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China Report

SCIENCE AND TECHNOLOGY

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CHINA REPORT

SCIENCE AND TECHNOLOGY

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PEOPLE'S REPUBLIC OF CHINA

NATIONAL DEVELOPMENTS

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NATIONAL DEVELOPMENTS

NATIONAL DEFENSE TECHNOLOGY TRANSFER FAIR ENDS

OW250131 Beijing XINHUA Domestic Service in Chinese 1502 GMT 24 Mar 85

[Reported by Guo Diancheng]

[Excerpts] Hangzhou, 24 Mar (XINHUA) -- The first national trade fair
for transferring defense industry technology to civilian use successfully
closed today in Hangzhou. Business transactions worth more than 1
billion yuan were concluded at the fair.

The trade fair was a large business meeting with technology as its
commodity. The various defense industry departments offered 7,394 technology
and product transfer projects at the fair. In the past 10 days nearly
10,000 customers from 28 provinces and municipalities all over the country
held trade talks here and concluded transactions on more than 3,200 projects,
or 44.3 percent of all the projects offered at the fair. Several trade
delegations each concluded business deals worth more than 100 million
yuan. The success of the trade fair shows that the CPC Central Committee's
decision on expanding the technology market is absolutely correct. It
also displayed the technological superiority and great potential of defense
industry departments. [passage omitted]

A responsible person of the trade fair told this reporter that the trade
fair enabled defense industry departments to acquire a better understanding
of the needs of the technology market and further defined the orientation
of defense technology serving the national economy. This will certainly
help promote greater and faster development and upgrading of defense
industry technology. Meanwhile, transfers of advanced defense industry
technology to civilian departments will play an important role in pushing
forward local economic development and scientific and technological progress.

CSO: 4008/295

NATIONAL DEVELOPMENTS

ZHANG JINGFU OPENS BEIJING TECHNOLOGY FAIR

OW300136 Beijing XINHUA Domestic Service in Chinese 1228 GMT 28 Mar 85

[Reported by Chen Naijin and Zhuo Peirong]

[Text] Beijing 28 Mar (XINHUA) -- An exchange fair showing office automation technologies developed in China and foreign countries was opened in Beijing today. State Councillor Zhang Jinfu cut the ribbon at the opening.

The modern office systems fair exhibits advanced office equipment including the computers and peripheral equipment needed to process and print documents and manage information. This equipment will enable office personnel to break free of tedious preparations and handling of charts, drawings, and documents and significantly increase work efficiency. It will also be useful for improving the working environment. When enterprise managers are discussing policy decisions on the annual plan, for instance, they can have all the data they need shown on the monitor through the operation of the computer system. Moreover, they can make revisions of the draft plan as the discussion proceeds. As soon as the decisions are made, copies of the already printed out plan will reach the hands of the managers.

According to the fair's manager Lu Shouguan, the steady progress of China's reform of the urban and rural economic structure makes it increasingly pressing to improve office work quality and efficiency. It is precisely for the purpose of solving this problem that the fair is being held. It is jointly sponsored by the Huayang Technology Trading General Corporation of China and the China Merchant's Steam Navigation Company of Xianggang at the request of the state departments concerned.

CSO: 4008/295

NATIONAL DEVELOPMENTS

LIAONING PROVINCE HOSTS TECHNOLOGY FAIR

OW180741 Beijing XINHUA in English 0634 GMT 18 Mar 85

[Text] Shenyang, 18 March (XINHUA)--Thousands of peasants are now flocking
to a special technology fair in Liaoyang City, Liaoning Province, for con-
sultancy and technical services.

On hand at the fair held every 5 days since mid-January are 70 experts on
agriculture, forestry, livestock and fishery, according to an official of
the Liaoning Provincial Science and Technology Commission.

More than 1,4000 items of technical literature have been sold at the fair,
and fine crop seeds and mixed feed are also in good demand, the official
said.

Technical fairs have spread from cities to rural areas in Liaoning Province,
China's leading heavy industrial center. Temporary fairs are now regular
events.

This trend, the commission official said, is a "breakthrough" in the re-
form of scientific and technological management.

Scientific research results and technology are now commodities. In the
past, he explained, it was almost entirely up to the government to spread
them.

Trade includes personnel training and auctioning of research projects as
well.

More than 11,000 products resulting from technological research have been
marketed since 1982, the official reported.

The commission has earmarked funds to help more than 20 counties and dis-
tricts develop technical markets, including special ones for the food indus-
try and rural industrial enterprises.

Statistics from nine cities and five counties show that 2,600 items of tech-
nology have been diverted to enterprises. They are yielding economic returns
worht 100 million yuan a year.

CSO: 4010/110

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NATIONAL DEVELOPMENTS

FUJIAN PROVINCE TO HOLD 10-DAY TECHNICAL FAIR

OW120925 Beijing XINHUA in English 0744 GMT 12 Mar 85

[Text] Fuzhou, 12 March (XINHUA)--Fujian Province's first technical fair
will open Thursday, the provincial Science and Technology Commission said
here today.

These fairs channel research findings into commercial production. Much
new technology used to lie fallow for lack of such a channel. Users now
pay for technology, once transferred free.

The fair will deal in new techniques, research findings, technical consul-
tancy, information services and personnel exchange, as well as in new pro-
ducts and materials.

Research institutes and universities from several large cities will offer
over 1,000 items.

Provincial authorities say both domestic and foreign institutes and indi-
viduals were welcome to attend.

The provincial government plans a permanent technical market in Fuzhou
City after the 10-day fair, as well as trade centers in major cities hand-
ling agricultural produce and industrial goods and techniques.

CSO: 4010/110

NATIONAL DEVELOPMENTS

INSTITUTE 507 REFORMS SCIENTIFIC RESEARCH MANAGEMENT SYSTEM

Beijing GUANGMING RIBAO in Chinese 5 Nov 84 p 2

[Article by Liu Jingzhi [0491 2417 2535] and special correspondent Zhu Lemin [2612 2867 3046]: "Experience of Research Institute 507, the Ministry of National Defense in the Reform of Its Scientific Research Management System"]

[Text] In recent years, Research Institute 507 of the Ministry of National Defense has carried out some valuable exploration and experiments in the reform of its scientific research management system and has had some achievements. Their experiences are as follows:

Practice Quantitative Assessment of Scientific and Technical Personnel

In the past, Research Institute 507 only carried out qualitative assessment of its scientific and technical personnel. Every year a comprehensive evaluation such as enthusiasm in work, conscientiousness in studying, etc. was carried out on each person. This appraisal model suited most comrades. There is no difference of quality and there is no conditions. To improve this situation, the institute changed the qualitative assessment into quantitative assessment. In the quantitative assessment system, the evaluation and score of a comrade is based on his achievements and level, whether his achievements match the state's investment and whether there is any mistake or accident which resulted from careless planning and irresponsibility. There is also a special regulation which applies to senior scientists and technicians. Besides scientific research achievements, their contribution and score is based on whether they have spent time training talents and the number of assistants and graduates they have brought up.

By so doing, the quality of a scientist or technician can be clear at a glance of the score. This sort of quantitative assessment is advantageous to smashing the situation in which there is no difference between good and bad and diligent and indolent. As a result, the enthusiasm of scientists and technicians can be mobilized and can yield more achievements and talents.

Practice the Contract System in Distributing Scientific Research Tasks

In the past, the distribution of scientific research tasks was generally carried out through administrative measures. The higher authorities assigned

tasks to the institutes which then, through same measures, assigned them to the research labs. There were no concrete indexes for funding, investment, technical manpower and scheduling while distributing tasks. As a result, supplements of fund, investment and technical manpower were continuously added to some scientific research tasks. Some projects would take 7 or 8 years to be completed that they became the "pilot engineering project" in the scientific research battlefront.

To counter the above-mentioned situation, Research Institute 507 adopted a contract system for the distribution of scientific research tasks in some scientific research areas in recent years and has achieved some fairly remarkable results. The institute adopted the state-guarantee method, as before, for research tasks whose academic value, economic results or social benefits cannot be measured over the short term; adopted the contract system for applied and development tasks and encouraged competition among people.

There are some tasks which possibly everybody would be interested in working on. In this case, let all those who are interested put forward their plan for funding, manpower and time needed and the technical standard to be achieved and select the best to sign a contract with. Contractors who complete the tasks well will be awarded and they can keep some percentages of the fund if there is some left. Contractors who do not complete their tasks will be punished and there will be no supplementary funding.

Transfer the Right of Using Scientific Research Funds

In the past, research institutes put too many restrictions on the use of funds leaving research labs with no autonomy at all. The research institutes were the ones to determine what apparatus and what equipment to buy. The money for buying "soy sauce" was not to be used for buying "vinegar." Even if there was misjudgment, the research labs did not have any right to change it. To get more funds, research labs were like "a lion opening its big mouth" and applied for as many funds as they could and this resulted in a great waste.

To put an end to waste as well as to reverse the queer phenomenon in which one cannot use the money for "soy sauce" to buy "vinegar," research institutes transferred the right of the use of funds to research labs from the beginning of this year.

Thus, each research lab receives a certain amount of funds. The director of the lab can decide what to buy first and what to buy later according to the lab's needs. Practices prove that this is a reasonable method. On the one hand, the pressing needs of research labs in scientific research can be satisfied. On the other hand, the leaders of the research labs are encouraged to think carefully about how to use the budget and make thorough arrangements.

Practice Paid Usage of Apparatus and Equipment

In the past, Research Institute 507 rarely paid attention to the economic results of the equipment they were buying. All the research labs would get

whatever they could get and buy whatever they could be it something they needed urgently or not. Once they had bought the thing, they did not care if the utilization ratio was high or low. They would not lend the equipment to other labs even if the equipment was laying idle in their labs. As a result, even though they were buying equipment every year, there was never enough.

To make full use of the equipment bought, Research Institute 507 adopted the "paid usage of equipment" method. For example, equipment worth 100,000 yuan and having an effective utilization period of 10 years, will be depreciated 10,000 yuan each year and will be recorded on the scientific research account of the purchasing unit. If the purchasing unit does not use it for a period of time, it can tell the institute and let others use it. During the period when the equipment is lent to other units, the depreciation of the equipment will not be recorded on the purchasing unit's account. If the purchasing unit does not tell the institute that it is not using the equipment and will not lend it to others, the depreciation of the equipment will still be written on its scientific research account every year.

12369
CSO: 4008/116

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NATIONAL DEVELOPMENTS

CHINA'S STANDARD REAGENTS SURVEYED

Beijing HUAXUE SHIJI [CHEMICAL REAGENTS] in Chinese No 6, 28 Dec 84 pp 379-382

[Article by Liu Tianxu [0491 1131 3563], Beijing Chemical Works: "Survey of the Standard Reagents in our Country"]

[Text] I. Survey

1. Standard Reagents

A standard reagent is a standard substance against which the chemical quantity of other substances is measured. It belongs to one of the many categories of chemical reagent. In our country, it is customary to refer to the standard reagents for volumetric analysis and the pH standard reagents, which are equivalent to the IUPAC's C grade, as jizhun reagents and all others as biaozhun reagents. Biaozhun reagents and jizhun are collectively called standard reagents.

Standard reagents can be further divided into many categories according to substances they measure, that is according to their applications.

2. Grade of Standard Reagents

Some of the domestically produced standard reagents have two grades. The higher grade ones are those standardized and released by the State and are referred to as primary standards. The lower grade ones are those, prepared by using higher grade standards as references, production plants use to measure their products (see table 1).

Table 1. Grade Comparisons of Some Standard Reagents

Category	Product Grade	Assay Condition	IUPAC* Equivalent
Volumetric Analysis Standard	Primary Standard	Content assayed by the Chinese Academy of Metric Science	C Grade
	Working Standard	Content assayed by production plant using primary standard as reference	D Grade

Category	Product Grade	Assay Condition	IUPAC* Equivalent
pH Standard	pH Jizhun	pH value measured by the Chinese Academy of Metric Sciences	C Grade
	pH Biaozhun	pH value measured by production plant using pH jizhun as reference	D Grade

*IUPAC is the International Union of Pure and Applied Chemistry.

It should be clear that standard reagent is not high purity reagent. Standard reagent is used to strictly control the content of main ingredient whereas high purity reagent is used to strictly control the content of impurities. See table 2 for examples.

Table 2. Partial Specification Comparisons of Zinc Oxide Reagent

Item	Volumetric Analysis Working Standard GB 1260-77	High Purity 4N* Grade Enterprise Standard of a Certain Plant
Content (ZnO)	99.95-100.05%	99.8-100.2%
Alkali & Alkali-Earth Metals	$\leq$0.05%	K, Na, Ca, Mg all are $\leq$0.001%
Lead (Pb)	$\leq$0.003%	$\leq$0.001%
Al, Cr, Co, Ni Cu, Zn, Ag, Cd	not measured	all are $\leq$0.001%

*4N grade is the lowest grade of high purity reagent.

II. Classifications

There are many categories of standard reagent. The categories now frequently used are listed in table 3. Our country has nine categories that either reach or approach the international level in terms of variety and quality.

Table 3. Category Comparison Chart of Standard Reagents

Category	State	[1] NBS	[2] Merck	[3] Baker	Domestic
Volumetric Analysis Primary Standard	solid	yes	no	yes	yes
Volumetric Analysis Working Standard	solid	yes	yes	yes	yes
Volumetric Analysis Standard Solution	solution	no	yes	yes	yes
Organic Elemental Analysis Standard	solid	yes	no	yes	yes
pH Standard Reagent	solid	yes	no	yes	yes
pD Standard Reagent	solid	yes	no	no	no
Ion-select Electrode Standard	solid	yes	no	no	no
pH Standard Buffer Solution	solution	no	yes	yes	yes
Gas Chromatography Standard	solid, liquid	yes	yes	yes	yes

Category	State	[1] NBS	[2] Merck	[3] Baker	Domestic
Thin Layer Chromatography Standard	solid	no	yes	no	no
Impurity Standard Solution	solution	no	yes	yes	yes
Spectral Analysis Standard Solution	solution	no	no	yes	no
Oil Solubility Standard Solution	solution	no	yes	no	no
Calorific Analysis Standard	solid	yes	no	no	yes
Clinical Analysis Standard Solution	solution	yes	yes	no	yes
Pesticide Analysis Standard	solid	no	yes	no	no
Nuclear Magnetic Analysis Standard	solid	no	yes	no	no
High Purity Metal Standard	solid	yes	yes	yes	no

Some of the categories designated "no" in table 3, such as pesticide standard, are being produced domestically. But their product lines are incomplete and will not be described in this article.

The following are brief descriptions with regard to the classification, application, user measurement and selection of currently available reagents in all categories.

1. Volumetric Analysis Standard Reagents

As described earlier, there are two grades.

(1) Volumetric Analysis Primary Standard Reagents

Equivalent to the IUPAC's C Grade, it is called "Primary Standard" in English. Its purity requirement is 99.98-100.02 percent. Its assay is carried out by the Chinese Academy of Metric Sciences employing the highly accurate Coulometric method.

Currently available items are: potassium hydrogen phthalate, anhydrous sodium carbonate, sodium chloride and potassium dichromate.

These items, being commissioned by the Chinese Academy of Metric Sciences to be produced at a certain chemical reagents plant, are examined and measured by the Academy. Those that meet the specifications are distributed to individual volumetric analysis standard reagents production plant, where they are used as standards for the standardization of "volumetric analysis working standard" reagents.

Reagent of this grade is the "standard" of standards.

(2) Volumetric Analysis Working Standards

Equivalent to the IUPAC's D grade, it is called "Working Standard" in English. The purity requirement is 99.95-100.05 percent. Production plants carry out the measurement by the highly accurate gravimetric titration method using "volumetric analysis primary standard" as standard. For detail, see GB 1253-1261-77[4]. It is to be used by user to standardize their volumetric analysis standard solutions. See table 4 for varieties and applications.

Table 4. Applications of Volumetric Analysis Working Standards

Working Standard	Solution Standardized	National Standard No
Sodium Chloride	Silver Nitrate Standard Solution	GB1253-77
Sodium Oxalate	Potassium Permanganate Standard Solution	GB1254÷77
Anhydrous Sodium Carbonate	Hydrochloric, sulfuric Acids Standard Solutions	GB1255-77
Arsenic	Iodine Standard Solution	GB1256-77
Potassium Hydrogen Phthalate	Sodium Hydroxide, Perchloric Acid Standard Solutions	GB1257-77
Potassium Iodate	Direct preparation of Potassium Iodate Standard Solution	GB1258-77
Potassium Dichromate	Sodium Thiosulfate	GB1259-77
Zinc Oxide	Disodium Edetate	GB1260-77
Anhydrous p-Aminobenzene-sulfonic Acid	Sodium Nitrite Standard Solution	GB1261-77
Benzoic Acid	Sodium Hydroxide Standard Solution	Enterprise Standard
Silver Nitrate	Halides, Thiocyanates Standard Solutions	Enterprise Standard
Potassium Bromate	Direct Preparation of Potassium Bromate Standard Solution	Enterprise Standard
Calcium Carbonate	Disodium Edetate	Enterprise Standard

Before use, it is necessary to be dried by user to remove about 0.1 percent of hygroscopic moisture.

2. Volumetric Analysis Standard Solutions

A standard solution is a solution with specific accurate concentration. The concentration accuracy is within 0.1 percent and it is used to measure content of substance by volumetric analysis.

The concentration of standard solution is standardized by using working standard reagent.

The preparation and standardization of standard solution are described in the National Standards GB 601-77[5] and should be followed. This type of reagent is equivalent to the IUPAC's E grade.

GB 601-77 contains 26 varieties of standard solution, which are divided according to application into 6 categories:

(1) Acid-base titrations: acetic acid, hydrochloric acid, sulfuric acid, sodium hydroxide and sodium carbonate standard solution.

(2) Non-aqueous titrations: perchloric acid standard solution.

(3) Oxidation-reduction: sodium thiosulfate, potassium permanganate, cerium sulfate, sodium oxalate, oxalic acid, ferrous sulfate, iodine and potassium iodate standard solutions.

(4) Precipitation titrations: silver nitrate, lead nitrate, mercurous nitrate, sodium thiocyanate and sodium chloride standard solutions.

(5) Complexometric titrations: disodium edetate, zinc chloride and magnesium chloride standard solutions.

(6) Organic functional group determinations: bromine, potassium bromate and sodium nitrate standard solutions.

Besides those mentioned above, naturally there are others such as iodine mono-chloride and iodine monobromide standard solutions for organic addition method, potassium ethoxide and tetrabutylammonium hydroxide standard solutions for non-aqueous titration.

For the convenience of outdoor work or those with low accuracy requirement, there are some concentrated standard solutions and powder equivalent standards. User can follow the instruction and dilute certain amount of concentrated standard solution or powder, which are packed in ampules, with water to a specific accurate volume, mix well and use. Currently, there are concentrated standard solutions of concentrate acid, base, silver nitrate and sodium chloride as well as equivalent powder reagents of potassium dichromate, sodium oxalate and sodium thiosulfate. This type of reagent is accurate to within 0.2 percent.

3. Organic Elemental Analysis Standard Reagents

This type of reagent is used as reference standard in elemental analysis of organic compounds. Now there are over 20 varieties in our country. Abroad, the largest supplier is the British BDH[6] Co with 33 varieties. It is equiva-lent to the IUPAC's E grade.

At present domestically available items are:

(1) Carbon, hydrogen standard reagents: e.g. sucrose, anthracene, benzoic acid.

(2) Nitrogen standard reagents: e.g. nitrobenzene, p-nitroaniline.

(3) Sulfur standard reagents: e.g. amidosulfonic acid.

(4) Chlorine standard reagents: e.g. p-chlorobenzoic acid.

(5) Bromine standard reagents: e.g. p-bromobenzoic acid.

(6) Iodine standard reagents: e.g. o-iodobenzoic acid.

Those plants producing this type of reagent mainly use element analyzer to do measurements. Some elements (e.g. iodine) are determined by semi-micro volu-metric analysis method after organic materials are destroyed by oxygen combus-tion.

When choosing this type of reagent, users have to be sure of, besides that the chosen standard must contain the element to be measured, the following two points:

(1) The chosen standard should be structurally similar to the sample.

(2) The major element content of the chosen standard should be similar to that of the sample.

The purpose of these considerations is to reduce as much as possible the system error in the process of measurement.

For example, the sample is naphthalene and the content of carbon and hydrogen are to be determined. From the comparison in table 5, anthracene must be chosen instead of sucrose.

Table 5. Comparison of the Organic Element Content

Compound	Carbon Content, %	Hydrogen Content, %
Naphthalene	93.7	6.3
Anthracene	94.3	5.7
Sucrose	42.1	6.5

For this type of product, the specification of element content is within 0.3 percent of the calculated value. For example, the specification of carbon content of sucrose is 42.1 ± 0.3 percent.

4. Impurity Standard Solutions

A standard of this type denotes a solution that contains, in unit volume, accurate number of element, ion or molecule. It serves as standard for trace impurity assay. Our National Standards GB 602-77[7] specifies the preparation of 72 varieties of standard. The concentrations of most solutions are 0.1 mg per ml while a few of them are 1 mg per ml.

There are more refined specifications for this type of standard abroad. The Baker[3] Co of the United States has impurity standards specifically for the use of emission spectrophotometric analysis. Their specifications are dictated by the characteristics of the spectral analysis. For example, in preparing zirconium standard, the zirconium dioxide reagent used must contain less than 0.02 percent of the hafnium impurity. The Merck[2] Co of West Germany has oil solubility analysis standard solutions. They are metal standards, prepared from selected corresponding metal salts of organic acid, to be used as standard for organic material impurity assay in order to avoid errors caused by the difference in existing state from the sample.

5. pH Standard Reagents

pH standard reagent is used as calibration standard for pH meter.

(1) Grade Classification

This type of reagent has two grades, i.e. pH jizhun reagent and pH biaozhun reagent. The pH jizhun reagent is equivalent to the IUPAC's C grade. After being commissioned by the Chinese Academy of Metric Sciences to be produced at a certain reagent plant, they are examined and measured by the Academy. Those that meet the specifications are distributed to individual reagent plants for use as standard to standardize pH biaozhun reagents. The pH value of this grade reagent is determined by double hydrogen electrodes of borderless cell. The accuracy of the method is ± 0.005 pH unit.

The pH biaozhun reagent is equivalent to the IUPAC's D grade. Reagents production plant measure their pH values by double hydrogen electrodes of bordered cell using pH jizhun reagents as standards. The accuracy of the method is ± 0.01 pH unit.

(2) Choice of pH Standard Reagents

By using seven pH standard reagents, six standard solutions can be prepared with pH ranges from 1 to 12, as described in table 6.

Table 6. pH Standard Reagents

Compound	Concentration, m	pH at 25°	Temperature Range °C
Potassium Tetroxalate	0.05	1.680	0–45
Potassium Hydrogen Tartrate	Saturated aq. Solution	3.559	25–45
Potassium Hydrogen Phthalate	0.05	4.003	5–45
Potassium Dihydrogen Phosphate Disodium Hydrogen Phosphate	0.025 0.025	6.864	5–45
Borax	0.01	9.128	10–45
Calcium Hydroxide	Saturated aq. Solution	12.462	0–45

Based on the pH value to be measured, user should choose a pH standard reagent having similar pH value to prepare a standard solution with specific pH value and use it to calibrate, i.e. to correct, pH meter. For example, to measure pH 5, potassium hydrogen phthalate is chosen to prepare 0.05 m standard solution having pH 4.003 and use it to calibrate pH meter.

The concentration unit of solutions prepared from this type of standard reagent is molarity, whose symbol is the small letter "m" to differentiate from volumetric standard solution's molarity, whose symbol is a capital letter "M."

The pH values of the solution prepared from a product at different temperatures are provided on the product's label. User can choose, based on experiment temperature, a corresponding pH value to calibrate pH meter.

Carbon dioxide-free water should be used as solvent in preparation.

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6. pH Standard Buffer Solutions

A pH standard buffer solution is a whole kit of standard solutions with pH values ranging from 1.0 to 13.0. Within the range of 1.0 to 10.0, there is a standard solution with each increment of 0.1 pH unit and within the range of 10.0 to 13.0, each increment of 0.2.

For the preparation of these standard solutions, see our National Standards GB 604-77[8]. See table 7 for examples of preparation.

After addition of sodium hydroxide and potassium dihydrogen phosphate, whose amount are given in table 7, is completed, CO_2 free water is added to make 100.00 ml, mix well by shaking. Check the pH value of each solution by pH meter.

Table 7. Recipes for Some pH Buffer Solutions

pH	Add 0.1N NaOH, ml	Add 0.2M KH_2PO_4, ml
6.0	22.4	25.0
6.9	25.9	25.0
7.0	29.1	25.0
7.1	32.1	25.0
7.2	34.7	25.0

pH standard buffer solution can be used as standard for measuring the pH value of unknown solution by colorimetric method. It can also be used as standard solution for measuring the color change range of acid-base indicator.

Standard solution of this type has small buffering capacity. Solutions with pH greater than 10.0 easily absorb carbon dioxide from air and lower the pH value so they must be sealed for storage.

The accuracy of standard solution of this type is $\pm$0.03 pH unit. Its accuracy is less than that of the pH standard reagent ($\pm$0.01 pH unit) and is not suitable for pH meter calibration.

Because of its low buffering capacity, it is not appropriate buffer solution for macro-complexometric titration.

7. Gas Chromatography Standards

This type of reagent is abbreviated as "sebiao." Production plants produce them by preparative chromatography.

There are many varieties of gas chromatography standard such as paraffins, arenes, alkyl halides, alcohols, esters and phenols.

Sebiao reagents are divided into two categories according to their applications and assay methods.

(1) Products Assayed by the Packed Column Method

The purity specification is not uniform among production plants, some use 99 percent, others 99.5 percent and still others 99.9 percent. Water content specification is 0.05 percent.

This type of product is generally used for measuring chromatographic retention, correction factor, column polarity as well as separation and trailing factor.

(2) Products Assayed by the Hollow Column Method

Hollow column is customarily called "capillary column." Because capillary column allows fast carrier gas flow, long column, sharp chromatographic peak, high sensitivity, good separation and is able to detect many impurities, the detection level of this method is higher than that of the packed column method.

The major applications of these products are the chromatographic science research, measurement of more accurate retention time and correction factor and measurement of other chromatographic coefficients.

Most production plants adopt the standards of Merck [2] Co, which is no less than 99.5 percent by capillary column assay with some varieties no less than 99.7 percent.

When using different detector, users better test the purity of "sebiao" reagent under their own assay condition in order to see if it satisfies the requirement of the experiment.

8. Clinical Standard Reagent Solutions

This type of reagent is used for clinical assay. At present, there are some standard solutions that are sold together with "clinical diagnostic kit" for hospitals and scientific research organizations to use.

The varieties that are currently supplied include glycogen, urea nitrogen, uric acid, cholesterol, glucose, phosphorus, chlorine, sodium, potassium, calcium and glycerol standard solutions.

Production plants use clinical assay method to measure this type of standard solution and have stricter requirement than that of the general standard solution with regard to the solution's color and pH neutrality.

The concentration unit of this type of standard solution is different from the general chemical reagent standard solutions (see table 8).

Table 8. Concentration of Clinical Reagent Standard Solution

Item	Dimension	Equivalent to
Chlorine Standard Solution	100 meq/l	100 meq/l
Glucose Standard Solution	100 mg/dl	100 mg/100 ml
Uric Acid Standard Solution	5 mg/dl	5 mg/100 ml

9. Calorific Analysis

This type of standard is for the determination of calorific analyzer coefficient, i.e. the measurement of water equivalent.

At present, only benzoic acid is supplied domestically. Abroad, such organization as NBS[1] has more varieties than us.

III. Summary

We can see from descriptions above that our country has established a national system of standard reagents, i.e.

1. Volumetric analysis primary standard reagents and pH jizhun reagents, which are equivalent to the IUPAC's C grade, are examined and assayed by the Chinese Academy of Metric Sciences and distributed to related organizations. They are not for sale.

2. Volumetric analysis working standard reagents, which are equivalent to the IUPAC's D grade, are included in the national standards. Among pH biaozhun reagents, three have been included in 1983. The other four varieties are at planning stage.

3. Impurity standard solutions and pH standard buffer solutions are all included in the national standards.

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NATIONAL DEVELOPMENTS

MARKET PROSPECT OF CHEMICAL REAGENTS ASSESSED

Beijing HUAXUE SHIJI [CHEMICAL REAGENTS] in Chinese No 6, 28 Dec 84 pp 367-368

[Article by Zhang Gancheng [1728 1626 2052], China National Corporation of
Medicine: "Market Situation of Chemical Reagents"]

[Text] The market is a general reflection of the economy and is a mirror that
reflects the relationship between merchandise and customer. Those involved in
the production, trade and management of chemical reagents ought to understand
market messages, exchange information and make good forecast of the chemical
reagents market.

The national purchase and sale plan of chemical reagents for the first half of
1984 has been completed ahead of schedule. According to the statistics, the
total amount of purchase is 55 percent of the yearly plan, an increase of 5.3
percent over the same period last year. The gross sale is 55 percent of the
yearly plan, an increase of 7.7 percent over the same period last year. By the
end of June, the stock is 2 percent higher than the yearly plan, an increase
of 4.9 percent over the same period last year. The merchandise mix has been
improved and the proportion of purchase, sale and storage has been better coor-
dinated.

Because of the active market for chemical reagents, sales everywhere have been
increasing since the beginning of the year. Most of the provinces have achieved
a greater range of increase over the same period last year. For example,
Heilongjiang's increase is 12.4 percent, Xinjiang's 14 percent, Henan's 14.3
percent, Zhejiang's 16.9 percent, Fujian's 17.6 percent and Ningxia's reaches
22.8 percent, the largest range of increase that tops the nation. Of course,
the growth is still unbalanced from the national point of view. It decreased
slightly in some provinces such as Nei Mongol, Shaanxi and Qinghai while slight
increases were seen in some provinces and municipalities such as Beijing,
Liaoning and Jilin. The changing trend is as follows:

The amount of purchase by science education and health establishments is 20-30
percent of the sale of chemical reagents and has been increasing since 1983.

The development of applied technologies is aiming at the areas of eating,
clothing, utilities, living, environmental protection and transportation such
as animal feed, nutrition source development, seed breeding and fish breeding

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in lotus pond. These scientific research projects require the use of lots of chemical reagents such as colchicine for seed breeding, L-lysine as nutrient and L-isoleucine for anti-epidemic application.

The advancements of scientific research will stimulate the growth of agriculture, industry and other departments, whose purchasing power for chemical reagents will increase. Newer and higher standards for the variety, specification, quality and packaging of chemical reagents will be demanded. But at present many small volume varieties for scientific research use are often out of stock. The market availability ratio in general has only reached 30-40 percent.

Recently, the education front has continued constructing more colleges and schools, adding new professions and departments, increasing the training of graduate students, masters and Ph.D.s, raising student's experimental skill level. Teachers, besides teaching, also do some scientific research. As a result, their demand for chemical reagents is also rising.

Along with economic growth in towns and villages, a greater increase in the number of hospitals and clinics has occurred. The number of patients treated has surged. There has been a corresponding increase in clinical tests done and the demand for test reagents has noticeably increased. The further implementation of the environmental protection law and the food sanitation law forces prefectures, cities and counties nationwide to intensify their work on monitoring the three industrial wastes pollution, pesticide residue and food and drinking water sanitation. The demand for monitor reagents will increase gradually.

The purchase by industrial sector accounts for about 40-60 percent of reagents sale. This year, several State's key construction projects will begin production. Many among them have set up test laboratory and workshop laboratory. Since the State Council's announcement of the Industrial Product Production Permit Measure, all affected organizations have paid attention to product testing. The purchase of reagents has increased correspondingly with the average increase of 6-8 percent over last year.

The growth of such industries as textile, brewing and food will increase the amount of purchase of some frequently used common reagents like ammonium sulfite, sodium pyrophosphate, sodium nitrate, sodium nitrate, ethyl lactate, ethyl butyrate and acetic acid. On the other hand, there is a glut of such household chemical products as pearl cream, cold cream, skin lotion and brewing materials. Their consumption of reagents has decreased.

The metallurgy and machinery industries, particularly those in the business of specialized steel, colored metals and general machinery, are undergoing equipment renovation and technology transformation. The demand for reagents such as sodium hydroxide and potassium hydroxide has also increased correspondingly. The demand for analytical reagents used by these businesses will decrease with the increasing use of instrumental analysis.

The purchasing power of villages has also surged. Based on estimates, the demand for acetone, hydrogen peroxide solution, hydrofluoric acid, petroleum

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ether, butyl acetate, toluene, anhydrous alcohol, and sodium hydroxide will double by 1985. However, many plants are taking a hard look at cost problem. Some of them are very calculating. For some reagents like toluene, they buy G.R. or A.R. grade instead of the MOS grade and filter them through microporous membrane. The cost is only 60 percent of that of the MOS grade reagents. Some of them use 811, 812 cleansing solutions to replace higher priced bulk reagents such as nitric acid, sulfuric acid, ammonium hydroxide, carbon tetrachloride and toluene. Further observations are needed to assess the result of these situations.

The condition of having no stock in current reagents market is a serious one. For example, one research institute asked for over 200 items of reagents, but only over 100 were available. The availability is less than 50 percent. One university needed 168 items of reagents, but only 99 of them were available. The availability is merely 53 percent. The phenomenon of a shortage of supply is even more serious in some large variety, high quality, highly serialized, high technical difficulty, small volume and rapid change reagents such as all kinds of pure reference for instrumental analysis, in which there are several hundred items in the $C_{13}-C_{40}$ series (there are 210 compounds in the PCB series alone), over 100 items of amino acids and derivatives, nucleosides and nucleotides, enzymes and their substrates, labeled compounds and ketosteroids.

Currently, there are over 700 reagents production plants nationwide, the majority of which are reproducing over 100 varieties of bulk, low tech, high profit and high valued (70 percent of the gross output value of reagents) staple products (only 3 percent of the trading varieties) but unwilling to produce and sell over 6,000 varieties of small volume, technically complicated, low profit and low valued (30 percent of the output value) specialty reagents (97 percent of the trading varieties). The result is an "inability to make enough profit from product output, and to supply enough varieties," and products are not marketable. All of these lead to the situation of unnecessary delay and supply shortage.

It can be concluded from conditions mentioned above that among the elements influencing reagents market, the favorable ones outnumber the adverse ones. We estimate that the 1984 gross national sale of chemical reagents will increase 6-8 percent over 1983. If, however, over a long period of time the problem of extremely short supplied items is not solved and the demand on variety, specification and quantity of research use reagents is not met, supply is not provided on time, service attitude is not improved and the quality of service is not raised, an increase of less than 6 percent is possible. Therefore, the supply sources ought to be actively organized, the extremely short supplied items should be emphatically taken care of by quickly replenishing them with imports, and efforts should be made to accomplish the following: to have a complete line of products that meet all specifications and are in ample quantity, good attitudes, prompt delivery and meticulous services. The three sides, i.e. chemical reagents management departments, scientific research institutions and reagents industry, business and trade, have to be closely coordinated and work together to strengthen market survey and study, to make good forecast and to satisfy by all means the need of research and experiment.

Today, a new technological revolution, characterized by electronics technology, biotechnology and information processing technology, is happening worldwide. The chemical reagents field will go along and produce qualitative and quantitative changes.

Currently, we have to pay attention to the ramifications of the new technological revolution in our chemical reagents industry, to bring up to date the messages and information concerning chemical reagents, to grasp the importance and uniqueness of chemical reagents in new technology, to study the development strategies of our chemical reagents industry, to study policies on technology acquisition and to study how to apply computer technology and bioengineering technology. Through strategy studies, new technologies suitable for the development of our chemical reagents industry are to be identified, the outdated business managements are to be gradually reformed and antiquated technologies and old product lines be constantly renovated and replaced. The replacements of chemical reagent variety is closely associated with the development of modern testing methods. The reagents for uranium assay is an example. Uranium reagent I and uranium reagent II were generally used in the 1960's. They were replaced by uranium reagent III in the 1970's. In the early 1980's, 5-Br-PADAP has been synthesized. The trend of gradual decrease of old varieties and gradual increase of new varieties has appeared. The chemical reagents production and sale departments ought to survey and study extensively and be constantly aware of the market changes in order to accommodate the development of science and technology.

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NATIONAL DEVELOPMENTS

SOFTWARE STANDARDIZATION PROBLEMS IN CHINA

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 3

[Article by Shang Tanshen [1424 5888 1957] of Electronic Computer Station,
State Bureau of Supplies: "Problems in Standardizing the Production of
Application Software"]

[Text] After reading Shi Bingkun's [4258 3521 0981] brief article "Program
Design Urgently Needs To Be Standardized" in No 10 issue of JISUANJI SHIJIE
[CHINA COMPUTERWORLD], 20 May 1983, I began to feel the urgency of solving this
problem, and I hope that concerned departments will quickly organize research
efforts in this area. According to the definitions of software and program in
"Software Talk, Part One" [CHINA COMPUTERWORLD, No 6, 20 Mar 83 p 6] by
Yang Fuqing [2799 5346 3237] and Zhu Sanyuan [2612 0005 0337], perhaps it would
be better to call it "software design standardization" instead. As the need
for standardizing application software production is even greater than system
software production, plus the fact that application software production involves
an even broader area, this paper will only deal with issues concerning the standardi-
zation of application software. It can be said that through some 20 years of
experience in computer hardware production, China has developed its own set
of hardware standards. Comparatively speaking, software production is somewhat
chaotic.

1. Dividing Application Software Production Into Stages: Although a great
deal has been published both at home and abroad about this subject, there is
no consensus. Of course, since applications vary in size and scale, there is
no need to emphasize uniform division of all software research and development
stages. However, since we want to build our own software industry, it is
important to set up some kind of universal standards.

In view of the current computer situation in China, the author believes that
it would be suitable to divide software production into the following stages:

1) System investigation stage. The primary tasks of this stage are to deter-
mine through investigation the goals and application scopes of application
systems; determine all the requirements of application systems; make proposals
on how to develop software systems, and study the economic results and social
impacts of proposed projects. Finally, it is necessary to put down the
application software development in the form of written proposal or user
requisition. This stage of work should be primarily carried out by either
the project sponsoring department or user with the cooperation of the application
system analyst.

2) System analysis stage. The primary tasks of this stage are to analyze the requirements of an application system; study the possibilities of meeting the requirements; estimate the cost of developing the application system; predict the outcome of the completed system; and write feasibility study report. It is also necessary to prepare system block analysis charts, system capability documents, and plans for designing the system. This stage should be primarily carried out by system analyst with the cooperation of user and programmer.

3) System designing stage. The main tasks of this stage are to draw up blueprints for data file (or data base) system of the application software system; prepare programming logic flowcharts based on program function requirements; and compile data and program manuals. In this stage, efforts are made to elaborate on the work in the preceding stage, and also to pave the way for the programming work in the following stage.

4) System programming stage. The chief task of this stage is to have programmers carry out the programming and debugging phase of the project.

5) System implementation stage: The main task of this stage is to test the application software system. On successful completion of the trial run, compile operation manual and system maintenance manual. Finally, carry out system evaluation.

2. Software product documents. After an application software has been developed, what sort of documents should be provided in order to bring the product up to standard? If the software is sold or transferred, what sort of materials should be made available to the user? There are many problems here. Some programs which have been running all the year around have no documents at all. Some software which have been transferred or sold do not even have basically required operation manuals. There is also lack of complete information on some of the software which had been imported from other countries. The author holds that when a software is produced, it should come complete with the following materials:

1) Application software development proposal (user requisition);

2) Feasibility study report;

3) Plans for designing application software;

4) System capability document (with system capability block analysis chart);

5) Data file (or data base) system document (with data file or data base system diagram);

6) Program documents (with programming flow charts);

7) Source program listing;

8) Object program disk;

9) System evaluation;

10) System operation manual;

11) System maintenance manual.

When an application system is sold or transferred to a user, the latter should be furnished with system function manual, data file (or data base) system manual, system operation manual, system maintenance manual, and object program disk. Standards should be established for each kind of manual, i.e., contents, textual format, punctuation, etc.

3. Quality standards for application software. It is indeed very difficult to find a common yardstick for standardizing the quality of application software. But there are, nonetheless, quite a few common quality requirements for all types of application software, and minimum standards should be established for the common requirements in order to help continuously upgrade our level of designing. For example, such requirements as accuracy, reliability, maintainability, and time-memory efficiency can be applied to any application software; as many problems are involved in determining to what extent the requirements should be made, there is need for flexibility here.

4. Marketing application software products. At present, more and more software products are being sold or transferred domestically. Thus, concerned departments should come up with appropriate measures and policies as soon as possible to help promote the gradual development of commodity-orientated application software. Application software developed for marketing or trans-ferrence should be subjected to some form of evaluation first, and not released to the user immediately after the debugging phase. Besides the object programs, the software research and development organization should also provide the user with required information about the software. Appropriate regulations should also be established regarding the responsibility of the software development organization to provide such software support as maintenance and technical training. Moreover, it is also necessary to formulate as soon as possible general standards on the pricing of application software for the reference use of software development organizations and users.

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NATIONAL DEVELOPMENTS

JINHUA COMPUTER COMPANY FOUNDED

[Article: "Jinhua Computer Company Jointly Set Up by Factory and School"]

[Text] To closely combine research and development with production, and allow research achievements to be rapidly translated into production results, thus helping to speed up the growth of China's electronic computer industry, the Jinzhou Computer Plant and Qinghua University's Computer Engineering and Computer Science Departments have jointly set up the Jinhua Computer Company which integrates research and development with designing and production. The company was recently inaugurated in Jinzhou City.

Headquartered in Jinzhou Computer Plant, the company is administered by the Ministry of Electronics Industry, Liaoning Bureau of Electronics Industry, Jinzhou Municipal People's Government, and Qinghua University. It is mainly devoted to the research, development, production, application and servicing of superminicomputers, minicomputers, and microcomputer systems. It also organizes technical exchange activities both at home and abroad to continuously upgrade the technical level and economic results of their computer products.

As part of the company, the Jinzhou Computer Plant will become a field work training base for both university students and research and development personnel. With the approval of the unit in charge of assigning tasks, research results achieved by the university will be assigned on priority basis to the factory for production.

This kind of school-and-factory organized integration of research and production is a new seedling rapidly growing in a garden which is dedicated to the improvement of China's research and development and production systems. Increasingly wider attention is being attached to this kind of organizational mode. Jointly founded by Qinghua University, which is a key institution of education, and Jinzhou Computer Plant, which is a leading plant, the Jinhua Computer Company is bound to further promote current improvement efforts.

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NATIONAL DEVELOPMENTS

BRIEFS

TECHNOLOGY FAIR IN FUJIAN--The 1985 Fuzhou spring technology fair for
revitalizing Fujian Province closed this afternoon. More than 20,000
people visited the fair over the past 10 days. A total of 2,456
technology transfer projects were concluded at the fair, with a total
turnover of about 3.56 million yuan. The special characteristics of the
fair were to orientate toward small and medium-sized enterprises,
villages and town enterprises, and specialized households in the rural
areas. Beijing, Shanghai, Tianjin, and seven other central cities,
Jiangsu, Anhui, and Liaoning Provinces, as well as Ginghua University,
the Ministry of Astronautics Industry, and the Ministry of Aviation
Industry, brought highly applicable technologies for trade at the fair.
To ensure that technology commodities were traded, the Fuzhou People's
Government organized the responsible persons of the various enterprises
on various fronts to buy technologies at the fair. Representatives of
many small and medium-sized enterprises, village and town enterprises, and
specialized households in Fujian Province also flocked to the fair.
During opening of the fair, comrades Wang Chonglun, vice president of the
All-China Federation of Trade Unions, Xiang Nan, first secretary of the
Fjuian Provincial CPC Committee, and Provincial Governor Hu Ping,
separately visited the fair. [Text] [Beijing Domestic Service in
Mandarin 1200 GMT 23 Mar 85]

CSO: 4008/295

APPLIED SCIENCES

DISCHARGE CHARACTERISTICS OF HIGH-PRESSURE, FAST-DISCHARGE XeCl EXCIMER LASER

[Article by Liu Dawei [0491 6671 0251]]

[Text] Abstract

Based on accurate measurements of voltage and current be-
tween the electrodes of a fast-discharge XeCl excimer laser
and together with computer analysis, the dynamic impedance
of the laser discharge plasma under high pressure (3-8
atmospheres) was obtained. The impedance was found to drop
to a few ohms in a few nanoseconds. The discharge peak
current and the corresponding impedance of the laser
cavity at various charging voltages were studied. The
results showed that it is neither practical nor necessary
to match the impedance of the discharge plasma and the
impedance of the transmission line.

I. Introduction

As a useful technique, preionization avalanche discharge has been success-
fully applied to high-pressure, high-power gas lasers. Being simple in
structure, reasonably high in efficiency and particularly suitable for high
repetition rate applications, this technique has received increasing atten-
tion and application in CO_2 lasers and excimer lasers. A number of circuits
have been used in generating uniform fast discharge at high pressure, includ-
ing the Blumein circuit, the L-C inversion circuit, the charged cable and
the pulse formation network (PFN). But to date there has not been detailed
study of the impedance characteristics of the discharge plasma and energy
deposition of these circuits. Such knowledge is undoubtedly very important
in the understanding of the development of the plasma and in further improve-
ments of the laser power output. Only a few papers have briefly touched
upon some aspects of the plasma impedance under long discharge period[1,2].
Measurements of fast discharge (a few nanoseconds to a few tens of nano-
seconds) under high gaseous pressure (several atmospheres) have not been
made because of the difficulties associated with direct measurement of the
voltage and current waveforms at the discharge electrodes, usually at a high

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potential. Using a fast, high-voltage measurement technique we used before, we have made direct measurements of the voltage pulse waveforms at the electrodes of the Blumlein discharge circuit[3]. We have also measured the current waveform using a special Rogowski coil. Based on accurate measurements of the voltage and current waveforms we studied the discharge plasma impedance characteristics and compared the experimental results with computed results.

II. Experimental Setup

Figure 1 shows the laser apparatus used in the experiment. The capacitors at the electrodes of the Blumlein circuit are made of epoxy printed circuits, 0.16 cm thick, and the actually measured capacitance is $C1 = C2 = 1.2 \times 10^{-9}$ farad. The laser electrodes E1 and E2 are each 10 cm long, 0.32 cm wide, and separated by 1.05 cm. We used a new efficient corona preionization electrode structure[4]. The preionization electrode consists of several tungsten wires going through a 0.32 cm o.d. quartz tube. The preionization electrode is placed directly on the front end of one electrode and is connected to the other electrode.
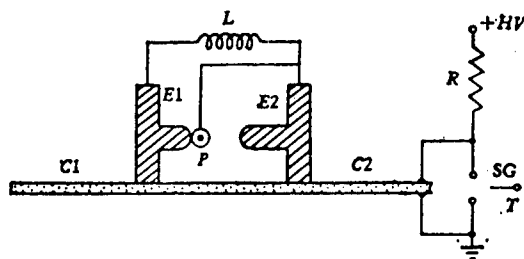
Figure 1. The Blumlein discharge circuit. Printed circuit capacitors C1 and C2 are charged through the resistor R. The trigger electrode T triggers the spark gap (SG). Notice that the inductance L is a short to the charging circuit and is open to the discharge circuit. The electrodes consist of the discharge electrodes E1 and E2 and the preionization electrode P.

The gain zone of the lasing medium has a volume of 2 ml and the total laser volume is 33 ml. The two mirrors in the cavity are separated by 17 cm, the reflecting mirror is coated with aluminum and the output mirror is a fused quartz plate. The gas pressure of the laser is between 3 and 8 atmosphere and the typical gas composition is He: 0.4% HCl:0.5% Xe. The charging voltage varies between 10 and 20 kV and the pulse repetition rate is 10 Hz. The electrodes of the Puckle cell used in the voltage pulse shape measurement are directly connected to the discharge electrodes E1 and E2. When the trigger electrode T is activated, the capacitor C2 discharges through the nitrogen filled spark gap SG and produces a potential between the laser electrodes E1 and E2 (also between E1 and P). As the discharge proceeds, the potential increases rapidly and corona preionization first occurs between E1 and P and UV photons are emitted, followed by initial preionization of the lasing material and the main discharge. Since the discharge electrodes E1 and E2 are at rapidly changing high potentials, measurement with a conventional high

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voltage transformer is very difficult. We solved this problem by using a Puckle photoelectric noncontact method.

Figure 2 shows the voltage and current waveforms at the two ends of the discharge electrode, (a) is the voltage waveform and (b) is the current waveform. The medium gas pressure is 5 atm, and the charging voltage is 5 kV.
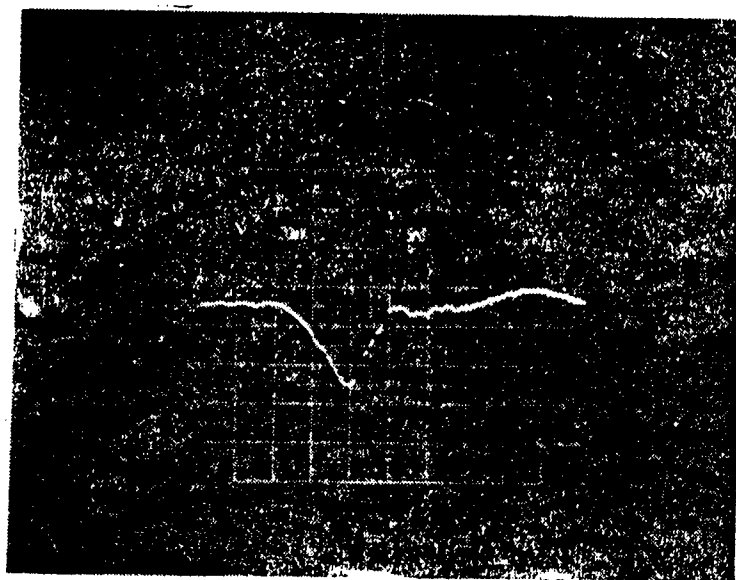
(a)
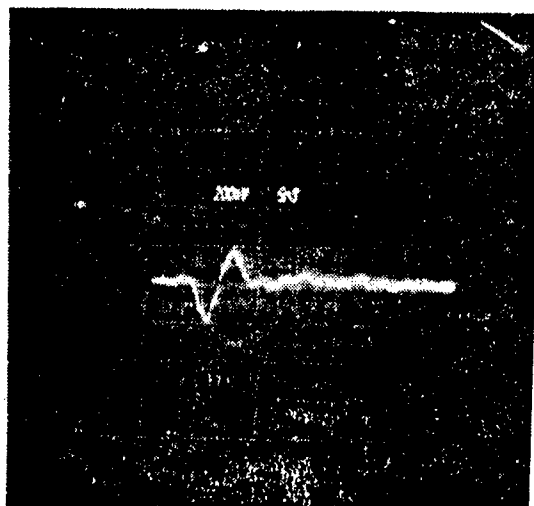
(b)

Figure 2.

III. Computer Analysis

Figure 3 shows the Blumlein equivalent circuit used in the computer analysis. We used the lumped parameter analysis in studying the π-network of the
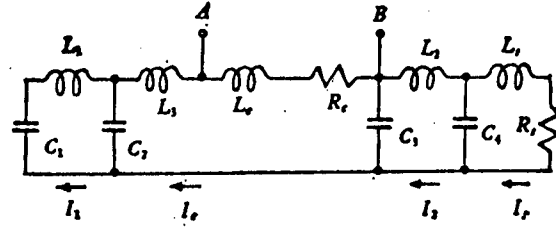
Figure 3. The Blumlein equivalent circuit. Point A and B are contacts for voltage and current measurements

transmission line. C_1, C_2, L_1 and C_3, C_4, L_2 are respectively the capacitance and inductance of the transmission lines at the two terminals of the Blumlein circuit. L_s and R_s are the inductance and resistance of the trigger spark gap, L_3 is the inductance of the electrode lead, L_c and R_c are the inductance and resistance between the discharge electrodes of the laser. The voltage waveforms are taken at the terminals A and B. We also compared with the results obtained from the distributed parameter calculation using as many as 10 π-networks. For normal operating conditions, the two methods gave essentially the same results. For the equivalent circuit in Figure 3, the loop circuit equations are

$$\frac{dq_1}{dt} = I_1, \tag{1}$$

$$\frac{dq_2}{dt} = I_c - I_1, \tag{2}$$

$$\frac{dq_3}{dt} = I_2 - I_c, \tag{3}$$

$$\frac{dq_4}{dt} = I_s - I_2, \tag{4}$$

$$L_1\frac{dI_1}{dt} + \frac{q_1}{c_1} - \frac{q_2}{c_2} = 0, \tag{5}$$

$$(L_3 + L_c)\frac{dI_c}{dt} + R_c I_c + \frac{q_2}{c_2} - \frac{q_3}{c_3} = 0, \tag{6}$$

$$L_2\frac{dI_2}{dt} + \frac{q_3}{c_3} - \frac{q_4}{c_4} = 0, \tag{7}$$

$$L_s\frac{dI_s}{dt} + R_s I_s + \frac{q_4}{c_4} = 0. \tag{8}$$

Under the high frequency and thin plate assumptions, the transmission line inductance may be calculated from the geometric dimension and the material property:

$$L = \frac{\mu_0}{l}\left[d - b + \frac{2}{m}\frac{\text{sh}x - \sin x}{\text{ch}x - \cos x}\right], \tag{9}$$

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where μ_0 is the magnetic permeability of vacuum, 1 is the width of the transmission line, b is the thickness of the copper foil, and d is the thickness of the dielectric medium. Both R_s and R_c are rapid functions of time. $(L_c + L_3)$ is the total cavity inductance and may be determined from the period of the current oscillation taken from an oscilloscope photo. Based on measured and calculated data, we have $L_1 = L_2 = 2.7 \times 10^{-9}$ H and $L_c \approx L_3/3$ in our experiments. R_s and L_s may be estimated from the voltage oscillation waveform.

The voltage waveform changes rapidly with time, especially during the few nanoseconds after the dielectric breakdown. Since the measurement device has a finite response time, estimated to be 2.5×10^{-3} sec (attributed to the photomultiplier, the filter and the oscilloscope), a correction must be made for the directly measured waveform. Figure 4 shows the measured waveform and the corrected true waveform for a charging voltage of 20 kV. The broken line is the voltage waveform trace taken from a Tektronix 7834 oscilloscope and the solid line is the corrected result using overlapping Lorentzians, the solid line is the true voltage pulse waveform of the laser medium. As can be seen, the correction is necessary. The correction is particularly needed at the instance after the discharge breakdown because the actual risetime is comparable to the equipment risetime and large error will be introduced without the correction.
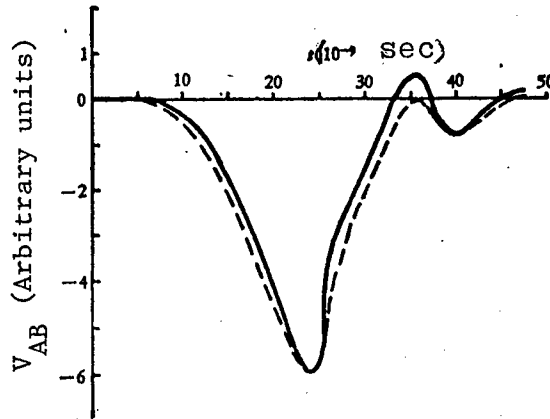
Figure 4. Voltage waveform. The broken line is the measured waveform at terminal A and B and the solid line is the result of overlapping transformation. The charging voltage is 20 kV.

IV. Results and Discussion

The voltage at the two ends of the laser discharge plasma is given by

$$V_{AB} = L_e \frac{dI_e}{dt} + R_e I_e, \tag{10}$$

where the first term is due to the induction between the discharge electrodes and the second term is caused by the resistance of the dielectric. The first

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term is important only immediately after the breakdown and dI_c/dt is large. Calculation shows that this effect is negligible in the present setup and the impedance of the laser medium may be approximately regarded as pure resistive.

Figure 5(a) shows the measured and calculated voltage waveforms. The dynamic impedance of the plasma was obtained from the measured voltage and current pulse shape and from computer analysis. Figure 5(b) shows the measured and calculated current waveform and Figure 5(c) shows the energy deposited in the laser medium by the discharge. Figure 6 is the dynamic impedance used in the analysis.
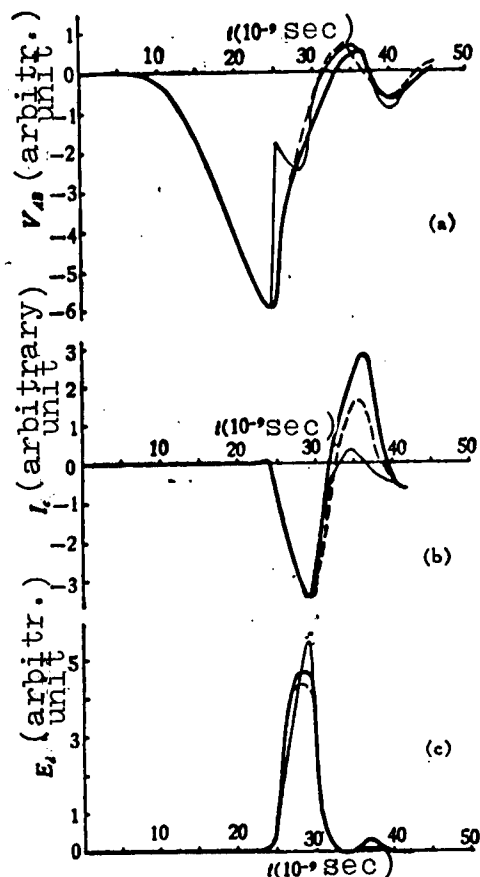
Figure 5. The thick solid line is the measured waveform, the thin solid line is the calculated result using the impedance at peak current as the average impedance, and the broken line is the calculated result using the time dependent impedance.

When the potential between electrodes E1 and E2 rises to about 18 kV (E2 is still at a high voltage of 2 kV relative to ground), the breakdown begins. In the first 2 ns the voltage between E1 and E2 drops by about 8 kV. The discharge quickly spreads and the maximum current of 4 kA is reached at 4.5 ns and the impedance drops to only 2 ohms. As the discharge continues, the current drops to zero at 7.5 ns or so, and further drops to below 1 ohm.
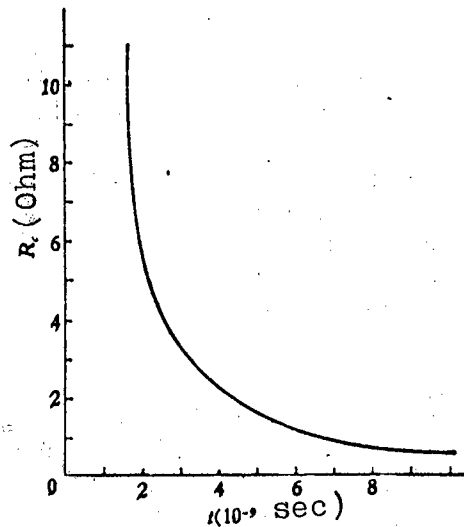
Figure 6.

As can be seen from Figures 5(a) and 5(b), the experimental results agreed
well with the results calculated from the time dependent impedance. Figure
5(c) shows that in the first 7.5 ns most of the energy available are deposit-
ed into the laser medium and little energy is deposited later. Even though
the approximation of taking the impedance at peak current as the average
impedance does not give good agreement between the measured and the calcu-
lated voltage and current waveforms, the approximation is adequate for the
energy deposit. This is because right after the breakdown the sudden change
in the average impedance causes a rapid drop in voltage but the decrease in
energy deposit is small since the current is small at this time. When the
current reaches its peak, the average impedance is approximately equal to the
actual impedance. After the peaking of the current, the average impedance
is slightly greater than the actual impedance and the rate of the voltage
drop is decreased, the result is that the energy deposit is somewhat over-
estimated. Consider the two effects, taking the impedance at the peak cur-
rent to be the average impedance is a good approximation.

Figure 7 shows that when the charging voltage is increased from 10 kV to
20 kV, the peak current increases from 1 kA to 4 kA and the average impedance
of the plasma decreases from 8 ohm to 2 ohm. At a higher charging voltage,
the rate of the impedance drop of the plasma is smaller. As shown in Figure 8,
a 1.4 percent laser output efficiency can be obtained when the charging voltage
exceeds 15 kV and the deposited energy exceeds 75 mJ. The efficiency of stor-
ing energy into the capacitor, in contrast, is only 0.7 percent and about 50
percent of the available energy is deposited into the plasma.

As can be seen from Figure 9, when the gas pressure is increased from 3 atm
to 8 atm, the peak current drops from 3 kA to 1.5 kA and the average impedance
increases from 2.5 ohm to 9 ohm. For the same charging voltage, the impedance
of the plasma increases rapidly as the gas pressure increases. This causes
a rapid increase of the energy deposited into the plasma but unfortunately
cancelled by the greatly reduced discharge intensity. Over the wide range of

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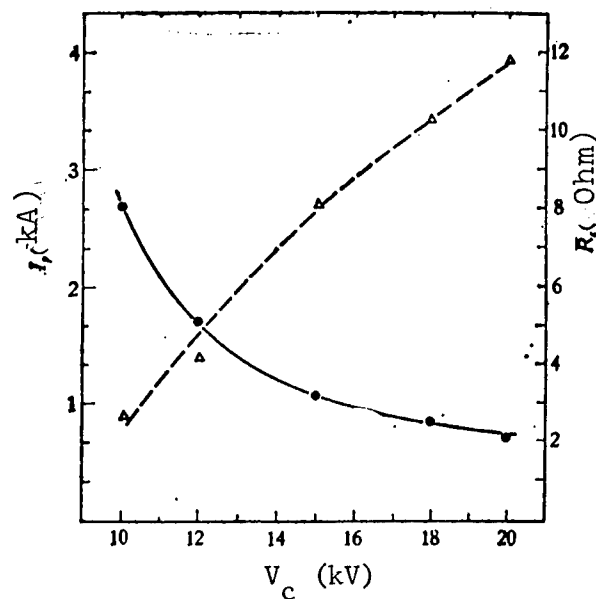
Figure 7. The solid line is the average impedance R as a function of the
charging voltage V_c. The broken line is the peak discharge
current I_c as a function of the charging voltage V_c. The gas
pressure is 5 atm and the gas composition is He:0.25%HCl:0.5%Xe.
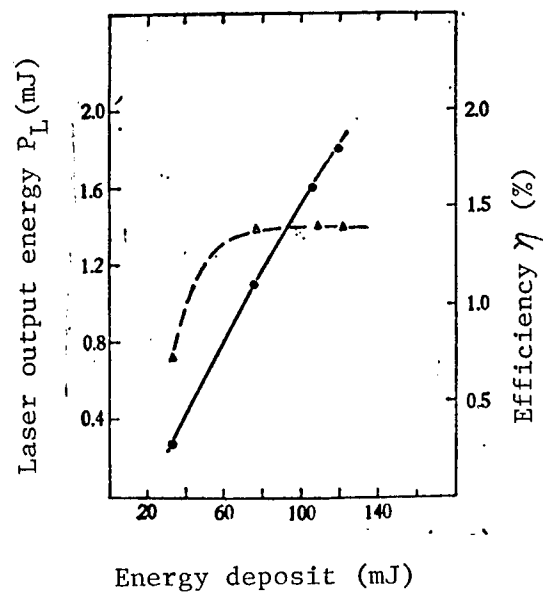
Figure 8. Relationship between the laser output and the energy deposit.
The broken line is the laser output efficiency with respect to
the deposited energy.

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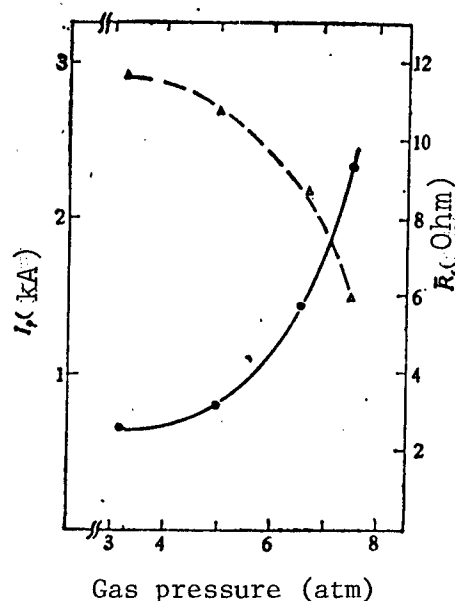
Gas pressure (atm)

Figure 9. The solid line is the average impedance as a function of the gas pressure and the broken line is the peak current I_p as a function of the gas pressure.
The charging voltage is 15 kV and the gas composition is He:0.25%HCl:0.5%Xe.

3 to 8 atm, the variation of the energy deposit of the laser medium is not great. The optimum value is reached between 5 and 6 atm. This is in agreement with the directly measured laser output.

No obvious reflected waves are observed in the measured voltage and current waveforms. The transmission line impedance may be estimated using the following formula:

$$Z_t = 377d/lk^{\frac{1}{2}}, \qquad\qquad (11)$$

where k is the dielectric constant. The calculation impedance of our setup is 1.6 ohm. During discharge, the impedance of the plasma decreases from several tens of kiloohms to less than 1 ohm in 10^{-8} seconds. This is a very rapid change. In addition, the average impedance changes over a wide range when the operating parameters (gas pressure and charging voltage) change. It is practically impossible to match the impedance of the plasma with that of the transmission line accurately.

V. Conclusions

1. We have developed a measurement technique for the current pulse waveform and successfully applied a newly developed electro-optical voltage pulse waveform monitoring device to the measurement of high-pressure, fast-discharge plasma.

2. We have made numerical calculation and computer analysis of the Blumlein excimer laser fast discharge circuit and obtained good agreement with the experiment.

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3. For the first time we have obtained the time dependent impedance characteristics of a fast-discharge (10^{-9} sec) laser plasma and studied its dependence on the operating parameters. Contrary to earlier belief[5], it is difficult to match the impedance of a transmission line to that of a discharge plasma accurately in a real device.

To further improve the discharge characteristics of a device, efforts should be made to improve the preionization technique, the switching method, and to choose the optimum discharge circuit parameters. The experimental method and the computer analysis presented here should be very helpful in achieving this goal.

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APPLIED SCIENCES

PREDISCHARGE PARAMETERS OF SF_6-CO_2 DETERMINED BY LASER

[Article by Li Zhengying [2621 2973 3467] of Huazhong University for Science and Technology, Wuhan: "A Laser Pulse Method for Determination of Electron Swarm Parameters in SF_6-CO_2"]

[Text] Abstract

Described in detail in this paper is a useful method which can be used to study avalanches in electronegative gases and then to determine electron swarm parameters (ionization coefficient a, adsorption coefficient η, and drift velocity v) including the number and distribution of primary electrons released from the cathode of a parallel electrode configuration by high energy laser pulses. The method has been used to study predischarge parameters in mixtures of SF_6 and CO_2. Relations between the parameters (a/P, η/P and v) and E/P (E is electric field, P is gas pressure) are given. A number above 10^8 of primary electrons has been obtained. The paper also described the measurement system used in the study and improvements of the system that can be made.

I. Introduction

With its superior insulation characteristics, SF_6 has been widely used in electrical appliances such as SF_6 filled combination circuits, SF_6 filled cables and SF_6 switches. Recently in an effort to reduce the cost and improve some discharge characteristics of SF_6 devices, the study of gas mixtures of SF_6 and common gases such as N_2 and CO_2 has become an important research topic and a great deal of work has been done[1-4]. However, to the author's knowledge, the ionization coefficient, adsorption coefficient, ion and electron velocity and ionic and electronic currents of SF_6-CO_2 have not been measured.

Traditionally the determination of predischarge parameters of gases (especially electronegative gases) has been made mostly with the Townsend method[3,4]. In this method, the predischarge parameters are determined by the so-called

curve matching method, that is, the parameters in the Townsend equation are adjusted to match the experimental log I versus d curve (here I is the discharge current and d is the uniform gap distance). The drawback of this method is that a large number of iterations are required for each set of experimental data to achieve the desired accuracy and involves extensive computation. Also, the Townsend method does not specifically address the development process of the discharge and cannot distinguish the behavior of the electrons, positive ions and negative ions in the discharge.

The development and application of high energy pulsed lasers in recent years have provided the study of gas discharge with a powerful tool[5,6]. Using the laser method, the predischarge parameters may be computed from the recorded waveform. In this article, a detailed analysis is given for the laser method and the predischarge parameters of SF_6-CO_2 are determined by the laser pulse method.

II. Experimental Apparatus and Method

The experimental apparatus consists of a stainless steel vacuum chamber and the associated components, as shown in Figure 1. A pair of aluminum electrodes 20 cm in diameter and having Rogowsky cross-sections are installed in the vacuum chamber. The upper electrode (the cathode) is fixed on the inner guide tube of an insulated sleeve tube, the center of the electrode has a 4 cm diameter quartz window. The contact surface of the quartz with the aluminum electrode is polished and has 100 Å of evaporated gold film. The lower electrode is attached onto an adjustable platform. The separation between the electrodes can be adjusted between 1 mm and 40 mm.

The cathode voltage is supplied by a highly regulated DC high voltage generator. The waveform of the predischarge current is recorded with a Tektronix 446 oscilloscope. The laser is an excimer laser with a wavelength of 308 nm, an output pulse power of 20 MW and a pulse width of 20 ns. The laser pulse shape is recorded with a electrooptic amplifier and oscilloscope.

The vacuum chamber is evaluated to 3 μTorr before it is filled with the gas to be studied. The gas is introduced slowly in the beginning and the chamber is finally filled with enough gas to the desired pressure. The chamber is then sealed off and the gases are left in the chamber to mix for at least 15 hours before the measurement. The pressure is measured with a pressure sensor with a digital display. In our experiment the pressure is varied between 5 and 100 Torr and the error in pressure measurement is less than 0.5 percent. The purity of SF_6 is 99.99 percent and the purity of CO_2 is 99.95 percent.

In order to avoid the effect of one discharge on the next discharge, the time interval between discharge is set at 5 minutes. To avoid the interference by the discharge in the laser, the entire system is installed in a copper shielded room. Pulse generator and fiber optics are used for the synchronization control between the laser system, the discharge gap and the measurement system to reduce the interference by the measurement system to a minimum.
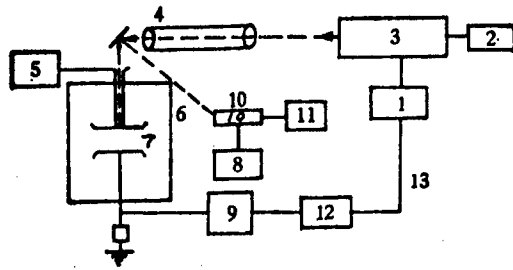
Figure 1. Experimental setup

1. Laser synchronizer
2. High voltage power supply of laser
3. Excimer laser
4. Focusing lenses and reflector
5. DC high voltage power supply
6. Vacuum chamber
7. Electrodes
8,9. Oscilloscope
10. Photomultiplier
11. Power supply for photomultiplier
12. Electrooptic pulse generator
13. Fiber optics

In our experiment the E/P (electric field strength/gas pressure) is varied between 80 and 150 $V \cdot cm^{-1} \cdot Torr^{-1}$.

III. Determination of Discharge Parameters

In a uniform electric field the current caused by the motion of the charged particles in an electronegative gas can be described by the following equations:

1) Electron current

$$I_-(t) = \frac{n_0 e_0}{T_-} \exp[(\alpha - \eta)v_- t] \quad \text{when } 0 \leqslant t \leqslant T_-, \tag{1}$$

$$I_-(t) = 0 \qquad \text{when: } > T_-; \tag{2}$$

2) Negative ion current

$$I_n(t) = \frac{n_0 e_0}{T_n} \frac{\eta}{(\alpha - \eta)} \{\exp[(\alpha - \eta)v_- t] - 1\} \quad \text{when } 0 \leqslant t \leqslant T_-, \tag{3}$$

$$I_n(t) = \frac{n_0 e_0}{T_n} \frac{\eta}{(\alpha - \eta)} \{\exp[(\alpha - \eta)(d - v_n t)] - 1\}$$
$$\text{when } T_- < t \leqslant T_n + T_-; \tag{4}$$

3) Positive ion current

$$I_+(t) = \frac{n_0 e_0}{T_+} \frac{\alpha}{(\alpha - \eta)} \{\exp[(\alpha - \eta)v_- t] - 1\} \quad \text{when } 0 \leqslant t \leqslant T_-, \tag{5}$$

$$I_+(t) = \frac{n_0 e_0}{T_+} \frac{\alpha}{(\alpha - \eta)} \{\exp[(\alpha - \eta)d] - \exp[(\alpha - \eta)v_+ t]\}$$
$$\text{when } T_- < t \leqslant T_+ + T_-. \tag{6}$$

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Here v_-, v_n, and v_+ are respectively the drift velocity of the electron, the negative ion and the positive ion; T_-, T_n, and T_+ are the corresponding drift time; d is the electrode separation; n_0 is the number of electrons at $t = 0$ and e is the electronic charge. The above equations are valid for any values of α and η. Figure 2 shows the current waveforms for $\alpha > \eta$, $\alpha = \eta$ and $\alpha < \eta$.
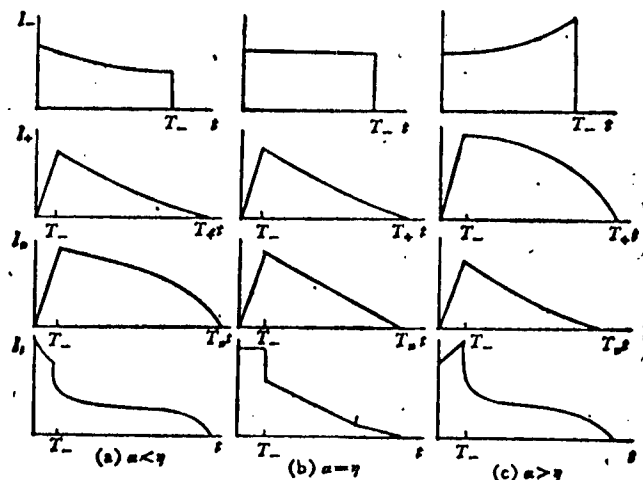
Figure 2. Current waveforms of electrons and ions when n_0 is a delta function $\delta(t)$.

From a practical point of view we are mostly interested in the E/P value when $\alpha > \eta$ because at lower values of E/P there would be no breakdown of the electronegative gas and its mixtures.

The n_0 in the above equations is actually not a delta function $\delta(t)$, that is, the n_0 primary electrons are not emitted by the cathode at the same instance of $t = 0$. For the laser wavelength used in our experiment, the distribution of the primary electrons may be represented by the laser pulse waveform. This is verified by the electron current waveform given below. The actual electronic current waveform for $\alpha > \eta$ is therefore like the curve in Figure 3.
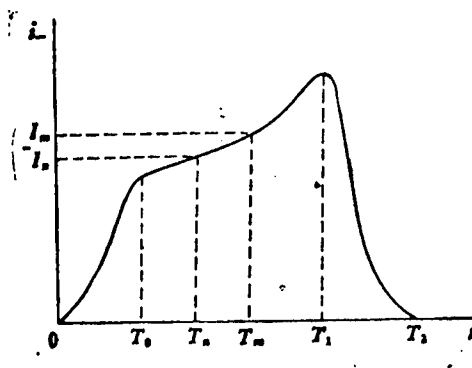
Figure 3. Electronic current waveform
$(\alpha > \eta)$

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When the primary electrons are generated with a high energy laser pulse, both the laser pulse waveform and the number and distribution of the primary electrons can be measured. The predischarge parameters can then be determined from the electronic current and ionic current waveforms.

1. Determination of v_-

From Figure 3, we have

$$v_- = d/(T_1 - T_0) = d/T_1,$$

where d is the discharge gap distance.

2. Determination of the effective ionization coefficient $\alpha - \eta$

Again from Figure 3, we have

$$(\alpha - \eta) = \ln(I_m/I_n)/(T_m - T_n),$$

where I_m and I_n are respectively the electronic currents at time T_m and T_n. To get an accurate $(\alpha - \eta)$, a number of points may be computed on the curve and the values are then averaged.

3. Determination of the primary electronic current waveform and number

Figure 3 shows that the primary electrons are distributed between 0 and T_0. An integration of this part of the curve gives the charge and hence the number of electrons.

Dividing the 0 and T_0 interval into n equal parts, we have currents i_1, i_2 ....., i_n, and

$$i_1 = I_1,$$
$$i_2 = I_2 - I_1 \exp(\alpha - \eta) v_- \Delta T,$$
$$\vdots$$
$$i_n = I_n - I_{(n-1)} \exp(\alpha - \eta) \Delta T,$$

where I_1, I_2, ..., I_n are the corresponding currents and ΔT is the step size, generally taken to be $\Delta T = 1n$ s. The primary electron distribution can then be obtained. Experimental results (see oscillograms) show that the electronic distribution is very similar to the laser pulse shape and there is no thermionic emission at the wavelength we used. The total number of primary electrons is 3×10^8, as computed from our data.

4. Determination of α and η

First we must determine whether T_+ and T_n (or v_+ and v_n) are equal. The total ionic current $I_t = I_+ + I_n$ (when $t > T_-$) can be obtained experimentally and its waveform is shown in Figure 4.

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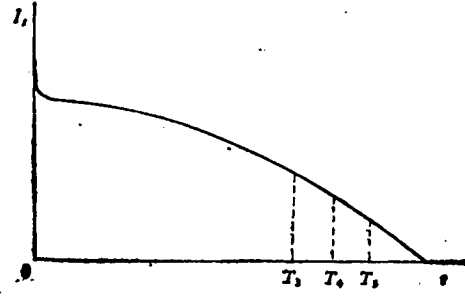
Figure 4. Ionic current waveform

Let

$$I_t = \frac{n_0 e_0}{T_+} \frac{\alpha}{(\alpha - \eta)} \{\exp[(\alpha - \eta)d] - \exp[(\alpha - \eta)v_+t]\}$$

$$+ \frac{n_0 e_0}{T_n} \frac{\eta}{(\alpha - \eta)} \{\exp[(\alpha - \eta)(d - v_nt)] - 1\}$$

$$= M_t\alpha + N_t\eta \qquad\qquad \text{when} \quad t > T_-,$$

where

$$M_t = \frac{n_0 e_0}{T_+(\alpha - \eta)} \{\exp[(\alpha - \eta)d] - \exp[(\alpha - \eta)v_+t]\},$$

$$N_t = \frac{n_0 e_0}{T_n(\alpha - \eta)} \{\exp[(\alpha - \eta)(d - v_nt)] - 1\}.$$

On the waveform of I_t we first assume $T_+ = T_n$, then,

$$I_3 = M_3\alpha_3 + N_3\eta_3,$$
$$I_4 = M_4\alpha_4 + N_4\eta_4,$$
$$I_5 = M_5\alpha_5 + N_5\eta_5.$$

Together with the $\alpha - \eta$ obtained earlier, we have α_3, α_4 and α_5 (and hence η_3, η_4 and η_5). If we find $\alpha_3 = \alpha_4 = \alpha_5$, then the original assumption $T_+ = T_n$ is correct. Otherwise, we assume $T_+ > T_n$ (or $T_+ < T_n$) and repeat the above calculation until α and η have the same values at the various points. This indicates that the last part of the ionic current waveform in Fig. 4 is represented by Eq.(6) or Eq.(4). Thus α (and η) and other parameters are determined. This calculation may be done on the computer.

Using this method, we studied the SF_6-CO_2 mixture. The electronic current and the ionic current at different E/P are shown in Figure 5, together with the laser pulse shape. Figure 6 shows the E/P dependence of α/P, η/P, and $(\alpha - \eta)$/P. In pure SF_6 and pure CO_2, the α/P, η/P and v_- values are in good agreement with the results in the literature[8-11].

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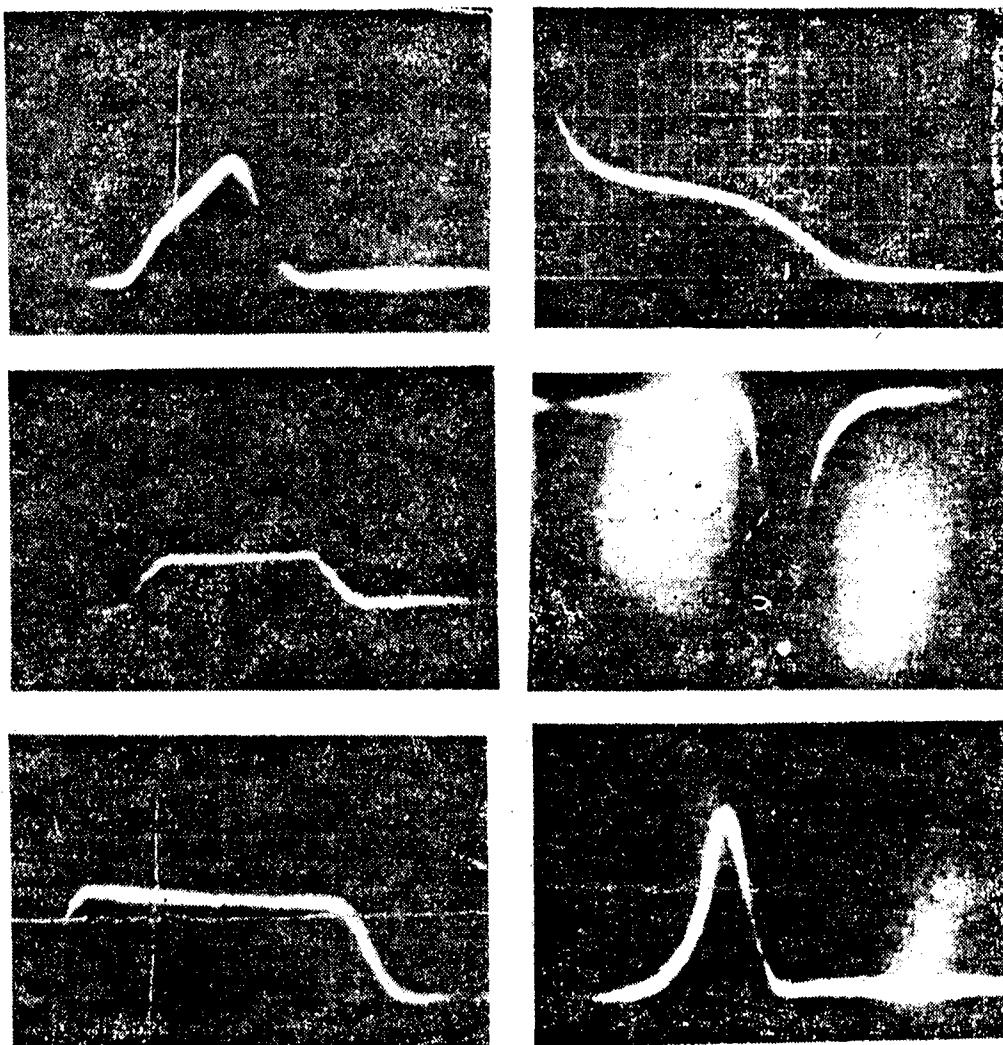
Figure 5. Oscillograms of the electronic current, ionic current, laser pulse shape and primary electron current in 50% SF_6 + 50% CO_2

(a) Electronic current, $\alpha > \eta$, E/P = $103V \cdot cm^{-1} \cdot Torr^{-1}$, Abscissa 20 ns/div, Ordinate 20 μA/div;

(b) Electronic current, $\alpha = \eta$, E/P = $94V \cdot cm^{-1} \cdot Torr^{-1}$, Abscissa 20 ns/div, Ordinate 20 μA/div;

(c) Electronic current, $\alpha < \eta$, E/P = $78V \cdot cm^{-1} \cdot Torr^{-1}$, Abscissa 20 ns/div, Ordinate 20 μA/div;

(d) Ionic current, $\alpha > \eta$, E/P = $103V \cdot cm^{-1} \cdot Torr^{-1}$, Abscissa 10 μs/div, Ordinate 0.5 μA/div;

(e) Laser pulse shape, Abscissa 20 ns/div, Ordinate 5 μA/div;

(f) Primary electronic current waveform, Abscissa 20 ns/div, Ordinate 5 μA/div.

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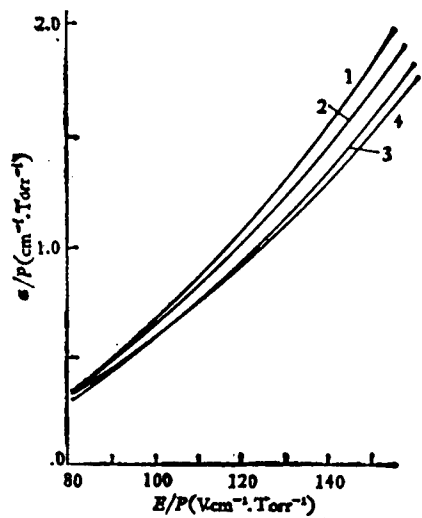
(a) 1 ⁓ SF$_6$; 2 ⁓ 50%SF$_6$ + 50%CO$_2$;
    3 ⁓ 10%SF$_6$ + 90%CO$_2$;4 ⁓ CO$_2$
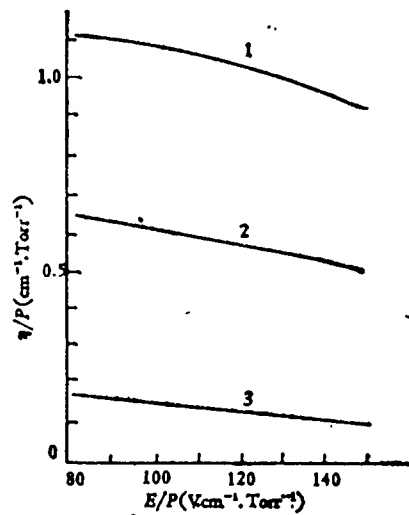
(b) 1 ⁓ SF$_6$; 2 ⁓ 50%SF$_6$ + 50%CO$_2$;
    3 ⁓ 10%SF$_6$ + 90%CO$_2$
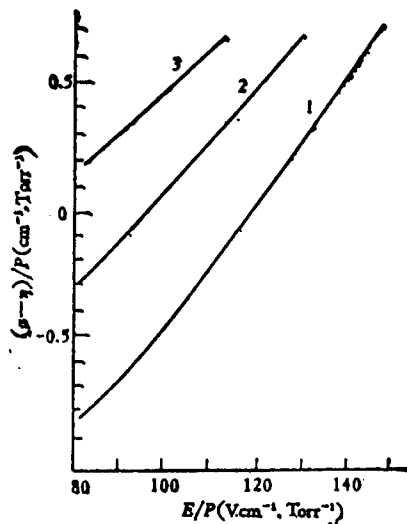
(c) 1 ⁓ SF$_6$; 2 ⁓ 50%SF$_6$ + 50%CO$_2$;
    3 ⁓ 10%SF$_6$ + 90%CO$_2$
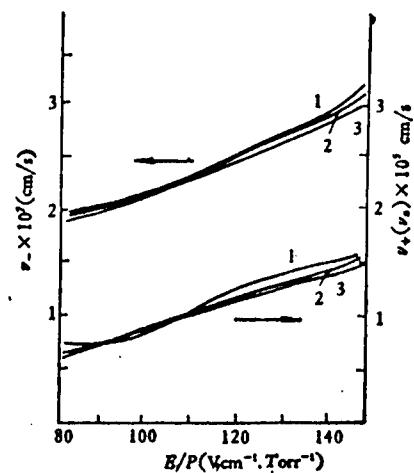
(d) 1 ⁓ SF$_6$; 2 ⁓ 50%SF$_6$ + 50%CO$_2$;
    3 ⁓ CO$_2$

Figure 6. Predischarge parameters of SF$_6$ + CO$_2$

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IV. Design of the Measurement Loop

The predischarge process of a pair of parallel plate electrodes may be represented by the loop in Figure 7. Thus, we have

$$V_0 - Z_m \left(\frac{C_0}{C_0 + C_g} \right) i_g - \frac{Z_m C_0 C_g}{C_0 + C_g} \cdot \frac{dV_0}{dt}.$$

When $0 \leqslant t \leqslant T_-$,

$$i_g - \frac{n_0 e_0}{T_-} \exp[(\alpha - \eta)v_- t] - \frac{n_0 e_0}{T_-} e^{ct},$$

and

$$\frac{dV_0}{dt} + a V_0 - b e^{ct} - \frac{i_g}{C_g},$$

where

$$a - \frac{C_0 + C_g}{Z_m C_0 C_g}, \quad b - \frac{n_0 e_0}{T_- C_g}, \quad C - (\alpha - \eta)v_-.$$

Hence,

$$V_0 - \frac{b}{a + c}[\exp(Ct) - \exp(-at)],$$

$$i - V_0/Z_m - i_g/[1 + Z_m C_g(\alpha - \eta)v_-].$$

Let $i = \sigma i_g$, then $\sigma - 1/[1 + Z_m C_g(\alpha - \eta)v_-]$.
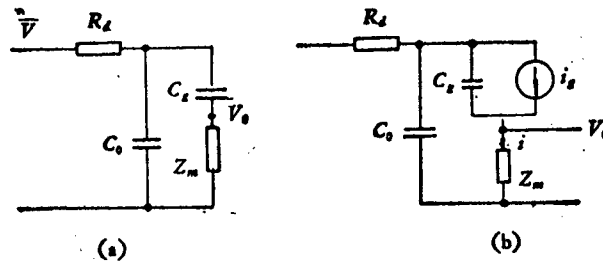
Figure 7. Equivalent circuit of the electrode measurement circuit loop

As can be seen, Z_m and C_g should be as small as possible. However, the signal will be too small to measure when Z_m is too small. The only practical approach is therefore to reduce C_g.

Based on the above analysis and taking into account the electrode structure and the size of the laser beam, we used the electrode measurement system in Figure 8 with $C_0 = 43$ pF, $C_g = 1.5$ pF, and $Z_m = 50 \, \Omega$. Using this circuit, the signal voltage is far greater than the circuit in Figure 7(a) used previously.

V. Conclusions

The method of generating primary electrons with a high energy laser pulse in the study of the predischarge process in SF_6 gas mixtures is very useful. It can accurately determine the predischarge parameters as well as the number

Laser beam
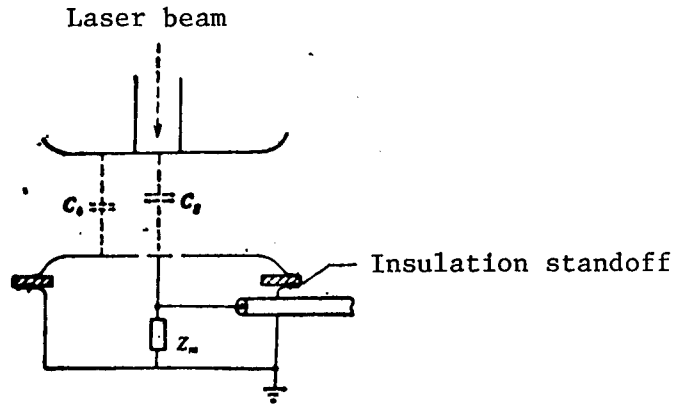
Figure 8. Actually used electrode measurement system

and distribution of primary electrons. This is a major step forward in the study of predischarge in gas mixtures. Using a 20 MW 20 ns pulsed excimer laser and gold plated electrodes, we obtained at least 3×10^8 primary electrons. The predischarge parameters of SF_6 + CO_2 are accurately determined using the laser pulse method and the results in pure SF_6 and in pure CO_2 agreed very well with those in the literature.

The measurement circuit used in this work has worked well. The electrode capacitance was made as small as possible in order to obtain a larger signal voltage. No amplifiers were used before the oscilloscope.

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APPLIED SCIENCES

USE OF COMPUTER-AIDED DESIGN IN LARGE-COMPUTER DEVELOPMENT DESCRIBED

[Article by Liu Shenquan [0491 1957 5425] and Gu Yuan [7357 0337], Institute of Computer Technology, CAS: "Use of Computer Aided Design in the Development of a Large Computer"]

[Text] ABSTRACT. This article describes the use of computer aided design by the Research Institute of Computer Technology, CAS, in developing a large computer.

1. Introduction

The Institute of Computer Technology, CAS, first used computer-aided design (CAD) in 1975 during the development of the 013 computer. At that time, it implemented a system for developing malfunction test codes for circuit cards and an automatic card wiring layout system on the 111 computer. The successful use of automatic card testing greatly speeded the development of the 013 machine. Some successful tests of the automatic card wiring layout technique were made; but because of the late availability of the SK-3 photographic pattern drawing machine it was not possible to use automatic wiring layout in the development process itself. The institute began to make comprehensive use of CAD technology in 1978 for the development of a large computer.

This machine was a large high-speed pipelined vector processor with extremely complicated logic. It was assembled from small-scale integration [SSI] and some medium-scale integration [MSI] circuitry using ECL [emitter-coupled logic]; the cards and boards were multilayered. There was one mainframe and one peripheral unit. The central vector processing unit in the mainframe used more than 40,000 modules, nearly 1,000 cards and more than 100 printed circuit boards. The logic design, engineering design and assembly all involved an extremely great amount of work; if CAD technology had not been used, a great deal of manpower would have been required, and the development period for the machine would have been longer. In addition, some processes and the circuit board layout could not have met design requirements if manual layout and photography had been used, because of the large size of the boards and the stringent precision requirements. Therefore, CAD is now not merely necessary, but essential, in the development of large computers.

In the system design stage we performed system simulation and analysis of the new computer's CPU on the 111 machine, proving useful figures and other design data. In the logic design stage, we used a register logic simulation system implemented on the 111 computer to test the correctness of the operations table. A gate logic simulation system implemented on the 013 computer was used to check the correctness of logic design. Logic simulation is actually equivalent to debugging the computer before hardware assembly, since it catches logic errors in advance. In the engineering design stage, the wiring of all cards and circuit boards was laid out by automated card and circuit board wiring layout systems implemented on the 013 machine. These two systems performed automated wiring of nearly 500 cards and 136 boards for the mainframe and peripheral unit. A card test code development system implemented on the 111 machine produced the test codes for automated card testing, after which the testing itself was performed on an SK-1 computer. We also developed a specialized module testing language and a core plane testing program, enabling the testing of modules and core planes to be controlled automatically by a computer. A circuit analysis system implemented on the 111 computer analyzed certain circuits developed by our institute for the new large-size computer, achieving excellent results.

Below we briefly describe the various computer-aided design techniques and systems.

2. System Simulation

In the system design stage, system simulation of the central processor (CPU) was performed on the 111 computer. The object of the simulation was to test the characteristics of all parts of the computer system, such as the effect on system speed, cost and reliability of the number of look-ahead fetch and look-behind transfer stations, the mode of operation and capacity of the instruction stack station, the number of registers, the length of the memory access cycle and the number of instruction buffers. In the simulation we focused primarily on their effect on speed; we made speed the yardstick for the system and used extensive simulation to determine the formula relationships between various characteristics and the speed of the computer. This provided basic data for the computer designers to use in their selection of a design approach. The computer simulation can be divided into four steps:

(a) For ease in implementing the simulation on the 111 computer, we combined instructions for similar operations and simplified the operand addresses within instructions, thus producing a simplified instruction set which yielded a simplified CPU model. This simplified instruction set was still close to the actual one.

(b) We used the simplified instruction set to write a series of typical arithmetic computation programs. In particular, we wrote a program for principal element elimination and a square root program as input data for the entire simulation system; this was called the analyzed program.

(c) We simulated the operation of the computer, expanding the analyzed program into an instruction stream and an address stream (called the analysis program) to be used as simulation input data.

(d) By means of the above simplifications we arrived at a simple instruction set and a simple operation table for each instruction, specified the characteristics and mode of operation of each element in the simplified model, defined the output format, and wrote a simplified CPU simulation program.

Our principal element elimination program produced a data tape with nearly a million instructions. Using this instruction tape as the simulation program input, we carried out system simulation of the CPU. Analyzing a single characteristic on the 111 computer took more than an hour. If it had been possible to add a convenient simulation language, the simulation time would have been considerably shortened.

3. The Register Logic Simulation System [1]

A register logic simulation system implemented on the 111 computer helped the logic design personnel check the correctness of their operation tables before hardware implementation, to test all instructions and the actual execution speed of certain instructions, to work out the correlations of parallel and overlapping operations, and thus to refine all figures needed for hardware design.

In order to perform register-logic simulation of the digital system, we used the JLY-111 register logic design language to describe the objects being modeled. This language resembles a high-level programming language. Clock generators, flip-flops, registers, arithmetic-logical units [ALU's] and memory are the basic logic elements and are defined by statements. For example, the register statement

$$§JC.C1, C2, J[48], L[48],$$
$$JZ(32)=O[6] T[2] F[2] B[4] D[18]$$

defines two flip-flops designated C1 and C2, two 48-bit registers designated J and L, and a 32-bit register composed of subregisters O, T, F, B and D and designated JZ. The register statement

$$§CC BC(64*23, 1, XBC, Jbcd, Jbh)$$

defines a register designated BC with a total of 64 elements, each of 23 bits, with a read-write cycle requiring one clock period, a read-write flag XBC, an address register Jbcd and a code register Jbh.

The interconnections and interactions of the devices thus defined were described by descriptive statements. The descriptive statements included transmit statements, receive statements, count statements, clear statements, initiate statements, boolean formulas, logic formulas and the like. Use of the descriptive language to establish the relationship between various devices in terms of the instruction set is equivalent to setting up the operations table and formulas in logic design. The computer description program written in the register logic design language defined a computer, a "soft machine" developed by us.

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The simulation system had two main components. The first was the translator
program. This program translates the explanations and statements in the
descriptive model written by the designer (i.e., the source program) into
machine language instructions or macroinstructions (the object program). The
second part is the simulation execution program, which consists of the simula-
tion control program and certain standard subroutines. In logic simulation,
the object program which expresses the "soft machine" is executed under the
control of the simulation control program. The simulation also requires de-
bugging programs. These are entered into the computer in an input language
and function as the initial input for the simulation. The simulation results
are output in an output language.

When the register logic simulation system was put into operation in the
institute's large computer design project, it quickly helped the designers to
find some errors. These included more than 20 errors in instruction control
and 8 errors in memory control of the mainframe and several errors in the
peripheral processor. This greatly shortened the machine debugging cycle.

4. The Gate Logic Simulation System [2, 3, 4]

A gate logic modeling system implemented on the 013 computer helped the logic
design personnel test the correctness of the logic diagrams. During the logic
simulation it was able to print out the waveforms created by the designers. It
analyzed and compared waveforms in order to assure correctness of the logic
design or to discover various types of logic errors such as overload, excessive
number of logical levels, phase errors and the like.

The logic network being simulated was described by a gate-level simulation
language. Gates and flip-flops were the basic components of the logical network,
and gate and flip-flop definitions in the simulation language were used for
definitions. For example, the gate description

$$\#MEH_3(X1, X2, X3)$$
$$T=1,$$
$$O=8,$$
$$I=1,$$
$$Z=X1+X2+X3$$

defines an AND gate H_3 with three inputs, a gate delay of 1, a maximum output
load of 8, and a power consumption of 1 at each output.

The interconnections of all components in the logic network were described by
statements in an interconnection language. For example, the interconnection
statement

$$Y_2(A, B) \Rightarrow X; \ Y_2(A, C) \Rightarrow Y$$
$$H_2(X, Y) \Rightarrow Z;$$

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is used to describe a logical network expressed by the equation $Z = AB + AC$.

The simulation language also contains loop statements, which are convenient for describing recurring components of logic circuits. Such components as adders, counters and other functional units can be described by process language statements. Output statements are used to specify the initial states of flip-flops or registers and the waveforms of external inputs. The output language is used to output the waveforms of designated signals.

Programs written in the simulation language on the basis of logic diagrams are called source programs. They are the initial data for logic simulation. The gate logic simulation system translates the source program into various tables and data signals suited to the simulation operations. The main tables and signals are: subroutines for computing states of various logic components, relational tables and load tables for relating various logic components, name tables, information required for external input signals and waveform processing and the like.

A table-driven method was used for simulation operations. Based on the information provided by the source program, the model calculates the output values of all logical components in the logic network in a discrete time sequence.

Because of limitations on the internal capacity of the 013 machine, we used the block simulation method in order to minimize the number of disk accesses. Its basic idea was division of the logic network into several blocks, each of which was simulated separately. All blocks which had not yet been simulated were entered on magnetic disks, and when needed were loaded into internal storage for simulation. Because of the division into blocks, each block had three types of signals: internal signals, true external signals, and virtual external signals. During each modeling period, the true external signals were specified in advance, the internal signals were calculated within each block, and the virtual external signals were calculated by adjoining blocks. We performed gate-level modeling of the ALU of the new large computer. This ALU included some 20,000 logic elements and about 12,300 modules. The testing program, consisting of 92 instructions, was the initial simulation input and was used to check the capabilities of all instructions and their continuity and overlap. We found more than 10 logic errors. This could be called a kind of advance debugging of the computer.

5. The Logic Partitioning Program System

A logic partitioning program system (LJHF) implemented on the 013 computer was used for partitioning the cards following logic design. It combines manual and automatic partitioning. The logic diagrams are described in a gate logic simulation language and are the input data for the system. Before automatic partitioning of the computer, the designer can design the logic components in groups according to their functions, making maximum use of human experience in partitioning. The machine partitioning algorithm method uses an initiating distribution algorithm and a branching limit algorithm.

The LJHF system consists of five subroutines:

input data processing;

storage of and operations with the functional group interconnection matrix;

allocation of functional groups;

iterative improvement of the allocation;

output of intermediate information and partitioning results.

This system was used to partition a logic diagram containing 200 gates in the course of development of our large computer. The partitioning resulted in seven completely identical cards (i.e., only one type of card). The module density was 95 percent. The gate-to-pin ratio was 4.0. This was a satisfactory result. There was so much input data that it was impossible to handle manually. But this experiment showed that automatic partitioning is feasible.

6. Automatic Wiring Layout on Printed Circuit Boards [5, 6]

The automatic wiring layout system for printed circuit boards consisted of two systems: 1) the automatic wiring layout system for multilayer cards (CJBX), and 2) the automatic wiring layout system for printed circuit boards. These two systems were both implemented on the 013 computer.

The interconnection data from the logic diagrams developed during engineering design are fed to the computer as input data for the system. The computer can then automatically lay out the wiring. The layout results can be output in diagram form or on punched tape. The diagrams are provided to design personnel for checking. The punched tape can be provided to the SK-3 (or SK-5) photographic pattern drawing unit for spot scanning, producing a photographic pattern for the printed circuit wiring. These patterns can be used directly for making printed circuit boards.

The automatic wiring layout system consists primarily of the pattern layout, line assignment, layer assignment, sequence determination, control, wiring and output sections. The pattern layout program forms information describing the characteristics of the board surface. The line assignment program uses the input connection information to make efficient line assignments and produces interconnection tables for use in wiring. The card layout program can also be used in automatic wiring layout; it uses the principal element iteration method to improve the initial manual layout of cards. The layer allocation program efficiently allocates the connection lines to the various wiring layers. The sequence program arranges the wiring sequence. The wiring program uses an improved Li algorithm and can utilize a two-dimensional or three-dimensional labyrinth process as needed.

The automatic wiring layout system incorporates experience with manual layout and uses efficient algorithms to achieve rather high layout efficiency. It has entirely replaced manual wiring layout and pattern application and has saved

large amounts of labor and time. A card measuring 175 x 278 mm with four layers of signal lines and about 500 connections can be completed in about 20 minutes of computation time, while manual layout would require 10 to 15 days; the computerized layout satisfies process requirements much better than manual layout. The method has already been used on 81 different card types for the peripheral unit of our large computer and 235 cards for the mainframe control systems, as well as cards for the ALU and external devices; the total amount of automated wiring has been nearly 500 boards, on more than 99 percent of which it was possible to lay out all of the required connections, while 1 percent required a small amount of added wiring. By revising the layout in these cases, it became possible to fit all of the connections onto the cards. The maximum number of connection lines was 910. The automatic wiring layout system for boards laid out the wiring for 136 large-size boards in our computer with an average complete-layout rate of more than 99.2 percent. The circuit board size was 318 x 234 mm; the boards had 318 leadout holes around their peripheries, and each board held 12 cards, each with 144 pins.

7. The Card Test Code Development System and Automatic Testing of Cards [7, 8, 9]

The card test code development system was implemented on the 111 computer. It developed the test codes for the cards. Two test code development systems were created. The system developed before 1978 used the boolean difference method; during development of the 013 computer, this system successfully solved the problem of automatic card testing. Later, the system was improved, enabling it to handle cards with 500 to 600 gates. It developed test codes for 315 peripheral unit cards of 72 different varieties, as well as for 30 different card types for the magnetic tape unit controller.

In 1977 a functional-circuit-level test code development system operating in terms of functional blocks and making use of the principal path sensitization method was implemented on the 111 computer. This system was 5 or 6 times as fast as the system using the boolean difference method and could handle cards with as many as 1,000 gates. It was used to produce test codes for 1,300 cards of 350 types for our large computer, giving good results. Combinational circuit cards accounted for about a third of the total, and sequential circuit cards for the other two-thirds.

The test codes produced on the 111 computer are output on punched tape and used as inputs for automatic card testing. The card testing unit is connected to the SK-1 minicomputer, which contains the card testing program. When a card is on the testing unit, the testing program processes the input data entered on paper tape, exchanges information with the testing unit, recovers the output results, performs fault diagnosis and prints out fault locations. The time required to test one card averages only 1 to 2 minutes; automatic testing is not only much faster than manual testing, but more reliable.

8. Data Conversion Program

The various systems which we used for computer-assisted design were largely self-contained, and no unified data base had been set up. In order to allow for data interchange between systems and to create a data base and file library

for computer development, we wrote a data conversion program for the 013 computer. This program provided input data to the automatic board wiring layout system and compiled interconnection tables and load tables for units ranging in size from boards to frames, thus greatly decreasing the engineer's work load and shortening the production time for our institute's large computer.

This program processes a computer's interconnection data in terms of hierarchical structure and produces a tree structure, as well as using index tables and sequence tables for file storage in the file library.

9. Module Testing Language

The module testing language (ZCY) is a specialized language implemented on the SK-1 (OR DJS-130) computer which was designed to test the characteristics of modules. A module testing program written in ZCY can test the static parameters of MSI and SSI circuits such as input, output, voltages, currents and the like in both TTL [transistor-transistor logic] and ECL form and can perform functional testing in the form of parameter tests.

The ZCY-BX compiling system has been implemented on the SK-1 for the module testing language. The test engineer writes a source program in ZCY language which describes the testing process, then uses the ZCY-BX compiler to translate it into a machine language object program on the SK-1 computer. The object program can be stored on punched tape or magnetic tape.

We also developed expandable program libraries and programs for automatic module testing. The module testing programs and automatic module characteristics testing programs are stored in the program library. To test a module, it is installed on the module test unit. Next the directory table and index table are loaded from magnetic tape and the program number for the module to be tested is found. Then the number of that program is entered on the control console of the module testing unit, after which the computer can execute the standard program, automatically perform testing and obtain the necessary test results. The SK-1 computer also has a data categorization program. The test data for each module and the categorized data can be output by a printer or recorded on magnetic tape for module selection and preparation.

Large numbers of modules were tested under computer control during development of the large computer.

10. Core Plane Testing Program

This program is used with the core plane test unit, an automatic testing device controlled by the SK-1 computer. The program includes various test and evaluation programs, including three all-zero checks and three all-1 checks, three worst-status checks, and three worst-status, worst-interference checks. The maximum test capacity is 190 K and there are 64 groups of sense lines. The unit can test at least six 36K core planes an hour.

The core plane test program is already in operation; it has been used on at least 2,000 core planes of 10 different types and has satisfied testing requirements.

11. The Computer-Aided Circuit Analysis System [10, 11, 12]

We have implemented three circuit analysis systems on the 111 computer, desig-
nated DFX-1, DFX-2 and DFX-MOS. The first two are used for bipolar transistor
circuit design and the third for MOS large-scale integrated circuit [LSI] design.

These systems all use an automatic circuit description language. This language
has more than 10 functional statements and more than 30 component statements and
can conveniently be used to describe such features as the composition, structure,
component characteristics, output requirements, analytical categories, and
operating conditions of linear circuits, it is easy for circuit design personnel
to master and use. The DFX-1 uses tabular outputs of node and branch voltages.
The DFX-2 and DFX-MOS not only give tabular outputs of branch and node voltages
and branch currents, but also can output time curves of these quantities.

The DFX-1 system uses an improved node method to implement the extended Newton-
Raphson formulas and can handle any grounded or floating voltage source. The
equations are solved by the Gauss-Jordan principal element elimination method
and use a transformation algorithm to correct the iteration results from the
extended Newton-Raphson method. This system can be used for DC analysis and
input-output analysis of linear and nonlinear circuits.

The DFX-2 and DFX-MOS systems also use the extended node method, the sparse
in-situ principal element elimination method with time-adaptive principal
element selection, a combinatorial algorithm and an automatic variable-step
variable-increment implicit numerical integration algorithm, and can handle
much larger-scale tasks at much higher iteration convergence rates. The scale
of the solutions has been expanded from fewer than 100 steps to more than 700.
The solution speed for the extended Newton-Raphson equations has been increased
by a factor of more than 300.

These systems have been used for analysis of a large number of circuits. Through
the use of computer analysis, our large computer's magnetic core sense amplifier
circuits, vector shift registers, double D flip-flops and the like had greatly
improved capabilities and much higher yields. The DFX-MOS system also provided
analytical data for the design of 4K, 8K and 16K MOS [metal-oxide-semiconductor]
circuits.

12. Conclusions

We made rather comprehensive use of computer-aided design in the development
of our large-size computer, which speeded up engineering design and debugging
of the complete machine. Labor was saved and engineering quality improved in
certain design steps. But this was only our first trial of the relatively
comprehensive use of CAD, and our CAD systems are not yet perfected. Our program
systems are all implemented on domestically produced computers. The fact that
their peripherals are of rather poor quality, lack magnetic disks or have magnetic
disks with small capacity and slow speed which are not yet interchangeable with
magnetic tape, that they lack plotters and graphic input devices, and in particu-
larly that they lack interactive systems, has caused some inconvenience in the

engineers' use of CAD systems. The various systems were implemented piecemeal on the 111 and 013 computers and lacked a unified data base. Although we created a data conversion program, this solved only a few specific problems. The design personnel have to expend a good deal of labor and time in data preparation. In addition, our system is written in assembly language and is different to transfer to other machines, so that it is hard to popularize it.

The computer-aided design projects described above were performed by our Laboratory No 3; it had the energetic cooperation and help of various brother organizations, such as our Laboratories Nos 1, 5, 6, 8 and 15, and vigorous support from the institute's leadership and the scientific and technical office. Comrade Zhao Renchang [6392 0088 2490] did a great deal of organizational work for the project. Comrades Zhang Xiu [1728 0208] and Wang Tingda [3076 8126 2192] of Laboratory No 1 gave us a great deal of assistance in matters of coordination.

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APPLIED SCIENCES

DIGITAL SIGNAL PROCESSING PROGRAM LIBRARY TO BE ISSUED ON DISK

Beijing WEIJISUANJI YINGYONG [MICROCOMPUTER APPLICATIONS] in Chinese No 2,
1983 p 37

[Article: "Digital Signal Processing Program Library on Magnetic Disk To Be
Issued"]

[Text] The Digital Signal Processing Program Library developed jointly by the
Northern Jiaotong University, Qinghua University, the Institute of
Acoustics (CAS), the Beijing Research Institute of Automation Technology and
the Nanjing Engineering Institute under the general leadership of the Signal
Processing Society, China Electronics and Instrumentation Society, has already
been inspected and approved. Its 28 programs include programs for the fast
Fourier transform, power spectrum estimation, fast convolution, linear predic-
tion analysis of speech signals, design and assembly of finite impulse response
and infinite impulse response digital filters, inverse spectrum analysis, inter-
polation, and extraction. The program library has been developed for CDOS and
CP/M disk operating systems and can be directly used on the CROMEMCO-III and
BCM-II microcomputers. The disk program library can save the user a great deal
of general-purpose programming work. It is furnished on five 8-inch diskettes;
prospective purchasers may write to Ma Xiulian [7456 4423 5571], Institute of
Signal Processing, Northern Communications University, Beijing.

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APPLIED SCIENCES

DJS142 MINICOMPUTER PASSES EVALUATION

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 1

[Article: "Chinese-Made High-End DJS142 Minicomputer Passes Evaluation"]

[Text] Jointly organized by the Electronic Computer Industry Bureau of the Ministry of Electronics Industry and Liaoning Provincial Bureau of Electronics Industry, an evaluation meeting was held in Jinzhou City to finalize and appraise the design of the DJS142 general-use digital computer. The research and development project for this model was highly commended by the participants who unanimously approved the technical evaluations.

The DJS142 was jointly designed by Qinghua University, Beijing Industrial University Campus No 2, and Jinzhou Computer Plant, and is currently the most powerful model among Chinese-made minicomputers. It has powerful capabilities, excellent reliability, and up to 0.5 MB memory. The magnetic disk subsystem is equipped with an intelligent controller, and can be adapted to a wide range of applications. At present, the model can be configured with floppy disks or from 5 MB, 10 MB, 20 MB to 192 MB hard disk storage; it can also be configured with Winchester disks as well.

The model was also successfully configured with exchangeable 1600 BPI phase-modulated magnetic tape drive and 800/1600 double density tape drive system.

The DJS142 also has a very rich library of software at its disposal. Its 6.60 version and 6.70 version operating systems support powerful interactive COBOL and business-orientated BASIC languages, thus adding excellent data processing features to the DJS100 series.

The designers of the DJS142 chose to develop their own unique hardware while adopting software components compatible with international top-end series models. Importance was attached to application development from the very beginning of the project. At the evaluation meeting, several application systems were assessed, including the DJS142 mainframe configured with large-scale high speed planar motor automatic plotting and graphic processing systems, remote sensing image processing system, network system, maritime meteorological information processing system, and multi-user educational and computing systems. These were domestically advanced level application systems well received by users.

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APPLIED SCIENCES

TQHY-1 CHINESE TELEGRAPH DECODER DEVELOPED

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 1

[Article: "Shanghai Develops Microcomputer-Based Chinese Character Telegraph Decoder"]

[Text] The Shanghai Computer Plant has developed a microcomputer-based decoder system which can automatically transcribe telegraphic codes into Chinese characters, and print out telegrams. It can be used as real-time decoder for telegraph terminals in provincial, municipal and county-level post and tele-communications offices, and can be adapted to shipping, railroad transportation, and other departments as well.

The TQHY-1 model decoder has a Z-80 microprocessor, 84 KB memory, and a Chinese character library containing 4,000 Chinese characters commonly used in telegrams. It can directly receive 50, 75 or 110 baud rate telegraphic signals, and print out Chinese words at the speed of 10 characters per second.

As compared with conventional Chinese telegraph decoders, this microcomputer-based decoder has the following advantages:

1. Compact desktop size with no special environmental requirements; can function normally in normal atmospheric temperatures of 0-40 degrees centigrade.

2. Excellent anti-interference capability; can be used in strong interference sites and outlying districts. On receiving telegraphic signals, it can filter out extra blanks, escape codes, carriage return codes and line feed codes, producing neatly and clearly typed telegrams. The decoding quality is excellent.

3. Can use roll paper which helps cut down operational costs.

4. Reduces manpower and work intensity. To receive 1,000 telegrams per day, a branch office needs 8-10 persons per shift; but with this type of decoder, it only needs 3-4 persons whose job is to handle proofreading instead of coding messages manually. Moreover, with this system, it takes less time for the telegrams to be cleared out of the post office, thus speeding up dispatch work.

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APPLIED SCIENCES

CHINESE LANGUAGE INFORMATION PROCESSING

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 3

[Article by Chen Shu [7115 6615] special correspondent: "Chinese Language Information Processing Is Key to Promoting Computer Applications in China"]

[Text] During the Sixth Five-Year Plan, it is important to unify the technical system, and start developing Chinese language processing and data base systems which are practical and can be popularized by the early 1990's. This was the central issue discussed at a national symposium organized by the Chinese Society of Chinese Language Information in Wuhan in late May.

Chinese language information processing involves the science and technique of inputting Chinese spoken and written language information into the computer for processing by means of pattern data entry. At present, attention is focused on finding ways of processing Chinese characters as it holds the key to the extensive use of computers for management applications in China.

In recent years, China has achieved relatively great progress in the research, development and production of Chinese language information processing systems. From qualitative description, the coding of Chinese characters has entered the stage of practical use in computer systems, making it possible to perform quantitative evaluation, thus creating conditions for combining the strong-points of various methods and systems, and selecting plans for developing different types of Chinese character input coding methods. Some 10 feasible Chinese language information processing systems and Chinese terminals have been completed, and are being put to use in enterprise management, business opera-tions (planning, personnel, finance, inventory control), window transactions (booking tickets, remittances, sales, registration, etc.), teaching aid, diagnostic aid, computer aided designing, census, ballot counting, and a variety of other applications. New results have been achieved in the current stage of development in such basic theories as word root, word frequency count, machine translation, Chinese character attributes, etc. There are indications of great prospects ahead for the entire research efforts on Chinese language information processing. Fast progress is also being made by the international community in Chinese language information processing. The only way for us to meet the needs of the times for Chinese language information processing is by stepping up our pace.

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APPLIED SCIENCES

STRUCTURED PROGRAMMING LANGUAGE DEVELOPED BY FUDAN UNIVERSITY

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 6

[Article: "JCY Language System Passes Evaluation"]

[Text] Developed by the Computer Department of Shanghai Fudan University, the "JCY language system" passed an official technical evaluation test recently organized by Shanghai's Bureau of Higher Education.

JCY is the abbreviation for "jiegou chengxusheji yuyan" [structured programming language]. It is an extended software developed on a 100 series computer. Absorbing advanced techniques and strongpoints of all kinds of programming languages developed by other countries, the developers organically combined the features of assembly language, high level languages, and operating system commands into one common programming language, thus achieving integration of machine-oriented and algorithm-oriented programming, establishing correspondence between source programs and object programs, and unifying program static structures and dynamic structures. The advantages of programming in JCY language are: well-defined structure, simple syntax, clearcut semantics, easy to read and easy to understand. The one scan method is employed by the compiler which is capable of compiling single statements individually. Some of the programs were tested on a NOVA 1200 computer for comparative study, and the results indicated that JCY surpassed RDOS-supported FORTRAN in compilation speed and object quality.

The JCY language system also provides excellent software environment. With JCY language, software development can be achieved with less time period and quicker results. The excellent software environment is also very suitable for teaching and learning software courses. On the basis of the JCY language, a "real-time JCY language" is now being developed for the first time in China through "Ziba" [self extrication] means.

The representatives at the evaluation session concluded that the JCY language system was of relatively good practical value and had reached national advanced level.

It is reported that in late July Fudan University's Computer Science Department and Anwei Normal University's Mathematics Department will jointly organize "The First JCY Language Popularization and Exchange Meeting" in Anhui to help popularize the JCY research achievements and expand its applications.

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APPLIED SCIENCES

NEW CROSS DISASSEMBLER DEVELOPED BY BEIJING CENTRAL IRON AND STEEL
DESIGN INSTITUTE

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 6

[Article: "Cross Disassembler for TI 990 Minicomputers and TMS 9900 Micro-
computers Successfully Developed"]

[Text] Recently, Beijing Central Iron and Steel Designing Institute successfully
developed a cross disassembler for TI990/4, or 10 minicomputers and TMS9900
microcomputers. Excellent results were also achieved in disassembling
an EPROM-programmed 12K application software of an imported equipment.

The 990 series computers are characterized by powerful instructions, complex
formats, relatively large numbers of registers and addressing modes. The
disassembler employs the sort-merge module for disassembling machine codes,
thus saving memory space and improving speed.

The disassembler can automatically set up entry address codes for branch
instruction programs (besides register address mode). As a result, the dis-
assembled programs are characterized by relocatable addresses and well-defined
modules, which makes it easy to digest and improve source programs. Whenever
current load addresses and actual addresses of object programs do not match,
the system can list the programs according to their actual addresses through
man-machine interaction. It can also automatically recognize symbol zones and
program zones, and produce paged printouts for easy binding.

The successful development of the disassembler program is helpful for
understanding, digesting, studying, and improving the software of imported
TI990 series minicomputers and TMS9900 microcomputers.

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APPLIED SCIENCES

SHANGHAI DESIGNS INVENTORY MODEL FOR PRODUCTION PLAN MANAGEMENT

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 8

[Article: "Remarkable Results Achievements With Storage Model Designed for Production Plan Management"]

[Text] With the cooperation of Shanghai Machine Tool Plant, the Shanghai Computing Technology Institute successfully developed a "storage model" for applications in production plan management. The model was tested on a Cromemco microcomputer with excellent results.

At present, one serious management problem encountered by many enterprises in China is poor economic results caused by the tremendous amount of floating funds and slow turnover speed. For example, according to annual statistical figures on the use of capital funds, the average number of turnovers which can be achieved with floating capital funds by a manufacturer of heavy motor vehicles in this country is three; but a similar Japanese manufacturer can produce tens or even hundreds of turnovers in the same period of time. One critical factor underlying this situation lies in the excessive volume and period of overstocked goods, which is a tremendous waste.

To find a way out, the Shanghai Computing Technology Institute and Shanghai Machine Tool Plant jointly studied the problem and decided to apply the inventory theory method to production plan management. The so-called inventory theory method is used for studying and solving storehouse problems or proper ways of storing raw materials, partially finished products and end products for production workshops, thus reducing overstocked products and speeding up capital turnover. The storage model uses mathematical means to describe the supply and demand relations of stocked goods from production to marketing, involving storage quantity, time and the minimum amount of total storage costs which can be achieved. With this method, it is possible to tap the potentials of production and improve economic results without increasing capital investment. The method is simple and straightforward; computation is easy, and can be programmed into the computer with little effort. It is also possible to apply it to various kinds of business conditions by selecting different parameters according to actual production conditions and using the computer to compare various optional plans, thus attaining better results.

Based on the inventory theory algorithm, the application program is modular structured, and has such capabilities as creating files, updating files, sorting records, retrieving information, and generating tables. The program runs in man-machine interaction mode, allowing the user to enter such information as annual product output figures and management expenditures, and the computer uses the mathematical model to find economical batch volumes and periods. If the user is not satisfied with the computation results, it is possible to adjust the batches and periods according to actual conditions, and satisfactory results can be achieved through iterative adjustments.

This method was used for computing a routine product line of a factory. The plant used to input materials for fabricating all the components of the products at one shot, using an average of 800,000 yuan of capital funds per month; with this method, the computer brought the cost down to an average of 390,000 yuan per month, saving about one-half of the capital funds. It is evident that the method is remarkably effective for production plan management and improvement of economic results, and should thus be popularized.

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APPLIED SCIENCES

MICROPROGRAMMED SUBMERGED ARC FURNACE ELECTRODE

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 8

[Article: "Microcomputer Controlled Submerged Arc Furnace Electrode"]

[Text] The Automation Institute of the Ministry of Metallurgical Industry and Jilin Iron Alloy Factory jointly developed a DBJ-Z80 single board micro-computer controller for electrodes of a submerged arc furnace. Used in iron alloy production, submerged arc furnace electrodes used to be difficult to control; but the newly developed controller has solved the problem with remarkable economic results.

Submerged arc furnace production plays a vital role in iron and steel industry; but this type of furnace consumes a great deal of electricity. In iron alloy production, controlling the electrodes of submerged arc furnaces is a big head-ache, and the problem is mainly attributed to high impedance in the circuits, which results in low power factor, and causes electric current and available power to fall out of alignment, and the three-phase electrodes to affect each other. This problem has been solved with the successful development of the submerged arc furnace electrode microcomputer controller. The control system consists of a DBJ-Z80 single board micro configured with channel interface and application software which can regulate the power and automatically hold and release the electrodes. The system can monitor all parametric variations inside the furnace and accurately compute various kinds of intermediate variables before exercising optimized control over the furnace in accordance with predeter-mined control algorithms and control measures, so as to balance available power and attain full load input. Thus, on the one hand, it is possible to maximize the utilization of the equipment, reduce smelting time and increase the output of iron alloy production; on the other hand, it is also possible to greatly reduce per unit power consumption due to rational selection of power supply parameters. It is estimated that 3 to 4 percent of electric power can be con-served, and the production output can be increased by as much as 15 to 25 per-cent.

Besides, as self-baking/consuming electrodes are employed in this type of fur-nace, it is necessary to continuously lower the electrodes during the smelting process to fill in the consumed portions of the electrodes. Besides regulat-ing power, the microcomputer based controller also automatically holds and releases the electrodes at fixed intervals; it can shorten intervals; it can

shorten the release time, and minimize the amounts of electrodes lowered each time of release. This way, it is not necessary to reduce the load each time the electrodes are lowered, thus stabilizing the smelting process in the controlled furnaces.

The successful development of the device will help to promote the automation of China's iron alloy production. It will become especially valuable for extensive use due to the current power shortage in our country.

9119
CSO: 4008/147

APPLIED SCIENCES

COMPUTER APPLICATION FOR FURNACE TEMPERATURE PRECISION CONTROL

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 8

[Article: "Using Computers for Furnace Temperature Precision Control"]

[Text] Liquid phase epitaxial furnaces are vital equipment for the manufacturing of such compound semiconductors as gallium arsenide. The drawback of program controlled liquid epitaxial furnaces in our country lies in the limited number of temperature-drop turn points and rates, which only allows continuous temperature drop with no means of raising the temperature or maintaining steady temperature during the control process. In its efforts to improve liquid phase epitaxial furnaces, Changsha Semiconductor Equipment Research Institute developed a M6800 based WW-1 microcomputer control system, and successfully realized furnace temperature precision control, thus providing China with an advanced equipment for semiconductor research and development, and semiconductor production.

The realization of precision control over the temperature of liquid phase epitaxial furnaces with microcomputers not only helps to improve technological reproduction, reduce human errors and thus increase the percentage of finished products, but also helps to improve the working conditions of technological operators. With the help of computers, the temperature drop turn points can be set up in the program using the attention function, thus allowing greater room for adjustments and flexibility in application, and even allowing modifications to be made to non-linearities while the temperature is being lowered. Moreover, it is possible to realize the automation of such operations as shifting graphite vessels and furnaces, etc.

The WW-1 liquid phase epitaxial furnace temperature control system consists of five parts: M6800 microcomputers, input unit, stable current source and temperature gage component, output unit and furnace. The furnace temperature is controlled by 3-point 3-section [sandiansanduan] silicon-controlled inverter; the filament current is regulated by changing the conduction angle of the silicon-controlled inverter, thus controlling the furnace temperature. A platinum resistor thermometer is used for measuring the furnace temperature; through a series of conversions, the temperature-based resistance variations are converted into binary codes and passed onto the computer for analysis; the results are then sent to the sampling maintenance circuit via D/A convertor, and the furnace temperature is thus controlled. The system's single-point precision exceeds ±0.1 degrees Centigrade/8 hours, the stable temperature zone is greater than ±0.2 degrees Centigrade/300 mm, and the single-point precision at frequently used temperature ranges can reach ±0.05 degrees centigrade/8 hours.

The system is already in operational use now.

9119
CSO: 4008/147

APPLIED SCIENCES

ZC-8282 CHINESE CHARACTER 'SWITCHABLE-PAGE' KEYBOARD PRODUCED IN CHINA

Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 20, 20 Jun 83 p 10

[Article: "ZC-8282 Induction Type Chinese Character 'Switchable-Page' Keyboard Production"]

[Text] The ZC-8282 Chinese character 'switchable-page' keyboard is a character-shift type Chinese character input device. It is a new type of keyboard which exchangably uses 7-bit and 8-bit codes. Each keyboard is composed of 152 domestically produced induction keys. As the output codes match internationally recognized ISO-7 and ISO-8 standard codes, the keyboard can be directly hooked onto all kinds of large, medium, mini and micro computers without adding any conversion equipment. It is not only capable of inputting Chinese character information, but also English language information, and can thus be used in the international community.

Each ZC-8282 keyboard page contains 2048 Chinese characters or symbols. Based on the user's needs, two or eight different kinds of keyboard pages can be installed. It is also possible to increase the capacity of Chinese character processing from 4,000 to 16,000 characters.

The most remarkable feature of the keyboard lies in the fact that each and every Chinese character can be composed by shift-type double stroke keys irrespective of how many Chinese characters are included. Moreover, there is no need to learn Chinese character coding techniques, and the features of Chinese typewriters are retained. Data entry speed can reach from 40 to 60 characters per minute. Compared with large keyboards (e.g., light pen touch type [?] keyboards), its structure is simple, it is easy to assemble and take apart, its performance is reliable, and it is cheaper. The 'switchable-page' keyboards in two sizes: 4,000 characters per page (A type), and 1,000 characters per page (B type), and can be designed according to user's actual needs.

The ZC-8282 keyboard was designed by Zhang Linxiang [1728 3829 5046] et al of Beijing State Plant No 529, and the keyboard is currently produced by the state-run Shaoshan Radio Plant in Xiangtan Prefecture, Hunan.

9119
CSO: 4008/147

APPLIED SCIENCES

IMPROVED START-STOP SCHEME REPORTED

[Article by Teng Xiaoyu [3326 1420 5038] and Sheng Jinling [3932 6855 7117] of Jiangsu Province Architectural Science Research Institute: "An Improved Start-Stop Scheme"]

[Excerpts] Generally, any computer peripheral equipped with motor transmission needs a start-stop device to reduce noise level and power consumption, and simplify operation. There are many different optional start-stop schemes.

Our organization has a 441-BIII computer and CY-160-5 line printer. After a period of use, we discovered two shortcomings in the original start-stop scheme designed by the computer manufacturer: One, there is at least 0.5 second delay at each start, which is a waste of time; second, if the starts are frequent, the relay is repeatedly closed, and the motor is subjected to sudden starts and stops, which not only causes spark disturbances, but also shortens the life span of the motor. Its control logic is basically divided into three stages:

1. When the mainframe uses wide column command and flip flop CQd is at "0" state, the potential is high at A, low at B, and high at C. Hence, Qd cannot issue transmission current, the relay does not contact, and the motor is at rest.

2. When the mainframe issues wide column start pulse signal, the potential is high at C, low at B; the pulse signal goes through the 0.5-1 second delay circuit (slow path); at the same time, CQd is at "1" state, the potential is low at A, high at B, low at C, while Qd issues transmission current, the relay contacts, the motor runs; as the pulse signal goes through the slow path, the printing starts when the motor is running at steady speed, thus ensuring the quality of printout characters.

3. After the first printout, CQd switches to "0" state; the delay action of the additional plate prevents B and C from switching instantly, and the motor is not stopped until 10-15 seconds later. During this interval, if a new print command is issued, the pulse signal passes through the fast circuit (5-10 ms) to increase the printing speed, and CQd returns to "1," i.e., the second stage. If no new print commands appear within the 10-15 second interval, both B and C will switch, the motor stops, and the device returns to the first stage.

Based on statistical figures, there is a fairly large number of continuous print commands within the 10-15 seconds interval; thus, the new scheme helps to improve the printing speed.

The improved scheme is already being used in wide column printers and magnetic tape drives.

9119
CSO: 4008/147

APPLIED SCIENCES

ANTARCTIC SHIP PASSES STRAIT OF MAGELLAN

OW141135 Beijing XINHUA in English 0635 GMT 14 Mar 85

[XINHUA headline: "Chinese Antarctic Expedition Sails through Belt of Westerlies on Return Journey (by Zhu Youdi)"]

[Text] S.S. Xiangyanghong 10, 13 March (XINHUA)--The two Chinese scientific expedition ships toppled through the stormy belt of westerlies at noon today on their way home.

The team came across a whole gale as they sailed out of the western opening from the Magellan Channel last Sunday. The terrific weather forced the team to change its route four times and sail north along the western coast of South America. Though the detour meant 220 nautical miles more than the planned journey, the team managed to pass through the belt earlier than scheduled. It is expected to come back to its original route tomorrow morning.

General Director of the expedition Chen Dehong said the team has once again stood the test of the stormy belt and the machines of both ships are working well.

The team is now heading toward the equator and is expected to arrive at the Shanghai Port of China around 10 April.

CSO: 4010/107

APPLIED SCIENCES

CONSTRUCTION OF FIRST ANTARCTIC STATION COMPLETED

OW15133 Beijing XINHUA in English 1447 GMT 15 Feb 85

[Text] Beijing, 15 February (XINHUA)--Construction of China's first research station was completed in the antarctica at 10 a.m. today.

It was announced here this afternoon by Luo Yuru, vice-chairman of the Chinese National Committee for Antarctic Research at a tea party for the family members of the Chinese Antarctic expeditors.

Luo, who is also director of the State Bureau of Oceanography, said that the Great Wall Station located on the George Island has two orange-colored steel-structured houses, and they are 20 meters long, 8 meters wide and 5 meters high each.

An antenna array for radio transmitting and receiving has been erected at the station. The meteorological observation system has been built and put into use, Luo said. The system includes satellite cloud chart receiving equipment, meteorological telecommunication antenna and an observation tower, he added.

Scientific research facilities for recording aeronomical and seismic data have been installed. Work on an oil storage tank, a wharf and an airstrip were also completed, Luo said.

While building the station, Chinese scientists also conducted research in four offshore areas and undertook surveys in the krill-rich zones, and studies of geology and marine biology.

At the tea party, 10 people called their dear ones on the Antarctica and exchanged greetings. Young pioneers presented red scarves to the representatives of the expeditors' family members.

China sent two ships to the antarctica with 500 scientists and crew members on board for a scientific expedition on 20 October 1984. They are expected to return to Shanghai next April.

CSO: 4010/107

APPLIED SCIENCES

WU XUEQIAN GREETS OCEANOGRAPHIC MEETING

OW101700 Beijing XINHUA in English 1605 GMT 10 Mar 85

[Text] Beijing, 10 March (XINHUA)--Chinese State Councillor and Foreign
Minister Wu Xueqian today sent a message to the 13th session of the Assembly
of the Intergovernmental Oceanographic Commission of UNESCO, congratulating
the commission on its 25th founding anniversary.

In the message, Qu, on behalf of the Chinese Government, praised the com-
mission for its endeavor to enhance the understanding of the nature and re-
sources of the seas and oceans, and for the encouraging achievements made by
the commission in its active promotion of international cooperation and inter-
action in the field of marine science and its technology and ocean service.

Wu also spoke highly of the commissions's efforts to assist its member coun-
tries, especially the developing member countries, in strengthening their
capabilities in marine science.

Wu assured the commission that "China will, as always, continue developing
its cooperation with the commission and making its own contributions to the
commission's development."

The Intergovernmental Oceanographic Commission under the United Nations Edu-
cational, Scientific and Cultural Organization was established in 1960 to
promote scientific investigation of the oceans. It now has more than 100 mem-
ber countries including China.

CSO: 4010/107

APPLIED SCIENCES

PRC SCIENTISTS END RESEARCH IN ANTARCTIC

OW100932 Beijing XINHUA in English 0907 GMT 10 Mar 85

[Text] Santiago, 9 March (XINHUA)--Two Chinese scientists returned to the Chilean capital today after conducting 2 months of research in the Antarctic.

The scientists, who arrived in the icy continent in January at the invitation of the Chilean Antarctic Research Institute, studied varieties of seaweed and fish in conjunction with Chilean researchers.

Three earlier Chinese study groups have researched meteorology (in 1981), animals (1982) and marine life (1985) in the antarctic.

CSO: 4010/107

APPLIED SCIENCES

PRC ANTARCTIC RESEARCH SHIP SAILS FOR HOME

OW100934 Beijing XINHUA in English 0909 GMT 10 Mar 85

[Text] Punta Arenas, Chile, 10 March (XINHUA)--The Chinese Antarctic expedition ships left here this morning to begin their trans-Pacific voyage home.

The expedition fleet, made up of the scientific research ship the S.S. Xiangyanghong 10 and the naval vessel J121, arrived on 5 March at this port situated on the southern tip of South America.

The ships received a warm welcome from local residents and took on fresh supplies of food and water. The ships are due to reach Shanghai on 10 April.

The two ships left Shanghai in November, carrying the 500 members of China's first antarctic expedition to the world's southermost continent, where the team set up the Great Wall Observation Station.

CSO: 4010/107

APPLIED SCIENCES

BRIEFS

ANTARCTIC METEOROLOGICAL STATION OPERATING--Beijing, 21 Mar (XINHUA) --
China's first meterological station in Antarctica -- the Great Wall
Meterological Station -- has been recognized by the International
Meterological Organization. The organization has included the station
in the network of world weather observatories and stations, and officially
designated 89058 as its international code name, this reporter was told
by Luo Jibin, deputy of the State Meterological Bureau, a few days ago.
The Great Wall Meterological Station was completed on 14 January, and is
the first China has built outside its own territory. Since it was
completed, the meterological station has been doing such work as weather
observation, receiving meterological data from satellites, telecommunications,
and weather forecasting. With its code name designated by the International
Meterological Organization, China's Antarctic meterological station may
send its meteorological data to the world meterological communications
network, where international weather information is exchanged and computed.
According to a briefing, the Great Wall Meterological Station has made
preparations for continuing weather observations all the year round.
[Text] [Beijing XINHUA Domestic Service in Chinese 0819 GMT 21 Mar 85]

EXPEDITION RETURNING TO SHANGHAI--SS "Xiangyanghong 10", 21 Mar (XINHUA) --
After leaving King George Island in Antarctica, China's first Antarctic
expedition has sailed more than 5,500 nautical miles. It is passing through
the Tuamotu Archipelago and Society Islands in the south-central Pacific,
and it is headed for the Equator. The Chinese Antarctic expedition fleet
left Chile's Punta Arenas on 11 March. It entered the Pacific after leaving
the Straits of Magellan. After 10 days of sailing, it passed through the
southern part of the Tuamotu Archipelago and reached the vicinity of the
Society Islands yesterday afternoon. The expeditionary ships will pass
through a point 40 nautical miles from the Society Islands' biggest island,
Tahiti. As the ships have entered the trade-wind zone in the southern
hemisphere, the weather has been warm, with intermittent clear weather
and showers, and bright and colorful rainbows at sea. On the way home,
the Chinese Antarctic expedition is launching an extensive campaign to
earnestly sum up its work, assess its success, and put in order the
specimens and data collected in Antarctica. It is prepared to withstand
the test of strong winds and big waves to ensure a safe journey home. The
expedition fleet is expected to arrive in Shanghai Port on 10 April. [Text]
[Beijing XINHUA Domestic Service in Chinese 1549 GMT 21 Mar 85]

EAST CHINA COMPUTER USERS ASSOCIATION--In late June, The East China Regional
Association of the China Computer Users Association was established in Hangzhou.
It also held its first annual conference. At the meeting, in accordance with
the nature and mission of the association, it was decided through discussion
that the East China Branch Association of the DJS-100 Series Computer Users
Association would be renamed East China Regional Association of the China
Computer Users Association. The participants also formulated activity plans
for the next 2 years, and organized academic exchanges as well. The association
is supported by the Jiangsu Province Computing Technology Service Company.
[Text] [Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12,
20 Jun 83 p 8] 9119

TWO NEW INTELLIGENT PLOTTERS INTRODUCED--Hefei Polytechnical University and
Shanghai Dahua Instrument Plant have jointly developed a desktop intelligent
plotter which has passed technical evaluation tests. The main characteristics
of this portable plotter are: powerful capabilities, low price, and compact
size. One outstanding feature of the microcomputer controlled system lies in
substituting "soft" for "hard," which helps to reduce both cost and power
consumption, and enhance circuit reliability. The mechanical structure
consists of single arm transmission, which simplifies the mechanism and gives
the plotter a brand new appearance. Wuhan University and Wuhan City Zhonghua
Electronic Instruments Plant have jointly developed an A3 size intelligent
plotter which recently passed technical evaluation in Wuhan. Controlled by micro-
computer, this plotter can plot any kind of pattern on a Size 3 graphic paper
(350mm x 260mm). It can also sort and collate discrete data processed by the
microcomputer, and use the data for plotting analog curves or graphs. [Text]
[Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 12, 20 Jun 83 p 10]
9119

CSO: 4008/147

LIFE SCIENCES

SHANGHAI WOMEN, CHILDREN GET BETTER MEDICAL CARE

OW230754 Beijing XINHUA in English 0656 GMT 23 Mar 85

[Text] Shanghai, March 23 (XINHUA)--The life expectancy of the three million women over the age of 15 in Shanghai is now 75, up from 73.2 in 1965, according to the municipal public health bureau.

The mortality rate for women giving birth in urban areas dropped to 1.94 per ten thousand in 1983 from three per ten thousand 20 years ago, an official said.

The rate of cervical cancer incidence was down from 19.92 per hundred thousand in 1978 to 9.02 per hundred thousand, thanks to sustained preventive efforts.

A health care network for women and children is now operating in both urban and rural areas, he said.

Last year, nearly 180,000 pregnant women received antepartum check-ups and some 78,000 underwent postpartum examinations.

All maternity hospitals now offer young couples consulting services on health care for normal childbirth, and nutritional and educational guidance for infants.

The mortality rate for children under the age of three fell to 15.14 per thousand in 1983 from 20.8 per thousand in 1964.

The city's two million children under the age of 14 receive regular physical check-ups. The government spends 300,000 yuan each year on administration of free injections for children to prevent such dangerous diseases as diphtheria, measles and infantile paralysis, which have been basically under control now. No tetanus case was reported over the past two years.

The city now has 48,000 doctors, averaging 40 for every 10,000 residents. Shanghai's hospitals had 53,000 beds at the end of 1984, 1,400 more than the year before. Of these, 6,112 were in maternity hospitals--an increase of 1,649.

The municipal government has decided to build several new hospitals and improve existing ones from 1986 through 1990. This will give Shanghai 5,100 more beds and 8,300 more doctors and nurses.

CSO: 4010/113

LIFE SCIENCES

LU DONG URGES QUALITY CONTROL IN MEDICINES

OW141835 Beijing XINHUA in English 1636 GMT 14 Mar 85

[Text] Beijing, March 14 (XINHUA)--Effective quality control must be imple-
mented on all pharmaceutical factories and medicines, and medicinal markets
supervised, Lu Dong, minister in charge of the State Economic Commission, said
here today.

He told a national meeting on the pharmaceutical industry that it was vital
the new pharmaceutical law should be carried out conscientiously. Substandard
products must not be allowed for sale.

By 1990, he said, most pharmaceuticals and medical equipment should be close
or up to advanced world standards.

Lu said that medicinal herbs were an important tradition in China.

Many were rare and valuable, and great efforts should be made to protect
resources. Research centers should be established and prices readjusted to
boost the use of traditional medicines.

Lu also said that importance should be attached to technical updating of
factories producing herbal drinks and tablets, and full support should be
given to enable them to expand production. Scientific research and education
on Chinese traditional medicine should be strengthened.

The pharmaceutical meeting, which began on March 7, is being attended by 180
delegates from all over the country.

CSO: 4010/113

LIFE SCIENCES

SICHUAN PROVINCE DEVELOPS TRADITIONAL MEDICINE

OW211536 Beijing XINHUA in English 1439 GMT 21 Mar 85

[Text] Chengdu, March 21 (XINHUA)--Sichuan Province completed 15 hospitals of traditional Chinese medicine in 1984, more than in the previous ten years put together, according to the provincial public health bureau.

The construction drive is a part of the southwest China province's efforts to promote the use of traditional medicine, bureau officials said here.

A new school of acupuncture and two correspondence colleges enrolling more than 10,000 students were also established. Institutes and secondary schools of traditional Chinese medicine have opened new specialities and increased enrollment.

The province organized training courses lasting from three months to two years for local medical staff.

To help promote its training programs, Sichuan has enlisted the aid of 650 noted practitioners of traditional medicine. The experience of 12 leading doctors of internal medicine, ophthalmology, gynecology and pediatrics has also been programmed for hospital computers here.

A spokesman said the public health bureau would give equal stress to traditional medicine, modern medicine and the combined use of Chinese and Western medicine.

The province plans to set up a major hospital of traditional Chinese medicine in each of its counties. It also expects to build up a province-wide network of clinics and hospitals of traditional medicine within the next six to seven years, and to train 13,000 qualified physicians.

It further plans to increase the production and processing of herbal medicines, and set up a complete traditional medicine system including facilities for treatment, education, research and pharmaceutical production.

CSO: 4010/113

LIFE SCIENCES

XIZANG TRAINS DOCTORS FOR OTHER PARTS OF CHINA

OW211552 Beijing XINHUA in English 1434 GMT 21 Mar 85

[Text] Lhasa, March 21 (XINHUA)--Forty-five doctors of Tibetan medicine have been trained recently in the Tibet Autonomous Region for other parts of China, a local official said here today.

Tibet, an under-developed autonomous region in southwest China, used to depend on other inland provinces to train university students.

The training of doctors of Tibetan medicine by Tibet is part of the regional cooperation program launched a few years ago.

The region set up a school of Tibetan medicine in 1983, enrolling 95 students, including 14 from other provinces and autonomous regions. The school offers courses in basic theory, clinical medicine, diagnosis, anatomy, physiology, pathology, pharmacology and acupuncture.

Earlier, Tibet trained doctors of Tibetan medicine for other parts of the country through training classes and courses for advanced study.

The students trained are now working in Sichuan, Gansu, Yunnan and Xinjiang, where there are Tibetan communities.

Tibetan medicine has a history of nearly 2,000 years and constitutes an important part of the treasurehouse of medicine and pharmacology of the Chinese nation. It has special cures for illnesses which occur in high-altitude areas.

Even people of other ethnical groups have come to accept Tibetan medicine. It was reported that last year alone more than 400 patients from 28 provinces, municipalities and autonomous regions sent letters asking for prescriptions and Tibetan hospitals have established case histories for these patients.

CSO: 4010/113

LIFE SCIENCES

BOSTSWANA HEALTH MINISTER MEETS PRC MEDICAL TEAM

OW141814 Beijing XINHUA in English 1616 GMT 14 Mar 85

[Text] Gaborone, 14 March (XINHUA)--The Botswana minister of health, Patrick Balopi [name as received], today met with a Chinese medical team which arrived here yesterday from China.

During the meeting, Balopi expressed his government's welcome to the Chinese doctors. He said two previous Chinese medical teams had done a good job and their work had contributed to the development of good relations between the two countries.

The 17-member medical team, sent by the Chinese Government at the request of the Botswana Government, will work here for 2 years. The second Chinese medical team will leave Botswana for home on 1 April.

CSO: 4010/109

LIFE SCIENCES

PARIS MAYOR AWARDS THREE CHINESE DOCTORS

OW150907 Beijing XINHUA in English 0812 GMT 15 Mar 85

[Text] Paris, 14 March (XINHUA)--Three Chinese doctors were awarded silver
medals here today by Emile August on behalf of the Mayor of Paris Jacques
Chirac for their contributions to Sino-French medical exchanges.

The three doctors, Zhang Kan, Wang Zhenyi and Weng Yongqing, have come to
Paris from the sixth Sino-French medical seminar.

Emile August and Zhang Kan spoke at the award ceremony. They said the annual
seminars have facilitated exchanges and cooperation between the two countries
in the medical area.

They said they will continue and improve the academic exchanges.

The first seminar was held in 1980. Since then the annual seminar has been
held alternately in the two countries.

CSO: 4010/109

LIFE SCIENCES

BRIEFS

MEDICAL INSTRUMENTS TO SOMALIA--Mogadishu, 16 March (XINHUA)--China presented a batch of medical instruments to the Benadir Hospital here this evening including 12-reflectors shadowless operating lamps, tower-shape distillers and a universal maternity table. The donation was handed over by Chinese Ambassador Wan Shikun to Somali Minister of Health Yusuf Hassan Elmi. After the ceremony, a reception to mark the eighth anniversary of the founding of the Chinese-aid Hospital for Women and Children was held in its compound. The hospital was built in 1977. A medical team of more than 20 members from China's Jilin Province is working in the hospital and in two other cities. [Text] [Beijing XINHUA in English 0226 GMT 17 Mar 85 OW]

CSO: 4010/109

ENVIRONMENTAL QUALITY

HUBEI AGRICULTURAL ECOLOGICAL ENVIRONMENT CONFERENCE ENDS

HK260152 Wuhan Hubei Provincial Service in Mandarin 1100 GMT 22 Mar 85

[Text] The first provincial conference on agricultural ecological environ-
mental protection, which lasted 5 days, concluded today.

When Governor Huang Zhizhen made his report to the representatives to the
conference, he pointed out: Protecting and building up an excellent agricul-
tural ecological environment is a task which brooks no delay. Regarding this
problem, we must have a strong sense of urgency and responsibility. We must
by no means lower our guard and become careless. When governments at all
levels get a clear picture of the overall economic situation, they must attach
great importance to the protection of the agricultural ecological environment
and must develop ecological agriculture.

He said: In the excellent agricultural situation, the phenomenon of
incoordination has existed. One of the salient problems is that natural
resources and ecological balance have been sabotaged. However, judging from
the overall situation, this ecological sabotage has been aggravated. The
pollution of the agricultural environment is still developing. This has
become a big hidden trouble for agricultural development. To protect the
agricultural ecological environment, it is necessary to take comprehensive
measures to: 1) Rationally utilize natural resources; 2) readjust and
establish the agricultural production structure; 3) adopt advanced scientific
agricultural production technology; and 4) do well in the prevention and
control of pollution of the agricultural environment.

At the conference, the experts engaging in environmental protection work
appealed: It is essential to develop agriculture in accordance with eco-
logical laws. It is imperative to fully and rationally utilize the materials
and energy in the agricultural environment to establish a benign ecological
cycle of steady and high yields. In particular, the environmental protection
and agricultural departments must mobilize the masses to protect the eco-
logical environment. In doing so, we can create a new situation in the pro-
tection of the agricultural ecological environment in our province.

CSO: 4008/285

ENVIRONMENTAL QUALITY

PRC'S 12-PROVINCE NORTHERN SHELTERBELT TO HALT DESERTIFICATION

HK220635 Beijing CHINA DAILY in English 22 Mar 85 p 4

[Article by Wang Sen, official of Ministry of Forestry]

[Text] Although afforestation in China's southern provinces is important, the tree and grass planting programmes in the Northern, Northeastern and Northwestern provinces have become almost a matter of life and death; the struggle of the inhabitants of these areas to maintain their livelihood in the face of constant encroachments by wind and sand.

Afforestation programmes in these areas aim to plant a continuous line of vegetation, called the Three-North Shelterbelt, to half desertification. It will involve planting in 12 provinces.

Deserts, primarily in the Northwest, cover 1.28 million square kilometres. Calamitous sandstorms threaten 6.7 million hectares of farmland and about the same area of pasture land in more than 200 counties; drifting sand dunes cover cropland or claw away top soil, causing great damage to plant life. In the Inner Mongolian Autonomous Region, deserts grew from 7,330,000 hectares in 1960 to 10,670,000 hectares by the end of 1977.

Within the Three-North area, 300,000 square kilometres of land is being gradually destroyed by soil and water erosion. Fertile top soil is constantly being removed, and this chokes rivers, canals and reservoirs. Silt carried by the Yellow River flowing through the Sanmen Gorge amounts to 1,600 million tons each year. It raises the river bed in the Yellow River's lower reaches by 10 centimetres annually. The river's channel is now three to eight metres above ground level held in by dykes, and places a constant threat to the life and security of surrounding inhabitants. Some 30 million tons of nitrogen, phosphorus and potassium are lost from the soil through erosion.

In the past the eastern part of the Three North region was protected by a thick band of trees and grass and the arid lands of the West were covered with bushes and other types of vegetation, and the rivers were all flanked by rows of poplars. As a result of excessive reclamation, overfelling and over-grazing, as well as devastation caused in war, forests and grasslands were seriously reduced.

In November, 1978, the State Council approved the Three-North Shelterbelt programme. The programme is being carried out in three phases. In the first phase, from 1978 to 1985, 5.93 million hectares were to be planted with trees or grass.

By the end of 1984, 92 percent of the target for the first phase had been carried out. The second phase, from 1986 to 1990, will see 6.51 million hectares planted, and in the third, which ends in the year 2,000, a further 10.66 million hectares will be dealt with. On completion of the shelterbelt, forest cover will increase to 10.6 percent of the total land in Three-North area, as compared to 4 percent in 1978, and 6 percent at present.

For the successful execution of the programme, efforts are to be mobilized at all levels; and both collective and private initiatives should be encouraged. The necessary funds should be raised from any available sources. The state has allocated a total of 267 million yuan to the programme over the past 7 years, and a further 900 million yuan have been invested through other channels.

In time, through these concerted efforts, parallel to the ancient Great Wall, built to protect China from invasions from the north, a green great wall will appear, which will protect future generations from the invasions of wind and sand.

CSO: 4010/114

ENVIRONMENTAL QUALITY

TIANJIN METAL FIRMS LEAD POLLUTION FIGHT

OW232029 Beijing XINHUA in English 1622 GMT 23 Mar 85

[Text] Tianjin, March 23 (XINHUA)--The metallurgical industry in Tianjin has taken the lead in pollution fight, thanks to the institution of economic responsibility system, according to the municipal environmental protection bureau.

According to a contract signed by the environmental protection and metallurgical bureaus, directors of factories and leaders in charge of anti-pollution projects will be fined if they fail to complete assigned projects and awarded if they fulfil the tasks on schedule.

As a result, the industry spent 5.7 million yuan to complete 97 anti-pollution projects in 1984, double the figure for the previous year.

The scheduled tasks for control of industrial sewage, converting industrial furnaces, kilns and boilers to non-polluting systems, disposal of slag and noise control were all fulfilled well.

Of the money spent, over 70 percent were raised by the enterprises themselves.

CSO: 4010/114

ENVIRONMENTAL QUALITY

GUANTING RESERVOIR ANTIPOLLUTION RULES ISSUED

OW200942 Beijing XINHUA in English 0852 GMT 20 Mar 85

[Text] Shijiazhuang, March 20 (XINHUA)--Tough new regulations on preventing pollution of the Guanting Reservoir, a major water source for Beijing, have been issued by Beijing Municipality and Hebei and Shanxi Provinces.

The reservoir, which stores one billion cubic meters of water at present, supplies Beijing with 600 million cubic meters a year. Three major rivers in Hebei, Shanxi and Inner Mongolia are the sources of the reservoir's water.

The regulations stipulate that no factories which would discharge industrial wastes into the reservoir, north of Beijing, may be built there and existing factories may not be expanded.

Factories discharging wastes above state norms must clean up the pollution within a set time. If they fail to do so, local governments may order them to close down, the regulations say.

It is forbidden to build electroplating, papermaking, coking, tanning, oil refining, printing or nonferrous metal smelting plants near the rivers which supply the reservoir.

The reservoir's water is now pure enough for drinking, thanks to sustained anti-pollution efforts over the past 10 years, according to the office in charge of the reservoir's pollution control.

During that period, 39 factories and 77 workshops purified waste water to cut their pollutants to a minimum.

Meanwhile, other factories causing serious pollution closed down or moved elsewhere. Water quality monitoring networks have been set up in Beijing and Hebei and Shanxi Provinces.

The Guanting Reservoir, completed 30 years ago, is the second largest of the 80 reservoirs built around Beijing. The largest is the Miyun, northeast of the capital.

CSO: 4010/114

ENVIRONMENTAL QUALITY

XINJIANG CITIES PROJECT PLANTS TREES, GRASS

OW191838 Beijing XINHUA in English 1433 GMT 19 Mar 85

[Text] Urumqi, March 19 (XINHUA)--Cities in the Xinjiang Uygur Autonomous
Region are getting greener thanks to a large-scaled tree-planting and grass-
sowing program.

Fourteen cities of the region planted 4,300,000 saplings last year--18
percent more than the previous year--and 167 hectares of flowers and grass,
quadrupling the 1983 total, according to latest figures.

Evergreen trees, flower beds, shrubs and grass now grow along the broadened
streets of Urumqi, the region's capital, helping to bring the city's green
cover rate to 12 percent from 10 percent three years ago.

The oil city of Karamay planted 550,000 trees and 0.33 hectares of flowers
last year.

And remote Shihezi City in the heart of a desert last year planted 350,000
trees and 110,000 square meters of flowers and grass.

Both Shihezi and Yining City have now covered 30 percent of their area with
plants.

CSO: 4010/114

ENVIRONMENTAL QUALITY

STATE AIDS GANSU'S   REFORESTATION PROJECT

OW190302 Beijing XINHUA in English 0250 GMT 19 Mar 85

[Text] Beijing, March 19 (XINHUA)--The State Council has ordered grain
supplies of 120,000 million tons on credit to help Gansu Province recover from
serious soil erosion affecting 533,000 hectares of hillside farmland in the
next five years.

The province, which is part of the Northwest China loess highlands, has over
the years plowed under 600,000 hectares of mountain forests and pastures,
disrupting the ecological balance and creating a growing erosion problem,
according to the "People's Daily" yesterday.

During inspection tours of the province, Chinese leaders Hu Yaobang and Zhao
Ziyang have urged Gansu to plant trees and grass and develop animal husbandry
in the affected areas.

About 67,000 hectares has been reafforested or turned to pastureland in the
past two years, the paper added.

Gansu has asked supplies of grain on credit to aid local people involved in
the reafforestation project. The proposal has been approved by the State
Council, the paper said.

Since 1982, the government has allocated 160 million yuan a year to help boost
Gansu's rural economy.

CSO: 4010/114

ENVIRONMENTAL QUALITY

ANHUI PROVINCE LAUNCHES TREE PLANTING DRIVE

OW121123 Beijing XINHUA in English 0650 GMT 12 Mar 85

[Text] Hefei, March 12 (XINHUA)--Relaxation of policy has touched off a great tree planting drive in Anhui Province, a pace-setter in rural reforms.

Officials here said Anhui planted 19,000 hectares of trees in the first two months this year, triple that of the same period of last year.

The province encourages peasants to contract to plant mountain slopes, allowing them to market timber freely.

The province's Suxian County planted 6,300 hectares in the last two months, completing 58 percent of its task planned.

The county has planted 21,000 hectares of trees since 1972, which line 80 percent of fields and shade all rivers, roads, railways and villages. Tree cover is 8.6 percent against 2 percent in the 1970's.

Called a "green bank" locally, the trees paid each family over 100 yuan last year.

Woods have improved the ecology and guaranteed good harvests for years ahead. County authorities estimate timber storage of one million cubic meters. The county cut 70,000 cubic meters last year.

The county used to plant trees once a year, but now it encourages peasants to plant trees all year round.

In Huaiyuan County, more than 20,000 pomegranates were planted in January, and an estimated 150,000 such trees will be planted and more than 300 hectares of pomegranate orchards will be opened by the end of this year.

CSO: 4010/114

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ENVIRONMENTAL QUALITY

TELEPHONE CONFERENCE ON SPRING AFFORESTATION

SK220226 Hohhot Nei Monggol Regional Service in Mandarin 1100 GMT 21 Mar 85

[Excerpts] On 20 March, the regional People's Government held a telephone conference to implement the guidelines of the fourth plenary session of the Central Greening Committee and work out plans for the region's spring afforestation work. It called on the whole region to afforest 9 million mu this year, to vigorously plant grass, and to cultivate vegetation.

Bai Junqing, vice chairman of the regional government and chairman of regional greening committee, presided over the conference. (Ha Lun), vice chairman of the regional greening committee and director of the regional forestry department, spoke at the telephone conference.

The conference held that the region's forestry situation has been excellent. Last year, the region as a whole afforested 10.48 million mu, ranking first in China. In order to fight a good battle in spring afforestation, the conference called on all localities to readjust the forestry structure to benefit agriculture, forestry, animal husbandry, scientific operation, and to enhance ecological, economic, and social benefits. It called for efforts to implement the ten regulations of the regional CPC Committee and government on forestry reform and easing policy restrictions and boost the enthusiasm of the masses in afforestation and protecting forests through policies.

The conference called on all localities to carry out voluntary afforestation campaigns among the people. In the coming 3 to 5 years, the emphasis of the region's voluntary afforestation will focus on building protection forests in urban areas, and along the embarkments of Huanghe and (Xiliao) He and along railway and highway trunk lines. Meanwhile, we should actively urge people to plant commemorative trees and forests. All localities should also pay attention to making the urban areas green, planting more lawn, building fewer projects in green lands, and cultivating more vegetation.

CSO: 4008/285

ENVIRONMENTAL QUALITY

GANSU LEADERS ATTEND CONFERENCE ON AFFORESTATION

HK130856 Lanzhou Gansu Provincial Service in Mandarin 2300 GMT 11 Mar 85

[Excerpts] Yesterday morning the provincial CPC Committee and government held
a telephone conference in Lanzhou to mobilize the people in the province to
launch a spring tree-planting drive.

At the conference Provincial Governor Chen Guangyi delivered a speech entitled
"It is necessary to take greater strides, carry out work more practically, and
achieve better results in growing grass and planting trees this year."

In his speech the governor pointed out that last year the province grew grass
on 5.19 million mu of land, overfulfilling the annual target by 15.5 percent,
and planted trees on 3.36 million mu of land, overfulfilling the annual target
by 46 percent. Some 120 million trees were planted around villages and houses
and along rivers and roads, and some 60,440,000 trees were planted volun-
tarily. With the per-capita number of trees planted standing at 5.1, the
province has made a breakthrough in afforestation and achieved initial success
in [words indistinct].

After reviewing the situation in the province's afforestation and favorable
conditions for growing grass and planting trees, Chen Guangyi said that the
general target for this year's afforestation is to take greater strides, to do
work more practically, and to achieve better results. The province is
scheduled to grow grass on 6 million mu of land, plant trees on 3 million mu
of land, raise seedlings on 400,000 mu of land, plant 100 million trees around
villages and houses and along rivers and roads, and plant 70 million trees
voluntarily.

The governor stressed that all localities and departments must establish,
perfect, and persist in the examination system in afforestation so as to
promote the fulfillment of the afforestation task in the province and to push
the province to attain a higher target in this year's afforestation work and
develop toward a first-class base for forestry and animal husbandry.

Party and government responsible persons from all prefectures, autonomous
prefectures, cities, counties, and districts in the province and leading
comrades from all provincial sections, commissions, departments and bureaus
attended yesterday's telephone conference. Also attending the conference were
provincial party, government, and army leaders Li Ziqi, Chen Guangyi, Liu
Bing, Jia Zhijie, Lu Kejian, Wang Jintang, Li Bin, Hou Zongbin, Ge Shiying, He
Jianshan and Lu Zhongliang.

CSO: 4008/285

BRIEFS

TIANJIN AFFORESTATION--Liu Jinfeng, vice mayor of Tianjin City and vice chairman of the Tianjin Municipal Greening Committee, revealed that in 1985 Tianjin plans to cultivate 300,000 saplings, plant 670,000 hedges, and plant 400,000 square meters of lawn in the urban areas. It also plans to make the residential areas green by planting 263,000 square meters of lawn. In suburban counties and rural areas, it plans to plant 10 million trees, cultivate an additional 20,000 mu of saplings to make the total sapling plots reach 70,000 mu, plant trees along 50 roads, build 660,000 mu of farmland protection forests, 1,500 mu of forests offering protection from wind and stopping drifting sand, plant 172,000 trees along reservoirs, afforest 30,000 mu in barren hills, and plant trees in 500 villages. [Summary] [Tianjin TIANJIN RIBAO in Chinese 27 Feb 85 p 1 SK]

SHANXI SAPLING CULTIVATION--Taiyuan, 10 Mar (XINHUA)--Shanxi Province is growing 1.01 million mu of saplings. The province can supply 2.9 billion saplings for use in this spring's afforestation. It has a surplus of some 560 million saplings for sale to other provinces. [Summary] [Beijing XINHUA Domestic Service in Chinese 0115 GMT 10 Mar 85 OW]

FUJIAN AFFORESTATION--By 5 March, Fujian Province had afforested 3.05 million mu of land, overfulfilling the provincial plan by 1 percent. [Excerpt] [Fuzhou FUJIAN RIBAO in Chinese 10 Mar 85 p 1 OW]

JIANGSU FARMLAND AFFORESTATION--Jiangsu Province has planned to reafforest a total of 600,000 mu of farmland. So far, reafforestation has been completed on 280,000 mu of farmland, or 48 percent of the total planned. [Excerpt] [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 12 Mar 85 OW]

JIANGXI AFFORESTATION WORK--By 10 March, Jiangxi Province had completed 3.13 million mu of afforestation, using manual labor, and 530,000 mu seeded from the air, overfulfilling the plan. This year, the province has carried out afforestation with funds raised by various methods, such as bank loans and self-financing, instead of simply depending on state investment. [Summary] [Nanchang Jiangxi Provincial Service in Mandarin 1100 GMT 19 Mar 85 OW]

DESERT BORDERS AFFORESTATION--Xinjiang Urumqi, 25 Mar (XINHUA)--Borders of the Taklamakan and Gurbantunggut deserts in the Xinjiang Uygur Autonomous Region are be covered with 67,000 hectares of trees this year. The job will be done by the Xinjiang Production and Construction Corps, with an investment of 17 million yuan from the central government. The corps has also raised 10 million yuan to finance farm workers to plant trees, especially in areas where the land is covered with saline and alkaline sands and tends to flood. The corps will plant fruit and other kinds of trees on 13,000 hectares of low-yielding land. [Text] [Beijing XINHUA in English 1039 GMT 25 Mar 85 OW]

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ACTIVITIES OF CHINESE SOCIETY OF CHINESE-LANGUAGE INFORMATION

[Article by Chen Shukai [7115 2885 2818] and Jiang Decun [1203 1795 1317]:
"Summary of 1982 Activities of the Chinese Society of Chinese-Language
Information"]

[Excerpts] 1982 is the second year of existence for the Chinese Society
of Chinese-Language Information. In the more than a year since it was
founded in Tianjin in June 1981, all parties concerned have made great efforts,
and under the leadership of the China Science and Technology Society and its
board of directors, with the concern and assistance of its cognizant organiza-
tion, the Research Institute of Computing Technology, Chinese Academy of Sci-
ences, and with the guidance of the cognizant units of its working organiza-
tions and specialized committees and the enthusiastic support of management
comrades, the society has done a certain amount of organizational and academic
exchange work.

Developing Varied Academic Exchanges

The Academic Committee presided over many preparatory meetings and promoted
preparatory work and academic exchange by the 5 special committees. The
special committees gave top priority to research style when conducting their
preparatory work, treating it as the lifeline of the academic personnel. In
addition, they accorded major importance to the quality and results of academic
activities and promoted the development of Chinese-character information pro-
cessing science and technology in keeping with the national economy's overall
development needs. The China Chinese-Language Information Research Society's
five academic activities in 1982 were varied and lively and achieved excellent
results. A total of 259 organizations and 409 individuals participated, sub-
mitting 197 papers; details are given in the table below.

In terms of the depth of its research, the society has already proceeded from
investigation of Chinese character input codes to character recognition,
speech recognition, establishment of language models, Chinese-language data
bases, Chinese-language data-management and special-purpose languages, and
high-level Chinese-character information processing languages, study of a
modernized Chinese-character information processing system, and a Chinese-
character intelligent terminal that has been well received by a wide variety
of users.

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Chinese-Language
Information

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Chinese Society of Chinese-Language Information Office: reports to Institute of Computing Technology, CAS — Senior Officer: Chen Shukai [8115 2885 2818]

Academic Committee: reports to China Computer Industry Bureau, Ministry of Electronics Industry — Senior Officer: Chen Liwei [8115 o500 3634]

Organization Committee: reports to Research Institute of Data Communications Technology, Ministry of Posts and Telecommunications — Senior Officers: An Qichun, Li Feng [2621 1496]

International Liaison Committee: reports to China Computer Services Company — Senior Officer: Ouyang Zhineng

Publications Committee and General Publishing Department (preparatory discussions under way)

Science Popularization Committee and Technical Consultation Committee (discussions and preparations under way)

Special Committee on Basic Theory: reports to Beijing Aeronautics Institute — Senior Officer: Liu Yuan [0491 3293]

Special Committee on Chinese-Character Information Processing Systems (planned): reports to Institute Computing Technology, CAS — Senior Officer: Dong Yunmei [5516 7291 5019]

Special Committee on Specialized Equipment for Chinese-Character Information Processing: reports to Nanjing Plant No 734 — Senior Officer: Zhang Songzhi [1728 3247 5347]

Special Committee on Chinese-Character Coding: reports to Technology Research Institute, Xinhua News Agency — Senior Officer: Guo Yefang [6753 0396 2455]

Special Committee on Natural Language Processing: reports to Institute of Linguistics, CAS — Senior Officer: Liu Yongquan

Various Provincial, Municipality and Autonomous Region Chinese-Language Information Societies: led by local science & technology societies; receive guidance in academic matters from the Chinese Society of Chinese-Language Information

Name of Academic Conference	Date and Location	Focus of Activities
Organization of Special Committee on Basic Research and academic exchange conference	11-15 May, Xiamen	--Chinese-character pattern recognition and Chinese-language processing software --Mathematical models of Chinese, computer comprehension of Chinese language --Use of computers to study linguistic structure of Chinese --Graphic and linguistic statistical research --Chinese character coding theory and research on coding evaluations standards
Special Committee on Chinese-Character Codes, first prearatory meeting	1-3 July, Beijing	--Exchange on status of Chinese character coding research in recent years --Discussion and determination of near- and long-term tasks in coding work
National scholarly exchange conference on Chinese-character information processing systems	12-18 September, Chengde	--Design of Chinese-character information processing systems --Modernization of computerized Chinese-language information processing systems --Approaches to high level language structure and dictionary design of Chinese character information processing systems --Chinese-character information processing system applications research
Special Committee on Chinese Character Coding expanded second preparatory meeting	5-9 October, Beijing	--Research on evaluation standards for Chinese character computer input codes --Priority work in Chinese character coding program and joint key efforts in overall program
Establishment of Special Committee on Specialized Equipment for Chinese-Character Information Processing and academic exchange meeting	20-24 December, Nanjing	--Chinese-character input keyboards --Chinese-character output printers --Chinese-character cathode ray tube displays --Information compression in Chinese-character data base, software design and software libraries

1982 Activities

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Chinese-character output technologies (including printed output, video display output and communications output) were developed to various degrees: currently dot-character impact printing, ink jet printing, laser printing and electro-static printing have already appeared, and these technologies, including hardware interfaces, are moving towards standardization and serialization.

Actively Developing International Exchange

Chinese-character information processing is already being accorded more importance in the information processing, data communication and computer fields. Some countries have developed special academic groups and special organizations to study and develop Chinese-character information processing science and technology and have held or are preparing to hold international academic conferences to exchange ideas in this subject area. In particular, experts in Japan and Southeast Asia are rapidly involving themselves in Chinese-character information processing research, while some experts in North America and Western Europe have also begun research work in this area. Our fellow Chinese in Taiwan and Hong Kong are among those carrying out various types of investigations aimed at modernizing the homeland's ancient language and writing.

In order to accelerate China's research and development work in Chinese-character information processing technology, with State Council's permission the Chinese Society of Chinese-Language Information will hold its International Symposium on Chinese-Language Information Processing in Beijing on 12-14 October 1983. This symposium will deal with questions of common interest and concerns to experts in various countries. It will cover:
(1) Chinese-character information processing systems; (2) Chinese-character input and output hardware; (3) Chinese character and speech recognition;
(4) Other topics related to Chinese-character information processing. In addition, small-scale exhibits will be presented during the conference. It is expected that the academic exchange will result in ties with specialists throughout the world, making it possible to jointly promote the continuous development of exchange activities on Chinese-character information processing technology.

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CSO: 4008/149

HONG KONG MEDIA ON CHINA

PRC PLANS TO DEVELOP SCIENCE PARK FOR ZHUHAI

HK160516 Hong Kong SOUTH CHINA MORNING POST   in English 16 Feb 85 Business
News Supplement p 1

[Article by Olivia Sin]

[Text] Everbright Industrial Co's three sq km industrial estate in the Zhuhai
special economic zone will be developed into a high-technology scientific park.

The chairman, Mr Wang Guangying, said yesterday the estate was designed to
cater to such industries as electronics, food processing and other light
assembling activities.

The estate design, believed to be unique in China, would have a strong appeal
to international companies, particularly U.S. companies which were accustomed
to a park-like environment, he said.

It would be equipped with offices, warehouses, staff quarters, shopping
centres and conference facilities.

About 30,000 people are expected to work on the estate when developed.

To secure professional advice, Everbright appointed the U.S.-based consultancy
engineering firm. Morrison-Knudsen International Co (MKI), to do a feasibility
study on the development of the estate, called the Bei Ling Industrial Estate.

MKI completed the study in six months and its recommendations were handed to
Everbright yesterday.

The study cost U.S. $200,000 and was shared qually between Everbright and the
Trade and Development Programme (TDP), a U.S. Government agency.

TDP promotes economic development abroad, particularly in developing countries,
by financing feasibility studies and planning services for major projects.

In the report, MKI suggested an overall approach to develop the infrastructure
of the site, the type of industries to be introduced and how to market the
estate.

It is believed that Everbright would accept most of the recommendations. Mr Wang said yesterday he was satisfied with the plan.

The report was presented at a ceremony which was attended by senior Zhuhai and U.S. officials, including the U.S. Consul-General in Hong Kong, Mr Burton Levin, and the director of TDP, Mr Christian Holmes.

The deputy director of the local branch of the New China News Agency, Mr Zheng Hua, was also present.

According to Everbright, the estate would be developed in two phases. Work has already started on the first stage covering 1.6 sq km.

Everbright, as developer of the estate, will co-operate with the Zhuhai Government to provide the infrastructure, estimated to cost more than HK$100 million.

A spokesman for Everbright said two factories had signed contracts to use the estate.

One of the factories manufactures compressors for refrigerators and air conditioners, while the other makes electric motors.

Everbright said the "high, scenic and rolling land" of the estate, bordering Macau, provided an ideal topography for the development of a "campus-like" environment.

Most of the buildings will be low rise. High-rise units will only be built at the border of the estate.

Everbright believes the unique design of the estate will add to its competitive edge compared with industrial estates in other economic zones.

The two phases will offer 2.75 million sq m of rentable space and total building space, including offices and housing, will be 1.22 million sq m.

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CSO: 4010/101