of new and useful data in recent years . . . so much so that there is a dearth of engineering talent to put this knowledge to work.

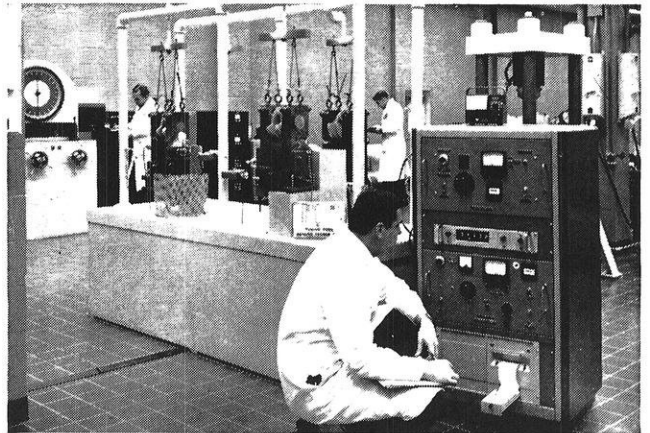
Many important changes are just

around the corner. Computer control of melting cycles will soon be applied on a practical basis. Die casting of iron may be coming out of the theory stage. The pace of new discoveries will be just that much faster in the years ahead.

Take a hard look at a career in the Malleable castings industry. Malleable foundries are of a size where you will have the opportunity to put your top skills to use almost immediately. It's a growing industry,

as witnessed by the \$75 million expansion program now under way. Its future is as bright as that of its major customers — producers of cars, trucks, and other transportation products, farm, construction and other types of machinery.

The image of the foundry laboratory as a cubbyhole is being shattered. Pictured above is one of several new laboratory facilities built by producers of Malleable castings in the last few years.



Professor Newhall is a foremost authority in the field of air pollution from internal combustion engines. Born in San Francisco, Dr. Newhall received his BSME from California at Berkeley with honors. His MS Thesis, also at Berkeley, produced Thermodynamic Charts for Internal Combustion Engine Analysis involving eight fuels with several charts for each fuel. These charts are widely used and are included in standard texts on combustion engines. His Ph. D. Dissertation at Berkeley was devoted to a "Theoretical and Ex-



perimental Investigation of Chemical Reaction of Kinetics During Rapid Expansions of High Temperature Combustion Products."

Professor Newhall has recently received the 1969 Pi Tau Sigma Gold Medal Award for "meritorious service in the interests of his fellow men." The award was presented at the national meeting of the American Society of Mechanical Engineers in Los Angeles, California. Pi Tau Sigma is a national honorary mechanical engineering fraternity.

The Automobile and Air Pollution

Prof. H. K. Newhall

Among the variety of substances found in the exhaust gases of the typical automobile engine, carbon monoxide, hydrocarbons, and nitric oxide are those presently considered to be air pollutants. The toxicity of carbon monoxide to humans is well known, and the response of humans to specific exposure levels of carbon monoxide has been fairly well documented. Thus emission of carbon monoxide from automobiles is clearly and unequivocally an air polluting process.

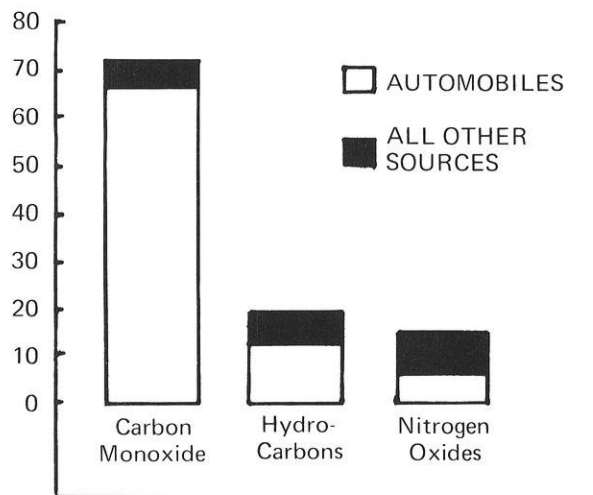
The question of pollution resulting from emission of hydrocarbons and nitric oxide into the atmosphere is more complex. Whether the quantities of hydrocarbons and nitric oxide presently disposed of in the atmosphere are in themselves dangerous to human health or to vegetation is questionable. However, it is now well known that when mixtures of hydrocarbons and nitric oxide as occurring in the atmosphere in a growing number of urban areas are exposed to sun light, photo chemical reaction occurs. Such reaction between hydrocarbons and nitric oxide in the presence of sunlight leads to the formation of so-called "photo chemical smog," which consists primarily of ozone, nitrogen dioxide and peroxyacyl nitrates. These compounds are associated with eye irritation, odor, human respiratory effects and reduction of atmospheric visibility. In addition ozone and the peroxyacyl nitrates have been identified as responsible agents for damage to food and ornamental crops in and near major urban areas of the United States. Ozone and other materials contained in photo chemical smog attack and shorten the effective life of many materials including rubber, textiles and dyes.

It is beyond the scope of this article to describe in detail the present extent of physiological and

economic effects of the various pollutants. However, proceeding on the basis that the present rates of emission of carbon monoxide, oxides of nitrogen and hydrocarbons into the atmosphere are objectionable, it is of interest to determine the contribution of the automobile to these emission rates. Figure One presents emission rate data published by the Department of Health, Education, and Welfare. These data include the total number of tons of each of the above pollutants entering the atmosphere in the United States during the calendar year 1966. Also included are the quantities emitted specifically by automobiles. According to this data, automobiles contributed 91 percent of all carbon monoxide, 60 percent of all hydrocarbons and 46 percent of the nitrogen oxides. While these percentages represent a national average and specific local values may differ from one geographical area to another, there is no question that the automobile is a major source of air pollution and perhaps the largest single contributor to the problem.

The formation and emission of air pollutants by automobiles is basic to the nature of the gasoline internal combustion engine. During the course of events constituting the cycle of operation of the engine, air mixed with a definite proportion of hydrocarbon fuel is drawn into the engine cylinder and subsequently compressed. The resulting flammable mixture is ignited and burns rapidly, forming high pressure combustion products. However, very near the relatively cool surfaces of the combustion chamber in which the process occurs, the flame is quenched and as a consequence, a thin layer of fuel vapor adjacent to the surface fails to burn. During the following expansion of combustion gases this layer of fuel vapor leaves the combustion chamber surfaces and is exhausted to

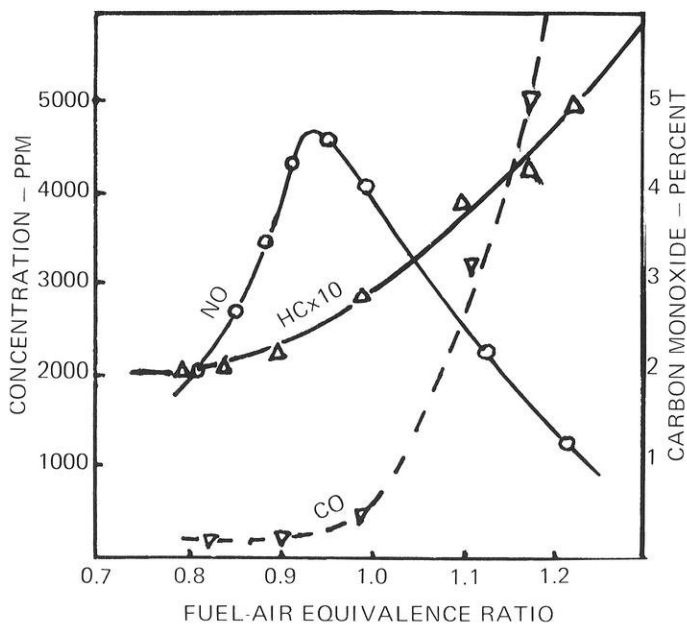
**FIGURE ONE – AIR POLLUTANTS
MILLION TONS/YEAR 1966**



the atmosphere along with the bulk of burned products. This is the basic source of hydrocarbon emissions from the engine.

By contrast, nitric oxide and carbon monoxide are formed in the more or less homogeneous bulk combustion gases rather than in a definite layer or isolated physical region. The mechanisms of generation of nitric oxide and carbon monoxide are basically chemical in nature and are quite different from the hydrocarbon emission process.

Standards for automotive exhaust emissions were originally put into law by the State of California in 1966. These standards which were adopted and enforced nationwide by the U. S. Government in 1968, set maximum acceptable levels for carbon monoxide, hydrocarbons and nitric oxide. Measurements upon which the standards are based are made with an automobile driven over a prescribed and carefully controlled driving cycle executed through use of a chassis



dynamometer. The present exhaust emission standards are 275 parts per million by volume hydrocarbons, 1.5 percent carbon monoxide and 350 parts per million nitric oxides as determined over the driving cycle. However, the nitric oxide standard has not as yet been enforced because the feasibility of control of nitric oxide has not been demonstrated.

For a typical well tuned automobile, but not equipped with air pollution control equipment, execution of a representative driving cycle will yield average pollutant concentrations in the exhaust gases of 900 parts per million by volume hydrocarbons, 3.5 percent carbon monoxide and 1500 parts per million nitric oxide. Probably the most important single engine operating variable influencing air pollutant emissions is the proportion of fuel supplied to the air entering the engine. Practical engine operation is restricted to a fairly narrow range of fuel-air ratios, within which there is considerable variation of pollutant levels.

The basic problem of engine emissions control can be pinpointed in terms of air-fuel ratio by Figure 2 which graphically displays the variation of each of the three important pollutants with varying fuel-air proportions. Fuel-air ratios are plotted in normalized form as fuel-air equivalence ratio. Increasing values of this parameter correspond to increasing proportions of fuel. Clearly if one were concerned with controlling only hydrocarbons and carbon monoxide, operation of the engine with equivalence ratios less than unity would be indicated. This approach is presently being employed by several automobile manufactures to meet Federal standards for hydrocarbon and carbon monoxide emissions. However, Figure Two reveals that under these conditions, nitric oxide levels are maximized. Thus the relatively simple problem of controlling hydrocarbon and carbon monoxide emissions is severely complicated by the established need for control of nitric oxide.

It has been recognized that as the annual rate of automobile production increases, the current standards will not be sufficient to control atmospheric pollution levels. For this reason the Federal Government has established a time table for progressively lower pollutant emission levels.

It is probable that current control techniques can be refined to meet standards projected for the next two to four years for hydrocarbons and carbon monoxide. However, achievement of further reductions in pollution levels will probably require a major change in approach. Several experimental systems have demonstrated feasibility for control of emissions to very low levels. One utilizes a large insulated exhaust manifold reactor into which air is injected for the purpose of completely oxidizing hydrocarbons and carbon monoxide remaining in the exhaust gases. Another system uses a combination of catalytic devices to process exhaust gases. At present neither system has demonstrated sufficient long term reliability to be seriously considered for production.

To summarize, it may be informative to quote a number of conclusions of the Department of

Commerce Panel on Electrical Powered Vehicles.*

I. The Relation of Automotive Emission's Air Pollution Problem

1. Air pollution presents a serious threat of increasing significance to the health and welfare of this country and all industrialized areas of the world. Without prompt and effective action to control this contamination of the atmosphere, living conditions within and around the cities of the Nation will continue to deteriorate. Automotive vehicle emissions, namely carbon monoxide, hydrocarbons, oxides of nitrogen, and lead compounds, are a principal contributor to this problem.
2. Emissions from automotive vehicles are largely responsible for the formation of photochemical smog in Los Angeles and some other areas, and vehicles are the principal source of carbon monoxide in the atmosphere. In addition to these known, specific effects, vehicle emissions combine with emissions from other sources, in ways and to an extent unknown, to contribute to general air pollution.
3. While there is evidence establishing ill effects from aggregate air pollution, there is an urgent need for more extensive information regarding the significance of specific and combined air pollutants on public health.
4. Population increase and urbanization trends require an overall national strategy for the control of all forms of air pollution and the early and effective implementation of emission standards to meet air quality goals. Local, state, and Federal agencies responsible for urban transportation systems given inadequate consideration to pollution implications in the development of transportation systems.
5. The magnitude of expected future need for urban-suburban personal transportation requires the early development of virtually non-polluting transportation systems. The use of mass transportation systems can be a factor in the reduction of air pollution.

II. Technology and the Control of Air Pollution

1. On the basis of current technology, it will be commercially feasible during the next decade to reduce exhaust emissions from new gasoline internal combustion engines to values at least as low as:

Hydrocarbons – 50 parts
per million (900 ppm)**
Carbon monoxide – .5% (3.5%)
Oxides of nitrogen – 250 parts
per million (1500 ppm)

*“The Automobile and Air Pollution, A Program for Progress.” Report of the Panel on Electrical Powered Vehicles, U. S. Department of Commerce, October 1967.

**Estimated levels for uncontrolled vehicles.

2. During the next decade, in the normal course of events, no significant reduction in total air pollution will be achieved through the introduction of unconventional low-polluting vehicles into the current population of approximately 90 million vehicles.
 - (a) The state of technology does not permit the current development of an economically feasible electric car except for special-purpose, limited-range use.
 - (b) Current research activities indicate that significant technical advances may be expected in the development of improved electric energy storage and conversion devices. The time anticipated for the development and commercialization of such devices will not allow their use in a significant number of vehicles in the next decade. Any acceleration of this technology to make earlier commercialization possible will be in controlling urban air pollution.
 - (c) Gas turbines are reasonable alternatives to internal combustion engines in the large sizes used in trucks, trains, and buses, but are not now economically feasible in the smaller units required for automobiles. Gas turbines produce low hydrocarbon and carbon monoxide emissions, and can be designed to yield low nitrogen oxide emissions.
 - (d) Hybrid power plants involving combinations of high energy devices and high power devices could have satisfactory performance, but their economic feasibility for private passenger automobiles has not been established.
3. Vehicles using external combustion engines for propulsion, such as the piston-type steam engine of advanced design, potentially offer a satisfactory alternative to the present automobile and should have very low pollution and noise characteristics.
4. Diesel engines in trucks and buses emit highly undesirable smoke and odor, in addition to other pollutants. Smoke can be controlled now with proper maintenance and operation and the odor problem can probably be solved with adequate research.
5. Adequate energy sources are available at least for the remainder of this century to meet the vehicle transportation requirements of the country regardless of the type of power plant that may be used.
6. Over the next years, the introduction and widespread use of any currently proposed propulsion systems will not be restricted by the supply of materials, with the possible exception of those which require large amounts of cadmium, platinum group metals, or silver. [***]



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TO DO THEIR DUTY

JERRY GOTTSACKER

Webster's defines "complex" as: "a group of obviously related units of which the degree and nature of the relationship is imperfectly known." Although the last half of the definition is progressively becoming more untrue, it adequately characterizes the profit-monster called the military-industrial complex. Eisenhower, in his 1961 farewell address, warned the nation to guard against the "aquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex." Again, Eisenhower's definition needs some opinionated qualification: Unwarranted in-

fluence is hardly happenstance or "unsought," it is rather actively pursued under the guise of patriotic duty. In any case, the military-industrial complex is in dire need of extra-Webster definition, especially to those who, with diploma in hand, may become part of the economist's nightmare of military wants and industrial supply.

If the Army is the most undemocratic of democratic institutions, then the military-industrial complex is the most uncapitalistic of capitalistic institutions. In the American economic market, where competition is the hallmark of free trade,

SANDERS - THE MILWAUKEE JOURNAL



one would suppose anything which inhibits free trade and competition to be not only anti-capitalist but unAmerican. Officially, monopoly is a federal crime – except in certain cases – and its illegality is founded in the belief that monopoly subverts the principles of capitalism by inhibiting competition. (Contemporary would-be monopolies, for the most part, are unfettered by the unenforced, unenforceable, and devious letter of the law.) Anti-trust, price-fixing, and tariff laws are all particulars of preserving the sacredness and holiness of the principles of capitalism. But to suggest that the military is unAmerican is scabrous, for unAmericanism and the military are queer bedfellows indeed. For a profitable understanding of the unAmerican military which composes half of the military-industrial complex, one must understand the methods of military procurement.

Methods of military procurement are hardly competitive. Contract bids, if submitted, are used as criteria in contract awarding in every way but one: Low monetary bid. Contracts are usually awarded on the basis of several factors including technological ability to accomplish the contract requirements, previous contracts, performance on previous contracts, and friends in the industry. Since most big military contracts are associated with development (as opposed to mere construction where, as in the building industry, cost of component materials is known before construction) cost is more or less an arbitrary whim of estimate. Cost over-runs are commonplace and since profit is a percentage—ten percent standard—of total cost, little effort is made to keep costs down. Subcontracts, dealt out by the prime contractor, also carry profit clauses which allow a profit return to the prime contractor. So, not only is the prime contractor profiting from its own contract, but it also derives profit from the layers of subcontracts beneath the prime contract. Such

profit grabbing often reaches astounding proportions. As Joseph Goulden and Marshall Singer relate in the November 1969 *Ramparts*:

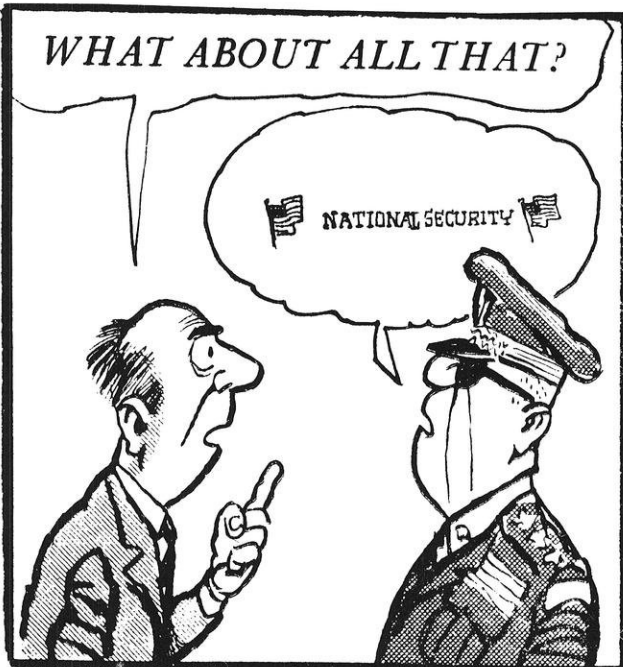
On one contract for 1032 additional launchers, Consolidated manufactured the launchers at a price of \$13.5 million (including profit) and delivered them directly to the Army. Douglas made plastic rains covers for the launchers at a cost of \$3 each, for a total of \$3361. Douglas then took a profit on that amount plus the Consolidated price, a profit of \$1.2 million on \$3361 worth of work. The percentage: 36,531 percent. Western Electric, which gave each missile a quick \$14 inspection at the base, proceeded to pyramid its return on top of Douglas's. Western did not do quite as well, coming out with a mere 6684 percent return on its effort.

Technically, then, it is entirely possible (provided one has the "connections" necessary to obtain military contract) to form a dummy corporation and collect untold millions in profits on work dealt out in subcontracts. Inefficient? Maybe, but nary a military contractor will admit to it.

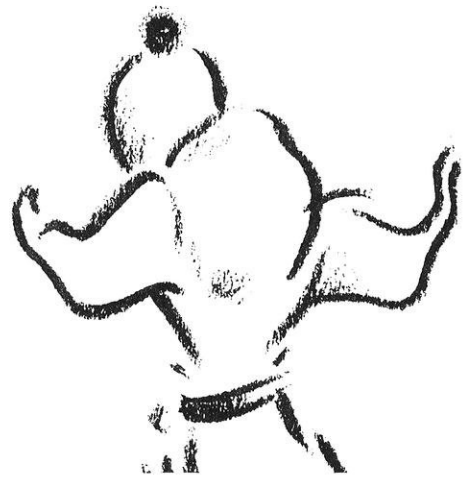
Patent monopolies are awarded to companies for all patentable work done under government contract. Profit on those patents return in two ways: 1) Patents acquired under research financed by taxpayers are handed over to private industry for their economic padding, and 2) guaranteed return of contracts for items to which a given company holds the patent. Facilitating the continuation of the military-industrial relationship and its money are the influence specialists of both the military and industry.

Both factors of the military-industrial complex maintain intricate lobbying forces. The Air Force Association, the Association of the U. S. Army, and the Navy League all represent the interests, especially power-wise, of their respective forces. The American Ordnance Association, the Aerospace Industries Association, and the National Security Association, to mention a few, represent

(Continued on Page 43)



CAVU*



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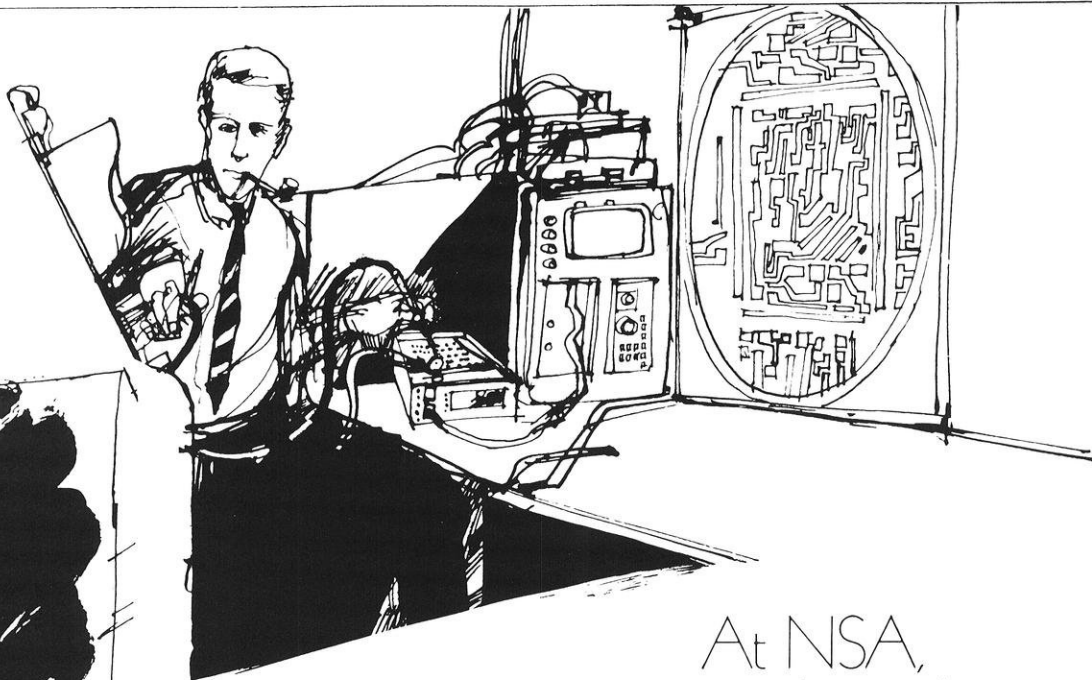
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**national
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agency**

“vanity is the better half of valor...”

HENRY GORDON

here's the plan, i quote:

I) start over from the beginning making certain that you skip every third letter.¹ Steve had been through all this before. You work real hard and then the last step says “write your name at the top and do none of the other questions.” So he didn't even bother getting out of bed. How could he? You see Steve is paralyzed from the neck down. Not really, but he likes to pretend as if he were.²

II) wouldn't it be neat to see someone smashed between two cars? Steve had one of those vivid imaginations. Last week he wanted to go to Spain or someplace over there across the ocean. It was Spain, yes, because he wanted to see where William Blake was born.

*“I will not cease from mental anguish
Nor will my sword rest in my hand
Till we have built Jerusalem
In Englands green and pleasant land.”*

That is his favorite quote.

III) Count the syllables in onomatopoeia, divide by two and forget the answer. Steve weaved in an obstacle course jaunt toward the maitre d'hotel of the Swiss blood bank.³ “Here”, he offered as Steve was given to generosity on “take all you want.” He was no neophyte at blood giving. The copious neatly crocheted red marks in his arm gave testimony to that. “No, I think you need all the blood you can get.” Undaunted,

IV) Yes, I feel maxi coats and mini skirts are running parallel with the pace. But people should look beyond fashions to the people themselves.⁴

Dearest Steve,

Contrary to any opinion, you are on my mailing

list. The boring talk re: school is pure unadulterated CRAP. Hard it could be – you are there to prepare yourself for the growing up state – work now and GROW UP.⁵ Maybe someone might think you smell, too. Don't look for the hostile ones – everyone isn't hostile. Prices have always been out of line. Food prices here too are high and getting higher. Where the hell its going to land I don't know. I watch for sales for food stuffs and to heck with any clothes shopping, I wear what I have.⁶

You know every now and then I get a low feeling and when I do – the first thing I do is look in the mirror – it is time I get a new hairdo and then I perk up.⁷ If all the guys around you are hostile get yourself a look in the mirror – change your appearance don't be afraid of looking like a square!!! . . . hell I know quite a few of them and they are OK Joes.⁸ A hair shaping would give you a lift . . . and plug like hell with your school work . . . Please for Heaven Sake⁹ don't be a quitter. Where are your guts? I'll always love you . . . only I don't want to love a SHEEP. Don't follow blindly¹⁰ . . . you have all the opportunities in the world . . . all that is worth having can be attained . . . don't duff . . . you will be young for a short time¹¹ . . . the learning is easier at your age . . . don't do anything without thinking . . .¹²
love gram.

V) Next cut a three inch lateral incision into Jay Lovestones cranium, let the milk cool, add the mixture and your pudding is ready. “What's for dinner Kurt?” Chocolate pudding. Nothing Kurt likes more than chocolate pudding. “Yep” he always says, “chocolate pudding sure wins the daily double.” “Who's on second?”¹³

VI) Write your name at the top of the page and skip the other questions.

FOOTNOTES

1.) this is a pasttime established during the days of the Latvian occupation of the southwestern Estonian village of Pesanacha. Many false allegations blaming the right wing aldermanic candidate of the heinous act of first suggesting this pasttime to the peasants to alleviate their sorrows. The astute student will readily recognize this as false and slanderous. This is rarely practiced today except by the most occult groups in western and southern France.

2.) sometimes allied with the female mania – penis envy.
3.) a testimony to the statement – all that glitters is not gold.

4.) love peace be happy smile on your brother all power to the people.

5.) sic temperus tyrannus

6.) *SALE* regularly three dollars, but since you are a student – four fifty.

7.) And this above all, to thine own self be true and it shall follow as the night day that thou canst be false to any man.

8.) qua sine non

9.) Frank Heaven – 13th century ecclesiastic and mystic poet.

10.) it is at this point that rhetoric begins to obscure the logic.

11.) mignonne, allons voir si la rose qui ce matin avait declose sa robe de poupre an soleil . . .

12.) lest i say more. Furthermore it is said that Unonuno never wore a raincoat even in the springtime.

13.) This marriage of the minds of Kurt and Steve is perhaps the greatest merger of wealth of any sort since the renowned Stuart Tudor marriage of antiquity. Mallarme in his immortal thirteen volume edition reported that his wife was indecisive.



Tomorrow, Paul Barr may even get to his desk

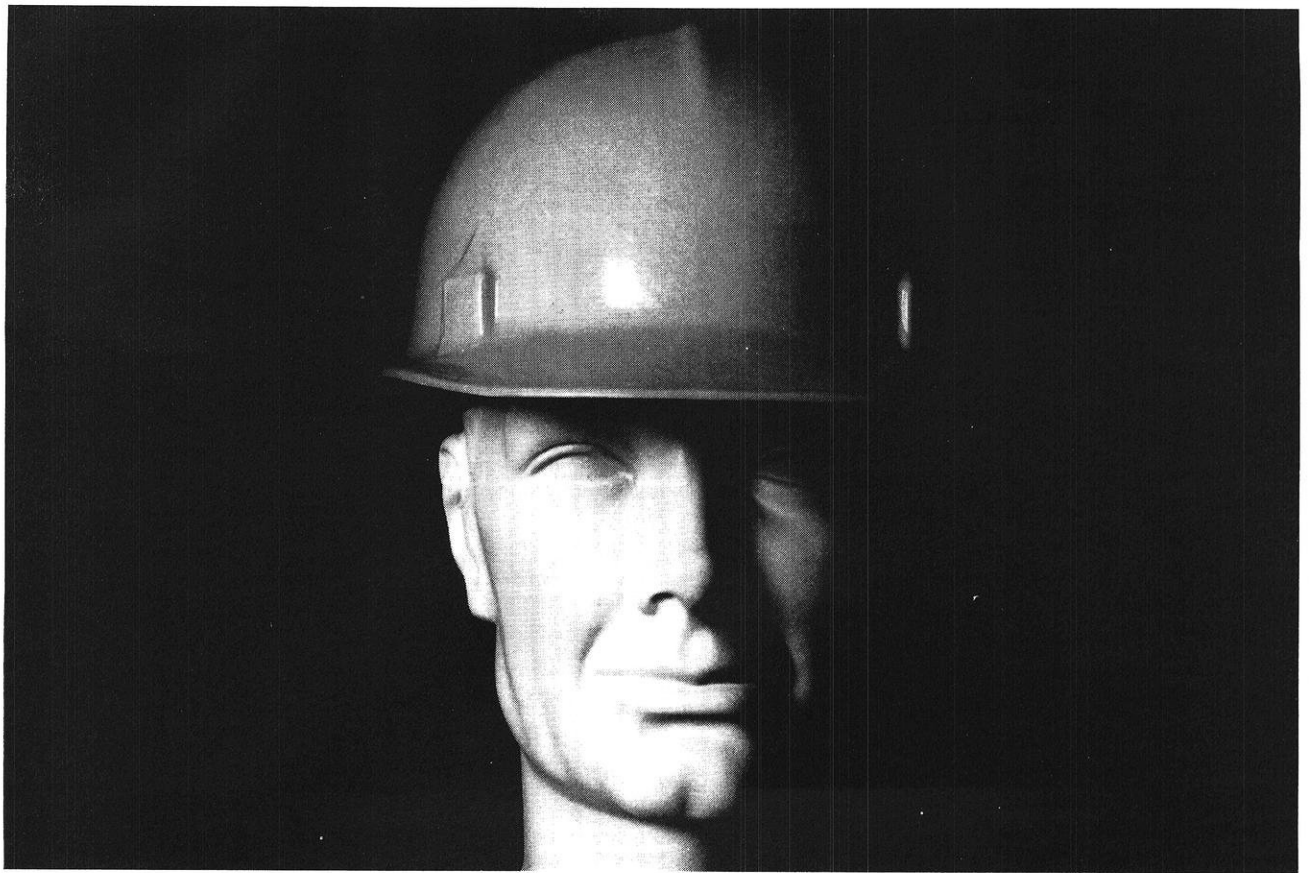
Paul Barr is a hard man to catch. He may be at the bench sweating over a prototype circuit . . . or have his head under a car lift surveying the built-in problem. He's got lab people hopping and test drivers in and out of spins. A couple of friction experts shake their heads when they see him coming. But wherever development engineering leads on a sophisticated new braking system, Paul Barr's on his way. And no two Mondays ever start alike. The question is . . . can you say the same? Take a good look at how your career shapes up, compared with Paul's and his colleagues' at Delco. You might even call us collect. Area Code 317/459-2808. Or, write: Mr. C. D. Longshore, Supervisor, Salaried Employment, Dept. 400, Delco Radio Division of General Motors, Kokomo, Indiana.

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CONSTRUCTING THE CONTEMPORARY CLASSIC

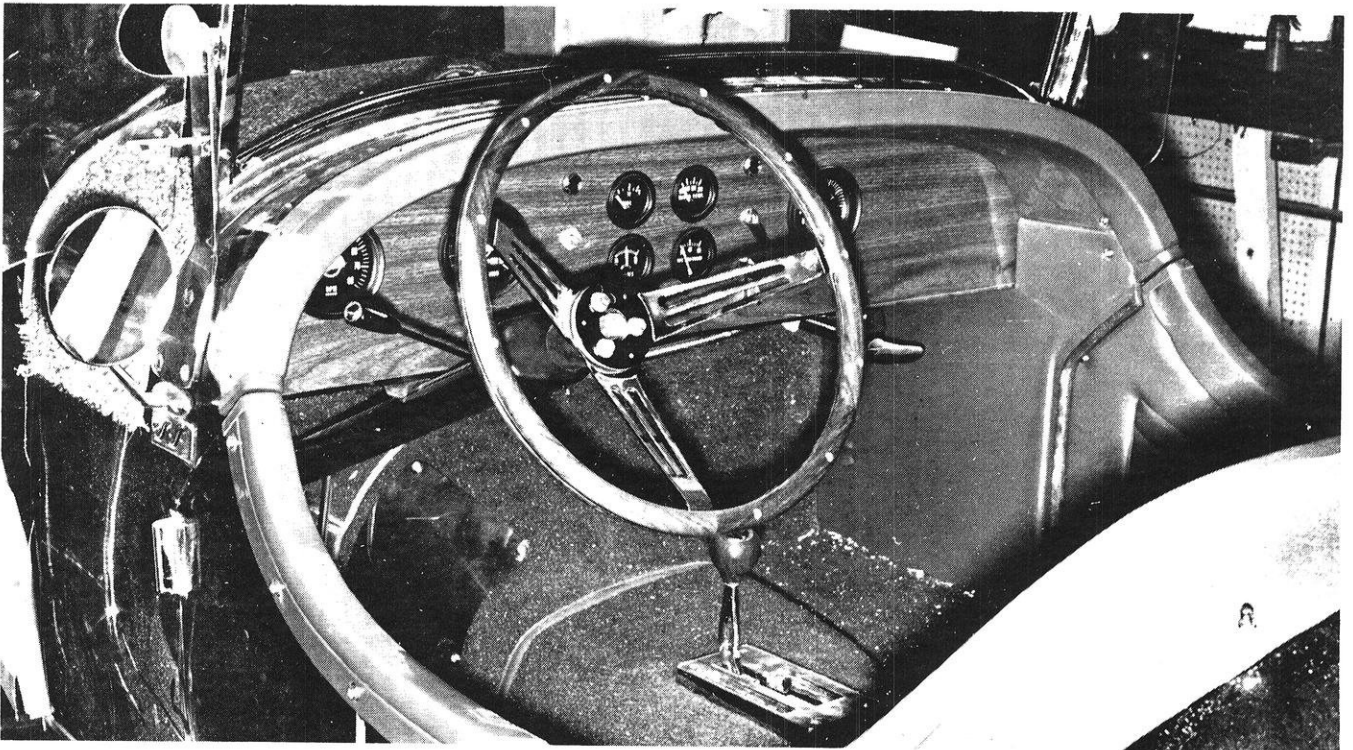
Nestled along a quiet industrial lane, a short distance from a busy highway in bustling Milwaukee, Wisconsin, is the United States' eighth largest automobile manufacturer, S. S. Automobiles Inc. Excalibur, the "Contemporary Classic," is produced here.

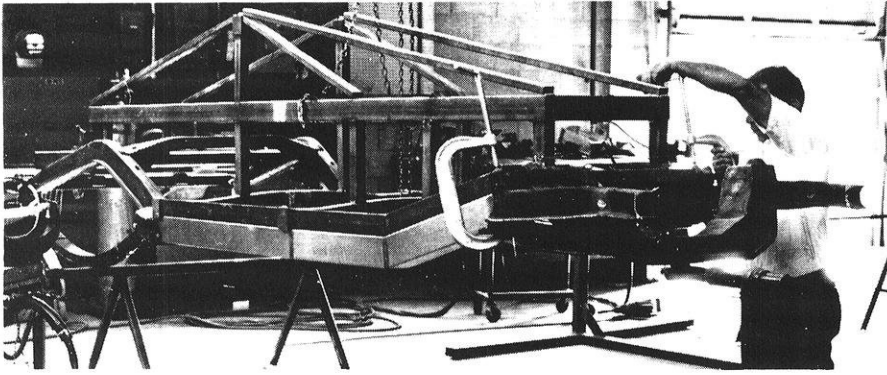
Excalibur is "classic" in that its inspiration is the famous 1927-1930 Mercedes Benz SSK doorless roadster. In view of the fact that Mercedes built only twenty-six of these handcrafted marvels, each carefully constructed for a discriminating

sportsman, the Excalibur is representative of an average design approach retaining the outstanding features of the original. The massive radiator, elongated hood, enormous stainless steel exhaust headers and doorless drop sides have all been re-contoured and proportioned. The wire wheels, tubular bumpers, and shower top with zip-on curtains all rakishly emulate Excalibur's heritage.

The safety and dependability of the modern standard components very much contribute to the "contemporary" image the car

After the engine and transmission are installed, the final accoutrements are added. Complete carpeting, leather upholstery and bucket seats, three spoked wood wheel, and a walnut dash with a surplus of round black gages all contribute to the car's authenticity.



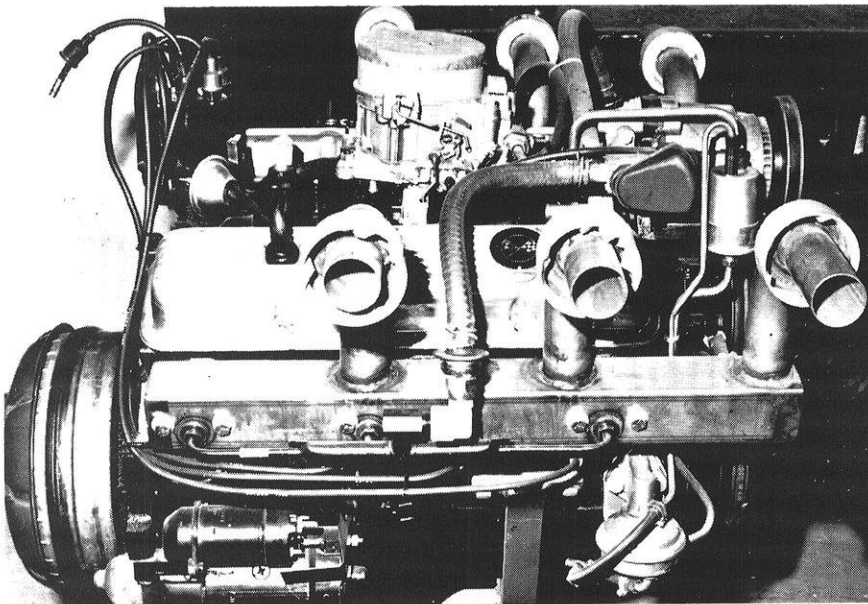


Perfect alignment of the alterations on the 109 inch Studebaker chassis is assured by a frame jig and extreme care in the welding of the new side rails.

The stainless steel firewall is convenient to secure some of the essential electrical elements. Reliability is assured by individual attention to wiring execution.



The tricky problem of attaining the graceful curve of three exposed stainless steel exhaust pipes and meeting government emission requirements is solved by the unique collector box, bolted in place of the Chevy headers which normally bend down alongside the engine. The torque converter on the left indicates that this engine will be mated with the \$200 optional automatic transmission.



exudes. A Chevrolet Corvette 327 cubic inch engine coupled to a close ratio four speed transmission, turning a limited slip differential, give a "modest" acceleration of zero to sixty miles per hour in under five seconds and a top speed of about 160. Should the 300 horsepower 327 prove too docile, an optional Paxton Supercharger may be fitted which boosts output to 450 ponies.

Attempting to keep all that muscle on the road is the job of the Studebaker Daytona chassis. Needless to say, the frame is highly modified, not so much for strength, but to adapt the various components. The major alteration of the narrow Daytona chassis is a 28½ inch engine mount relocation and removal of the torsional X member, allowing room for the transmission. Moving the engine back not only improves the weight distribution, but puts the custom buckets just about in the rear seat position of the standard Studebaker. Subsequent dash positioning permits the long hood and deep cowl, also exposing the forward chassis components and A frame suspension members by judicious placement of the radiator shell. The unshrouded functional front end elements are "cleaned up," or filled and ground, contributing to the mechanical look of the real SSK.

The bodies of a few early Excalibur prototypes were hand-formed from aluminum sheet and mounted on steel tubing. Since serious production has begun however, the only remaining aluminum component is the extensively louvered lengthy hood bonnet, all other body parts are made of fiberglass in a "chopper gun" production process. Fiberglass resin and particles are sprayed into a mould and chemically harden, giving excellent corrosion and impact resistance and sufficient rigidity for the finished part.

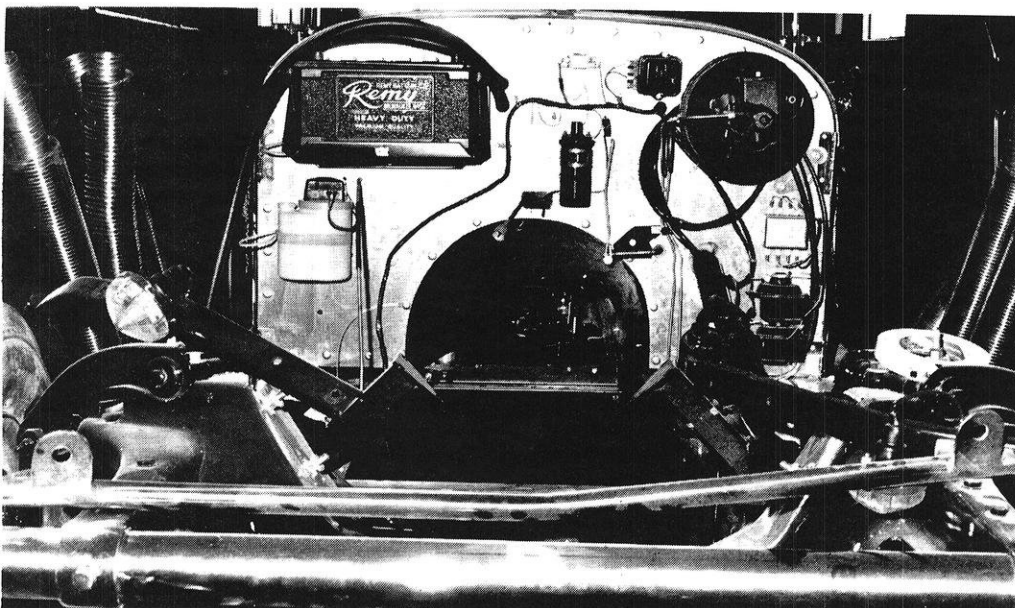
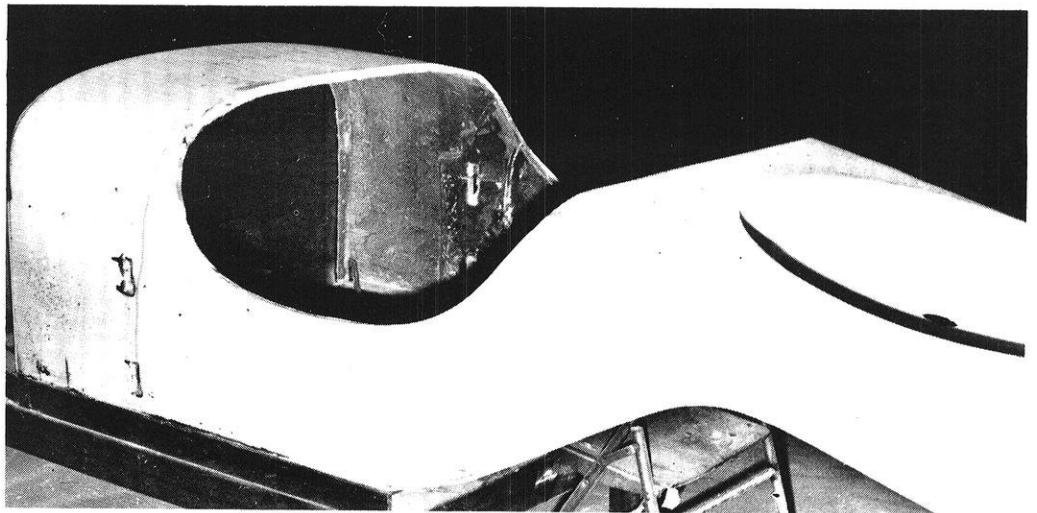
The various body parts are painted, wired, and upholstered, and then are mated to the finished frame and preassembled engine. The apparent imprudence for chassis strength and torsional

(Continued on Page 34)



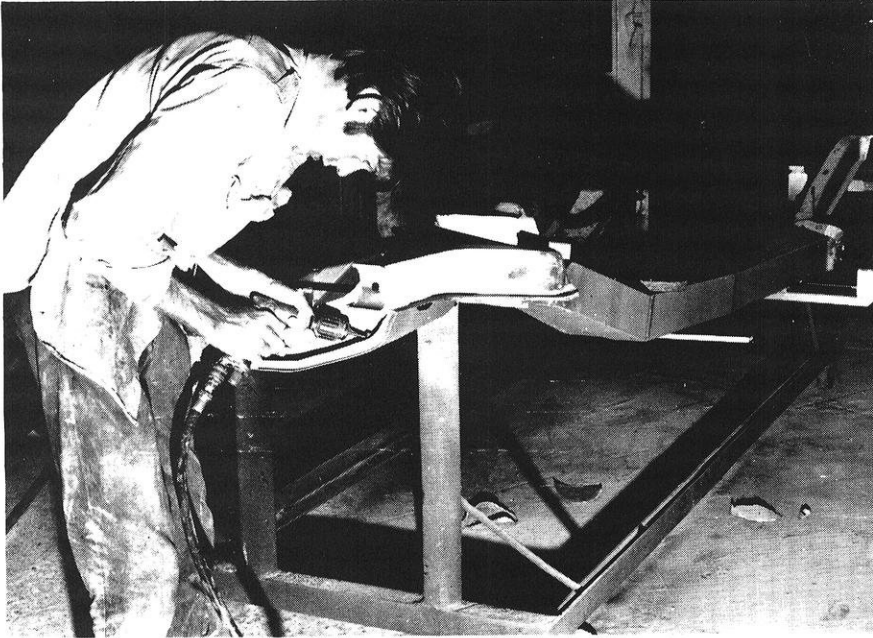
After the trip to the spray booth, the axles, body, and chassis of this future Phaeton were assembled and then placed atop the short assembly line.

The unadorned body, recently removed from its mould, is about to be altered by the addition of the optional doors. The large recess on the rear deck resolves the "turtle mounted spare" conundrum.



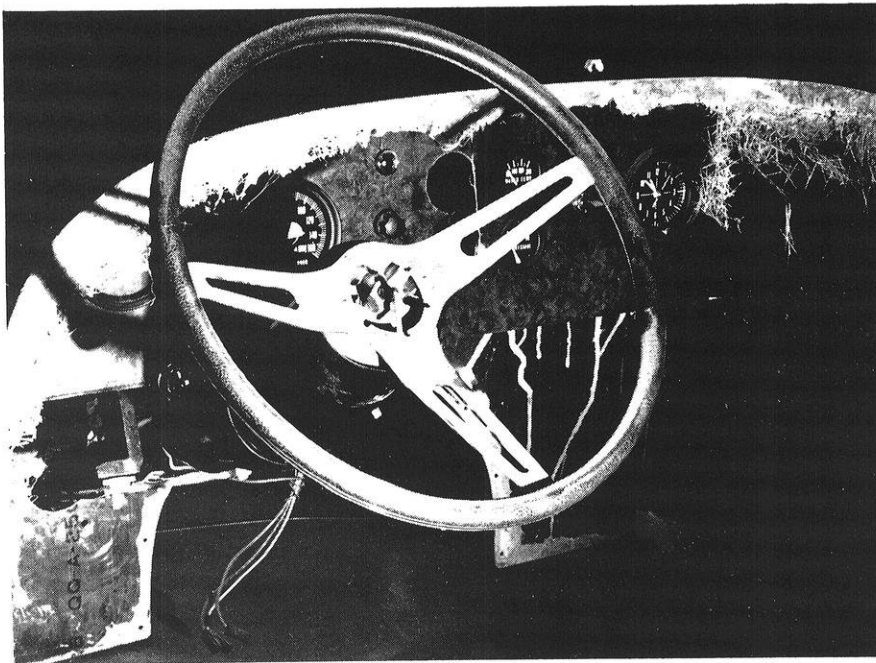
The completion of the car hinges upon the installation of the engine. Once this is accomplished the radiator and its massive chrome shell, fenders, exhaust pipes, lowered hood, and running lights are all located to form the amalgamated whole.

(Continued from Page 32)



The imperfections in the exposed front frame cross member are filled with a plastic body mender and then ground smooth. The frame is then separately painted the same color as body.

The straw-like particles along the periphery of the mounted wooden dash are remnants of the fiberglass material used in the "chopper gun" production process of the body components.

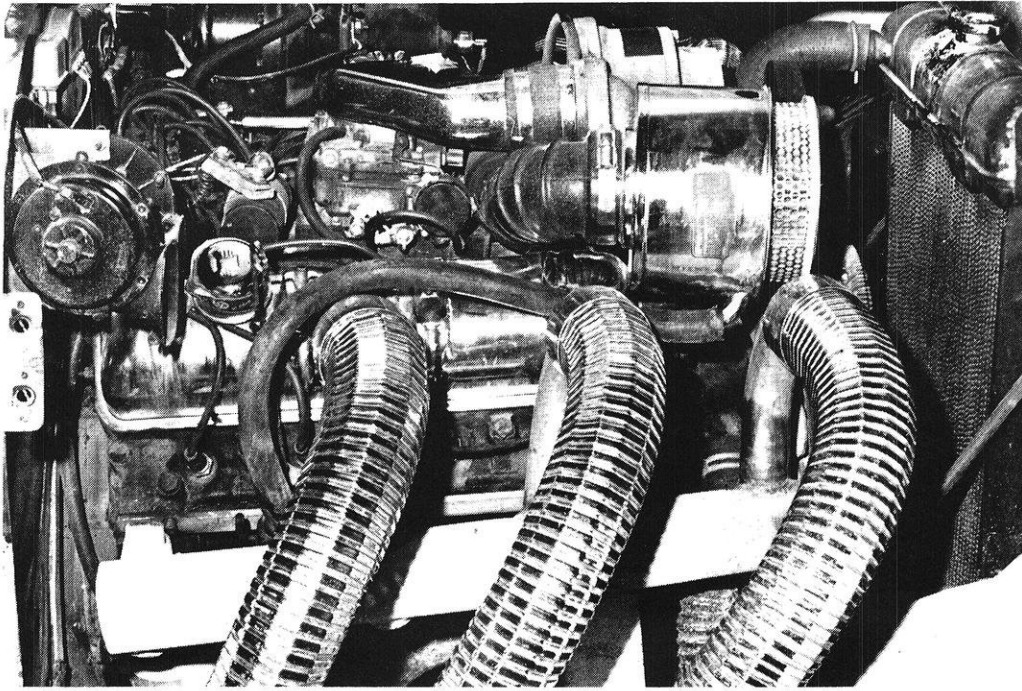


rigidity is absolved by the lack of reacting mass, the completed Excalibur weighs a mere 2500 pounds. Due to increased driver mayhem, competing American automobile manufacturers have set a "muscle" car limit of no less than ten pounds per horsepower. A "modest" 300 horsepower Excalibur with a 200 pound driver is approximately nine pounds per horsepower, while the supercharged 450 is a fire breathin' six pounds per horsepower!

The problem of keeping the dragin' on the highway is partially alleviated by altering front wheel caster and camber and by lessening the spring rates of both the independent front suspension and the Hotchkiss rear drive. Stopping the beast is the duty of a pair of 11½ inch front discs mated with a pair of 10 inch rear drums, which are hydraulically coupled to a vacuum assisted master brake cylinder. The superior handling, excellent snubbers, and nearly instantaneous throttle response will keep the commuter competitive in any driving handicap encountered.

Place your order, there are three Excalibur models available; the SSK with its bicycle fender legacy, the SS Roadster with its front fenders smoothly flowing into functional running boards, and the SS Phaeton, a four place beauty for family touring. All Excaliburs are meticulously handcrafted from approximately 1500 parts of worldwide genre, all subject to the future owner's individual options. The cost for honest-to-goodness twentieth century nostalgia isn't inexpensive however, given about sixty days and \$10,000 later you might be a bit choked up.

[***]



The engine of this elderly Excalibur is equipped with the optional Paxton supercharger. The older style chrome flex tube was obtained from the same firm in Kassel, Germany who had been the original vendor for Mercedes Benz back in the late 20's.

Put in all together, add a little polish (\$), and this is what you have.



In Quest of an Improved Saran Wrap or Why I Am Getting More Patents and Enjoying it Less

GARY WULFSBERG

In the summer of 1965 I did some research for the Dow Chemical Company, which led to the discovery of a new process for oxidizing alcohols. (Although I was not told about the ultimate use for this process, I think that it was to be used to produce new or cheaper plastics.) I heard nothing about this matter for four years thereafter, so I supposed that the discovery had not worked out.

However, this past summer I received a phone call informing me that the process was now ready to be patented, and that I would be receiving for my signature (1) the patent application and (2) an assignment giving Dow the exclusive rights to exploit the patent. When I went to

work for Dow, I had to sign an "Employee Agreement" consenting to sign such forms. However, now I was seized by a great reluctance to sign. I returned the forms unsigned, with a letter giving a number of reasons for my noncooperation.

At that time, the strongest of these was my personal alienation from the idea of spending the rest of my life living in the joyless, meaningless, and repressed style of existence involved in working for companies such as Dow in towns such as Midland. But as a result of this exchange of letters, I have found that there are even more fundamental issues involved that affect all of us, regardless of what work we do or in what town or country we live.

My first letter to Dow reads as follows:

July 17, 1969

Mr. J.R. Lochhead
Patent Department
Dow Chemical Company
Midland, Michigan

Dear Mr. Lochhead:

After thinking the matter over I have decided that I cannot in good conscience sign the patent application for the catalytic oxidation process invented by Dr. Wymore and myself, or the assignment of this patent to the Dow Chemical Company.

I do this not so much in protest of Dow's manufacture of napalm, which is an ugly enough business, but more in agreement with the statement of the president of the Oil, Chemical, and Atomic Workers Union, Mr. Gospiran, that the chemical industry is not much in need of manufacturing more products.

Since doing this work four years ago, I have become aware that the people of this land and world have many, many unfulfilled needs: Black people need the power to build their own communities. Vietnamese need to be able to build their nation free from American dominance and bombs. Youth needs an alternative to the dehumanizing, non-nourishing emptiness of the suburbs (among which Midland, Michigan is one of the worst). Low- and middle-income people need relief from the tax burden of subsidizing the new industrial state. Elderly people, used up by their past employers, need a meaningful place in society, and protection from inflation. We all need clean air, clean water, and an ecologically-balanced environment.

Many people, aware of these human needs, have criticized the spending for the present moon shot as a misappropriation of funds. But beyond this I notice that a sizeable proportion of America's wealth, resources, and power is in the hands of giant corporations such as Dow Chemical company. When these corporations invest their funds in research, development, or new production, only occasionally do they go to meet any of the above human needs. Far more often they go into production of a new "product", such as freeze-dried coffee, Saran Wrap, or enzyme detergents, that are so little needed by people that an extensive advertising campaign is required in order to get people to buy them.

And so I wonder about this invention. How many millions will be spent to exploit it? And what will be the great benefit to mankind? Perhaps a marginally-improved Saran Wrap that maybe doesn't crinkle so readily? Well, scientists have a need too. We need to see that the fruit of our labor is going to be worth something to mankind.

Indeed, I recognize why so many useless products will continue to flow forth from corporations like Dow. Most of the real needs that people have today are not and cannot be profitable (their material needs generally having already been satisfied). Thus pollution-abatement and ecological planning are expensive, and the prospects of their being "profit-producing" are remote to nil. The giant industrial sector of our society can make only pipsqueak (if not negative) contributions to fulfilling the real needs of the people — because it is burdened with the weight of the profit system. Perhaps someday this burden can be lifted from industry, and it can then serve the people well.

Finally, I discovered in talking to my patent attorney that you do not even need my signature in order to obtain

this patent and its assignment. I cannot stop you, my protest will have no effect and is totally symbolic. My position as a "research scientist" at Dow was therefore no different from that of an assembly-line worker — neither of us had any say over the use to which our labor is put.

Why, then, the farce of putting the patent in my name, and why the insult of offering me a one-dollar "royalty" for the patent? My invention legally never belonged to me in the first place. Why should I pretend to follow in the footsteps of Ben Franklin or Thomas Edison? They owned the fruits of their labors — I cannot own mine. In fact, I do not wish to — I look forward to the day when I can assign my invention to the living beings of the Earth. **THE PATENTS BELONG TO THE PEOPLE!**

Peace and Community,
Gary Wulfsberg

The Dow Chemical Company
Midland, Michigan
August 4, 1969

Dear Gary:

I'm glad I found you home last evening and was able to have a brief discussion of the question of your signing the patent application and assignment. In order to expedite proceedings, I am taking the liberty of sending you again the application and assignment so you will have the papers before you for signing and returning at your earliest opportunity should this be your decision.

As I emphasized to you, Gary, there is no desire here to needlessly spend the time and money of either of us to straighten this matter out. The problem is that if a patent should issue it would issue to you and Dow jointly. In that event we could only provide the Company with clear title by securing an assignment from you, either with your cooperation or by enforcing the employee agreement to do it.

I like the other deal I proposed much better. If you will return these papers signed and notarized, I would welcome the opportunity to discuss the broader aspects of the questions you raise in private correspondence. This would be more rewarding for us both, because I know that we both have better use for our time than to do battle over these papers.

Very truly yours,
A.R. Whale
Patent Department

August 20, 1969

Dear Dow:

Enclosed please find the unsigned patent papers. I am willing to sign them voluntarily only if Dow can write me a convincing reply to my first letter. The questions I raised are quite important to me personally, since practically any

work I may do in chemistry will serve to further the existing trends toward a "new industrial state." I have, to be sure, already formed some conclusions as to whether these trends are or are not beneficial to the people of America, but these conclusions are still tentative. I need to hear a corporation's case in this matter. You feel that the important thing is for me to sign the papers quickly, then "some time" these matters can be discussed "over a beer." But really! I am trying to ask "Where are the corporations taking America?" and you are saying "First sign so that we can get there faster, then we can talk about where we're going!"

These questions are important to many more people than myself. Our whole society, and all other societies, are profoundly affected by the decisions made in the giant American corporations — decisions which we are unable to influence effectively. Dow's requirement of my signature presents me, as a citizen, with the very rare opportunity of capturing the attention of a large corporation. I know corporations are not accustomed to justifying their existences, either to single citizens, or to society. But I believe that they should have to do so. I quote Benjamin Franklin: "Private Property . . . is a Creature of Society, and is subject to the Calls of that Society, whenever its Necessities shall require it, even to its last Farthing." Or as he might have put it in 20th-century lingo, "The corporations belong to the people."

Finally, I regret any inconveniences, Mr. Lochhead and Mr. Whale, that I may have caused to you personally. As I hope you can see, my questions are aimed entirely at Dow the corporation, and not at individual workers for Dow. Perhaps some of these thoughts are your own private thoughts — for surely no one is more overwhelmingly affected by the corporation than its workers. There is mounting evidence that work for a corporate bureaucracy does not give enough personal satisfaction — even top executives and their families are damaged in an alarming number of cases. If you are not fulfilled by your work either, then we are "soul brothers" in this action. And if you are satisfied, then I hope and presume that my small nuisance value is not enough to spoil the beauty of your lives.

Yours sincerely,
Gary Wulfsberg

The Dow Chemical Company
Midland, Michigan
Sept. 15, 1969

Dear Mr. Wulfsberg:

I have your "Dear Dow" letter of August 20, 1969 with which you returned the unsigned papers we discussed by phone on August 3. In it you challenged me to write you "a convincing reply" to your letter of July 17.

I will undertake to do this, not because it has relevance to your signing the papers which you have acknowledged are your obligation to sign, but because I believe you are riding on some false assumptions and perhaps listening to false prophets. Moreover, I do have an interest in the questions you raise.

I am returning a copy of your July 17 letter with paragraphs numbered to correspond with those below. Let's take them one by one.

1. You have decided that "in good conscience" you cannot sign the patent application sent you for signature. Later in the letter you acknowledge that your invention "legally never belonged" to you in the first place in view of your promise to assign inventions to the Company. This being an apparent act of conscience, one must presume we were asking you to do something that conflicts with that conscience.

But in our phone conversation you agreed you were merely throwing sand in the machinery for your own purposes, quite unrelated to the question at hand. This is confirmed in your August 20 letter when you speak of our request for your signature as being a "rare opportunity of capturing the attention of a large corporation." So this problem is not really a matter of conscience, as you originally declared. How can you square this reasoning with your conscience?

2. You refer to Dow's manufacture of napalm. I don't know whether you really mean what you say, however, when you rely less on your objections to napalm than on a statement by Mr. Grospiran of the Oil, Chemical and Atomic Workers Union to the effect that, in your words, "the chemical industry is not much in need of manufacturing more products."

Quoting out of context is misquoting; and misquoting is dishonest. In discussions of Dow and napalm I have seen so much misquoting by irresponsible protestors that I doubt their moral right to protest. I have seen men displaying the paraphernalia of religion make public points based on misquotations, deliberate misunderstandings and worse. The napalm question is a symbol, and a good one, but it's been inflated into a phony issue, its symbolism distorted and exploited, and in the name of practicing symbolism it has served as a cloak for the commission of acts that are, by your definition or mine, as immoral as they are illegal.

As for Mr. Grospiran, I wonder in what context he was speaking. It is inconceivable to me that a union leader would contend that the industry he serves needs no more new products. He is saying that he, as President of their union, is willing to deny employment to many of his members in the very near future. This would inevitably follow, and follow soon, the termination of new product development in **any** industry, and particularly in ours. If he does hold that view, consider the disservice he is doing to those who rely on his leadership, for in denying the vitalizing effects of competition he is tampering with their future most irresponsibly.

If we as a people failed to respond to the challenges of competition we would die — first our spirits and then, many of us, literally. Unless we are competitively striving for something against an opposing force, be it natural or manmade, we do not even know when we have achieved the best possible result. In the industrial context we would not contribute to the health or happiness of others who could use useful products of our labors.

When I refer to "useful" products, I mean anything that people want or need which in some way could make their lives better. A "marginally improved Saran Wrap," to which you referred, can be a useful product if it is better or cheaper or more easily available than other products which do the same thing. It is also a useful product because it provides employment in which people can apply their

talents and earn the money to send kids to college, to donate to their favorite charities, to gain the time to work personally in causes which they favor, and on and on and on.

3. Since working for Dow that summer four years ago, you say you have become aware of the many unfulfilled needs of the people of our land and the world over. You then catalog some of your major concerns. I find your list interesting and unassailable, for you speak the concerns of all of us. (I pass your reference to Midland as interesting, sarcastic and based on I wonder what kind of personal experience.) Again, however, I raise the question of relevance. If concerned people would devote more time to the objects of their concern and less to symbols which advertise their concerns, many of these unfulfilled needs would be fulfilled much sooner. Symbols have public relations value, but those appropriating them simply haven't learned yet through experience that this can be overdone and their energies dissipated. To become preoccupied with symbols is a travesty against the important needs they represent.

If you can find satisfying relevance in the issue of whether or not to sign a patent application for a catalytic oxidation process to the problems of Viet Nam, the needs of Black people, the high taxes we all face, and the like, I can certainly find relevance in the work of Dow to these very problems. There will come a day in Viet Nam when our planes and ships will be carrying goods and technicians to help the Vietnamese be their own people, free of the dominance of anyone, including the Americans. Where research has developed new and cheaper products needed by the Vietnamese or which can be manufactured by them with their own levels of skill and locally available materials, this will be an accomplishment of which you and I both should be proud. Where companies like Dow provide opportunities for young people like you to work in industrial laboratories with modern equipment and outstanding scientists, the Company will have made a contribution I believe you can appreciate. (Dow now has a summer program for introducing disadvantaged young men to chemical lab and plant work.)

Your reference to the tax burden "subsidizing the new industrial state" is not clear, at least as it applies to Dow. As a major company Dow is a major taxpayer but a relatively minor supplier to the federal government.

Finally (still on paragraph 3), I can't disagree that we need clean air and clean water. But, I ask, what is it that has produced the problems with the air and the water? Is it not the very production of goods and the employment of people with all the benefits we as individuals enjoy from improved products and gainful employment? The pollution problem is simply a result of our enormous progress in the country and represents a problem we must face as a consequence. As with other problems in the past, research and industry and government together will apply themselves to solve this one, too.

4. You conclude that "only occasionally" does a company like Dow invest in research, development or production that meets human needs. As a chemist you are surely aware of the essential role of chemicals in the lives of people everywhere. One of Dow's worthy competitors has called it, if memory serves: "Better things for better living through Chemistry." Dow happens to be primarily a supplier of basic chemical commodities from which others make products for the consumer. Efforts such as yours in

the area of improved catalysts for chemical reactions are important to us because they represent opportunities to bring new economies to the production of basic chemicals. And in this competitive business we must look for those economies under penalty of losing the business to someone who can make our products cheaper or better. The cost savings not only enable the producers of consumer products to effect corresponding economies and offer the resulting products at lower costs to consumers, they often permit new products to be made which were prohibitively expensive in the earlier stages of the product's development.

I hope you are not suggesting by your reference to companies like Dow producing products not needed that we should have in this country a well-ordered bureaucracy in which somebody tells us what we need, when we need it and where to get it. It may be very important to a housewife, whose daily duties are as great in her life as large thoughts about social problems may in yours, that she have a new enzyme detergent (which you select as typical of the mundane) to enable her to do her job better. This does not mean that she does not share other larger concerns. But making her tasks go faster and easier leaves her more time and energy for other projects, be they the local humane society or a relief fund for Vietnamese children. My point is that it takes many economic cycles to make the world go around, and a man can live a significant life wherever his talents and interests lead him. There is profound chemistry (and respected chemists) involved in the understanding and development of detergents. I suggest we should honor the society that has given our housewife a selection of detergents and the right to make the choice.

5. While you are obviously being facetious here, I believe your point is that scientists must feel they are doing something truly useful for mankind. This is a fine sentiment. In my experience, however, scientists are no more and no less preoccupied with larger thoughts than anyone else. However, when scientists organize into groups there is sometimes a tendency for the group to confer a mantle of saintliness on the individual scientist.

I enclose a copy of an article based on a talk I gave to AAAS several years ago. To me it is inconsistent for a scientist to say on the one hand he wants to confer the product of his labors freely on society and not to profit personally, and on the other to shun anything to do with the commercialization of his work. What he really means is that he would like to see his invention used by society for the benefit of individuals. It is therefore inconsistent for him to do exactly the opposite of what would give his inventions the greatest likelihood of the widest use. He would be better advised to seek his patents or promote commercialization of his invention under terms by which he could control who does the promoting and producing for the public and how they do it. Only in this way can he assure that his invention will do what he wants it to do in the world!

If you are with me in opposing a bureaucracy that will tell us what to do, where to do it and give us no choice in selection of products for our comforts or necessities, then you're with me in insisting that the profit incentive through competition must operate. And if that is the case, you must also be with me in appreciating the practical fact that an investment in the commercial development of a scientific idea is most often attractive when it carries with it the possibilities of a limited period of exclusive use, such as the patent system can provide. If you are still with me, you will

then join me in viewing the scientist as short-sighted who simply makes his inventions and hopes they will be used by somebody for something somewhere but who feels it beneath his dignity to participate in the culmination of his work for the public's benefit.

6. Here you again decry the "many useless products" flowing from companies like Dow. Unless you want to be told what is useful and useless, you are in no position to identify what is useless and what is not except with reference to your own particular needs and preferences.

You refer to the "pipsqueak contributions" of industry in "fulfilling the real needs of the people" and attribute this to industry being "burdened with the weight of the profit system." Do you really mean that? If you do, it doesn't seem to me you are applying a scientific method of reasoning to the data at hand. With all our failures and fallacies as a nation, we have succeeded in raising the standard of living of our people and of millions of other peoples throughout the world. And this has been done in a competitive environment — a profit system, if you will — that makes it satisfying (and profitable) to do what others want done and make what others will use.

The trouble is, I suggest, that our people problems are not as easily solved as are technical problems. But that is no reason to disparage technology or the businesses it supports. We are belatedly appreciating the need for more attention to minority groups, but this is no reason for throwing rocks at a chemical plant. Industry is not only involved in solving the people problems, it is indispensable to the effort, but it needs support and encouragement. Remember, science and industry (and the profit system) must be a part of the solution just as they are a part of the problem. Remember, too, the poor are only poor with respect to their neighbors who are not so poor, and their more affluent neighbors are more affluent because of their greater share in the products and comforts of a society that provides them. Our job is not to dissolve the agency of affluence but to give the agency the environment to provide more products and comforts within the reach of those who want but don't have them and to help the disadvantaged to acquire them.

7. I am sorry you regarded your work at Dow as "no different from that of an assembly-line worker." First I would ask why this is true. You were not, you must recognize, what one would call a "research scientist" at this stage of your professional life, and inevitably your work was of a different character than had you been a research scientist. Nevertheless, your comments at your exit interview indicated your experiences here were rewarding to you personally in your then personal context. And you were highly regarded as a promising chemist. Your name on a patent application testifies that you did some independent thinking in the environment and in conjunction with the associates you encountered. This doesn't sound like "assembly-line" work to me! The fact that in three months you may not have been "fulfilled" in reaching uncharted shores should not disappoint you, nor should it cause you now to disparage your work experience at Dow. I am inclined to regard your obvious distaste for Dow as due to factors unknown to me.

I am not disregarding your remark that the analogy between a research scientist and assembly-line worker was made with particular reference to the absence of the right to direct the "use to which our labor is put." Did you really expect that, as a senior in college, you would be asked to

direct your own research or to say how it should be used? If so, are you not omitting a rather important step of learning that would permit you to earn your way to such a status?

8. You have certain basic misconceptions about the patent system. Perhaps the attached article will be helpful to you. As for your invention, there is no "farce" — as you express it — in putting your name on the patent. The patent would issue in your name simply because it would be a contribution from you.

It might interest you to know that one reason Thomas Edison, to whom you refer, was so successful in bringing his inventions into public use was that he chose the patent route to disclose many of them. His patents are numerous — numbering 1,093 in all. It was these patents, licensed for royalties to companies for the 17-year life of the patents, that made it worthwhile for companies to be assembled to exploit his inventions and for Mr. Edison to staff and stock his laboratory and make still more inventions.

The corporate scientist who must assign his inventions to his company is not so different as you might think. No matter how excellent a scientist a man might be, he needs a laboratory, equipment, supplies, helpers, and many facilities to help him in his work — such as analytical services, glass-blowers, etc. For the scientist wishing to work on problems having greater immediacy of demand or desiring for some other reason to work in an industrial laboratory rather than a university, he must decide generally the field that interests him and then the company whose research efforts most nearly comport with those interests. He must, of course, be satisfied of the company's integrity and reputation and the research environment it provides.

In exchange for supplying him with the opportunity to do the general type of work he wants to do, he will usually be asked, as were you, to assign his inventions to the company. To suppose that it could work otherwise is to ignore the investment the company makes in its scientists and the consequences of the scientist completing a long, expensive and potentially profitable contribution to his field and then moving to a competitor with his newly gained knowledge. While employed in his field, the industrial scientist will have the opportunity to earn a good wage, work in areas of social interest, raise a family and in a thousand ways be a good citizen just like the scientist of the university.

So much for the numbered paragraphs in your July 17 letter. Now permit me a couple of comments on your August 20 letter.

You urge as a philosophy the paraphrase of Franklin's words which would tell us that "the corporations belong to the people." How right you are, and how true this is! The stockholders of Dow own this company lock, stock and drum, and it is to them we owe a duty to earn a profit and share it with them. As a corporation we are responsible to them legally and morally, and we don't forget it.

So corporations like Dow exist for the profit of those who have invested in its operations. But such corporations are responsive to more than their shareholders. They have a social conscience which is increasingly apparent in today's society. Indeed, the aims of society and of the corporation are fortuitously consistent if not identical in many respects. Both seek to provide security for their members; both work toward an ever-increasing standard of living for those within its concern; both recognize achievement and reward it by

(Continued on Page 42)

Dan Schmidt, Missouri '64, met the challenge in mining at St. Joe



Since he graduated from the University of Missouri at Rolla, Dan found opportunity for progress at St. Joe. He's Plant Engineer at St. Joe's ultra-modern Fletcher mine. There he's responsible for some of the most sophisticated equipment to be found in any mine-mill complex on earth. He works with a young, aggressive team in a company that's tops in the industry. □ Dan and his wife Carole and their two sons find life pleasant in Southeast Missouri. He hunts, fishes and competes in

softball and tennis. They live in the country but they are only 90 minutes drive from big city attractions such as major league baseball in St. Louis. □ St. Joe has challenging opportunities for people with the ability and the drive to meet them. They are located in Southeast Missouri, Pennsylvania, Upper New York State and New York City. □ You may find your challenge and your future with St. Joe.

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Producers and Marketers of Lead, Zinc, Zinc Oxide, Iron Ore Pellets, Iron Oxide, Agricultural Limestone, Cadmium, Copper Concentrates, Silver and Sulphuric Acid.

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positions of influence; both make contributions for the betterment of communities, and both work together in the causes that affect our nation. Society does this through voluntary committees and social agencies supported by one layer of government or another. A corporation does it through direct contributions, supplying the needs of its customers, paying taxes and the cooperation and encouragement it lends individuals who themselves participate in various non-company activities of social significance.

I must assume from the concerns you have expressed about the problems of the world and your low regard for those who by your definition are not contributing to the great solutions of mankind that you yourself are earnestly engaged in pursuits that are more beneficially directed. It would be presumptuous of me to say that the subject matter of your thesis or the major projects in which you are engaged are not relevant. Esoteric as these subjects might be, I am sure you can draw a relevance from them to satisfy yourself that you are not compromising your principles by so devoting your time.

From what I have learned about you, your future is bright in the sciences, and I sincerely hope you can find relevance so that you will contribute where your capabilities are the strongest. In fact, that is what each of us must do. But the freedom to do our own thing is precious, and I hope you remain free to accept or reject employment based on your own ideas of what fields you want to work in, where you want to live, where you want to grow your kids and the kind of people with whom you want to work. Otherwise, you and I and Dow and everyone else will be doing somebody else's thing. And if you are to remain free to do yours, then we and Dow must likewise remain free to do ours.

Very truly yours,
A.R. Whale
Patent Department

P.S. Enclosed also for your Winter reading is a copy of a forthright talk by Mr. Doan, President of Dow.

November 4, 1969

Dear Mr. Whale:

I would like to thank you for taking the time to write your letter of September 15. It is a very remarkable document. I won't attempt to comment on every point you make, but only on the more important ones — and there were some very important ones, which did much to clarify my thinking on this matter.

I refer to two points in particular. On page two you said, "As for Mr. Grospiran, I wonder in what context he was speaking. It is inconceivable to me that a union leader would contend that the industry he serves (sic) needs no more new products. He is saying that he, as President of their union, is willing to deny employment to many of his members in the very near future. This would inevitably follow, and follow soon, the termination of new product development in **any** industry, and particularly in ours . . ." This tends to verify the conclusion of some economists: that the continuous development of new products is necessary to prevent the American economy from slipping

into depression. As I understand it, this is because industry is constantly automating and otherwise introducing greater productivity in existing product lines, so that without new products more and more men would be laid off.

On page three you say ". . . I can't disagree that we need clean air and clean water. But, I ask, what is it that has produced the problems with the air and water? Is it not the very production of goods and the employment of people with all the benefits we as individuals enjoy from improved products and gainful employment? The pollution problem is simply a result of our enormous progress in this country and represents a problem we must face as a consequence. . ." Certainly our nation's pollution problems are mainly a result of our new products. Indeed, they come out so rapidly that it is quite impossible to test their total effects on the environment, and to learn the soundest uses of these products. So the wisest course for us would be to introduce new products conservatively and slowly, only after very extensive testing and experience in their handling. But this is not done — since such a policy would lead the American economy into depression. So we get even more and more "marginally-improved Saran Wraps", and with this "progress", the resulting pollution and despoilation of the environment. As this assault of new products grows, the ecology of the globe reels, coming even closer to collapsing in an eco-catastrophe. So the "progress" of advanced capitalism poses us with a "choice": either we head into **depression** or into **eco-catastrophe**.

But you are more Sanguine about the prospects: "As with other problems in the past, research and industry and government together will apply themselves to solve this one, too." I can indeed foresee the course of this "solution": the environment and the economy will deteriorate dangerously and people will be clamoring for radical and revolutionary change. So the corporations will offer us an alternative to a solution: a "New Deal for the Environment"! Supported by Dow, a "pollution czar" (Drew Pearson's term) will sit in Washington to crack down on polluting farmers, towns, and small businessmen (litterbugs will be prosecuted vigorously). For the large corporations there will be greater investment tax credits to encourage new products, and there will be antipollution tax credits to subsidize devices for reducing the pollution resulting from these new products. This will be paid for by soaring taxes on lower- and middle-income people. Automation and productivity will soar, the Saran Wrap will continue to "improve", and the financial insecurity of the citizenry will climb, leading to ever greater unrest, in the midst of the greatest volume of baubles the world has ever seen.

So it is ironic that, in your letter, you indicate abhorrence to "well ordered bureaucracy in which somebody tells us what we need, when we need it and where to get it." Modern corporate capitalism will come to create desire, and support this bureaucracy in its vain struggles to avoid being submerged in either depression or eco-catastrophe.

Jacques Ellul, in his work *The Technological Society*, drives home the conclusion that modern technology and organization require ever-more authoritarian methods of governing, as the goal of technical efficiency becomes paramount. If there is any hope of avoiding the twin disasters of depression or eco-catastrophe, we must fundamentally re-structure our economy so that it does **not** provide strong incentives toward automation, more efficient productivity, profit, and improved Saran Wraps. We

must have a new economic system which, although (if at all possible) non-authoritarian does not confront so recklessly Nature's non-negotiable demands.

So I am afraid that, far from convincing me of the wisdom of going ahead with new catalytic processes, you have convinced me of their ultimate tragedy.

In sorrow,
Gary Wulfsberg

P.S. Enclosed also for your Winter reading is a copy of a poem by Gary Snyder, environmental freak.

So this is where this "patent dispute" now stands. I expect eventually to be sued (successfully) by Dow for my signature. So, of course, my refusal in and of itself will not alter the course of the economy at all. But if it will stimulate others (as it has me) to consider the nature of our ecological and political problems, and to work for an alternative system, then it will have been entirely worthwhile.

Questions concerning this correspondence should be addressed to the Science Students Union, c/o the Wisconsin Engineer.

[***]

TO DO THEIR DUTY

(Continued from Page 23)

the interests, especially monetary, of industry. Some have registered lobbyists. But lobbying is more extensive than that of the congressional type—its fingers reach into industry.

Probably the only manifestation of retirement for armed forces officers is the "Ret." following their name and rank. If "Ret." means what it is supposed to for officers, then industry must be one hell of a rest home. A study done in April of 1969 by Wisconsin Senator Gaylord Nelson revealed that, in the top 1000 military contractors (three-quarters of all prime contractors), 2072 retired regular military officers above the rank of captain were resting. The top ten contractors nursed 1065 (over half) of the 2072 retired officers. And all officers have "friends in he Pentagon."

The "retired" officer's counterpart in the military is the civilian advisor, who keeps the military dreamers informed of the latest realities. The people, the taxpayers, are an indirect lobby, for they earn the government money from government contracts in private industry, and usually support government contracts which will bring jobs to a given locale. (An exception to that rule are the residents of northern Wisconsin who are fighting Project Sanguine. The Project threatens to destroy the area topography, electrify fences, interfere with television reception and mess up telephone communications by implanting a giant electric grid in the forest floors of northern Wisconsin.)

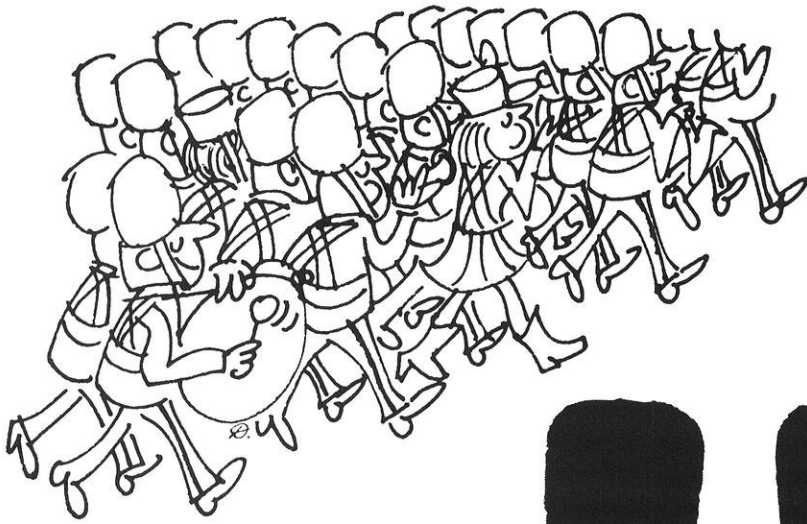
The taxpayer, as overburden as he is, neglects the job of overseeing and exerting influence pertaining to military spending. Certainly the taxpayer cannot audit the books, in fact nobody can. The defense industry has no standard method of accounting, a fact which makes it impossible to audit over 75% of the Defense Department's expenditures. While the Pentagon has the ability to inspect the books of contractors, it very seldom exercises its ability. On the contrary, the Pentagon has often times defended contractors for over-

expenditures before congressional committees. The General Accounting Office, the government agency which audits at request, is very seldom asked to investigate Pentagon contracts and has no power to audit at will. Furthermore, contracts are often labeled "Top Secret" and as such, are inaccessible to most authorities outside the Pentagon.

Pentagon buying discourages industrial development. Military contracts reimburse the contractor for the plants, equipment, and working capital needed for production. The contractor supplies little outlay and retains all facilities and equipment after work is completed. Often times private industrial companies operating under military contract are "private" only in structure: the government provides the facilities, equipment, capital, and sometimes even the work force to man the facility while the privileged few stockholders and executives reap the profits. Paid for by taxpayers, these large government subsidized companies are owned and controlled by an elite few. Joe taxpayer does not get out what he puts in. He, in fact, is likely to lose in the end; maybe a son or two "lost in the war."

One can see that the military-industrial complex is a successful marriage by most criteria, especially guaranteed monetary profit. The military provides the war (which keeps them in business) and industry provides the weapons of war (which keeps them in business). Whether it be the Cold War and its sister, the Armaments Race, or the Viet Nam war, a war is a war and profits are profits. (Inflation, a time of "unprecedented profits" for the war industry, banks, and the like, provides yet another subtle incentive for war: Inflation provides the profits, war provides inflation, the military provides the war, and industry reaps the profits.) While the military-industrial complex stands above war, with weapons and profits for some, the marriage is only one of the "fruits of capitalism." Not so sweet a fruit, though, for those who *pick* the grapes.

[***]



They know the score!

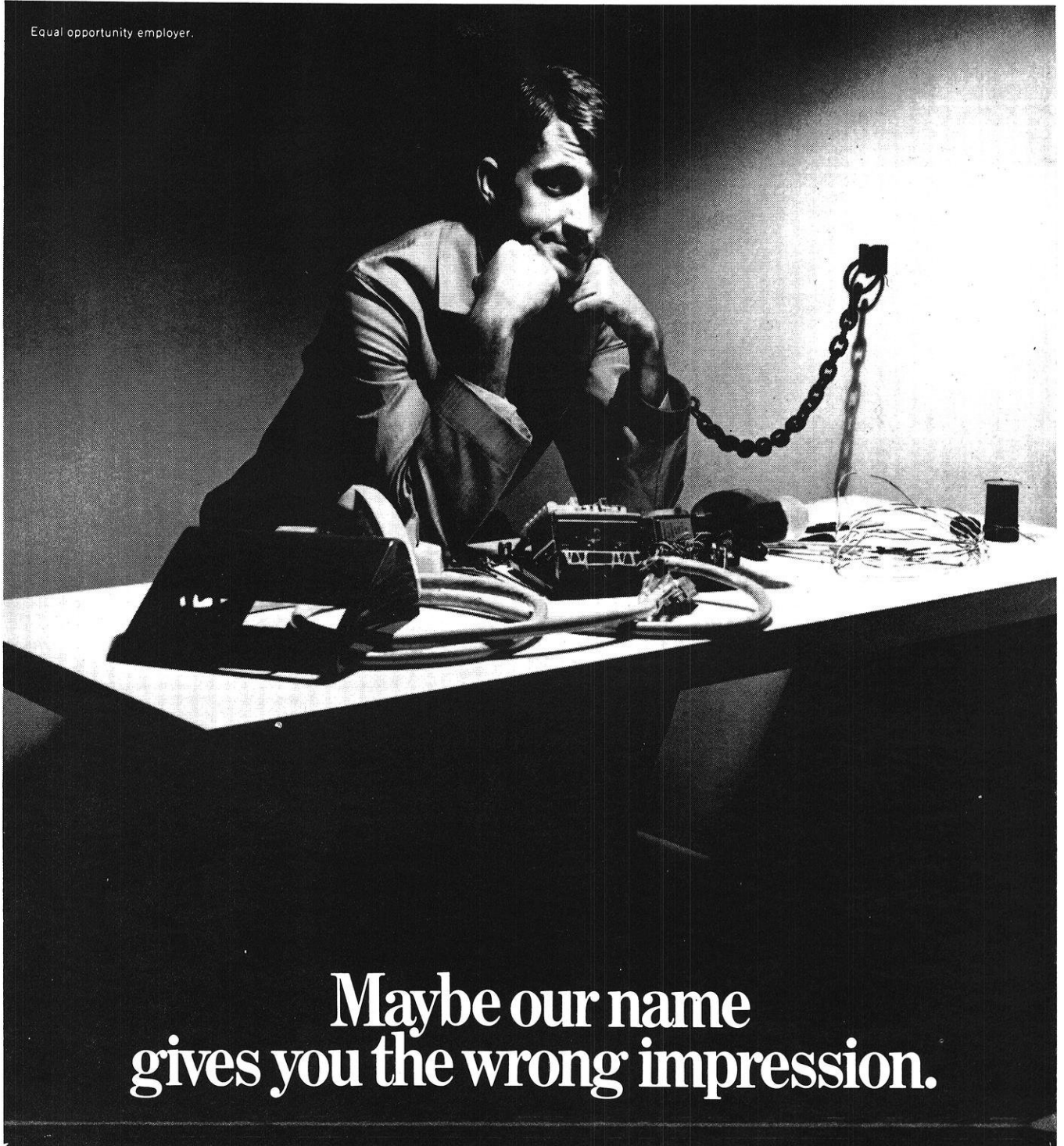
Oh, maybe they don't savor Sousa, but career-wise, they're virtuosos. How about you? Take note of our booklet, "Careers with Bethlehem Steel and the Loop Course." It could be instrumental in convincing you to make sweet music with us. Pick up a copy at your placement office or write: Manager of Personnel, Bethlehem Steel Corporation, Bethlehem, PA 18016.

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Don't be misled by the word *Telephone* in our name.

Actually we're a group of over 60 companies and some of them happen to be in the telephone business. They're in our General Telephone group and are involved in developing new ways for man to communicate.

So if you want to work for our phone group, you can.

But if your interest lies in other things, you might prefer working for another of our com-

panies, like Sylvania.

Sylvania manufactures over 10,000 products alone, knocking out everything from Micro-Electronic Semi-Conductor Devices to Educational Communications Systems.

The communications field is one of the fastest-growing industries around. The more it grows, the more we grow and the more room you have to stretch within us.

We're looking for Scientists and Engineers with ambition and ideas.

Together we can discover new worlds.

Or make an old one easier to live in.

General Telephone & Electronics

Smokey the Bear Sutra

GARY SNYDER

Once in the Jurassic, about 150 million years ago, the Great Sun Buddha in this corner of the Infinite Void gave a great Discourse to all the assembled elements and energies: to the standing beings, the walking beings, the flying beings, and the sitting beings – even grasses, to the number of thirteen billion, each one born from a seed, were assembled there: A Discourse concerning Enlightenment on the planet Earth.

“In some future time, there will be a continent called America. It will have great centers of power called such as Pyramid Lake, Walden Pond, Mt. Rainier, Big Sur, Everglades, and so forth; and powerful nerves and channels such as Columbia River, Mississippi River, and Grand Canyon. The human race in that era will get into troubles all over its head, and practically wreck everything in spite of its own strong intelligent Buddha-nature.”

“The twisting strata of the great mountains and the pulsings of great volcanoes are my love burning deep in the earth. My obstinate compassion is schist and basalt and granite, to be mountains, to bring down the rain. In that future American Era I shall enter a new form: to cure the world of loveless knowledge that seeks with blind hunger; and mindless rage eating food that will not fill it.”

And he showed himself in his true form of

SMOKEY THE BEAR

A handsome smokey-colored brown bear standing on his hind legs, showing that he is aroused and watchful.

Bearing in his right paw the Shovel that digs to the truth beneath appearances; cuts the roots of useless attachments, and flings damp sand on the fires of greed and war;

His left paw in the Mudra of Comradely Display – indicating that all creatures have the full right to live to their limits and that deer, rabbits, chipmunks, snakes, dandelions, and lizards all grow in the realm of the Dharma;

Wearing the blue work overalls symbolic of slaves and laborers, the countless men oppressed by a civilization that claims to save but only destroys;

Wearing the broad-brimmed hat of the West, symbolic of the forces that guard the Wilderness, which is the Natural State of the Dharma and the True Path of man on earth; all true paths lead through mountains –

With a halo of smoke and flame behind, the forest fires of the kali-yuga, fires caused by the stupidity of those who think things can be gained and lost whereas in truth all is contained vast and free in the Blue Sky and Green Earth of One Mind;

Round-bellied to show his kind nature and that the great earth has food enough for everyone who loves her and trusts her;

Trampling underfoot wasteful freeways and needless suburbs; smashing the worms of capitalism and totalitarianism;

Indicating the Task: his followers, becoming free of cars, houses, canned food, universities, and shoes, master the Three Mysteries of their own Body, Speech, and Mind; and fearlessly chop down the rotten trees and prune out the sick limbs of this country America and then burn the leftover trash.

Wrathful but Calm, Austere but Comic, Smokey the Bear will Illuminate those who would help him; but for those who would hinder or slander him,

HE WILL PUT THEM OUT,

Thus his great Mantra:

Namah samanta vajranam chanda maharoshana

Spataya hum traka ham mam

“I DEDICATE MYSELF TO THE UNIVERSAL DIAMOND

BE THIS RAGING FURY DESTROYED”

And he will protect those who love woods and rivers, Gods and animals, hobos and madmen, prisoners and sick people, musicians, playful women, and hopeful children;

And if anyone is threatened by advertising, air pollution, or the police, they should chant **SMOKEY THE BEAR’S WAR SPELL:**

DROWN THEIR BUTTS

CRUSH THEIR BUTTS

DROWN THEIR BUTTS

CRUSH THEIR BUTTS

And **SMOKEY THE BEAR** will surely appear to put the enemy out with his vajra-shovel.

Now those who recite this Sutra and then try to put it in practice will accumulate merit as countless as the sands of Arizona and Nevada,

Will help save the planet Earth from total oil slicks,

Will enter the age of harmony of man and nature,

Will win the tender love and caresses of men, women, and beasts

Will always have ripe blackberries to eat and a sunny spot under a pine tree to sit at,

AND IN THE END WILL WIN HIGHEST ENLIGHTENMENT,

thus have we heard.

Welcome to the cold, cruel world.



Of course, if your father's a millionaire, or you're about to marry an heiress, you have no problems. But, if not, then there's only one sensible thing to do. Come to work at Allison Division of General Motors.

There's nothing cold or cruel here. Just the opposite. Particularly if you're an engineer with big ideas. Aerospace projects? Allison's got them. Turbofan. Turbojet. Turbo-prop. Turboshaft. Military and commercial applications right across the board.

Maybe you're more down-to-earth. Fine. Some of Allison's

advanced military vehicle projects will be more your cup of tea. Like the new M551 General Sheridan, for instance. The powershift transmission, of course, is our specialty, and even the gun launcher is an Allison brainchild.

There's more. And you can be part of it. Take your time. Check them all. But don't forget Allison. Remember, life can be beautiful . . . even without an heiress.

Send for Allison's new brochure: Destination Tomorrow. Write: Ken Friedlein, Scientific Placement, Dept. 300, Allison Division of General Motors, Indianapolis, Ind. 46206.

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Rochester, N. Y.: world photographic capital; chemical engineering from pure research to sheerest commercialism; also vitamins for man and beast, food ingredients, laboratory chemicals

Some chemical engineers prefer the South



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Columbia, S.C.: polyester fibers

Longview, Tex.: petrochemistry

Unlike our peers in industry, our major U.S. chemical manufacturing is done in only four communities. Therefore chemical engineers who join us run less risk of being suddenly uprooted from a community they like.* Subjects to occupy their thoughts between breakfast and dinnertime:

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Photographic coatings and processes must be designed to balance perhaps seven critical diffusion and reaction steps necessary to form a color image in "chemical reactors" as thin as 1/10,000 in.

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*If you happen to be a very serious-minded person and consider geography an unsound basis on which to choose engineering employment, we had better not mention the whippersnapper young chemist who admitted that he had picked us over another company because he liked the sound from Rochester radio stations, but admitted this only after moving into a spot where he was responsible for the work of some 5,000 people.

For some chemical engineers this line of persuasion just wastes ink. Getting tied into one town is precisely what they wish to avoid, and the spouse, if any, may feel the same. For them we offer lively duty in marketing. This consists of working out a match between what's needed by our far-flung chemical customers and what's created by the root-loving engineers.

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That's sort of like asking why a banker goes to work in a bank.

A guy goes to work where the best work is. And some of the best engineering work around today is in and around factories.

What would you say to designing the numerical control system for an automated steel mill?

Or developing quality control procedures for the world's most powerful airplane engine?

Or managing a production team responsible for delivering power generation equipment to utility customers?

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