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# China Report

SCIENCE AND TECHNOLOGY

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CHINA REPORT  
SCIENCE AND TECHNOLOGY

No. 165

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REMOTE-CONTROLLED HYDROACOUSTICS DETONATOR DEVELOPED

Tianjin DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 1, 1982 p 48

[Article by Gan Jiandeng [3927 7003 4098]: "Our Nation's First Acoustic Remote-Controlled Detonator for Inland Rivers Has Been Successfully Developed"]

[Text] Underwater demolition is the major engineering method in our nation for dredging inland river navigation channels. In this type of detonation, connecting the lead wires in deep water, in swift currents, and in bubbling eddies is very difficult and dangerous. To solve this difficulty of underwater demolition, the Ministry of Communications in 1978 assigned the First Navigational Channel Construction Department of the Changjiang Navigational Channel Bureau the scientific research task of developing an "underwater ultrasonic remote-control detonator" for carrying out underwater acoustic remote-controlled detonations. Over a period of more than 3 years, the First Navigational Channel Construction Department and the Department of Electrical Engineering of Chongqing University joined efforts and developed and assembled a prototype. It has been technically tested and used in actual test demolitions on more than 100 occasions on the Changjiang in dangerous water regions under more than 60 different conditions (different geological conditions of the riverbed and different hydrological characteristics). The tests showed that the design was rational and that it could satisfy the safe distance requirement for underwater demolition and construction. In November 1981, the higher authorities of the units involved in its development invited the experts and professors of related units--including the Chinese Acoustics Institute, universities and colleges, military construction departments, and navigational channel construction departments--to evaluate it technically. They believed that the design of this detonator was feasible. The performance of the electrical circuits was stable. The electrical properties were good. It possessed a superior ability to resist interference, and it was suitable for use under conditions of strong noise in inland rivers and severe interference from construction. It is our nation's first experimental prototype inland river and inland water acoustic remote-controlled detonator.

The techniques for assembling this detonator are still imperfect, and the units involved in its development are conducting further studies and making improvements. At the same time, they are studying and developing auxiliary detonators for underwater multiple demolition. In the near future, this new technique of acoustic remote-controlled detonation will be applied in the dredging of inland river navigational channels in our nation.

APPLIED SCIENCES

SICHUAN DEVELOPS ANOTHER TWO TELECOMMUNICATIONS DEVICES

Beijing DIANXIN JISHU [TELECOMMUNICATION TECHNOLOGY] in Chinese No 2, 1982  
p 48

[Article by Wei Guozhen [614 0948 2823]: "Sichuan Provincial Post and Telecommunications Science Research Institute Again Successfully Develops Two New Devices"]

[Text] After having successfully developed the overhead exposed line ZMG 302 model high-voltage 12-channel carrier-wave facility (with a frequency band of 156-280 kilohertz), the Sichuan Provincial Post and Telecommunications Science Research Institute has developed two new devices which expand the potential of the overhead exposed line carrier-wave facility with the aim [of overcoming] the insufficient telecommunications capacity in the province and the present inability to carry out large-scale capital construction in telecommunications.

One device is the ZMC 401 type exposed line for super 24-channel carrier-wave telephone equipment (frequency band of 298 to 530 kilohertz). It adds an additional 24 carrier-wave circuits onto the pairs of lines of the newly added high-voltage 12-channel carrier-wave circuits. This means that there are 3 + 12 + higher 12 + super 24 = 51 carrier-wave circuits on one pair of overhead exposed lines.

The other device is the ZMG 303-type new high-voltage 12-channel carrier-wave equipment (frequency band, 228 to 350 kilohertz). It can be added onto four cross-indexed pairs of lines, and it supplements the ZMG 302 type device (or the ZZD-04 type device), which cannot be added to the above pairs of lines. When used jointly, the ZMG 303 device and the ZMG 302 device can add high-voltage 12-channel carrier-wave equipment onto most of the line positions of the new eight-type overhead crosslines (except for the 6th line position and the 10th line position of the new 8A type, because the degree of prevention of crosstalk is lower).

The above-mentioned two devices have already been installed on a 250-kilometer overhead exposed line with an intermediate amplifier and have been tested for more than a year. The performance has been good. The electrical quality of the telecommunications line reached the requirements of the current carrier-wave circuits. The amplification distance is the same as that of the currently used 12-channel carrier wave, and it can satisfy the distance requirements for telecommunications in the province. The original 12-channel and high-voltage 12-channel carrier-wave circuits are not affected.

APPLIED SCIENCES

DEVELOPMENT OF INDUSTRIAL MICROSCOPE, GENERATOR REPORTED

Powerful Microscope

Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 2 1982 p 32

[Article by Xu Ce [1776 3261]: "[Normal] Metalloscope"]

[Text] The Chongqing Optical Instruments Plant has successfully developed the XTZ-1 model [normal] metalloscope suitable for microscopic observation and photography of metallic structures and ordinary opaque objects within the visible light spectra. It is equipped with a bright view field, a dark view field, a light polarization device, and a photographic device. It can be used by metallurgical and machinery plants, higher educational institutions, and research units for metallic detection and examination. It can also be used to examine the designs on masked pattern plates in the manufacture of integrated circuits, and to examine fine spare parts in the instruments industry.

The device has a total magnification of 100 to 1,600 times. The device has further expanded the usefulness of the metalloscope.

Direct DC Generator

[Article by Chang Jiexiang [1603 1367 4382]: "Direct-Current Voltage Current Generator"]

[Text] The Shanghai Second Electrical Instruments Plant has successfully developed the YJ 65 model direct-current voltage-current generator. The device has been technically evaluated.

The device is a type of portable precision power source suitable for use in testing industrial meters and daily maintenance of field meters and instruments. The device has four voltage ranges of 10, 100, 1,000 mV and 10V and three current flows of 1, 10, 100 mA. The output is 0-11 V standard voltage of 11mA standard current. Accuracy is  $\pm 0.1$  percent. The instrument has good ability for resisting interference, and it has an automatic protection device. When the output surpasses the allowable value, an alarm signal goes off.

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CSO: 4008/148

NATIONAL STANDARDS ESTABLISHED FOR CONVERSION OF ALUMINUM ALLOY

Beijing GUANGMING RIBAO in Chinese 25 Apr 82 p 1

[Article by Zhong Cheng, [5883 2052]: "Our Country Establishes National Standards for Conversion Values of Aluminum Alloy Hardness and Strength; This Is A Basic Construction in Material Science; Compared to Similar Standards in Foreign Countries, They Occupy the Leading Position in Terms of Systematization, Accuracy, and Suitability"]

[Text] After more than seven years of research work, our country has established our own standards of "Conversion Values of Aluminum Alloy Hardness and Strength." These conversion values are established on the basis of our domestic material system, strength determination, and hardness standard and are based on 20 groups of conversion formulas established through nearly 80,000 experiments and data verification. They have gone through examination and approval recently and will be published for use as our national standards. Compared to similar standards in industrially advanced nations, our standards occupy the leading position and will exhibit notable economic results.

This scientific research accomplishment is the product of our great socialist cooperation. Participating in the cooperative work and in tackling the problem were principal scientific and technical personnel from eight units, including the China Metrology Research Institute, Beijing Aeronautical Materials Research Institute, No. 304 Institute of the Third Machine-Building Ministry, the Beijing Maintenance and Repair Base of the China Civil Aviation General Administration, and Northeast Light Alloy Processing Plant. The principal research personnel, Li Yuzhi [2621 3758 2535], Li Zhijuan [2621 5365 1221], Li Yushu [2621 3768 2579], Tang Rongsen [0781 2837 2773], Zong Huicai [1350 1920 2088], Yuan Huizhen [5373 1920 3791], and Guo Zhenxing [6753 2182 5281], are all middle aged engineers in their early forty's. In addition, several tens of engineering and technical personnel from 18 scientific research and production units also were responsible for some of the tasks. Their spirit of cooperation and scientific approach of dealing with facts were subjects of praises from various sectors. They were praised by experts involved in the area as having accomplished in an outstanding fashion a "basic construction project" in material science.

The National Bureau of Standards entrusted the China Metrology Research Institute to organize a national standards examination and approval meeting in Beijing during last March and early April on the "Conversion Values of Aluminum Alloy Hardness and Strength." It was pointed out during the meeting that the research plan for this work was rational. Materials selected were extensive, representative, and in common use. Sample processing was rigid and conducted with great care. The designed and selected heat treatment plan was a successful one. The testing instruments were accurate and data were reliable. Both the data processing and the establishment of conversion curves were rigid and scientific. The conversion values are accurate. They are reliable as a result of verification and have practical values. The meeting recognized that the accomplishment is a breakthrough in both scientific research and in technical application and that it is creative. It has filled a void in our basic standards. Compared with similar standards in industrially advanced countries, the established standards occupy the leading position internationally. The economic results will be extremely notable when our implementation of national standards has been thoroughly carried out. As an example, if these standards were adopted in a certain factory for the inspection of aluminum alloy materials and the testing of spare parts, nearly 10 million yuan would be saved annually.

#### What Is A Standard Conversion Value of Hardness and Strength?

The measurement of hardness is extensively used in aeronautics, aerospace, electronic, metallurgical, machinery, and chemical engineering industries. Metals, alloys, rubber, plastics and their products, soil, lumber, coal, leather, glass fibre reinforced plastic, and even fruits have their hardness indice. Hardness tests must be conducted on materials of all sizes from rails, large rollers, and aeronautical spare parts, to wrist watch spare parts and electronic parts. The use of hardness tests on various materials has the special characteristics of simplicity, speed, avoiding damages to spare parts, and diversification.

Strength is a basic property of materials. To a relatively large degree, the strength of a material determines its usefulness. The major difficulty in directly testing the various strengths of a material lies in the need to break the material or the spare part itself. Since the 1930's, people have discovered close relationships between the hardness of various standard and between hardness and strength. However, it has only been possible to carry out rough calculations. In modern industrial production, there are many spare parts which are specially large, specially small, specially thick, specially thin, or geometrically irregular. To test their strength in accordance with design requirements is extremely difficult. For this reason, they are normally tested for hardness, and the hardness is then converted to strength based on a close relationships. To use this method, it is necessary to establish a set of uniform scientific standards, namely "conversion values." In the last 10 years, many countries have been conducting research on conversion value standards between hardness and strength.

With the rapid development of the aeronautics, aerospace, and electronics industries, requirements for hardness and strength conversion values for aluminum alloys have become greater and greater. However, because of the large volumes of work, large areas affected, and the very high degree of difficulty, up to now only a few industrially advanced countries have conversion value standards for hardness and strength of aluminum alloys. Moreover, only three sets of conversion standards are available. Also, the alloy systems and technological conditions are not differentiated, resulting in relatively large errors. In the "Aluminum Alloy Hardness and Strength Conversion Value" standards established by our country, nine sets of conversion standards are listed. Moreover, conversion relationships have been established for different alloy systems and for many tens of technological conditions. The conversion accuracies are considerably greater compared to those achieved abroad. This set of "conversion values" provides a systematic numerical base for the scientific research, engineering design, and production departments in material inspection, spare parts testing, and fault analysis. It will have a direct or indirect effect in assuring product quality, saving raw materials, improving productivity, and the study of new technology. The economic results from its utilization are therefore very large.

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CSO: 4008/159

## APPLIED SCIENCES

### VACUUM TECHNOLOGY STANDARDIZATION COMMITTEE MEETS

Shenyang ZHENKONG [VACUUM] in Chinese No 1, 1982 inside backcover

[Article by Zhang Shufan [1728 2579 5400]: "1981 Working Conference of the National Technical Committee for Standardization of Vacuum Technology Is Held in Chengdu"]

[Text] The National Technical Committee for the Standardization of Vacuum Technology held its 1981 working conference at the Jinjiang Hostel in Chengdu from 2 to 7 December 1981. A total of 22 committee members, delegates, and secretaries attended. The liaison secretary of the National Bureau of Standards, Comrade Shi Baoquan [4258 0202 2938], also attended. Through the joint efforts of all comrades at the conference, the conference realized its predetermined goals and was a success. Delegates expressed their appreciation for the detailed arrangements and the massive work done by the 708 Plant for this conference.

The conference first reviewed a draft of the nationally standardized terminology for vacuum technology compiled by the Shenyang Vacuum Technology Institute. The draft was sent to all committee members and related units on 27 August to solicit their opinions. The Shenyang Vacuum Technology Institute received comments from seven committee members. The institute conscientiously studied them and again revised the draft. The comrades attending the conference conscientiously and fully discussed the revised draft again, and unanimous opinions were expressed. The draft was written again by the drafting unit according to the GB1.1 criteria, and the participants agreed to submit the draft as the national standard for review and approval. The draft of the nationally standardized symbols in vacuum technology was also submitted with the drafts of the terms and technical terminology of vacuum technology for review and approval.

The conference then discussed the detailed articles of standardization as drawn up by the committee. The Secretariat reorganized the opinions expressed at the conference regarding the detailed articles and submitted them to the National Bureau of Standards for review and approval.

The conference discussed the summary of the work performed by the committee in 1981 and the work plans for 1982. Everybody believed that although the

committee had been established only 1 year, a lot of work had been done. In future work, conferences should not be held too often. All conferences which can be combined should be combined. Conferences must pay attention to results. Next year's working conference should have a richer content. The Secretariat must strengthen its liaison with members. Related work must be reported to the committee members in time. Finally, everyone expressed willingness to work together to elevate the level of standardization of vacuum technology in our nation.

During the conference, delegates visited the Qingcheng Paper Manufacturing Plant and the 708 Plant. The delegates learned a lot during these visits, and their confidence in carrying out the work of standardizing the terminology of vacuum technology was strengthened.

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CSO: 4008/147

APPLIED SCIENCES

REPORT OF CHINA MECHANICAL ENGINEERING SOCIETY MEETING

Beijing QIZHONG YUNSHU JIXIE [HOISTS AND CONVEYANCES] in Chinese No 1, 1982  
p 44

["Academic Reporting Conference on Hoists Sponsored by the Materials Transportation Society of the China Mechanical Engineering Society"]

[Text] The Academic Reporting Conference on Hoists, jointly sponsored by the Materials Transportation Society of the China Mechanical Engineering Society and the Materials Transportation Society of the Hubei Provincial Mechanical Engineering Society, was held from 1 to 6 November 1981 in Wuchang. The head of the Hubei Provincial Bureau of Machinery Industry and president of the Hubei Provincial Mechanical Engineering Society, Bai Luo [4101 3157], attended the opening ceremony, as did Zhang Defu [1728 1795 3940], principal of the Wuhan Water Transport Engineering Academy. Prof Yang Changkui [2799 7022 7503] of the Dalian Engineering Academy and president of the National Materials Transport Society and eight directors attended the conference.

This academic reporting conference on special topics was the first nationwide professional academic conference held since the founding of the National Materials Transportation Society in October 1980. The conference exchanged a total of 50 papers. Among them, 11 were exchanged at the general conference, 13 were exchanged in group meetings, and the rest were exchanged in published form. During the conference, delegates from the Hot Rolling Plant and the Cold Rolling Plant of the Wuhan Steel Works gave a brief introduction to imported hoists, and the delegates visited the sites to learn.

The central topics of the conference were to analyze and compare the technical standards of foreign and domestic hoists, to review and summarize the achievements and problems in our design and manufacture of hoists, and to study the key problems now existing in domestically produced hoists and the ways to solve these problems. The delegates unanimously felt that at present, the key outstanding problems that exist in our nation's hoists are that the hoists' speed reducer and fundamental spare parts urgently need to be renewed and replaced, that progress in the serialization, generalization, and standardization of fundamental spare parts for the hoists is slow, that the technical performance of electrical equipment and electrical control equipment on hoists is backward, their operating life is short, and their

reliability is poor. All these things have seriously affected and hindered the improvement of the technical level of the entire hoist.

The conference hoped the delegates and the board number of technical personnel in the hoist industry would discuss and study key technical problems that exist in our nation's hoist technology, and that have been pointed out during academic exchange and discussions at the conference, in order to realize more achievements and make even greater contributions to satisfying the needs of the various professions and hasten the improvement of the standard of our nation's hoists.

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CSO: 4008/147

APPLIED SCIENCES

MECHANICAL ENGINEERING SOCIETY HOLDS ACADEMIC MEETING

Dalian ZUHE JICHUANG [MODULAR MACHINE TOOL] in Chinese No 3, 1982 back cover

[Draft supplied by Jie Jisheng [6043 0370 3932] and Su Boguang [5685 0130 0342]: "Mechanical Processing Society of the Chinese Mechanical Engineering Society Holds Academic Discussion Meeting"]

[Text] The 1981 academic discussion meeting of the Production System Academic Group of the Mechanical Processing Society was held in Dalian during 11-14 December. The meeting was attended by representatives and authors of papers from factory enterprises, higher institutions, scientific research units, and provincial and regional mechanical engineering societies from Beijing, Shanghai, Tianjin, Sichuan, Jiangsu, Liaoning, Jilin, Heilongjiang, Shandong, Shanxi, Hebei, Henan, Hubei and Hunan. The academic discussion meeting was chaired by directors Wang [Yong] [3769 (6978)] and Zeng Ying [2582 5391] of the Mechanical Processing Society, Chinese Mechanical Engineering Society. The focal topics of academic discussion were "technical development policy for mechanical processing" and "technical economics of high efficiency, specialization equipment." During the academic discussion, representatives expressed their own views as well as their understanding, ideas, and suggestions relative to the following problems:

1. Relationship between the promotion of automation techniques in the machine industry and the current problem of working by manual labor.
2. Current problems in the adoption and promotion of high efficiency equipment in the machine industry.
3. How to evaluate on a total and rational basis the technical economic benefits of adopting high efficiency equipment?

The 15 papers presented during academic discussion meeting were:

- |                               |  |
|-------------------------------|--|
| Zhang Shu [1728 2562]:        | A Discussion on Our Country's Direction of Development of Integrated Manufacturing Systems |
| Chen Xunjie [7115 1789 0094]: | A Probe Into Our Country's Future Development of High Efficiency Automated Production      |

- Pan Guishan [3382 6311 0810]: A Probe Into Our Country's Automation Problem
- Jiang Hanzhang [5592 5060 4545]: A Probe Into Our Country's Development of Numerically Controlled Machine Tools
- Hu Zhizhang [5170 3112 3864]: A Brief Talk on the Suitability of Automated Equipment in Sewing Machine Manufacture
- Li Weikun [2621 4850 2492]: A Probe Into Problems in Machine Processing Automation Line
- Zhang Jijun [1728 0679 0193]: System of Standards and Mathematical Evaluation of Technical Economic Results of Combination Machine Tools and Their Automation Lines
- Wang Lanrong [3769 5695 2837]: Introduction to Method of Computation of Machine Utilization Time Limit
- Nao Kai [6984 0418]: Simple Evaluation of Economic Results of Equipment Investment
- Shi Xiongmao [2457 7160 5399];  
Yang Zhicheng [2799 5268 6134]: Computation of Principal Technical Economic Standards of Combination Machine Tool Automation Lines
- Wang Rixin [3769 2480 2450]: Preliminary Probe Into the Service Life of Combination Machine Tools and Their Automation Lines
- Wang Rixin [3769 2480 2450]: Probe Into the Standard Investment Results Coefficient and Its Method of Computation for Combination Machine Tools and Their Automation Lines
- Bai Lianzhong [4101 6647 1813]: Price Comparison Factors Considered in the Method of Calculating the Cost of Modular Machine Tools and Their Automation Lines
- Yu Yicheng [0060 6318 3819];  
Chen Bingsen [7115 3521 2773]: Analyzing the Economic Results of Making Modular Machine Tools Flexible

Based on ideas and suggestions of the representatives, the secretariat of the Production System Academic Group will improve the exchange of information of interest, organize the discussion of special academic subjects, and develop technical inquiry service and other forms of academic activities.

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CSO: 4008/152

APPLIED SCIENCES

EXPERIENCES IN 'UNITIZED' TRANSPORT TECHNIQUES EXCHANGED

Beijing QIZHONG YUNSHU JIXIE [HOISTS AND CONVEYANCES] in Chinese No 2, 1982  
p 64

[Article by Li Shoulin [2621 1343 2651] of the Hoisting and Conveying Machinery Research Institute of the First Ministry of Machine Building: "Brief Report on the Exchange and Learning Class in Unitized Transport Techniques"]

[Text] To initiate studies in the basic knowledge of the techniques of materials flow processes and to exchange experiences in developing unitized transport techniques inside factories, an "exchange and learning class in unitized transport techniques" was held in Guangzhou from 7 to 18 October 1981 by the Hoisting and Conveying Machinery Research Institute of the First Ministry of Machine Building and the Guangdong Provincial Machinery Research Institute, with the help of the Ninth Academy of the First Ministry of Machine Building, the Food Grains Research Institute of the Ministry of Food, the Design Department of the No 2 Motor Vehicle Plant, the Xiangtan Electrical Motor Plant, the Beijing Low-Voltage Electrical Device Plant, and the Beijing First Machine Tools Plant. A total of 52 delegates from 39 factories and enterprises, design academies subordinate to the First Ministry of Machine Building, the Ministry of Food, the Ministry of Light Industry, and the Ministry of Railroads and from some provincial and municipal machinery bureaus attended the learning class. The Scientific and Technical Department of the First Ministry of Machine Building and the Guangdong Provincial Machinery Bureau also sent delegates to attend the class and to provide guidance.

The learning class conducted lectures in nine subjects: 1. Basic knowledge of material flow; 2. Basic knowledge of systems engineering; 3. Planning of materials transport systems in machinery plants; 4. Designing materials transport systems in machinery plants; 5. Warehousing; 6. Application of storage models in the production of standard motor vehicle parts; 7. Analysis of the quantity of serving trays and transport equipment needed; 8. Brief introduction to unitized transport tools; 9. Serving trays and transporting by serving trays. In addition, the No 2 Motor Vehicle Manufacturing Plant, the Xiangtan Electrical Motor Plant, the Wuxi Diesel Engine Plant, the First Academy of the Ministry of Agricultural Machinery, and the Qijiang Gear Plant also introduced their work and experiences in the development of unitized transport techniques and management at their respective units.

The delegates unanimously came to believe, because of the increased varieties of products in modern production and because of the complex productive organization, that the concept of materials transport is no longer the simple transporting of materials from locality A to locality B or the simple reduction of physical labor, but rather that it is a comprehensive problem involving production and the system of supply and marketing. It should be an organic and important part of the production system. Therefore, studying the basic theory of materials transport, and planning and designing material flow systems in factories from the viewpoint of systems engineering are the key to promoting and developing techniques for materials transport. The delegates also believed that not only is unitized transport the organizational format for solving the packaging of finished products and the transporting of spare parts within factories, but it also fundamentally changes the incidence of damage, the large-scale drop in production quality, and the serious hindrance to the development of production in the past due to collision, rust, pollution and loss of spare parts during transport. In the future, while further popularizing and perfecting unitized transport, we should also manage well the generalization and standardization of tools at work posts, serving trays, and containers, and hasten the development and production of various types of superior quality and inexpensive unitized transport machinery and tools suitable for use within shops and between shops.

Delegates to the conference placed a great deal of hope in the development of material flow techniques for the system of the First Ministry of Machine Building according to the directives of Technical Document No 360 (81) drawn up by the Hoisting and Conveying Machinery Research Institute of the First Ministry of Machine Building. It is hoped that the Hoisting and Conveying Machinery Research Institute will strengthen the leadership and organization of material flow techniques.

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APPLIED SCIENCES

INFORMATION ON DESIGN OF VIBRATING MACHINERY EXCHANGED

Beijing QIZHONG YUNSHU JIXIE [HOISTS AND CONVEYANCES] in Chinese No 2, 1982  
p 64

[Article by Li Shuzhong [2621 2885 1813] of the Zhaoyang Dongfanghong Machinery Plant]

[Text] From 16 to 20 August 1981 in Zhaoyang, Liaoning, the (preparatory) design society of the China Mechanical Engineering Society held the nation's first academic meeting to exchange experiences concerning the design of vibrating machinery. Some 67 delegates from 53 units of related universities and colleges, scientific research and design agencies, and production and user departments attended the meeting. The meeting heard special reports by the Northeast Engineering Academy, the Zhaoyang Dongfanghong Machinery Plant, and the Qidashan Mineral Ore Selection Plant on scientific research, design, and use of vibrating machinery. Scientific research achievements in theoretical research and technical research, achievements in designing and testing, and achievements in major technical renovation realized during the past few years in the field of vibrating machinery in our nation were exchanged. The direction of development of vibrating machinery was explored, and 33 academic papers were exchanged.

The meeting established a technical cooperation network centered around the Hoisting and Conveying Machinery Research Institute of the First Ministry of Machine Building, the Northeast Engineering Academy, the Machinery Research Institute of the Luoyang Mines, the Zhaoyang Dongfanghong Machinery Plant, the Design Research Academy of the Shenyang Coal Mines, and the Qidashan Mineral Ore Selecting Plant. This has established an organizational foundation for the future development of exchanges of information and technical cooperation. The liaison office of the core group is temporarily located at the Zhaoyang Dongfanghong Machinery Plant.

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CSO: 4008/147

MICRODISPLACEMENT DEVICE MANUFACTURED BY XINDU PLANT

Beijing JICHUANG [MACHINE TOOL] in Chinese No 2, 1982 p 48

[Article by Tao Jiale [7118 1367 2867]: "0.05  $\mu\text{m}$  Microdisplacement Device"]

[Text] The Xindu Machinery Plant followed up its development of an 0.1  $\mu\text{m}$  microdisplacement device in 1980 with the successful development of a 0.05  $\mu\text{m}$ -class microdisplacement device in August 1981. This type of device has a new structure, its cost is low, it is small, and its precision for repeated positioning is very high. Over a total distance of 0.05  $\mu\text{m}$  intervals. It is suitable for microadjustments of various types of precision instruments and for microfeeding of super-precision machine tools.

The device was carefully examined and tested by the Chinese Weights and Measurements Scientific Research Academy in September 1981. The maximum deviation in displacement with a precision of 0.05  $\mu\text{m}$  for all positions was  $\pm 0.02 \mu\text{m}$ , and the precision of repeated positioning was 0.04  $\mu\text{m}$ .

Five units of this device were developed as the first batch. At present there are several series, and they are actively being arranged for small-batch production so as to provide commercial products to relevant professions and sectors as quickly as possible.

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CSO: 4008/147

FORMATION OF BEIJING SCIENCE POPULARIZATION REPORTERS ASSOCIATION

Beijing YINSHUA JISHU [PRINTING TECHNIQUES] in Chinese No 2, 1982 p 13

[Article by Jin Keji [6855 0344 4764]: "Formation of Beijing Science Popularization Reporters Association"]

[Text] The Beijing Science Popularization Reporters and Editors Association was formed in Beijing on 13 January 1982. This is a mass organization of an academic nature of reporters and editors engaged in publicizing science popularization from the publicity departments of newspapers, journals, broadcasting [organizations], and television. It is an academic organization under the Beijing Municipality Science Association. It is also the first of the local organizations to be formed under the China Science Popularization Reporters and Editors Association.

The planning for the formation of the Beijing Science Popularization Reporters and Editors Association was started last August at the time the national association was formed. The Beijing area has nearly 90 newspapers, journals, broadcasting [organizations], and television stations which are engaged in publicizing science popularization, ranking first in the country in terms of techniques, extensiveness of content, and audience. The formation of the Beijing Science Popularization Reporters and Editors Association has an important significance in uniting the large numbers of science popularization reporters and editors in the Beijing area to develop academic exchange, study work patterns, improve quality of publicity, and better serve the four modernizations.

As a result of full deliberations and democratic consultations prior to the meeting, He Xing [0149 1630] and 35 others were recommended to serve as directors on the First Board of Directors of the Beijing Science Popularization Reporters and Editors Association. Party Unit Secretary Comrade Tian Fu [3944 1133] of the Beijing Municipality Science Association came to the meeting to give a talk. Leading comrades of publicity departments for news and publications also attended the meeting.

5974

CSO: 4008/152

## APPLIED SCIENCES

### SCIENCE AND TECHNOLOGY ACHIEVEMENTS REPORTED

Shenyang DONGBEI GONGXUEYUAN XUEBAO [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY]  
in Chinese No 1, 1982 p 106

[Draft material supplied by Xiao Yuchang [5135 3768 2490]: "Science and Technology Achievements"]

[Text] Model  $\Delta\phi 250/\phi 310$  Reaming Tool for Mine Use

This is a modern large drill tool, successfully developed and manufactured jointly by our institute, the Shanghai No 1 Gasoline Engine Plant, and the Dagushan Iron Mine in Anshan. It has the advantages of simple construction, large self-advancing force, energy saving and drilling of large holes with small axle pressure. Through trials in industrial production, it has shown that, compared with the  $\phi 310$  drill bit used originally and when drilling in  $f = 16\sim 18$  rocks, the drilling efficiency is improved by 22.08 percent, cost is reduced by 53.27 percent, the amplitude of drill vibration is reduced by two-thirds, the accident rate of the drill is lowered, and the life of the drill bit is increased by 177.22 percent. Based on the overall condition of using the 60-RIII drill and  $\phi 250$  drill bit at the Dagushan Iron Mine, changing to the use of the  $\phi 250/\phi 310$  reaming tool for hole drilling means the saving of 98,000 yuan in drill tool expenses annually for each drill used.

Model  $\Delta$ SFS-300 Pneumatic Rock Breaker

Aimed at the problem of secondary breaking of large rocks which are common in metal and nonmetal mines, our institute cooperated with involved mines and plants of the Beijing Iron Mine and the Beitai Iron Mine and successfully manufactured the "Model SFS-300 pneumatic rock breaker." It replaces the traditional and outdated breaking methods of manual hammering, secondary blasting with explosives, or secondary drilling and blasting. It greatly reduces the labor intensity of the workers and achieves safety in production at the mines. This type of rock breaker has the advantages of structural reliability, good stability, high adaptability, large crushing power and high productivity. The economic results of this equipment are notable. Because of the savings in blasting materials, chutes and screens, the Beijing Iron Mine reduced its expenditures by over 100,000 yuan each year for each breaker used. With a slight modification of accessory equipment, this machine can also be used for breaking up old reinforced concrete roads, cleaning furnace linings in metallurgical enterprises, and breaking piles in the construction enterprises.

## Model G-01 Distillation Nitrogen Fixation Instrument

Aimed at overcoming the disadvantages of large distillate volume, lengthy time of determination and low determination sensitivity of the [Kelly] nitrogen fixation distillation installation which is widely used both here and abroad, our institute has successfully developed and built the "Model G-01 distillation nitrogen fixation instrument." It employs the unique methods of direct heating and reduced pressure distillation as well as neutralization and titration during distillation. The advantages of small distillate volume, rapid determination, wide range [of application], good repetitive results and high accuracy have been achieved. The entire installation is logically designed, compact, easy to operate, easy to control and low in cost of construction. It is suitable for the determination of nitrogen content in iron and steel, nonferrous metals, alloys, pure metals, slag, chemical fertilizers, soil and other products.

5974

CSO: 4008/150

APPLIED SCIENCES

TECHNICAL EVALUATION MEETING ON QY8 CRANE TRUCK CALLED IN WUHAN

Tianjin GONGCHENG JIXIE [CONSTRUCTION MACHINERY AND EQUIPMENT] in Chinese No 3, 1982 p 48

[Draft material supplied by Li Weimin [2621 0251 3046]: "Technical Evaluation Meeting on QY8 Crane Truck Called in Wuhan"]

[Text] A technical evaluation meeting on the QY8 crane truck, jointly designed and trial manufactured by the Hubei Construction Machinery and Equipment Plant and the Construction Machinery and Equipment Research Institute of the State Capital Construction Commission [Guojia Jianwei], was held in Wuhan Municipality, Hubei Province, from 24 December to 26 December 1981.

Participating in the meeting were 50 representatives from 31 units all over the country, including universities and special institutes, research departments, manufacturing plants concerned, and user departments. The meeting was jointly chaired by the Bureau of Construction Machinery and Equipment of the State Capital Construction Commission and the Construction Commission of Hubei Province.

The QY8 crane truck is a totally turn-around, adjustable arm, hydraulic crane mounted on an EQ140 truck base. It is suitable for such work as industrial and civilian construction, cargo loading and unloading, and equipment installation.

During the meeting, reports on the design, manufacture, trial, industrial evaluation and consumer use of the QY8 crane truck were heard. Technical materials were studied and the operation of a prototype machine was viewed. It was agreed by all the representatives that the equipment has superior technical properties, the design parameters were logical, the model has a pleasing appearance, and that in the domestic design of crane trucks the use for the first time of the new techniques of dual speed hoisting and guide valve control was a successful one. The prototype machine had been through complete testing and operated through 5,350 operational cycles in five types of working conditions. The machine was then taken apart for inspection and found to meet good quality standards and design requirements. It had received a good evaluation by consumers because of its easy operation, high productivity, and easy maintenance and repairs. In summary, the trial manufacture of the machine was a successful one, meeting the advanced standards in China. The meeting recommended that a small quantity of the machines be produced.

5974

CSO: 4008/150

MACHINE TOOL INDUSTRY CAN SERVE SEWING MACHINE INDUSTRY

Dalian ZUHE JICHUANG [MODULAR MACHINE TOOLS] in Chinese No 4, 25 Apr 82  
inside front cover

[Article by Gao Baoliang [7559 0202 5328]]

[Text] The development of a sewing machine industry in China is an implementation of the national economic readjustment policy of recent years. For this development, there is certainly a great deal to be done by the machine tool industry. In the past 3 years, more than 200 special tools were designed for the sewing machine industry by the Dalian Research Institute of Modular Machine Tools alone.

The large scale development of the sewing machine industry began in 1980. It was launched with a great force. The 63 designated sewing machine plants of the country almost all demanded new equipment or refurbishment. Just for making the casing, the base plate, and finishing after painting, if each plant is to be provided with one set of tools, 3087 machine tools will be needed. At an estimate of 30 thousand yuan each, the total may reach 92.61 million yuan. This is a very considerable figure. Since 1980, all the sewing machine plants have ordered a large number of tools from the machine tool plants of the Ministry of Light Industry (such as Nanjing Light Industry Machinery Plant, the Shenyang Light Industry Machinery Plant, and Taian Light Industry Machinery Plant) and the various plants of the Bureau of Machine Tools, but they have not ordered a sufficient number of them. This is especially true with the after-painting finishing tools (about 16 tools in a set.) These tools were ordered by several plants only. The remaining large number of plants are still waiting.

Furthermore, a sewing machine contains 147 parts, of which 75 parts need special tools to process. If each of these requires 4 special tools, a total of 300 machine tools are needed. At an estimate of 10 thousand yuan per tool, each sewing machine plant will need 3 million yuan. For the 30 parts-plants of the country, the total may reach 90 million yuan. It appears that the sewing machine industry is a good market for the machine tool industry. The question is how are we going to take over this market.

What are the current problems in our machine tool industry? The first problem is the fact that many machine tool plants do not recognize this market. The second problem is the fact that many plants do not know how to take advantage of this situation. The third problem is the fact that the level of management of our plants

is too poor to satisfy the requirements of the sewing machine industry. The fourth problem is the fact that the price of the tools we supply is too high, the delivery time is too long, etc. So, what should we do?

(1) We should assume an attitude of servicing the light industry markets. The light industry markets must not be looked upon as a matter of expediency with no long term considerations. This is a problem the current leaders of all levels should give their proper attention.

(2) The various plants should seriously organize technicians to design special equipment and encourage them to be positive about it. What should be done if all these plants say they have no sufficient capacity for this job? Attention should be seriously given to the educated ones to cause them to be fully functional. The work of designing should be regarded as the first work process in the production procedure.

(3) The scientific research departments of these plants should start the work of studying and designing products. They must not set scientific research and designing work aside and ignore it. All the plants should be producing the first generation products while thinking about the second, the third generation products. This is the only way to bring business to one's own plant and to make it prosperous.

(4) All the plants should strengthen market surveys and technological researches. They should behave like good counselors and advisers of the users in matters of equipment selection. For example, when special tools are used to make certain key parts, the quality of these parts will improve and moreover the equipment capacity of the entire plant may thus be more fully utilized to bring about overall improvement to its productivity. This kind of additional economic benefit is especially very apparent when some old factories adopt technical reform.

(5) The plants should strengthen plant management, reduce the cost of production, shorten the production cycle, etc. They should study methods of scientific management and designs of work procedures to find ways of reducing cost and production time so as to shorten the production cycle.

(6) The quality of products should be strictly controlled. Reputation is the life of the factory. There should be a guarantee that only qualified products may be allowed to leave the plant. There should be precise and practicable indices of reliability for all types of special tools in the catalogue.

(7) The order and delivery contracts should be faithfully carried out and after-sale services should be satisfactorily provided. This is also a problem demanding our attention. At present, some plants want jobs so eagerly that they sign contracts with many users but cannot deliver the goods on time. They delay, delay, and delay to cause very bad reactions from the users. This sort of thing will affect our reputation. After machine tools are delivered to the users, we should also enthusiastically help them adjust and test these tools.

With the development of the national economy, all industries are trying to improve the quality of their products and expand the number of products they produce. This is true with the sewing machine industry also. We should provide good service as our users grow and prosper. This is the only way to keep our industry vital and successful for ever.

ERRATUM: This article is republished from JPRS 80949, of 1 June 1982, No 163 of this series pp 6-12 to correct certain terminology.

APPLIED SCIENCES

ERRATUM: CHINESE EVALUATE SA 365N DAUPHIN 2 HELICOPTER

Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 4, Apr 82 pp 5-7

[Article by staff reporters of 'INTERNATIONAL AVIATION']

[Text] On 6 February 1982, the sky was clear, but the air around the capital's airport was filled with early spring chill. Rows of passenger cars carrying over a thousand spectators from all over the country were heading toward one of the flight test fields in the airport. They all came here to witness the first exhibition flight of the first SA 365N Dauphin 2 helicopter (No 6013) produced in this country.

At 9:30 sharp, accompanied by the roaring sound of the engine, a white and blue Dauphin 6013 was lifted from the ground. At a height of approximately 5 m, the helicopter made a sharp 90° turn to the right and began to climb upward with great speed. In a short while, it began demonstrating a number of maneuvers: diving and dashing at the review stand; climbing vertically and then hovering at an altitude of 400 to 500 m; making a 90° right turn followed by a left turn, and suddenly "dropping" straight down; then gradually climbing backward again as the spectators applaud with admiration. During the 15-minute performance, over 20 maneuvers were executed one after another; they fully demonstrated the superior mobility of the Dauphin helicopter.

As soon as the flight exhibit ended, the spectators rushed toward the helicopter to congratulate the Chinese and French pilots who took part in this exhibit. We took this opportunity to arrange an interview with the planning director of the Technology Advancement Department of the Chinese Aeronautical Technology Import-Export Company (CATC), asking him about the joint Sino-French effort in producing the Dauphin helicopter. We also located the chief engineer of the Harbin Airplane Factory to ask him about the main features of the Dauphin 2 helicopter. Finally, we interviewed the co-pilot of this demonstration flight, and talked about his experience in operating the Dauphin. The contents of these interviews are summarized below.

Sino-French Joint Venture

The SA 365N Dauphin 2 helicopter is a medium-size general purpose helicopter developed by the French Aerospatiale Company. It was evolved from the 365C model and was issued a French Aviation Certificate in 1981. It is a technologically advanced product of the late 1970's. Recently, China adopted the French manufacturing techniques and began production of the helicopter as well as the engine. Prior to reaching a decision to select this model, the CATC

had made a detailed analysis and comparison of the more advanced helicopters from various countries and had visited many companies abroad.

In July 1980, the CATC signed a technology transfer contract with the French Aerospatiale Company, which was later approved by both governments in October of that year. The contents of the contract were as follows: 1) France will transfer the complete set of technical procedures for manufacturing the helicopter and the engine to China; 2) France will initially deliver two completed helicopters to China; subsequently, it will deliver certain parts to be assembled in China; in time China will manufacture all the parts and assemble the entire helicopter. The Dauphin 6013 which took part in the demonstration was the first of the two helicopters which were flight-tested and certified in France and delivered to China on 29 January of this year. The contract also stipulated that as compensation China will return a certain quantity of manufactured helicopter parts to France. With this type of joint venture agreement not only can we learn the most advanced helicopter technologies and acquire the products with minimum time delay, but also save considerable foreign exchange by not directly purchasing the product from abroad.

#### Main Features of the Helicopter

The SA 365N Dauphin 2 helicopter is considered a fairly advanced product among helicopters of a similar class. It is light-weight, and has high speed capability; its moving parts are reliable and have relatively long design lives; it is also easy to maintain and operate. Its design was based on the following guidelines: large passenger cabin easy entrance and exit; high cruising speed and large effective payload; long range with good economy; high degree of maneuverability and mobility; long operating life between repairs and ease of maintenance. In the development and production of this helicopter, many advanced technologies were incorporated. The main features of this helicopter include the following.

**Composite Material Rotor:** The rotor consists of 4 blades made of fiberglass and graphite. The rotor type is OA2 212-207; it has a twist of  $10^\circ$ , a blade-tip sweep of  $45^\circ$ ; its turning efficiency is 0.75, and its nominal speed is 348 rpm. This type of composite material is strong and easy to machine; it was used on another helicopter Gazelle made by the French Aerospatiale Company. It has been reported that during an accident where two helicopters collided, the rotary blades of the Gazelle chopped the other helicopter into two halves; the body of the Gazelle was destroyed, but the rotary blades were essentially undamaged. Furthermore, metallic blades have poor corrosion resistance; they must be constantly inspected using microscopes to search for corrosion spots caused by sea water or chemical gas; if not discovered in time the corrosion spots may develop into cracks and cause the blades to fracture. Blades made of composite materials do not have this problem, which is a desirable property when operating over ocean surfaces.

The leading edge of each blade is covered with a stainless steel belt for protection against damage by debris. The four blades can also be folded backward to save parking space. The time required to fold the blades is approximately 10 minutes; for subsequent operation the blades can be directly unfolded without further adjustment. If one of the four blades is damaged, each can be replaced individually; the replacement blade can also be used without adjustment.

**Star-shaped Flexible Blade Housing:** This is one of the new composite material blade housings developed by France in the late 1970's. It has a star-shaped plate structure made of fiberglass and epoxide material. The plate arms have high damping rigidity and flexibility required for swinging motion; they also have visco-elastic damping devices.

The main advantages of this type of blade housing are that it does not require lubrication or maintenance, and it is highly reliable. For example, if a metallic blade housing develops a crack, it is likely to be destroyed under the action of centrifugal forces, and break into pieces. The composite material blade housing, on the other hand, will automatically stop operation under these conditions; furthermore, the cracked component will change color, making it easy to identify and replace. The composite material blade housing also has a simple structure, with only 64 parts, which is 4/5 less than the metallic blade housing of the Alouette; its weight is only 57 kg, which is 55 percent that of the Alouette. The Dauphin helicopter suffers little vibration during flight; this is partly due to the vibration-suppressing counterbalance weight in the rotary blade, and partly due to the special design of the blade housing. The reduced vibration level results in extending the useful life of each component of the helicopter, and the airborne instruments and equipment.

**Culverted Tail Rotor and Nonsymmetrical Vertical Tail:** The tail rotor is located within the vertical tail. It has 13 rotor blades; its diameter is 0.9 m, and its speed is 4,700 rpm. The life span of the tail rotor blades is essentially infinite, and there is no lubricated axle. This type of tail rotor is safer than the conventional type in that it will injure ground personnel, and the pilot need not worry about it hitting objects on the ground or tree tops when operating at low altitudes.

The vertical tail of the Dauphin has a relatively large area and uses a nonsymmetrical wing design, so that it can produce a certain amount of counter-torque. Even when the tail rotor fails, this design will enable the helicopter to return to the airport at cruising speed, and perform a glide landing at a speed of 75 km/hr. This countertorque also allows the helicopter to cruise at high speed with almost no power loss due to the tail rotor. Therefore, the fuel consumption of the Dauphin is less than helicopters with conventional tail rotors, and its range is correspondingly increased.

**Propulsion System:** This helicopter has two Arriel 1C turboengines developed by the Turbomeca Company during the 1970's. The peak power of each engine is 710 hp; the power to weight ratio can be as high as 6, and the fuel consumption is only 250 g/hp-hr. The engines are equipped with an automatic power equalizing device, so that when one of the engines fails, the other will automatically increase its power to an emergency level. Therefore, the Dauphin helicopter can perform a type-A take-off under full load conditions; conventional helicopters under similar conditions must reduce payload (passengers or fuel) to meet aviation regulations. The single-engine climb rate can be as high as 1.7 m/sec. In addition, the engine also has a fast-response advancing device connected to the blade pitch, which allows the power to increase from minimum to maximum in only 2 seconds.

The engine structure is of a molded design, which only has 5 unit components. To disassemble the engine into individual units only takes 8 minutes; to

assemble the engine requires 24 minutes. When the engine is malfunctioning, it is only necessary to replace the unit which is defective.

**Composite Material Body Structure:** The body structure contains 59 percent composite material, 28 percent aluminum-Nomex sandwich structure, and 13 percent conventional riveted aluminum structure. This type of structure not only results in a reduction in weight, but also in the manufacturing cost and aerodynamic drag. As a result of a series of weight reduction measures, the maximum ratio of take-off weight to empty weight can reach 1.95. Therefore, even though the exterior of this helicopter does not differ a great deal from that of other light-weight helicopters such as Alouette 3 or the Bell-212, its cabin capacity (5 m<sup>3</sup> plus luggage compartment) is larger, and its load capacity is comparable to that of the U.S. S-76.

**Safety Features:** The Dauphin helicopter has redundant hydraulic, fuel supply, and electric systems, some of which even have three-unit redundancy. The dimensions of all mechanical components have relatively large tolerances so that in case of a failure in the lubrication system, the helicopter can continue to fly for 30 minutes, during which time the pilot can call for help or attempt an emergency landing. Other emergency measures include an emergency fuel dumping system which can release all the fuel in a few seconds, and emergency pontoons in case of forced landing over the ocean. The emergency pontoons are normally stored inside the body so it does not affect the flight speed; if the helicopter is forced to land over the ocean, the pontoons are automatically inflated within a few seconds (see title figure); at the same time two life rafts each having a 10-person capacity automatically slide down from top of the cabin and after inflation stand ready at two sides of the helicopter. The fuel tank and the tail section of the helicopter are both sealed structures with good buoyancy characteristics. On conventional helicopters, the rotor cannot be started in a high wind exceeding 75 km/hr; otherwise the helicopter may topple over. The Dauphin 2 on the other hand is equipped with star-shaped blade housing and stopping blocks on the blades, so that it can be started safely even in a strong wind with 100 km/hr wind velocity. Therefore, the Dauphin 2 can operate in a strong wind with intensity 7 over the ocean.

**Maintainability:** The Dauphin 2 helicopter generally requires a minor repair every 300 hours and a major repair every 2,400 hours; the maintenance time for each flight hour is 0.47 hours, whereas some helicopters require as many as 11 hours. The procedures for disassembling and assembling mechanical parts are quite simple. By using the special tools in the luggage compartment and a small crane, a technician and the pilot can remove the four blades in 10 minutes (8 minutes for installation), disassemble the blade housing and the main speed-reduction unit in 1 hour 50 minutes (1 hour 13 minutes for installation), and remove the engine in 1 hour 30 minutes (1 hour for installation). The helicopter also has good accessibility. In addition to the two doors to the cockpit, there are four doors to the passenger cabin. On each side of the helicopter is a retractable stepping board; there is also a door to the luggage compartment. The main speed-reduction unit has many inspection windows through which the operating conditions can be monitored. The units which require frequent maintenance all have hinged covers; the entire nose section is also a hinged cover which in its open position will clearly reveal all the circuitry of the onboard equipment and instruments for easy maintenance (see back cover). Therefore, since the delivery of the SA 365N last year and its

predecessor SA 365C in 1978, there have never been any accidents during operation.

### Performance and Applications

The helicopter's main performance parameters are listed as follows:

maximum gross weight	3,850 kg
effective payload	1,810 kg
maximum external load	1,700 kg
maximum continuous power	594x2 hp
maximum speed	306 km/hr
cruising speed	260 km/hr
maximum range	882 km
maximum climb rate	7.7 m/sec
dynamic ceiling	4,000 m
hover ceiling	2,350 m (with ground effect) 1,200 m (without ground effect)
fuel consumption per km	1.06 kg

Compared with other helicopters of its class, the outstanding features of the Dauphin 2 are: larger payload, longer range, higher speed, and better economy. For example, the maximum range of the Bell-212 is 47 percent less, that of the Bell-412 is 28 percent less; the fuel consumption of the Bell helicopter is 1.5 kg/km whereas that of the Dauphin 2 is only 1.07 kg/km. Therefore, the higher initial cost of the Dauphin 2 is more than compensated by its long-term economy and its reliability. However, it must be pointed out that the SA365N helicopters currently being produced in France do not all meet the performance specifications stated in the Sino-French contract. The French Aerospatiale Company is currently taking measures to correct this situation.

The Dauphin 2 has many applications. There are about 50 selected services suggested by the French Aerospatiale Company. The basic model can be easily modified to perform special missions such as off-shore petroleum operations, transportation of personnel, off-shore support activities, rescue operations, elevated construction work, installation of high-voltage lines, aerial photography, geological exploration, oceanic patrol, and forest fire prevention. The U.S. Coast Guard recently ordered 90 Dauphin 2's for its short-range retrieval operations; Canada and Saudi Arabia also purchased the Dauphin 2 for their petroleum exploration activities. The French Aerospatiale Company has also developed military versions of the helicopter such as the SA 365F Dauphin 2.

### Operating Characteristics

The co-pilot who participated in this flight demonstration, Comrade Ye Guanwei [5509 6034 4850], had spent more than 3 months in France for flight training. Except for a few very special subjects, he had mastered most of the training courses. He considered the Dauphin 2 an outstanding helicopter: light-weight, good aerodynamic design, retractable landing gears, and high speed--during a dive the maximum speed can reach 324 km/hr, which is quite unusual for helicopters of this class. Furthermore, the maximum range can reach 350 km; but if the fuel tanks are loaded to full capacity, then only 6 passengers can be accommodated (normal capacity 10-14 passengers). Comrade

Ye Guanwei was most impressed by the maneuverability of the helicopter. Compared with other helicopters he had flown, he considered the control system of the Dauphin 2 to be more complicated, but once familiar with the system, it becomes very easy to maneuver the helicopter. During this flight demonstration, the high degree of mobility allowed a number of difficult maneuvers to be executed with little control. However, high mobility implies poor stability; thus when the helicopter encounters a disturbance such as a wind gust, it tends to sway more than others. Comrade Ye did not notice any difference in the control characteristics between a culverted tail rotor and conventional tail rotors, but the improved safety of the culverted tail rotor gives the pilot psychological peace of mind.

3012

CSO: 4008/158

APPLIED SCIENCES

BRIEFS

INTERNAL COMBUSTION LOCOMOTIVES--The double innovation [shuang ge] technical information network of the Ministry of Railway's Locomotive and Rolling Stock Industry System has decided to call an all-railway "technical experience exchange meeting on energy conservation of internal combustion locomotives" in the latter part of May 1982. Currently, to welcome the meeting, energy conservation experiences on internal combustion locomotives are being conscientiously summarized and preparations for actively writing papers, reports, and other materials are being made by engineering and technical personnel of internal combustion locomotive manufacturing and repair plants, railway bureaus and maintenance sections and their related scientific research units, and higher institutes and universities. [Text] [Dalian NEIRANJI [INTERNAL COMBUSTION ENGINE] in Chinese No 2, 1982 p 51] 5974

NEW FIBER OPTIC--Shanghai, 7 Jun (XINHUA)--Scientists in Shanghai have successfully developed a new kind of fiber optic called a "monomode." The fiber, 1/10 of thickness of a human hair, is used to transmit various kinds of information with the help of a laser, and can simultaneously carry over 1 million-channel telephone circuits. Its advantages include greater information carrying capacity and longer transmission distance, compared with the multimode fiber which China developed several years ago. The fiber can also be used to make fiber optic gyros and sensors. The monomode fiber was developed by the scientific workers at Shanghai University of Science and Technology and the Shanghai Quartz Glass Factory after 2 years' efforts. Professor Huang Hongjia, vice president of the university, who contributed to the fiber research, said that the application of monomode fiber opens a broad horizon for modernizing the country's telecommunications, and also places China in the front rank in world light technology research. [Text] [OW101355 Beijing XINHUA in English 0731 GMT 7 Jun 82 OW]

CSO: 4010/7

LIFE SCIENCE

SCIENTISTS CLONE HEPATITIS B VIRUS STRAIN

OW141258 Beijing XINHUA in English 1243 GMT 14 Jun 82

[Text] Beijing, 14 Jun (XINHUA)--Scientists at the Shanghai Institute of Biochemistry have for the first time successfully cloned a particular strain of hepatitis B virus, according to the division of biological sciences of the Chinese Academy of Sciences.

The success in manufacturing ADR hepatitis B virus (HBV) Genome marks a major step in China's genetic engineering research, academy sources said today.

Hepatitis B, caused by HBV infection, is one of the more serious diseases in the world today. It is estimated that about 200 million people are infected and scientists believe that HBV may have something to do with the onset of cirrhosis and liver cancer, since it frequently leaves the vital organ weakened or damaged.

There are four types of the virus: ADR, ADW, AYR and AYW. The genome cloning of ADW and AYW HBV has been accomplished in the United States, France, Britain and the Federal Republic of Germany. However, the genome cloning of ADR HBV, prevalent mainly in China, Japan and some Southeast Asian countries, has so far not been reported.

The scientists at the Shanghai Institute of Biochemistry began their genetic engineering research on HBV in 1980. Last year, scientists of the institute's molecular genetic laboratory and tumor research group isolated and purified the ADR HBV genome from the plasma of Chinese HBV carriers. Early this year, they, in cooperation of the Shanghai municipal epidemic prevention station, completed the genome cloning of the ADR HBV in Escherichia (E) Coli. The transformation efficiency was high and a maximum of 158 clones of ADR HBV genome were obtained in the experiment.

The success demonstrates that China's genetic engineering research on HBV has advanced to world rank. It also has provided favorable possibilities for China to independently produce hepatitis B vaccine through genetic engineering and further study of ADR gene structure, DNA sequencing and gene expression.

CSO: 4008/184

## BRIEFS

CHILDREN'S MEDICINES IN SHORT SUPPLY--(Feng Fuchun), a worker at the Shenyang Railway Bureau wrote a letter to our station urging that medical departments guarantee the supply of children's medicine. The letter states: In the past few years, the state has shown great concern for protecting children's health. However, some hospitals and clinics, ignoring the fact that they have pediatrics departments, seldom stock children's medicine. Doctors prescribe penicillin to all children no matter what kind of diseases they have, or erythromycin to those who are found allergic to penicillin. Some children suffer from abdominal pains and diarrhea after taking erythromycin. Each family is allowed to have only one child under the family plan. When children are sick, their parents worry. If hospitals do not have medicine, the parents will worry even more. Sometimes, they have to get medicine at a pharmacy on their own. This not only affects the timely treatment of the ill children but also causes troubles for parents, who sometimes will make mistakes in haste. Some children's daily medicines which are in full supply and are cheap cannot be found in hospitals and clinics for a long time. Children's tranquilizers and medicines to relieve indigestion, coughs and asthma cannot be seen at all. I hope medical departments care for children and solve the children's medicine problem as soon as possible. [Text] [SK291234 Shenyang Liaoning Provincial Service in Mandarin 2200 GMT 28 May 82]

PROGRESS IN TREATING CANCER--Beijing, 2 Jun (XINHUA)--China has achieved initial success in using home-made hemato prophyrin derivative (HPD) and lasers to diagnose cancer, according to Cong Zhong, an official of the Chinese State Scientific and Technological Commission. HPD is a component of hemoglobin with a specific affinity for cancer cells. When injected, it stores mainly in diseased cells. When irradiated by lasers of a certain wave length, it glimmers orange, thus locating cancer and enabling its earlier discovery, Cong Zhong said. When irradiated by lasers of another wave length, the HPD reacts photochemically, oxidizing and destroying the affected cells. It leaves healthy cells largely undamaged, Cong Zhong said. Research began on HPD in May 1980. In the past 2 years, he said, the photo-sensitization therapy has been used to diagnose and treat oral leukoderma, skin cancer, muscosa carcinoma and other kinds of cancer. Cong Zhong said more theoretical and practical work will be done to expand the application of the therapy and improve the diagnosis and treatment of cancer. [Text] [OWO20728 Beijing XINHUA in English 0718 GMT 2 Jun 82]

## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### INTRODUCTION TO NATIONAL DEFENSE SCIENCE, TECHNOLOGY UNIVERSITY

Beijing HANGTIAN [SPACEFLIGHT] in Chinese No 2, 26 Mar 1982 pp 6-7, 32 and inside back cover

[Article by the Admissions Office, National Defense Science and Technology University]

[Text] The National Defense Science and Technology University, previously known as the Harbin Military Engineering College, was built in 1952, and began operation in 1953. Chairman Mao had delivered a speech at the College, and had personally named the school publication "Gong Xue." In addition, a number of proletarian revolutionists including Zhou Enlai, Zhu De, Deng Xiaoping, Chen Yi, He Ling, Liu Bocheng, Ye Jianyin, had also visited the College and provided guidance to the school.

In 1970, the school moved south to Changsha City and was renamed the Changsha Engineering College; in 1978, it was re-established as the National Defense Science and Technology University. The mission of the school is to produce highly qualified scientists and engineers devoted to research, design, production, experimentation, and application in high technology fields related to national defense. Currently, there are eight departments: Applied Mechanics, Applied Physics, Automatic Control, Electronics, Materials and Fuels, Electronic Computer, System Engineering and Mathematics, Precision Machinery, plus the Department of Advanced Training for Government Officials. The school has 23 specializations, 39 lecture and research offices, 5 central research laboratories, and many special laboratories; it has a well-equipped electronic education center, and a modern computer center for teaching and research. The school library (a new library building with modern facilities has been completed) has total volumes of over 600,000, and over 2,000 Chinese and foreign periodicals. In order to strengthen political awareness and encourage academic interchanges, the school has two publications: the "National Defense Science and Technology University," and the "National Defense Science and Technology University Bulletin." The College also has a fully equipped experimental factory, a modern computer plant, and a print shop. In addition, there is a hospital which serves both faculty members and students.

The school is administered by committees whose members are experienced Party leaders, professors, and scholars. Currently, there are approximately 1,500 teachers and professionals; more than 210 of them have ranks higher than assistant professor.

During the 29 years of the school's history, over 16,000 students have been graduated. It has made significant contributions in building China's military engineering teams, particularly in the area of high technologies related to national defense.

While teaching is the main objective of the school, it has also been actively engaged in scientific research. Since its establishment, the school has undertaken over 700 research projects for the engineering departments of various military services. Many of these projects are considered to be of critical importance to China's engineering development; 19 projects won awards at the 1978 National Science Convention, and 58 projects won awards at the Hunan Provincial Science Convention. At present, the school has over 100 projects devoted to special engineering problems and other scientific missions for Government agencies and the National Defense Science Committee.

The academic curriculum of the National Defense Science and Technology University is described below.

The curriculum of the Applied Mechanics Department covers primarily the application of basic theories and experimental techniques of mechanics to aerospace activities, as well as the solution mechanics problems encountered in aerospace applications. The Department offers the following specializations: fluid dynamics, aircraft solid mechanics, and rocket engines; it also has a central research laboratory and several special laboratories. The contents of fluid dynamics include the laws of motion of a spacecraft in the atmosphere, high-speed convective heat transfer, separated flow, computational fluid mechanics and experimental techniques, and magneto-hydrodynamics; it provides the student with a sound theoretical background for designing spacecraft, and particularly for solving the re-entry problem. The contents of aircraft solid mechanics include fracture control of spacecraft structures, finite element method for structural analysis, vibrations, structural mechanics of composite materials, structural optimal design, and mechanical properties of aerospace materials. The contents of rocket engines include variable-thrust liquid rocket engines, system analysis of liquid rocket engines, theory of combustion of rocket engines, and basic theory and experimental techniques of heat transfer and mass transfer, as well as the internal operation of solid rocket engines. It provides the necessary theoretical background and experimental data for rocket engine design. This Department produces research scientists and engineers who have solid theoretical foundations and familiarity with the basic principles of engineering design; they are also proficient in modern experimental techniques and electronic computer usage, and are qualified for the tasks of designing and building spacecraft and modern strategic weapons.

The curriculum of the Applied Physics Department covers primarily the application of new results in modern physics to the problems of national defense; in particular, emphasis is placed on the investigation of interaction between matter and particles such as photons, electrons, and neutrons. This Department offers the following specializations: radiological physics and protective measures, laser technology, explosion physics, and infrared remote sensing techniques; it also has a special training class for physics instructors.

Laser technology is one of the newly established specializations in this school. Because of laser's unique characteristics, its applications in national defense have grown rapidly in recent years; they include laser guidance, laser ranging, laser communication, and laser thermo-nuclear fusion, which is under current development. The laser specialization in this Department is designed to train advanced scientists and engineers who will devote their careers to research, design, and experimentation related to the application of laser in national defense. At present, it is responsible for many important research projects in which significant contributions have been made. For the benefit of both graduate and undergraduate students, the Department has well-equipped experimental facilities and a highly qualified faculty. Radiological physics and protection is an older specialization in this Department. It is designed to train theoretical research scientists and engineers who will devote their careers to radiation detection techniques (e.g.,  $\alpha$ -ray, X-ray, neutron radiation, and electromagnetic pulse, etc.) and the study of interaction between radioactive particles and matter and protective measures against radiation. Explosion physics is a specialization which was established in 1961 by merging two independent specializations: explosion mechanics and high energy physics. It plays an important role in high technology national defense and is devoted to the study of the physical and mechanical properties of matter under special conditions such as high temperature, high pressure, rapid deformation, and plasma; in other words, it is concerned with the dynamic response and dynamic destruction mechanisms of matter under these conditions. It is a specialization which encompasses both physics and engineering mechanics. The physics instructor training class was established to train faculty members for military technical institutes. In order to provide the students with modern techniques in experimental physics, it has a fully equipped central research laboratory which is constantly being updated.

Automatic Control is one of today's most active technical fields. It plays an important role in national defense; in particular, it has a wide range of applications in aeronautical and aerospace technologies, research and utilization of nuclear energy, telemetry and command, control technologies, etc. The curriculum of the Automatic Control Department includes mathematical modeling, signal detection, processing, and identification, as well as theoretical and practical methods for implementing control strategies and various types of automatic monitoring, regulating and control systems. The subject of automatic control is closely related to the science of electronic computers. Currently, it offers the following specializations: ballistics, trajectory and guidance, flight control, statistical analysis of test data, and industrial control.

Electronic technology plays an essential part in the development of almost all modern technologies, particularly space science and aerospace technology. For example, the effectiveness of guided missiles and spacecraft is enhanced by using onboard radars, radio remote control and remote sensing equipment; in military communication, intelligence and command systems, digital communication equipment, signal processing and display equipment are widely used to improve the speed and accuracy of military command. The curriculum of the Electronic Technology Department includes: signal technologies, which cover

signal extraction, transmission, detection, processing, display, and identification; microwave technologies, which cover the radiation, propagation, transmission, and reception of electromagnetic waves and the interaction between electromagnetic waves and matter; and electronic system engineering, which covers the analysis of electronic systems on guided missiles, satellites, and various military systems, optimum design techniques, and other key issues in system engineering. The newly built signal processing laboratory, the microwave absorption chamber, and the microwave integrated circuit laboratory, are all modern facilities which can be used for teaching or scientific research.

Aircraft and spacecraft are expected to operate in complicated and extremely adverse environments; hence they must be constructed with materials which retain their strength under high temperature and high speed conditions. Propellants with high energy content are the energy sources of rocket propulsion. The Department of Materials and Fuels has a curriculum covering the performance and design of various new materials and fuels, as well as their applications in aerospace technology. Material science is closely related to such basic sciences such as physics of solids, solid mechanics, and chemistry. In recent years, the development of quantum mechanics and quantum chemistry has introduced new concepts to the study of relationship between material properties and structures, and to the exploration and design of new materials. Furthermore, advanced experimental and analytical techniques in physics and chemistry provided the necessary tools for these investigations. This Department has three specializations: metallic and metallic-base composite materials, non-metallic and non-metallic-base composite materials, and composite solid propellants.

Electronic computer has become a widely used tool in all aspects of modern society; it has been responsible for the development of science, economy, and military technologies, and is now an essential element in modern scientific research. In this country, electronic computer has been classified as one of eight critical technologies and has received nation-wide attention. Modern computers are advancing rapidly in the following areas: large-scale computers, micro-computers, computer networks, and artificial intelligence computers. The Department of Electronic Computers has lecture rooms and research offices designed for both software and hardware studies. It has a laboratory for conducting experiments on circuitry, logic, basic modules, and micro-processing systems; it also has a fully equipped modern factory capable of building computers of various types. Through its research projects, this Department has made important contributions which include 13 different types of computers; one of these was a central computer used onboard a data-collection ship during a rocket test in the Pacific.

In national defense, the timely completion of large scale and complex projects often involves large expenditure of man power, materials, and money. To achieve the project goal in an optimum manner, it is necessary to approach the task from an overall system viewpoint, and to apply modern scientific techniques in the planning, design, manufacture, testing, utilization, control, and management of systems which contain machine as well as human elements. The use of engineering techniques to solve system-related problems is called "systems engineering." It is a field which encompasses many different

engineering disciplines, e.g., information system engineering, aircraft system engineering, etc. Each discipline has its unique technical basis, but they all share certain common theoretical disciplines which include operations research, computational techniques, and behavioral science. The Department of System Engineering and Mathematics is established to train research scientists and engineers in the following specializations: information system engineering and flight vehicle system engineering. The Department also has a specialization in applied mathematics, whose objective is to take problems from various scientific and engineering disciplines and formulate them as general mathematical problems; solutions to the mathematical problems are then used to solve the actual engineering problems. The major areas of study in this specialization include: computational methods, operations research, and probability and statistics. Students in this specialization not only acquire a solid foundation in pure mathematics, but are also trained in applied mathematics courses such as computer languages, computational methods, applied software, linear and non-linear programming, graph theory, queuing theory, measure and decision theory, fuzzy set theory, mathematical statistics, random processes, time series analysis, as well as physics, mechanics, and philosophy.

The rapid advancement in aerospace technology places increasing demands on the precision requirement for onboard equipment. To meet this demand, the Department of Precision Machinery offers specializations in computer-controlled industrial art, and non-electric automatic instrumentation. Its objective is to train research and design personnel in the areas of industrial art and instrumentation for the development of guided missiles, satellites, and space-ships. Computer-controlled industrial art is basically a specialization in mechanical manufacturing whose machining process is controlled by computers. In order to build high-precision instruments, it is necessary to use advanced techniques such as computer- or microprocessor-controlled machine tools and sophisticated machining methods. This not only results in high-precision products, but also reduces the development cycle and manufacturing cost. Non-electric automatic instrumentation is a specialization in instrumentation whose measurement process is controlled by computers. By using advanced techniques to measure and monitor the machining process, high-precision products are ensured.

The specializations of the National Defense Science and Technology University are designed to serve the high-technology and aerospace industries. We are in need of the most modern weapons to protect our country and we want to explore the mysterious outer space. These are historical missions for today's youths of China.

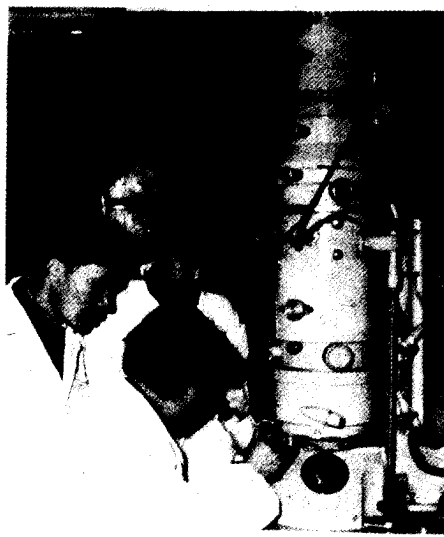
Young friends, let us establish a world view based on dialectic materialism and cultivate our morality and will power. Let us concentrate on our learning today so that we may contribute our best to the socialistic mother country tomorrow!

No matter which special field you have chosen, a solid foundation in mathematics, physics, and chemistry is essential. It is also important to have a good background in native language and be proficient in one of the foreign languages. In addition, you must devote enough time to physical fitness so you may have a healthy body to serve the Party and the people.

In conclusion, the National Defense Science and Technology University welcomes all of you who have made up your mind to contribute to the high-technology and aerospace industries for national defense--the generation of the 80's.



Comrades Chen Bin and Qian Xuesen offered guidance during their visit to the school



Large electron microscope



A simulation computer



Vibration testing

3012  
CSO: 4008/153

Instrumentation

AUTHOR: XU Xilin [1776 6932 2651]

ORG: None

TITLE: "China's First Large High Speed Dynamic Equilibrator"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 4, 1982  
p 28

ABSTRACT: Through the cooperative efforts of Shanghai Experimental Machinery Plant, Designing Research Academy No 2 of the First Ministry of Machinery, Shanghai Transportation University, Shanghai Steam Engine Plant, and Shanghai Electrical Machinery Plant, China's first 200-ton high speed dynamic equilibrators has been successfully made. Its technical certification has been completed and its major technical property indices have been judged to be close to or the same as the level of similar products made in foreign countries. Its balancing rotors have a range of weight of 15-200 tons. The maximum length of the rotors reaches 18 m and the maximum diameter 6.1 m. The maximum balancing speed is 3,600 rotations/minute and the highest rotation speed of hypervelocity experiment is 4,320 rotations/minute. It is suitable for high speed dynamic balancing and hypervelocity tests of large capacity steam turbines, and generator rotors. Its successful manufacture has important significance for China's industry of manufacturing turbogenerators.

AUTHOR: MA Zulin [7456 4371 2651]

ORG: None

TITLE: "Precision Photoelectric Pyrometer"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 4, 1982  
p 28

ABSTRACT: Yunnan Instrument and Meter Plant, Harbin University of Engineering, and Chinese Academy of Metrological Science have succeeded in making a new standard temperature measuring instrument-- the precision photoelectric pyrometer. It is suitable for 800-2,300°C high temperature scale transmission and precision measurement. Highly sensitive multiplier phototube is used as the detector, with a spectral transparency half-width 100 Å interference filter. When it is used to measure an object of 1100°C, the resolution factor is  $\pm 0.1$  °C, and a re-appearance rate is  $\pm 0.5$  °C. Compared with the photo-pyrometers used in China in the past, it is 5 times more sensitive, and the comprehensive errors are reduced to half. The instrument has been certified. Its major technical indices are judged to have reached the technical level of similar products made in foreign countries. It is now being manufactured by Yunnan Instrument and Meter Plant.

6168

CSO: 4009/322

## Nuclear and Radiochemistry

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JIN Zhenchuan [6855 2182 1557]

ORG: Both of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "Separation and Purification of  $^{99}\text{Tc}$  from Acidic High Level Radioactive Liquid Waste by Anion Exchange Chromatography with  $\text{NH}_4\text{CNS}$  as Eluant"

SOURCE: Beijing HU HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 4 No 2, May 82 pp 91-99, 80

TEXT OF ENGLISH ABSTRACT: A procedure has been developed for the separation and purification of  $^{99}\text{Tc}$  from acidic and several other kinds of high level radioactive liquid wastes.

The feed, a simulated solution of high level liquid waste from reprocessing of spent fuel, was passed through a column with  $\text{NH}_4\text{CNS}$  as eluant, after it had been denitrated by formic acid to a pH value of 2.

The quantity of  $^{99}\text{Tc}$  absorbed in the resin should be limited to one-fifth of full capacity on the column to give best decontamination. Other optimum conditions are: concentration of  $\text{NH}_4\text{CNS}$ , 0.6 M at pH 8.5; flow rate of eluant, less than 0.35 ml/cm<sup>2</sup>·min.

[Continuation of HU HUAXUE YU FANGSHE HUAXUE Vol 4 No 2, May 82 pp 91-99, 80]

By this procedure, the radioactive nuclei, such as  $^{90}\text{Sr}$ ,  $^{95}\text{Zr}$ - $^{95}\text{Nb}$ ,  $^{137}\text{Cs}$ , etc., and even the most troublesome  $^{106}\text{Ru}$  can be easily removed.

The procedure is simple, rapid and inexpensive. It has been applied to the purification of raw products of  $^{99}\text{Tc}$  obtained from reprocessing of spent fuel with satisfactory results. The decontamination factors of  $^{99}\text{Tc}$  from  $\gamma$ -emitters,  $^{106}\text{Ru}$ - $^{106}\text{Rh}$ ,  $^{125}\text{Sb}$ ,  $^{137}\text{Cs}$ , are  $1.5 \times 10^7$ ,  $5.0 \times 10^7$ ,  $1.2 \times 10^7$  respectively after two cycles of operation and recovery of  $^{99}\text{Tc}$  in the product is better than 99.9 percent.

AUTHOR: ZHOU Shoumei [0719 1108 4168]

ORG: Design Research Academy No 3, Ministry of Agricultural Machinery

TITLE: "Field Survey Report on Electrical Control System for Transfer Machines: I"

SOURCE: Dalian ZUHZEICHUANG [MODULAR MACHINE TOOLS] in Chinese No 4, 25 Apr 82  
pp 2-5

ABSTRACT: Among the electric control systems for automatic machining in China, there are relay control system, sequential controller, computer, programmable sequential controller (quasi-computer) systems. Due to the fact that electronic technology is not yet popularized in factories, not very many organizations adopt the electronic sequential controller system. As the cost of relay control system is low and its operation stable, it is extremely popular. Of the 477 existing automated machining lines in the country, nearly 266 lines use this type of control. The condition of application and brief comments on the cost and efficiency of the 4 types of electric control systems of the relay control system, the relay sequential controller control system, the electronic sequential controller control system, and the computer or programmable sequential controller (quasi-computer) control system constitute the major portion of the paper. Finally, in discussing the trend of future development, the paper maintains that as microprocessors are being continuously perfected, their volume reduced, their reliability improved, and their cost lowered, the computer and programmable sequential controller type will be more extensively adopted, because they may be adapted to different and complex machining processes by simply changing the system software.

6248

CSO: 4009/316

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LU Duoying [0712 1161 5391]  
et al.

ORG: All of the North China Third Research Institute

TITLE: "A Fundamental Study on the Separation of Uranium Isotopes by Ion Exchange Chromatography"

SOURCE: Beijing HU HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 4 No 2, May 82 pp 126-inside back cover

TEXT OF ENGLISH ABSTRACT: This paper deals with the exchange reactions of U-isotopes between an aqueous solution of uranyl salt and a bed of cation exchange resin particles in a displacement chromatogram. It has been experimentally proved that when the exchange reaction of U-isotopes of uranyl ion between two phases is carried out, the U-235 isotope is enriched in the liquid phase; and then the exchange reaction between the uranyl ions and the complexes ( $UO_2A$ ) in the liquid phase takes place and the U-235 isotope is enriched in the  $UO_2A$ . It has been shown that the two isotope effects mentioned above are superimposed in the separation process. Moreover, a simple model and an expression of the superimposition are given, which indicates that the slight difference between U-235 and U-238 in their ability to form the complexes is the main reason for the separation of the uranium isotopes.

9717  
CSO: 4009/328

Optical Thin Film

AUTHOR: SU Jielong [5685 6946 7127]

ORG: None

TITLE: "The First Symposium and Establishing Meeting on the Specialty, Committee of Optical Thin Film Held in Beijing"

SOURCE: Shanghai GUANGXUE XUEBAO [ACTA OPTICA SINICA] in Chinese No 3, May 82 p 203

ABSTRACT: The Chinese Society of Optics called its first Symposium on Optical Thin Film in Beijing on 4-8 Jan 82. The Optical Thin Film Specialty was officially established during the meeting. The participants of this symposium included 130 delegates representing systems of Chinese Academy of Sciences and higher education as well as 23 provinces, cities, and prefectures. The majority of them are specialists, scientists, and engineers of China having devoted a long time in the work of optical thin film. Associate Prof. YUAN Youxin [5913 1635 1800] of Changchun Research Institute of Optical Precision Machinery Chinese Academy of Sciences delivered a report on "The Present Condition and Future Prospect of Optical Thin Film in China," in which, aside from the history of development of the field, he also introduced the extensive and increasing applications of optical thin film in space technology, infrared technology, laser technology, various optical instruments, and optical engineering. At present it has become an important branch of modern optics. In some aspects, Chinese studies of optical thin film have reached or been very close to the advanced level of the world and those who engage in optical thin film work total as many as 3,000-

[continuation of GUANGXUE XUEBAO No 3, 1982 p 203]

5,000 persons. The symposium received 99 papers and 24 papers were read during the meetings while 39 papers were read in separate group meetings. Four of these papers (6 percent) were on thin film theories and thin film system designing; 41 papers (65 percent) on its applications and work procedures; 16 papers (25 percent) on thin film control and test technologies. The Optical Thin Film Specialty Committee established at the symposium will contain 30 committee members and YUAN Youxin will be the chairman of the committee, which will have an office in Beijing College of Engineering.

6248

CSO: 4009/324

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