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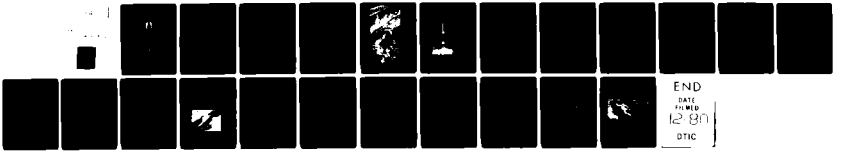

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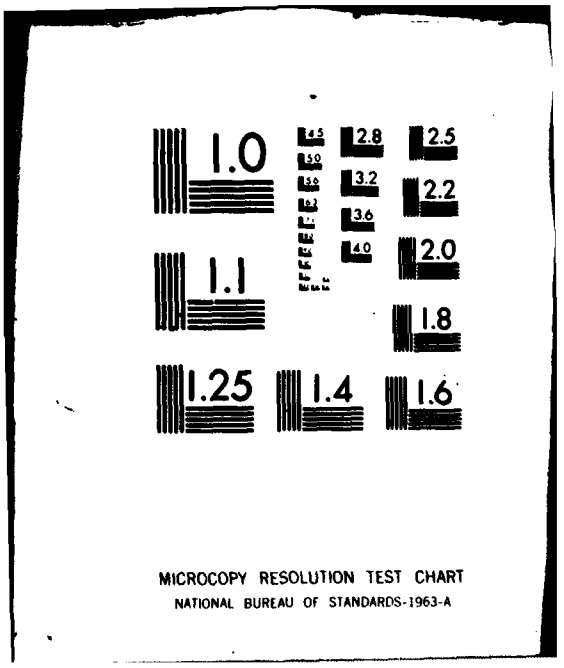
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FOREIGN TECHNOLOGY DIVISION

THE PRC'S SLBM DEVELOPMENT

by

Dong Gong

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THE PRC'S SLBM DEVELOPMENT

[Subtitle: Recent Missile Nuclear Submarines Have Worldwide Capabilities]

by Dong Gong

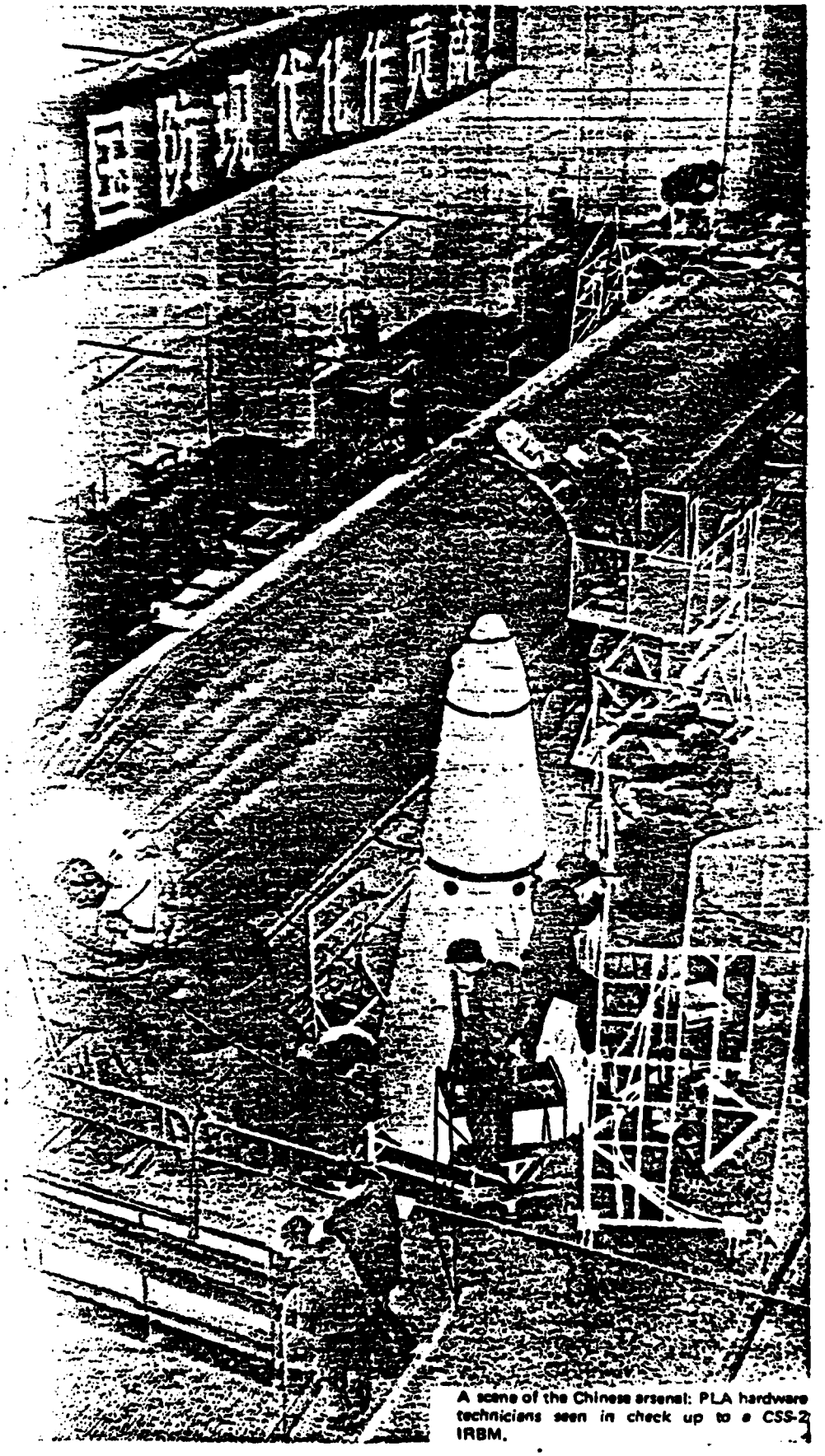
In 1950, China and the Soviet Union signed a treaty of friendship, alliance and mutual assistance. This treaty was a driving force for the modernization and development of the PRC's navy. In 1953, after the Korean ceasefire, a Soviet naval mission stationed in China gave a great deal of post World War Two naval weapons and equipment to the Chinese navy.

Colonel Oleg Penkovsky of the Soviet Union's Red Army Intelligence Bureau, records in "The Collected Works of Penkovsky" that up until 1962 China did not have any nuclear missiles or any other type of nuclear weapons. They only had conventional missiles similar to those of other people's democratic nations. Penkovsky wrote that: "Using our blueprints, the Chinese could make conventional missiles themselves.... . In a Moscow Military Academy (Tsiolovsky Military Engineering

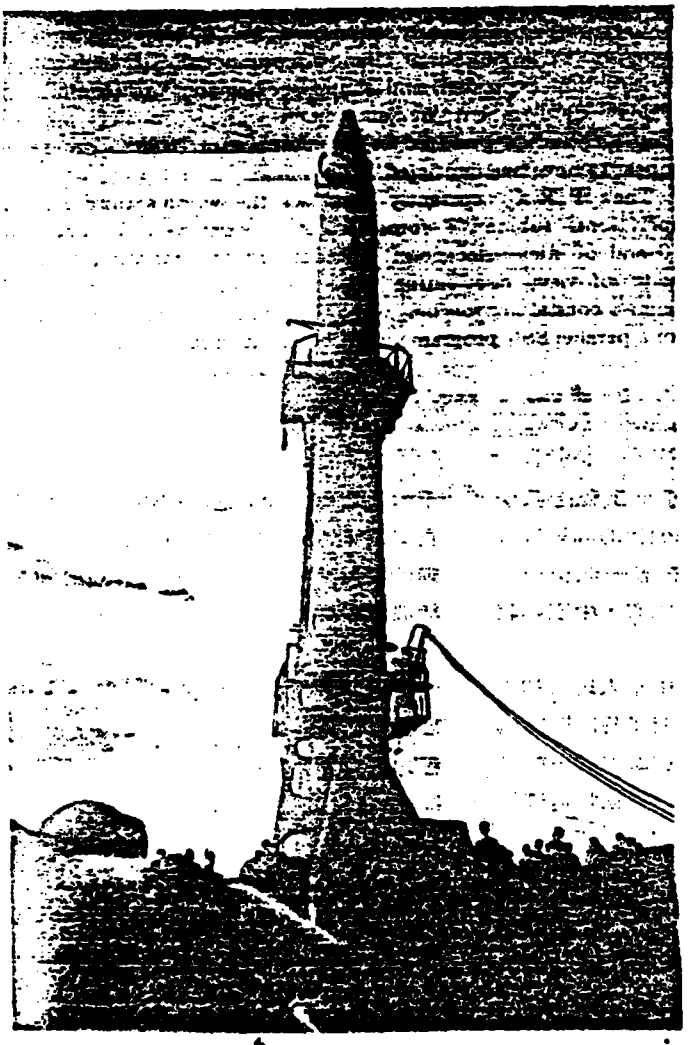
Artillery Academy, an academy of higher education for conventional artillery and missile artillery) there has existed for a long time a department for students studying abroad. It specialized in training officers from East European satellite nations, China and Korea."

From 1959 to 1963, investigations by the PRC's technical personnel of foreign strategic missile systems design concepts has led to the research and development of a single stage, liquid fueled medium range ballistic missile (MRBM), designated CSS 1. China's first CSS 1 missile seemed to be modeled on the Soviet's SS 3 or SS 4 missile systems. On 27 October 1966, in Kansu Province, the PRC Liberation Army's Strategic Rocket Forces launched one CSS 1 MRBM which traveled 1,750 kilometers, detonating a 20 kiloton atomic warhead prior to impact. This missile firing was the first operational test of a PRC designed and produced nuclear warhead for an operational ballistic missile system.

By 1970, the PRC had designed, developed, produced and deployed in limited numbers its first generation intermediate range ballistic missile (IRBM), the CSS 2 which is reported to have a range of between 2,700 and 3,200 kilometers. There have been at least three missile warhead detonations since 1972.



A scene of the Chinese arsenal: PLA hardware technicians seen in check up to a CSS-2 IRBM.



The first strategic missile arm of the PLA 2nd Artillery – CSS-1 MRBM.

Concurrently with the research, test and development of land launched nuclear missile systems, the PRC made progress toward satellite launch systems and nuclear submarine propulsion equipment.

After the sudden departure of Soviet Naval Mission personnel in the early 1960's, the PRC expanded submarine construction work and at the same time began work on the development of the submarine launched ballistic missile (SLBM), nuclear missile warhead, nuclear propulsion and nuclear powered ballistic missile submarine.

表1 外國的戰略導彈系統

	蘇聯	蘇聯	蘇聯	美國	美國	英國	法國
代號	SS-3 [a]	SS-4	SS-9 [b]	LCM-25C	A-1	A-2	M-1
類型	陸中程彈道導彈	陸中程彈道導彈	洲際彈道導彈	洲際彈道導彈	潛射彈道導彈	潛射彈道導彈	潛射彈道導彈
試飛年期	1960以前	1960以前	1960	1963	1960	1961	1966／67
體積（米）	21×1.6	約21×1.6	37×3.4	31.3×3	8.6×1.3	9.4×1.3	10.4×1.5
節數	單節	單節	三節	二節	二節	二節	二節
推進劑	液態	液態	液態	液態	固態	固態	固態
制導	無線電指令	無線電指令／慣性	慣性	慣性	慣性	慣性	慣性
彈頭	核彈／高爆性彈頭	1米加噸當量核彈／高爆性彈頭	20米加噸核彈	5米加噸或以上核彈	核彈頭	核彈頭	50萬噸核彈
發射重量（千克）	約26,000	約27,000	約200,000	149,700	約13,650	約14,000	18,000
射程（千米）	800至1,200	1,500至1,800 [c]	約1,200	約15,000	2,200	2,760	約2,500

a—第一代陸中程彈道導彈

b—1型，第一代第二代的洲際彈道導彈

c—取決於彈頭的重量

Table 1 Foreign Strategic Missile System

Key:

1. Soviet Union
2. Soviet Union
3. Soviet Union
4. United States
5. United States
6. United States
7. France
8. designation
9. model
10. medium range ballistic missile
11. medium range ballistic missile
12. intercontinental ballistic missile
13. intercontinental ballistic missile
14. submarine launched ballistic missile
15. submarine launched ballistic missile
16. submarine launched ballistic missile
17. year put into service
18. before 1960
19. before 1960
20. volume (meters)
21. about 21 x 1.6
22. number of sections
23. single section
24. single section
25. three sections
26. two sections
27. two sections
28. two sections
29. two sections
30. propellant
31. liquid
32. liquid
33. liquid
34. liquid
35. solid
36. solid
37. solid
38. guidance
39. radio control
40. radio control/inertia
41. inertia
42. inertia
43. inertia
44. inertia
45. inertia
46. warhead
47. nuclear warhead/high explosive warhead

48. 1 metric ton equivalent nuclear bomb/high explosive warhead
49. 20 metric ton nuclear bomb
50. 5 metric ton or higher nuclear bomb
51. nuclear warhead
52. nuclear warhead
53. 500,000 ton nuclear bomb
54. launching weight (kilograms)
55. about 26,000
56. about 27,000
57. about 200,000
58. about 13,650
59. about 14,000
60. range
61. 800 to 1,200
62. 1,500 to 1,800
63. about 1,200
64. about 15,000
65. about 2,500
66. note: a. first generation low middle range ballistic missile
67. b. model 1, the first second generation intercontinental ballistic missile
68. c. depends on weight of warhead

Due to China's lack of usable missile weapons and its recognition that the Soviet made SS N 4 surface launched missile system used in the G 1 class submarine was obviously obsolete, as a result they refitted their only launchable missile into a "modern" SLBM trial fire platform. It is estimated that in the five or six years prior to 1974, they had already made appropriate refitting for the hull and command platform shell. These types of fittings were carried out in Dairen's Red Flag Ship Building Factory and the G class submarine was assembled there in 1964.

There was news that China's first nuclear powered

submarine was launched before 1971 because of a 1971 report that mentioned the "Han" class submarine. Yet, it was said that manufacturing problems encountered in the original design similar to those of the earlier American nuclear thrust system, caused the testing of this warship to be delayed over two years before being completed. In 1973, a Chinese delegation visited West Germany and were especially interested in the problem of nuclear thrust used in warships. This was considered a rare experience which further raised the possibility of estimating the possible problems for warships. The initial testing of the submarine was possibly completed in 1974 or 1975 as reported in a 1975 report: "The Chinese navy is in the process of testing submarine launched missiles on its old style G class submarine and has tested submarine launched rockets from the "Han" class submarine built in 1975." Since the construction of the first "Han" class submarine was previous to 1974, this report considers that the second submarine was built in 1975 and had the launching power of a SLBM. If the test of this warship also required two years for completion then it should have been put into active service at the end of 1977 or the beginnig of 1978.

China's SLBM program and its development level are not known to the outside world but what is known is that the Tangshan earthquake of 28 July 1976, China's most serious

earthquake in four centuries, destroyed China's northeastern submarines and their manufacturing facilities.

表2 中國的戰略導彈發展方案

代號	CSS-1	CSS-2	CSS-3	CSS-X-4	CSS-NX
類型	中程彈道導彈	中程彈道導彈	有限射程洲際彈道導彈[a]	全射程洲際彈道導彈[b]	潛射彈道導彈
投役年期	1966	1970	1976	1980或以後	1980[c]
體積（米）	約21×1.6	約23×2.4	不詳	約35×3	約10×1.5[d]
節數	單節	單節	多節	三或四節	二節
推進劑	液態	液態	液態	液態	固態
制導	慣性	慣性	慣性	慣性	慣性
彈頭	約二萬磅當量	2至20萬磅當量	2至3米加磅當量	3米加磅當量	約3至20萬磅當量
發射重量（千克）	約26,000	約27,000	不詳	約150, 00至200,000	約13,700至14,000
射程（千米）	約1,800	2,700至3,200	4,800至5,600	約11,000至12,800	約2,200至2,700

註：a—1976年以後的有限射程洲際彈道導彈。
b—估計與美國的「大力神II」式和蘇聯的SS-9型導彈同級的武器；投役年期預計於八十年代初期。
c—估計的投役年期。
d—尺寸和威力大約與美國早期的「北極星」式導彈相當。

Table 2 China's Strategic Missile Program

Key:

1. designation
2. model
3. medium range ballistic missile
4. medium range ballistic missile
5. limited range intercontinental ballistic missile[a]
6. full range intercontinental ballistic missile[b]
7. submarine launched ballistic missile
8. year put into service
9. 1980 or later
10. volume (meters)
11. about 21 x 1.6
12. about 23 x 2.4
13. no details
14. about 35 x 3

15. about 10 x 1.5[d]
16. number of sections
17. single section
18. single section
19. multisectioned
20. 3 or 4 sections
21. two sections
22. propellant
23. liquid
24. liquid
25. liquid
26. liquid
27. solid
28. guidance
29. inertia
30. inertia
31. inertia
32. inertia
33. inertia
34. warhead
35. equivalent of about 20,000 tons
36. equivalent of 20,000 to 200,000 tons
37. equivalent of 2 to 3 metric tons
38. equivalent of 3 metric tons
39. equivalent of about 30,000 to 200,000 tons
40. launching weight (kilograms)
41. about 26,000
42. about 27,000
43. no details
44. about 150,000 to 200,000
45. about 13,700 to 14,000
46. range (kilometers)
47. about 1,800
48. 2,700 to 3,200
49. 4,800 to 5,600
50. about 11,000 to 12,800
51. about 2,200 to 2,700
52. note: a. 1976 tested limited range intercontinental ballistic missile
53. b. Estimated to be the same weapons as American "Titan II" and Soviet SS 9 model missile. Estimated to be put into service at the beginning of the 1980's.
54. c. Estimated year to be put into service
55. d. Measurements and power about same as earlier American "Polaris" missile.

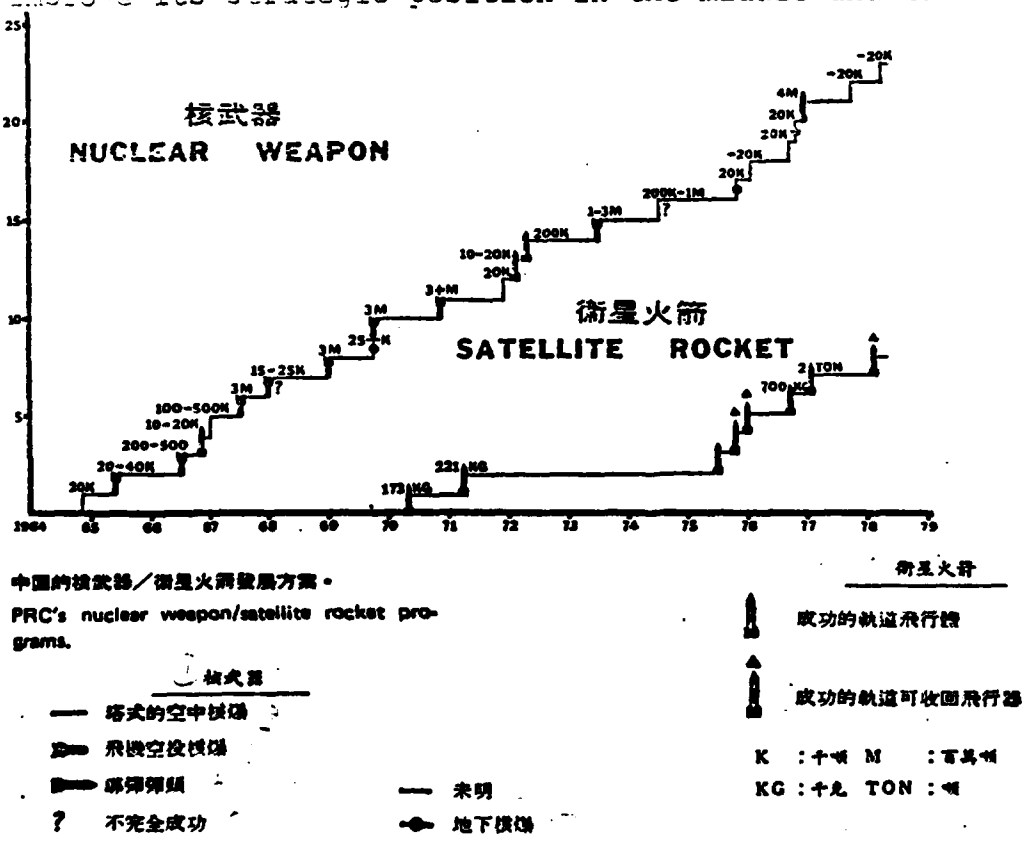
China very possibly plans to expand the production of the SLBM. From the point of view of economics and politics, at present China does not need to produce nuclear powered attack submarines. China currently possesses the world's third largest submarine force, which is comprised of 70 to 80 diesel electric attack submarines. From a maritime defense point of view, considering the shallow waters along much of China's coastal approaches, use of the country's limited resourses for a parallel SSN program would be counterproductive.

The late General George S. Brown of the U.S. Armed Forces summarized China's strategic forces in the United States Military Posture Statement for FY 1979:

> "Their (Chinese) capacity to produce fissionable material is expanding.... . During 1977, the Chinese surface to surface missile and related programs apparently expanded. In addition there have been nuclear weapon tests. This actively suggests a continuing emphasis by the Chinese on developing strategic missile and space systems. The People's Republic of China has made a substantial investment in research, developmental testing, and production facilities for both liquid and solid propellant missile systems. Although the Chinese have not yet flight tested a solid propellant ballistic

missile, they continue to expand their solid propellant rocket motor facilities."

From China's earth satellite launching program, we can see that in its tests China has all along been able to fire at American ballistic missiles and because China can infer, it already has the capability to produce a relatively short range SLBM. As the Chinese reports point out, China is in the process of investigating its many limited resources in order to research and develop weapons systems so that it can greatly improve its strategic position in the middle and late 1980's.



中国的核武器／衛星火箭發展方案。

PRC's nuclear weapon/satellite rocket programs.

核武器

— 塔式的空中核爆

飛機空投核爆

導彈彈頭

? 不完全成功

— 未明

地下核爆

衛星火箭

成功的軌道飛行體

成功的軌道可收回飛行器

K ：千噸 M ：百萬噸

KG：千克 TON：噸

Key:

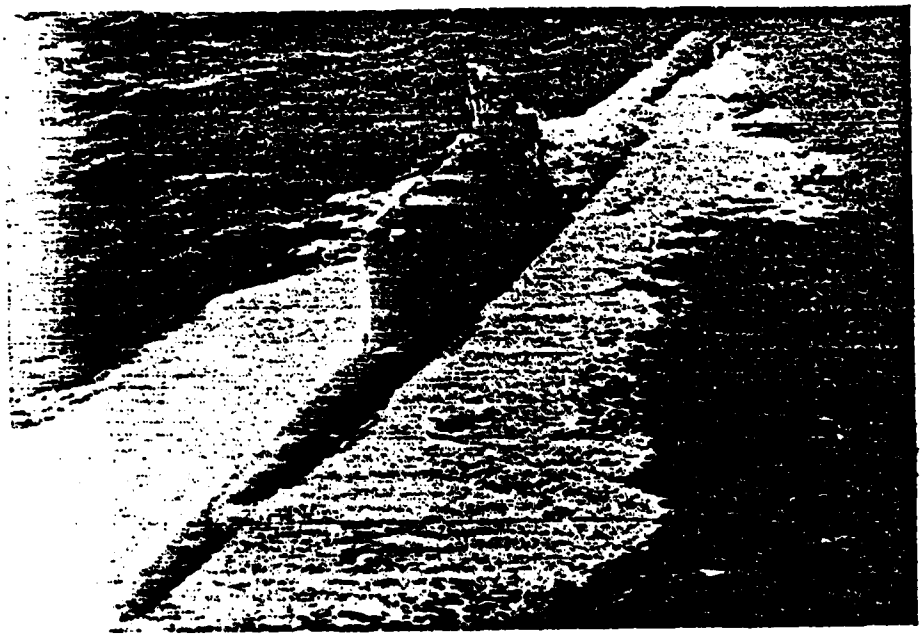
1. nuclear weapon
2. tower air nuclear explosion
3. airplane drop nuclear explosion
4. missile warhead
5. not completely successful
6. unknown
7. underground nuclear explosion
8. satellite rocket
9. successful orbiting
10. successful orbit with retrievable aircraft

Any testing of the SLBM begins with a complete program of being able to launch from the ground. This program is similar to the development of the "Polaris", "Neptune" and "Trident" missiles carried out by the Americans in the first stage of their development. The carrying out of a series of these kinds of ground launching tests can reduce the inherent danger of making initial shallow water launchings from China's only test platform.

Asian information sources report that in the last few years China has had several unconfirmed missile launch tests. Although public propaganda has not yet reported specific SLBM activities yet obviously there have been launch tests and launchings of missiles without warheads. Besides this, there have also been reports on some related activities.

In July of 1976, an American reconnaissance plane took

pictures of China's oceanography and the scientific surveying instrument boats "Sun Red No. 5" and "Sun Red No. 11" near the American Samoan Islands. This is only one recent example of the activity of Chinese boats navigating in the Pacific Ocean. To develop the whole course of the ICBM, whether it is launched from land or sea, whether the projectile nose falls in the Pacific or Indian Oceans, they must always have a "Red Sun" system or other specially structured support ship. The activities of these support ships in the ocean also possibly require naval vessel envoys.



▲中國海軍的國產型式G級常規動力彈道飛彈潛水艇在海上航行。

China's home made G class connentional powered ballistic missile submarine sailing half submerged.

Based on miscellaneous data and the analysis of several Chinese naval design programs, we can use the attached diagram to show the vertical view and side view exposed to water of the improved "Han" class nuclear powered ballistic missile submarine (SSBN). In view of these reports, the first "Han" class submarine is possibly a nuclear attack submarine and the second is possibly related to the submarine launched missile test. Because of this, we can infer that China's method for improving the second "Han" class submarine was probably the same as the method used by the Americans in 1957 to remake the design of the "Flying Fish" (USS Skipjack, SSN 585) nuclear powered attack submarine. Below are prominent specific estimations of the improved "Han" class submarine.

The Hull: expanded USS Albacore teardrop model hull structure. The dimensions and exterior are similar to the U.S. Navy "Permit" class submarine (SSN 594) or "Sturgeon" class submarine (SSN 637).

Missile Cabin: It is estimated that the back of the pilot's cabin is 10 to 15 meters and installed in the hull structure are 6 launching tubes (divided into two series, each series containing 3), a launch control device and guidance equipment.

Measurements: The entire length of the hull is about 100 meters.

In width, the diameter of the supercharge hull is about 11 meters. The command platform shell is at a height of about 7 meters and in the middle section of the command platform shell near the advancing edge there is fitted a horizontal rudder.

Displacement: The displacement when foating is about 4,300 tons and when in shallow water the displacement is about 5,300 tons.

Weapons: The 6 Chinese made two section solid fuel thrust SLBM have a range of 2,700 kilometers. There are four 533 mm. torpedo tubes installed in the bow.

Thrust Equipment: A single pressurized water cooled reactor.

Propeller: One

Speed: When under water full speed is 25 to 30 nautical miles per hour.

Crew: About 100 officers and men.

Based on the above estimations, the level of China's research and development corresponds to the earlier design period of the SLBM systems of the Soviet Union, United States and France. The missiles are probably about 10 meters long with

diameters of about 1.5 meters.

[Insert from top of p. 17]

China's G Class Conventionally Powered Ballistic Missile Submarine

Displacement: water surface 2, 350 tons; underwater about 2,800 tons.

Volume and Measurement: length 97.5 meters; width 7.6 meters; draught depth 6.7 meters.

Power Equipment: 3 platforms of diesel engines with a total power of 6,000 horse power; 3 platforms of electric motors with a total power of 6,000 horse power; drive shaft.

Capacity: floating ship speed of 20 knots, submerged ship 17 knots; on water at an economical cruising speed the traveling range is 19,722 nautical miles.

Weapon Installations: Ten 533 mm. torpedo tubes. Three vertical ballistic missile tubes.

Crew: 86 persons (12 officers, 74 seamen)

Before the bad relations between China and the Soviet Union occured, the Soviet Union provided China with design blueprints of the G class submarine and China based on these blueprints constructed a submarine in Dairen's Red Flag Ship Building Factory in 1964. This G class submarine was not equipped with actual combat use missiles. The Soviet G I class submarine equipped with SS N 4 missiles is a backward water launched missile and we believe that China has recognized this drawback and its use has been abandoned. Moreover, this G class submarine has been used to develop a new generation of testing platforms for submarine missiles. It is said that China has tested a self made designed ballistic missile on this submarine and yet because this missile uses a solid propellant it is not suitable for use in ocean operations and thus was abandoned. China's final aim is to construct nuclear powered ballistic missile submarines. The G class submarine cannot be constructed again.

From 1976 after the death of Mao Zedong, there was a great change in China's production of high grade strategic "defense" systems. This type of change was advantageous to expanding and speeding up the development of naval missile technology.

On 26 February 1978, Chinese Premier Hua Guofeng said at the Plenary Session of the Chinese People's Political Consultative Conference that in order to speed up scientific development there should be implemented the policies of "make the past serve the present" and "foreign things serve China."

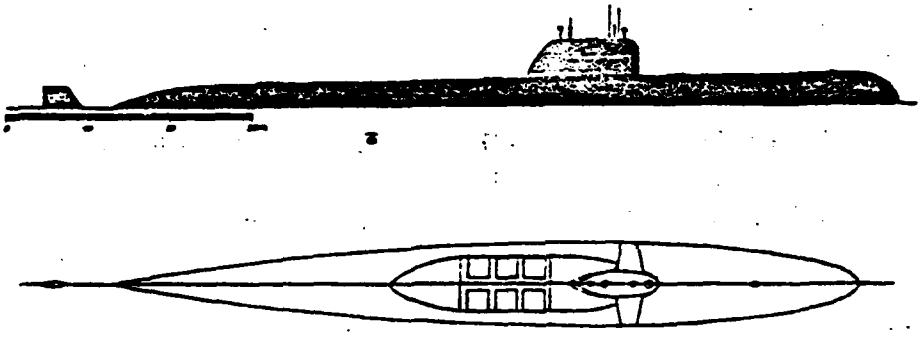
On 5 March 1978 upon concluding the First Plenary Conference of the Fifth National People's Congress there was adopted the "Outline of the Development of National Scientific Technology" resolution for the period from 1978 to 1985. This resolution, as a national guiding principle, mentioned the use of advanced scientific technology to accomplish the policy and measures for equipping the Chinese armed forces so as to greatly strengthen China's defense power, emphasizing the use of atomic energy and the development of electronic computers and space science.

In the last year, Minister Li Qiang of the Ministry of Foreign Trade led a delegation and visited several western European nations where they diligently sought the newest western technology. At the same time, many European delegations also visited China and negotiated with China the question of the sale of modernized equipment and materials. Much of the equipment and materials were naturally related to military use.

Like the Soviet Union, after China recognizes that to possess a strong world naval power is advantageous for its economy, politics and military, they must be able to vigorously develop their submarine launched strategic missile strength.

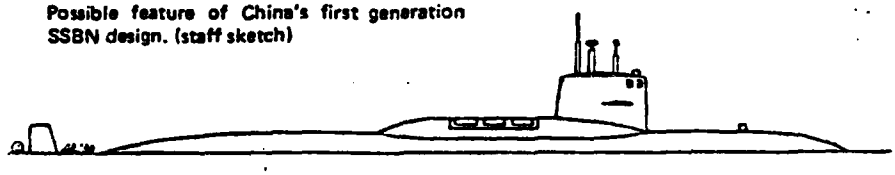
中国海軍的第一艘核動力試驗潛艇「漢」級的側視想像圖・

Side-view diagram of China's first nuclear powered submarine, the Han class submarine, (drawing by *Interconair*)



中国海軍的第一代核動力彈道導彈潛水艇的可能設計圖・

Possible feature of China's first generation SSBN design. (staff sketch)



一九八〇年四月　現代軍事