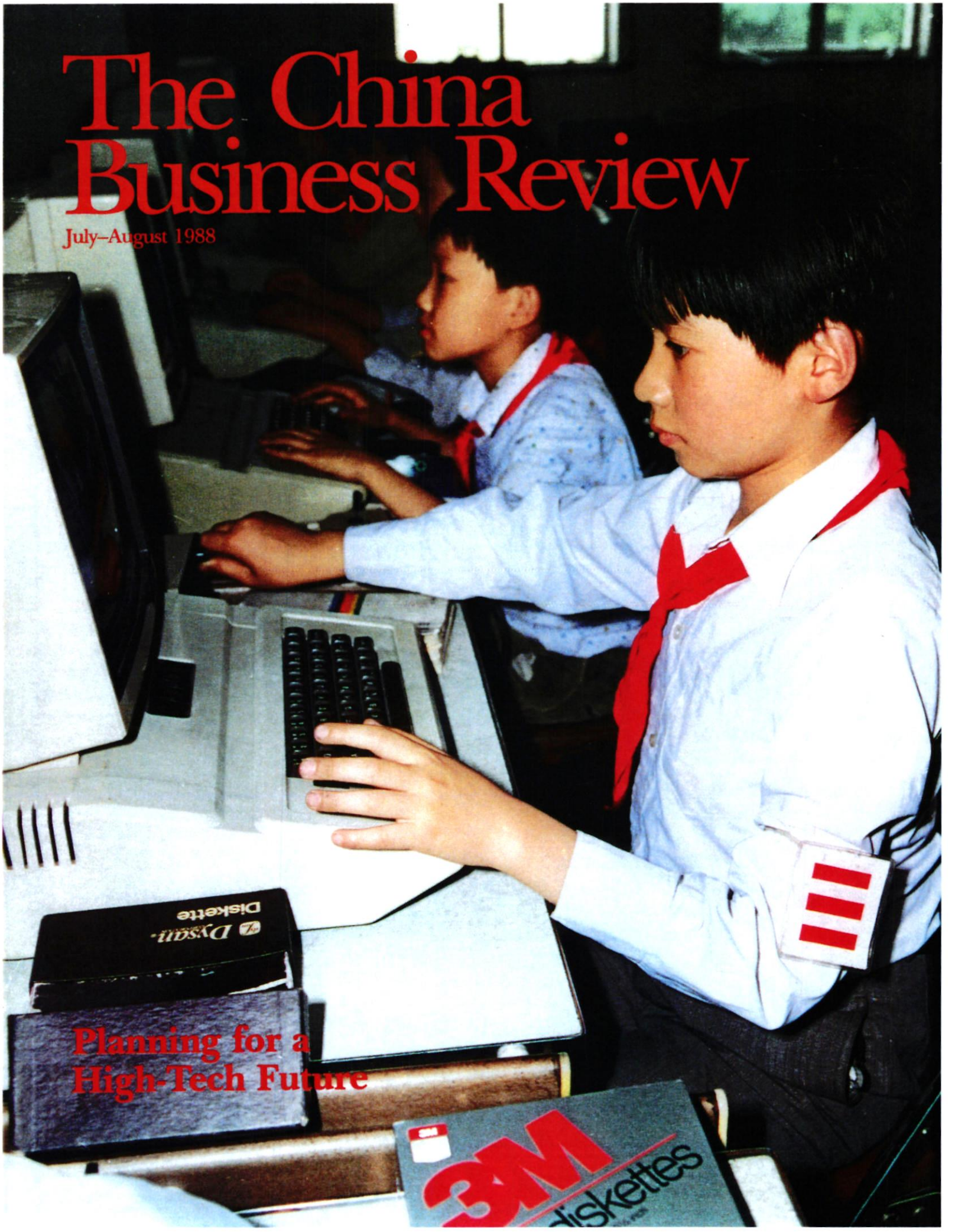
The China Business Review

July–August 1988



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Our new name underscores that we are:

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- *Improving understanding in the conduct of business and increasing awareness of the important role commerce plays in the overall U.S.-China relationship through our new research and educational arm, the China Business Forum.*

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The U.S.-China Business Council
1818 N Street NW, Suite 500
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The China Business Review

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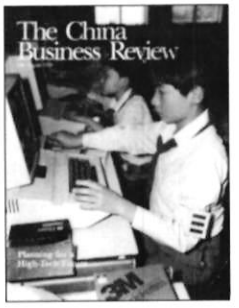
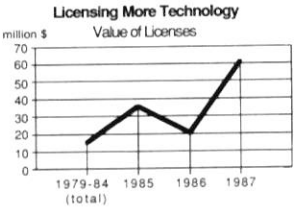
July–August 1988 Volume 15, Number 4

Cover: Children learning to use computers offer hope for China's high-tech future. *Photo courtesy of Xinhua News Agency.*



Technology exports: International interest in Chinese technology is on the rise. **Page 32.**



Nonferrous metals: From aluminum to zinc, many new nonferrous projects are now in the works. **Page 40.**

摘要

CHINESE BONDS UNDER SCRUTINY

Moody's Investors Service announced on May 18 its first-ever rating for a Chinese bond. A DM300 million ($170 million) Eurobond, issued by the Chinese government and due to mature in 1992, earned an A3 rating, placing it in the lower-middle range of Moody's scale of investment-quality bonds. The rating evaluates China's ability to generate foreign exchange to pay its foreign debt, which Moody's estimates at a low $27 billion. After receiving top ratings since 1982 on Japanese and European markets, Chinese officials are reportedly disappointed with the lackluster Moody's rating.

The Moody's rating is one of the two credit assessments generally needed before a country issues bonds in the United States. A second rating—from Standard & Poor's—is due out in early August. Issuing bonds in the United States and Western Europe will allow China to diversify its debt, the bulk of which is currently held in yen. Diversification is desirable because yen appreciation has caused China's yen-denominated debt to nearly double in recent years.

China's bond falls within Moody's "A" range of bonds possessing "many favorable investment attributes." China thus ranks between the two other Southeast Asian countries rated, above Malaysia (Baa1) but below India (A2).

Steve Taran, Moody's senior China analyst, explained, "The difference between the A2 and A3 rating is how the market reacts to events in the two countries. In India, the structures that will have to deal with the changes are in place and evolving slowly. The predictability makes investors more comfortable. In China, the interesting changes taking place now—in the control of the economy, patterns of ownership, industrial structures, and on the social side—appear to be moving in a positive direction. But there are still major policy contradictions. Moody's is not concerned that they're going to default—but the market perception of China paper could be adversely affected by short- and intermediate-term problems in the economy."

Like Moody's, the Standard & Poor's assessment will analyze in general terms China's ability to pay foreign debt—but will not assign a number or letter grade. Instead, a hypothetical bond issue will fall into one of six broad categories. The first three are termed "investment grade" and the second three "speculative."

The forthcoming S&P assessment will doubtless be viewed against those of other countries. Southeast Asian countries already rated include Singapore in the top category, Taiwan in the number-two place, and Hong Kong, South Korea, and India in the third category of investment grade ratings. Will China trail India again and land among the "speculatives" or will it pull even this time? There's no doubt that on this next test China is hoping for a higher grade. —SER

A NEW NAME FOR NEW TIMES

The National Council for US–China Trade has a new name—the US–China Business Council—to underscore its expanding role in support of the American business community involved in China. The decision was approved at the Council's 15th anniversary annual membership meeting, held in Washington, DC, in early June.

The name "The National Council for US–China Trade" no longer accurately describes the Council's role as a private business organization that represents and assists its member companies in the conduct of all types of business in China. When the Council was founded in 1973, six years before normalization of political relations between the United States and China, it served a quasi-governmental role, hosting high-level delegations and helping US importers and exporters make contacts within the Chinese bureaucracy.

Fifteen years later, US–China commercial relations have changed dramatically, and so has the role of the Council. US–China trade has grown from just $800 million in 1973 to more than $10 billion in 1987. Moreover, trade is now only one of many commercial activities involving US firms with China. Companies now engage in technology transfer, licensing, countertrade, investment, and other flexible forms of doing business. More than 400 US firms have made investments since China opened to foreign investment just eight years ago.

In response to this greater diversity, the Council now offers a much broader range of services. Companies require sophisticated information and analysis to plan their approach to the China market and keep up with legal, economic, and political developments in their sector. The Council maintains the most complete China business information center in the United States, and a staff of analysts trained to advise and solve individual company problems. Companies also face complex commercial issues and disputes that can be resolved most effectively through concerted action within a business group like the Council, rather than through governmental channels. As the spokesman for the American business community in China, the Council is dedicated to supporting its member companies through services that the companies cannot or would rather not handle alone.

MERGER MANIA

When a Chongqing weaving mill went ¥12 million into debt last year, it found an unexpected white knight in the form of the prosperous and well-managed Chongqing General Flax Textile Mill. By acquiring the failing weaving mill, the more successful textile mill was able to add new workers and workshop space. And in only three months under new management, the weaving mill was back in the black, posting a profit of ¥60,000. Moreover, its workers each received a ¥50 bonus, their first in

more than four years.

This is but one example from a rising tide of what the Chinese call mergers. They could more accurately be termed acquisitions, since in most cases an economically viable enterprise takes over one in serious financial trouble. While China does have a few actual mergers, conflicts between the two different management teams make this a more challenging option.

Since early this year, mergers have been touted as a new way to strengthen economic reforms. At a national conference called to discuss the tricky theoretical issues involved, some participants claimed that allowing "the big fish to swallow the little" smacks of pre-revolutionary capitalist practices. But even a commentary on the front page of *People's Daily*, China's Party newspaper, called the merger of loss-making enterprises with profitable enterprises "an inevitable phenomenon of survival of the fittest in the course of the development of the commodity economy."

From the government's perspective, mergers offer a way to weed out money-losing enterprises and decrease their dependence on State financial support. Moreover, efficiency and productivity should rise as larger factories institute economies of scale. The whole industrial system could benefit as the product mix is readjusted, distribution of the factors of production are rationalized, and the number of economic units is scaled back.

But the exact role of the government must be clarified before the mergers and acquisitions process is allowed to go much farther. Government approval appears to be a prerequisite for most acquisitions, and in some cases, local governments have helped promote and guide the process. Some managers, however, wish the government would simply let market mechanisms operate. The opening of the first "enterprise annexation market" in Wuhan this year may be a sign that government intervention will decline as the practice becomes more widespread.

The valuation of assets is another thorny problem. And up to now—although some managers have been transferred after a merger—all workers have been kept on. What happens if some become redundant after the merger and the new company wants to dismiss them?

Despite such problems, the government is likely to prefer acquisitions to bankruptcy. Forcing an enterprise into bankruptcy raises a host of new administrative problems, while mergers and acquisitions can actually help spread efficiency to more of the industrial system. In fact, the Chinese press is already predicting that mergers will become the third phase of enterprise reforms. At least for now, China, like Wall Street, appears to be bullish on M&A.—JSS

THE LONG MARCH TO PEACE—CORPS

When then-Foreign Minister Wu Xueqian announced in March that Peace Corps volunteers would be welcome in China, one of the last strands of the "Bamboo Curtain" quietly disintegrated. Since the Peace Corps was established in the early 1960s, the two sides have been at odds, with China charging the organization was an imperialist arm of the CIA, while the Peace Corps espoused anticommunist rhetoric throughout the Third World.

A team of Peace Corps officials plans to visit China later this year to work out the details of the agreement. China's impressive advances in the fields of health care and agriculture will probably limit the need for Peace Corps activity in these areas. But it seems safe to speculate that China's appetite for learning English, whetted by the quest for foreign technology, will result in a request for English teachers—lots of them. The Peace Corps should have few problems filling the posts as a large number of past volunteers have already expressed interest in pioneering the Peace Corps presence in China, according to Paula Hirschoff, writing in *WorldView Magazine*, published by the National Council of Returned Peace Corps Volunteers.

While cynics may speculate China simply wants to tap a cheap source of well-qualified English teachers willing to go to less developed interior areas, the Peace Corps sees the move as a major milestone. China is the first communist country to ask the Peace Corps to lend a hand. Acceptance of Peace Corps volunteers not only opens a new source of development expertise for China and nurtures a group of Americans who understand the country, but it also signals China's more relaxed and ever-broadening world view. —AED

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Servicing Foreign Equipment

Providing after-sales service is now more than an afterthought—it's an essential part of most major sales to China. Here, American companies share their views on how it should be done

Perri Strawn

In the early 1980s it was not uncommon to hear stories of sophisticated, imported equipment lying useless in China's warehouses. Sometimes the customer had not been properly trained to use the product. In other cases, the equipment was broken and the parts and knowledge to fix it were simply unavailable.

Such instances of unused or underutilized foreign equipment in China are now dwindling thanks to a change in the attitudes of both buyers and sellers. Realizing that service is essential to establishing a long-term market, foreign companies have helped set up more than 200 service centers in China since 1983. And their Chinese customers, learning from past mistakes, have gradually come to expect spare parts, service, and training to be part of any purchase contract. Some American firms involved in these centers (*see* list) shared their thoughts with *The China Business Review* on how these changes have come about, and what's involved in providing service in China.

Maturing Chinese customers

In the last decade Chinese endusers have matured as international consumers. In the early 1980s "the concept of supplying service to customers in China didn't exist . . . the idea took awhile to penetrate," according to Robin Dick of Cummins Engine Company. During on-site equipment inspections made by Cummins technicians, Chinese customers might act as though everything was satisfactory—until further investigation uncovered the machinery actually "laying in the field in bits." Even then, Chinese managers tended to blame themselves for the problem. "Supposedly our engine was perfect," Dick said.

Lack of contact between foreign manufacturers and Chinese endusers contributed to these problems. China's large foreign trade companies generally negotiated major equipment contracts on behalf of endusers, who had no idea how to reach the manufacturer for help with equipment problems. But ongoing foreign trade reforms are giving Chinese enterprises a greater role in trade decisions, and improved supplier–enduser contact.

The Chinese are learning another basic lesson: service costs money. Although this can still be a sticking point during negotiations, most Chinese endusers now realize that they must pay for service after their warranty runs out.

Deciding when and how to provide service

Foreign companies are realizing that providing service for their equipment helps build their reputations in China and improves their competitive position. Although the average service center in China just breaks even on operating costs, "it is a positive selling aspect, there's no two ways about it," according to Pete Pastoor of Cincinnati Milacron.

Producers of computers, automated control systems, engines, mining and drilling machinery, and other equipment with moving, breakable parts are most likely to need an after-sales service facility. In addition, original equipment manufacturers (OEMs) that make components for equipment being sold to China play an active role in the service scene. Original parts must be maintained—everything stops, for example, when the control system of an oil-mining operation breaks down. "One of the reasons we went to China is that our customers [i.e., foreign equipment suppliers] are dragging us there," said John Butler of the Allen-Bradley joint venture in Xiamen that will produce, sell, and service the company's automation control products.

Many companies choose not to establish in-country service because their business in China is too small to warrant the expense. Instead, they send field technicians from the United States or other company bases to China as needed. One American manager recommends that when a company's annual sales to China exceed $500,000, it should consider an in-country service arrangement.

There are many different levels of service to consider. Should a company provide only for installation and simple repair work, or for customer training as well? What skills should a service center's staff have? Where will spare parts be stored? Will the company have equipment scattered throughout China?

The Chinese partner in a leading role

Most foreign companies that provide service in China rely heavily on a Chinese partner. The most common form of cooperation is a contractual agreement in which the Chinese counterpart is responsible for installing and servicing the company's products, and receives a service fee from the foreign company. Such arrangements are less expensive for the foreign firm than stationing expatriates in China or setting up an equity joint venture. The Chinese side also benefits from a guaranteed source of foreign exchange and the

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Perri Strawn is an editor of East Asian Business Intelligence, *and worked as an intern for* The CBR *this spring.*

training and employment the arrangement provides.

Choosing a Chinese partner compatible with the company's needs is not always easy. The reputation of an organization, its size, and ability to service all the firm's customers, no matter who they are or how scattered around the country they may be, are the most significant factors to consider.

Many companies sign service agreements with their largest—but by no means only—Chinese customer. But the ministry or company chosen as the service agent will often "service themselves first and better" before helping the foreign partner's other customers, according to Tim Wheeler of Prime Computer. Foreign firms should therefore look for a partner willing to provide impartial service to any enduser.

Structuring a cooperative service agreement

The foreign company may choose to pay its Chinese counterpart a fixed fee or a percentage of the company's China sales. One Chinese counterpart receives $50,000 a year for each of the three service centers it operates on behalf of an American company. Another receives 1 percent of the value of each China sale made by the American firm, with an additional half-percent every three months during the warranty period that the center provides service without help from the home office. In addition, the Chinese partner often charges a "start-up fee" of several thousand dollars to cover the initial expenses of opening an office.

Flexible payment terms help companies accommodate changes in business patterns. Beckman Instruments originally paid a fixed percentage of its revenue from China sales to support its service center. But several years of 100 percent sales increases caused these payments to soar, and as a result the payment terms were changed to a fixed annual fee, according to Beckman's Sandy Tam.

Many foreign companies originally hoped to operate distributorships in which a Chinese agent would be paid a relatively high fixed fee to sell and service all the company's products. But Chinese staff are often unwilling to act as salesmen. Cummins Engines originally agreed to pay its Chinese partner a commission for every Cummins sale in China. But because the Chinese were directly involved in so few sales, the terms were altered so that Cummins now pays a commission only when the Chinese employees actively participate in making a sale.

The joint venture option

Although an equity joint venture (EJV) allows the foreign party greater operational control over its service center, this more formal agreement has not been a popular option. EJVs in the service sector usually require the foreign firm to make a greater investment of time and money than in a cooperative service arrangement. Because it is hard for a service operation with no manufacturing or licensing component to turn a profit, both sides are often unwilling to make the initial investment.

One exception is Lockheed Aircraft Services International (LASI), which plans to establish an EJV service center with the Guangzhou branch of China's civil aviation administration, CAAC. The $30 million initial investment will be split 50–50 between the foreign partners (Lockheed and Hutchison Whampoa) and CAAC, with CAAC paying the center to service its planes. Bob Menke of LASI said China's willingness to pursue this EJV stems from CAAC's strong desire to improve maintenance, and its belief that the center will bring in significant amounts of foreign exchange.

Several manufacturing joint ventures also have well-developed service capabilities. The joint venture formed by Allen-Bradley Corp. and its Chinese partners is setting up four technical service centers—in Xiamen, Beijing, Shanghai, and Shenyang—to provide sales, service, and applications support. The service component plays a support role, with no intention to pull in profits, according to Allen-Bradley's John Butler.

Photo courtesy of Bailey Controls Co.

Bailey Controls Company moved from its first technical service center (shown) to a new location at the Beijing Automation Technical Research Institute in 1986. To keep pace with changes in technology, many companies find it useful to locate their service centers at a research facility of their host organization.

Selecting Chinese employees

Most service centers are staffed primarily by local Chinese. Company managers from Hong Kong or elsewhere in Asia often oversee operations, while the Chinese partner selects the service center's technicians from within its own ranks.

An increasing number of foreign companies are now able to influence the selection of their service center staff—a process once tightly controlled by the Chinese side. Prime Computer, for instance, specified in its contract the level of experience, education, and English ability the center's employees should have, and also tested prospective employees. Cincinnati Milacron chooses service staff from a group recommended by its partner, the Precision Machine Tool Maintenance Corporation, and has negotiated informally for the right to reject or dismiss unsatisfactory candidates. "Technically we can't dismiss anyone, but they always honor our request," said Cincinnati Milacron's Pete Pastoor. Some American companies report that suitable employees can also be found through China's fledgling labor market.

Most company managers are extremely positive about the ability and enthusiasm of their Chinese workers. Use of local labor minimizes supplier–customer communications problems—a big plus for the foreign party. And foreign companies have found that with training and experience a local Chinese staff provides top-notch service.

Training the work force

Training of the Chinese staff generally takes place in an overseas company facility. Many companies prefer to conduct this training at their branch offices in other Asian countries. This keeps transportation and living costs relatively low and in some cases allows the workers to be trained in Chinese. When this option

US COMPANY SERVICE CENTERS IN CHINA
(Established Since 1983)

US/Chinese Partners	Product	Details/Starting date
Lockheed Aircraft Service Intl (US) and Hutchison China Trade Holdings Ltd. (HK)/ Guangzhou Regional Administration of CAAC	Aircraft	$30 million, 50-50 equity joint venture to service CAAC planes. Plan to eventually service foreign aircraft. Expected onstream 8/88.
Hayes Microcomputer Products/NA	Computer modems	Repair station to be staffed by two Chinese employees. Mid-1988.
Prime Computer/China National Electronics Import and Export Corp. (CEIEC)	Computers	CEIEC-Prime Computer Service Depot to be staffed by six Chinese engineers. Three-year contract includes bonded warehouse. Mid-1988.
Allen-Bradley Corp./ Construction and Development Corp. of Xiamen SEZ, CMEC, Automation Research Institute of MMI, and China Natl Machine-Building Industry Supply and Sales Corp.	Automation control products	Technical centers set up in Xiamen, Beijing, Shanghai, and Shenyang as part of this 50-50 manufacturing joint venture that will produce, sell, and service automation control products. Spring 1988.
Onan Corp./China National Technical Import Corp. (TECHIMPORT)	Diesel generators	Three-year contract to provide service, parts, and training. Initially stocked with $100,000 worth of generator parts. 3/88.
McDonnell Douglas/ CAAC	Aircraft	Flight and maintenance training center including advanced flight simulator. Early 1988.
Baird Co./Xintian Precision Optical Instrument Corp.	Spectrum instruments	Beijing Spectrum Instrument Service Center to provide maintenance, repair, installation, and training. 1/88.
Digital Equipment Corp. (DEC)/China National Instruments Import and Export Corp. (INSTRIMPEX)	Computers	Beijing center to provide spare parts and technical training for DEC clients. 12/87.
Allison Division of GM Corp. and the Detroit Diesel Corp./TECHIMPORT	Detroit Diesel engines and Allison transmissions	DDA Beijing Service Center provides endusers with technical service, sales service, and training. Includes bonded warehouse. 10/87.
EG&G Chandler Engineering/Ministry of Urban Construction and Environmental Protection	Mud and cement consistometers	Repair and maintenance facility. Early 1986.
Xerox Corp./Shanghai SMPIC Corp. and Bank of Communications	Copiers	$30 million, 30-year copier manufacturing JV offering repair and maintenance service. 9/87.
Apollo Computer, Inc./ INSTRIMPEX	Computer workstations	Instrimpex-Apollo Computer Service Station and bonded warehouse in Beijing. Cooperative agreement in which Apollo pays for labor and space. 8/87.
GE Calma/TECHIMPORT and Electric Power Planning Engineering Institute of the Ministry of Water Resources and Electrical Power	CAD/CAM systems	CAD Technical Service Center in Beijing to provide training and product support. 4/87.
International Imaging Systems/Oriental Scientific Instruments Import and Export Corp.	NA	Center at Beijing Normal University. 3/87.
Xerox Corp./TECHIMPORT and Huabei Division of the China Electrical and Mechanical Equipment Corp.	Copiers and typewriters	Product supply center in Beijing to support service centers in Beijing, Shanghai, Guangzhou, and Chengdu. Parts on consignment. 1/87.
IBM Corp./NA	IBM computers	Provides technical support through Bright Star Co. 10/86.
Versatec Co./NA	Computers	Maintenance station in Beijing to service computers. 6/86.

is unavailable, training frequently takes place in the United States.

Training costs are negotiable. Since 1985 Nicolet Instruments has paid all costs for three US training programs for its Chinese technicians. Sunnen Products Company pays US domestic expenses while their Chinese partner covers the roundtrip airfare for trainee groups.

If an American company plans to provide training on advanced equipment, whether in the United States, China, or a third country, a license permitting the transfer of technical data may be required by the US government. Normally, such licenses are processed by the Department of Commerce (DOC) in one month, but if interagency or COCOM review is required, approval can take much longer.

Many companies fear newly trained employees will be pulled from their service centers by the controlling Chinese agency and moved to other factories. But Prime Computer's contract stipulates that skilled workers cannot be tranferred to other jobs for one or two years. This guarantees some stability and prevents the center from becoming merely a training ground.

Keeping spare parts in supply

Another important aspect of maintaining a service facility is keeping a ready supply of spare parts on hand. This is often more complicated than it sounds.

Many companies choose to set up a bonded warehouse for the storage of spare parts. Like spare parts included in an initial joint venture contract, parts stored in this reserved area of the service center enter China duty-free. The duty is waived as long as they are used in one-for-one swaps to replace defective parts. But the buyer must pay duty if the parts are sold rather than swapped.

Setting up a duty-free area requires special approval from the Chinese government. American firms must also get a license from the US government to ship spare parts to China—a process that has proved to be a headache for many. As Norman Mulvenon of EG&G Ortec—a supplier of nuclear radiation detection, analysis, and measurement instruments—said, "Unfortunately you can have a completely assembled unit that doesn't require an export license, but the parts do." The DOC

approval process often takes months.

In the past companies shipped their parts to China under a service supply license, used primarily for the immediate servicing of equipment. But the number of companies using the service supply license has decreased as the general licensing regulations have been simplified, according to Michael Hoffman, director of licensing for the DOC's Special Licensing Division.

The general licensing regulations were liberalized in 1987 to allow the export of parts "for use as one-for-one replacements in previously exported equipment." No shipment of replacement parts to China under this license may exceed $75,000 in value.

In filing for an export license, a company names the service center the ultimate consignee and attaches a list of endusers. This list can include potential customers as well as active customers, avoiding the need to seek subsequent authorization each time a new customer is added.

Most company spokespeople said the licensing process has improved recently, but were quick to add that it still involves too much time and paperwork. Some companies have decided it's not worth the effort to get the US and Chinese licenses for bringing spare parts into China. A few try to source compatible replacement parts made in China, while others just let their Chinese endusers order parts as needed.

"No service, no sales"

How a well-developed service capability translates directly into increased sales in China is hard to demonstrate conclusively. But service and sales *are* related and will become more so with time. Many companies believe that in-country service for their products gives them a competitive advantage. Kent Chu of Applied Color Systems said some of the company's rivals have not fared as well in China because they had to rely on outside service. "It is our feeling that having a service center has helped us in most of our business dealings there. I believe some of our competitors have not done as well." As Chinese endusers get more experience in international trade, those companies willing to stand behind their products with service should have an increasingly strong advantage. 完

General Electric Co./ Beijing Chemical Industry Research Institute	NA	Center to service GE's plastics clients in northern China. 6/86.
Gen Rad, Bei Jing Washington Co./Integrated Circuit Testing Technology Center	Integrated circuit testers	Technology service center in Beijing provides installation, maintenance, measuring, consulting, and software development. 4/86.
Nicolet Instrument Corp./INSTRIMPEX	Computers, digital oscilloscopes and other electronic equipment	Center staffed by four Chinese and three Hong Kong engineers. Early 1986.
Cincinnati Milacron/Precision Machine Tool Maintenance Corp.	Machine tools	Cooperative agreement pays for office space and staff of three Chinese employees. Includes bonded warehouse. Early 1986.
Total Technical Services/ Beijing ITIC and Beijing Institute of Aeronautics and Astronautics	Computers	Total Technical Services Eastern, Inc., a 50-50 JV in Beijing to provide installation, maintenance, spare parts, and sales of computer equipment. 1/86.
Sunnen Products Co./ Ministry of Aeronautics and Astronautics	Precision sizing and hole-finishing machines	Sunnen invested $50,000 in machinery and equipment for Beijing JV service center. 1/86.
Caltex Petroleum Corp./ China Natl Machinery and Equipment Import-Export Corp. (CMEC)	Lube oils	Caltex Lubricant Supply Center to sell lube oils and supply technical service. 12/85.
Perkin-Elmer East Asia Ltd./INSTRIMPEX	32-bit super minicomputers	Center has more than $500,000 worth of equipment, spare parts, and tools. 9/85.
Ballantine Laboratories/ National Institute of Metrology	Instruments, calibration and standards equipment	Sales and service center in Beijing. 9/85.
Hewlett-Packard Co. Ltd./CMEC and Beijing Computer Industrial Corp.	HP 3000 supermini computers and instrument products	China Hewlett-Packard 10-year, $5 million, 50-50 JV in Beijing to provide sales and service for China-assembled HP computers. 6/85.
Fisher Controls International Inc./China Petrochemical International	Automated controls systems	Fisher Controls Technical Service Center to provide seminars, product sales, and application advice. 6/85.
Bailey Controls Co./ Beijing Automated Technical Institute	Automated controls systems	Beijing Bailey Technical Center provides service, training, and demonstrations of Bailey Controls products. 5/85.
Intergraph Corp./CMEC and Research Institute of Automation	Computer graphics systems	Chinese staff provides technical information. Mid-1985.
Applied Color Systems/ Tianjin Textile Research Institute	Computer color-matching system	Staff of five Chinese provides service and advice. Mid-1985.
Applied Materials Inc./ Ministry of Electronics Industries	Semiconductor production systems	Jointly manage Applied Materials-China Service Center in Beijing to install and service systems. Early 1985.
Control Data Corp./ INSTRIMPEX	Computers	Spare parts warehouse in Beijing with initial stock worth $615,000. 10/84.
EG&G ORTEC/China Nuclear Energy Industry Corp. (CNEIC)	Nuclear radiation measurement instruments	In cooperative agreement EG&G pays fee that is percentage of shipments to China. In Beijing. 10/84.
EG&G Princeton Applied Research Corp./CNEIC	Instruments	Technical service center in Beijing to repair, align, and calibrate instruments. 10/84. In late 1987 changed Chinese partner to CNEIC.
Allen Bradley Co./CMEC and Great Wall Machinery Co. Ltd.	Industrial automation products and systems	CMEC to set up distribution and service center in Dalian. Initially a three-year agreement. 9/84.
Flow Systems Inc./China National Aero-Technology Import and Export Corp. (CATIC)	Water-jet and abrasive-jet cutting equipment	Five-year contract with CATIC for service and installation. CATIC has testing center for Flow equipment. 1984.

Compiled by Perri Strawn from US company interviews and US-China Business Council files. Details on service centers established before 1984 can be found in the Sept-Oct 1983 issue of *The CBR*.

PROJECT NOTEBOOK

会员动态

Babcock and Wilcox Beijing Company Ltd.

Julia S. Sensenbrenner

One of the most serious constraints China faces as it tries to modernize its economy and improve the standard of living is a crippling shortage of electric power to run factories and support increasingly popular consumer goods such as refrigerators, washing machines, and fans. China's demand for electricity can be expected to grow well into the 21st century, but expanding power generation to meet this demand will not be easy. In addition to difficulties in transporting coal and a shortage of large generating stations, planners stumble over China's inability to produce enough large-scale utility boilers imperative to efficient power generation. Boilers play a role in the first phase of power production by making the steam used in steam turbines, which are attached to the generators that produce electricity.

In the early 1980s the Chinese government approached the Babcock & Wilcox Company, a subsidiary of McDermott Incorporated (US) and a leading supplier of large utility and industrial boilers, to ask if the company was interested in forming a joint venture. Babcock & Wilcox's market research showed that China was the world's largest market for utility boilers, with demand for industrial steam growing faster than in the United States. Pleased with the potential and the Chinese government's strong interest, the company began negotiating a joint venture in 1983.

By October 1985, a $12 million 50–50 equity joint venture deal to produce both Chinese-designed industrial boilers and Babcock & Wilcox-designed utility boilers was inked between Babcock & Wilcox and the Beijing Boiler Works. Under the agreement, Babcock & Wilcox Beijing Company Ltd. took over about two-thirds of the Beijing Boiler Works, leaving the rest of the original plant and staff to continue its production of smaller industrial boilers under separate operations. To supplement the existing facilities, the joint venture constructed several new buildings, including a 9,000 square meter fabrication shop, an engineering center, and an administration building.

A success story

Hugh Benton, vice president for Ventures and Licensing at Babcock & Wilcox International, says the company considers its China joint venture a success. Revenue levels originally projected for the fifth year of operations were generated in Babcock & Wilcox Beijing's first full year of production. The venture's first contract for a 200 megawatt (MW) boiler was received at the start of operations, about two years earlier than originally expected. And the process of transferring the technology for 300 MW boilers is ahead of schedule, with a higher percentage of the engineering now being done in China than originally thought possible. Benton comments, "The solid technical foundation of our Chinese engineers should permit more of the engineering to be performed in China with only terminal backup from Babcock & Wilcox in North America."

In addition factory productivity has risen 30 percent since operations began in late 1986. Benton credits much of this to the expatriate team that provides proven management practices and to wide-scale worker acceptance of an incentive pay program based on the production of an entire shop. Meeting pre-set production goals has encouraged teamwork and dedication to the job—to the point that employees concerned about falling short of quotas have worked extra shifts on their own. Currently the factory is working about 3 million manhours a year in three shifts—which is still somewhat short of full plant capacity.

Nine resident expatriates, involved in such key areas as general management, technology, engineering, quality assurance, and materials management, have become an integral part of the joint venture team. These people, who either head departments in the plant or hold key positions within departments, teach the Chinese workers how to run the plant while imparting principles of advanced management and technology. The expatriates have earned the respect of most Chinese workers by their hard work, demonstrated expertise, and commitment to making the joint venture succeed.

Benton ascribes the success of integrating the expatriate team into the Chinese factory to two primary factors. Most of the nine expatriates had already worked together in the United States prior to their China posting and thus formed a cohesive group from the start. And General Manager Irl Hicks has been extremely adapatable as he attempts to cope with multiple problems unknown to US managers. These range from communications challenges and staff living conditions to power shutoffs and slow bureaucratic response.

China currently has an oversupply of small, less efficent boilers, but Babcock & Wilcox Beijing's products are in high demand due to their size and quality. In 1987 the venture shipped 70 coal-fired boilers, including the factory's first 200 MW unit. In 1988, the 67 boilers on order are

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Julia S. Sensenbrenner is editor of The China Business Review.

generally larger in capacity, including the venture's first 300 MW unit. Because Babcock & Wilcox Beijing produces each boiler on receipt of an order, the success of the sales and marketing team is essential. A Chinese manager heads the team, although General Manager Hicks retains final approval over all marketing plans and prices.

Building strong relationships

Many factors have contributed to the venture's progress. Benton regards laying a solid legal and financial foundation and establishing a good working relationship with the partner in the planning and negotiating phase as primary prerequisites. Crafting an all-encompassing contract requires thorough and complete planning by both sides, and an attempt to foresee all contingencies. Throughout the two-year negotiating period, Babcock & Wilcox found it had to balance persistence with patience on the pace of negotiations. Fielding a small, stable negotiating team committed to pushing the project forward turned out to be the key.

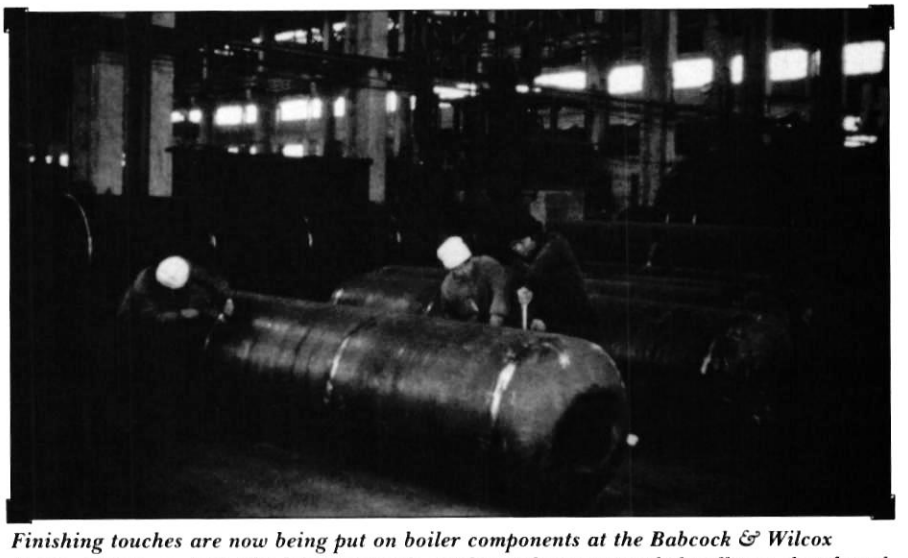
But negotiations require two sides—and Benton adds that the Chinese partner must also be enthusiastic about forming a joint venture. Since Babcock & Wilcox had a product China needed, the Chinese government helped by recommending the best potential partner. But even when all factors work in favor of a joint venture, the deal can only reach a conclusion if both sides have a clear understanding of non-negotiable elements and are willing to compromise in less crucial areas.

Since production began, other factors important to smooth operations are emerging. On the production line, workers are enthusiastic, Chinese engineers make significant contributions, and the equipment is well serviced. A strong and cohesive board of directors has become a reliable and trusted forum for ironing out problems.

Forging a close working relationship between industry and government has been an important aspect of the venture's success. The Beijing location is a plus in this respect, providing ready access to officials at all levels. And high-level officials can easily visit the venture as well, as Babcock & Wilcox found when Party Secretary Zhao Ziyang decided to tour the boiler plant in March. The venture enjoyed an unexpected benefit in the favorable publicity resulting from this visit.

Photos courtesy of Babcock & Wilcox

The need for large quantities of high-quality imported pipes has forced Babcock & Wilcox Beijing to use creative methods to supplement foreign exchange shortfalls.



Finishing touches are now being put on boiler components at the Babcock & Wilcox Beijing Company, Ltd. The joint venture's employees have responded well to a shop-based incentive pay program, increasing productivity by 30 percent since late 1986.

Foreign exchange shortfall

Like many joint ventures in China, Babcock & Wilcox Beijing faces a continuing shortage of foreign exchange. Almost all materials for the industrial boilers can be sourced domestically, but the more sophisticated utility boilers require large quantities of imported materials. In the venture's feasibility study, Babcock & Wilcox Beijing expressed its desire to export 20 percent of total production by the early 1990s as a way of balancing foreign exchange. While the joint venture recently won its first export job and will supply two small industrial boilers to the Philippines next year, the 20 percent goal may be difficult to attain. In the Third World, Babcock & Wilcox Beijing must compete against international boiler producers with established reputations and financial support from their home governments. This makes Babcock & Wilcox Beijing quite concerned that it may never earn enough through exports to meet the ongoing foreign exchange expenses of importing materials, paying expatriates, and supplying some of the highly technical engineering

now performed in North America.

As a result, the venture is exploring options for tapping outside sources of foreign exchange. One possibility briefly considered was investing in a hotel project in Tianjin. Swapping renminbi for foreign exchange is another alternative, but Babcock & Wilcox Beijing currently cannot afford to pay the premium required when the money is exchanged with another company. To date the venture has only swapped renminbi for foreign exchange at official rates.

Problems in reaching full productivity

Babcock & Wilcox is pleased with progress so far, but to bring the venture up to full productivity and profitability, several goals must still be achieved. A shortage of skilled workers prevents production at full capacity. And until the venture can offer suitable housing for its new workers, it will have trouble recruiting skilled technicians and engineers from distant areas.

Raw materials have been another ongoing problem area. Since materials can only be purchased from State supply channels twice a year and shortages of key materials are not infrequent, the venture must plan in advance and maintain a relatively high inventory on site. But because Babcock & Wilcox Beijing holds an important position in China's overall industrial development, the State raw material supply system grants it high priority, allocating the joint venture 40 percent of its needs. Still, the company must fill in gaps, and buying additional raw materials on the open market is expensive. Despite improvement in the past year, the plant's material utilization rates remain too low, with too much scrap.

China has begun the difficult process of improving its infrastructure, but for now the country's overstrained transport system further complicates business operations. Babcock & Wilcox Beijing has faced problems gaining timely access to a sufficient number of railroad cars to guarantee shipment of materials and products. And on occasion, shipping larger-sized components has proved problematic. The company hopes to be able to eventually cut costs by increasing the size of components made in the factory and reducing the extent of on-site assembly.

Facing the future

These problems have by no means discouraged Babcock & Wilcox. In fact, Babcock & Wilcox Beijing plans to continue expanding production by about 5 percent each year through a combination of improved productivity, additional workers, and stepped-up training. But since growth is currently limited more by the size of the plant than by sales potential, Babcock & Wilcox is now considering building more facilities at the Beijing site or possibly forming another joint venture.

The company believes that its commitment to this joint venture will help it compete against other foreign companies working in China. But the ultimate goal, says Benton, is to successfully participate in the Chinese market and export internationally. If Babcock & Wilcox Beijing achieves this goal, it will certainly be able to claim its place as the newest producer of a world-class boiler.

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The Long-Awaited Cooperative Venture Law

Despite raising more questions than it answers, the new law fills a major void

Jerome Alan Cohen

Nine years after the promulgation of a law on equity joint ventures (EJVs) and after more than 5,200 cooperative venture contracts had been approved, China's National People's Congress finally adopted a law for cooperative ventures (also known as cooperative joint ventures) in April. The Law of the PRC on Chinese–Foreign Cooperative Joint Ventures (the Law) fills a gaping hole in China's legislative framework for foreign investment, assuaging Chinese embarrassment over an increasingly obvious neglect of Western-style legality.

Because the cooperative venture (CV) investment form offers greater flexibility than that of an equity joint venture, the absence of legislation did not prevent CVs from attracting greater amounts of foreign investment (*see* graph). Dealmakers could, on an ad hoc basis, experiment with any arrangement that could win official approval.

But most existing CVs in China are modest projects involving Hong Kong investors and overseas Chinese. Many multinational investors were deterred from this form of investment by the lack of authorizing legislation. As China's leaders became more aware of the importance of law in facilitating cooperation with foreign business—and increasing investor confidence—the problems caused by the lack of a CV law became increasingly apparent.

A fairly flexible framework

In providing a basic framework for cooperative ventures, the Law reflects nine years of operating experience. In general, however, it is a vague, broad statute that leaves many questions unanswered. Details and clarifications must await promulgation of implementing regulations, which authoritative sources say may be issued "within a few months." Yet the diversity of contractual arrangements embraced by the term "cooperative venture" and the complexity of some of the legal problems involved could easily cause considerable delays.

The new Law does confirm the legality of many of the features that differentiate a CV from an EJV, albeit in language that is sometimes less than explicit. A cooperative venture can be an independent legal person like an EJV, with its highest authority lying in a board of directors led by a chairman. But it may also operate as a so-called nonlegal person, with the top authority apparently residing in a joint management body led by a director.

The CV Law also allows the contracting parties to determine the distribution of earnings or products of the venture as they choose, rather than in proportion to specific ownership shares as required under EJV law. This eliminates the need for the parties to agree on a precise valuation of their contributions to the venture in order to ascertain ownership percentages, removing the valuation problem frequently encountered in EJV negotiations. Moreover, unlike the EJV law, which generally sets a 25 percent minimum for the foreign party's contribution to registered capital, the new law imposes no minimum percentage on foreign investment.

Although the CV law does not touch directly on the issue of registered capital, in some cases it may still be necessary to value the partners' contributions to the CV and establish a registered capital. Authoritative investment officials have made it clear that, at least if a CV wants legal person status, it must have registered capital and the amount must be stated at the time the CV registers with the State Administration for Industry and Commerce (SAIC). If a CV has registered capital, it will presumably be subject to the rules promulgated in 1987 and 1988 on debt–equity ratios and the form and timing of capital contributions. Both of these rules are specifically addressed to EJVs but are stated to apply "by reference" to CVs. How strictly these rules will be applied to cooperative ventures remains to be seen, but one hopes the traditional flexibility of the CV form—which the new law seems generally to confirm—will not be unduly restricted.

Another difference from the EJV Law, which prohibits any reduction in registered capital during the contract period, is that the CV parties have the right to provide for the foreign investor to recover its investment during the term of the venture. Recovery can be made on a pre-tax basis if the financial and tax authorities approve—an approval that will be difficult to obtain if experience is any guide. However, if the parties do agree to early investment recovery, all the CV's fixed assets go to the Chinese side when the contract term expires.

Fewer management requirements

An important and distinctive characteristic of a CV is confirmed by the Law: a foreigner may serve as chairman of the board of directors of the CV, or as director of the joint management body when a CV is

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formed without legal person status. The chairman's small amount of real power lies in the role as the venture's legal representative with the ability to legally bind the venture. Thus the opportunity to appoint the chairman is valuable to the foreign side—and is one that the foreign party does not have under the EJV Law.

In general, the CV Law offers investors greater freedom to organize their venture as they see fit. Although it requires that a Chinese be named vice chairman if a foreigner serves as the venture's chairman, it places no requirements on the posts of general manager and deputy general manager. In fact, it does not even require that there be a general manager and fails to mention any other position. In addition, the CV Law permits the investors to entrust a third party to assume management and operations of the venture, subject to unanimous board consent, government approval, and a modification of the CV's registration. In certain localities contracts between joint ventures and hotel management companies have gone into effect without government approval in the past. It is unclear whether the Law's third party management provision will apply to future hotel management contracts, which some hotel companies regard as not affecting management of the venture itself but only of the hotel, one of its assets.

The more flexible management provisions in the CV Law may foreshadow changes in the EJV Law, which is due for revision after almost a decade of practice. Other signs point in this direction. General Secretary Zhao Ziyang declared last January that at China's present stage of economic development the country can benefit from foreign-managed joint ventures. And the PRC's new leaders—with a less nationalistic view of China's sovereignty than their predecessors—have advocated that foreign-invested ventures follow "international practice."

Bringing investment law up to date

Current investors should also be alert to other provisions of the new Law that diverge from the EJV law. Most of these changes reflect improvements in China's rapidly evolving investment environment or attempts to protect the country from previous problems with foreign investment. Unlike the maximum 50-year contract term for EJVs, there is no specified time limit for the term of a CV. This suggests that CVs may be allowed longer terms, although future regulations may ultimately crush this hope. The new Law also authorizes CVs to open foreign exchange accounts at any banks approved by the State foreign exchange authorities. That ventures are no longer forced to work with the Bank of China (BOC) or BOC-approved banks is further evidence that the BOC has lost its monopoly in the arena of foreign-related banking. The promise of quicker decisions on applications to establish CVs is another significant feature of the CV Law. Decisions must be rendered within 45 days, half the time allotted to EJV applications.

The Law also demonstrates that the Chinese government recognizes some responsibility for eliminating the greatest single obstacle to successful foreign investment in the PRC—foreign exchange. Although the Law makes a ritual bow to the principle that each CV is responsible for balancing foreign exchange receipts and expenditures, it realistically goes on to state that, if a CV cannot attain such a balance, "it may, in accordance with State provisions, apply to relevant authorities for assistance." Details of how this will work in practice are not provided.

The Law adopts a more restrictive tone in dealing with financing. Article 17 provides that "with respect to funds borrowed by Chinese and foreign cooperative venturers to be used for investment or conditions for cooperation, and the guaranties therefor, each party shall resolve these on its own." Although the meaning of this is unclear, like earlier regulations it appears to be designed to prevent the recurrence of situations in which a foreign "investor" in a CV involves the venture or the Chinese party in the risks of financing the foreigner's capital contribution to the venture, by arranging, for example, for the venture or the Chinese party to guarantee repayment of funds borrowed by the foreigner for its capital contribution. The provision, however, would not seem to go beyond that to prevent the venture from guaranteeing any loan taken out by the foreign party to finance the difference between the CV's capital and the total investment required for the project. Yet the cryptic language has already generated confusion in contract negotiations. The Ministry of Foreign Economic Relations and Trade (MOFERT) plans to clarify this issue in the near future.

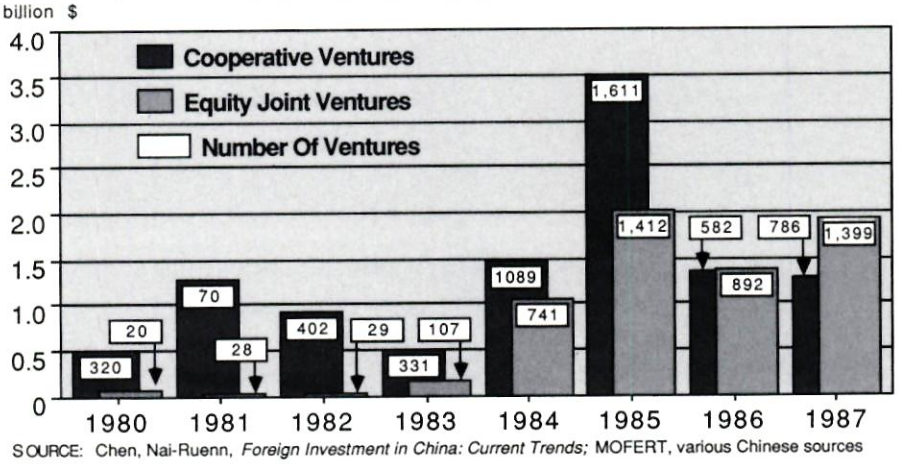
The lingering problem of limited liability

For almost a decade foreign investors have hoped Chinese law would give them the best of both worlds—the flexibility of a CV along with the protection offered through limited liability. Since the EJV Law clearly established EJVs as limited liability companies, investors have anxiously awaited the same legislative assurance for CVs.

Unfortunately, the new Law never mentions the problem. However, the General Principles of Civil Law (GCPL) provides that legal person CVs, like EJVs and wholly foreign-

Value of Foreign Investment

Will Cooperative Ventures Regain Ground Following Promulgation of the New Law?



SOURCE: Chen, Nai-Ruenn, *Foreign Investment in China: Current Trends;* MOFERT, various Chinese sources

Chart by Pam Tobey

owned enterprises, "bear civil liability to the extent of the property the enterprise owns, unless the law provides otherwise." This is widely understood to mean that, generally, legal person CVs can have limited liability if they follow the proper steps. After the Law was promulgated, Deputy Director Chu Baotai of MOFERT's Foreign Investment Administration Bureau said that a legal person CV will enjoy limited liability "if it publishes its registered capital and declares itself to be a limited liability company."

Yet to become a legal person a CV must convince the SAIC that, among other things, it meets the requirement of the GCPL that it "possess the necessary property or funds." This means it must state its registered capital when it applies to register with the SAIC. Given the difficulties of determining the value of certain types of nonmonetary capital contributions, if such contributions in kind predominate over cash contributions the SAIC may determine that some CVs that otherwise possess the characteristics of a legal person are undercapitalized.

A nonlegal person CV is not endowed with limited liability. Thus, if assets are insufficient to meet debts, the investors must use their own assets to pay off a CV's debts. But third parties should beware, for the GPCL suggests that each investor in a nonlegal person CV is liable only "in accordance with its share of capital contribution or the provisions of their agreement;" the investors will be jointly liable only "if the law or agreement so provides."

Because Article 22(3) of the Law is poorly drafted, it could be interpreted to mean that, if the parties agree to let the foreign investor recover its investment during the term of the CV, even a venture that would otherwise have limited liability would lose it. This reportedly is the view of some National People's Congress delegates. Yet knowledgeable MOFERT officials say this language was not intended to deprive a CV of limited liability, but merely to assure that the Chinese party would not be left holding the bag should the foreigner recover investment early and leave the CV with too many debts for its remaining assets. They say the provision was designed to ensure that both parties to a limited liability legal person CV keep available to the venture all assets originally committed—not that they sacrifice their other assets to pay off the CV's debts.

Chu Baotai has written that, in the case investment is recovered early, the foreign co-venturer must provide a guarantee or goods as security for its obligation to return the recovered investment if needed to shoulder a fair share of the CV's debts. The CV contract can arrange this in various ways. In a contract approved in Shanghai in 1987, for example, the parties agreed to treat the early return of capital as an interest-free loan to the foreign party that was subject to call by the CV if necessary to honor its obligations.

No changes in taxes—at least temporarily

Although ambiguous, the new Law's tax language seems designed to leave tax matters virtually unaffected. Unlike EJVs (which pay income tax under special legislation that generally imposes a flat 30 percent national rate and a local rate of 10 percent), income tax for most CVs is not paid by the venture, but by each of the investors based on their income share. Absent special considerations, the Foreign Enterprise Income Tax Law (FEITL) imposes on the foreign investors a national tax at progressive rates that vary from 20–40 percent and a local income tax of 10 percent. The Chinese investors, usually State enterprises, are taxed under other legislation that imposes a higher rate.

Some investors had hoped the Law would expand the limited income tax preferences currently granted under the FEITL to foreign investors in ordinary CVs and shift income tax responsibility for legal person CVs to the venture itself. In creating income tax incentives that promote China's economic policies, the trend has been to equalize the benefits offered to CVs, EJVs, and wholly foreign-owned enterprises (WFOEs). For example, specific legislation for various special zones makes geography more important than the form of investment. Similarly, under the Provisions for the Encouragement of Foreign Investment, the ability of the business to meet standards set for export-oriented or technologically advanced certification—rather than the form of investment—is the determining factor for reduced rates and additional income tax benefits.

In light of this trend, both Chinese officials and foreigners have questioned the desirability of maintaining two separate income tax regimes—one for EJVs and the other for CVs, WFOEs, and foreign enterprises engaged in other activities. It is widely anticipated that by the end of 1988 an already announced overhaul of the foreign-related income tax laws will lead to an integrated law, one that is likely to give all types of foreign investment enterprises substantially equal tax treatment.

A disturbing bounty of unaddressed issues

The CV Law bristles with questions. Can labor services or goodwill continue to serve as an investment item? How do the "rights to the use of the land" mentioned in Article 8 differ from the "rights to the use of the site" referred to in EJV legislation? Does a provision encouraging the establishment of export-oriented and technologically advanced CVs mean that other productive ventures and service CVs will be actively discouraged or simply given fewer incentives?

Other areas also remain vague. The nature of a nonlegal person CV is one outstanding example. Is this entity similar to an American partnership? What are the registration requirements it, or the foreign venturer, must meet? Is the director of its joint management body its legal representative? Can each of the partners create legal relationships with others that will bind the venture? There is great need to clarify the relationship between these aspects of the CV Law and the relevant provisions of the GPCL.

Similar gaps exist in another area of great concern to foreigners—early recovery of investment. In dealing with this alternative, Article 22 implicitly raises tax questions concerning both substance and administration. What methods will the financial and tax authorities approve for recovering investment before income tax is paid? For example, in what circumstances will the foreign investor be able to resort to accelerated depreciation? Moreover, when must approval take place? If the authorities will not consider the matter prior to contract signing, will it be possible to make this approval a precondition to the contract's legal effectiveness? In addition, questions

remain about the scope and treatment of fixed assets belonging to the Chinese side upon early recovery of investment.

Despite all of these problems and unanswered questions, the promulgation of the CV Law is an important achievement—one that on balance should facilitate further foreign investment in China. It would have been preferable if a draft of the Law had been published prior to its final formulation, so that many of the questions and criticisms presented here and elsewhere could have been considered before promulgation. Nevertheless, the Law has already begun to stimulate a process of reflection, discussion, and clarification. If experience with the EJV Law is any guide, this should eventually lead to the issuance of implementing regulations more impressive and useful than the law that spawned them.

The Law of the People's Republic of China on Chinese–Foreign Cooperative Joint Ventures

Article 1. This Law is formulated in order to expand economic cooperation and technical exchange with foreign countries and to promote the establishment by foreign enterprises and other economic organizations or individuals (hereafter referred to as "foreign cooperative venturers") jointly with enterprises or other economic organizations of the People's Republic of China (hereafter referred to as "Chinese cooperative venturers") of Chinese–foreign cooperative joint ventures within the territory of China (hereafter referred to as "cooperative ventures") in accordance with the principle of equality and mutual benefit.

Article 2. In establishing a cooperative venture, the Chinese and foreign cooperative ventures shall, in accordance with the provisions of this Law, reach agreement in a cooperative venture contract on such matters as the investment or conditions for cooperation, the distribution of earnings or products, the sharing of risks and losses, the manner of operation and management, and the ownership of the property upon termination of the cooperative venture.

A cooperative venture that meets the provisions of Chinese law regarding the conditions for being a legal person shall acquire the status of a Chinese legal person in accordance with law.

Article 3. The State shall, in accordance with law, protect the lawful rights and interests of cooperative ventures and of Chinese and foreign cooperative venturers.

Cooperative ventures must abide by the laws and regulations of China and must not cause harm to China's social public interest.

The relevant authorities of the State shall, in accordance with law, carry out supervision of cooperative ventures.

Article 4. The State encourages the establishment of productive-type cooperative ventures that are export-oriented or technologically advanced.

Article 5. To apply for the establishment of a cooperative venture, such documents as the agreement, the contract, and the articles of association signed by the Chinese and foreign cooperative ventures shall be submitted for examination and approval to the departments in charge of foreign economic relations and trade under the State Council or to departments and local governments authorized by the State Council (hereafter referred to as the "examination and approval authority"). The examination and approval authority shall, within 45 days from the date of receiving the application, decide whether or not to grant approval.

Article 6. After the application for the establishment of a cooperative venture has been approved, within 30 days after receipt of the certificate of approval, an application for registration shall be made to the administrative authorities for industry and commerce and the business license obtained. The date of issuance of the business license of a cooperative venture shall be the date of establishment of such venture.

A cooperative venture shall, within 30 days after the date of establishment, carry out tax registration with the tax authorities.

Article 7. If, during the period of cooperation, the Chinese and foreign cooperative venturers agree through consultation to make major modifications to the cooperative venture contract, they shall report to the examination and approval authority for approval; if the contents of the modifications involve items for which the law prescribes industrial and commercial registration or tax registration, procedures for change of registration shall be carried out with the administrative authorities for industry and commerce and the tax authorities.

Article 8. The investment or the conditions for cooperation provided by the Chinese and foreign cooperative venturers may be in cash, in kind, in rights to the use of the land, industrial property rights, nonpatented technology, and other property rights.

Article 9. The Chinese and foreign cooperative venturers shall, in accordance with the provision of laws and regulations and the agreements in the cooperative venture contract, perform in a timely manner the obligations to contribute the investment fully or to provide the condition for cooperation. In the event of failure to perform by the stipulated time, the administrative authorities for industry and commerce shall set a time limit for performance; in the event of continued failure to perform by the expiration of such time limit, the matter will be handled by the examination and approval authority and the administrative authorities for industry and commerce in accordance with the relevant provisions of the State.

The investment or the conditions for cooperation provided by the Chinese and foreign cooperative venturers will be verified, and a certification issued, by an accountant registered in China or by the relevant agency.

Article 10. If a Chinese or foreign cooperative venturer assigns all or a part of its rights or obligations under the cooperative venture contract, it must obtain consent from the other party or parties and report to the examination and approval authority for approval.

Article 11. Cooperative ventures shall carry out operation and management activities in accordance with the approved cooperative venture contract and articles of association. The right of autonomy of cooperative ventures in their operation and management shall not be subject to interference.

Article 12. Cooperative ventures shall establish a board of directors or a joint management body which shall, in accordance with the provision of the cooperative venture contract or the articles of association, decide the major issues of the cooperative venture. If one or the other of the Chinese and foreign cooperative venturers assumes the chairmanship of the board of directors or the directorship of the joint management body, then the other side will assume the vice chairmanship or the deputy directorship. The board of directors or the joint management body may decide to appoint or employ a general manager to be in charge of the daily operation and management work of the cooperative venture. The

Adopted by the First Session of the Seventh National People's Congress on April 13, 1988.

general manager will be responsible to the board of directors or the joint management body.

If, after its establishment, a cooperative venture changes to entrusting a person other than the Chinese and foreign cooperative venture with its operation and management, it must obtain the unanimous consent of the board of directors or the joint management body, report to the examination and approval authority for approval, and carry out the procedures for change of registration with the administrative authorities for industry and commerce.

Article 13. Such matters as the employment, dismissal, remuneration, welfare benefits, labor protection, and labor insurance of the staff and workers of cooperative ventures shall, in accordance with law, be stipulated through the conclusion of contracts.

Article 14. The staff and workers of cooperative ventures shall, in accordance with law, establish trade union organizations, conduct union activities and protect the lawful rights and interests of the staff and workers

Cooperative ventures shall provide the necessary conditions for the activities of their trade unions.

Article 15. Cooperative ventures must keep accounting books within the territory of China, file accounting statements in accordance with provisions, and accept supervision by the financial and tax authorities.

Cooperative ventures that contravene the preceding paragraph and do not keep accounting books within the territory of China may be fined by the financial and tax authorities, and the administrative authorities for industry and commerce may order them to stop business or revoke their business licenses.

Article 16. Cooperative ventures shall, on the strength of their business license, open foreign exchange accounts with banks or other financial institutions approved by the foreign exchange control authorities of the State to carry out foreign exchange business.

The foreign exchange transactions of cooperative ventures shall be carried out in accordance with the relevant provisions of the State on foreign exchange control.

Article 17. Cooperative ventures may borrow funds from financial institutions within the territory of China and may also borrow funds outside the territory of China.

With respect to funds borrowed by Chinese and foreign cooperative venturers to be used for investment or conditions for cooperation, and the guarantees therefor, each party shall resolve these on its own.

Article 18. The various kinds of insurance for cooperative ventures shall be purchased from insurance institutions within the territory of China.

Article 19. Cooperative ventures may, within the approved scope of operation, import goods and materials needed by the venture and export products produced by the venture. Goods and materials such as raw materials and fuel needed by cooperative ventures within the approved scope of operation may be purchased on the domestic market, and may also be purchased on the international market.

Article 20. Cooperative ventures shall resolve on their own the balance of foreign exchange receipts and expenditures. If a cooperative venture cannot balance on its own its foreign exchange receipts and expenditures, it may, in accordance with State provisions, apply to the relevant authorities for the granting of assistance.

Article 21. Cooperative ventures shall pay taxes in accordance with State provisions regarding taxation and may also enjoy preferential treatment of reduction of and exemption from taxes.

Article 22. The Chinese and foreign cooperative venturers shall, in accordance with the agreements in the cooperative venture contract, distribute earnings or products and assume risks and losses.

In cases where the Chinese and foreign cooperative venturers have agreed in the cooperative venture contract that upon the expiration of the period of cooperation all the fixed assets of the cooperative venture will belong to the Chinese cooperative venturer, the parties may agree in the cooperative venture contract upon methods for the foreign cooperative venturer to recover its investment in advance during the period of cooperation. In cases where it is agreed in the cooperative venture contract that the foreign cooperative venturer will recover its investment before the payment of income tax, application must be made to the financial and tax authorities, and the financial and tax authorities shall examine and approve the application in accordance with provision of the State regarding taxation.

In cases where, in accordance with the provisions of the preceding paragraph, the foreign cooperative venturer is to recover in advance its investment during the period of cooperation, the Chinese and foreign cooperative venturers shall, in accordance with the provision of relevant laws and the agreements in the cooperative venture contract, assume responsibility for the liabilities of the cooperative venture.

Article 23. After the foreign cooperative venturer has performed the obligations stipulated by law and agreed in the cooperative venture contract, it may remit abroad, in accordance with law, the profits distributed to it, other lawful revenues and the funds distributed to it upon termination of the cooperative venture.

The salary revenue and other lawful revenue of the foreign staff and workers of cooperative ventures may be remitted abroad after the payment of individual income tax in accordance with law.

Article 24. Upon the expiration or early termination of a cooperative venture, liquidation shall be carried out with respect to the assets, claims, and liabilities in accordance with the procedures stipulated by law. The Chinese and foreign cooperative venturers shall, in accordance with the agreements in the cooperative contract, determine the ownership of the cooperative venture's property.

Upon the expiration or early termination of a cooperative venture, procedures for the cancellation of registration shall be carried out with the administrative authorities for industry and commerce and the tax authorities.

Article 25. The period of cooperation of cooperative ventures shall be determined through consultation by the Chinese and foreign cooperative venturers and shall be clearly specified in the cooperative venture contract. If the Chinese and foreign cooperative venturers agree to extend the period of cooperation, they shall apply to the examination and approval authority at least 180 days prior to the date of expiration of the period of cooperation. The examination and approval authority shall decide whether or not to grant its approval within 30 days after the date of receipt of the application.

Article 26. When disputes between the Chinese and foreign cooperative venturers arise in the performance of the cooperative venture contract or the articles of association, they shall be resolved through consultation or mediation. If the Chinese and foreign cooperative venturers do not want to resolve the matter through consultation or mediation, or if consultation or mediation is unsuccessful, they may, in accordance with the arbitration clause in the cooperative venture contract or a written arbitration agreement reached by the parties after the fact, submit the dispute for arbitration by a Chinese arbitration agency or another arbitration agency.

If the Chinese and foreign cooperative venturers did not conclude an arbitration clause in the cooperative venture contract, and do not reach a written arbitration agreement after the fact, the Chinese and foreign cooperation venturers may bring suit in China's courts.

Article 27. The department in charge of foreign economic relations and trade under the State Council shall formulate detailed implementing rules in accordance with this Law, which shall go into effect after being reported to and approved by the State Council.

Article 28. This Law shall go into effect on the day of promulgation. 完

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PAST, PRESENT, AND FUTURE AT COUNCIL'S 15TH ANNIVERSARY CELEBRATION

Sharing anecdotes from past experiences and strategies for future endeavors, veteran China business hands gathered to celebrate the 15th anniversary of the National Council for US–China Trade on June 1–2 in Washington, DC—and voted to change the Council's name to the US–China Business Council (*see* p. 4). Traveling from China to join in the festivities was a delegation from the China Council for the Promotion of International Trade (CCPIT), the Council's counterpart organization in China.

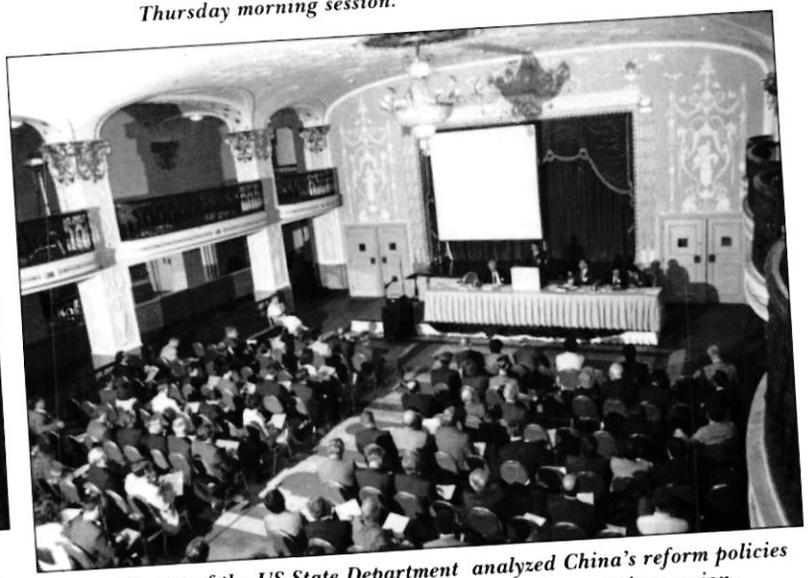
The celebration began with a dinner featuring an address by Michael Armacost, under secretary of State for Political Affairs. Armacost outlined the remarkable progress made in Sino–US relations since normalization nearly a decade ago, pointing out that routine high-level discussions, consultation on problems, and a 10-fold growth in trade have brought the relationship to a point beyond partisan debate in either country. The two governments now consult on an extraordinary range of issues—from export con-

Photos by Ray Crowell

Member company representatives exchange views with Ji Chongwei, director of China's State Council Research Center for Economic, Technological, and Social Development.

Speaker Jerome Alan Cohen (second from left) discusses legal developments in China with other Council members during the Thursday morning session.

Boeing's Robert Seal and CCPIT Chairman Jia Shi at the reception preceding Wednesday's dinner, at which Jia presented the Council with an elegant cloisonne plate to commemorate the Council's 15th anniversary.



Thomas Fingar of the US State Department analyzed China's reform policies and prospects, one of several speakers at the Thursday morning session.

trols to human rights in Tibet—with no adverse consequences for other aspects of the relationship.

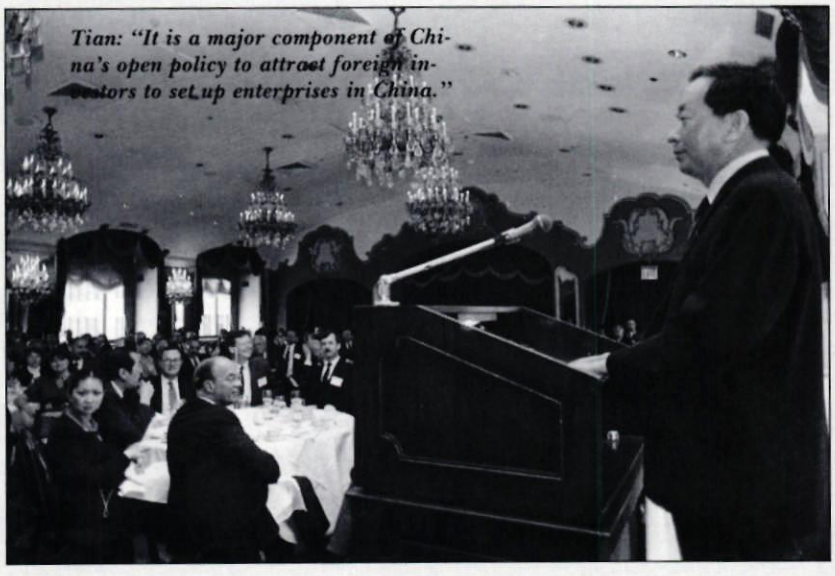
Armacost predicted that the Sino–US relationship would grow even stronger in the 1990s. As the international dominance of the two superpowers gives way to multiple power-sharing, China will no longer have to walk a high wire between Washington and Moscow. Despite gradual improvement in Sino–Soviet relations, he sees little chance the two countries will return to the tight ties of the 1950s, because the need for Western technology will keep China focused on the importance of solidifying relationships with the United States and its allies. Armacost advised that to ensure a future of friendship and growth, China and the United States must continue their forthright approach to problems while insulating the core of the relationship from the frictions that are bound to arise on a day-to-day basis.

At the Council's annual meeting the following morning, Ji Chongwei, director of China's State Council Research Center for Economic, Technological, and Social Development, and Thomas Fingar, chief of the China Division of the US State Department's Bureau of Intelligence and Research, provided perspectives on the recent reorganization of China's State bureaucracy. Jerome Alan Cohen, the well-known China legal expert, recounted his 15 years of experience in negotiating contracts in China, highlighting the tremendous changes that have taken place in the business climate. Finally, the Council's research director, David Denny, outlined the findings of a Council study on the American competitive position in China. Denny noted that American companies have fared surprisingly well in sales of technology and services during the past two years but have been outperformed in equipment sales by Japan and West Germany.

Member company representatives participated in afternoon roundtable discussions that followed up on the issue of competitiveness. They exchanged ideas about the effect of the lower value of the dollar on trade, export financing, and US government support. The Council will pursue several suggestions during the roundtables on how to improve the competitiveness of member companies in China.

Photos by Cheung Ching-Ming

Ambassador Han Xu, Council President Roger W. Sullivan, Vice Premier Tian Jiyun, and Council Chairman of the Board Claus M. Halle.



Tian: "It is a major component of China's open policy to attract foreign investors to set up enterprises in China."

COUNCIL HOSTS LUNCHEON HONORING VICE PREMIER TIAN JIYUN

On May 12, the Council hosted a luncheon in honor of Vice Premier Tian Jiyun. Tian, the highest-ranking Chinese official to visit the United States this year, is in charge of China's international economic policy. He also assumed responsibility for foreign investment following the recent retirement of State Councilor Gu Mu.

At the luncheon, Tian met with member company representatives and delivered a speech outlining China's current economic priorities and development strategies. He described China's emphasis on developing its coastal regions and the newly created province of Hainan, and said he was confident that the 13th Party Congress decision last fall to open more than 140 coastal cities and counties to foreign trade would help direct resources and foreign investment to the areas where China's infrastructure is already strongest. Tian added that the essential purpose of China's export drive is to increase imports, but expressed concern that US protectionism and tight export controls could hinder that progress as well as harm bilateral relations.

In answering questions after his speech, Tian revealed that foreign insurance companies would be permitted to operate on Hainan Island on an experimental basis. This represents an important change in policy, as the People's Insurance Corporation of China has long resisted relinquishing its monopoly on underwriting. And Tian reassured investors that China now recognizes the importance of reinvestment to economic growth, adding, "the Chinese are no longer the tight-fisted people of the past, putting their money in pots and burying them in the ground."

The Chinese Academy of Sciences, once a monolithic research bureaucracy, has set up new entrepreneurial companies to change the way China develops technology

Laying Corporate Foundations for China's High-Tech Future

Richard P. Suttmeier

China's impressive achievements in space and nuclear weapons stand in sharp contrast to the backward production technologies found in most of the country's industries. Much of this inequality can be blamed on the loose links between China's R&D institutions and the factories that apply technology in the production process. In the past, State enterprises did not need to employ researchers since everything they produced—regardless of quality and technical sophistication—could be sold to the State. Research institutes, meanwhile, subsisted comfortably on annual State grants. Science and technology leaders, well aware of this paradox, have proposed a series of practical reforms to encourage factories and research institutes to combine forces in new ways.

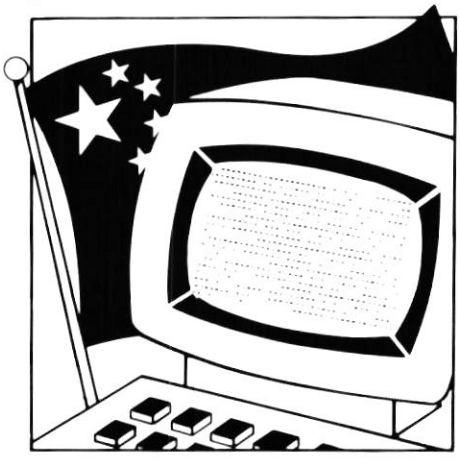
At the heart of these changes lies the Chinese Academy of Sciences (CAS), China's premier organization undertaking research in basic and applied sciences and new technologies. Previously, the relatively advanced R&D work done at CAS institutes was geared toward national defense needs. But, at the behest of government leaders, CAS is now setting up a variety of new companies to develop high-tech products and conduct research on a contract basis. CAS President Zhou Guangzhao has coined the phrase, "one academy, two systems" to signify the evolution of the Academy into an organization committed both to R&D and commercialized results.

Artwork by JoEllen Murphy

National priorities for developing technology

The many grass roots changes in science and technology development

Entrepreneurial high-tech companies affiliated with the Chinese Academy of Sciences are already helping China improve its ability to apply new technology on the factory floor.



are taking place within a framework of well established national priorities. In March 1986 a small group of senior Chinese scientists proposed that China undertake a special program to promote R&D in high-technology fields, and the top Party leadership quickly agreed. For the next year, some 100 leading scientists worked with the State Science and Technology Leading Group to map out high technology development until the year 2000.

The resulting *Baliusan* Program (the name means 86/3—the date the program was first proposed) sets two initial goals for China's S&T programs to accomplish by 1990: the establishment of new engineering research centers in the field of robotics, biotechnology, and new materials; and the opening of 50 new national laboratories. In addition, beginning in late 1987, research grants were removed from the auspices of the bureaucratic five-year fiscal plans. Instead, the *Baliusan* Program supports research through a rolling application process, with individual project proposals reviewed and approved by committees of specialized experts.

Funding will focus on fields deemed critical to China's future: biotechnology, space technology, information technology, laser technology, automation technology, energy technology, and advanced materials. The State Science and Technology Commission administers five of these program areas, while space and laser developments, with their important defense applications, are monitored by the National Defense Science, Technology, and Industry Commission (NDSTIC).

The budget for the *Baliusan* program has not been made public, but reports indicate that the government's commitment is extensive. Some ¥60 million has reportedly been budgeted for the information technology projects, while about ¥30 million will support automation work for the next few years.

Although funding for individual

Richard P. Suttmeier, Henry P. Bristol Professor of International Affairs at Hamilton College, has written extensively on Chinese science and technology. During 1987 he directed the Beijing Office of the National Academy of Sciences/Committee on Scholarly Communication with the PRC. He has also worked as a senior analyst for the US Office of Technology Assessment on the recent study, Technology Transfer to China.

projects is limited by the large number of projects requiring support, the *Baliusan* program is likely to enhance significantly China's ability to "track" important developments and to upgrade its own high-technology production during the 1990s.

Corporate spin-offs from CAS

The CAS probably receives a significant portion of the *Baliusan* grants. The way in which CAS spends the money is changing rapidly.

In the early 1980s only 20 to 40 percent of all CAS research results were being applied in production. At that time, China's industrial reforms began to provide incentives for enterprises to improve industrial methods and technologies. At the same time China's S&T policymakers began to encourage more cooperation between R&D institutes and enterprises (*see The CBR*, May–June 1987, p. 53). As a push in this direction, State funds for research institutes declined 10 to 15 percent a year. The academy—along with other R&D organizations—was forced to increase contract research to raise revenues.

Inspired by US encouragement of high-tech firms in such places as the Silicon Valley and Route 128 in the Boston area, the Academy decided to form new high-tech companies to increase the commercial applications of its research. With the advent of these companies under CAS, the amount of all research results utilized for industrial applications has reportedly risen to some 50 to 70 percent.

Dozens of fledgling CAS companies are now in operation. More than 15 of them—either the first to be set up or those working in key areas—are run by the central staff of the Academy (*see* p. 26), under the direction of CAS Deputy Secretary General Hou Ziqiang. More than 100 companies are run by the Academy's 120 affiliated institutes (as opposed to the central CAS administration), while some 50 joint ventures have been formed between CAS and local governments. Finally, a growing number of companies have been formed through cooperative agreements between the Academy and foreign firms.

High-tech trailblazers

Two companies directly under CAS illustrate the scope of activities these new companies have undertaken. One of the earliest enterprises founded under the new policy is the Keli Company, established in 1985 by researchers from the Institute of Acoustics. Keli recently joined with other research and production units to form the Keli Group, which boasts 5,000 employees (including 1,000 university graduates) in 20 research and production facilities.

Keli conducts a wide range of R&D projects involving signal processing technologies. In one recent success, Keli actually beat out the Ministry of Petroleum Industry's own research institutes to win a contract for work on advanced array processors as part of a key national project. Building on past research by the CAS Institute of Acoustics, the Keli Group hopes to produce array processors for offshore oil exploration that approach US technological standards. Keli is also building a new factory to produce typewriters, scanners, and high-resolution color monitors. This project will cost ¥10 million, ¥3 million of which will come from the State Planning Commission. Another ongoing R&D effort involves cooperating with British and Japanese companies to develop low-cost videophone technology.

San Huan is a second promising new CAS company, working in the area of new materials. San Huan specializes in producing high-energy magnetic materials employing China's abundant "rare earth" elements. The company was founded in 1985 by personnel from the CAS Institute of Physics in cooperation with the ministries of electronics, metallurgy, and nuclear industries, and maintains a relatively small staff in Beijing. Participating institutes apply their research findings in 10 factories around the country.

The magnetic materials San Huan produces are among the most sophisticated in the world and have widespread industrial applications, such as enabling motors to be made smaller and lighter. In 1987 San Huan exported products worth $800,000, and their overseas sales are expected to rise to some $2 million in 1988. On the strength of this performance, San Huan is now the leading member of a consortium of Chinese companies working with US and Hong Kong investors to build a major new plant in Tianjin. The plant, scheduled to employ 500–600 people by 1990, will produce super high-energy NdFeB magnets superior to those made in the United States and Japan—currently the only other countries with this technology. The consortium plans to produce goods worth $30 million by 1990, primarily for export.

Support for infant companies

CAS currently serves as the "incubator" for most of these new firms, granting permission for commercial initiatives based on often ambiguous policies that dictate the relationship between the central institute and the spinoff company. While strong support in the early phase is essential, the companies receive conflicting signals concerning their degree of autonomy.

Many research institutes, for example, are reluctant to allow personnel to transfer to the new companies. CAS—in keeping with national policy to get S&T personnel out of institutes and into enterprises—usually backs the companies in these cases. Yet, to reduce the risks for

personnel associated with the companies, CAS continues to supply housing and other social services and holds the dossiers of transferred personnel. This gives employees the option to return to CAS if the company proves unprofitable.

As part of its incubator role, CAS typically advances capital to the companies (at present, without interest) to be repaid once the company is commercially successful. In the startup stage, the Academy also gives the companies space in buildings belonging to its institutes. However, in keeping with the objective of "graduating" the companies to the status of independent economic entities, expanded commercial operations are increasingly financed independently of CAS. Although no company has yet paid back the original loan, a transition stage has been reached in which companies such as San Huan and Keli are increasingly independent.

The establishment of CAS-spinoff companies seems to be alleviating some of the perennial problems within China's S&T system. Companies are more aware of the need to be accountable for the use of research funds to reduce costs and to improve the quality of work. R&D personnel at the new enterprises are finding their work challenging, less bureaucratic, and usually more lucrative. And many of the companies now farm out research contracts to their parent institutes, a development that CAS believes is improving the quality of research done by the institutes.

Despite grumbling among scientists that basic research is being neglected under current policy, new market-driven demands also pose challenges and opportunities for basic research. Some observers feel the "oriented basic research" that is emerging is often more disciplined and productive than the undirected basic research of the past.

As it accumulates experience with the new companies, the Academy has also begun to provide more comprehensive business services to its fledgling enterprises. In conjunction with the former State Economic Commission, CAS recently organized a R&D lending agency. And early this year, CAS also linked up with US and Hong Kong investors to create a new finance company, which can legally raise funds.

A newly established CAS information and consulting center will serve as a matchmaker for new companies that want to establish foreign or Chinese contacts. The Academy also plans to expand the availability of legal and accounting services. Finally, in May, CAS joined with China's first venture capital firm, Venturetech, and the China National Chemicals Import–Export Corporation to found the Newtech Development and Trade Corporation aimed primarily at promoting the export of CAS technology.

Overseas alliances for CAS firms

The role of the new companies—and their pursuit of profits—is evolving rapidly. In the initial stages, the companies mainly tried to integrate high-tech devices into functioning systems. But as more CAS-spinoff companies entered the race, the profitability of this type of work declined rapidly. One common solution has been to move into production by forming larger "groups" combining factories with research institutes. But because China has no domestic mass market for high-technology products, many companies have had to adopt an export orientation, trying to find market niches somewhere between the ad-

THE STONE CORPORATION: CHINA'S IBM?

The story of China's exploration into the commercialization of high technology would be incomplete without noting the rise of what are ambiguously referred to as "nongovernmental" (*min ban*) enterprises. Some 10,000 of these new firms now operate outside the State sector. Different from the traditional "collective" enterprises of the past, many were founded by scientists and engineers who became disaffected with work in classical socialist institutions. Although these companies have yet to work out all the problems of recruiting new personnel and providing for their welfare and housing, many of them are thriving.

The best known—and probably the largest and most successful—of China's nongovernmental high tech firms is the Beijing-based Stone (Si Tong) Corporation. Stone was started in 1984 by Wan Runnan, a young software specialist at the computer center of the Chinese Academy of Sciences. With only a ¥20,000 loan from a commune in the Beijing suburbs, Wan and his colleagues helped Stone achieve total sales of ¥600 million in 1987. The corporation now consists of 10 companies involved with computer technology and networks, office automation, electronic devices and components, printing, technology service centers, and electronics shops. It employs several hundred people in Beijing and has a national sales and service network.

Stone's initial success came from sales of Japanese-made printers customized for use with Chinese character software. This reliance on imported hardware has continued with the introduction of Stone's first major product, an advanced, multiscript, electronic typewriter. Hardware for the MS 2400 machines is made in Japan by Mitsui and is sold to China without "intelligence." The Stone software is then encoded on chips and installed at a modest but well run new assembly plant in Beijing. Designed for Chinese-language use in Chinese offices, the machine also handles Japanese and European languages. Stone hopes to introduce an advanced personal computer tailored to the Chinese market in the near future.

Stone's existence, its success as an economic entity operating outside of the State economy, and its strategy of relying on sales of imported hardware devices, all make it controversial. The company's continuing need for foreign exchange to import technology requires creative operating procedures. Stone has, for example, entered into business relationships with rural enterprises, particularly in southern China, which earn foreign exchange by selling processed food products but have no effective strategy for using these earnings.

The Stone Corporation's operations combine risk taking, technology, and marketing in ways not yet attempted by Chinese State enterprises. Despite official approval, however, Stone continues to be hampered by "the system." Its legal status (including the question of who owns its assets) remains cloudy, and its personnel management practices are constrained by the norms of socialist egalitarianism. Unorthodox business operations—for China—contributed to making Stone the object of a high-level political investigation in 1986. It is a sign of the times, however, that by early 1987 Stone had been officially sanctioned as a model of what technical entrepreneurship can do for the nation. By prospering "on the periphery," the Stone Corp. has demonstrated what a more liberalized economy could do for technology-based companies.

—RPS

vanced technological products and services of the OECD countries and the low-cost products of Hong Kong, South Korea, Singapore, and Taiwan.

Foreign enterprises, often attracted by innovative technology, are beginning to form limited commercial alliances with the new CAS companies. Hong Kong firms are the most active thus far, but companies from the United States, Japan, Singapore, the United Kingdom, and Australia are also involved in cooperative research, technical services, and production. A Hong Kong firm and the Institute of Zoology, for example, formed a venture to produce pesticides, while a Japanese company is helping to produce infra-red filters.

Another CAS Chinese firm, Kejian, has a joint venture with Massachusetts-based Analogic Corporation to produce phased array sector medical scanning systems. This has involved some technology transfer to China, joint research in Massachusetts, and production at a new facility in the Shekou Special Economic Zone. Reportedly, the cost/performance ratio of the resulting scanning system is superior to anything on the market, forcing Japanese competitors to cut prices to compete. Kejian is cooperating with the same firm to make a Nuclear Magnetic Resonance (NMR) machine. In this effort, the American partner supplies the electronics, Kejian provides the magnets, and software and systems engineering are developed jointly.

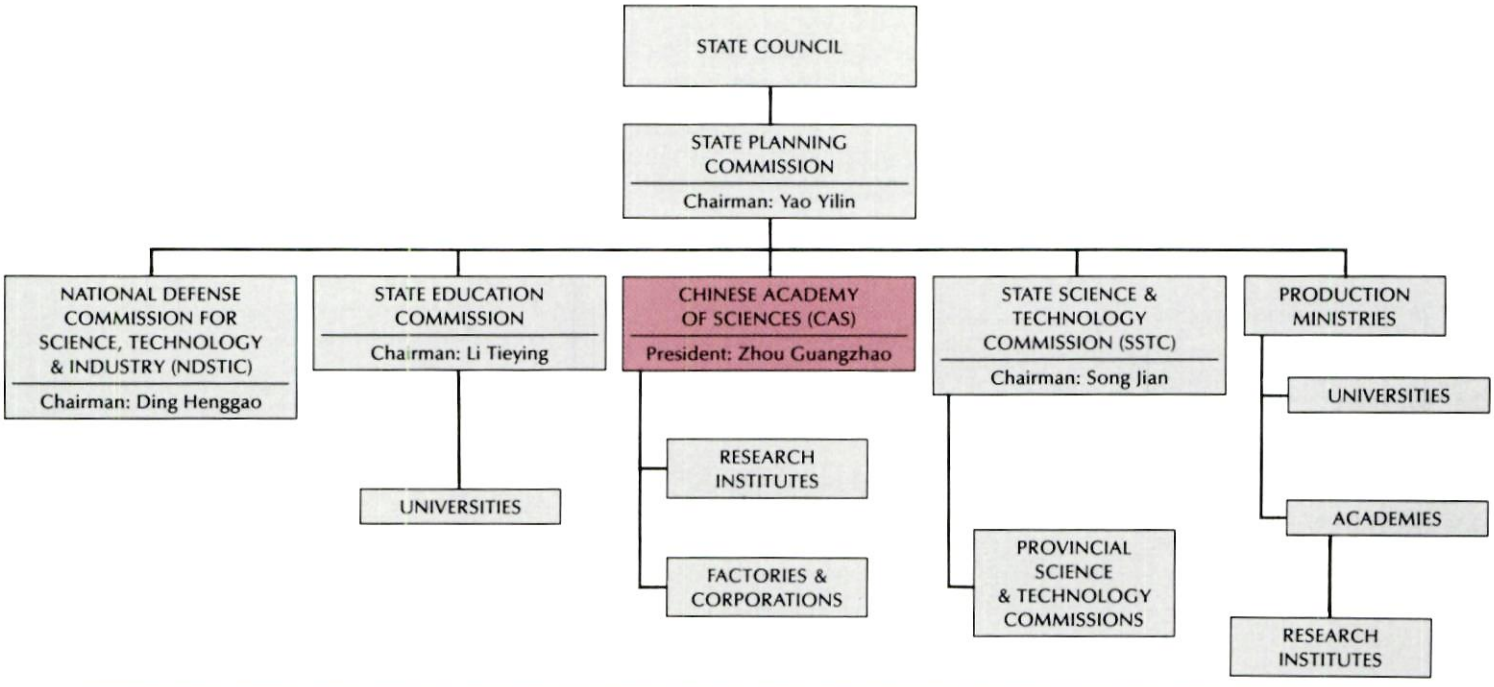
A lift from the top

The success of the CAS companies and other experiments in technical entrepreneurship have captured the imagination of China's leadership. Zhao Ziyang has endorsed the new entrepreneurship, and in March the Chinese Communist Party Central Committee completed a study of the "high-tech economy" of the Zhongguancun area in northwestern Beijing where many of the new firms are located, and urged Beijing municipal authorities to join with Haidian district, the local university community, and the Chinese Academy of Sciences, to take measures to promote technological development. The result is a new 100 square kilometer high-technology enterprise zone that provides tax incentives and business services to firms located there. Already Zhongguancun has attracted many new companies that spun off from CAS, various ministries, or universities, as well as groups of enterprising individuals. High-tech zones following the Zhonguancun model are being established in other cities as well, including Shanghai, Nanjing, Guangzhou, and Tianjin.

Leading these reform efforts are the new leaders of China's S&T institutions, technical agencies, and research institutes, who are well schooled in the realities of China's technological infrastructure. Educated in the Soviet Union and at China's top universities prior to the Cultural Revolution, these leaders were once R&D personnel themselves. Now administrators, they want to overcome the bureaucratic entanglements that frustrated their professional work in the past.

If China can combine such top-down change with the exciting new "market-driven" approaches to the commercialization of research, the future relationship between research and production should change dramatically, smoothing China's passage into the 21st century. 完

SCIENCE & TECHNOLOGY IN CHINA



CHINESE ACADEMY OF SCIENCES

(computer and electronics related units)

Academic Bureau

Bureau of Technological Sciences and Development

Institutes

Automation Institute (Beijing)
Computing Technology Institute (Beijing)
Electrical Engineering Institute (Beijing)
Electronics Institute (Beijing)
Microelectronics Center (Beijing)
Optics and Fine Mechanics Institute (Beijing)
Semiconductor Institute (Beijing)
Software Research Institute (Beijing)
The Computing Center (Beijing)
Optics and Fine Mechanics Institute (Changchun)
Computer Applications Institute (Chengdu)
Optics and Electronics Institute (Chengdu)
Electronics Institute (Guangzhou)
Intelligent Machines Institute (Hefei)
Optics and Fine Mechanics Institute (Hefei)
Optics and Fine Mechanics Institute (Shanghai)
Silicate Institute (Shanghai)
Automation Institute (Shenyang)
Computing Technology Institute (Shenyang)
Optics and Precision Mechanics Institute (Xi'an)

Major Affiliated Companies of the Chinese Academy of Sciences

Beijing Ke Hai Corporation—development, production, and marketing of new products and technology in the electronics, light industry, machinery, and bio-engineering fields.

Beijing Software Experimental Factory—design of software engineering technology.

Blast Engineering Company—demolition engineering and development services offered on contract or consulting basis.

China Sigma Optics-Electronics Ltd.—development, production, and marketing of photoelectronic technology; technical consulting.

Corporation for Scientific Instruments on Sensing Techniques—production of electrical equipment; remote sensor R&D; technical consulting; establishment of high-tech joint ventures.

Da Heng Company—R&D of optics and fine mechanics.

Da Tong Company—development and production of computers and communications technologies.

Hope (H) Computer Company—development of computer hardware and software; technical consulting; office automation equipment sales and purchases.

Kejian Corporation Ltd.—manufacture components and complete sets of NMR imaging and scanning equipment for medical use.

Keli High Technology Corporation—product development and manufacture of microcomputers and systems using digital techniques.

Keshen Corporation for Scientific and Technological Consultancy and Development—consulting.

San Huan New Material Research and Development Inc.—development and production of rare-earth magnetic materials.

Science, Education, and Technology Development Corporation—R&D of optical, mechanical, and electronic technology.

Shenzhen Science and Industry Park Corporation—development and production of high-tech products.

Compiled by Beverly Musolf LoPinto and Richard P. Suttmeier

By clamping down on imports of integrated circuits and other electronic components, China hopes to boost its producers to international heights

Integrating the Electronics Industry

Denis Fred Simon

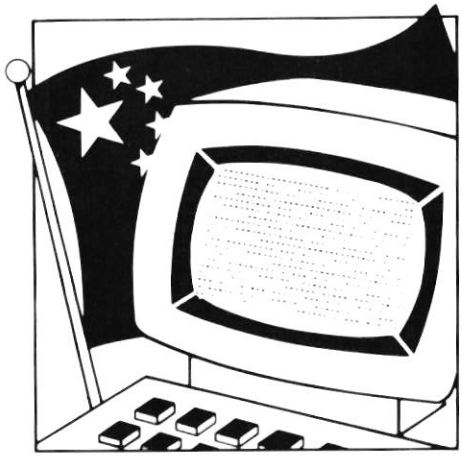
Electronics are the key component in crafting the world's high-tech future. Distances between countries are growing smaller thanks to advanced telecommunications systems. Computers now run everything from production lines to the company payroll in advanced industrial countries—and the number of possible applications mounts with each passing hour. Chinese leaders agree that to catch up with the rest of the world economically, their country must make a quantum leap and enter the electronics age.

This transition requires a major overhaul of China's electronics industry. Production technologies that are common in the West remain difficult for the Chinese to master, and few technical advances are shared between researchers and producers. And the bureaucracy encompassing major electronics sectors such as computers, consumer goods, telecommunications, and machinery has long been fragmented, with each sector carving out its own kingdom for research, development, and production.

To address these problems, China's economic planners have been working to develop a new electronics strategy over the past few years. After several adjustments and some fine tuning, the plan is now merging into a coherent whole. Increasing production of all electronic products is emphasized, with top priority focused on integrated circuits—the components that coordinate and guide the functions of electronic products. By the end of 1990, China hopes to bring its electronics technology up to 1970s and 1980s Western technological levels.

But the approach Chinese planners have taken may not be the most

Fearful of being left behind as the technological revolution enters the 21st century, China has intensified efforts to improve integrated circuit production, and thus support advances in other vital sectors of the electronics industry.



efficient for the industry. To catch up as quickly as possible, China is restricting imports and striving for greater self-sufficiency, hoping that the country's research institutes and factories will rise to the challenge. The danger is that China may find itself falling even further behind if endusers cannot get the high-quality components needed to raise the technical level of their own production.

Integrated circuits: the electronic key

Just as iron and steel were the underpinnings of the Industrial Revolution, integrated circuits (ICs) serve as the building blocks of modern information-based economies. Through their complex programming options, integrated circuits allow technicians to customize the operations of different types of equipment. Thus the capability to produce a sufficient supply of high-quality, reliable circuits is directly related to the ability to design the highly sophisticated computers and microprocessers that are the hallmark of a modern electronics industry.

Recognizing the critical importance of ICs, China has stepped up production over the past several years, in part by purchasing more production lines from abroad. Total production of almost 24 million ICs in 1983 more than doubled to reach 53 million by 1985 and hit 78 million in 1987. And 1989 production is expected to exceed 100 million units. China currently produces about 680 types of ICs in 30 different categories, most using technology from the late 1960s or early 1970s that is based on US and Japanese designs. Serial production lines mainly put out linear, small-scale ICs for use in low-end electronics products such as televisions and washing machines.

Problems with self-reliance

Because most of the integrated circuits China produces do not meet the higher technology needs of China's telecommunications and computer industries, demand for high-quality, reliable ICs greatly exceeds supply—especially for medium- and large-scale ICs. Of the 53 million ICs produced in 1985, for example, only 4 percent were medium- or large-scale circuits. As a result, China's more advanced industries were forced to import large quantities of

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medium- and large-scale ICs.

In the mid-1980s, Chinese leaders decided that the country should aim for greater self-sufficiency in electronics production in order to conserve foreign exchange and protect domestic industries that were losing ground to cheaper and more reliable foreign components. Curbs on imports of ICs and related electronic components were announced in late 1985 and further tightened in 1987. Planners hoped that restricting foreign competition would give a boost to domestic industry. But it will take some time before China's IC manufacturers can take up the slack previously filled by imports. The industry is plagued by low yields, unstable product quality, high expenses and operating costs, and extreme waste of manpower and materials. Chinese circuits cost from five to 10 times as much to make at home as to purchase from abroad. Therefore, in addition to dealing with the limited capacities of low-quality ICs, electronics enterprises that must rely on domestic IC technology also face inflated costs.

Inadequate equipment and facilities are at the heart of the production problems. For example, most advanced industrial countries have progressed to using lasers to cut integrated circuits, while China still relies on diamond saws that tend to be less precise. And the existing design and layout of Chinese factories cannot easily accommodate IC production lines, which need to be laid out in a continuous line, rather than stacked on different floors, to operate most efficiently. Chinese researchers have not provided help in solving these problems, because they persist in designing sophisticated technologies that cannot be applied in many Chinese manufacturing enterprises.

While it will be years before China becomes internationally competitive on the high end of electronic component production and technology-intensive applications, the overseas market for simple Chinese electronic products can be expected to expand as South Korea and Taiwan gradually move their own electronics exports upmarket.

A constraint on computer development

China's shortage of quality integrated circuits has broad implications for the modernization of other industries. The computer industry feels the effects perhaps more than any other sector.

China's annual computer production is set to reach 1,800 large and medium computers and 40,000 micro and single board computers by 1990. This expansion is coupled with the computer industry's own self-sufficiency drive, which calls for 80 percent of the country's microcomputer needs to be met by domestic suppliers by 1990.

Current restrictions on IC imports hamper these ambitious goals by limiting the available supply of sophisticated, high-quality components. This in turn affects not only the number of computers that can be produced, but the extent to which they can be customized for diverse uses. In particular, computer-aided design (CAD) and computer-aided manufacturing (CAM) technology—vital to reaching the next stage of industrial modernization—will suffer, as circuits must be specially designed for use in the microprocessors that guide machines.

By slowing the pace of technological advancement in the computer industry, the shortage of high-quality integrated circuits has retarded developments in industrial manufacturing, communications, and transportation. Only top-priority projects requiring specialized computer systems—such as the establishment of nationwide scientific and technical computerized information networks—are likely to move forward quickly.

Good news in consumer electronics

Consumer electronics developments are also held back by the poor quality of domestically made components. China's inability to supply inexpensive, high-quality semiconducters and ICs limits the extent of design and innovation possible for consumer electronics producers. China is not yet able to mass produce products such as microwave ovens, for example, because it cannot cheaply manufacture the components.

But the consumer electronics sector holds out some hope for what China might be able to accomplish if ICs and other electronic components

A 3-STAGE PLAN FOR INTEGRATED CIRCUITS

Laying the foundation: 1986–90. Master 3-inch silicon chip and 3.5 micron production, and begin work on 2 micron technology. Ensure reliable mass-production of 4K MOS RAM, 16K DRAM, 4K CMOS RAM, 8- and 16-bit microprocessors, 1,600-2,400 CMOS gate array logic circuits, and low-power TTL circuits. Focus R&D efforts on 2 micron technology and and CMOS circuits.

Continuing development: 1991–95. Continue to focus on large-scale integrated circuit (LSI) production, mastering 4-inch silicon chips and 2 micron production technology. Attain mass-production of 64K MOS RAM and 6,400-12,800 CMOS gate arrays. Continue to concentrate on 16-bit microprocessors, with some work on 32-bit processors and 256K MOS RAM. Begin work on gallium arsenide (GaAs) circuits. Focus R&D efforts on 5-inch, 1 micron technology.

VLSI production: 1996–2000. Develop very large-scale integrated circuit (VLSI) production, including mass-production of 256K and 512K MOS RAM and 32-bit microprocessors. Produce some 1 megabyte memories. Focus R&D efforts on new generation ICs such as advanced superconductors and bioelectronic circuits. Strive to attain equivalent of the 1990 IC production level of the United States.

MOS: metal oxide semiconductor
RAM: random access memory
TTL: transistor–transistor logic
DRAM: dynamic random access memory
CMOS: complementary metal oxide semiconductor

Sources: *China Computer World*, May 8, 1984; MEI

can be produced at adequate quality levels. Rising domestic demand for such consumer goods as televisions, washing machines, electric fans, and tape recorders has called more attention to the industry and caused domestic content to increase dramatically in a short time.

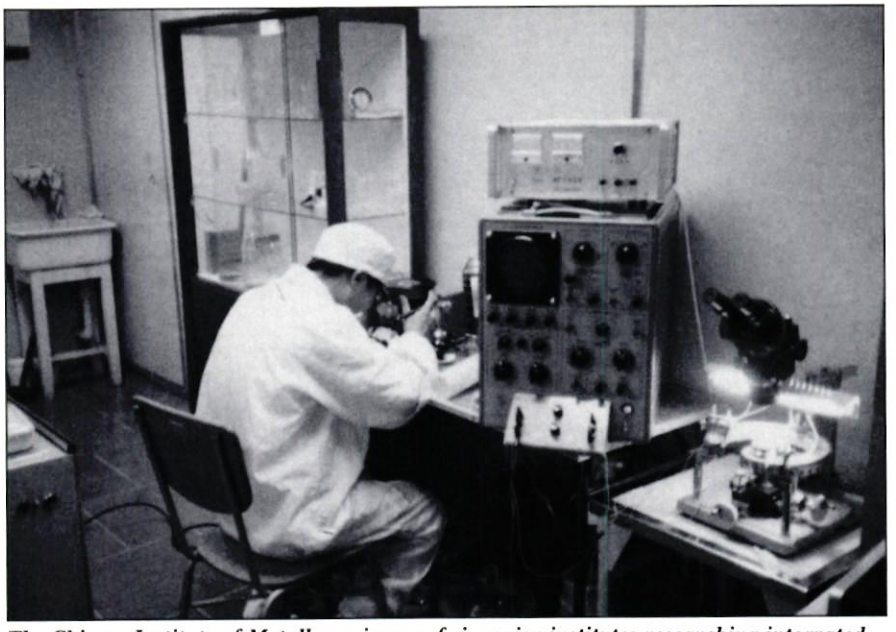
A *China Daily* article published last July estimated that 80 percent of the television sets and 50 percent of the tape recorders made in China in 1988 will use domestically produced integrated circuits. This demonstrates that domestic components are increasingly adequate for consumer electronics products utilizing basic technology.

When producers can source components that better suit their technical requirements, the quality of their products should improve. Producers of black and white televisions, for example, have improved the mean time-between-failure rate from 8,000 hours to over 15,000 hours in 1987.

This expanding ability to produce simple electronic products is paying off abroad. The China Electronics Import–Export Corporation concluded a deal last summer with Mona International Electronics, Canada's second-largest electronics company, to provide $120 million worth of color and black and white television sets over the next five years. The TVs will be marketed in Canada and the United States.

While it will be years before China becomes internationally competitive in the high end of electronic component production and technology-intensive applications, the overseas market for simple Chinese electronics products can be expected to expand as South Korea and Taiwan gradually move their own electronics exports upmarket. Plans call for quadrupling 1987 electronics export levels to reach an annual total of $800 million by 1990. A big boost to the export effort will come from a ¥104 million ($28 million) subsidy, approved in 1985, from the Industrial and Commercial Bank of China to assist in the renovation and modernization of existing electronics production lines. The newly formed Ministry of Machine-Building and Electronics has agreed to pay the projected ¥8 million ($2.15 million) interest attached to these loans. The requirement that the factories must repay

Photos courtesy of Denis Fred Simon



The Chinese Institute of Metallurgy is one of six major institutes researching integrated circuit technology.

Raising the quality of integrated circuits and other electronic components is essential if China is to achieve its goal of raising production of the electronics industry to 1970s and 1980s Western technological levels by 1990. Here, workers assemble electronic components at the Shanghai No. 18 Radio Factory.

TECHNOLOGICAL DEVELOPMENT OF MEMORY CHIPS: CHINA VS. THE WORLD

Year developed	Integration density (bit)		Line width (microns)		Wafer size (inch)	
	Intl	China	Intl	China	Intl	China
1970	256		10		2	
1973	1K				3	
1975	4K	1K	7		4	
1977	16K		5			
1979	64K	4K	3		5	
1981		16K		5		
1983	256K		2		6	
1984		64K				
1985	1024K		1 -1.5	4-5		3-4
1986	4096K		0.5-1	3-4	6-8	

SOURCES: Guo Pingxin: "The Development of Microelectronics and the Emergence of Bio-Microelectronics," *Guide to China's Computer Industry* (Beijing: Electronics Industry Publishing House, 1985), various Chinese sources.

INTEGRATED CIRCUITS ORGANIZATIONS

Leading Production Facilities

Chinese Academy of Sciences Factory No. 109 (Beijing)
Beijing No. 2 Semiconductor Factory
Beijing No. 3 Semiconductor Factory
Dongguan Electronics Factory 878 (Beijing)
Tianjin Semiconductor Factory
Shanghai No. 5 Components Factory
Shanghai No. 14 Radio Factory
Shanghai No. 19 Radio Factory
Shaoxing Electronics Factory (Shaoxing, Zhejiang)
Changzhou Semiconductor Factory (Changzhou, Jiangsu)
Jiangnan Semiconductor Factory (Wuxi, Jiangsu)
Tianguan Electronics Factory [military facility] (Qinan, Gansu)
Lishan Microelectronics Corporation (Xi'an, Shaanxi)

Leading Research Institutes

Institute of Semiconductors [under the Chinese Academy of Sciences] (Beijing)
Institute of Microelectronics [under Qinghua University] (Beijing)
Institute of Metallurgy [under the Chinese Academy of Sciences] (Shanghai)
Nanjing Solid State Device Research Institute
Hebei Semiconductor Research Institute (Shijiazhuang, Hebei)
Shenyang Liaohe Experimental Research Institute [under the Ministry of Machine-Building and Electronics Industry]

Source: Ministry of Machine-Building and Electronics Industry

the loans should encourage efficient use of the purchased technology as factories strive to shorten the payback period.

Reorganization to promote cooperation

While early efforts to upgrade the industry focused on increasing output, integration of the different electronics subsectors is the latest adjustment to China's national electronics plan. To better coordinate research and applications of electronics technology, the Ministry of Electronics Industry (MEI) and the State Machine-Building Industry Commission were merged in March to form the Ministry of Machine-Building and Electronics Industry, headed by Zou Jiahua. The decision to combine these two powerful entities reflects China's strong interest in emulating Japan's successful development of "mechatronics," or the integration of mechanical and electronic engineering. But these attempts to force coordination between the various users of electronics technology could fall flat if traditional bureaucratic loyalties are not dissolved, and instead continue to restrict the amount of cooperation that takes place.

To force further integration, the ministry is also experimenting with new organizational structures. Four major computer conglomerates in Beijing, Shanghai, Shenyang, and Guangzhou illustrate how Chinese planners are trying to increase the horizontal links between producers and endusers. The Great Wall Computer conglomerate in Beijing, for example, is composed of 58 computer production units, four R&D institutes, and five universities that work together to coordinate electronics development, production, and application. Although other experiments along these lines receive less national attention, they may have the flexibility to move forward more rapidly (*see* p. 22).

The electronics bureaucracy, experimental conglomerates, research institutes, and production enterprises face an uphill battle as they try to raise China's technological level. Shaping an integrated electronics industry—one that can supply components of appropriate quantity and quality to all sectors—can be expected to take years if not decades. 完

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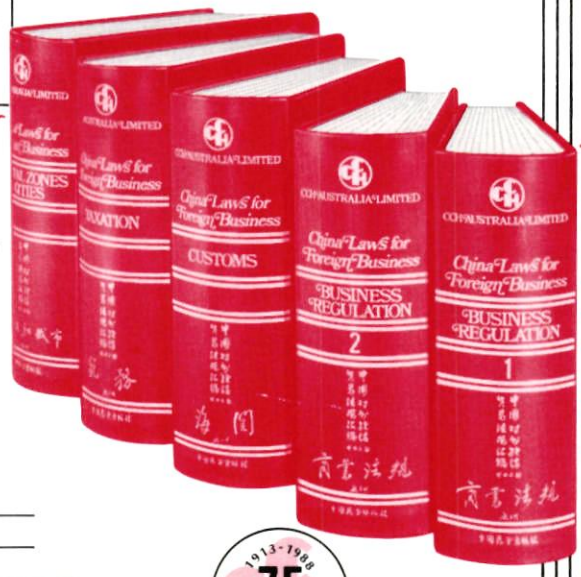

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From software to satellite launches, overseas technology sales are gradually gaining in sophistication

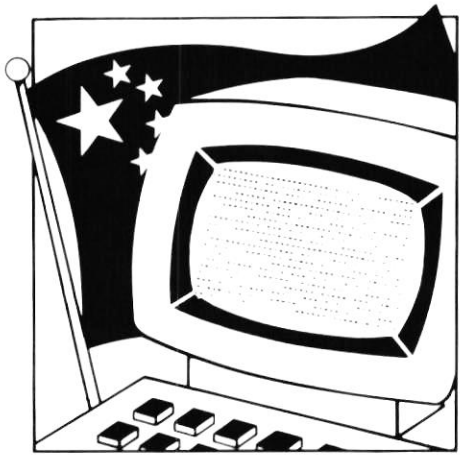
China's Technology Exports

Erik Baark

Since 1980 China's budding technology exports have been overshadowed by the extensive technology imports needed to modernize the country's industrial base. Nonetheless, China has increased technology exports with growing sales of technology licenses, military hardware, and services ranging from construction to satellite launching.

Efforts to commercialize China's research and development program (*see* p. 24), along with a system of awards for scientific results and the protection offered by the four-year-old patent law, have nurtured a new crop of scientific and technological advances. And the realization that technology trade is one of the fastest growing components of the international market has given China an additional incentive in its drive to develop and export technology—and thus earn foreign exchange and increase its international stature.

China's efforts to market its technology abroad provide concrete evidence of the country's growing technological capabilities and confidence. Technology licenses and military arms exports are growing at a particularly fast pace.



Wide swings in sales

China's vague export classifications and confusing customs statistics make it practically impossible to get a clear picture of total technology exports. Watches and televisions, for example, are frequently classed as technology exports, although in most countries they would be considered technology-intensive products rather than actual technologies. And statistics on the country's thriving defense technology exports are obscured within the huge "products not classified elsewhere" customs category—if they are included at all.

Technology exports can be broadly broken down into four categories: technology licenses, military equipment, services, and capital goods. Export values tend to fluctuate widely from year to year (*see* graphs), partly because of unstable world market trends but also because China lacks an established structure for technology development and export.

Monitoring the types of Chinese technology offered for sale at exhibitions abroad is one way to measure how China is faring in this respect. The statistics show that technologies offered can vary substantially from year to year. From 1986 to 1987, for example, exhibits of items with industrial applications dropped from 66 percent to 37 percent of total technology exhibited. In contrast, both environmental protection and agricultural production technologies began to appear more often at exhibits, rising from about 2 percent of exhibits to just under 10 percent during the same period.

Exhibits of medical technologies declined slightly from 1986 to 1987, from 16.9 to 14.4 percent of all technologies offered abroad. Cosmetics production technologies entered the scene only in 1987, accounting for 6.2 percent of technologies offered. Strong showings in these areas reflect China's traditional skills in herbal medicine and fermentation techniques.

The absence of technologies related to energy is surprising in view of China's emphasis on this sector and may illustrate the highly theoretical orientation of technology development. Most R&D is conducted in research institutes rather than in industrial facilities, where more practical designs—such as those for energy-saving devices—might be emphasized.

Building a reputation

As much to accumulate prestige as foreign exchange, China targets industrialized countries for technology sales and proudly publicizes what it considers to be significant purchases. One such success story is the Chinese-language software package with five-stroke Chinese-character input technology sold to Digital Electronic Corporation (US) in 1987 by the China National Technical Import Corporation (TECHIMPORT). Another computer success is a Chinese character microcomputer typesetting system invented by the China Printing Science and Technology Research Institute. The system has garnered $100,000 in sales agreements with

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foreign businesses.

China also points with pride to the sale of certain types of medical equipment to Japanese and US purchasers, such as the SDL Corporation's $10 million purchase, announced in 1987, of 20,000 physiatric tools that utilize traditional Chinese medical techniques to regulate blood circulation and energy forces. Another model sale is a new Vitamin C fermentation technology licensed to Hoffman LaRoche (Switzerland) in 1986.

Most technologies sold by Chinese inventors—at home as well as abroad—lack final development and engineering design. Consequently, most foreign purchasers must perform further engineering work, such as adjusting processes for mass production. This is also common practice when Western countries purchase technology from the Soviet Union and Eastern Europe. Because most technologies require extensive refinement by the purchaser, China's technology sales are not usually linked to equipment purchases.

Toehold in the Third World

While industrialized countries are the most desirable markets, Third World countries have been a steady focus of technology exports, which often take the form of official aid. For example, China played a vital role in building the 1,160 mile Tanzania–Zambia railway, begun in 1968 and opened to traffic in 1976, by both financing the project through grants and long-term concessional loans and carrying out construction.

China has participated in the Technological Cooperation Between Developing Countries (TCDC), a program developed by the United Nations and funded primarily by the United Nations Development Program (UNDP). Recent TCDC projects include building centers for biogas development and setting up facilities for, small hydropower generation, sericulture, and integrated fish farming. Playing an active role in TCDC may not pay off in cash, but it should raise China's stature in the Third World.

China's relations with developing countries have turned more commercial recently. In 1986, for example, Nepal purchased equipment and know-how to produce 80,000 sets of bus tires per year while Burundi bought technology to produce gunnysacks and woven bags.

Exhibitions lead to licensing deals

To encourage individual inventors or research units that lack the means to systematically market their efforts abroad, the Chinese government subsidizes entrance fees to all overseas technology exhibitions, leaving the exhibitor responsible only for a nominal fee of ¥300. Subsidizing participation in international technology exhibits appears to be paying off. Foreign licenses of Chinese technology have surged dramatically since the mid-1980s when China began to actively participate in overseas technology exhibitions and sponsor domestic shows.

The first Chinese delegation to display technology wares abroad appeared at the 13th International Exhibition of Inventions and New Technology in Geneva in April 1985. Chinese exhibitors showed 19 items and went home with 12 contracts in hand. Between April 1985 and November 1986, China participated in eight international technology exhibitions in the United States, Japan, and Europe, showing an average of 32 items at each fair. By the end of 1986, China had signed a total of 125 contracts or letters of intent for exhibited technology.

Many of China's inventions have won awards at technology exhibitions around the globe. At the 35th Eureka World Fair for Inventions held in Brussels in 1986, for example, Chinese inventions captured 49 of the 191 medals awarded—and took another 46 medals home from the following year's exhibition.

Starting with a 1986 fair in Shenzhen, China has also sponsored exhibitions at home featuring domestic technology achievements. Some general shows are held in conjunction with regular events such as the Guangzhou Trade Fair, while others focus on more specialized technologies or regional achievements. Shenzhen has become a popular exhibition site due to its proximity to Hong Kong and export orientation. The 1986 fair featured defense industry spinoff technology such as the well-known Long March rockets and microreactors for small nuclear energy plants. In late 1987, China branched out by sponsoring a technology export fair in Hong Kong, offering 1,779 different items for sale. Another fair along these lines will be held in Shenzhen late this fall.

Military hardware exports

While Chinese customs statistics do not clearly indicate the total value of arms exports, a recent US congressional report ranks China as the fourth-largest supplier of arms to developing countries, with total sales exceeding $5 billion. A large portion of China's military hardware exports go to war-torn countries in the Middle East, including Iran, Iraq, and Afghanistan.

Some US analysts estimate that Iran purchases about $1 billion in weapons from China each year. And the Stockholm International Peace Research Institute reports that the Iranians recently signed a $1.6 billion deal with China to trade oil for Chinese fighter aircraft, tanks, and missiles. Sales of Silkworm missiles to Iran and CSS-2 intermediate-range missiles to Saudi Arabia indicate an increasing level of sophistication in China's military hardware production, which should bode well for future technology sales.

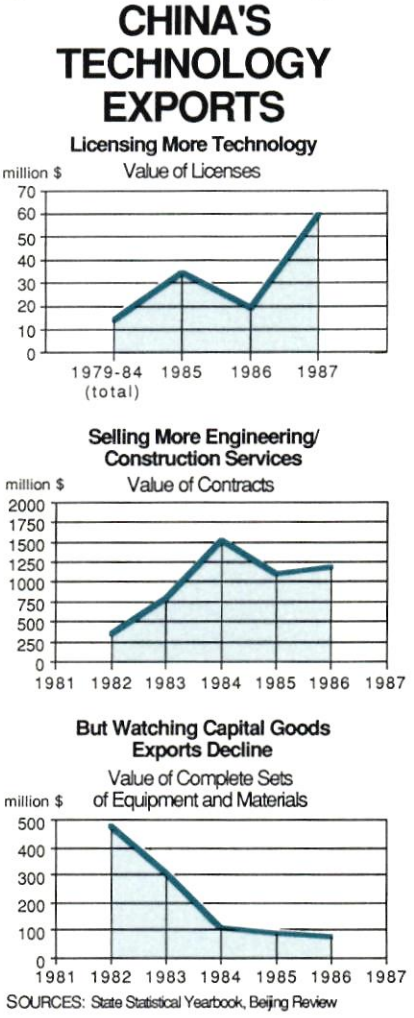


Chart by Pam Tobey

More demand for construction and satellite services

In addition to arms, the Middle East provides China with a sizable market for engineering and construction services. But as strife in the region has slowed demand, China has successfully shifted promotion of construction capabilities to Asia, Latin America, and Western Europe. From 1982 to 1986, the value of China's annual export of engineering and construction services nearly tripled, from $346 million to $1.189 billion. Hong Kong and Macau, contracting for services on projects totaling $224 million in 1986, are China's largest foreign customers.

One potentially prestigious—but currently stalled—export service is launching satellites for other countries using China's Long March rockets. Although China's attractively discounted satellite piggyback service was widely publicized as recently as 1986, so far it has found few firm buyers.

China's ability to recover as well as launch satellites—only the United States and the Soviet Union share this technology—is attracting more international attention. In August 1987 the French firm Mantra Espace rented space on a Chinese satellite to test micro-gravity experimental devices, successfully recovering the satellite after five days in space. Companies in other countries have since expressed interest in the satellite recovery service.

Capital goods on the decline

The major exception to China's expanding technology sales picture is the drop in exports of capital goods; that is, machinery utilizing technology for new production processes. Exports of textile machinery, machine tools, production lines, and turn-key projects have declined steadily from 1980 until 1986, when customs statistics showed a small upturn (*see* graph).

While China's export figures parallel the world recession and subsequent upturn, the figures also highlight the technological gap between China and advanced industrial countries. During the early 1980s, for example, China started modernizing the textile industry by importing textile machinery rather than buying technology to manufacture these machines at home. This import strategy widened the gap across the board between Chinese and state-of-the-art technology. While the current five-year plan emphasizes upgrading machine-building technology, these efforts will take years to show results. In the meantime, China may continue to export capital goods successfully to other Third World countries but is unlikely to break into markets in advanced industrial countries.

Incremental improvements

China's entry into the international technology market is powered by a range of domestic reforms ranging from evolving patent legislation to increased cooperation between research institutes and enterprises. While these and other factors have led to an increase in the number of inventions and technologies developed and sold abroad, declining capital equipment exports—especially of sophisticated machinery—highlight fundamental weaknesses in China's technological base. Substantial amounts of time, money, and effort will have to be invested in overhauling the industrial base before China can garner a place among the major suppliers of sophisticated technology to the international market. 完

Increased predictability—but more restrictions

New Rules for Technology Imports

Christopher G. Oechsli

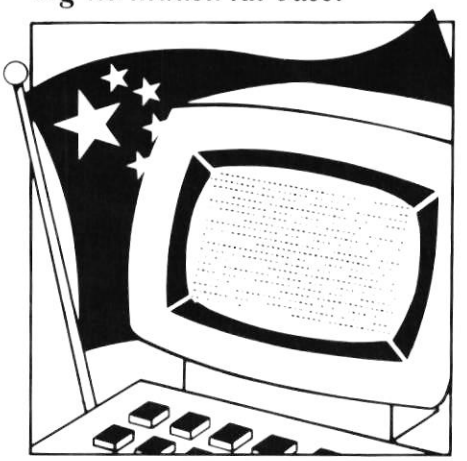
As China's modernization program picks up steam, officials have become increasingly frank about the vital role foreign technology plays in the process. The desire to import technology is tempered, however, by China's dual fears of unleashing a foreign exchange spending spree and inadvertently acquiring redundant, outdated, or inappropriate technology. Statistics tell a tale of caution and control: last year, China signed 561 technology import contracts for a total of $2.96 billion, a 34 percent drop from 774 contracts totaling $4.45 billion in 1986. Recent decentralization in sourcing and purchasing authority heightened the government's concern about monitoring the cost, kind, and quantities of technology imports.

The "Detailed Rules for the Implementation of the Regulations on Administration of Technology Import Contracts," (the Rules), issued last January, reflect both China's needs and worries in this area. The new Rules expand on some hitherto vague or ambiguous provisions in China's technology import regulations and provide the clearest view yet of the attitudes prospective foreign suppliers can expect to encounter in negotiating technology transfer contracts. Despite supplying a welcome increase in predictability, the new Rules also officially reaffirm some restrictions that were previously cast only as internal guidelines or model contract terms. Thus from the perspective of foreign companies, the regulations demonstrate progress in the evolution of China's technology import procedures, but still leave room for improvement.

Defining technology transfer

The new Rules expand and refine

New guidelines make it clear that China will only purchase from abroad those technologies necessary for modernizing its industrial base.



the definitions of technology import contracts originally laid out in China's 1985 Regulations on the Administration of Technology Import Contracts (*see The CBR*, Nov–Dec 1985, p. 36). First, "know-how" contracts now include leasing contracts, sales of technical materials such as operating manuals, and assembly or processing contracts. Second, contracts to transfer "pure trademarks"—trademark licensing that involves no other type of technology transfer—are explicitly exempt from coverage under the new Rules. However, most trademark licenses accompany some type of technology transfer that is subject to the Rules.

A third change expands exemptions for foreign investment enterprises (FIEs), by including cooperative joint ventures and wholly foreign-owned enterprises in the definition of an FIE. Contracts transferring industrial property rights or know-how to an equity joint venture generally are regulated by the relevant FIE laws rather than the technology import contract regulations. However, given the comparative lack of detailed guidelines governing the capital contribution of technology to FIEs, it is likely that many FIE contracts containing foreign technology contributions will be scrutinized according to the technology import contract rules.

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Spelling out more in the contract

The original technology regulations specify certain terms that must be included in a technology transfer contract, and the new Rules expand the list of required items.

▶ **Testing risks and responsibilities.** The two parties must specify who is responsible if the technology fails to meet established targets in the agreed-upon time, and the responsibilities of each party in that event. Chinese buyers often insist on some form of automatic compensation or withholding of final payment if the technology fails the certification test. The tests, therefore, should be clearly and realistically designed, with the standards for raw materials, utilities, personnel, and quality control to be used in the testing procedures spelled out in detail.

The new Rules also state that the supplier must deliver technical documentation (such as operating manuals or blueprints) within a timeframe that accommodates the recipient's work schedule.

▶ **Confidentiality and shared improvements.** The parties must make provisions in their agreement regarding confidentiality. The Rules specify that the confidentiality term

generally may not exceed the length of the contract. If, however, the supplier provides confidential improvements to the technology, the supplier may impose an additional confidentiality period for the improved technology. The issue of who will own the improved technology, and how it will be shared, must also be addressed.

▶ **Compensation.** Compensation terms for contract breaches by either party must be set. In practice, suppliers have found it difficult to negotiate limits on their liability because the Chinese prefer to propose penalty provisions that, while negotiable, do not contain ceilings.

▶ **Dispute resolution.** The parties must specify the methods they will use to resolve disputes.

▶ **Definition of terms.** The Rules introduce the requirement that common or key terms and phrases be clearly defined in the contract. This is a standard US legal practice that helps establish a "meeting of the minds" on terminology.

▶ **Trademark samples.** The 1985 Technology Import Regulations require the supplier to provide the registration or application numbers for all patents and trademarks related to the technology being transferred. The new Rules require suppliers to attach samples of all related trademarks. This information is required whether or not the patents and marks are registered in China. Suppliers can, however, strike an independent confidentiality agreement with the recipients if they are worried about protecting the technology and trademarks supplied.

Confidentiality problems

The 1985 Regulations provide that a technology import contract should generally not exceed 10 years, and the new Rules add that protection of the technology's confidentiality should generally last only as long as the contract. This new provision reflects the reluctance of Chinese recipients to commit to extensive confidentiality terms unless the technology is highly desired.

The 1988 Rules also state that if the technology is publicized through no fault of the recipient, the recipient is no longer required to keep the technology secret. The Rules also protect the recipient's right to continue using the imported technology after the contract expires, unless the supplier receives official approval for restricting the technology's use.

Bans on export restrictions

China's 1985 Technology Import Regulations prohibit suppliers from imposing "unreasonable" restrictions on exports of items made with the transferred technology. The new Rules reflect China's current export emphasis by stating that suppliers may not impose any export restrictions at all, except on exports to countries or regions where the suppliers hold an exclusive license or distributorship. Only the official organization that examines and approves the contract can grant the supplier an exemption from this restriction.

Besides restating an existing rule requiring suppliers to pay relevant Chinese taxes, Article 16 also codifies existing practice by specifying that suppliers may not shift tax responsibilities to the recipient.

Gaps in the approval process

The new Rules generally reaffirm the contract approval provisions of previous technology import legislation. For example, if the approval authority does not act on a submitted basic contract within 60 days, the contract is considered to be approved. But it remains unclear what happens in the case of contracts requiring special approval—those calling for an extended confidentiality period, export restrictions on the recipient, or preferential tax treatment, for example. If no action is taken on such a contract within the prescribed time, is it considered approved? The Rules add importance to this issue by reaffirming that banks, customs offices, and tax authorities may refuse to do business with the contracting parties unless they provide a certificate of government approval. Where will a certificate come from in the event of "passive" approval? These continuing questions and ambiguities make the approval-granting provision unreliable.

The new Rules further undermine predictability by expanding the approval authorities' discretion to reject or modify a contract. The broad language in Article 18 allows rejection of contracts that are "imperfect," contain "unreasonable" price or payment terms, or assign "unclear, unequal, or unreasonable" responsibilities or obligations to each party. The authorities' ability to define these terms—and thereby force contract modification in the final stages of agreement—will likely remain a frustration for foreign negotiators.

Who's calling the shots?

The Rules, along with the parent Regulations, give prospective foreign suppliers a clear picture of what their Chinese negotiating partners—and the approval authorities—will accept in a technology import contract. Satisfying both of these parties is essential for foreign companies that want to see their technology contract executed. Although economic decentralization has increased the number of entities that can import technology on their own, the central authorities have retained their right to approve contracts in order to regulate the overall import picture. Thus to avoid unexpected obstacles at the end of the road, foreign suppliers should first ensure that their negotiating partners have the authority to participate in a contract and then try to confirm important contract terms with approval authorities throughout the negotiating process. 完

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Efforts to improve vocational training may shift from schools to factories following funding cutbacks

The Technical Education Challenge

Jurgen Henze

China's work force has long been educationally underqualified. Up to 70 percent of the workers in most industries have only seven to eight years of schooling. Because the country's limited number of college graduates are usually assigned to academic or bureaucratic positions, few factories harbor any hope of employing a college graduate. Instead, mid-level specialists trained at vocational–technical schools form the technical core in China's factories.

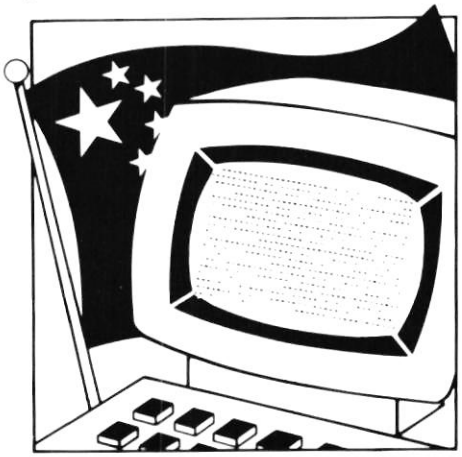
Graduates of vocational schools form the core of China's technical work force. But factory workers may need better preparation if they are to lead China to a high-tech future.

More vocational graduates

During the Cultural Revolution, from 1966–76, China's existing vocational–technical education system suffered through a "revolution in education" that emphasized practical farming skills and small-scale production in school-run factories. The emphasis on experience over academics did not provide students with strong scientific and technical skills, resulting in a dearth of technical specialists among workers educated at that time.

In the late 1970s, as China's leaders realized that this shortage would hinder efforts to improve industrial productivity, they began to look for ways to revamp vocational–technical education. After studying systems in several countries, China adopted an experimental scheme incorporating elements from various approaches.

In the early 1980s, the Ministry of Education (now known as the State Education Commission) embarked on a new course. Some general academic high schools were converted into vocational or agricultural high schools, while others added vocational classes to the general curriculum. Enrollment climbed in every type of vocational school from



1980–87 (*see* box). But numbers alone will not resolve all the problems related to a shortage of skilled technicians. Improvements in the quality and efficiency of technical training programs are also needed.

Problems in the job market

As the number of students at vocational–technical schools has grown, so have the problems in matching the job skills of graduates with the employment needs of Chinese enterprises. One attempt to solve this problem was to get rid of the old job assignment system, under which ministerial, regional, and university competition for students hindered rational assignments. Now vocational–technical school graduates are recommended for jobs based on the results of special examinations given by local labor departments.

Surprisingly, in some regions the vocational grads have difficulty finding employment. Overstaffed production and service industries are becoming more cost-conscious, carefully monitoring entry-level recruitment to prevent an overinflated payroll. Labor authorities have responded by enforcing manpower forecasting, setting up new coordinating administrative organs, reforming salary structures, and directing more people to private enterprise.

Problems in the school system

The rising demand for experienced industrial technicians is luring qualified teachers out of the schools and into more lucrative factory jobs. As a result, obtaining and retraining qualified teachers for vocational schools is a serious problem. Some 40 percent of all vocational–technical school teachers hold only a specialized secondary school degree (*see* box) or less. And the lack of any national curriculum or unified and systematically prepared teaching materials leaves these minimally qualified teachers on their own for both teaching methods and materials.

But potential cutbacks in government funding pose the most serious threat to the vocational–technical education system. The National People's Congress held last March recommended that more money be diverted away from education and toward industrial projects offering a high rate of return. While the entire educational system will certainly feel the pinch, vocational schools may suffer the most, since their per unit expenditures can run three to four times higher than schools offering a standard academic curriculum. One

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proposal reflecting the interest in cutting down State educational costs has been to encourage vocational schools to help finance themselves through earnings from school-based production or farming.

Responsibility falls to the factory

Funding cutbacks have already forced changes in the current system. One increasingly popular practice is commissioned training, in which enterprises agree to sponsor a student to study a specific subject, at a cost of ¥450–¥650 per year, in return for the student's commitment to join that factory upon graduation.

Some factories are responding to the continuing inadequacies of the vocational–technical education system by bringing more worker education and training in-house. A wide range of on-the-job and off-the-job training is currently in use, including workers' universities, correspondence courses, radio and television courses, and evening classes. In-house education is increasingly important for units that want to stay at the forefront of new technologies. And a new emphasis is being placed on adult "life-long" education, in which workers receive additional training over the course of their employment. This approach to raising workers' skills will require fewer funds than upgrading the quality of vocational–technical schools.

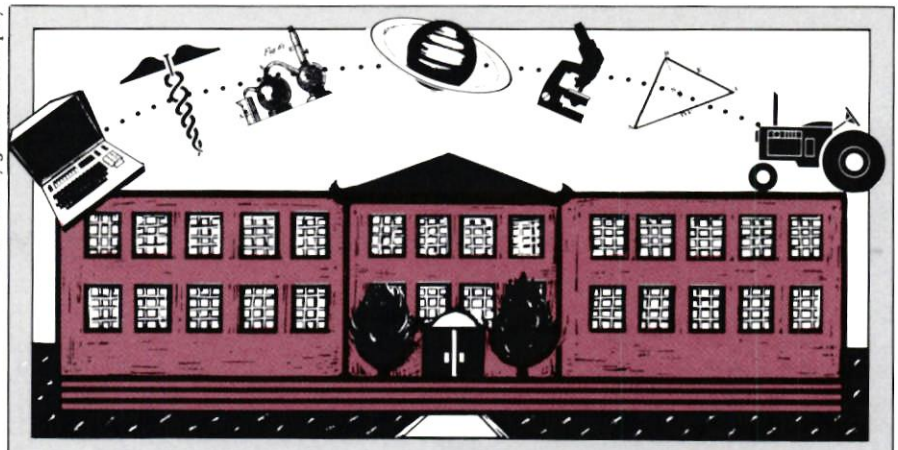
Because extra training requires extra cost, these efforts will succeed only if enterprises are given greater financial autonomy. But the biggest hurdle may be convincing plant managers and Party secretaries that education is a long-term investment offering definable rates of return.

A time of transition

China's vocational–technical education system is entering a transition period. Leaders are learning that the system set up in the early 1980s must be modified to meet the demands of today's marketplace. And the role of factories will continue to grow as they are forced to rely primarily on their own resources to raise employees' technical skills.

China's industrial reform program could benefit from the support of a strong technical education program. This will only happen when a stable, coordinated alliance is forged between the State, vocational–technical schools, and Chinese enterprises. 完

Artwork by JoEllen Murphy



A GLANCE AT SECONDARY EDUCATION

High schools with a standard academic curriculum
1980: 55.08 million students
1987: 58.69 million students

The vast majority of Chinese students still attend high school programs with a general curriculum, although more vocational electives are integrated into the academic program. About 24 percent of these high school graduates attend college.

Specialized secondary schools
1980: 1.24 million students
1987: 1.87 million students

Primarily financed and administered by industrial ministries or their regional departments, these schools—which include technical high schools and teacher-training schools—allocate 50 percent of instruction time to a standard curriculum, and split the other half equally between specialized education and practical training or internships. During a three- to four-year course, students specialize in areas such as engineering, veterinary science, medicine, agriculture, forestry, economics, and finance. Most graduates are assigned to high-level jobs at key enterprises under whichever ministry runs the school. Graduates generally start out at grade 3 or 4 on the eight-grade wage scale for industrial employees. There is, however, often a mismatch between the student's field of study and actual job.

Workers training schools
1980: 700,000 students
1985: 742,000 students

These long-established three-year school-based training programs produce the majority of China's skilled workers and mid-level technicians. Students study roughly the same subjects as students at specialized secondary schools, but at a lower level. About one-third of the students join the program after graduating from high school, but others enter with just a junior high school diploma. The schools may be shifting their emphasis toward more practical training if recent plans released by the Ministry of Machine-Building and Electronics Industry are any indication. The 50–50 split between theoretical instruction and practical training will be changed to favor two-thirds training.

Vocational high schools and agricultural high schools
1980: 454,000 students
1987: 2.68 million students

Run by a variety of regional or local industrial, service, or governmental units, this catch-all category includes one- to three-year programs that offer the lowest level of instruction, and generally face a shortage of teachers and teaching materials. The schools vary greatly in character and length of study, but about 31 percent of the students study agriculture, 26 percent engineering, and 12 percent administration. Graduates usually get low-salary, low-status jobs ranking at grade 1 or 2 on the wage scale.

Training centers for vocation-technical education
1980: NA
1985: 1.7 million students

These short-term programs financed by local labor departments were first established in the late 1970s to absorb urban high school graduates who could not immediately be placed in jobs. The schools provide basic training.

The New Face of Nonferrous Metals

Shifting priorities in China's nonferrous industry open a window of opportunity for foreign companies

David Richter

Since the early 1980s, China's consumption of nonferrous metals has increased dramatically to keep up with the need for more raw materials in the military, machine building, packaging, and construction industries. Despite having vast reserves of almost all nonferrous metals, China has become a net importer. By 1987 the annual nonferrous metal import bill had reached almost $1 billion, with China spending close to $350 million to bring in aluminum and copper, its two primary nonferrous imports.

Economic planners originally chose to import nonferrous metals rather than spend the billions necessary to develop existing resources. But a $3.2 billion nonferrous trade deficit from 1980–85 and the serious foreign exchange shortage of 1985–86 made them reconsider. While most industries faced tightened capital construction budgets in 1987, the State Council moved to *increase* funding for major projects in the nonferrous industry. As a result of the heightened interest in exploiting China's underdeveloped mining and smelting capacity, many new large nonferrous projects are now in the works (*see* list).

To complement this new development strategy, in September 1987 China's State Council enlarged the decision-making authority of the China National Nonferrous Metals Industry Corporation (CNNC), the ministry-level organization charged with monitoring the operations and administration of China's nonferrous metals industry. CNNC was given the power to determine what percent of production at each nonferrous enterprise must be turned over to the State. By being more flexible in letting enterprises sell more metals on the free market and retain a larger share of their earnings, CNNC should be able to encourage producers to increase production, improve marketing, and expand exports.

Finding funding

China plans to tap a wide variety of sources to obtain the money needed to support increased investment in the nonferrous sector. In addition to mobilizing State and provincial funds, China will borrow money from abroad, looking first to concessionary funding sources. The World Bank and the Asian Development Bank (ADB) are obvious choices, but planners are also pursuing government-to-government soft loans. Both France and Canada have already indicated their willingness to extend generous loan packages for nonferrous projects (*see* list).

The nonferrous industry is likely to make its first attempt to secure a World Bank loan later this year. In June 1987, CNNC General Manager Fei Ziwen visited the World Bank to discuss the possibility of obtaining a loan for the proposed Great Wall Aluminim Complex near Zhengzhou in Henan Province. The Chinese have yet to make a formal request for the loan, but World Bank officials expect the application will soon be made. The Bank's in-depth feasibility study process makes it unlikely that money would be available for the project before 1990.

Only when concessionary sources have been exhausted will China turn to the more expensive alternative—commercial financing. Commercially funded projects must be able to

Photo courtesy of Xinhua News Agency

Dexing Copper Mine in Jiangxi Province is one of China's largest and has purchased American equipment and services. Here workers prepare to transport ore.

David Richter, a program manager at the US–China Business Council, follows developments in the energy and resource sectors for member companies.

export enough nonferrous metals to earn the foreign exchange for loan repayment. China considered commercial financing for a new aluminum smelter at Weinan, near Xi'an in Shaanxi Province, until Canadian government financing became available.

An alternative source of investment is the China International Trust and Investment Corporation (CITIC), which first demonstrated its interest in the nonferrous sector when it took a 10 percent stake in the Portland Aluminum Smelter in Australia in 1986. CITIC's first domestic commitment is a significant 35.6 percent share in the Bohai Aluminum Company—a $286 million project in Hebei Province. And since Huang Dichun, the former deputy general manager of CNNC, was recently lured into a position at CITIC, it appears likely that more nonferrous projects will be part of CITIC's future plans.

To coordinate foreign investment, nonferrous industry leaders are discussing the establishment of an investment corporation that would focus on this sector. Such a corporation would be consistent with China's current plans to decentralize project financing and fundraising responsibilities, transferring this task from the State Planning Commission to the industrial ministries. If a nonferrous investment corporation is formed, it will probably be based on the steel industry's model, the China International Iron & Steel Investment Corporation (CSI). Jointly administered by the Ministry of Metallurgical Industry (MMI) and the State Planning Commission, CSI has actively promoted foreign investment in China's major steel projects since it was formed in 1987 and recently signed its first two loan agreements worth a total of $80 million.

Aluminum projects illustrate strategy shift

Investment in all nonferrous metals—including copper, lead, zinc, and rare earths—has increased, but so far the lion's share of resources has gone to aluminum. In the early 1980s China realized the importance of this sector for both defense and commercial applications and began developing the domestic industry (*see The CBR*, May–June 1986, p. 61). As the trial case for the nonferrous industry, aluminum offers some lessons on how development of other metals may proceed.

Domestic production of aluminum has grown rapidly during the decade, reaching 615,000 tonnes in 1987, up from 400,000 tonnes in 1982. CNNC expects annual aluminum production to hit 1 million tonnes by 1991—still not enough to achieve China's goal of meeting domestic demand by the early 1990s.

Early efforts to boost domestic aluminum processing capacity focused on imports of secondhand plants and equipment to outfit the industry. This strategy played to the strengths of Japanese companies, who sold China a number of used plants, including the Showa Smelter

CNIEC AND MINMETALS FIGHT FOR EXPORTS

Photo courtesy of Xinhua News Agency

Jiangxi's Xialong Tungsten Mine. China hopes to add nickel and rare earths to the list of major nonferrous exports such as tungsten, molybdenum, and tin.

A second element of China's new nonferrous strategy is to expand exports. Major projects already underway in rare earth metals and nickel (*see* list) offer new foreign exchange earning possibilities that will supplement the income from traditional exports like antimony, tungsten, molybdenum, and tin.

As a first step in increasing exports, CNNC established the China National Nonferrous Metals Import–Export Corporation (CNIEC) in January 1984. CNIEC entered the company of the China National Minerals and Metals Import–Export Corporation (MINMETALS) under the Ministry of Foreign Economic Relations and Trade, and the China Metallurgical Import–Export Corporation (CMIEC) under the Ministry of Metallurgical Industry, becoming the third organization officially authorized to market nonferrous metals overseas. CMIEC primarily handles ferrous metal products, but does export a small amount of nonferrous and rare earth metals produced at MMI's iron and steel facilities, which include the world's largest rare earth deposit at the Baotou Iron and Steel Plant in Inner Mongolia.

Competition between CNIEC and MINMETALS has been fierce as the newcomer has moved in on what was previously a near-monopoly for MINMETALS. To increase CNIEC's international exposure, CNNC sponsored three trade symposia in Japan, West Germany, and the United States, one each year beginning in 1985. These shows were a success, generating Chinese sales worth $52 million in West Germany and $60 million in New York. And to begin making inroads into MINMETALS' longstanding overseas contacts, CNIEC opened an office in New York in 1987 and in Essen, West Germany, in June 1988.

But CNNC's determination to channel more exports through its own company are hampered by the requirement that provincial branches of CNIEC coordinate exports with the head office in Beijing. In contrast, MINMETALS' local offices can now act independently and sell directly to foreign parties. This decentralized authority gives MINMETALS more flexibility in exporting nonferrous metals produced at both the local and provincial levels. While the two organizations will continue to jockey for position, the government will gladly accept foreign exchange earnings from either. —DR

A PROFILE OF MAJOR PROJECTS IN CHINA'S NONFERROUS METALS INDUSTRY

ALUMINUM

PINGGUO ALUMINUM COMPLEX (Pingguo County, Guangxi)
Present capacity: Greenfield plant
Financing: $300 million French mixed credit financing package for purchase of French equipment.
Description: Joint venture between CNNC, Guangxi Provincial Government, and CITIC. Total investment of $485 million. Project will use domestic technology. Aluminum Pechiney is leading French company involved. **Phase I:** Design capacity of 300,000 tpy alumina and 100,000 tpy electolytic aluminum. Projected completion: 1990. **Phase II:** Increase production to 1 million tpy alumina and 500,000 tpy electrolytic aluminum. Trial production: 1993.
Power: Hydroelectric; 250 MW hydropower station will be built to power the plant.
Equipment to be imported: For alumina processing: Bayer process and relevant equipment; decomposition technology and equipment for producing alumina sand at super-concentrated precipitation; energy-saving falling-film still; large-sized alumina production equipment and meters; and static flash calciner with auxiliary equipment. For alumina smelting: four sets of 220-KV power transformers and rectifiers; 220 KV transforming substations and switchgears; DC power measurement and stabilization system loops; frequency filters and capacitor compensation systems, and digital treatment and controls systems.

GREAT WALL ALUMINUM COMPLEX (Jiaozuo, Henan)
Present capacity: Greenfield plant
Financing: SPC-approved project considering seeking US Trade and Development feasibility study grant and applying for World Bank loan. Will build alumina plant, aluminum smelter, and coal-fired power plant. **First phase:** Design aluminum smelting capacity of 300,000 tpy. Projected completion: 1990. **Second phase:** Design production capacity of 500,000 tpy aluminum. Projected completion: 1992–93.
Power: Thermal; coal from Shanxi Province.

SHANXI ALUMINUM PLANT
Financing: Domestic sources. Possible French export credits.
Description: Aluminum Pechiney (France) will supply bauxite digestion facility. **Phase I:** design processing capacity 500,000 tpy alumina. Projected completion: 1990.
Power: Hydroelectric power.

SOUTHWEST ALUMINUM PROCESSING PLANT (Chongqing, Sichuan)
Present capacity: 50,000 tpy processed aluminum
Financing: Japanese government financing may support import of cold rolling mill.
Description: Aluminum processing capacity to be expanded to 200,000 tpy by 1990–91. Wean Industries (US) and United Engineering (US) are bidding for the cold rolling mill project against West Germany and Japanese companies. In March 1988 $11 million worth of contracts to supply technology and equipment for hot rolling mill were signed by Japanese companies Ishikawajima-Harima Heavy Industries Company, Mitsubishi Electric Corporation, and Toyo Menka Kaisha. Expected on stream late 1990.
Equipment to be imported: Cold rolling, coating, and foil lines; aluminum foil finishing mill; coilers and slicing machine; tension-leveling machine; protective gas annealing furnace; continuous color coating line; and roll-grinding machine.

GUIZHOU ALUMINUM SMELTER (Guiyang, Guizhou)
Present capacity: 100,000 tpy
Financing: Domestic funds.
Description: Complex includes two bauxite and one limestone mine, one alumina plant, and two electrolytic aluminum smelters. Second aluminum smelter modernized with technology and equipment from Japan, France, West Germany, Switzerland, Italy, and the United States. **Phase II:** Expansion will add aluminum capacity of 80–100,000 tpy. Seventh Five-Year Plan (7th FYP) project.
Power: Hydroelectric power.
Equipment to be imported: Transformer rectification unit, computer, horizontal casting machine, heat transfer medium boiler, pulverized dense phase material transportation device, continuous proportion scale, continuous kneader, and a four-axial screw preheater.

QINGHAI ALUMINUM SMELTER (Datong County, Qinghai)
Present capacity: 100,000 tpy
Financing: Domestic funds.
Description: Construction began in 6th FYP. **Phase I:** Nearing completion of first 100,000 tpy. **Phase II:** Expansion will add aluminum capacity of 100,000 tpy. 7th FYP project. Projected completion: 1990.
Power: Hydroelectric power from the Longyangxia Hydropower Station.
Equipment to be imported: Anode production system; transformer rectification unit; automatic control system for aluminum electrolysis; pollution control unit; and casting system for primary aluminum and on-line molted aluminum purification device.

from Chiba (which went to the Baiyin Aluminum Plant in Gansu Province). Only a few aggressive American companies, such as Dorr-Oliver and Alcoa, who sold equipment to the Shanxi Alumina Plant, captured a share of the business.

But ongoing work on the Qinghai Aluminum Plant project signals a major change in strategy that is likely to be applied to other nonferrous projects. China is now importing only key pieces of equipment and technology from foreign companies, while domestic equipment and local engineers will be used for the bulk of the production and engineering work.

More opportunities for foreign companies

Foreign companies will still be able to participate in the development of China's domestic nonferrous metals industry through sales of mining and plant equipment, engineering services, computers and controls, and technology transfer.

American companies, active on all these fronts, have been particularly successful in selling equipment. The Dexing Copper Mine in Jiangxi Province purchased large quantities of US equipment, including processing machinery from Allis Chalmers and Rexnord, trucks from Euclid and WABCO, and shovels and blast hole drills from other American companies. At another copper mine—the Zhongtiaoshan Copper Mine in Shanxi Province—the Chinese adopted US block-caving technology and purchased much American equipment.

While industry officials have begun to recognize the value of foreign engineering services, foreign exchange constraints will probably limit foreign engineering company participation to technical components of projects that Chinese engineers cannot handle on their own.

The Dexing Copper Mine demonstrates the usual Chinese approach to foreign engineering services in the nonferrous industry. Although Fluor Corporation (US) completed the feasibility study for the project, Dexing elected to use domestic engineering for project management.

On the other hand, China will probably turn to a foreign engineering firm to supply the special design and engineering work to exploit the Chenmenshan Copper Mine in Jiangxi Province because the bulk of

the deposit lies under a lake.

The concessional financing edge

The future of American participation in China's nonferrous sector now looks brighter because US companies can offer technology and equipment at competitive prices following the decline in the value of the dollar. But industry experts say that it will probably be financing—and not technology—that determines the winners in nonferrous projects. As a result, American companies are keeping their options open. CNNC strongly encouraged Wean Industries and United Engineering to put together a bid on a cold rolling mill at the Southwest Aluminum Processing Plant in Sichuan Province. But to make their bid more competitive, the two companies turned to Mitsui for financing. And Alcoa—already working on a tabular alumina joint venture in Shandong Province—is pursuing several other projects in which the company's technology gives them the competitive edge. On one, the Weinan aluminum project, Alcoa is hedging its bets by working with Bechtel Canada to take advantage of Canadian governmental financing.

American companies must keep pace with financing packages offered by foreign governments, for these aggressive, concessionary export financing programs can give foreign companies an advantage over their American competitors. Aluminum Pechiney of France, for example, gained a leg up on Guangxi's Pingguo Aluminum Complex Project because the company's advanced technology had the added backing of a $300 million government export credit package.

The case of the Luoyang Monocrystalline Silicon Plant demonstrates the benefits to US companies when the United States is able to offer some financing assistance. US companies made $10 million in equipment sales after the US Trade and Development Program provided a feasibility study grant to CNNC. Despite this success, US government support is likely to continue to be limited. Thus US participation in China's major nonferrous projects will depend on the extent of China's commercial borrowing—and whether American companies can take advantage of bilateral financing programs sponsored by other countries when commercial loans are limited. 完

SHAANXI WEINAN ALUMINUM SMELTER (Weinan, Shaanxi)
Present capacity: Greenfield site
Financing: Canadian govenment soft loan under negotiation.
Description: Smelter with design capacity of 100,000 tpy electrolyzed aluminum. Bechtel Canada working with Alcoa technology is competing against, among others, team of Lavalin (Canada) with Alcan technology. Projected completion: 1990.
Power: Thermal power; coal from Shaanxi Province.

BOHAI ALUMINUM COMPANY, LTD. (Qinhuangdao, Hebei)
Present capacity: 10,000 tpy aluminum
Financing: Australian, Hong Kong, and domestic sources provided funding for this $286 million project.
Description: Joint venture between Aluminium Smelters of Victoria Ltd. (Australia), Shortridge Ltd. (HK), CITIC, Hebei Provincial Metallurgical Industry Corporation, Qinhuangdao Municipal Land and Sea United Shipping Corporation, and MMI signed in July 1987. **Phase I:** Expand rolling capacity to 100,000 tpy. Projected completion date: 1990. **Phase II:** Further expansion of rolling capacity to 300,000–500,000 tpy. Projected completion: 1992–93.
Power: Thermal power plant.

RARE EARTHS
BAOTOU IRON & STEEL COMPANY (Baotou, Inner Mongolia)
Financing: Domestic funds.
Description: Rare earth deposit is largest in world. State Council recently approved $330 million renovation and expansion plan primarily for iron and steel production but does not include rare earth component. Total investment estimated at $330 million. Plan will increase rare earth concentrate, rare earth chloride, and rare earth monoxide production capacity by 4.5, 2.3, and 7.3 times, respectively, over 1985 level. Projected completion: 1990. Iron and steel capacity will each be expanded to 2.5 million tpy, and rolled steel capacity to 1.7 million tpy. Targeted completion date: 1990. Plan also calls for: expanding capacity of transportation system of the Bayan Obo iron mine; adding an ore dressing line; building a 180 sq m large sintering machine; expanding capacities of open-hearth furnace and convertor; adding pretreatment facilities for molten iron and out-of-furnace refining facilities; renovating the main power room of the rolling workshop; adding a new rod rolling mill; raising capacity of 75 kilogram rail processing line; and upgrading capacity of oil pipeline production line.

NICKEL
JINCHUAN NONFERROUS METALS COMPANY (Lanzhou, Gansu)
Present capacity: 20,000 tpy nickel, 10,000 tpy copper, and 180,000 tpy sulphuric acid
Financing: Domestic funds. Possible Swedish export credits.
Description: China's largest nickel reserves and second-largest copper and cobalt reseves. Complex encompasses two underground mines, a small open pit, and a metallurgical plant. Company favors vertical crater retreat mining method in order to secure low-grade nickel reserves in the overlying strata. **Phase I:** Expansion and modernization of present facility up to design capacity of 40,000 tpy nickel, 20,000 tpy copper, and 400,000 tpy sulfuric acid. Project will also retrieve platinum and paladium powder. Projected completion: 1990. **Phase II:** CNNC will expand and modernize mine and metallurgical complex. Mine production will increase to 8,000 tpd of ore by 1990 and 17,000 tpd by 1995. Will expand production capacities by an additional 20,000 tpy nickel, 10,000 tpy copper, and 220,000 tpy sulphuric acid. **Phase III:** Will futher expand electrolytic nickel capacity to 80,000 tpy. Projected completion: 1995.
Equipment to be imported: Advanced underground mining equipment, continuous mining equipment, engineering design services in both mechanized undercut-and-fill and overhand cut-and-fill mining methods, and large-diameter blast hole drills.

LEAD AND ZINC
CHANGBA LEAD-ZINC MINE (Chengxian County, Gansu) and **NORTHWEST (XIBEI) SMELTER** (Beiying, Shanxi)
Financing: Domestic funds.
Description: Expansion of Changba's new surface mine and lead–zinc smelter. Smelter's design capacity is 50,000 tpy of lead and 100,000 tpy of zinc. Total investment is $270 million. Lurgi (West Germany) constructing lead smelter. Japanese companies Mitsui and Teho Zinc constructing zinc smelter. Eventually Changba Lead-Zinc Mine will overtake Guangzhou's Fankou Mine as China's largest lead and zinc producer. Projected completion: 1990.
Equipment to be imported: Construction of 20-mile slurry pipeline to transport lead–zinc concentrate to nearest rail line is under consideration.

COPPER
DEXING COPPER MINE (Jiangxi)
Financing: Domestic funds.
Description: Mine will produce 90,000 tpd of ore by end of Phase III expansion. Projected completion date: 1990. Basic engineering package done by Fluor, Inc. (US).

Announcing:

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The US-China Business Council has just completed a new study analyzing American competitiveness in China and and presenting outstanding business opportunities in coming years.

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Computers that Speak Chinese

Three software programs that bring the Chinese language into the computer age—and simplify business communication

William Cross

As computers began to gain widespread popularity a decade ago, it appeared Chinese characters might be destined to go the way of Egypt's hieroglyphics: admired for their beauty but gradually discarded as a means of communication. Those companies and scientists trying to develop a simple software system faced a variety of problems as they tried to render the 6,000–7,000 Chinese characters in common daily use with only a standard computer keyboard.

In English, words are formed from a small, finite set of letters. Chinese, on the other hand, uses one or more characters to represent each word. Since new characters can be created as needed by combining simple characters into complex ones, the number of Chinese characters is theoretically limitless.

Transliterating Chinese is no answer, either. Replacing characters with an alphabet using the system known as *hanyu pinyin* (or simply pinyin) raises the problem of homonyms. There are over 40 different characters with the pinyin transcription *shi*, for example.

Yet despite the apparent obstacles, an explosion of new software, hybrids of software and hardware, and stand-alone hardware systems have now made Chinese-language computing one of the most exciting aspects of the information age. New companies are entering the field both in the United States and Asia. Many of the systems are enormously expensive, since stand-alone machines designated for a particular client or application are largely unsuitable for mass distribution. Yet several relatively inexpensive software packages designed to run on IBM personal computers and their so-called "clones" have become available, making the job of firms in the China field somewhat easier.

To avoid spending vast sums on poorly planned schemes to computerize the office with a Chinese word processing program, a firm should carefully investigate its options.

Defining your needs

When personal computers were first widely introduced into the workplace five years ago, managers all too often went out and purchased systems that were unpopular with (and often unsuited to) the employees who had to use them. To avoid spending vast sums on poorly planned schemes to computerize the office with a Chinese word processing program, a firm should think through the following questions:

▶ *What will I ask the system to do?* It is important to understand what kinds of documents will be created and how they will be used. For example, individuals engaged in scientific research or academic writing involving extensive vocabularies of specialized characters need more flexibility than a law firm or import–export company that will use its software chiefly for writing business letters.

▶ *How often will the system be used and by how many people?* A large firm with multiple personal computers may need a local area network to efficiently meet its needs. Not all software packages offer this option.

▶ *What is the background of the user?* The different transliteration and romanization methods used in the PRC, Hong Kong, and Taiwan can greatly effect the user's efficiency on a particular system.

▶ *Will it be necessary for the software to integrate with other business computer programs such as databases and spreadsheets already in use?*

▶ *Will documents be written in traditional Chinese characters, the simplified ones used in the People's Republic of China, or both?*

It would be very time-consuming to survey every computer system now able to handle Chinese. This article looks at three systems and attempts to evaluate them for their ease of operation, usefulness, and ability to solve real business problems.

CHINASTAR

One of the most widely used systems in Asia, Chinastar—not to be confused with the popular English-language word processing software Wordstar—is a powerful Chinese word processing program suited to almost any discipline. It offers five input modes to accommodate users with different educational backgrounds, can expand to include other languages such as Japanese, and is compatible with several major computer networks. Yet along with its strengths come some weaknesses.

The greatest advantage of Chinastar is clarity. The primary text entry method is called *cangjie*, after the legendary inventor of the Chinese language. First the user mentally

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breaks a character into its components, then types an alphanumeric code that calls up that character onto the screen. The method requires a thorough familiarity with written Chinese. Anyone who can speak and read Chinese but who cannot easily visualize characters from memory will have trouble using Chinastar.

A series of letter codes is used to call up each of the 20,000 characters stored in the system. The codes are related to 24 major "radicals," or character parts, which form the underpinnings of written Chinese. For three different characters containing the same radical, the users would hit the "a" key to produce the character for *ri* ("sun"); type "ab" for *ming* ("next"), and "amyo" to form *shi* ("to be"). Each character requires up to five keystrokes, but typing in pinyin or other romanization systems is certainly no less labor-intensive.

The developers of Chinastar clearly favor traditional characters. One version of the software only comes with traditional characters. And even the "professional" version of Chinastar, which includes both traditional and simplified characters, requires that users load a separate disk onto the computer, precluding an easy shift between the two styles.

If it sounds complicated, it is. Even the software's distributor concedes it takes at least two weeks to learn Chinastar. The system is powerful and has many useful features, including four other text entry methods (a modified *cangjie* that works with the first and last letters of the code to call up all related characters; *hanyu pinyin*; *bopomofo*; or *zhuyin fuhao*, the transliteration system developed in 1913 that is still used on Taiwan; plus the option of selecting another romanization system, such as Wade-Giles or Yale). Still, the system's complexity remains a serious consideration for the potential user.

TIANMA (FLYING HORSE)

For anyone who learned Chinese using the pinyin romanization system, Tianma is by far the easiest program to learn and operate. Romanized Chinese words are typed onto the screen using an ordinary computer keyboard. Then a tap of the F10 function key transforms the pinyin into characters.

Tianma tackles the problem of multiple homonyms by borrowing a page from artificial intelligence research. Before automatically choosing a Chinese character, the program "reads" the text for context—often relying on the statistical frequency of word usage to make a reasonable, if not always correct, choice. An on-screen help menu makes the system easy to operate. And unlike Chinastar, shifting back and forth between simplified and traditional characters requires only a keystroke with Tianma.

The conversion from pinyin to Chinese characters may look like magic, but the results can sometimes seem more like a shell game. Frequently used family and given names, literary words, and technical jargon can confuse the program and yield incorrect characters with the same pinyin transcription, requiring the operator to go back and correct them. Still, proofreading is quite easy. Simply move the cursor to the incorrect character and hit a second function key. A string of homonyms with the same pinyin romanizations will appear at the top of the screen. The user then moves the cursor beneath the right character and makes the switch with a keystroke.

To test the software's accuracy in a business situation, a randomly chosen passage from a report on Chinese trademarks was typed in. Surprisingly, the system picked up technical terms like *shangbiao* ("trademark") and *qiye* ("enterprise") with no trouble, but stumbled over simple connectors like *jiu* ("only"). The overall error rate was an acceptable 9 percent.

What's more, the program raised its efficiency when two additional features were used: a personal dic-

THREE SYSTEMS AT A GLANCE

中文之星 ChinaStar-II

Advantages: Accurate entry of individual characters; five different input methods; suitable to all applications; expandable to handle other languages including Japanese; supports most dot-matrix and laser printers; compatible with networks like Sperry Sernet and IBM PC Net.

Drawbacks: Difficult to install and time-consuming to learn; support manuals not "user friendly."

Hardware requirements: IBM PC, AT, or compatibles equipped with Hercules mono graphics card. Other hardware requirements vary with the configuration (*see* below).

Cost: Model II-46 with only traditional characters sells for $199 (requires 640K of memory plus 10 MB hard disk). Professional Chinastar II needs only 256K of memory (characters are generated by a "hard card" installed in the computer's internal expansion slots). Cost is $695 in either traditional or simplified characters, $895 for both. For information, contact JHL Research, Inc., 2552 W. Woodland Drive, Anaheim, CA 92801 (Tel: 714/827-7420).

Tianma 天马

Advantages: Little or no training needed; easy to use; set-up requires installation of "hard card," but software automatically loads itself; compatible with several popular printers, including Hewlett-Packard Laserjet.

Drawbacks: Works easily in business applications, but requires more proofreading when using extensive "non-standard" vocabulary.

Hardware requirements: IBM PC, XT, AT, or compatible with a minimum of 512K memory, plus a hard disk and a graphics card (Hercules, EGA, or CGA); Hercules card provides highest on-screen resolution, but card used does not affect printout quality.

Cost: Tianma II is available for $695 from Asia Communications, Inc., 2761 McColl Place, Victoria, BC Canada V8N 5Y8 (Tel: 604/477-7829).

自来字中文软件系统 Intex 公司的新产品

Advantages: Simple to use and accurate; loads easily.

Drawbacks: Only works with Toshiba dot-matrix printers; poor character resolution and print-out.

Hardware Requirements: IBM PC, XT, AT, or compatible with 640K RAM, a hard drive, and a Hercules graphics card.

Cost: Available for $395 from Intex Software Systems International, Ltd., One Penn Plaza, Suite 4330, New York, NY 10119 (Tel: 212/750-1140).

tionary and homonym ordering. Frequently used words or pinyin combinations can be stored in the dictionary to improve the conversion success rate. And by rearranging the order homonyms are listed in the program, often-used terms can be placed at the beginning where they are more easily found. Obviously, anyone writing letters or documents that recycle the same vocabulary will benefit from these features.

Tianma so heavily favors users schooled in pinyin that native speakers of Chinese from Hong Kong and Taiwan frequently dislike the program and complain about its inaccuracy. One explanation for low efficiency is mistakes made while inputting pinyin. For example, the compound *Zhongguo* ("China") will be incorrectly rendered if *Zhong* ("middle") and *guo* ("kingdom") are not typed together. The program is certainly less than perfect, and having to go back and correct improperly chosen characters can be annoying and time-consuming. Yet of the three systems reviewed here, Tianma is the quickest to learn and easiest to operate.

INTEX/ASIAGRAPHICS ZLZ

Dr. Christopher George, the developer of the Asiagraphics system, credits his Chinese father-in-law with the breakthrough that made the *zi lai zi* ("words from the self" or ZLZ) program workable. Dr. George had been searching for a way to call up characters on a computer screen by using "radicals," the basis of written Chinese. Radicals sometimes have a meaning related to the character, and most speakers of Chinese have at least a passing familiarity with them.

For example, *shuo* ("to speak") has the radical *yan* ("language") in it, and is thus related to other words having to do with language arts. Cooking terms invariably have the radical for fire (*huo*) in them, etc. Unfortunately, there are 214 radicals and only 52 letter keystrokes on a standard computer keyboard. His father-in-law pointed out that 52 radicals could accommodate most characters in use, and neatly fit onto a 26-letter keyboard with upper- and lower-case keys.

The result is an elegant, easy-to-use software that combines the ease of pinyin typing with the accuracy of Chinastar's individual character entry. One simply types in the Chinese

word in pinyin along with its tone indicator, plus a code letter or number indicating the radical family.

It sounds complicated, but in practice is quite straightforward. Typing "shui;s" brings up the character for "water" on the screen. Dancing the fingers over letters "peng/U" and "you;F" introduce "friend"; a spin along the keyboard to "dian|L1" and "shi|P" turns on the TV.

The last example shows that the codes have a few minor wiggles to handle homonyms. Unfortunately, this is one of the weaknesses of the Asiagraphics system. Committing all the codes to memory will work for some, but it is hardly a practical solution. The instruction manual provides an appendix of all the characters in the system organized alphabetically, but looking up words this way can be time-consuming.

There are other minor flaws, such as the failure of the manufacturer to include stickers with the 52 different radicals to put on the computer keyboard. This complaint may seem like quibbling, but if the program isn't used every day, the codes quickly vanish from memory.

More annoying is the low quality of the character image and the software's limited printer use. The ZLZ character font (that part of the software used to create the character on screen from dots of light) is clearly inferior to both Chinastar and Tianma. In addition, ZLZ will only print out on Toshiba dot-matrix printers. Dot-matrix quality is often acceptable in rough drafts and for some correspondence, but few businesses will be satisfied with less than laser printer quality for important documents.

Getting down to the decision

So which is the best system? The answer depends on the needs of the individual user. Chinastar, with its power and expandability to Japanese, Russian, and Greek, will appeal to firms doing business in languages other than Chinese and English. The program comes in several versions (*see* box), one of which can be installed on up to four PCs at once, clearly a cost-saving feature in offices with multiple personal computers.

Non-native Chinese speakers will likely be more comfortable with a system geared to pinyin, and here Tianma has the advantage in terms of ease of operation (though its forceful artificial intelligence features may require so much proofreading as to dilute this advantage). Although Chinastar has a pinyin entry method, Tianma is both less expensive than the "professional" version and certainly easier to use.

The Intex/Asiagraphics program is the most cost-effective for small businesses and individuals who need the ability to type in Chinese but don't require the smooth graphic look of a laser printer. The program's graphic look is perfectly readable, and the pinyin text entry method is uncomplicated.

In the end, when it comes down to making a decision regarding a package, it is wise to keep in mind the Chinese proverb *liang ti cai yi*—"make the clothes fit the body." 完

Trademark Update

China's new trademark rules stem abuse by clarifying application procedures and strengthening infringement provisions

David B. Kay

As business opportunities for both Chinese and foreign companies have expanded in China, the country's fledgling trademark system has been flooded by a growing number of applications. In 1987 total domestic and foreign trademark applications filed with the Trademark Office of the State Administration of Industry and Commerce (SAIC) topped 187,000, up from only 18,500 in 1982.

During the same period, the incidence of trademark infringement began to rise as factories tried to improve profitability by reproducing popular brand names. Some unknowingly violated trademarks, while others simply wanted to make a quick profit. China's trademark system has begun to show the strains of coping with both the magnitude of applications and the increasing incidence of trademark violations.

New rules and new actors

Chinese authorities are gradually developing the administrative apparatus and legislation needed to facilitate the trademark application and protection process. When authorities realized that China's 1982 Trademark Law and 1983 Implementing Rules were inadequate, they responded by abrogating the Implementing Rules with a beefier version promulgated as the "Detailed Implementing Rules for the Trademark Law of the People's Republic of China," which took effect last January. In general, these new rules are more detailed and broader in scope than the 1983 Implementing Rules that they replace.

The new rules should make it easier to handle the growing number of applications and the problem of trademark infringement. But China also needs more trained personnel in this field. Due to a lack of trademark examiners, trademark applicants in China must wait between 12 and 18 months for an application to be approved. The personnel shortage also prevents the authorities from moving quickly to take products with counterfeit marks off the market.

One piece of good news for foreign firms frustrated by delays is that the new rules allow an expansion in the number of official trademark agencies. Until now, foreign companies had to handle all trademark matters through the Beijing-based China Trademark Agency under the China Council for the Promotion of International Trade (CCPIT) or its affiliate organization, China Patent Agent (HK) Ltd. The new trademark rules eliminate this monopoly by permitting the State Administration of Industry and Commerce (SAIC) to appoint other organizations to act as foreign trademark agents. Although the SAIC has not yet opened any new agencies, the opportunity to do so should help reduce the backlog that has been building up at CCPIT and China Patent Agent (HK) offices.

More specific application rules

The new rules provide clearer guidelines in a number of areas that were problematic or vague under the previous legislation.

▶ **Encouraging consistent use of Chinese names.** Article 10 of the new rules requires that the trademark applicant's name be consistent with the approved or registered name already in use in China. One of the most common trademark registration problems crops up when an application—which must be in Chinese—fails to provide a translation of the applicant's name. The trademark agent assigns a Chinese name for the company, but if this ad hoc name is not used consistently on all of the foreign party's applications, problems will crop up. The company can find its application blocked by another company's prior registration of an identical trademark, when in fact the "other" company is actually the same foreign party under a different Chinese name. Applying to amend the name used on earlier applications will cost the company $120 for each name change.

▶ **Limiting registration to goods within the company's scope of business.** The Trademark Law limits the exclusive right to use a registered trademark to the goods specified on the trademark application and approved by the Trademark Office. The 1988 rules go on to stipulate, however, that the goods may not exceed the applicant's registered scope of business. It is difficult to know how this will be enforced, as applicants are not required to submit a business license or certificate of incorporation indicating scope of business.

In any case, this new requirement may curtail a type of defensive registration, now commonly practiced in China. Owners of especially well-known trademarks who like to control use of their marks even on products they don't produce, frequently register their marks under classes that are unrelated to their scope of business. Under the new rules, the owner of a mark registered in, for instance, the class for soft drinks will not generally be able to generally object to someone else using the identical mark on a completely unrelated product such as T-

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shirts.

Hotels, accounting firms, and other service organizations may find it even more difficult to protect their marks if forced to comply with this provision. Under China's current system only products—and not services—can be registered. A hotel, unable to register its name as a service mark, generally seeks protection by registering the name under a wide range of classes for products ranging from matchboxes and ashtrays to towels and neon signs in order to keep others from using the hotel's name. Since the production and sale of these goods is technically outside of the hotel's scope of business, the new rules would allow the trademark authorities to refuse such applications. In the absence of alternative protection for service marks, however, it is highly unlikely that this will occur.

▶ **Clarifying use of geographic names**. Article 6 of the new rules expands on the Trademark Law's prohibition against using names that are identical or similar to the names of foreign countries. The new amendment specifies that both administrative divisions at and above the county level and commonly known foreign place names—not just names of countries—may not be used as trademarks. The new rule, will not, however, affect marks that have already been registered. Trademark applications approved after the recent amendments to the law, such as *Reno* brand clothes and *Malibu* cigarettes, suggest either that this rule is not being rigidly enforced or that some Chinese trademark examiners are unfamiliar with foreign geographic names.

▶ **Expanding mandatory registration**. Previously only pharmaceutical and tobacco products were required to bear registered trademarks, but the new rules give the SAIC the right to add other products to the list in order to more easily regulate items that pose a potential hazard to consumers. In the absence of more developed consumer protection legislation, it is possible that such items as alcoholic beverages and some consumer electrical appliances may be added to the list.

More companies may now face the administrative inconvenience of submitting a certificate of authorization with trademark applications. To register tobacco trademarks for products imported into China, foreign applicants usually provide a certificate proving that the applicant is licensed by the home country government to manufacture or market tobacco products. And for pharmaceutical and tobacco products manufactured in China, the application must be supported by a certificate of authorization from the relevant Chinese authorities.

▶ **Broadening the non-use provision.** The Trademark Law stipulates that any registered trademark not used for three consecutive years can be cancelled. Previously only local branches of the SAIC were authorized to request a cancellation, but the 1988 rules allow anyone—Chinese or foreign—to make the request. This should offer some relief to foreign trademark owners blocked from registering their mark because similar or identical marks were previously registered—but unused. But foreign trademark registrants will also have to be vigilant in making sure their trademark is used at least once every three years. A company owning a trademark that is the object of a cancellation request is notified by the Trademark Office and given a specific time frame for demonstrating use. If the evidence is late or insufficient, the trademark can be cancelled.

Although some foreign companies have technically violated the use requirement, the Trademark Office has not yet reported the cancellation of any registered foreign trademark based on the non-use rule.

▶ **Requiring assignment of associated trademarks.** The new rules require that when a registered trademark is sold, or in legal terms, "assigned," the seller—or assignor—must assign the mark along with other identical or similar trademarks that are registered for the same or similar goods. For example, a manufacturer such as Polaroid may have registered its mark in a variety of different but related classes, such as cameras and photographic film. The Polaroid mark in these two classes would be considered "associated marks." Under the new rules, if Polaroid decided to sell off its camera division—and the Polaroid trademark—to another party, the company could also be required to sell, or assign, the Polaroid trademark for film. This new provision follows common international practice.

▶ **Mandating registration of licensing contracts**. Under the new rules, a trademark holder who licenses the use of a registered trademark to another party must now submit the licensing contract to the county-level SAIC office (for recording purposes rather than approval). Refusal to comply with this rule can result in cancellation of the mark and seizure of the licensor's trademark representations. Presumably, mandatory registration of the licensing agreement with the SAIC will make it easier for the authorities to track down a manufacturer who produces defective or sub-quality goods. Also, trademark licenses are now governed by the Regulations on Administration of Technology Import Contracts and their recently promulgated Implementing Regulations (*see* p. 35).

Expanded trademark protection

China's trademark system has a relatively strict first-to-file rule, and does not require—as do other countries—that an applicant file in good faith, believing that he is the mark's true owner or an authorized licensee. A number of registrants—both foreign and Chinese—have taken what is considered unfair advantage of the first-to-file rule by registering other companies' marks in China before the true owners did so, forcing the owners to buy back the exclusive rights to use the marks in China.

In arbitrating several such cases, trademark authorities have frequently decided in favor of the true owner of the mark, basing their decisions on accepted international practice or on the provision for "well known" marks in the Paris Convention for the Protection of Industrial Property. Previously, nothing in Chinese law supported these decisions, but some amendments in the new trademark rules are apparently designed to give victims a statutory basis for attacking abusers of the first-to-file rule.

Under the Trademark Law, an objection to a trademark registration can be raised with the Trademark Review and Adjudication Board (TRAB) within one year from the date the registration is approved. The 1988 rules now codify common practice by stating that this objection procedure is available only to trademark registrants. However, to accommodate foreign trademark holders who have not yet registered their

marks in China, a separate article in the 1988 rules allows anyone to apply to cancel an "improperly registered" trademark—a vague term that appears to have been left intentionally undefined in order to give the trademark authorities greater leeway in interpreting the article's application. This wording presumably removes the requirement that the objector must hold a trademark registration, while allowing companies to make a cancellation request after more than one year.

There are several limitations on this new objection procedure, however. First, a request to cancel an "improperly registered" mark cannot be brought against a disputed mark that has already been adjudicated. Second, there are indications that "improperly registered" will be interpreted narrowly. A recent newsletter published by the China Patent Agent (HK) Ltd. states that objections to a prior-registered nonfamous mark are only permitted if the mark is identical to another mark, although an objection can be filed against a famous mark if it is either identical or similar. Unfortunately, there is no clear indication of what standards will be used in determining what constitutes a famous mark, although the TRAB has used the Paris Convention's definition in previous cases.

New infringement procedures

To stem growing abuse of the trademark system, the new rules significantly strengthen various provisions relating to infringement of trademark rights.

▶ **Expanded definition.** In addition to the unauthorized use or sale of a registered mark, the Trademark Law also cites as infringement any damage to another's exclusive right to use a registered mark. The 1988 rules go on to list specific acts that are considered to cause damage and thus constitute an infringement. These include distributing goods that bear an infringing trademark; using—as the name of a product or on packaging—writing or figures that are the same as or similar to another party's registered trademark for the same or similar goods, where such use is sufficient to cause confusion; and intentionally facilitating a trademark infringement by storing, transporting, mailing, or concealing illegally marked goods.

▶ **Steeper fines.** According to the new rules, the penalties imposed on infringers have been changed from a maximum of ¥5,000 to up to twice the profit earned through the infringement. Also, while previous regulations allowed parties dissatisfied with the local authority's decision in an infringement suit to institute court proceedings, the 1988 rules state that a higher administrative authority (the SAIC office in Beijing) should first review the local decision. If the higher level decision still proves unsatisfactory, the matter can then be taken to court. Since SAIC personnel have more experience with trademark matters than the average Chinese judge, involving the central SAIC in the appeals process should reduce the number of cases going to court.

▶ **Extended authority to act against infringers.** Under the 1983 rules, only a party whose trademark had been directly infringed could lodge a complaint with the SAIC or one of its local branches. The 1988 rules allow anyone to lodge a complaint against a suspected infringer or counterfeiter, while the party whose right has been infringed may also file a suit in the people's court. This amendment may be intended to give the SAIC the authority to pursue infringers and counterfeiters on its own initiative. It is unclear what effect this change will have on trademark licensing agreements and joint venture contracts that give the foreign licensor the exclusive right to pursue infringements.

Accepting international practice

China's trademark authorities recently announced that China will replace its outdated trademark classification system with the International Classification of Goods. Despite this positive change, there is still room for improvement in some aspects of the system. China is unable to conduct trademark searches in order to determine whether a similar or identical mark has already been registered. And no Chinese organization is currently capable of carrying out routine commercial investigations of the market to determine if counterfeit goods are being distributed. Nevertheless, the spirit and—one hopes—the implementation of the new rules clearly indicate China's commitment to bringing its system of intellectual property protection in line with international practice. 完

What's in a Name?

Mitchell A. Silk

The absence of strictly enforced regulations to prevent duplication or unauthorized use of enterprise names has created "a state of chaos," according to one Chinese official.

Many Chinese enterprises try to heighten their products' consumer appeal by choosing a name that associates the product with famous objects or ideas. A sampling of the Beijing telephone directory, for example, reveals that enterprises named after the Great Wall manufacture everything from electric fans, tires, and wine to refrigerators, radios, and even underwear. A Chinese law firm and one of the most famous hotels in the country have also taken the Great Wall name as their own.

Trends toward economic decentralization and entrepreneurship have fueled tremendous growth in the number of enterprises in China, with registered enterprises totaling 4.9 million in 1986, an increase of more than 20 percent over 1985. The absence of strictly enforced regulations to prevent duplication or unauthorized use of enterprise names has created "a state of chaos," according to one Chinese official, causing manufacturers to lose profits to competitors and consumers to become confused over product identity.

In June 1985 China's State Administration of Industry and Commerce (SAIC) took the first step toward reining in some of the abuses by promulgating the Provisional Regulations on the Registration of Industrial and Commercial Enterprise Names, granting exclusive use rights and legal protection to properly registered enterprise names. But until implementing regulations specifying explicit registration procedures and the scope of protection are released, many basic questions remain.

Foreign applications await final approval

The regulations were drafted with China's domestic enterprises in mind, so until implementing regulations appear the SAIC will not officially apply the regulations to foreign enterprises doing business in China. Yet foreign enterprises should still consider applying under the existing informal procedure because the first-to-file principle at least gives an enterprise some statutory basis for protecting its name.

Enterprises register their name through a two-step application process. First, the applicant submits a letter to the SAIC requesting permission to apply to register, giving the preferred Chinese and English names as the applicant wishes them to appear and the reason for seeking registration. Chinese enterprises may register their names on the county or provincial level, while all foreign enterprises must register with the central SAIC authorities or other local-level SAIC subordinates empowered to accept foreign applications.

Foreign applicants must also submit documentation proving the name is registered or protected in the country of incorporation. American companies have met this requirement by providing notarized and consularized copies of their articles of incorporation, along with Chinese translations of the notary and consular certificates.

Upon satisfactory review of the request and accompanying documentation, SAIC will give the applicant a form to fill out and submit with a ¥300 filing fee. Chinese applications can be officially approved, but foreign requests will be held on file until after the implementing regulations are promulgated.

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Special breaks for foreign firms

Enterprises are granted the exclusive use of properly registered names—within limits. Chinese enterprise names are protected only up to the level at which they registered; that is, an enterprise registered at a county-level SAIC authority is granted the exclusive right to the name only within that county. Foreign enterprises, by contrast, will receive national protection—which also extends to joint ventures and wholly foreign-owned enterprises.

Foreign companies also receive special treatment in other respects, including the right to use the word "China" (*Zhongguo* or *Zhonghua*) in their names—a privilege otherwise reserved for national-level Chinese enterprises. Further, foreign enterprises are exempted from the blanket prohibition against using names of foreign countries, or those in foreign languages or Chinese pinyin. And a SAIC official says foreign companies not registered in China may also reserve enterprise names in advance by going through the informal application procedure. Whether the foreign company must secure official approval as a foreign enterprise prior to application is unclear, but protection for the name automatically lapses if operations do not start up within one year after registration.

Legislation lacks teeth

For both Chinese and foreign enterprises suffering name infringements, the regulation's enforcement provisions offer no specific penalties beyond stating that violators "shall be disciplined by the administration authorities for industry and commerce." A SAIC official elaborated that, in addition to injunctions prohibiting unauthorized use of a name, SAIC will employ the provisions of the Regulations Governing the Registration of Industrial and Commercial Enterprises to impose fines of up to ¥1,000. For a successful enterprise this amount—little more than an incidental business cost—will not serve as an effective deterrent to illegal use of a registered name. Only if stronger disciplinary measures are added to the implementing regulations will China be able to restore order to the current chaotic state of enterprise names. 完

China's Forthcoming Copyright Law

Gao Hang

Sometime this year China is likely to lose the distinction of being the only major nation without a copyright law. After working through almost 20 drafts in the past 10 years, Chinese officials have crafted a copyright law that reflects the intense study and wide range of resources drawn upon during the formulation process. A paraphrased summary of the draft law as it currently stands is provided below.

Despite the meticulous drafting process, the new law will not solve all China's problems related to the protection of published works. Some foreign authors fear that their books will still be pirated since China's need for copyrighted information—particularly in the area of science and technology—is extensive, while foreign exchange for copyright payments remains scarce. In addition, to expedite the enactment of the copyright law, China decided to exclude computer software from protection. The extremely complicated issue of safeguarding software authors' rights will be addressed in separate legislation that is currently being drafted.

Two other controversial categories affecting Chinese authors—work done under the auspices of employers and works based on folklore—are also specifically excluded from protection. In China, almost all authors of copyrighted works are paid employees—either professional writers who receive fixed salaries or authors of technical or scientific works that depend on guidance and financing from their employer. Debate has raged over whether these people should be entitled to make profits from work done on the job. The current draft of the law rules that, in general, such works remain the property of the employer. And although many people argue that China should follow the example of other developing countries and protect its extensive body of folklore, those who fear conflicts in defining authorship prevailed in the draft.

After the copyright law is promulgated, China plans to join either or both of the major conventions governing international copyright protection—the Universal Copyright Convention (UCC) and the Berne Convention for the Protection of Literary and Artistic Works. Passage of the new copyright law later this year and membership in these organizations should help pave the way for expansion of exchanges of copyrighted information between China and the rest of the world. 完

A PREVIEW OF CHINA'S DRAFT COPYRIGHT LAW

Chapter One: Preamble. The purpose of the law is to protect the rights of authors in their literary, artistic, and scientific works; to regulate relations among creators, distributors, and the general public; to encourage creation and distribution of excellent works; and to foster science and culture.

Chapter Two: Scope of the Law. Citizens and legal persons within China are to enjoy copyright protection for their works whether they are published in China or abroad. The law also provides copyright protection for foreigners whose works are first published in China and for unpublished works of both Chinese and foreign citizens. Foreigners also enjoy protection for works originally published outside of China in accordance with bilateral or multilateral agreements to which China is a party.

Chapter Three: Works Protected. The list includes writings; oral works; musical works; works of fine art; photographic works; works of applied art; illustrations, maps, plans, and models relating to geography, topography, architecture, or science; and other literary, artistic, or scientific works.

Chapter Four: Defining Authorship and Author's Rights. The author is the person who has directly created the work. Authors' rights are divided into moral and economic rights. Moral rights include the right to: decide whether or not to make a work public, claim authorship, have one's name associated with a work, protect the integrity of a work, revise a published work, and withdraw a published work (under certain conditions). Economic rights include the right to publish, reproduce, record, publicly perform, broadcast, and cinematize, and the right to be remunerated by assigning rights and authorizing their exploitation by others.

Chapter Five: Copyright Ownership. The copyright belongs to the author(s) who created the work. Copyright to a work created within the scope of the author's employment generally belongs to the employer. Copyright in a work made for hire belongs to the commissioning party.

Chapter Six: "Neighboring Rights." Performers enjoy the right to have their performances respected, to have their images protected from distortion, to authorize or prohibit broadcasting or recording of their performances, and to be compensated. Producers of phonograms have the right to authorize or prohibit the commercial reproduction and distribution of their programs and to be compensated. Broadcasters have the right to authorize or prohibit the rebroadcasting, retelevising, fixation, and reproduction of their programs for commercial purposes and to be compensated.

Chapter Seven: Copyright Duration. Economic rights endure for the life of the author plus 50 years. The term for neighboring rights is 25 years from first publication. Moral rights are perpetual.

Chapter Eight: Inheritance, Transfer, and Licensing of Copyrights. Upon death an author's economic rights can be inherited in accordance with the Inheritance Law of the PRC. Economic rights can be transferred for a fixed period, not exceeding 20 years. Exploitation of economic rights may be licensed to others for a set period of time using a certain means.

Chapter Nine: Copyright Limitations. If the name of the author, title, and source are indicated and the other rights of the author are respected, certain types of exploitation of published works do not require authorization or payment. The following types of exploitation do not require consent but do require payment: broadcasting published works other than editorials; performing published works; and reprinting in newspapers and periodicals works from other types of news media.

Chapter Ten: Enforcement and Remedies. In the case of infringement, the author or copyright owner can either appeal to the local copyright office or institute legal proceedings in Chinese People's Courts. The copyright administrative offices have the power to stop infringements, make public apology and compensate for damages, confiscate income from the infringer, and impose fines. Any dissatisfied party may, within three months of notification, institute legal proceedings in Chinese People's Courts. 完

Gao Hang works in the International Division of the National Copyright Administration of China. The views expressed in this article do not necessarily represent those of the Administration.

会员动态

INTERKILN FIRES UP SEVERAL CERAMICS VENTURES

The Houston-based Interkiln Corporation of America has made a major commitment to China, investing in three ceramics joint ventures in the past three years, with negotiations for a fourth just concluded. The company's commitment to China capitalized on timing: in the mid-1980s, when China was looking to attract foreign technology to improve its ceramics industry, Interkiln was seeking opportunities to expand.

The first joint venture, the China Ceramics Co. Ltd., started production in Xiamen last January. Interkiln teamed up with two Chinese partners, the former Xiamen Ceramics Factory—which tore down its plant to make way for the joint venture operations—and the Xiamen Construction and Development Corporation, a minority partner that acts as the guarantor. Investment for the project totals ¥125 million ($33 million), with Interkiln contributing 40 percent of the registered capital.

The venture actually consists of two factories, one for sanitary ware and one for porcelain dinnerware, which share the site and pool their earnings. Interkiln Vice President Lyle Haber noted that the dual design was requested by the Chinese partner, but this type of joint operations is not unusual in the ceramics industry. He added, "having both factories strengthens our position; should the market vary, one factory can compensate for the other."

The sanitary ware plant, currently operating at about 60 percent of its planned capacity of 285,000 pieces per year, expects to reach full production sometime in 1989. Two separate production lines manufacture English-style and US-grade bathroom fixtures—including vanity basins, toilet bowls, tanks, and pedestals—which differ in size and specifications. The English-grade products are now exported to the United Kingdom. Production of US-grade ware for sale in the United States is scheduled to begin later this year, while off-grade products—about 20 percent of production—will be sold on the domestic market. The production breakdown of English- versus US-grade ware will vary according to market demand. Most of the dinnerware factory output will be exported.

A second Interkiln sanitary ware joint venture factory is under construction in Shanghai. The Shanghai Pacific Ceramic Co. is scheduled to begin production of 350,000 English- and American-style pieces per year at the end of 1989. The products of the two joint ventures will, however, differ in style and appearance and will be sold under separate brand names. The Xiamen output will target the low-end market, while the Shanghai products will be aimed at medium-price purchasers. Both factories might eventually move their products upmarket depending on demand.

Construction is just about complete on a third Interkiln joint venture, the Taishan Ceramics Co., Ltd. in Shanghai, which will produce glazed and unglazed floor and wall tile. Production of 1 million square meters per year of tile—about 60 percent for export—is set to begin later this year. And negotiations have just been concluded for a joint venture brick and tile factory in Dalian.

AMERICAN STANDARD STARTS PRODUCTION AT SANITARY WARE VENTURE

For American Standard, Inc., the January 1988 start-up of a joint venture in Guangdong caps eight years of smooth cooperation. Negotiations between the Intex Group of American Standard's Building Products sector and the Qingyuan Economic Development Corporation of Guangdong Province began in 1980. A contract was signed in 1986 to form the Hua Mei Sanitary Ware Co., Ltd., based 100 kilometers northwest of Guangzhou. American Standard, which provided technology and equipment, holds a 51 percent share of the project's total $12 million investment.

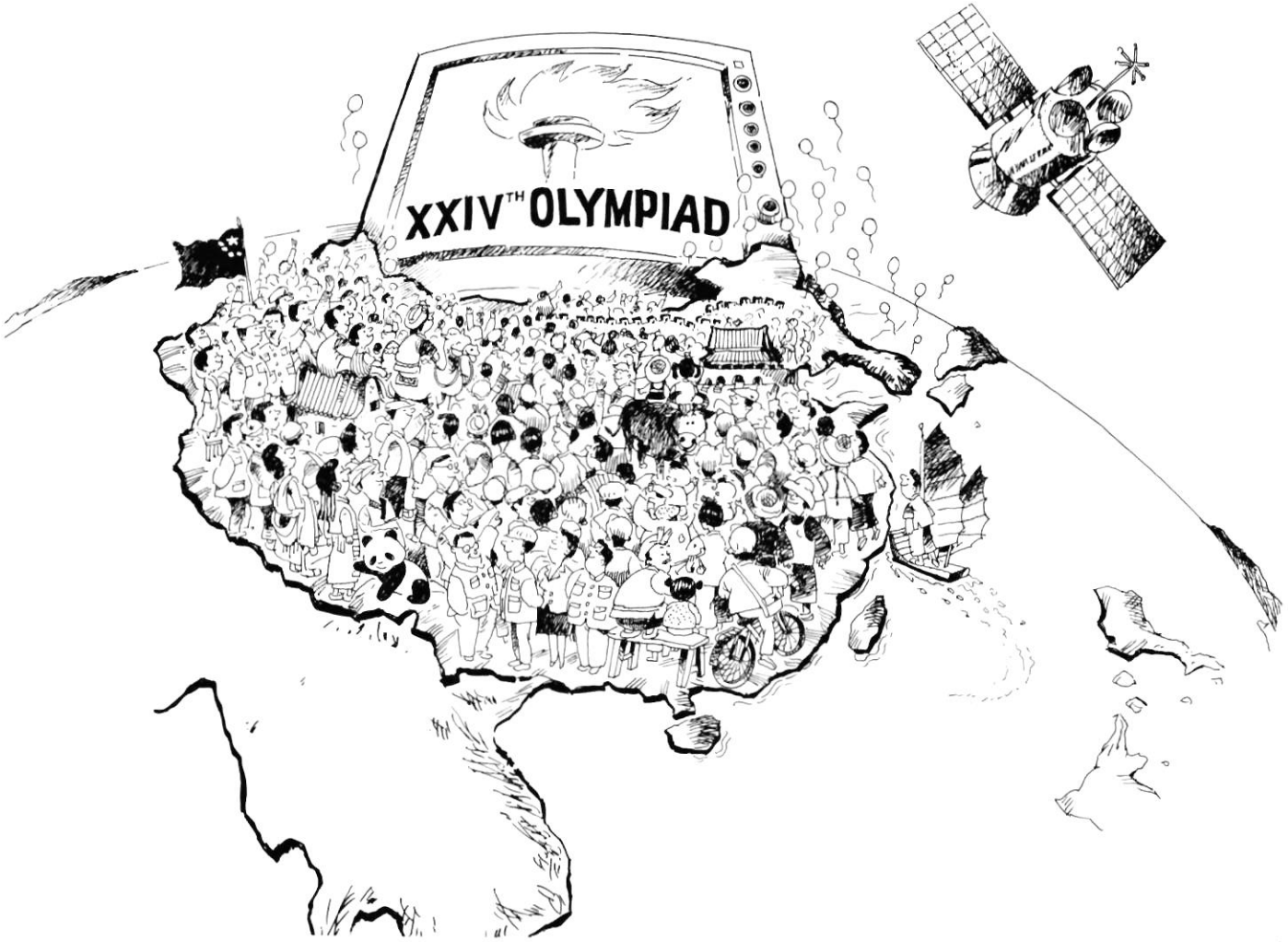
The factory, built in 1987, was completed right on schedule, and production began with contracts for the first few months of output already in hand. Production, which includes commercial and residential toilets, bidets, and lavatory pedestals, is currently running at about 50 percent of the factory's design capacity of 300,000 pieces per year. Two-thirds of sales are targeted toward the high-end domestic market, including Western-style hotels and office buildings, with the rest slated for eventual export to Southeast Asian countries.

So far American Standard is pleased with the venture's progress. Hau Mei's General manager Bing Benetua says, "We've had no problem finding Chinese buyers—at present our goods are in great demand." The venture's marketing activities include attending exhibitions and taking out advertisements in Guangdong. Right now much effort is focused on maintaining customer relations. Benetua notes that Hua Mei must improve logistics to ensure delivery. "The roads are poor—delivery takes a long time, and there's often damage in transit." Efforts to reduce damage have been hampered by problems in sourcing quality packing materials. Assuming all goes well, future plans call for expansion of the product line to include toilet seats and plastic tank fittings.

In addition to the Intex Group, two other American Standard subsidiaries have been involved in successful China operations. In 1986 the Michigan-based Tyler Refrigeration Corporation sold a license to Luoyang Refrigeration Machinery Factory in Henan Province to manufacture refrigerated display cases. And three factories in Shanghai have been producing commercial air-conditioning equipment since the 1970s using technology licensed from the Wisconsin-based Trane Co.

—Sharon E. Ruwart

For 16 Days, Starting September 17, 1988 Your Company Message Can Be Seen By Over 250 Million People... On One Television Network.



The People's Republic of China has given CBS exclusive rights to sell its television advertising package for the 1988 Olympics. Due to the great popularity of this exciting event in China, your message can enjoy high reach and frequency in this rapidly growing and potentially enormous market. You can even enjoy product exclusivity.

Because of our long and successful experience in China and our close relations with China Central Television, a simple call to CBS is all that it takes to get your message to this market. Contact CBS Broadcast International, (212) 975-8585, Telex 662101 CBINY, and be certain that the millions of 1988 Olympic viewers in China will also be seeing your company message.

CBS

CBS BROADCAST INTERNATIONAL

BOOKSHELF

书刊介绍

The New China: Comparative Economic Development in Mainland China, Taiwan, and Hong Kong, by Alvin Rabushka. Pacific Research Institute for Public Policy, Westview Press, 1987. 254 pp. $32.50.

China: Asia's Next Economic Giant? by Dwight H. Perkins. Seattle: University of Washington Press, 1986. 98 pp. $12.95.

Last year, the "Four Tigers" of East Asia (South Korea, Taiwan, Hong Kong, and Singapore) posted Gross Domestic Product (GDP) growth rates ranging from Hong Kong's high of 13.6 percent to Singapore's "low" of 8.8 percent—statistics that give proof to the dynamism of the Tigers' approach to development. But what are we to make of China, which registered a remarkable 9.4 percent increase in GDP for 1987? Has Beijing benefited from following successful East Asian development patterns?

Yes, indeed, according to Perkins and Rabushka. Both authors attribute China's economic momentum to features common to Japan and the Asian Newly Industrialized Countries (NICs)—the drive to export combined with a Confucian emphasis on education, thrift, and hard work. Perkins also points to increasing political stability, and Rabushka to market forces, as significant factors enhancing productivity in China and the NICs. And both authors agree that while the road to greater economic efficiency is fraught with difficulty, China's experiments have been successful enough to warrant their continuation.

While Perkins presents a surefooted analysis of China's economic potential, and Rabushka provides a wealth of information on Taiwan, China, and Hong Kong, neither author does justice to the magnitude of constraints facing Chinese economic reform policies—constraints that make China's achievements all the more astonishing.

Take the problem of developing entrepreneurship, for example. Taiwan and South Korea had to find a balance in the 1950s between providing enough protection to native industries to give managers and workers experience, but not so much as to stymie their desire and ability to compete. Unlike Chinese managers today, NIC enterpreneurs did not have to grapple with Party officials or government bureaucrats for control over their own enterprises, or face a long-term struggle simply to fire redundant or incompetent labor. For the most part, Taiwanese and South Korean managers had sound market forces to respond to—and if they didn't react, they failed. In China, managers operate under a system that combines price subsidies and supply monopolies with partial market mechanisms, and they face little risk of failure. In short, China's domestic environment does not promote the kind of discipline and risk-taking that led the NICs to export-competitiveness.

Both Perkins and Rabushka have also largely neglected significant ideological differences between China and the Asian NICs that make a repetition of the NIC experience very difficult. China's socialist leadership confronts serious, time-consuming questions, such as how many laborers a private entrepreneur should employ, how rich the entrepreneur should become, and whether stockholding constitutes speculation. To be sure, no developing state, however dictatorial, is free of divisiveness over policies or unconcerned about its legitimacy in the eyes of the public. But few governments perceive so many economic strategies as potential threats to their rule: every market-oriented move in China portends a change in the balance of power, inevitably diminishing the Communist Party's authority while giving more control to technocrats. Moreover, inflation, unemployment, and increasing income disparity is much more disturbing to Chinese than to citizens of other Asian one-party states, where social order has not been based on the premise of rigid equality.

The main shortcomings in Perkins' highly readable essays concern points of emphasis rather than interpretation. For example, he correctly points to "political stability under an independent sovereign government," combined with relatively modest income differentials, as a major contributor to the success of East Asian economic policies. More to the point, however, is the fact that the postwar governments in Taiwan and South Korea had an unusual degree of power to shape national policies. Not only were both governments spared severe religious and ethnic tensions, but Taiwan and South Korea did not confront a powerful bloc of landlords, and were free to control big business through such mechanisms as loans, taxes, and licenses. Furthermore, they opened their doors to foreign investment only after they were politically strong enough to call the shots on matters like investment priorities and equity shares.

China may not have feudal landlords, but it does have an enormous network of bureaucratic fiefdoms that have for decades obstructed implementation of national policies and made it necessary for Beijing to bargain with more numerous and powerful special interests than ever confronted Taipei and Seoul.

Of the two books, Perkins' is the better bet for its capable analysis of China's economic potential. Despite the promise of the title, Rabushka's book makes few comparisons be-

Books and business guides submitted for possible review in The China Business Review *should be sent to the Council's book editor, Jennifer Little.*

tween China, Taiwan, and Hong Kong—and then only fitfully, within the six pages entitled "Conclusion and Future Prospects." The conclusions mainly amount to an unreserved encomium for market-oriented policies, ignoring other significant factors such as the considerable role of Taiwan's government in managing economic development. For energetic readers inclined to sift out comparisons on their own, the volume is a handy compilation of information on the three economies. But those who suspect that China's economic planners are as concerned with socialist imperatives as East Asian success strategies will probably not find the analyses they are looking for in either book.

—Deborah Diamond-Kim

Foreign Trade, Investment, and the Law in the People's Republic of China, edited by Michael J. Moser. 2nd ed. New York: Oxford University Press, 1987. 603 pp. $45.

This book is a must for all but the most seasoned China business practitioners—and will make a handy shelf reference even for them. It covers in great detail the significant areas affecting business dealings with China, including trade, investment, technology transfer, taxation, banking and finance, and intellectual property protection. The chapters are written by many leading China legal experts, yet the book has a decidedly practical style and is unmuddled by legalese.

The sole note of caution is that this book can quickly become outdated. In the short period since the book's 1987 publication, for example, new foreign investment and technology transfer legislation already calls for modification of these portions of the text.

The book is unsurpassed as an analysis of China's business environment as of late 1986. But frequent revision will be necessary to keep this volume up to date and give it the long shelf-life it deserves. —John Frisbie

China Tax Guide, by Michael J. Moser and Winston K. Zee. New York: Oxford University Press, 1988. 197 pp. $29.95.

Like the book reviewed above, the *China Tax Guide* is a thorough and practical handbook. The bulk of the guide analyzes China's Individual Income Tax, Consolidated Industrial and Commercial Tax, Joint Venture Income Tax, and Foreign Enterprise Income Tax laws and their application. Additional chapters examine customs duties, special taxes, and tax treaties. The sample tax forms provided in the appendix are especially useful to those who will be paying taxes in China.

The timeliness of this book will also suffer from China's ever-changing tax codes—for example, individual tax rates have been halved since the book was published. Nevertheless, the *Guide* puts China's tax codes and practice in a single volume whose usefulness can be prolonged if the reader keeps abreast of current developments. —John Frisbie

BOOKS RECEIVED

Asia: Guide to Business Travel (International Herald Tribune Guide to Business Travel), by Robert K. McCabe. London: A&C Black, 1987. 186 pp. $14.95, softcover.

A Census of One Billion People: Papers for the International Seminar on China's 1982 Population Census, edited by Li Chengrui. Boulder, CO: Westview Press, 1987. 704 pp. $50 hardcover.

China and the European Economic Community: The New Connection, by Harish Kapur. Dordrecht, Netherlands: Martinus Nijhoff, 1986. 351 pp. $71.50 hardcover.

The End of an Isolation: China After Mao, edited by Harish Kapur. Dordrecht, Netherlands: Martinus Nijhoff, 1985. 371 pp. $67 hardcover.

Enemies of the People, by Anne F. Thurston. New York: Knopf, 1987. 323 pp. $19.95 hardcover.

Establishing an Office in Hong Kong, by David Schlesinger. 5th ed. Hong Kong: American Chamber of Commerce in Hong Kong, 1987. 108 pp. No price given, softcover.

Fundamental Issues in Present-Day China, by Deng Xiaoping. Beijing: Foreign Languages Press, 1987. 202 pp. Distributed in the US by China Books & Periodicals. $9.95 hardcover, $5.95 softcover.

Living in Hong Kong, edited by Alan Moores. 6th ed. Hong Kong: American Chamber of Commerce in Hong Kong, 1986. 317 pp. HK$85 for Amcham members; HK$100 for nonmembers.

The Making of Modern Tibet, by A. Tom Grunfeld. Armonk, NY: M. E. Sharpe, Inc., 1987. $27.50 hardcover.

The Writings of Mao Zedong 1949–1976 (volume I, covering September 1949–December 1955), edited by Michael Y. M. Kau and John K. Leung. Armonk, NY: M.E. Sharpe, Inc., 1986. 771 pp. $90 hardcover.

PRC Business Firms in Hong Kong & Macau, compiled by T.F. Ting and the US and Foreign Commercial Service in Hong Kong. Hong Kong: American Chamber of Commerce in Hong Kong (1030 Swire House, Central), 1988. 70 pp. $36 including airmail charge.

Each month more PRC companies set up shop in Hong Kong to tap business potential and prepare for 1997. This directory—the most exhaustive compendium so far—lists alphabetically by industry 400 PRC companies with offices in Hong Kong and Macau. All entries include the company's address, telephone and telex numbers, and key personnel, while about 15 percent also include information on products or services. Two indices offer additional useful facts, listing companies by aegis and local authority and providing company names in both English and Chinese. —JLL

China Commercial Relations Directory 87/88. 7th ed. Hong Kong: American Chamber of Commerce in Hong Kong, 1987. 156 pp. $20 including airmail charge.

Over 200 US and foreign companies belonging to the American Chamber of Commerce in Hong Kong paid to be included in this biennial directory, which has proven a useful tool for companies that want to introduce their products and services to China. Entries listing addresses and contact information are given in English and Chinese and arranged alphabetically, along with information on representative offices in China. Listings are also indexed by product and service.

—JLL

CHINA BUSINESS

中外贸易

Jennifer Koch and Susan Poole

The following tables contain recent press reports of business contracts and negotiations exclusive of those listed in previous issues. For the most part, the accuracy of these reports is not independently confirmed by *The CBR*. Contracts denominated in foreign currencies are converted into US dollars at the most recent monthly average rate quoted in the IMF's *International Financial Statistics*.

National Council member firms can contact the Business Information Center to obtain a copy of news sources and other available background information concerning the business arrangements appearing below. Moreover, firms whose sales and other business arrangements with China do not normally appear in press reports may have them published in *The CBR* by sending the information to the attention of the Business Information Center at the US–China Business Council.

中外贸易

SALES AND INVESTMENT THROUGH MAY 31

Foreign Party/ Chinese Party	Arrangement/Value/ Date Reported
Agricultural Commodities	
China's Imports	
Canadian Wheat Board (Canada)	Sold 4.4 million tonnes in April. 5/88.
(Zimbabwe)/China National Tobacco Corp.	Sold 10,700 tonnes tobacco. $30 million. 1/88.
(Cuba)	Will supply raw sugar. 3/88.
US Department of Agriculture	Sold 350,000 tonnes wheat at subsidized prices. 4/88.
(Mexico)	Sold 300,000 tonnes of raw sugar. 5/88.
Investments in China	
Sapporo Breweries Ltd. and Tokyo Maruichi Shoji Co. (Japan)/Xinjiang	Established Xinjiang Fubei Sapporo Hop Corp. joint venture to cultivate aromatic hops. (SBL:45%-TMS:5%-PRC:50%). 2/88.
Agricultural Technology	
China's Imports	
Canpotex (Canada)	Sold 550,000 tonnes potash. $60 million. 3/88.
Food Engineering Service (US)	Signed contract in egg processing industry. $3.5 million. 3/88.
(Hungary)	Sold two fodder production lines. 3/88.
Investments in China	
China Nordic Co. Ltd. (Norway)/Guangdong Provincial Aquatic Products Co.	Signed contract establishing Autou Aquatic Breeding Farm joint venture. $2.9 million. 3/88.
Other	
National Agronomic Research Institute (France)/ Ministry of Agriculture, Animal Husbandry, and Fisheries	Presented 16 breeding pigs in bilateral cooperation program. 3/88.
European Economic Community	Signed aid agreement to develop China's dairy industry. 3/88.
Chemicals, Petrochemicals, and Related Equipment	
China's Imports	
Petrolite Fuel Technologies (US)/Shengli Oilfield, Shandong	Will install two fuel oil treatment plants. 3/88.
Coates Brothers (Hong Kong) Ltd. (UK)/ Guangdong	Will supply inks and coatings for aerosol spray cans. $128,000 (HK$1 million). 3/88.
Sulzer-Escher Wyss (Switzerland)/Jilin Chemical Industries	Will supply compressor group for nitric acid plant. 1/88.
Stord Bartz A/S (Norway)	Delivered waste recovery plant to a Beijing industrial alcohol plant. $7.8 million (NKr50 million). 1/88.
Britain Oxygen Co. (UK)/ CNTIC	Will supply product compressor and 125 TPD nitrogen plant. $3 million. 1/88.
Chiyoda Corp. (Japan)/ Fushun, Liaoning	Will build 10,000 TPY butene-1 plant. 3/88.
UOP Inc., subs. of Allied-Signal Inc. (US)/CNTIC and LIGHTINDUSTRY	Signed licensing agreements to produce linear alkylbenzene and linear olefins at Fushun Detergent Chemical Plant in Liaoning. 3/88.
Tecnicas Revnidas (Spain)/CNTIC	Will supply complete set of production equipment for fatty alcohol plant at Fushun Detergent Chemical Plant in Liaoning. $94 million. 3/88.
Davy-Zimmer AG (FRG), subs. of Davy McKee (UK)/Shaanxi and Heilongjiang	Signed contracts to provide two nylon plants to produce tire cord. 3/88.
Davy-Zimmer AG (FRG), subs. of Davy McKee (UK)/Guangdong	Will build 8,000 TPY polyester polycondensation plant to produce film base for audio and video tape. 3/88.
Investments in China	
Loctite Corporation (US)/ Yantai, Shandong	Opened industrial glue production joint venture while exploring future ventures in Shandong. 5/88.
PS Brandschutz (FRG)/ Jing'an Equipment I/E Corp. and Beijing Building Coating Factory	Established North Fire Protection Coating Co., Ltd. to produce fire protective coatings. $2.7 million (¥9.9 million). (FRG:33.3%-JEIE:30%-BBCF:36.7%). 5/88.

Abbreviations used throughout text: BOC: Bank of China; CAAC: Civil Aviation Administration of China; CAIEC: China National Automotive Industry Import-Export Corp.; CASS: Chinese Academy of Social Sciences; CATIC: China National Aero Technology Import-Export Co.; CCTV: China Central Television; CEIEC: China Electronics Import-Export Corp.; CEROILFOODS: China National Cereals, Oil, and Foodstuffs Import-Export Corp.; CHINATEX: China National Textiles Import-Export Corp.; CITIC: China International Trust and Investment Corp.; CITS: China International Travel Service; CNCCC: China National Chemical Construction Co.; CNOOC: China National Offshore Oil Corp.; CNTIC: China National Technical Import Corp.; COSCO: China Ocean Shipping Co.; CPIC: China National Corporation of Pharmaceutical Economic and Technical International Cooperation; HPDC: Huaneng International Power Development Corp. ICBC: Industrial and Commercial Bank of China; INSTRIMPEX: China National Instruments Import-Export Corp.; ITIC: International Trust and Investment Corp.; MACHIMPEX: China National Machinery Import-Export Corp.; MAI: Ministry of Aviation Industry; MEI: Ministry of Electronics Industry; MINMETALS: China National Metals and Minerals Import and Export Corp.; MLI: Ministry of Light Industry; MOCI: Ministry of Coal Industry; MOFERT: Ministry of Foreign Economic Relations and Trade; MOPI: Ministry of Petroleum Industry; MPT: Ministry of Posts and Telecommunications; MURCEP: Ministry of Urban and Rural Construction and Environmental Protection; MWREP: Ministry of Water Resources and Electric Power; NA: Not Available; NDSTIC: National Defense, Science, Technology, and Industry Commission; NORINCO: China North Industries Corp.; SINOCHEM: China National Chemicals Import-Export Corp.; SINOPEC: China National Petrochemical Corp.; SINOTRANS: China National Foreign Trade Transportation Corp.; SITCO: Shanghai Investment and Trust Corp.; SPC: State Planning Commission

Goulds Pumps Inc. (US)/ Nanjing Deep Well Co.	Established joint venture to produce pump units for four US petrochemical plants. 3/88.

Chemicals (Agricultural)

China's Imports

Ammoinia Casale S.A. (Switzerland)/CNCCC	Will provide engineering services to ammonia converters and synthesis loops through World Bank-supported Fertilizer Rehabilitation Project. $1.7 million. 1/88.
Nichimen Corp. (Japan)/ CNTIC	Will supply 10 tonnes saturn insecticide. $22,900. 3/88.
Occidental Chemical Corporation (US)/China Wuhan Chemical Engineering Corp. and CNCCC	Signed agreement for licensing of fertilizer-grade phosphoric acid production technology using Occidental's hemihydrate process. 5/88.

Construction Materials

China's Imports

Vicwood Development Ltd. (HK)	Awarded eight contracts to supply steel parts for a World Bank-financed rural water supply program. $1.9 million. 5/88.
General Electric Co. (UK)/Shanghai	Installed elevators in 23-story Telecom Building. 3/88.
Schuller Engineering, subs. of Glaswerk Schuller GmbH (FRG)	Will supply and install glass fiber mat plant to produce floor and wall coverings, and asphalt roofing. 3/88.

Chinese Investments Overseas

Sammi Corp. (South Korea)/China Construction Engineering Corp.	Established joint venture in Macau to produce construction materials. 2/88.

Consumer Goods

China's Imports

NA (FRG)	Will supply several single-machine wallpaper factories. 1/88.

Investments in China

Kobayashi Kose (Japan)	Will establish joint venture to produce cosmetics. (Registered capital $2.4 million). 2/88.
Hoechst Celanese (US)/ China National Tobacco Co.	Formed second joint venture to produce cellulose acetate tow cigarette filters in Nantong, Jiangsu. 2/88.
Chen Hsong Machinery Co. Ltd. (HK)/Juye County Leather Co., Shandong	Established Southwest Shandong Leather Ltd. joint venture to produce leather products. $4.8 million (¥18 million). (HK:45%-PRC:55%). 3/88.
Warner-Lambert Co. (US)/Harbin No. 3 Sweet Factory	Established Harbin Warner-Lambert Confectionery Co. joint venture to produce chewing gum and cough drops. $5 million. 3/88.
Playmates Holdings (HK)/ Huangpu, Guangdong	Established toy manufacturing joint venture. $15 million. (HK:55%-PRC:45%). 3/88.
Acme Marls Ltd. (UK)/ LIGHTINDUSTRY	Signed contract to cooperatively produce bone china. $2.9 million (£1.67 million). 3/88.
Swarovski Ventures Ltd. (Austria)/Huizhou Municipal Porcelain Coloring Crafts Factory and Guangdong Foreign Trade Development Corp.	Established 30-year joint venture Huisi Fashion Jewelry and Crafts Co. to produce custom jewelry and gift items. $2 million. (50-50). 4/88.

Electronics, Electrical Equipment, and Computer Software

China's Imports

NA (Japan)/Beidou Micro Motor Plant, Hebei	Sold micro motor production line. 3/88.
Canon Co. (Japan)	Will sell four microchip manufacturing machines. 1/88.
Nixdorf AG (FRG)/MPT	Will supply China's post offices with electronic data processing equipment. 2/88.
CAD Centre (UK)/China Shipbuilding Corp.	Signed licensing contract for CAD software. 3/88.
Hewlett-Packard Co. (US)/Jiaotong University, Shanghai	Sold complete computer system. $700,000. 3/88.
Polaroid Corp. (US)/Media Diskette Manufacturing Factory, Zhuhai SEZ	Signed licensing contract for production of floppy diskettes. 3/88.
Hamilton/Brighton (US)/ Nanjing University	Sold integrated CAD system. 3/88.
Hamilton/Brighton (US)/ Yongji Factory, under Ministry of Railways, Shaanxi	Sold electrical design and engineeering CAD system. 3/88.
Hamilton/Brighton (US)/ State Administration for Industry and Commerce	Sold administrative control network computer system. 3/88.

Investments in China

Progeni (New Zealand)	Filed application to establish wholly owned computer venture. 5/88.

Other

Canon Co. (Japan)/ Beijing	Opened copier service and maintenance center. 3/88.
Hewlett-Packard Co. (US)	Opened liaison office in Shenyang, Liaoning for marketing, service, and training. 4/88.

Electronics (Consumer)

China's Imports

Asahi Glass Co. (Japan)/ Hongguang Cathode Ray Tube Plant, Chengdu, Sichuan	Will supply technology and equipment to renovate color TV tube glass frame production line. 5/88.

Investments in China

NA (Hong Kong)/ Shenzhen SEZ and Economic Development Service Center	Will jointly establish and manage for 10 year term the Shenzhen Huale Standard Parts Co., Ltd. to sell household appliances abroad. $779,130 (¥2.9 million). (HK:31.2%—PRC:68.8%). 5/88.

Chinese Investments Overseas

CATV (HK)/China National Posts and Telecommunications Industry Corp. and Shandong Provincial Television	Signed agreement giving Chinese partners 10 percent stake in CATV's cable television franchise. 5/88.

Finance and Banking

Banking Agreements

Banca Commerciale Italiana/Investment Bank of China	Concluded cooperation agreement. 5/88.
Sparbankernas Bank (Sweden)/ICBC	Concluded mutual representation agreement. 1/88.
Union Bank (Switzerland)/Agricultural Bank of China	Signed cooperation agreement to promote new business. 4/88.
Credit Suisse (Switzerland)/Investment Bank of China	Established a correspondent relationship to handle transactions through letters of credit and documentary collections. 5/88.

Loans

Chemical Bank (US) and Sanwa Bank (Japan)/ Beijing ITIC	Arranged 12-year $138 million loan for construction of Beijing Amex Center, a US-PRC office/apartment joint venture. 5/88.
Hokkaido Takushoku Bank (leading manager) and 18 banks from Japan, Great Britain, and France/Guangdong	Signed five-year $150 million loan for development funds. 5/88.
Scandinavian Far East and Skandinavisak Enskilda Banken (Sweden) and Den Norske Creditbank (Norway)/BOC and CITIC	Negotiating a $41.5 million 12-year syndicated loan for construction of SAS Grand Hotel. 5/88.
The World Bank	Approved $63 million IBRD loan and $25 million IDA credit to finance construction at Huangpu Port, Guangzhou. 1/88.
(France)/Sichuan Tumor Research Center and Hospital	Provided $7 million loan to purchase large-scale diagnostic and treatment equipment from French companies. 3/88.
Export-Import Bank (US)/ HIPDC	Will provide $151 million loan to purchase equipment and services for the Shidongkou coal-fired power plant in Shanghai. 3/88.

Barclays Bank Hong Kong (HK)/CITIC, Hong Kong	Signed agreement for five-year $200 million loan. 3/88.
Mitsui Bank Ltd. (Japan)/ Bank of Communications, Shanghai	Provided $20 million loan for economic development. 3/88.
C. Itoh & Co. Ltd. (Japan)/China Kanghua Development Corp.	Signed letter of intent to provide $1 billion loan. 3/88.
The World Bank/Dalian Port Administration	Signed agreement to provide $96 million loan for construction of Dayaowan wharf and infrastructure at Dalian Port. 3/88.
The World Bank	Approved $60 million IDA credit to expand commercial fishing and livestock farming. 3/88.
Arab Economic Development Fund (Kuwait)/ Shenyang, Liaoning	Signed loan agreement for Jinzhou Harbor project. 3/88.
Consortium banks (HK)/ China Development Finance Co. of BOC	Will provide 10-year, $204.9 million loan at concessionary rates. 4/88.
12-bank consortium including Chase Manhattan Corp. (US) and Midland Bank (UK)/BOC	Will provide 20-year loan at 5 percent annual interest to HIPDC for two generating units for Yueyang Thermal Power Plant, Hunan. $300 million (£172 million). 4/88.
Other	
First City Bank of Texas (US) and Alexander Y. Chow and Co. (HK)/BOC and MOFERT's China United Trading Corp. and China Export Bases Development Corp.	Set up ACB International Ltd. to encourage trade between the US and China by serving as consultants and partners in joint venture projects. 5/88.
Occidental China Inc., sub. of Occidental Petroleum (US)/China Kanghua Development Corp.	Established OK Investment Company. (US:55%-PRC:45%). 5/88.
American Express (US)/ BOC	Signed agreement to launch gold and corporate charge cards in China. 5/88.

Food Processing and Food Service

China's Imports	
Rapistan Lande (Netherlands)	Supplied two general sorting systems for food distribution firms. $1.8 million (DF3.4 million). 1/88.
Electra Food Machinery (US)	Sold corn chip processing line. $300,000. 2/88.
Meincke Food Processing Equipment A/S (Denmark)	Will supply bakery equipment. $5.5 million (DKr36 million). 2/88.
Investments in China	
Pepsico Inc. and McCormick & Co. (US)/Shanghai Foodstuff & Sundries Co.	Formed Shanghai McCormick Seasoning & Foodstuffs Co. to produce approximately 3,500 tonnes of spices and seasonings annually for export. $3 million. (US:60%-PRC:40%). 5/88.
Seagram (China) Ltd. (Canada)/China Distillery, Shanghai	Established Shanghai Seagram Ltd. to produce 1 million crates of wine, whisky, and champagne annually. (Registered capital $6 million). (50-50). 5/88.
NA (Singapore)/Qingdao Laoshan Mineral Water Plant, Shandong	Established Qingdao Laoshan Huaxin Beverage Corp. Ltd. joint venture. $4 million (S$8 million). (50-50). 3/88.
Chen Hsong Machinery Co. Ltd. (HK)/Cao County Food Ltd., Shandong	Signed two joint venture agreements to produce food products. $4 million. (HK:40%-PRC:60%). 3/88.
Lowenbrau AG (FRG)/ Huizhou, Guangdong	Signed cooperative agreement to produce Lowenbrau beer. (FRG:30%-PRC:70%). 3/88.

Leasing and Insurance

Investments in China	
National Bank of Labour and Locafit Industrial Equipment Leasing Co. (Italy)/Chengdu, Sichuan	Established a 20-year joint venture to lease machinery, trucks, meters, and instruments. (Registered capital $8 million). (ITL:30%-PRC:70%). 5/88.
Fuji Bank Ltd. (Japan)/ China Kanghua Development Corp.	Agreed to establish 20-year leasing firm. (JPN:40%-PRC:60%). 3/88.
Mitsubishi Trust and Banking Corp., Mitsubishi Corp., and Ryoshin Leasing Corp. (Japan)/ Everbright Industrial Co. and Everbright Finance Co.	Established The Everbright International Leasing Co. Ltd. joint venture to import and export machinery and electrical and transportation equipment. $6 million. (50-50). 3/88.
C. Itoh & Co., Daiichi Kangyo Bank, and Century Leasing System Co. (Japan), and Credit Lyonnaise (France)/Henan ITIC and three Chinese companies, Zhengzhou, Henan	Will establish Yellow River Leasing International Co. to lease industrial machinery. (Registered capital: $5 million). (JPN:25%-FR:15%-PRC:60%). 4/88.

Machine Tools and Machinery

China's Imports	
JH Fenner (UK)/Yichang, Hubei	Will build conveyor belt factory. $5.3 million (£3 million). 3/88.
Investments in China	
Chen Hsong Machinery Co. Ltd. (HK)/Heze Casting Machine Plant, Shandong	Will establish Chenlu Machinery Ltd. joint venture to produce plastic injection machines. $2 million. 3/88.

Medical Equipment and Devices

China's Imports	
(France)/Sichuan Tumor Research Center and Hospital	Will purchase large-scale diagnostic and treatment equipment from French companies with $7 million French loan. 3/88.
Investments in China	
Glaxo Hong Kong Ltd. (HK), subs. of Glaxo Group (UK)/China Pharmaceutical Industrial Co.	Planning joint venture to produce Ventolin inhalers. $17.6 million (£10 million). (50-50). 3/88.
Other	
International Development Cooperation (US)/ China State Pharmaceutical Administration	Agreement to exchange information, conduct feasiblity studies, and provide US technology for medical equipment and other development projects. 5/88.
International Save Ourselves (SOS) Assistance (Switzerland)/International Center for Medical and Health Exchange under the Ministry of Public Health	Signed agreement to open five SOS Alarm Centers to give medical treatment to foreigners living or traveling in China. 4/88.

Metals Minerals, and Processing Technology

China's Imports	
Bauxite Alumina Trading Co. (Jamaica)	Will sell 100,000 tonnes of alumina to China over two-year period at $230/tonne. 5/88.
(NA) Venezuela	Negotiating to sell 250,000 tonnes of alumina. 5/88.
Mill Equipment & Engineering Corp. (US)/ Shoudu Iron and Steel Co., Beijing	Will provide equipment and services for plate and steckel mill. 2/88.
Investments in China	
OK Investment Company (JV between Occidental China Inc. (HK) and China Kanghua Development Corp.)/Henan Linru Coking Plant	Signed 25-year contract to build and manage the OK-L Coal Company to process raw metallurgical coal for use in Linru Coking Plant. (JV:60%-PRC:40%). 5/88.
Agency of Natural Resources under MITI (Japan)/SPC	Negotiating an agreement to jointly extract, refine, and use rare earths. 5/88.
Other	
Kaiser Engineers (US)/ Ministry of Energy	Will provide training program for coal mining equipment through a US Trade and Development Program grant. $125,000. 5/88.

Sumitomo Metals Industries Ltd. and Sumitomo Corp. (Japan)	Signed two-year compensation trade agreement in which Sumitomo will supply assistance and facilities for coking kilns in exchange for vanadium pentoxide. 5/88.

Military Equipment

China's Imports

Litton Corp., Guidance and Control Division (US)	Will supply LN-39 inertial navigation systems for F-8 aircraft under subcontract from Grumman Corp. 3/88.

Petroleum, Natural Gas, and Related Equipment

Investments in China

ACT Operators Group, including Agip (Italy), Chevron (US), and Texaco (US)/CNOOC	Signed supplementary agreement to further develop Huizhou Oilfield near the Pearl River. 3/88.

Other

US Trade and Development Program/Bohai Oil Corporation	Will provide $645,000 for feasibility study of off shore oil development in Liaodong Bay. 5/88.
US Trade and Development Program/China State Shipbuilding Corp.	Will provide $600,000 for feasibility study of natural gas production in the East China Sea. 5/88.

Pharmaceuticals

Investments in China

Janssen Pharmaceutical Co. (Belgium)/Shaanxi Pharmaceutical Industrial Company	Establishing Xi'an Janssen Pharmaceutical Ltd. Company to produce medicines for domestic market. $30 million. 5/88.
Schering Corp. (US)/ Shanghai No. 2 Pharmaceutical Works	Will provide technology, formula, equipment, and $200,000 loan to cooperatively produce netobimin, an anthelmintic. 12/87.
NA (HK)/Heilongjiang and Zhuhai SEZ, Guangdong	Established Huagang Group Ltd. joint venture to produce traditional Chinese medicines. 3/88.

Other

SmithKline Beckman Corp. (US)/Shanghai and Sichuan	Will conduct joint research to develop a vaccine for hepatitis B. 5/88.
G.D. Searle & Co., subs. of Monsanto Co. (US)/ China State Pharmaceutical Administration	Signed agreement to cooperate in pharmaceutical research and development. $500,000. 4/88.

Ports

China's Imports

Ginge-Kerr A/S (Denmark)	Will supply fire-fighting equipment for shipyard. $108,000 (DKR700,000). 1/88.
The World Bank	Approved $63 million IBRD loan and $25 million IDA credit to finance construction at Huangpu Port, Guangzhou. 1/88.

Power Plants and Power Equipment

China's Imports

GEC Turbine Generators Ltd. (UK)/HIPDC	Will supply Yueyang, Hunan plant with two 350,000-KW generating units. 5/88.
Combustion Engineering Co. (US)/CNTIC	Supplied instrumentation and control equipment for Beilungang Thermal Power Project in Ningbo, Zhejiang. $8.49 million. 12/87.
(FRG)/Shanxi	Will supply second-hand Barbarak coal-fired power station. 1/88.
Newman Generators (UK)/Chaoyang, Guangdong	Will supply five megawatt mini power station. 1/88.
IMI Titanium (UK)/Daya Bay Nuclear Power Station	Will supply 850 miles of welded tube. 2/88.
Ansaido S.p.A. (Italy)/ Huaneng Power Generation Corp.	Will renovate generating unit at Xinhua Power Plant, Heilongjiang. 3/88.

Other

(FRG)	FRG will be allowed to bury its nuclear waste in the Gobi Desert in exchange for nuclear power technology and development assistance. 2/88.
NA (Belgium)/Pingtan Island, Fujian	Built four-windmill windfarm. 2/88.

Property Management and Development

China's Imports

Sheraton Asia Pacific Corp. (US)/Joint venture between Guiqing Hotel Organization Office of Guilin and Tai Hing Mandarin Realty Company, Inc (US)	Will manage 500-room Sheraton Guilin Hotel. 2/88.
Holiday Inns Corp. (US)/ Wuhan	Began construction on 350-room Holiday Inn-Tian An Wuhan Hotel. 2/88.
Cheong Profit Development Ltd. (HK)/Beijing Xinhua Enterprise Industrial Corp. and Shanghai Jinjiang Holdings Co.	Will co-manage Kunlun Hotel in Beijing. 4/88.

Investments in China

Aoki Corp. (Japan) and Prescott Bush Resources Ltd. (US)/Shanghai Sports Service Corp. and Zhu Jia Jiao (construction) Co., Qingpu County	Established a three-way venture to develop 18-hole golf course and resort facility in Shanghai. $18 million. 5/88.
Kanok Furniture & Construction Co. (Thailand) and United Industrial Corp. (Singapore)/CITIC	Established CIT-UIT Investment Co. joint venture for interior design projects. 4/88.

Scientific Instruments

China's Imports

Acton Research (US)	Signed contracts for several monochromator systems and 11 spectrometer systems. $280,000. 1/88.
NA (FRG)/Institute of Water Conservancy and Hydroelectric Power Research, Beijing	Sold vibration simulator for earthquake research. $1.5 million. 3/88.

Investments in China

Hamamatsu Photonic Ltd. (Japan)/Beijing Nuclear Instrument Factory	Established Beijing Hamamatsu Photon Techniques Ltd. joint venture to research, develop, and manufacture photomultipliers and optical detectors. 4/88.

Ships and Shipping

China's Imports

Finsam Industrier (Norway)	Will supply refrigerated containers. $7.8 million (NKR50 million). 2/88.
MacGregor Naivre (UK)/ COSCO	Will supply two cellular hold hatch covers for container ships. 3/88.

Investments in China

(NA) Britain/COSCO	Established Coso-HO shipping agency to operate container transportation service for 52 COSCO container ships. 5/88.

Telecommunications

China's Imports

NA (Sweden)/Chongqing, Sichuan	Will supply 40,000 program-controlled telephone sets and exchanges. $10 million. 5/88.
Kabmatic AB (Sweden)/ CNTIC	Contract signed for sale of production line for telephone, distribution, iron-conductor, and mine cable at Tianjin No. 2 Cable Factory. $1.92 million. 5/88.
Spar Communications Group (US)/China Electronic System Engineering Co.	Will supply six transportable earth stations. $2.9 million. 2/88.
L.M. Ericsson (Sweden)/ Guangdong	Will supply AXE digital public switching system. $73 million. 2/88.
Alcatel (France)/Beijing Telecommunications Administration	Will supply exchanges, digital satellite exchanges, digital transmission equipment, and optical links. 3/88.

Investments in China

Philips N.V. (Netherlands)/Wuhan Trust Loan Investment Corp. and Wuhan Optical Fiber Communication Technology Co.	Established 20-year joint venture to manufacture optical fiber and optical cable. $38 million (DG72.5 million). (50-50). 3/88.
Northern Telecom Ltd. (Canada)/China Tonggang Electronics Corp. in Shenzhen	Established Tongguang Northern Telecom Co. to produce integrated service networks and digital telephone sets. $13 million. 4/88.

Other

(Canada)	Signed memorandum of understanding for cooperation in telecommunications science and technology. 3/88.
Northern Telecom Ltd. (Canada)	Will donate digital telecommunications switching equipment worth $3.5 million to 1990 Asian Games. 4/88.

Textiles and Textile Plants

Investments in China

NA (Japan)/Shanghai	Set up Huazhong Sock Company to produce 10 million pairs of socks annually with 60 percent exported. 5/88.
Teshima Co. Ltd. and Seiko Industrial Co. Ltd. (Japan)/Shanghai Yinfeng Woolen Mill	Established Shanghai Yinfeng Garment Co. Ltd. joint venture to produce western-style trousers. $950,000. 3/88.

Transportation and Transportation Equipment

China's Imports

COFATA, subs. of Aerospatiale (France)/CAAC	Sold 28 Trinidad TB-20 training planes to train commercial pilots. $5 million. 3/88.
Grotnes Metalforming Systems, Inc. (US)/Liuzhou Minicar Factory, Guangxi	Sold automotive rim manufacturing line. 3/88.
Marubeni Corp. (Japan)/CNTIC	Will supply five pickup trucks. $53,000 (J¥6.86 million). 3/88.
Nichimen Corp. (Japan)/CNTIC	Will supply two hydraulic truck cranes. $235,000 (J¥30.4 million). 3/88.
Toyota Tsusho Corp. (Japan)/CNTIC	Will supply 16 window vans and related parts. $163,000 (J¥21 million). 3/88.
Mitsubishi Corp. (Japan)/CNTIC	Will supply six cable-working trucks and eight cargo trucks. $690,000 (J¥89.4 million). 3/88.

Investments in China

Uni-Carden (FRG) subs. of GKN (UK)/Shanghai Automobile and Tractor Industries Corp.	Established Shanghai GKN Drive Shaft Co. to produce drive shafts for Volkwagen's Shanghai-made Santana cars. (UNI:25%-FRG GOVT:25%-PRC50%). 5/88.
Isuzu Motors Ltd. (Japan) and Shortridge, Ltd. (HK)/Beijing No. 2 Automobile Plant and CITIC	Established joint venture to produce BJ-136 light trucks based on Isuzu design. (Registered capital $54.1 million) Total investment: $145.2 million (¥537 million). 5/88.
Sprick (FRG)/Tianjin No. 2 Bicycle Factory	Producing German brand-name bicycles at imported German factory. $3 million (DM5 million). 3/88.
British Raleigh Co. (UK)/Anyang Bicycle Industry Co., Henan Province	Will establish joint venture to produce Raleigh brand bicycles. 4/88.
Royal Nedlloved Group of Hansen Far East Ltd. (Netherlands)/ Shanghai International Trade Information and Exhibition Co. and SINOTRANS, Shanghai Branch	Will jointly operate the Shanghai Exportrans Ltd. to package and transport foreign products for exhibition in the Shanghai vicinity. 5/88.
Northwest Engineering Corp. (Scotland)/Inner Mongolia No. 2 Machinery Co.	Formed North Hauler Ltd. to produce large off-highway dump trucks. 5/88.

Other

Sir Owen Williams and Partners (UK)/Bureau of Highways under the Ministry of Communications	Won consultancy contract for World Bank-supported Tanggu-Beijing-Tianjin Expressway project. 1/88.
Air France (France)/CAAC	Will jointly operate a Boeing 747 freighter service linking Paris and Shanghai. 5/88.
Cathay Pacific Airways (HK)/CAAC	Agreed to increase flights between Hong Kong and Beijing to three per week. 2/88.
Aerospatiale (France) and Aerospace Technology (Australia)/CATIC	Began feasibility study on cooperative design, development, and production of new lightweight helicopter. 2/88.
Malaysia Airline System (Malaysia)/China Aviation Supplies Corp.	Signed agreement to provide repair and maintenance services for aircraft components. 3/88.
Semaly Co. and Sofretu (France)/Guangzhou	Conducting feasibility study for Guangzhou subway. 4/88.

Miscellaneous

China's Imports

Lyonnaise Des Eaux, subs. of Degremont (France)	Will build water treatment plant in Xi'an. 2/88.
Ecology and Environment Inc. (US)/Environmental Protection Bureau of Shenyang, Liaoning under MURCEP	Will conduct feasibility study of hazardous waste treatment and disposal facility funded by US Trade and Development Program. $325,000. 2/88.

Investments in China

Trans Asia Trading Corp. (Canada)/Shaanxi Province	Established a joint venture to promote Shaanxi's products in North America and Southeast Asia. 3/88.
National Tourist Organization (Greece)/China National Tourist Administration	Signed agreement on tourist cooperation. 5/88.
Columbia Business School (US)/University of International Business Economics of Beijing	Concluded agreement establishing executive program on joint venture management funded E.I. du Pont de Nemours and Co. and CITIC. 5/88.

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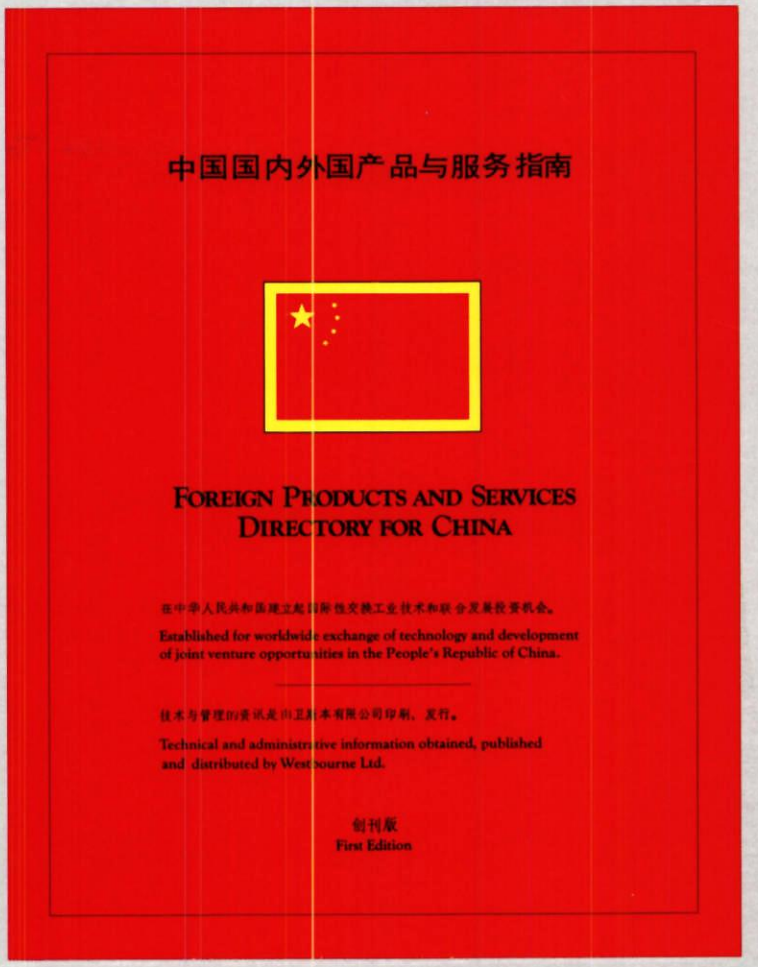

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