Outlook

A sampling of ideas, trends and developments in the product market



PCB's never die. They don't even fade away.

Concern over the health hazards of polychlorinated biphenyls continues to mount. Widely used as dielectric insulating fluids for distribution transformers and capacitors, they are responsible for producing skin diseases and digestive, liver and reproductive disorders in humans (see Outlook, May, Sept, '75). Now scientists are finding that these compounds persist in the environment to a far greater degree than they had expected. Since 1968 when PCB's were first discovered in fish, they have shown up in rivers, lakes, birds, human milk and food.

In 1972 Monsanto, the sole U.S. producer of these compounds, voluntarily restricted the sale of PCB's to closed system electrical applications such as capacitors and transformers. This action cut production of PCB's in this country almost in half to about 40 million pounds per year and was expected to produce a big drop in the levels of PCB's in the environment. But it hasn't happened. Part of the problem is that PCB's, like DDT, are not easily biodegradable. Though Monsanto supplies an incinerator service that will destroy liquid PCB wastes, many of its customers still spill PCB's into waterways or use incinerators that result in PCB's being released into the atmosphere.

The electrical/electronics industry is closely watching proposed government restrictions on PCB's because there are no known compounds with equivalent dielectric properties that are nonflammable.

As an indication of the severity of the problem, the Environmental Protection Agency sponsored a three day national conference on PCB's in Chicago, November 19 to 21. In an opening address, EPA administrator Russell E. Train urged Congressional passage of the long-proposed Toxic Substances Control Act that would authorize the federal government to limit or prohibit the production and use of any chemical that poses a threat to human health or the environment.

Thomas E. Kopp of EPA's Office of Toxic Substances in Washington, D. C., estimated that 10 million pounds of PCB's reach the environment each year through leaks, spills and vaporization. Several manufacturers, including Westinghouse and GE, have reduced the discharge of PCB's into the environment. But they all claim that reducing the run-off to zero is virtually impossible.

Control at the electronic component manufacturers' plants won't eliminate the problem. According to John L. Hesse of the Department of Natural Resources in Lansing, Michigan, one major power company in Michigan reported an annual loss of about 800 pounds of PCB liquids to soils from burst capacitors, and 12,000 pounds from salvaged capacitors.

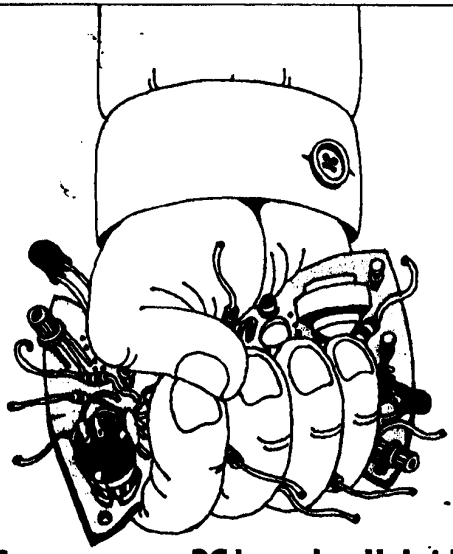
Current estimates indicate that there are at least 1000 tons of PCB's falling over the United States each year in rain and particulate matter.

What is disturbing is that analyses of this material generally show it to be most closely related to Aroclor 1254, one of the higher chlorinated biphenyls still in use. But, even with the known sources of pollution, scientists are hard put to account for the high levels of PCB's in the atmosphere. One conjecture is that vapor leaks from supposedly sealed systems may be occurring to a greater degree than suspected.



Many electrical and electronic equipment manufacturers in the U.S. vehemently dispute the need for a total ban on PCB's. They contend that PCB mixtures today are far less toxic than those previously used. Aroclor 1016, for example, in-

MONS 031843



Squeeze your PC board or Hybrid into a Monochip for $1800.

It's really easy. Take your idea or circuit design, no matter what stage it's in and breadboard your system with our $39 design kit. Then, send us your layout sketch, and in just three short weeks you'll have 50 custom ICs as prototypes.

How can we do it so fast and inexpensively? Monochip is a linear monolithic IC chip carrying up to 300 bipolar components without the last layer of metalization. You can choose from four basic Monochip standards representing different sizes. Then, in your sketch, you simply tell us which components you want connected and we do all the work in three weeks. If you think that's fast, you'll really like the prices and delivery on production units. That's a promise. We're second-sourced, too, so don't worry.

In case you're wondering, Monochip is also great for the first stages of product design. The risk is small, no long development time or hidden charges.

You can get our book of 130 Analog IC design applications for only $3.00. It contains 350 pages of popular Monochip circuit ideas and some neat design tricks. Just check the coupon below.

interdesign
1255 Reamwood Avenue,
Sunnyvale, CA 94086
Phone (408) 734-8666

☐ My check for $3 is enclosed for the 101 Monochip applications handbook.
☐ Send me the complete details on Monochip.

Name_____

Company_____ Phone_____

Address_____

City_____ State_____ Zip_____

Check 16

troduced by Monsanto in 1971, has a much lower panta- and hexachlorophenyl content than that of Aroclor 1242, which it has almost entirely replaced.

Speaking on behalf of the EIA at the National conference, Richard Rollins, vice president-engineering of the Jard Corporation, emphasized that Aroclor 1016 cannot be classified as having the same adverse chemical effects as Aroclor 1242. As evidence of its higher biodegradability, Rollins noted that Aroclor 1016 is not commonly found in the environment or in fish despite the fact that the capacitor industry has been using it since 1972.

Rollins noted that there is no known substitute for capacitor dielectrics that provides the same degree of reliability and safety in the same package size.

Ironically, the very properties that make PCB's so desirable as capacitor dielectrics — a high degree of thermal chemical oxidation and hydrolytic stability — are the same ones that cause the persistence of these compounds in the environment.

They're working on it

Several companies are intensifying their efforts to find an effective replacement for PCB's. Monsanto is currently evaluating two non-PCB dielectrics for capacitors that are blends of synthetic hydrocarbons with a high-dielectric-constant additive. But neither compound is fire resistant.

And Exxon Chemical has developed a diisononyl phthalate dielectric that is being evaluated by the capacitor industry. Designed for use in paper dielectric capacitors, the material has good electrical and physical properties and has a relatively high flash point of 430°F. But, at this time, the reliability, safety, and biodegradability of the material have not been established.

E. J. Inchalik of Exxon commented on the growing importance of the newer types of capacitors using polypropylene films and paper, or all polypropylene films. "The next generation of capacitors

may well use metallized polypropylene films, and PCB's won't work in this type of capacitor. They generate hydrogen chloride, which leads to premature breakdown."

Dow Chemical has a butylated monochlorodiphenyl oxide that will replace Aroclor 1016 in high voltage power correction capacitors. According to Dean Branson, project manager at Dow's Health and Environmental Research Laboratories, the material has lower dielectric losses than Aroclor 1016, will take 10% to 20% higher voltage surges, requires no redesign in size, has a lower risk of explosion (flash temperature well above operating temperature), is less toxic, and is much more biodegradable.

Dow Corning claims to have an environmentally safe silicone oil (polydimethyl siloxane) that it says is a direct replacement for PCB transformer oils. Although the silicone liquid will burn, it has a higher flash point than many PCB-containing transformer fluids, a low heat of combustion, and has been shown to be self-extinguishing in catastrophic failure testing.

A concern for people?

One thing is clear. There are still a lot of unknown quantities in the search for PCB replacements. And, in addition to the obvious costs of changing to a new technology, there are subtle external elements that can have a big economic impact. For instance, Dale Hattis of the Massachusettes Institute of Technology's Center for Policy Alternatives revealed some alarming figures at the national PCB conference. According to Hattis, "Technological changes introduced with the intent of reducing environmental/health risks — especially in the absence of regulatory follow-up — can create hazards as dangerous or more dangerous than the one eliminated." As an example, he stated that some substitutes for PCB's in some large heat exchangers, and in some special hydraulic fluids for high risk fire uses, are flammable at elevated temperatures. The result is that fire insurance rates on some industrial facilities employing these heat exchangers have doubled. In one case study, the total increase in premiums was estimated to be in the tens of millions of dollars annually. If the insurance companies are correct about the increase of fire risk, then what about the increase in human casualties? — *D/H*

Computer forecast: 9% growth through 1980

As 1976 begins, let's take a look at what one of the experts thinks is in store for the computer industry through this year and beyond. Arthur D. Little, Inc., studied the industry over a five-year span and, concentrating on the general purpose computer business, estimated that in 1980 general purpose computer installations would be valued at more than $60 billion. According to ADL, 1975's installed base comes to $40.8 billion, meaning that the industry can look forward to a 9% growth rate over the coming five years.

This growth pattern has not been constant, however. Frederic Withington, ADL's computer industry specialist, pointed out that, when it's all added up for 1975, domestic shipments will be down over 20% compared to 1974's record $8.2 billion sales figure. Two reasons account for this decline. First, the general state of the economy in 1975 resulted in some postponement of customer deliveries. Second, Withington pointed out that the industry's chief competitors are out of phase with each other in the introduction of major product improvements. Simply stated, it means that the volume of shipments is more a function of the introduction of new product generations than of economic conditions. "A big growth spurt follows these machine introductions. Then the figures taper off until the next processing generation comes out," explained Withington.

With well over 70% of this market, it is IBM's actions that determine the course of the industry, and right now, "the industry is only gradually emerging from a slow growth period" because, according to Withington, "IBM has yet to launch a new generation of computers." Precisely when that will be is a matter of speculation, since IBM maintains a policy of not commenting on product possibilities.

Everyone benefits

Besides a 9% growth rate, Withington foresees increased dominance of world markets by the American mainframe makers. "America's dominance of this market will increase over the next five years," he predicted, "since foreign competition has dwindled to ICL, Siemens and Fujitsu. However, these American companies will have to give up some of the action. In 1980, the world market will appear to be more in the hands of American manufacturers than it really is." The discrepancy between what is and what appears to be will be caused by the trend of regional and specialized affiliates to be included under the general purpose manufacturers' umbrellas. "These arrangements," he continued, "will be the result of the high cost of worldwide marketing and service support for computer systems and software. Thus the mainframe makers will affiliate with regional, specialized manufacturers, but will retain product uniformity via product line specification and systems programs. "In the end," he concluded, "everyone will benefit." — *JT*

DON'T MISS
The FORUM on Connectors
- February -

MONS 031845

Back talk

LCD's stand up to LED's

Ashley-Butler, Inc., an LCD manufacturer, takes issue with the life statistics compiled by Monsanto and published in a recent electronic products (Oct. '75, p 29).

"I found your special report on display panels extremely informative. I wish, however, to take issue with the information contained in the "Technology Comparison Table" compiled by Monsanto and published on page 32 of this article. Monsanto (which, I believe, manufactures LED's) states that LCD's offer a 10k hour life (compared with the 1,000,000 hours they attribute to light emitting diodes.

"Ashley-Butler, Inc., has developed LCD's, particularly large-area displays, to a state-of-the-art in which we consider ourselves preeminent. We are currently, offering a variety of displays for the OEM market and other applications, including messaging. We also sell our own liquid crystal, nematic and cholesteric, to other manufacturers, among whom are firms mentioned in your article. Photon, our clock, has been widely distributed in the worldwide consumer market, and a point-of-sale graphic display has been distributed in high volume to more than twenty corporate customers. The clock and the advertising unit carry a two-year written guarantee on all parts, including display, under continuous running conditions. (Both units are in the Design Collection of New York's Museum of Modern Art.)

Long lived LCD's

"Ashley-Butler has in its plant, moreover, LCD units that have been running continuously for four years, with no loss of contrast. RCA boasts LCD's which, our engineers affirm, have been in continuous operation for six years. (The only reason a more precise life-span cannot be placed on LCD's is that the technology hasn't been around long enough to make a proper determination.)

"In light of our experience in LCD longevity, would you not perhaps agree that the Monsanto evidence is somewhat misleading"

Elliott J. Echelman
Ashley-Butler, Inc.

Show management predicts success

In the September editorial we pointed to the success WESCON and the National Computer Conference have enjoyed over the past few years. However, the decline in company participation and the lack of attendance by engineers at the New York Interecon and Boston Nerem shows is obvious to observers. The combining of the two is an attempt to make one strong show out of two very weak ones. We're pulling for them, we hope they succeed. But...

Here, in part, is a rebuttle by Edwin H. Shields, Public Relations Counsel for WESCON.

"You point at the recent highly successful WESCON as an apparent 'fluke' — but it's the third straight WESCON sellout in a row—and the third with very large audiences (27,800, 28,200, and 30,500).

Will Electro shine?

"You predict a weak ELECTRO — if you'd only asked, I could have told you that ELECTRO booth commitments are running far ahead of WESCON for the same period! We're not foolish enough to predict the national economic condition six months ahead (who is?), but if the pace of exhibit applications continues, ELECTRO will, as was WESCON, be fully subscribed several weeks ahead of its opening.

"We've never said that shows could or should replace aggressive sales and marketing programs, nor can they reduce the need for consistent advertising. But if you believe that well-conceived and creatively managed expositions don't penetrate a regional market, please confer with the 325 WESCON exhibitor companies. Be sure to ask Tektronix, DEC, Sprague, Dana, Systron-Donner, Cherry Electric, Wang, Teradyne, Hamilton-Avnet, Gould, and Hewlett-Packard for openers."

Edwin H. Shields
WESCON

Book Review

Active filter design

A straightforward publication devoted to the average design engineer provides a direct method for the design of active filters. Using simple formulas and design tables, design of almost any filter type is possible. The author anticipates practical problems that the engineer might encounter and discusses the effects of component tolerances, amplifier limitations and RC selection in his book, *Active Filter Design*.

Arthur B. Williams
Artech House
610 Washington Street
Dedham, Massachusetts 02026
Price: $23

Plastics and elastomers

The result of many years of effort by leading experts in the field, the *Handbook of Plastics and Elastomers* is the only complete work that covers every aspect of the subject from design through manufacturing and end-product use. For anyone engaged in an activity involving plastics and elastomers, it provides an extensive array of property and performance data presented as functions of the most important related variables. The volume also contains complete applications guidelines, including cost and fabrication method tradeoffs, design and application criteria, finishing and performance limits.

McGraw-Hill Book Company
Editor: Charles A. Harper,
Westinghouse Electric
Price: $39.50

MONS 031846