INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

C-O-N-F-I-D-E-N-T-I-A-L 16037-22

COUNTRY	Communist China	REPORT NO.	CR/GR 332/00015-67
SUBJECT	Photographs and Related Text on Chicom Electronic Equipment, Radio/TV, Precision and Scientific Instruments	DATE DISTR.	16 March 1967
		NO. PAGES	
25X1		REFERENCES	25X1
DATE OF INFO.	Unknown		
PLACE & DATE ACQ.			

THIS IS UNEVALUATED INFORMATION

SOURCE: Translations of Asia News Service Photos and Features of Chinese Industry, No. 55, 1 November 1965; No. 62, 15 February 1966; No. 65, 1 April 1966; No. 69, 1 June 1966; No. 71, pt. 1, 1 July 1966; No. 72, 15 July 1966.

Available in OCR/Graphics Register are photographs on Communist China's electronic and precision instrument industry and certain aspects of research and development on program-controlled machine tools at Ching-hua University, Pei-ching and testing metal stress at the Chia-tung University, Hsi-an. Subjects covered are analog computer, electronic microscopes, measuring and detecting devices, electron bombardment furnaces, prospecting equipment, radio/TV sets and others.

The enclosures to this report are the unedited text from the publications cited above and are available from the CIA Library. When detached from this report, they are Unclassified.

CIA Photo Accession No.:

1061489	24 step medium size electronic analog computer manufactured by Tientsin Electronic Instruments Plant.
1070631	New pulse transistorized ultrasonic meters to measure metal corrosion developed by the Shanghai Shipping Transport Scientific Research Institute and manufactured by the Chung-yuan Electric Appliance Plant. 1965.
1071967	200,000 power electron microscope.
1087583	Universal tool microscope installed in Precision Machinery Laboratory of Harbin Industrial College. Photo shows an analysis being made of errors in a pinion gear.

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GROUP 1
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1087584	Microscale calibrated to accommodate a minimum of one microgram and a maximum of two grams recently manufactured by the Tien-ping Instrument Plant, Shanghai.
1087589	800mm horizontal fully-automatic centrifugal separator manufactured by the Fan-yung Machinery and Equipment Plant, Kuang-chou. This separator, which is vital to the operation of nitrogenous fertilizer plants, is capable of producing 4-5 tons of nitrogenous fertilizer per hour.
1105859	Checking on sedimentation condition of aluminum alloy through an electron microscope with magnification power of 100,000 at the Harbin Industrial University. This microscope was built jointly by this university and the Shanghai Optical Instrument Plant.
1105860	Experiment in the Automation Section, China University of Science and Technology, Pei-ching.
1105858	Experiment in the Electrical Engineering Lab., Ching-hua University, Pei-ching.
971015	High voltage electric laboratory of the Central China Industrial College, Wu-han.
1120164	Vacuum-type electron bombardment furnace manufactured by Chin-chou Electric Furnace Plant. Furnace is capable of smelting difficult-to-melt metals. 1966.
1120165	Microscope for inspecting high precision measuring instruments manufactured by Chin-chou Optical Machinery Plant. 1966.
1120166	Testing radio sets at the Hsin-sheng Precision Instrument Plant, Chin-chou. 1966.
1149046	Inspecting Mei-to model 28A 8-transistor radio at the Shang-hai Radio Equipment Plant No. 3.
1149047	Packaging television sets at the Tien-ching Radio Plant 712.
1149048	Industrial television installed at the chuck rolling mill of An-shan Iron and Steel Plant. 1966.
1147635	Electronic automatic voltmeter manufactured by the Shang-hai Geological Instrument Plant. Measures differences in potential of DC meters used in geological studies. 1966.
1147636	Stone density meter manufactured by Pei-ching Geological Instrument Factory. Measures the humidity and density of rocks which do not dissolve in water. 1966.
1147638	BaT C3 crystalloid oscillation converter used in the study of sea-floor earthquakes and prospecting. Converter changes oscillatory movement into electric energy.

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1147639	Earthquake oscillation converter. Converts movements of earth's surface into electricity by means of radio activity and refraction.
1147642	Instrument used to measure absolute age of granite in Department of Geology, Nan-ching University. 1966.
1145599	Precision scales with minimum sensitivity of 1 millionth gram and maximum sensitivity of 2 grams manufactured by the Shang-hai Scales Instrument Plant. 1966.
1145600	WT 2B precision scales with maximum capacity of 20 grams, minimum reading value of 0.01 mg. manufactured by the Pei-ching Optical Instrument Plant. 1966.
1145601	Model GT 2A precision scale with maximum scale load of 200 gram, minimum reading value of 0.1 mg. manufactured by the Pei-ching Optical Instrument Plant.
1158073	T4125Z optical jig boring machine manufactured by Chekiang University shown at China Export Machines and Instruments show in Hong Kong. Tolerance of 0.004mm approaches the international standard.
1158074	High precision gear grinder test manufactured by the Shang-hai Chi-chuang Machine Tool Plant. Capable of grinding gears up to the 1.6m diameter. 1966.
1147334	Electron bombardment furnace produced by the Shang-hai Electron Furnace Plant. Furnace is used for refining high fusion rare metals such as tungsten and molybdenum of high purity rate.

Enclosure (as stated above)

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Pictorial Report on Chinese Industry
Semi-Monthly publication
Monthly fee: 3,000 yen

PICTORIAL REPORT ON CHINESE INDUSTRY

PHOTOS AND FEATURES ON CHINESE INDUSTRY

Contents:

No. 72 (July 15, 1966)

Production of Precision Scales in China

Rapidly Progressing Chemical Fertilizer Production; Development of a Unique Chinese Way through Technological Innovation

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PRODUCTION OF PRECISION SCALES IN CHINA

One-ten millionth of one Gram Super Precision Scales

Recently China has been achieving considerable success in producing precision scales, which are thus far manufactured in only a few countries of the world. The most noteworthy one among them is the vacuum-quartz small-quantity heat scales, whose production, in small numbers, was begun this year at the Shenyang City Glass Laboratory. It is a super-precision balance which has a minimum sensitivity of one-ten millionth of one gram. Test production of these scales was achieved by the Metal Laboratory of the Chinese Academy of Science, and the Shenyang City Glass began their manufacture.

In a scientific laboratory test, the variation of mass must be observed often under the condition of vacuum and/or of high heat. Such variation is extremely small and is difficult to measure without the help of a highly elaborate balance. The precision small-quantity scales hitherto produced by China had had a minimum sensitivity of one-millionth of one gram. Although this balance was so elaborate as to weigh even a piece of cotton fiber or an ink spot on a piece of paper, it was unable to meet necessities adequately.

The smallest weight used for the newly-produced quartz small-quantity heat balance, which has a minimum sensitivity of one-ten millionth of one gram, weighs 0.01 mg. and is finer than human down; and during the operation it could be blown away unless the operator stops his breath. This balance is composed of three parts, namely, vacuum, heat, and balance. The parts of the balance are set in the vacuum system, are resistent to high temperature and corrosion, and are made of quartz glass which has a very small factor of expansion. The balance can measure metal or high temperature test material which is heated to 1,000 degrees centigrade, and the sensitivity and accuracy of the balance are not at all affected even by carbondioxide or steam.

One-millionth of one Gram Precision Scales Produced by the Peking Optical Instrument Manufactory

Although the above points out an epochmaking achievement in the recent meter industry in China, the precision small-quantity scales with minimum sensitivity of one-millionth of one gram are produced at the Peking Optical Instrument Manufactory and the Shanghai Scales Manufactory.

According to the Jenmin Chipao of January 24, 1966, the Peking Optical Instrument Manufactory succeeded prior to this spring (January of the lunar calendar) [sic] in the test production of high-precision balance which has a maximum weighing capacity of 20 grams. According to the report, the production of this high-precision balance was said to have been possible only after the ideological struggle of whether or not to tackle the heavy burden of revolution and achieve a high technological standard. Half a

year prior to this, the National Meter Bureau requested this factory to present a test product of a super high-precision scales. Then there were a variety of opinions: some supported the request; some were skeptical about its success; others argued that such a high-precision balance was produced only in a few countries of the world and that their factory was not equipped with the necessary means to produce such scales; and still others maintained that the precision scales hitherto produced in China reached barely the third-class standard, and a high technological standard should be achieved step by step; hence second- and the first-class test products should precede the super-class test product. However, it is said that meanwhile a movement to study the thought of Mao Tse-tung was launched and the spirit to overcome difficulties to produce this super-class precision balance was generated. Thus the key engineers began to review the up-to-date experiences of the test production of precision small-quantity scales; and by making the best use of the valuable results of experiences, they finally succeeded in designing a blueprint for the high-precision balance. The craftsmen are reported to have succeeded after a series of trials in the test production of all the 400-odd parts needed to make a high-precision balance in approximately half a year.

One-millionth of one Gram Scales Produced by the Shanghai Scales Manufactory

According to a telegram dispatched by the New China [News] Agency from Shanghai on October 17, 1965, the Shanghai Scales Manufactory also succeeded in producing a precision small-quantity balance which has a minimum sensitivity of one-millionth of one gram and a maximum weighing capacity of 2 grams.

The weight used for this precision small-quantity scales is smaller than a grain of white confectioners' sugar crystal and can be blown away even by a single careless breath. The balance has a very keen sensitivity, and when it is approached by a hand, it is able to sense even so slight a variation of weight as is caused by the body temperature of man. Consequently, the balance is kept in a controlled-temperature room with a separator attached outside. Both the materials to be weighed and the weights to be used are carried in through two "windows" by the revolving pan of the scales. The windows are always closed and the switch is controlled completely from the outside. This precision balance is used by a national meter certification authority for the measurement of standard weight; apart from this, it is necessary for the laboratories and test rooms of scientific research organizations, universities, and professional schools when they measure the mass of a matter.

The Shanghai Scales Manufactory which produced this balance also manufactured in 1960 a small-quantity balance which was capable of weighing one-two hundred thousandth of one gram. Subsequently, in early 1963, it received a mission for test production of one-millionth of one gram precision small-quantity balance and succeeded in its test production in late 1964. According to the above-mentioned source, in foreign countries, copper

and aluminium are used for the beam of a precision balance, but the engineers of the factory have made the beam using a more ideal material. This material is said to be relatively light and to have a high degree of mechanical proof, and the effect of heat upon this material to be relatively small. The manufacture has a margin of error of about one graduation (one-millionth of one gram), and this index is a considerably advanced one even by international standards.

In the course of the test production, both the engineers and the workers made great efforts to overcome the difficulties associated with revisional test. The test, of course, must be conducted in a controlled-temperature room, whose temperature must be fairly high. Since there was no temperature-control facility in the factory, they built a simple such facility through their own efforts. As a result of their experiments, they also discovered a comprehensive method of testing a precision small-quantity scales, and thus prepared the necessary condition for the formal production of this manufacture henceforth.

Shanghai Linung Scales Manufactory and Shenyang Teko Scales Manufactory

Among other factories which have been promoting the production of high precision scales are Shanghai Linung Scales Manufactory and Shenyang Teko Scales Manufactory.

Early last year the Shanghai Linung Scales Manufactory manufactured three kinds of high precision standard scales with a large weighing capacity, each having a load capacity of 1 kg, 5 kg, and 20 kg. These standard scales are the precision gauges necessary for the mining industry, scientific research organizations, and the laboratories of universities and professional schools; their respective graduation units are 0.5 mg, 2.5 mg, and 10 mg; and each of them has the precision of one-two millionth of its full scale. For example, when a 1 kg material is weighed by the 1 kg scales, even the additional weight of 1.6 cm-long hair is immediately indicated on the scales.

It is the Teko Scales Manufactory of the Shenyang City which succeeded in producing China's first second-class 5 kg balance and first-class 1 kg balance, having been enlightened by Shanghai Linung Scales Manufactory which is a sister factory of the former. Although the Shenyang factory is one of the factories in China which started to produce scales relatively early, it could, until 1965, produce only fifth-class scales of comparatively low accuracy. Hence early last year, on the occasion of reviewing the performance of the factory, various questions were raised and answers were sought on its inability to produce high-precision scales above the fourth class.

Traditionally, the scales produced by this factory were an imitation of foreign products; and because of their complicated structure, much material was wasted and not only was the cost of production high, but also the quality of the products was relatively inferior. Within the last few years, the factory carried out a number of improvements, yet was unable to achieve a significant breakthrough. Some people thought that it was no

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mistake to imitate foreigners because the latter had several decades of experience in scales production, whereas they themselves were still young, inexperienced, and lacked in expertise and suitable facilities. Against such spiritual state, however, the factory branch of the Chinese Communist Party organized the employees of the factory so that they should learn the relevant writings of Chairman Mao; and thus by liberating their thoughts and elevating their recognition, it succeeded in producing, with a single leap a fourth-class 5 kg balance. Then some leading members of its management who were satisfied at this result, took a strong pride in their achievement.

Before long, however, a group of the "union of the three" -- the leading members of management headed by the vice chief of the factory, Chang Chung-Fu, technicians, and laborers -- visited Shanghai Linung Scales Manufactory, which had been a long-time competitor of the Shenyang Teko Scales Manufactory, for an observational study. They were very surprised at learning that the Shanghai factory was producing third-class 5 kg scales. Upon returning to their factory, they rallied all their vigor in order to produce second and first-class scales by leaping over the barriers of producing third-class scales, and commenced the engineering and test-production activities for second-class 5 kg and first-class 1 kg scales, organizing a small team of the "union of the three" for the test production of new manufactures. Owing to the herioc ambition of the employees to overtake and bypass the advanced plants and to their clear understanding of the significance of catching up at a bound even the seemingly insolvable problems confronted in the course of engineering and test production were smoothly solved and the two kinds of high-precision scales, which until then China had never been able to produce, and which were urgently needed for scientific research organizations and the department of weights and measures, were produced in only three months.

A precision small-quantity balance manufactured by the Shanghai Scales Instrument Manufactory with a minimum sensitivity of one-millionth of a gram and a maximum load capacity of two grams.

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Precision balance, Model WT2B manufactured by the Peking Optical Instrument Manufactory. It has a maximum scale capacity of 20 grams, and a minimum reading value of 0.01 mg.

Precision balance, Model GT2A produced by the Peking Optical Instrument Manufactory. It has a maximum scale load of 200 g. and a minimum reading value of 0.1 mg.