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Economic Intelligence Report

TRANSPORTATION IN NORTH KOREA: ACHIEVEMENTS AND PROSPECTS 1951–61 AND 1967 PLAN

CIA/RR ER 62–36

November 1962

CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

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CENTRAL INTELLIGENCE AGENCY
Washington 25, D.C.

19 December 1962

MEMORANDUM FOR: Recipients of CIA/RR ER 62-36, Transportation in North Korea: Achievements and Prospects, 1956-61 and 1967 Plan, November 1962, SECRET

SUBJECT : Correction of cover and title page

The date in the title on both the cover and the title page should read as follows:

1956-61 AND 1967 PLAN

FOR THE ASSISTANT DIRECTOR, RESEARCH AND REPORTS:

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Chief, Publications Staff

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Economic Intelligence Report

TRANSPORTATION IN NORTH KOREA: ACHIEVEMENTS AND PROSPECTS 1951–61 AND 1967 PLAN

CIA/RR ER 62–36

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FOREWORD

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An attempt is made in this report [redacted] to evaluate North Korean 50X1
plans for development of the transportation system through 1967. The Seven Year Plan (1961-67) of North Korea has now been underway for nearly 2 years, and the time is approaching when the phase of the plan to expand heavy industry, scheduled for 1964, will begin creating substantial service requirements on the transportation system.

The North Korean government has been vociferous with information regarding its progress and plans for the modern transport industry except for certain information that might have military intelligence value. [redacted] 50X1
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TRANSPORTATION IN NORTH KOREA: ACHIEVEMENTS AND PROSPECTS* 1956-61 AND 1967 PLAN

Summary and Conclusions

Modern transport** in North Korea achieved a level of performance in 1961 about 2.5 times that of 1956, and prospects for nearly tripling by 1967 the level of tons carried in 1961 appear to be reasonable. The high rate of growth in transportation during 1956-61 was achieved mainly through intensive utilization of the rail system, but the acquisition of relatively large numbers of motor vehicles for highway transport also was a factor. Increases in transportation performance have been adequate to meet the demands of the "flying horse" drive for rapid industrialization that began in 1958.

The Seven Year Plan of North Korea calls for modern transport to carry nearly 220 million tons*** in 1967, slightly more than that carried by modern transport in Communist China in 1953, and to perform nearly 20 billion ton-kilometers, about one-half the Chinese ton-kilometer performance in 1950. This level of performance is expected to be attained through improvements in the rail system and the expansion of motor vehicle transport. Rail capacity is to be expanded mainly by electrification of the major rail lines. Motor vehicle transport undoubtedly will increase rapidly by the utilization of domestically produced trucks to provide feeder service for railroads and waterways. In general, the North Koreans have the capability to produce and use the basic equipment required to carry out their transport plan. There is some doubt, however, whether sufficient investment is being allocated to transport during the early years of the Seven Year Plan. Investment in transport will not be emphasized until the last 4 years of the plan period. Although the goals for transport performance in 1967 are ambitious, they probably will be accomplished provided the industrial and agricultural sectors of the economy move forward according to plan and generate sufficient traffic.

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* The estimates and conclusions in this report represent the best judgment of this Office as of 1 October 1962.

** The term modern transport as used in this report refers to railroads, motor trucks and trailers, buses, and modern ships in the North Korean inland water and coastal fleets. The term native transport refers to animal-drawn and man-drawn carts, porters', and primitive craft such as junks and wooden sailing vessels.

*** Unless otherwise indicated, tonnages are given in metric tons throughout this report.

Since 1954 the value of industrial production in North Korea has expanded slightly faster than the volume of tons carried by modern transport. Future industrial growth is planned to require a proportionately smaller number of tons carried. Such a relationship will be possible if the commodity composition of the traffic changes as expected. There may be proportionately less coal to be hauled as electric power production increases, and the industrial goods to be transported may consist of a higher percentage of high-value, low-volume products as industrial output increases and becomes more complex.

In 1961, performance by all modes of transport in North Korea reached 77 million tons carried and 10.4 billion ton-kilometers (tkm). The rail system continued to be the major form of transport, accounting for 95 percent of the ton-kilometer performance. Motor truck transport, however, carried an increasing share of the total tons carried, 45 percent of the total in 1960 compared with 32 percent in 1956. Water transport, in spite of considerable effort to expand its services more rapidly, has accounted for less than 5 percent of the total performance.

During 1956-61 the operating efficiency of the railroad system increased significantly, as indicated by a decrease in turnaround time of railroad freight cars from 5.1 days in 1956 to 2.96 days in 1961. This improvement, however, does not compare very well with the achievement in Communist China of a turnaround time of 2.47 days in 1959 with an average length of haul twice that of North Korea. During 1957-61 the average tonnage of freight trains was increased by 32 percent through a program to increase the carrying capacity of cars by the reconstruction of existing cars and by the addition of larger cars to the park. It is estimated that North Korea had 10,800 freight cars in 1961, about 600 more than in 1956, with the additions coming mainly from domestic production and reconstruction of war-damaged cars. Also contributing to the increased rail efficiency were improvements in the rail network, which included a modest amount of electrification of certain key lines and the installation of some automatic block signaling, welded rails, and mechanized loading and unloading facilities.

Improvements in efficiency in truck transport have resulted in increases in output per truck of about 30 percent in terms of ton-kilometers and nearly 90 percent in terms of tons carried during 1957-60. It is estimated that North Korea had 23,000 trucks at the end of 1961 compared with 10,000 at the end of 1956. During 1956-59, trucks were imported from the USSR, but recently domestic production has reached about 3,000 2-1/2-ton trucks annually.

I. Introduction

North Korea is a comparatively primitive country in which human carriers using the A frame and oxcart and horsecart transport are still common, but modern transport has expanded rapidly since the rehabilitation of the devastation caused by the Korean War. Primitive transport continues to support local handicraft and agriculture, but modern transport has kept pace with the industrial development of the country. Tons carried by all forms of modern transport are estimated to have grown at an annual average rate of 22 percent from 1956 through 1961, resulting in a total of 77 million tons carried in 1961. Much of the growth was achieved during the economic drive called the "flying horse" program to accomplish by 1959 the goals of the First Five Year Plan (1956-60) in 4 years. The drive reached a peak of activity in 1959 and began to slow down during 1960. In most sectors of the economy the goals for 1960 were completed in 1959, but the plan continued through 1960. Although some maladjustments in the economy occurred in 1960 and 1961, the economic problems have not been nearly so serious or prolonged as those in Communist China. Apparently because of the setback in 1960 and 1961, the Seven Year Plan (1961-67) as originally announced in August of 1960 was revised downward in 1961 and made considerably more moderate.

The present plan for economic development is an ambitious program, however, which, if successfully carried out, will make heavy demands on the physical and human resources of North Korea and also will involve rapid technological advances in industry and agriculture. This plan calls for industrial output by 1967 to be 3.2 times the level of 1960; agricultural output, 2.4 times; and national income, 2.7 times. During the first 3 years the plan is intended to alleviate shortages in consumer goods for a population of 11.5 million (as of the end of 1962) and during the last 4 years to develop further the already productive industrial sector of the economy.

The development of the economy will place an enormous task on the transportation system, according to the North Korean press, and the railroads especially are expected to meet the growing requirements through technological improvements and the intensive use of the existing facilities. Plans call for doubling the volume of freight to be transported by railroads, and the capacity of the railroads is expected to be expanded through electrification of the rail system. Investment in transportation, however, will not be emphasized until the last 4 years of the plan period. These plans lead to several questions which are discussed here but which cannot be completely answered. Is the plan for transport in equilibrium with plans for agriculture and industry as a whole? Is enough emphasis being placed at present on technological

improvements in transportation, and does North Korea have available the technological knowledge and capability to carry out the planned improvements in transportation?

The importance of making such an analysis of transportation in North Korea does not stem from the level of transportation performance in comparison with other countries, because the transportation system of North Korea accounts for only a small percentage of the total transportation performance of the Sino-Soviet Bloc. In spite of its rapid growth, transportation performance in North Korea is less than that of any country of the Bloc except Albania and North Vietnam. This analysis is important, however, because of the significant role of transportation in the North Korean economy and because of the possibility of future hostilities between North Korea and South Korea. Together with the communications sector, transportation directly accounts for about 9 percent of the gross national product. The modern transport industry employed about 72,000 persons in 1960, or about 5 percent of the total number, excluding cooperative members, employed in all branches of the state-operated sector of the economy. 1/*

II. Development of the Transportation Network

A. Railroads

At the end of 1961 the length of rail network in operation in North Korea amounted to about 3,850 kilometers (km), 85 percent of which was standard gauge and the remainder narrow gauge. Since 1956 the length of the network has been extended about 200 km. 2/ The network is nearly all single track except for a few short sections of double track near major cities (see the map, Figure 1**). The major rail line along the west coast from the Chinese border to Kaesong was double tracked originally, but the rails and crossties of one track were removed by the Japanese during World War II for use as replacements on other lines. Although it seemed for a few years that the North Korean government would have the second track replaced, present plans to increase the capacity of the route call for the electrification of the single-track line rather than for the restoration of the second track. 3/

Although the entire rail network has been extensively rehabilitated and improved since the Korean War with the help of various countries of the Bloc, it still lacks uniform standards. The weight of the rail varies considerably on any one line, and sharp turns and steep grades on some lines impose restrictions on speed and limit the loads of trains. Work is continuing to improve these conditions, however,

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** Inside back cover.

and speeds of more than 100 km per hour on major trunk lines have been claimed. 4/ The system is being modernized with the installation of some automatic block signaling, considerable amounts of heavy-duty and welded rails, and mechanized loading and unloading facilities. Electrification of all main lines is being undertaken to replace steam propulsion, and work to convert the entire network to standard gauge is underway.

The Japanese were responsible for the first period of extensive rail construction on the Korean Peninsula, which took place immediately before and during the Russo-Japanese War (1904-05). Military considerations governed the construction of the lines, and emphasis was placed on north-south lines that provided Japan with direct routes to Manchuria and the USSR. The rail system also was planned to serve the economic needs of Japan, the north-south lines tieing the resources of Manchuria and Korea into the production complex of Japan. Lateral lines were neglected. The mountainous terrain has influenced further the establishment of railroads in a longitudinal pattern. 5/ The division of the peninsula into North Korea and South Korea created additional problems in utilizing the rail system for internal development of the North Korean economy. Although work is progressing toward adapting the rail system to the needs of the economy and developing other modes of transportation to supplement the rail system, some major features of an integrated and efficiently operating system may not be completed even by the end of the Seven Year Plan.

The principal north-south lines are still connected with only one east-west line. Although the east-west line has been electrified to expand its capacity, it is congested by the exchange of goods between east-coast and west-coast industrial centers. On the second east-west line a 38-km section from P'yongsan to Chiha-ri is now in operation, but the remaining section of about 100 km through extremely mountainous terrain from Chiha-ri to Pokkye-ri is not scheduled for completion until 1964. Another important link of the rail network under construction is located along the east coast between Ch'ongjin and Najin near the Soviet border. The completion of this 78-km section, planned for 1963, will speed up the delivery of coal from northern collieries to the industrial centers 6/; shorten the distance to the junction with the Soviet rail system at Podgornaya*; and relieve congestion on the main line extending north from Ch'ongjin, which has considerable traffic in iron ore and forms one of the major connections with the Chinese rail system at Sangsambong and Namyang (see the map, Figure 2**).

* The section between Hongui in North Korea and Kraskino in the USSR constitutes the transloading area. This section crosses the Tumen River at Podgornaya, a village in the USSR.

** Following p. 6.

By electrifying the major rail lines, the North Korean government expects that the rail system will be able to carry the increased traffic generated by the Seven Year Plan. Electrification of rail lines did not progress as planned under the First Five Year Plan (1956-60), which contemplated that all rail lines would be electrified by 1967. Actually, only 202 km had been electrified by the end of 1961. 7/ Plans now call for electrification by 1967 of about 1,500 km of main line, about 40 percent of the present system, which will carry from 65 to 70 percent of the total volume of rail freight in the country. 8/ Lines to be electrified include the east-coast line as far north as Ch'ongjin and the west-coast line from Sinuiju to Kaesong. Past progress does not indicate that the goal will be accomplished, but, with trained workmen and experienced administrators, which by now are likely available, and with the diversion of sufficient resources for the purpose, progress may be rapid. The present electrified line consists of three sections: the 129-km section of the east-west line between Sinsongch'on and Kowon, one section on the east-coast line, and another short section on the line that connects with the Chinese system at Manp'ojin. During the first half of 1962 the east-coast line extending south from Songjin (Kimch'aek) to Hongwon was reported to have been electrified. 9/

Although North Korea has little excess capacity for hydroelectric or thermal electric power production, new powerplants of both types currently are under construction throughout the country. Production of electric power is planned to increase from 10.4 billion kilowatt-hours (kwh) in 1961 to 17 billion kwh in 1967. Hydroelectric powerplants furnish nearly all production at present, but thermal electric powerplants being constructed principally near coal mines will provide an increasing share of the total production. The railroad system, however, has consumed an insignificant proportion of the electric power and in 1967 will still require less than 2 percent of the planned output of electric power to transport the planned level of rail freight traffic by electric traction.

B. Highways

At the end of 1961 the highway network in North Korea consisted of about 20,000 km of roads of varying quality. Beginning in 1957, the goal was to improve the quality of the network, which had been reconstructed hurriedly for makeshift use after the war because of possible resumption of hostilities. By the end of 1959, most major roads and bridges had been reconstructed with permanent structures according to standards adopted by the North Korean government. 10/ In 1960 and 1961, major emphasis was placed on further improvement of principal roads. Only 335 km were reported as newly constructed or expanded during 1957-60. 11/ In spite of extensive reconstruction the highway network consists mainly of gravel or dirt roads, intended for light traffic only.

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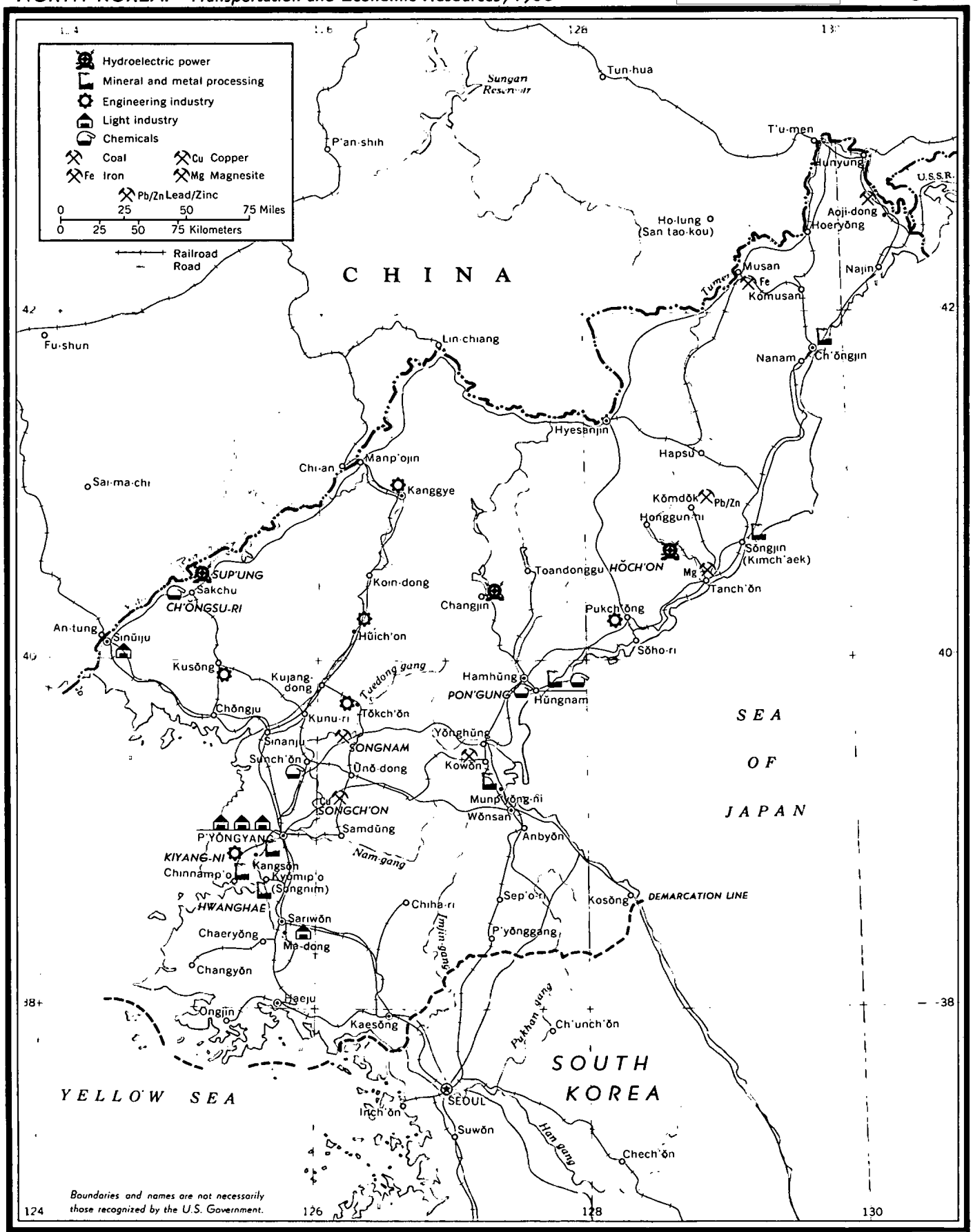
NORTH KOREA: Transportation and Economic Resources, 1960

Figure 2



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Paving is limited to a few long sections leading to P'yongyang and possibly to a few short sections near other main cities. Other heavily traveled sections are scheduled to be paved during the Seven Year Plan. 12/

Early in 1960, all the principal highways of North Korea (comprising Classes I and II in the North Korean government road classification) generally were in good condition. These highways are built and maintained by the central government. Class I highways connect provincial capitals and foreign countries with P'yongyang; Class II highways connect seats of local government with the main highway system. Although a small number of bad curves and grades still existed in 1960, the general alignment of all principal highways had been greatly improved. New bridges were for the most part built of concrete, with a roadway width of 6 meters. However, all secondary roads, classified as Class III, were in poor condition. The old bridges, built during the Korean War, were still in use in many places. Maintenance of Class III and other local roads is the responsibility of the local or provincial governments. 13/

C. Waterways

About 3,200 km, or 20 percent of the river system of North Korea, are deep enough to sustain cargo-carrying vessels. 14/ The Yalu River has the longest navigable distance and serves as the only means of transportation in some of the mountainous regions. The Tumen River is important for the shipment of timber. In general, however, the rivers of North Korea are shallow routes that are suitable mainly for junks and native craft. Navigation is interrupted by freezing from December to March and by floods from June to August. The only improvements undertaken have been dredging and maintenance of deepwater channels in or near the estuaries of the most important rivers.

Important coastal ports, which are mainly natural harbors along the east coast, include Ch'ongjin, Najin, Wonsan, and Hungnam. On the west coast the only port of sufficient depth for oceangoing ships is Namp'o, located about 30 km from P'yongyang, in the estuary of the Taedong River. As a result of the wartime destruction of a large part of the fleet, ports, and shipyards, water transport has not been important, and the ports are used mainly by the Korean fishing fleet and by vessels moving in short-distance coastal traffic. The North Korean government developed extensive plans for the reconstruction of water transport to relieve the railroads of some of the foreign trade traffic and heavy domestic traffic along each coast, but these plans have been only modestly successful. In the past several years, European and Bloc ships have been calling at several ports, especially Namp'o and Ch'ongjin, but only at Ch'ongjin is quay-side anchorage available for ships with

a draft of more than about 20 feet. Small Japanese ships have called at Ch'ongjin and Ch'aho since about 1955, and a number of Soviet ships from the Soviet Far East have called each month, particularly at Najin and Unggi. Reports from all ports indicate that stevedoring and lighter service is scarce and poor. Dredging and expansion of port facilities are being carried out to meet the requirements of foreign ships, and increased shipping activity can be expected, although progress in these areas likely will be slow.

D. Civil Aviation

North Korea expended considerable effort to reconstruct and improve the country's most important airfields after the Korean conflict, but very few of the fields are used to provide civil air service. Most of the good airfields are located along the west coast, near the China border, or near P'yongyang. Only one airfield can sustain heavy transports of the Tu-104 type, and 17 can sustain only light transport planes of the Li-2 type. Most of the latter airfields have concrete runways 4,000 feet long or more but were constructed for jet fighter operations and therefore are considered incapable of sustaining heavier aircraft. Roads between the airports and the rail network or cities are mainly earthroads. 15/

Civilian air service is operated by the national airlines on at least one domestic route: from P'yongyang to Ch'ongjin, with a stop at Hamhung. The North Korean national airlines also operate a twice-weekly international service from P'yongyang to Peking, and China provides reciprocal service on the same route. Weekly service between Moscow and P'yongyang is maintained by the USSR via Novosibirsk with Il-18 planes. North Korea probably has only four aircraft in civilian service, three Li-2's and one Il-14, which are Soviet-built, piston-engined aircraft.

III. Transport Performance and Relationship to Output in Other Sectors of the Economy

A. Performance

1. Freight Transport

In 1961, performance by the modern transport system of North Korea reached 77 million tons carried and 10.4 billion ton-kilometers (tkm), both about 2.5 times the level of performance in 1956 (see Table 1* and the chart, Figure 3**). The share of tons carried by the railroads decreased during the period from about

* Appendix A, p. 23, below.
** Following p. 8.

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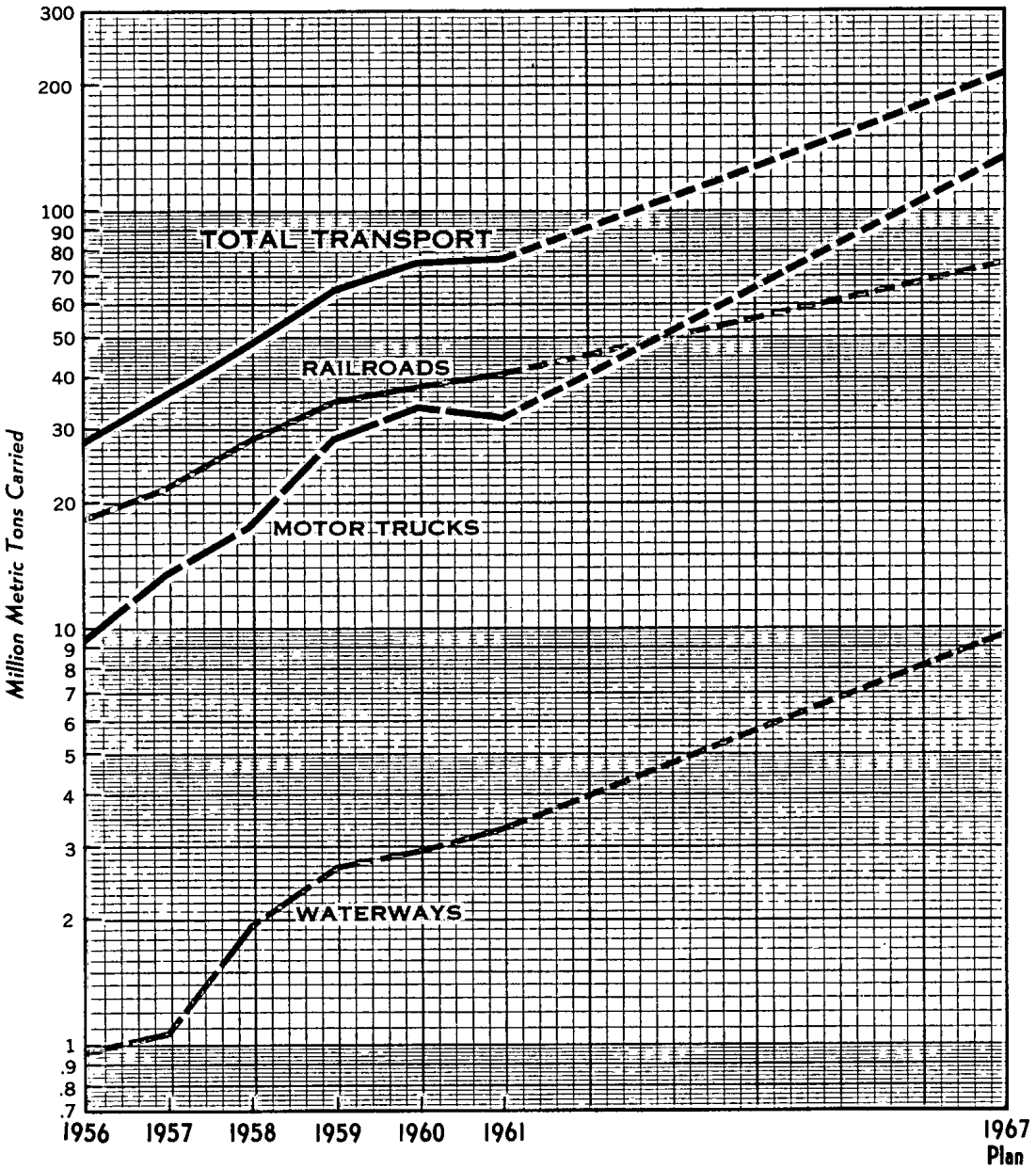
Figure 3

NORTH KOREA

TONS CARRIED BY MODERN TRANSPORT

1956-61 AND 1967 PLAN



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64 percent in 1956 to a little more than 50 percent of the total in 1960 and 1961. In terms of ton-kilometers, however, the railroads continued to perform more than 95 percent of the total, indicating the importance of the railroad system in long-distance traffic. During 1956-60, motor truck transport carried an increasing share of the total tonnage, a trend that had continued since the years before the Korean War, when motor trucks accounted for less than 10 percent of the total tonnage carried. From 32 percent of the total tonnage in 1956, the share carried by motor trucks increased to a high of 45 percent in 1960 (see the chart, Figure 4*). In 1961 the share performed by water transport was about 4 percent of the total tonnage and less than 2 percent of the ton-kilometers, in both cases only slightly higher than in 1956. Air transport has accounted for less then 1 percent of the total performance in any one year.

If the Seven Year Plan is successful, the proportion of tons carried by rail and by motor vehicles in 1967 will be nearly reversed from their 1956 positions: motor vehicles will carry 61 percent of the total tonnage compared with 32 percent, and railroads will carry 34 percent compared with 64 percent. Although plans have not been announced for ton-kilometer performance, it is estimated that the railroads will continue to perform nearly 90 percent of the total, and motor vehicles as well as water transport will show only modest increases in their respective shares of the total.

a. Railroads

Performance by rail transport from 1956 through 1961 increased at an average annual rate of about 18 percent in terms of both tons carried and ton-kilometers. The high rates of growth in the earlier years have tapered off since 1959. In order to achieve the planned goal of 75 million tons carried and 17.5 billion tkm in 1967, 16/ an increase of 10 to 11 percent annually will be required during 1962 through 1967. An increase of 6.5 million tons, or nearly 16 percent above the level of 1961, is planned for 1962. 17/ The average length of haul of all freight by rail remained between 220 and 240 km from 1956 through 1961, and only a slight decrease is planned by 1967.

Of the major commodities transported by rail during 1956, coal accounted for 26 percent of the total tonnage; construction materials including cement and timber, 29 percent; and minerals and metals, 12 percent. Although detailed information is not available for any year since 1958, these same commodities accounted for 27 percent, 32 percent, and 15 percent, respectively, during that year, indicating a trend toward greater reliance on the rail system to transport

* Following p. 10.

industrial and construction materials for the industrial expansion program. Grain accounted for about 4 percent of the rail tonnage carried in 1956 and in 1958, or about the same percentage as in Communist China during 1958. More than 95 percent of the coal imported and produced in North Korea moved by rail in 1957. At present the railroad system is a principal consumer of coal in the country, but it is possible that the percentage of the total rail tonnage occupied by coal may be reduced as electrification of the railroads progresses. The North Korean planners expect that when the main rail lines are electrified, only one-fifth of the coal now being used by the railroads will suffice to produce the electric power needed for railroad operation.

b. Motor Trucks

It is estimated that tons carried by motor trucks increased from about 9.2 million tons in 1956 to about 32.6 million tons in 1961, indicating an average annual rate of growth of nearly 29 percent. Although such a rate of growth seems high, increases in inventory and improvements in operating efficiency (which are discussed in the following section) put this increase within reason.* The Seven Year Plan calls for tonnage carried by motor transport by 1967 to be 3.9 times the level of 1960, which amounts to an average annual rate of growth of about 21 percent. If motor transport grows as planned, by 1967 it will carry nearly 80 percent more tonnage than that carried by the rail system. Such a performance in 1967 is possible if motor transport continues to expand to provide feeder service for rail and water transport; to replace primitive transport, especially in rural areas; and to support production at mines and industrial plants not located on the rail network. The average length of haul by motor vehicles, which has decreased from about 14 km in 1956 to 10 km in 1961, apparently will remain short, as the Seven Year Plan forecasts that the rail transport system will continue to be the major form of long-distance transport (see Table 2**).

c. Waterways

In spite of considerable investment, effort, and propaganda directed toward the expansion of water transport, performance by this means of transport, in terms of tons carried, increased at a

* Data for motor truck transport given in North Korean official releases, however, indicate a level of performance since 1958 of more than double this estimated tonnage. Apparently the inflated performance announced for 1958, 18/ the first year of the "flying horse" program, has never been publicly revised, and because the data for performance during each of the following years have been announced merely as percentage increases above the previous year, the mistake has been carried forward.

** Appendix A, p. 24, below.

Figure 4

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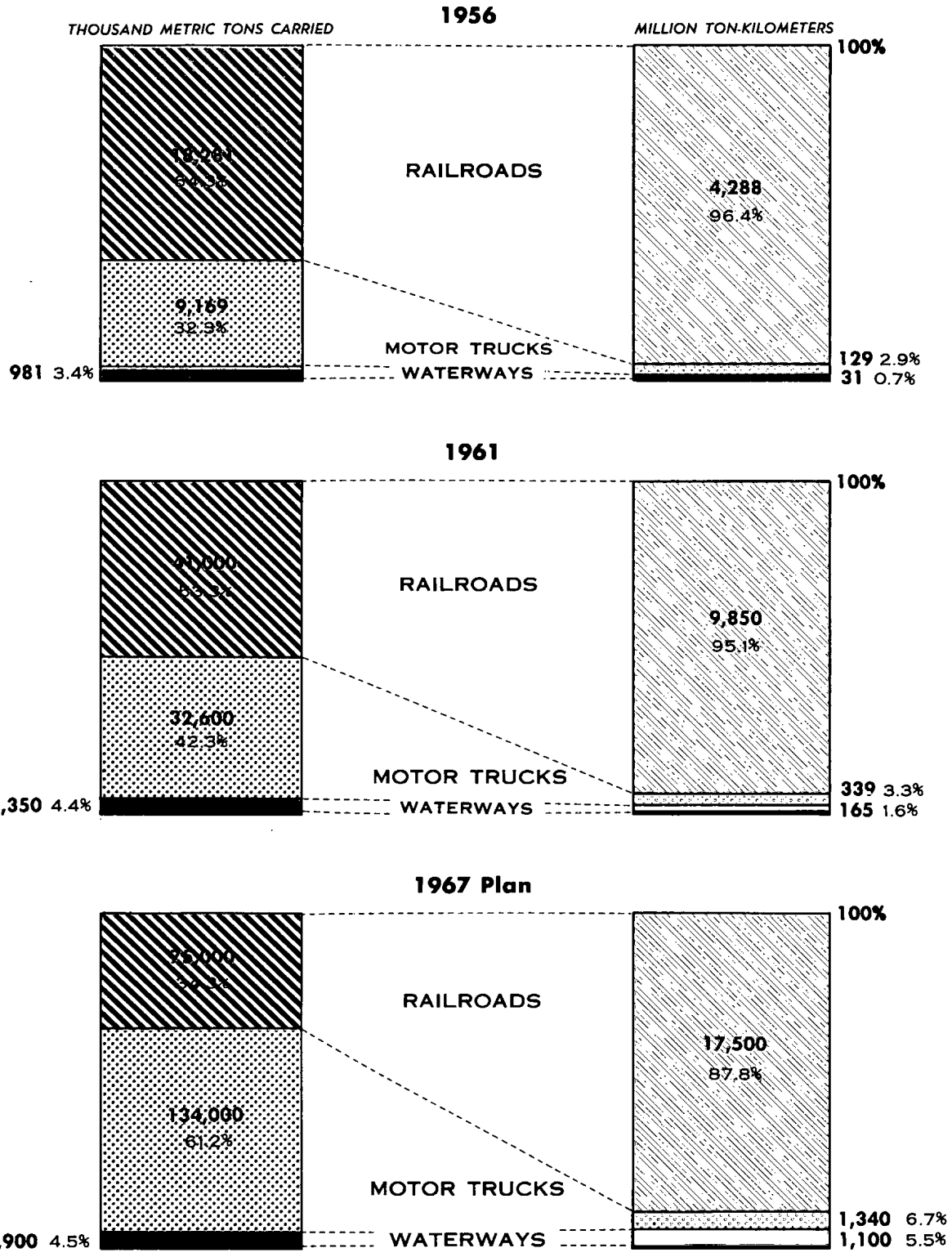
NORTH KOREA
PERFORMANCE OF THE MODERN TRANSPORT SYSTEM
1956, 1961, AND 1967 PLAN



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slower rate than that by motor vehicles from 1956 through 1961. The average length of haul increased by more than one-half to nearly 50 km, with the result that the ton-kilometer performance showed a slightly higher increase than did that of motor transport. Nevertheless, the North Korean government states that water transport, which carried only about 3.4 million tons in 1961, is lagging behind. By 1967 the volume of water transport is planned to be 3.3 times the level of 1960 and ton-kilometers eight times. 19/ Although it is doubtful that these increases will be achieved, the failure of water transport to fulfill its plan will not be significant, as it will continue to account for a relatively small proportion of the total transportation performance.

2. Passenger Transport

[redacted] the validity of data released by the North Korean government on passenger transport, but the released data seem reasonably in line with the rates of growth in freight transport [redacted] North Korea has emphasized motor bus transport as the principal mode of passenger transport. Motor buses have been imported and some have been produced domestically. Official travelers are given priority in rail travel, and it is difficult for unofficial travelers to obtain railroad tickets. Although bus service does not extend to many mountainous areas, bus routes do reach county seats and laborers' districts where no railroad exists. As a result, the number of passengers traveling by motor transport increased from about 17 percent of the total of 46 million passengers carried by modern transport in 1949 to nearly 80 percent of a total of about 294 million passengers in 1960. The number of passengers traveling by motor transport in 1960 was 3.6 times the number in 1956, slightly less than the increase estimated for motor truck freight during the same period. Rail transport carried only 20 percent of the passengers and accounted for about 70 percent of the passenger-kilometers in 1960, leaving less than 1 percent of the total performed by water transport (see Table 3*).

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3. Primitive Transport

In contrast to the practice in Communist China, primitive transport is seldom mentioned in official releases of information by the government of North Korea. [redacted] a common form of transport in North Korea is the human porter using an A-shaped frame to carry large loads on his back. Apparently the government would rather not publicize the fact that primitive transport not only has continued in North Korea but probably has expanded. Teams of oxen and horse carts have been organized and are administered at the provincial level. In 1958 the volume of freight transported in the whole country by such teams was announced as 4.2 times the 1953 level, and freight turnover was about 2.2 times. 20/

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* Appendix A, p. 25, below.

B. Relationship to Output in Other Sectors of the Economy

In 1960 the index of industrial production, measured in terms of value added in mining and manufacturing in North Korea, was 442 (1954 being the base year), and the index of total tons carried by modern transport was 384. A simple correlation between the two indexes was computed for the years 1954-60, and a formula was derived for the regression line. By assuming that the same relationship between the indexes will continue through 1967 and by substituting the planned level of industrial production for 1967 in the formula, it was found that the index of tons carried should reach 1,186 by 1967. The index of tons carried planned for 1967 is 1,106, or only 93 percent of what would be expected if the trend line were followed. This plan indicates that North Korea expects to reach the planned level of industrial production with a proportionately smaller number of tons carried. Such a relationship will be possible in 1967 if the commodity composition of traffic changes as expected. For example, if consumption of coal is greatly reduced by the electrification of the rail lines and if the goods produced by industry gradually consist of a higher percentage of high-value, low-volume goods, the value of industrial production undoubtedly will increase at a faster rate than transportation performance. Agricultural output, moreover, is planned to increase at a slower rate than other sectors of the economy and therefore will generate proportionately less volume to be transported.

IV. Inventory of Equipment and Operating Efficiency

A. Railroads

It is estimated that the inventory of railroad freight cars in North Korea increased only slightly from about 10,200 cars in 1956 to 10,800 cars in 1961. 21/ The rolling stock sent by other Bloc countries to North Korea arrived before 1956 for the most part and was reported to have included nearly 2,000 boxcars from Communist China and 45 refrigerator cars from East Germany. 22/ Since 1956, additions to the inventory have been mainly from domestic production and from reconstruction of war-damaged cars. According to North Korean official announcements, more than 2,000 freight cars were produced domestically during 1957-61, although these data undoubtedly are inflated by the inclusion of non-main line cars. On the assumption that the rolling stock park includes 1 locomotive for each 30 freight cars, the park probably includes at least 360 locomotives, between 30 and 50 of which probably are electric locomotives. The Seven Year Plan envisions an annual output of 2,000 freight cars by 1967, for a total production of 13,000 cars during the plan period. Also, a total production of 200 electric and diesel locomotives and more than 450 passenger cars is planned during 1961-67. Two electric locomotives reportedly were produced during 1961 as well as the first railroad passenger car made from North Korean materials. 23/

In recent years, railroad operating efficiency in North Korea has not improved as planned, although the improvement has been substantial (see Table 4*). Freight car turnaround time was reduced from 5.1 days in 1956 to 3.1 days in 1960 but not to the 2.5 days desired by the Minister of Transportation. A further improvement to 2.96 days was reported for 1961, and a goal of less than 2.5 days has now been set for 1967. 24/ The average load per loaded car was said to be 30 tons in 1958, and although the goal for 1959 apparently was 35 tons, an average of 33.1 tons was reported for 1959. The goal for 1967 for the average load per loaded car has not been announced, but a program is underway to increase the carrying capacity of cars both by reconstruction of existing cars to carry heavier loads and by adding larger cars to the park. The average tonnage of freight trains was 32 percent higher in 1961 than in 1956. If the average freight train tonnage is raised by another 20 percent as planned by 1967, it seems reasonable to assume that the average load per loaded car will be at least 35 tons and may reach 40 tons.

About 9,000 cars were required in 1959 to carry the reported performance of 35.1 million tons, assuming an average load per loaded car of 33.0 tons and a turnaround time of 3.1 days. This figure represents an operating park** of about 88 percent of the estimated inventory of 10,200 cars for that year. Similar computations for 1960 and 1961 indicate that the proportion of the total inventory in operation increased to about 93 percent. Such high ratios may reflect an improved maintenance and repair capability, as new railroad car building plants and repair shops have been built in the past few years, but these high ratios may also indicate either some degree of inaccuracy in the various reported operating factors or an inventory larger than estimated. To carry 75 million tons in 1967, with a turnaround of 2.5 days and an average load of 35 tons per loaded car, an operating park of 14,700 cars will be needed. If the average load increases to 40 tons, an operating park of only 12,840 cars will be required. The addition of 13,000 cars to the park during the plan period would seem to be more than ample to replace old cars and to permit some shortfall in the goals for the various operating factors.

B. Motor Trucks

It is estimated that North Korea had 23,000 civilian trucks at the end of 1961, and the inventory of civilian trucks, which increased

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* Appendix A, p. 26, below.

** The operating freight car park is calculated by multiplying the number of cars loaded per day by turnaround time. The difference between the total park and the operating park is the so-called reserve park, which includes cars idle for lack of assignment as well as those idle for repairs.

rapidly from about 10,000 units in 1956, can be expected to continue its expansion. The increases during 1956-59 resulted principally from imports of about 6,000 trucks from the USSR. Although North Korea may continue to import large-size or specialized trucks, future increases in the inventory will come mainly from domestic production, as a small but well-balanced motor vehicle industry has been developed. Production is confined as yet to 2-1/2-ton, 4-by-2 trucks based on the Soviet GAZ 51. 25/ Output of these so-called "Victory 58" trucks at the Tokch'on Factory increased from 100 trucks in 1959 to 3,100 in 1960 and 3,300 in 1961. Plans call for production of 4,700 trucks in 1962 and 10,000 in 1967. If the planned level of tons carried by motor trucks in 1967 is to be achieved, it will be necessary for all of the domestically produced trucks to be added to the North Korean truck park, although the country probably will export a few trucks to increase national prestige abroad. The machine building industry also produces spare parts, except tires, for most of the truck inventory. Buses and small automobiles also are reported to be in series production. Experimental production is underway on 6-ton and 10-ton trucks, but production of such vehicles will prove uneconomical in North Korea. Even if large trucks are produced, they would have limited use in the country, for the roads for the most part are not constructed to sustain heavy traffic.

About 47 percent of the total truck inventory in 1958 was assigned to the Vehicle Transport Bureau (VTB) of the Ministry of Transportation, and the remainder was assigned to organizations and enterprises under other ministries. 26/ A similar breakdown for any year since 1958 is not available, but at present the percentage probably greatly favors the VTB. The policy has been to increase the inventory of trucks under the VTB faster than the number assigned to nontransport organizations because it was found that trucks under nontransport enterprises have very low operational rates. According to North Korean official statistics, the number of trucks under the VTB increased by 25 percent in 1958 compared with 1957, while those under nontransport enterprises increased by only 1 percent. It was also announced that in 1960 the number of vehicles under the VTB increased by 40 percent compared with 1959. 27/ The higher utilization rate of trucks under the VTB undoubtedly has been one of the factors contributing to the increased efficiency of the truck park.

By using inventory and performance data, computations show that the annual ton-kilometer output per truck in North Korea increased by 29 percent in 1960 compared with 1956 and that tons carried per truck increased 87 percent in the same period. In 1961, however, performance per truck decreased 11 percent in terms of ton-kilometers and 17 percent in terms of tons carried compared with 1960. [redacted] 50X1
[redacted] the increases shown in earlier years were achieved mainly by improved 50X1

coordination, such as arranging loads for the trip both ways; by improving maintenance and repair of vehicles; by increasing the use of trailers hauled behind conventional trucks; and, most important, by implementing the two-shift system. There is nothing to indicate that trucks were overloaded as they were in Communist China during the "leap forward" campaign, but there are numerous references in North Korean publications to the poor maintenance and repair of vehicles that caused mechanical troubles while the trucks were on the road. Apparently such troubles were the reason why one transport group in P'yongyang achieved a net operational rate* of only 80 percent compared with the planned 95 percent. 28/ The decline in output per truck indicated for 1961 possibly can be attributed to a shortage of cargo to be transported; to the transfer of numerous trucks to rural areas to bolster agricultural production; and to the increased use of domestic fuels, which undoubtedly reduced efficiency.

Because all petroleum products consumed in North Korea must be imported and because North Korea is short of foreign exchange, truck transport has been forced to conserve gasoline. In 1958 the North Korean Cabinet ordered that every year, beginning with 1959, 75 percent of the total number of trucks and 50 percent of the automobiles existing at the beginning of the year should be modified within a few months so as to use substitute fuels. This order included all trucks except those with a loading capacity of more than 5 tons. Devices to save gasoline were ordered attached to all vehicles permitted to use gasoline. 29/ Substitute fuels included anthracite coal, briquets, charcoal, and carbide. Work norms for trucks and drivers were adjusted to require less time in operation for trucks burning substitute fuels, with a lower rate for trucks using coal and carbide than for trucks using charcoal. Judging from a fairly constant rate of imports of gasoline for a number of years, the conversion of some vehicles at least must have been accomplished. Just what effect the conversion had on efficiency has not been announced at the national level, but propaganda from various provincial groups claims that trucks powered by indigenous fuels operate as well as gasoline-powered trucks. One such announcement claimed that remodeled trucks climb hills 1,000 meters above sea level as well as gasoline-powered trucks, even with 5-ton to 7-ton trailers behind them. 30/

C. Waterways

In 1958, North Korea had about 500 small craft of all kinds, only 3 of which were more than 100 tons. The government recently stated that there was a pressing need for more ships. So far the shipbuilding industry has produced only a few small ships, but it now claims

* Proportion of the total time actually spent in transport work, excluding time for repairs and going to and from the work site.

to have the capacity to produce 3,000 deadweight (DWT) cargo vessels. The first such ship, which was launched in 1961, was equipped with a coal-fired steam engine that also was said to have been built in North Korea. The industry expected to complete a 3,500-DWT fish refrigeration ship by the end of 1961. 31/ In addition to building vessels, North Korea has acquired a 3,032-DWT cargo ship from Bulgaria. 32/ Although the ship is reported to be flying the North Korean flag, no information is available concerning its activities.

V. Administration and Labor Force

At the present time, although the railroads were formerly administered separately from other forms of transport, the Ministry of Transportation, headed by Kim Hoe-il, controls all forms of modern transport in North Korea. The executive branches of the Ministry include various bureaus and departments, a number of which deal with the operation, control, and construction of the railroads. One of the most important bureaus controlling railroad transport at the national level is the Transportation Bureau, which at the end of 1961 was authorized to organize headquarters for combined control over railroad transport activities at railroad stations, factories, and enterprises. It was expected that these headquarters could more efficiently operate freight cars entering the premises of factories and enterprises and could help the factories solve various transportation problems related to their production activities. 33/ Responsibility for the actual operation of the railroads is assigned to four regional administrations, with headquarters located in P'yongyang, Kaech'on, Hamhung, and Ch'ongjin.

The Motor Vehicle and Road Management Bureau, which was placed under the Ministry of Transportation in 1957, allocates all motor vehicles, distributes and manages fuel and oil, directs the construction of roads and bridges on Class I and Class II highways, and supervises the business activities of the provincial motor vehicle divisions. The Marine Transportation Management Bureau manages the operation of all North Korean vessels, directs construction of new vessels, and controls the ports and the local organs that control transportation on each of the rivers. The Air Bureau has similar responsibilities for civil air transport and civilian airfields.

The number of persons employed in modern transport in North Korea increased about 31 percent from 1956 to 1960, from 55,000 to 72,000, compared with increases in employment during the same period of 80 percent in all state-operated enterprises and 138 percent in modern industry. The following tabulation shows that although employment in transportation is an insignificant part of the total estimated nonagricultural labor force, which includes workers in handicraft industry, it accounts for an important part, about 5 percent, of the labor force

employed in state enterprises in 1960. Also noteworthy is the fact that transportation employed about one-tenth of the number of persons employed by modern industry in 1960. 34/

	Thousand Persons
Total labor force	4,000
Nonagricultural labor force	1,600
Labor force in state enterprises	1,500
Of which:	
Industry	700
Transportation	72

The productivity of labor in the transportation industry was reported to be about 80 percent higher in 1960 than in 1956. 35/ Productivity in motor transport increased at a higher rate than the average for the industry as a whole, and productivity in rail transport made only modest gains during these years.

VI. Investment

After the reconstruction of the transportation system during 1954-56 was basically completed, investment in the transportation sector (including communications) decreased in absolute terms and as a percent of the total capital investment. In 1957-60, transportation received 7.7 percent of the total capital investment in the economy made through the state budget compared with 13.1 percent during 1954-56 (see Table 5*). The actual proportion of the total investment going to this sector during 1957-60 was considerably less than the allocated 10.1 percent in the original 1957-61 plan. 36/ The absolute amount invested each year in terms of 1950 prices declined from a high of 50 million new won** in 1954 to 17 million in 1957, but since 1957 the amount has gradually increased. 37/ Neither the amount of investment in transportation in 1961 nor the proportion of the total investment of 7 billion won planned for 1961-67 allocated to the transportation sector has been announced. It has been reported, however, that investment in transportation as a sector of the economy will not be emphasized until the last 4 years of the plan. In

* Appendix A, p. 27, below.

** Won values in this report are presumed to be in new won and may be converted to US dollars at a rate of exchange of 2.57 won to US $1. This rate does not necessarily reflect the value of the won in terms of the dollar.

the first 3 years, investment will be concentrated on expanding and consolidating established productive facilities in the machine building and chemical industries and also in light industry and in fishing and agriculture. During the last 4 years, new construction in transportation, fuel, power, mining, and other key undertakings as well as in the chemical and machine building industries will be emphasized. If the extensive plans announced for transportation are to be accomplished by 1967, it would seem that the sector should receive about 700 million won, or about 10 percent of the total investment, about the same proportion as it received during 1954-60.

Even the investment of 10 percent of the total is small, however, compared with the rate of investment in transportation in other countries. During 1953-57, Communist China allocated 13 percent of the total capital investment, including nonbudgetary investment, to transportation and communications, and it is believed that the proportion increased after 1957. Although North Korea has not been attempting to expand the transportation network as Communist China has, North Korea has invested large sums in the electrification of parts of the rail network.

In North Korea the part of the total investment in the transportation sector allocated to railroads has been about 55 percent, according to data available for 1957 and 1958. 38/ In Communist China the comparable figure was 66 percent in 1953-57. 39/ Another 15 percent of North Korean investment in transportation went to highways and 8 percent to post and telecommunications, leaving about 22 percent for waterways and civil aviation. 40/ Waterways must have received by far the larger share of the latter figure because the plan for each year has emphasized the importance of developing water transport. Air transport has received little attention.

VII. Problems and Prospects

The goals for transportation in North Korea in 1962 and 1967 are ambitious, but they probably can be accomplished provided the industrial and agricultural sectors of the economy move forward according to plan and generate sufficient traffic. There is some doubt that the plans for production of rolling stock will be fulfilled, but failure in this field would not be crucial. In case of necessity, North Korea could continue to import rolling stock. Plans to improve water transport have had remarkably poor success in the past, but again this deficiency is not important, because water transport contributes only a small part of the total transport performance.

Regarding technical and industrial knowledge required for the long-range development of North Korea, it may be significant that the

government has informed the scientists of the country that certain information is essential if the Seven Year Plan is to be completed successfully. In the field of transportation the desired information includes information on the automation of signals and other safety devices for rail transport, research on new types of steel for truck parts, mass production casting techniques for automobile parts, and information regarding production of large trucks and of ships up to 10,000 tons. It is doubtful, however, that this information is absolutely essential for the transport industry to reach its goal for 1967. In the case of the rail system, automatic block signaling would improve efficiency, but certainly more significant is the electrification of main lines, for which technical knowledge apparently is available. Production of large trucks and ships is not necessary in North Korea, and if such were available, they would have limited use. A higher grade of steel for truck parts would alleviate some maintenance problems, and mass production casting techniques would speed up production of trucks, but neither is essential. The basic requirements for increasing transportation performance are present already or the essentials can be obtained with a reasonable investment program.

It seems to be characteristic of Communist-planned economies that the amount of investment allocated to develop the transportation system is barely sufficient to permit transportation to meet the demands placed on it by industrial expansion, and such is believed to be the case in North Korea. Although the transportation system will not have excess capacity if this happens, it will meet the demand for service. It also seems characteristic of Communist economies that plans for transportation generally underestimate the transportation performance needed to reach industrial goals but that the goals for transportation generally are exceeded. If this experience is repeated in North Korea during the next few years, transportation performance will expand roughly in the same relationship to industrial production as in the past.

The progress already made by the transportation industry of North Korea undoubtedly has greatly increased the ability of the country to wage war. Future progress no doubt will enhance this ability further. Major emphasis has been placed on the improvement of international rail connections with the USSR and Communist China and of the rail system in the southern part of the country near the line of demarcation, improvements that may serve military as well as economic goals.

APPENDIX A

STATISTICAL TABLES

Table 1

North Korea: Performance of the Modern Transport System a/
1956-61 and 1967 Plan

Year	Thousand Metric Tons Carried				Percent of Total		
	Railroads	Motor Trucks	Waterways b/	Total	Railroads	Motor Trucks	Waterways
1956 c/	18,281	9,169	981	28,431	64.3	32.3	3.4
1957 c/	21,455	13,891	1,095	36,441	58.9	38.1	3.0
1958	28,200 d/	17,500 e/	1,980 d/	47,680	59.1	36.7	4.2
1959 f/	35,132	28,878	2,754	66,764	52.6	43.3	4.1
1960 f/	38,645	34,348	2,990	75,983	50.9	45.2	3.9
1961 g/	41,000	32,600	3,350	76,950	53.3	42.3	4.4
1967 Plan	75,000 h/	134,000 i/	9,900 j/	218,900	34.3	61.2	4.5
	Million Metric Ton-Kilometers				Percent of Total		
1956 c/	4,288	129	31	4,448	96.4	2.9	0.7
1957 c/	5,072	189	37	5,298	95.7	3.6	0.7
1958	6,300 d/	213 e/	69 d/	6,582	95.7	3.2	1.1
1959 f/	7,798	304	104	8,206	95.0	3.7	1.3
1960 f/	9,123	332	136	9,591	95.1	3.5	1.4
1961 g/	9,850	339	165	10,354	95.1	3.3	1.6
1967 Plan	17,500 h/	1,340 k/	1,100 j/	19,940	87.8	6.7	5.5

a. Excluding performance by civil air transport, which accounts for less than 1 percent of the total modern transport performance.
b. Including both inland and coastal waterways, for which separate estimates are not available. Data were converted from nautical miles at the rate of 1.853248 km per nautical mile.
c. 41/.
d. 42/, giving percentage increases above 1946 and the previous year.
e. In 1959, highway freight tonnage was 165 percent of the level in 1958, and highway freight turnover was 143 percent. 43/
f. 45/.
h. 47/.
i. Freight carried by motor vehicles will increase more than 2.9 times during 1961-67. 48/
j. During 1961-67 the volume of water transport will increase 2.3 times and freight turnover more than seven times. 49/
k. Estimated, assuming an average length of haul of 10 km.

50X1

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Table 2

North Korea: Average Length of Haul by Modern Transport a/
1956-61 and 1967

Kilometers

Year	Freight Traffic		
	Railroad	Highway	Waterway
1956	235	14.1	32
1957	236	13.6	34
1958	223	12.2	35
1959	222	10.5	38
1960	236	9.7	45
1961	240	10.4	49
1967	233	10 b/	111
	Passenger Traffic		
1956	59	6.5	18
1957	55	5.9	19
1958	55 b/	6.0	16
1959	56	6 b/	16 b/
1960 b/	57	6	15

a. Information computed from data in Tables 1 and 3, pp. 23, above, and 25, below, respectively, unless otherwise indicated.
b. Estimated.

Table 3

North Korea: Volume and Amount of Passenger Transport by the Modern Transport System a/
1956-60

Year	Railroads	Highways	Inland and Coastal Waterways	Total	Railroads	Highways	Inland and Coastal Waterways
	Thousand Passengers				Percent of Total		
1956 b/	36,853	64,759	882	102,494	36.0	63.1	0.9
1957 b/	43,529	94,481	1,280	139,290	31.3	67.8	0.9
1958	42,700 c/	137,000 d/	1,466 e/	181,166	23.6	75.6	0.8
1959 f/	55,300	190,000 g/	1,600 h/	246,900	22.4	77.0	0.6
1960	59,500 c/	233,000 g/	1,700 h/	294,200	20.2	79.2	0.6
	Million Passenger-Kilometers				Percent of Total		
1956 b/	2,179	419	16	2,614	83.4	16.0	0.6
1957 b/	2,374	562	24	2,960	80.2	19.0	0.8
1958 d/	2,349	820	24	3,193	73.6	25.7	0.7
1959 i/	3,100	1,140	26	4,266	72.7	26.7	0.6
1960 i/	3,390	1,400	26	4,816	70.4	29.1	0.5

a. Data are believed to exclude intracity traffic. Excluding passengers carried by civil aviation, which was 0.2 percent or less of the total passenger-kilometers performed by modern transport in 1956-57.
b. 50/
c. Estimated, assuming an average haul of 55 km in 1958 and 57 km in 1960.
d. 51/
e. 52/
f. 53/
g. Estimated, assuming an average haul of 6 km.
h. Estimated, assuming an average haul of 16 km in 1959 and 15 km in 1960.
i. 54/

Table 4

North Korea: Selected Operational Data of Railroads
1956-61

Year	Freight Car Turnaround Time (Days)	Locomotive Running Distance (Kilometers per Day)	Average Technical Speed of Train a/ (Kilometers per Hour)	Average Operational Speed of Train b/ (Kilometers per Hour)	Average Tonnage of Freight Trains (Metric Tons)
1956 c/	5.1	223.6	27.2	18.7	628
1957 c/	4.4	244.0	29.7	20.3	659
1958	3.7 c/	260 d/	30.6 d/	19.6 d/	712 c/
1959 e/	3.1	284.8	33.0	20.4	785
1960	3.1 f/	293.8 f/	33.3 g/	20.8 g/	806 f/
1961	2.96 h/	N.A.	N.A.	N.A.	830 h/

a. Average speed during running time only, excluding stops.
b. Average speed, including stops.
c. 55/
d. 56/
e. 57/
f. 58/
g. 59/
h. 60/

Table 5

North Korea: Capital Investment
in the Transportation and Post and Telecommunications Sector of the Economy
Compared with the Total Capital Investment a/
Selected Years, 1954-67

Year	Total Capital Investment Through the State Budget for the Economy (Million Current New Won)	Transportation and Post and Telecommunications	
		Total (Million Current New Won)	Percent of the Total Capital Investment for the Economy
1954	330	66	20.0
1956	351	28	7.9
1954-56 average	357	47	13.1
1959	620	55	9.0
1960	567	42	7.4
1957-60 average	500	39	7.7
1961	590 b/	N.A.	N.A.
1961-67	7,000 c/	700 d/	10 d/

b. 62/
c. 63/
d. Estimated.

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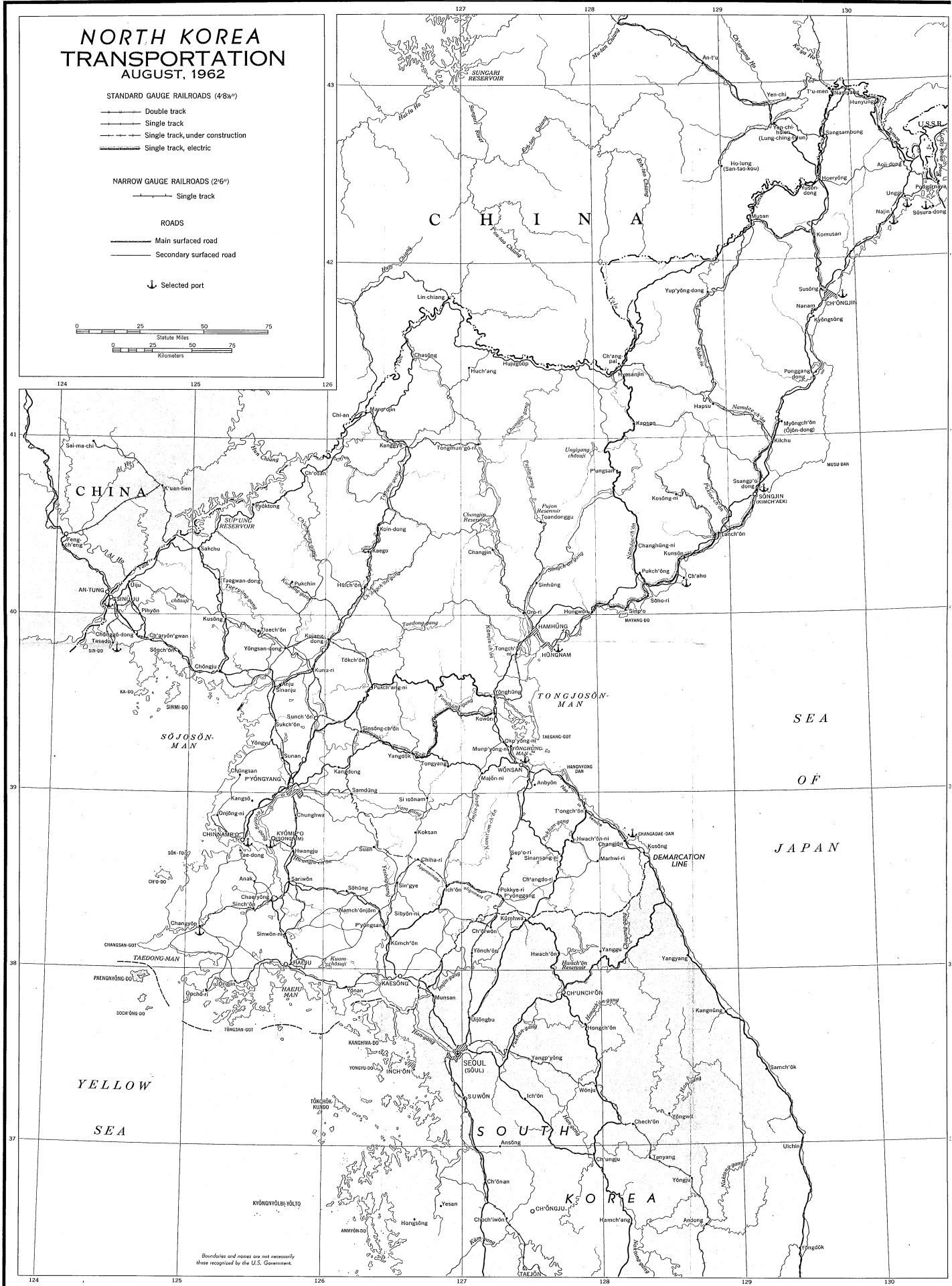
FIGURE 1



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