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ECONOMIC INTELLIGENCE REPORT

**POST AND TELECOMMUNICATIONS SERVICES
IN POLAND
1950-57**



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(ORR Project 46.1962)

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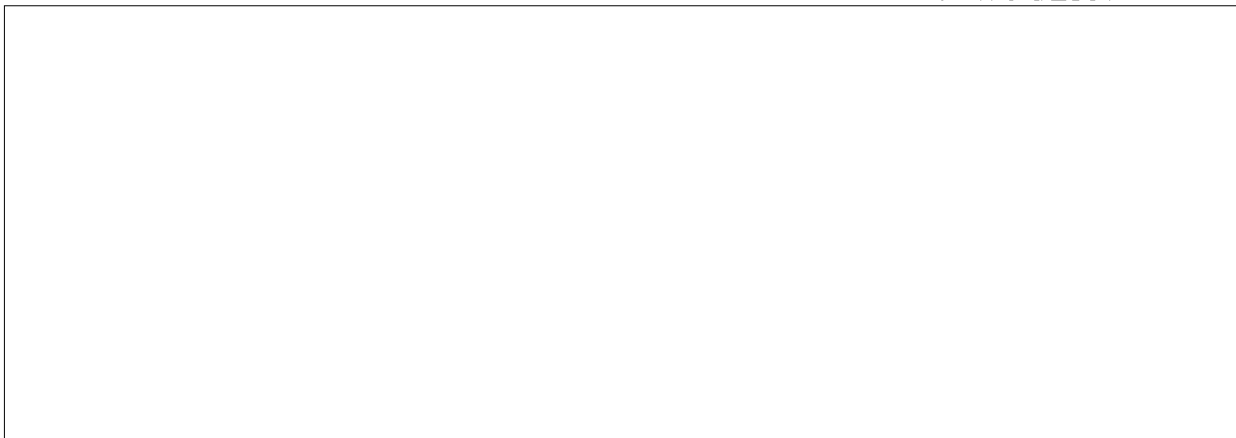
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FOREWORD

This report is concerned with those post and telecommunications facilities and services in Poland operated and controlled by the Ministry of Communications. Other ministries operate functional telecommunications systems such as those serving the armed forces, shipping, railroads, and industries. These independent post and telecommunications systems are not covered in this report. It must be pointed out, however, that although the facilities and services covered here are confined to those under the jurisdiction of the Ministry of Communications, their use is not so restricted. The armed forces make abundant use of this system, as do all ministries.

This report is one of a series on the post and telecommunications services of the various countries of the Sino-Soviet Bloc.

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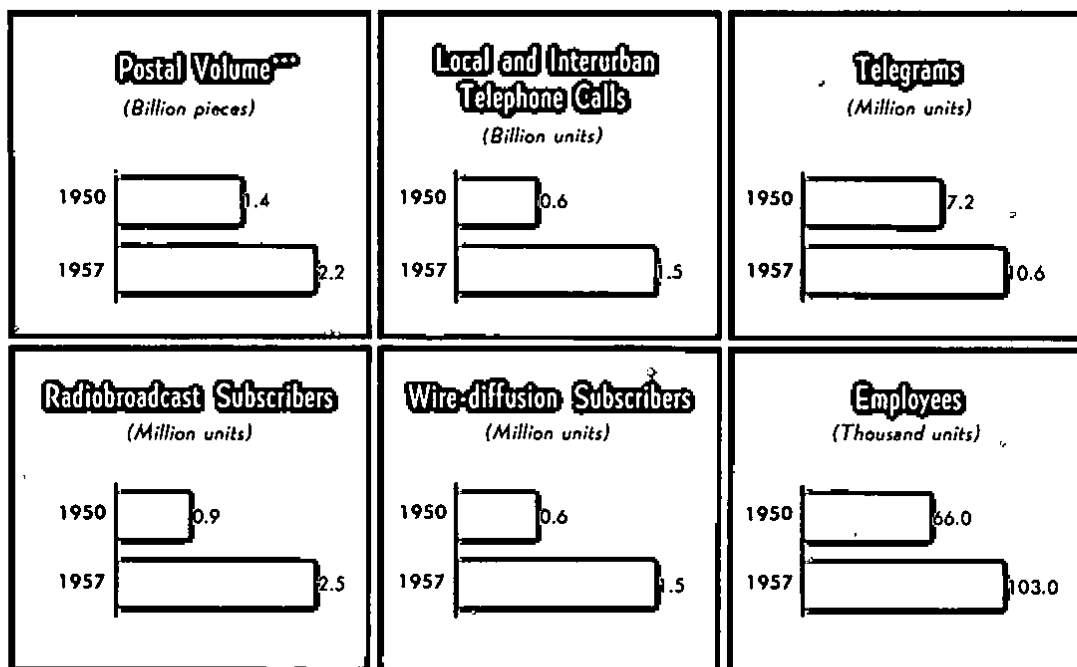
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POST AND TELECOMMUNICATIONS SERVICES IN POLAND*
1950-57

Summary and Conclusions

The public** post and telecommunications system in Poland, which provides postal, telephone, telegraph, radiobroadcasting, wire-diffusion, and television services, is managed by the Ministry of Communications. Government agencies, state enterprises, and the armed forces are the principal consumers of telephone and telegraph services, and the public is the largest consumer of postal and broadcasting services. A summary of the growth in major services and employment in the Ministry of Communications from 1950 to 1957 follows.



* The estimates and conclusions in this report represent the best judgment of this Office as of 15 August 1958. Technical terms are defined in Appendix A, Glossary of Technical Terms.

** The term public in this report refers to the facilities and services under the control of and operated by the Ministry of Communications. It does not refer to functional systems such as those serving the armed forces, the state police, or other ministries.

*** Including letters, newspapers, periodicals, packages, and money orders.

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The telephone and telegraph systems supply the minimum telecommunications needs of Poland. The telegraph system is more widely available, but the telephone system handles the bulk of telecommunications traffic. Services of both systems are limited by lack of automation, and the telephone system is also restricted by an insufficient number of telephone exchanges and an inadequate interurban wireline capacity. The establishment of a TELEX* network, which is currently under development, will provide the largest addition of facilities to the telecommunications system planned for the near future.

The wireline network, which is composed of open wirelines and multiconductor cables, provides wide coverage throughout the country. At present the capacity of this network is limited, but it probably will be augmented by a microwave radio relay network in the future. Initially, however, the microwave network will be used to relay only television programs.

The broadcasting system, which is composed of radiobroadcasting, wire-diffusion, and television networks, provides domestic coverage to all areas of Poland. International radiobroadcasting coverage extends to Europe, North America, and South America. The radiobroadcasting network is most intensive in urban areas, whereas the wire-diffusion network is most intensive in rural areas. The television network, which is just beginning to expand, is limited to a few major cities. The future emphasis on broadcasting will be toward expanding the transmission and reception base of the radiobroadcasting and television networks.

The growth of individual post and telecommunications services through 1950 will vary greatly. Because investment funds have not increased sufficiently to continue past rates of growth for all services, the Ministry of Communications has had to reevaluate its investment program. This reevaluation is believed to have resulted in a decrease in investment expenditures for radiobroadcasting and for wire-diffusion networks in order to maintain planned investment expenditures for the telephone and telegraph systems and the television and microwave radio relay networks. The present economic reorganization is not expected to cause major changes in the investment program.

Although the policies of the Gomulka government have resulted in reductions in the investment funds of the Ministry of Communications, other Gomulka policies have helped the operations of the Ministry.

* TELEX is a term applied to a system of subscriber telegraph used in European countries. As Poland has a subscriber telegraph network interconnected with the European network, the term TELEX is used in this report to describe the Polish network.

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For example, the cessation of jamming activities and the subsequent adaptation of much of the jamming equipment to radiobroadcasting use improved radiobroadcasting service while at the same time obviating large investment expenditures. In other instances, the emphasis of the Gomulka government on profitability has resulted in higher rates for telephone and telegraph services and in the elimination of marginal international radiobroadcasting services. The continuation of this economical attitude toward telecommunications services and facilities should result in better utilization of the resources of the Ministry.

I. Introduction.

The purpose of this report is to present and evaluate the status, operations, and development of public post and telecommunications facilities and services provided by the Ministry of Communications in Poland. Data generally cover the years 1947-57, but textual discussion frequently begins with World War II and ends with future plans and prospects.

II. Ministry of Communications.

A. Organization.

All public post and telecommunications facilities and services in Poland are owned and operated by the state through the Ministry of Communications. The primary responsibilities of the Ministry are to provide domestic and international telephone and telegraph services through an integrated wireline and radio network; domestic and international broadcasting service utilizing wire-diffusion, radio, and television facilities; and domestic and international postal service. In addition, the Ministry has the responsibility for technical control over functional telecommunications systems operated by other ministries. 1/*

After World War II the postal, telephone, and telegraph services were organized under the Ministry of Post and Telegraph. Broadcasting services were operated independently by the Polish Radio Committee. By 1955, most of the operations of the broadcasting services had been transferred to the Ministry of Post and Telegraph, and the Polish Radio Committee was left with the responsibility for writing and preparing the program material. 2/ Also, in 1955 the title of the Ministry was changed to the Ministry of Communications. 3/

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The Minister of Communications, appointed in February 1958, is Zygmunt Moskwa. 4/ He is assisted by three deputy ministers: Faustyn Ladosz, Marian Olewinski, and Zenon Szpigler. 5/ It is believed that one of the deputies serves as the first assistant to the Minister and that the other two deputy ministers have line responsibilities, one for administrative control and the other for operational control.

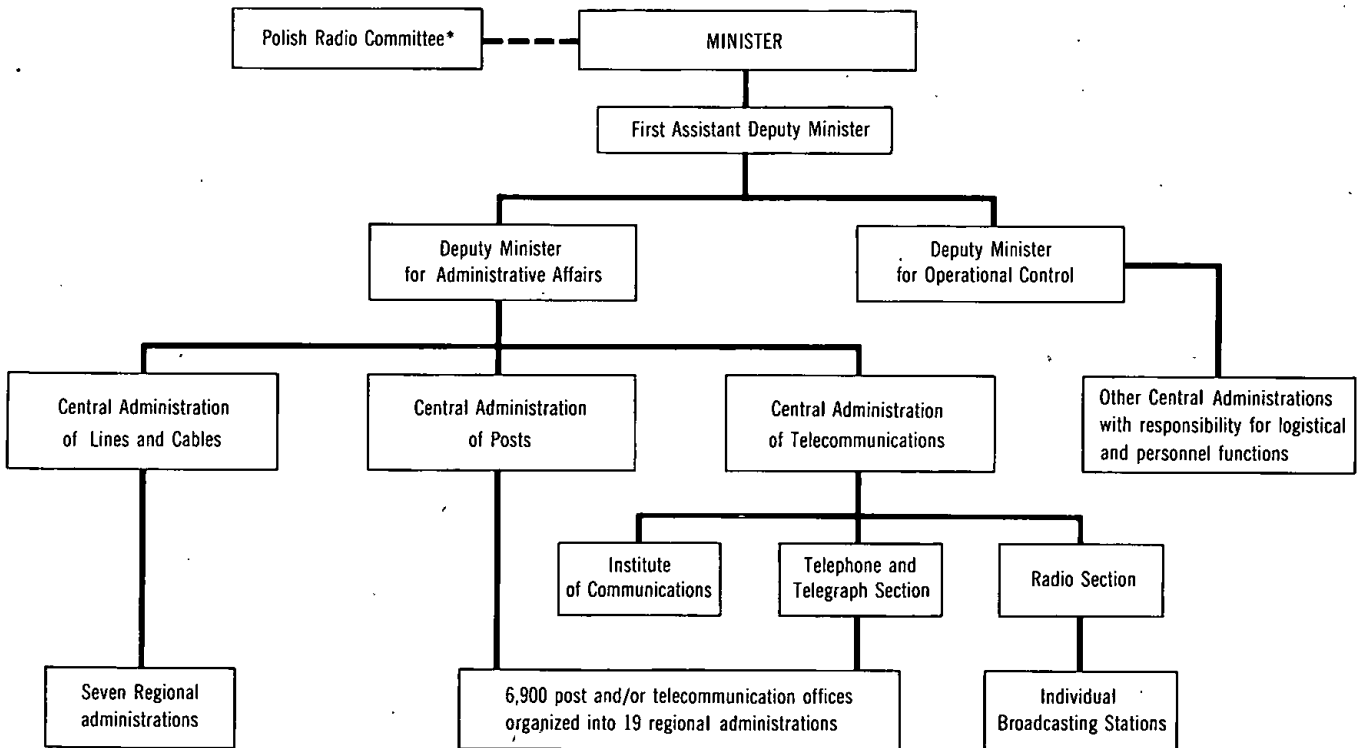
The administrative and operational functions of the Ministry, as shown in Figure 1,* are carried out through central administrations. These administrations are the Central Administration of Lines and Cables, the Central Administration of Posts, the Central Administration of Telecommunications, and a number of central administrations for personnel and logistical support.

The Ministry has undergone two major internal organizational changes since the end of World War II. The first, as a result of the gradual transfer of broadcasting services from the Polish Radio Committee, established the Central Administration of Radiobroadcasting to assume broadcasting responsibilities for the Ministry of Communications. The second organizational change occurred in January 1957, at which time the Central Administrations of Telephones, of Telegraph, and of Radiobroadcasting were consolidated under one Central Administration of Telecommunications. 6/

The consolidation of telephone, telegraph, and broadcasting services in 1957 under one central administration has apparently caused considerable friction. The services rendered by the telephone and telegraph services as opposed to the broadcasting services are reportedly too dissimilar to work well together. For example, the difficulties experienced in the wire-diffusion network in 1957, which led to a decrease in the number of wired loudspeaker subscribers, were attributed in part to the inability of these services to operate under one central administration. One critic of the Ministry stated, "Practice has shown that such interdependence [between the telephone and telegraph and the broadcasting services] yielded very poor results, for the employees of the communications boards [Central Administration of Telecommunications] are more concerned with the telephones than with the radio." 7/ In addition, these organizational difficulties in the Central Administration of Telecommunications are believed to have led to the dismissal of the former Minister of Communications, Jan Rabanowski. 8/ It would appear, therefore, that action will be taken toward reorganizing the broadcasting services. The most likely step would be to reestablish the broadcasting services as an independent central administration of the Ministry, although the Polish Radio Committee has indicated that it could administer the services better than the Ministry of Communications.

* Following p. 4.

POLAND ORGANIZATION OF THE MINISTRY OF COMMUNICATIONS, 1957



*The Polish Radio Committee supplies the program material for radio and television broadcasts.



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B. Revenue.

The total revenue of the Ministry of Communications of Poland rose from 579 million zlotys* in 1949 to 1,754 million in 1957, representing an increase of slightly more than 200 percent. Table 1,** in addition to showing the total revenue received by the Ministry for 1949-57, gives a breakdown of the source of revenue by socialized and by private sectors*** of the economy. Although the socialized sector has remained the primary user of services of the Ministry, it is apparent that the private sector since 1949 has accounted for an increasing share of the total post and telecommunications services. The share of total revenue received from the private sector does not, however, give an accurate measure of the percent of total post and telecommunications services used by private consumers. The prices charged the private sector for post and telecommunications services, as shown in Table 2,**** are believed to be higher than those charged the socialized sector, thus inflating the percent of total revenue received by the Ministry of Communications from the private sector.

A statement by a deputy minister of communications in 1957 indicates that, although the total revenue received by the Ministry of Communications has been steadily rising since the end of World War II, the Ministry has continued to show a yearly deficit for the same period of time. 9/ This deficit can be attributed for the most part to a deficit in the private sector of the post and telecommunications services provided by the Ministry. Table 3,† which shows the accounting breakdown for the socialized sector in 1954-55, illustrates the profit position of this sector.

The shares of total revenue contributed by post and telecommunications services for 1949-54 are shown in Table 4.†† The most noteworthy†††

* Zloty values in this report are expressed in current zlotys unless otherwise indicated and may be converted to US dollars at the official rate of exchange of 4 zlotys to US \$1. This exchange rate, however, does not necessarily reflect the true dollar value. Prices have been made consistent with the 1950 revaluation of the zloty.

** Table 1 follows on p. 6.

*** The socialized sector of the economy is composed of government agencies, state-owned enterprises, and military users of services provided by the Ministry of Communications. The private sector of the economy is composed of all consumers outside the socialized sector.

**** Table 2 follows on p. 7.

† Table 3 follows on p. 8.

†† Table 4 follows on p. 9.

††† Text continued on p. 10.

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Table 1

Estimated Total Revenue of the Ministry of Communications of Poland
by Sector a/
1949-57

	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Revenue from the socialized sector (million current zlotys)	<u>553 b/</u>	<u>586 c/</u>	<u>669 c/</u>	<u>791 c/</u>	<u>868 c/</u>	<u>951 d/</u>	<u>1,047 d/</u>	<u>1,139 c/</u>	<u>1,263 c/</u>
Percent of total revenue	96	89	87	76	74	78	76	74	72
Revenue from the private sector (million current zlotys)	<u>26 e/</u>	<u>73 e/</u>	<u>96 e/</u>	<u>249 e/</u>	<u>310 e/</u>	<u>268 e/</u>	<u>331 f/</u>	<u>400 f/</u>	<u>491 f/</u>
Percent of total revenue	4	11	13	24	26	22	24	26	28
Total revenue (million current zlotys)	<u>579 g/</u>	<u>659 g/</u>	<u>765 g/</u>	<u>1,040 g/</u>	<u>1,178 g/</u>	<u>1,219 g/</u>	<u>1,378 h/</u>	<u>1,539 h/</u>	<u>1,754 h/</u>

- a. The socialized sector of the economy is composed of government agencies, state-owned enterprises, and military users of services provided by the Ministry of Communications. The private sector of the economy is composed of all consumers outside the socialized sector.
- b. Total revenue was adjusted to reflect the revaluation of 1950 (3 percent of the pre-1950 value of the zloty). The revenue of the socialized sector was derived by assuming that it amounted to 96 percent of total revenue. ^{10/}
- c. Derived from an index using 1949 as the base year. ^{11/} Revenue for 1956 was derived by applying the reported rate of growth of 8.9 percent, ^{12/} and revenue for 1957 was derived by applying the average annual rate of growth during 1949-56.
- d. ^{13/}
- e. Derived by subtracting the socialized sector from total revenue.
- f. Assuming that the private sector's share of total revenue increased each year by 2 percent above the level of the preceding year.
- g. Data for 1949-54 were taken from Table 4, p. 9, below.
- h. Total of revenue from socialized and private sectors.

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Table 2

Estimated Rates for Local and Interurban Telephone Calls and Telegrams
of the Ministry of Communications of Poland
1948-57

	Current Zlotys									
	<u>1948 a/</u>	<u>1949 a/</u>	<u>1950 b/</u>	<u>1951 b/</u>	<u>1952 c/</u>	<u>1953 d/</u>	<u>1954 e/</u>	<u>1955 f/</u>	<u>1956 f/</u>	<u>1957 g/</u>
Telephone rates										
Local calls by public telephone	0.10	0.10	0.15	0.15	0.50	0.65	0.65	0.65	0.65	0.70
Interurban 3-minute calls for distances up to 25 km										
Business hours	N.A.	N.A.	0.45	0.45	1.35	1.50	1.50	1.50	1.50	2.40
Nonbusiness hours	N.A.	N.A.	0.27	0.27	0.90	0.90	0.90	0.90	0.90	1.00 to 1.50
Telegram rates										
Ordinary rate for 10 words	N.A.	N.A.	N.A.	N.A.	3.6	N.A.	4.5	4.5	4.5	6.0
Rate for each additional word above 10 words	N.A.	N.A.	N.A.	N.A.	0.3	N.A.	0.4	0.4	0.4	0.6

a. 14/
b. 15/
c. 16/
d. 17/
e. 18/
f. 19/
g. 20/

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Table 3

Estimated Revenue and Expenditures of the Ministry of Communications
of Poland a/
1954-55

	Million Current Zlotys	
	<u>1954</u>	<u>1955</u>
Gross revenue	<u>951.4</u>	<u>1,047.2</u>
Gross expenditures	902.2	927.4
Material expenditures	<u>324.8</u>	<u>317.2</u>
Material	N.A.	79.6
Amortization	N.A.	61.1
Miscellaneous	N.A.	176.5
Nonmaterial expenditures	<u>577.4</u>	<u>610.2</u>
Wages	484.9	490.6
Social insurance	75.1	77.5
Equipment insurance	3.5	8.6
Rent	3.0	7.2
Delegations and trips	9.7	23.3
Miscellaneous	1.2	3.0
Gross profit	49.2	119.8
Taxes	Negligible	0.1
Net profit	<u>49.2</u>	<u>119.7</u>

a. The figures in this table refer to revenue and expenditures from post and telecommunications services rendered to socialized enterprises 21 and are believed to approximate the revenue and expenditures of the socialized sector of the post and telecommunications services provided by the Ministry.

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Table 4

Estimated Total Revenue of the Ministry of Communications of Poland
by Services a/
1949-54

	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
Revenue from postal services (million current zlotys) b/	<u>278</u>	<u>291</u>	<u>327</u>	<u>386</u>	<u>415</u>	<u>441</u>
Index (1949 = 100) c/	100	105	117	139	149	159
Percent of total	48	44	43	37	36	36
Revenue from telecommunications services (million current zlotys) b/	<u>301</u>	<u>368</u>	<u>438</u>	<u>654</u>	<u>763</u>	<u>778</u>
Index (1949 = 100) c/	100	122	145	217	254	259
Percent of total	52	56	57	63	64	64
Total revenue (million current zlotys) d/	<u>579</u>	<u>659</u>	<u>765</u>	<u>1,040</u>	<u>1,178</u>	<u>1,219</u>
Index (1949 = 100)	100	114	132	180	203	211

a. Total revenue for 1954-57 is available in Table 1, p. 6, above. The distribution of post and telecommunications services is unavailable for the years following 1954.

b. Extrapolated by applying the appropriate index to data for 1949. The data for 1949 were adjusted to reflect the revaluation of the zloty in 1950 (3 percent of its pre-1950 value). 22/

c. 23/

d. Revenue for postal services plus revenue for telecommunications services.

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development over this period has been the decreasing share of postal revenue, from almost half of total revenue in 1949 to about one-third in 1954, and the accompanying increase in telecommunications revenue. The largest shift in the share of revenue of the respective services was in 1952, when broadcasting was added to the telecommunications services of the Ministry. Although information is not available to carry the series through 1957, it is believed that the services' shares of revenue have remained relatively constant since 1954. In the near future, telecommunications services -- especially television and TELEX -- can be expected to increase more rapidly than postal services, thus further increasing the share of total revenue contributed by telecommunications services.

C. Investment.

Investment funds of the Ministry of Communications of Poland consist of centralized and decentralized funds. Centralized investment funds consist of allocations to the Ministry from the state investment plan and are believed to be the source of most of the investment funds of the Ministry. Decentralized investment funds come from retained earnings of post and telecommunications enterprises which use the funds primarily for social and cultural purposes. The estimated amount of centralized investment funds for the Ministry of Communications for 1950-57 is shown in Table 5.* Although these estimates are considered to be somewhat tenuous, it is believed that the data reflect the trend in investment activity of the Ministry. The overly ambitious investment estimates of the Six Year Plan (1950-55) caused a reevaluation of goals in 1953 which resulted in a significant reduction in actual investment outlays for the remainder of the plan. ^{24/} Although the amount for investment outlays in the original Five Year Plan (1956-60) was apparently less ambitious than that of the previous plan, it was further scaled down by the coming into power of the Gomulka government in 1956.

Some fragmentary data which are available for recent years indicate the costs involved in establishing a telephone exchange, television facilities, and wire-diffusion loudspeakers. The planned cost for the construction of a building to house a moderate-size telephone exchange in Wroclaw was estimated to be 15 million zlotys. ^{25/} This amount comprises the bulk of the funds for the exchange but not the total cost. Funds for the construction of television facilities in 1957 were estimated to be 23 million zlotys. ^{26/} Average construction costs for the installation of one wire-diffusion loudspeaker have been estimated to be between 400 and 700 zlotys. ^{27/} Using these estimates, total investment in 1956 for the wire-diffusion network would have been between 76 million and 133 million zlotys.

* Table 5 follows on p. 11.

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Table 5

Estimated Investment of the Ministry of Communications of Poland a/
1950-57

	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Investment (million 1955 zlotys) b/	324	366	369	401	392	373	333	339
Index (1950 = 100)	100	113	114	124	121	115	103	105

a. Data refer to investments included within the state investment plan -- that is, centralized investments.

b.
 investment for communications re-
 presented 10.6 percent of the total investment for transportation and
 communications.

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Investments through 1960 by the Ministry probably will not increase significantly. Although there is considerable need for new and improved telecommunications facilities, this need will not be met through substantially increased investments. Instead, investment priorities will probably be reevaluated within the Ministry to meet its most pressing needs. For example, because of the conversion in 1956 and 1957 of former jamming facilities to radiobroadcasting, investments in radiobroadcasting can be substantially reduced in the future. Furthermore, the decreased emphasis on the wire-diffusion network, which in the past has been a large recipient of investment funds, will result in a substantial reduction in investment. The reduction in investment in radiobroadcasting and wire-diffusion will probably provide funds for the development of other telecommunications facilities and services, particularly the TELEX and micro-wave radio relay networks.

D. Manpower.

1. Labor Force.

As shown in Table 6,* the Ministry of Communications of Poland employed approximately 103,000 employees in 1957, one-third of which are

* Table 6 follows on p. 13.

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estimated to have been women. ^{32/} With the exception of 1948, the percentage of growth in the number of employees during 1947-57 has been relatively stable, averaging about 7 percent per year. In 1957 a deliberate effort was made by the Ministry of Communications to replace the number of nonoperational employees with operational employees. The central office of the Ministry in Warsaw discharged 450 nonoperational employees expressly to provide positions for the same number of operational employees. ^{33/} Thus it is likely that there was a higher percentage of operational employees in 1957 than in previous years, although the figures appear to indicate a relatively stable growth.

The absolute annual growth in the future of the number of employees in the Ministry is expected to continue at the approximate level of that in 1957.

2. Wages.

The total annual wage bill and the average annual wages of employees of the Ministry of Communications during 1953-57 are shown in Table 7.* The total annual wage bill rose from 769 million zlotys in 1953 to 1,421 million zlotys in 1957. The average annual wage for employees of the Ministry during 1953-57 was approximately 16 percent less than that of the nonagricultural labor force. ^{34/} The primary reason for the low average annual wage is the large number of unskilled employees in the Ministry, especially in the postal system.

In the Five Year Plan for 1956-60, the average annual wage of employees of the Ministry was to increase gradually. The planned growth is shown in index numbers in the following tabulation ^{35/}:

	1955 = 100					
	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>
Planned	100	100	102.9	105.6	107.1	107.9
Actual	100	104.3	119.0			

Although the actual wage data for 1956 and 1957 are in current prices and the planned wage data in 1955 prices, the difference in prices is not believed to be significant enough to detract from their general comparability. The large difference between planned and actual average wages is probably a reflection of general wage concessions made in the Ministry of Communications in 1956 and 1957.

* Table 7 follows on p. 13.

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Table 6

Estimated Average Annual Number of Employees of the Ministry of Communications of Poland
1947-57

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Number of employees (thousand)	50.3 a/	56.8 a/	61.4 b/	66.0 b/	70.6 b/	75.2 b/	79.8 c/	85.4 c/	89.7 d/	97.3 d/	103.0 e/
Index (1949 = 100)	82	92	100	107	115	122	130	139	146	158	168

a. 35/

b. Interpolated, using arithmetic progression.

c. 37/d. 38/e. 39/

Table 7

Estimated Total Annual Wage Bill and Average Annual Wage of Employees
of the Ministry of Communications of Poland
1953-57

	1953	1954	1955	1956	1957
Total annual wage bill (million current zlotys)	769 a/	908 a/	1,038 b/	1,177 b/	1,421 c/
Average annual wage (current zlotys)	9,600 a/	10,600 a/	11,600 b/	12,100 b/	13,800 d/

a. 40/b. 41/

c. Computed from average annual wage and average annual number of employees (see Table 6, above).

d. 42/

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3. Training.

The Ministry of Communications of Poland maintains an extensive educational program. The program is organized around three types of schools -- basic vocational, technical vocational, and academic. The basic vocational and technical vocational schools are directly controlled by the Ministry. Basic vocational schools give 2-year courses in radio mechanics, and technical vocational schools give 2- and 4-year courses in the administration, operation, and maintenance of post and telecommunications services and facilities. The academic schools or universities offer engineering degrees in the field of telecommunications. ^{43/} In addition to the academic schools, the Institute of Communications, which is responsible for development work for the Ministry, gives highly specialized training to approximately 40 students per year in various fields of telecommunications. ^{44/} The number of full-time students in schools operated by the Ministry of Communications is as follows ^{45/}:

	<u>1955/56</u>	<u>1956/57</u>
Basic vocational schools	1,113	1,085
Technical vocational schools	3,753	3,695

In addition, there were 617 part-time students in technical vocational schools in 1955/56 and 788 part-time students in 1956/57. ^{46/} The Ministry has a correspondence program which operates through the technical vocational schools. ^{47/} The Ministry administers schools located in the following cities ^{48/}:

<u>City</u>	<u>Type of School</u>	
	<u>Basic Vocational</u>	<u>Technical Vocational</u>
Bydgoszcz	x	
Czestochowa	x	
Dzierzoniow	x	
Gdansk		x
Gliwice		x
Gorzow Wielkopolski		x
Krakow	x	x
Legnica	x	
Lodz		x
Nowy Sacz		x
Poznan		x
Przemysl		x
Szczecin	x	x
Warsaw		x (2)
Wroclaw	x	x
Zdunska Wola	x	

S-E-C-R-E-T

4. Productivity.

Labor productivity in the Ministry of Communications of Poland, as shown in Table 8,* has registered an increase in every year during 1949-57 with the exception of 1953. Although price increases shown in Table 2** have inflated the data shown in Table 1*** for 1949-57, especially in 1952 and 1957, it is believed that labor productivity in both physical and value terms would still show a moderate yearly increase.

The planned increase in mechanization and automation in the Ministry of Communications as well as decreases in nonoperational personnel should enable the Ministry to continue to increase labor productivity.

E. Equipment.1. Production

The telecommunications equipment industry of Poland is administered by the Ministry of Machine Building. In recent years this industry has been one of the most rapidly expanding in the Soviet Bloc. 49/ This expansion can be expected to continue, as plans for 1956-60 call for an increase in production of 4.5 times that of 1955. 50/ Although production capability in Poland is limited to relatively simple types of telecommunications equipment, future plans probably include the development and production of more complex equipment.

Future expansion in the telecommunications equipment industry will present problems of coordination with other Soviet Bloc countries. The growing desire for integration and specialization within the Bloc in the field of telecommunications equipment led to an agreement on production among the USSR, East Germany, Hungary, and Czechoslovakia in 1956. 51/ Poland was not included in the agreement, probably because of its low capacity for production in relation to that of the four other countries. Planned increases in Polish production will probably assure the country's participation in future agreements. As production agreements involve uniform technical standards for maximum applicability and integration throughout the Bloc, the telecommunications equipment industry in Poland will most likely be forced to adopt these standards. The effect will also be felt in the Ministry of Communications because of its dependence on domestic production for the development of the telecommunications system.

* Table 8 follows on p. 16.

** P. 7, above.

*** P. 6, above.

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Table 8

Estimated Productivity of Employees of the Ministry of Communications
of Poland a/
1949-57

	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Average revenue per employee (current zlotys)	9,430	10,000	10,800	13,800	14,800	14,300	15,400	15,800	17,000
Index (1949 = 100)	100	106	115	147	157	152	163	168	181
Yearly increase (percent)		+6	+8	+28	+7	-3	+8	+3	+8

a. Derived by dividing total revenue (see Table 1, p. 6, above) by total number of employees (see Table 6, p. 13, above) of the Ministry of Communications. All data are rounded to three significant digits.

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2. Imports and Exports.

The Ministry of Communications of Poland depends upon the domestic telecommunications industry for the majority of its equipment needs. Requirements for complex telecommunications equipment, however, have necessitated imports from both Soviet Bloc and non-Bloc countries. Imports from the Bloc have included television receivers from the USSR 52/; radiobroadcast and television receivers and telegraph equipment from Hungary 53/; television receivers, radiobroadcasting transmitters, and very high frequency (VHF) radio equipment from East Germany 54/; and radiobroadcasting transmitters from Czechoslovakia. 55/ Except for telegraph equipment from Hungary, most of the imports from the Bloc have been used to improve broadcasting services. Imports from non-Bloc countries, however, have been used to improve both basic telecommunications and broadcasting services. Recent imports from non-Bloc countries have included telephone equipment, multiconductor cable, and radiobroadcasting transmitters from Sweden 56/; error-correction equipment for the TELEX system from the Netherlands 57/; telegraph equipment and television transmitter tubes from West Germany 58/; television transmitters from France 59/; and television equipment from the UK. 60/ Many of these imports, formerly embargoed, have been made possible by the special COCOM policy toward Poland.

In contrast to its imports, Poland exports little telecommunications equipment, either to the Soviet Bloc or to non-Bloc countries. 61/

III. Postal System.

The Ministry of Communications of Poland provides postal service for both the government and the public. In addition to providing regular mail service, the postal system serves as a banking institution by providing checking and savings services for the public.

The volume of postal service for 1947-57 is shown in Table 9.* The annual rate of growth of the various categories of postal service has been irregular, with the exception of letters sent. The volume of letters sent has increased rather consistently at an average annual rate of growth of slightly more than 9 percent. The annual rate of growth of newspapers and periodicals has shown the most marked fluctuation, ranging from an increase of 62 percent in 1949 to a decrease of about 10 percent in 1956 and a decrease of 33 percent in 1957. The sharp decrease in the volume of newspapers and periodicals sent during 1956 and 1957 most likely reflects the comparatively relaxed political atmosphere of the Gomulka government, which has not forced the public to subscribe to official publications.

* Table 9 follows on p. 18.

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Table 9

Estimated Volume of Postal Service of the Ministry of Communications
of Poland a/
1947-57

	Million Units										
	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Letters b/	671 c/	748 c/	792 d/	828 e/	896 e/	1,010 e/	1,070 e/	1,160 e/	1,290 d/	1,440 d/	1,600 e/
Newspapers and periodicals	161 c/	253 c/	411 d/	520 e/	621 e/	697 e/	716 e/	816 e/	831 d/	744 d/	498 e/
Packages f/	9.76 c/	11.7 c/	13.6 d/	14.7 e/	17.6 e/	19.0 e/	17.8 e/	18.0 e/	19.4 d/	20.4 d/	19.6 e/
Post and telegraph money orders	8.63 c/	9.86 c/	11.3 e/	12.1 e/	15.1 e/	28.0 e/	32.7 e/	36.9 e/	39.2 d/	42.0 d/	41.7 e/

a. All data are rounded to three significant digits.

b. Including regular and registered letters.

c. 62/

d. 63/

e. Figures for 1950-54 are [redacted] adjusted to allow for the volume of international service.

f. Including packages and "declared and registered value letters."

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The number of post and telecommunications offices, as shown in Table 10, is estimated to have reached 6,934 by the end of 1957, representing an increase of about 65 percent above the number of offices existing in 1947. The majority of the post and telecommunications offices established since 1947 have been in rural areas. The drop in the number of post and telecommunications offices in 1955 and in 1957 was probably a result of consolidation and does not represent a decrease in the availability of service.

Table 10

Estimated Number of Post and Telecommunications Offices
of the Ministry of Communications of Poland a/
1947-57

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Post and telecommunications offices	4,199 <u>b/</u>	4,546 <u>b/</u>	4,752 <u>c/</u>	5,007 <u>d/</u>	5,262 <u>e/</u>	5,700 <u>f/</u>	6,049 <u>e/</u>	7,214 <u>c/</u>	7,108 <u>g/</u>	7,115 <u>g/</u>	6,934 <u>h/</u>

a. Including post and telecommunications offices, agencies, and auxiliary stations.

b. 66/

c. 67/

d. Interpolated, using arithmetic progression, between 1949 and 1951.

e. 68/

f. 69/

g. 70/

h. 71/

A majority of the post and telecommunications offices provide postal and telecommunications services. In 1956, for example, 7,042 of the 7,115 post and telecommunications offices provided both services, 50 offices provided postal service exclusively, and 23 offices provided telecommunications service exclusively. 72/

The primary emphasis of the postal system has been directed toward extending service to rural areas and improving the speed of service throughout all areas of the country. The extension of postal service to all rural areas of the country was largely completed by the end of 1956 and was accomplished by a rapid expansion in the number of village post offices and rural postmen. 73/ For example, the number of rural postmen increased from 3,700 in 1947 to 15,316 by the end of 1956. 74/ With regard to speed of postal service in 1956, 74 percent of all letters sent and 96 percent of the letters sent to Warsaw from capital cities of provinces and from important industrial cities were delivered within 24 hours. 75/ Although substantial progress has been made, there undoubtedly is room for improvement in both the availability and the speed of postal service.

Indications are that the Ministry of Communications will place emphasis on the modernization of the postal system in the future

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through increased mechanization. Equipment specifically mentioned in plans has included high-speed canceling machines, electrical tractors and vehicles, machines for cleaning out mail sacks, registered letter and money order numbering machines, and lifting devices for mail sacks. 76/ Only 625 new post and telecommunications offices are planned for 1956-60, which is in sharp contrast to the 2,356 offices constructed during 1950-55. 77/ The reduced emphasis on increasing the number of post and telecommunications offices indicates that the requirements for these facilities in urban and rural areas have been largely satisfied.

IV. Telephone and Telegraph Systems.

The telephone and telegraph systems of Poland are capable of supplying the needs of the socialized sector of the economy. The telegraph system is the more extensive of the two systems. Although the telephone system is also extensive, its capacity is limited by an insufficient number of telephone exchanges and instruments, a lack of automatic telephone exchange equipment, and an inadequate wireline network. The establishment of a TELEX network, which is currently under development, will provide the largest addition of facilities to the telecommunications system to be expected in the near future.

The telephone and telegraph systems utilize an extensive but low-capacity wireline network. The wireline network consists of multiconductor cable and open wire. A network of point-to-point radio stations is available for use as a backup for the domestic wireline network. In the future, the wireline network will be supplemented by an extensive high-capacity microwave radio relay network.

A. Telephone.

The telephone system in Poland is used primarily for official activities of the state, with only secondary emphasis given to providing telephone service for private consumers. The following tabulation shows a breakdown by use and by location of telephones in Poland 78/:

<u>Telephones</u>	<u>1956</u>	<u>1957</u>
Official	337,000	361,000
Private consumer	138,000	155,000
In private homes	109,000	124,000
In public places*	28,000	31,000**
Total available***	<u>475,000</u>	<u>516,000</u>

* Including telephones in telephone offices as well as those in telephone booths.

** The 1957 figure is estimated, using the percentage distribution for private consumer telephones and for telephones in public places that prevailed in 1956.

*** See Table 11 (p. 22, below) for more complete data on telephones.

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Almost one-third of the telephones are available to private users. This use, however, is not to be misconstrued as indicating the availability of telephones for the average citizen, because evidence shows that a majority of these telephones are found in the homes of Polish United Workers (Communist) Party members and other privileged individuals. 79/ To illustrate the lack of telephones available for private consumers, in 1956 there were 20,000 unsettled applications for telephones in Warsaw alone, and in April 1957 there were 46,000 applicants for private consumer telephones in Poland. 80/

The telephone system in Poland is concentrated primarily in the urban areas of the country, with practically no rural coverage. For example, out of a total of 475,000 telephones in the country in 1956, only 27,000 were located in rural areas. 81/ These rural telephones were barely sufficient to allow coverage for 45 percent of the villages and producer cooperatives in Poland. Telephone coverage of state farms was 71 percent, however, and of machine tractor stations 89 percent, indicating the preferential treatment given to state-owned enterprises. 82/ It is believed that this distribution of telephones between urban and rural areas will not improve, as plans for 1956 called for the expansion of exchanges in urban areas by 10.3 percent, in contrast with the expansion of exchanges in rural areas by only 8.2 percent. 83/

The locations and capacity of major telephone exchanges in Poland are shown on the accompanying map, Figure 2.* Telephone exchanges are spread rather evenly throughout the country, except for concentrations in the vicinity of Katowice and along the Polish-Czechoslovak border. Although the present number of telephone exchanges in the country is not known, there were 2,400 exchanges in 1953 and 4,400 in 1954. 84/ The majority of these exchanges have a capacity of less than 200 lines. The total number of telephone subscriber lines available, the number of subscriber lines in use, and the number of telephones in use are given in Table 11.** The service rendered by these facilities is represented by the number of local and interurban telephone calls, as shown in Table 12.***

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The percentage relationship between automatic and manual telephone subscriber lines during 1946-56 is shown as follows 85/:

	Percent			
<u>Subscriber Lines</u>	<u>1946</u>	<u>1948</u>	<u>1950</u>	<u>1956</u>
Automatic	62.0	67.0	67.4	68.8
Manual	38.0	33.0	32.6	31.2

* Following p. 22.

** Table 11 follows on p. 22.

*** Table 12 follows on p. 23.

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Table 11

Estimated Number of Telephone Instruments, Subscriber Lines Available, Subscriber Lines in Use and Public Telephone Booths of the Ministry of Communications of Poland a/ 1947-57

	Thousand Units										
	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Telephone instruments	189 <u>b/</u>	207 <u>b/</u>	220 <u>c/</u>	253 <u>c/</u>	286 <u>c/</u>	322 <u>c/</u>	335 <u>d/</u>	397 <u>c/</u>	440 <u>e/</u>	475 <u>c/</u>	516 <u>c/</u>
Subscriber lines available	225 <u>f/</u>	238 <u>g/</u>	252 <u>g/</u>	290 <u>h/</u>	328 <u>h/</u>	366 <u>h/</u>	404 <u>h/</u>	442 <u>h/</u>	480 <u>i/</u>	523 <u>j/</u>	565 <u>k/</u>
Subscriber lines in use	137 <u>l/</u>	150 <u>l/</u>	167 <u>m/</u>	192 <u>n/</u>	217 <u>n/</u>	244 <u>n/</u>	273 <u>n/</u>	301 <u>n/</u>	333 <u>o/</u>	360 <u>p/</u>	391 <u>q/</u>
Percent of use of available subscriber lines	61	63	66	66	66	67	68	68	69	69	69
Public telephone booths	3.250 <u>r/</u>	3.900 <u>r/</u>	4.360 <u>s/</u>	5.100 <u>t/</u>	5.840 <u>t/</u>	6.580 <u>t/</u>	7.320 <u>t/</u>	8.060 <u>t/</u>	8.800 <u>u/</u>	9.200 <u>v/</u>	10.800 <u>w/</u>

a. All data are rounded to three significant digits.

b. 86/

c. The relationship of telephone instruments to telephone subscriber lines in use in 1955 was 132 telephone instruments for every 100 telephone subscriber lines. The average of the corresponding ratios for the other years for which figures are reported -- 1947-48 and 1953 -- was substantially the same.

d. 87/

e. 88/. Plan figure.

f. 89/

g. 90/

h. Interpolated, using arithmetic progression, between 1949 and 1955.

i. 91/

j. 91/ indicates an increase of 43,000 subscriber lines in 1956.

k. Interpolated, using arithmetic progression, between 1956 and the plan goal of 690,000 for 1960. 93/

l. 94/

m. 95/

n. 96/

o. 97/

p. 98/

q. Figures are given for the year June 1956 to June 1957. 99/ It was assumed that the amount was substantially the same for the year December 1956 to December 1957.

r. 100/

s. 101/

t. Interpolated, using arithmetic progression.

u. 102/

v. 102/ indicates an increase of 400 public telephone booths in 1956.

w. Interpolated, using arithmetic progression, between 1956 and the plan goal of 15,800 for 1960. 104/

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Table 12

Estimated Number of Local and Interurban Telephone Calls
Made Over Facilities Operated
by the Ministry of Communications of Poland a/
1947-57

	Million Units										
	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Local calls	380 <u>b/</u>	427 <u>b/</u>	487 <u>c/</u>	600 <u>c/</u>	699 <u>c/</u>	862 <u>c/</u>	950 <u>c/</u>	1,053 <u>c/</u>	1,180 <u>c/</u>	1,280 <u>c/</u>	1,380 <u>d/</u>
Interurban calls	41.9 <u>e/</u>	39.7 <u>e/</u>	38.9 <u>f/</u>	47.0 <u>g/</u>	56.3 <u>g/</u>	67.7 <u>g/</u>	77.7 <u>g/</u>	89.4 <u>g/</u>	97.0 <u>h/</u>	102 <u>h/</u>	107 <u>d/</u>

- a. All data are rounded to three significant digits.
b. 105/
c. 106/
d. Extrapolated by applying the absolute growth shown during 1955-56.
e. 107/
f. 108/
g. 109/
h. 110/

There has been no substantial shift to automation during this period. Recent plans indicate that an emphasis is to be placed on automating telephone exchanges in urban areas. 111/ In spite of this emphasis, increases in automation are expected to follow the pattern shown above.

The lack of automation and of subscriber line capacity is a major deficiency in the Polish telephone system. Gradual progress in overcoming this deficiency can be expected. 112/

B. Telegraph.

The regular telegraph and TELEX networks of Poland are closely integrated. Both networks operate through 22 major telegraph centers. Regular telegraph service was available in 1957 to 400 post and telecommunications offices, and TELEX service was available to 365 subscribers located in all parts of the country. In 1957 the Ministry of Communications operated approximately 1,800 telegraph channels serving both regular telegraph and TELEX facilities. 113/

Twenty of the 22 main telegraph centers in Poland are located in capital cities of the provinces and in Gdynia and Radom. Warsaw, Wroclaw, and Szczecin have two centers each, a main telegraph center and a reserve center. The reserve centers are reportedly located in former German bunkers, implying that they may be employed for secure, emergency use. The main centers use manually operated switchboards,

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with the exception of the fully automatic center located in Katowice. The switchboards in use were manufactured in East Germany, and teletype machines in use were manufactured in the US, West Germany, East Germany, and the USSR. 114/

The regular telegraph network is an important means of telecommunications in the country. The volume of traffic handled by this network is shown in Table 13. Growth in traffic volume was relatively rapid from 1948 to 1952, averaging more than 10 percent per year. During 1953-56 the rate of growth has decreased, averaging about 4 percent per year. The introduction of TELEX in 1957 probably accounts for the decrease in traffic volume.

Table 13

Estimated Number of Domestic and International Telegrams
Transmitted Over Facilities Operated
by the Ministry of Communications of Poland a/
1947-57

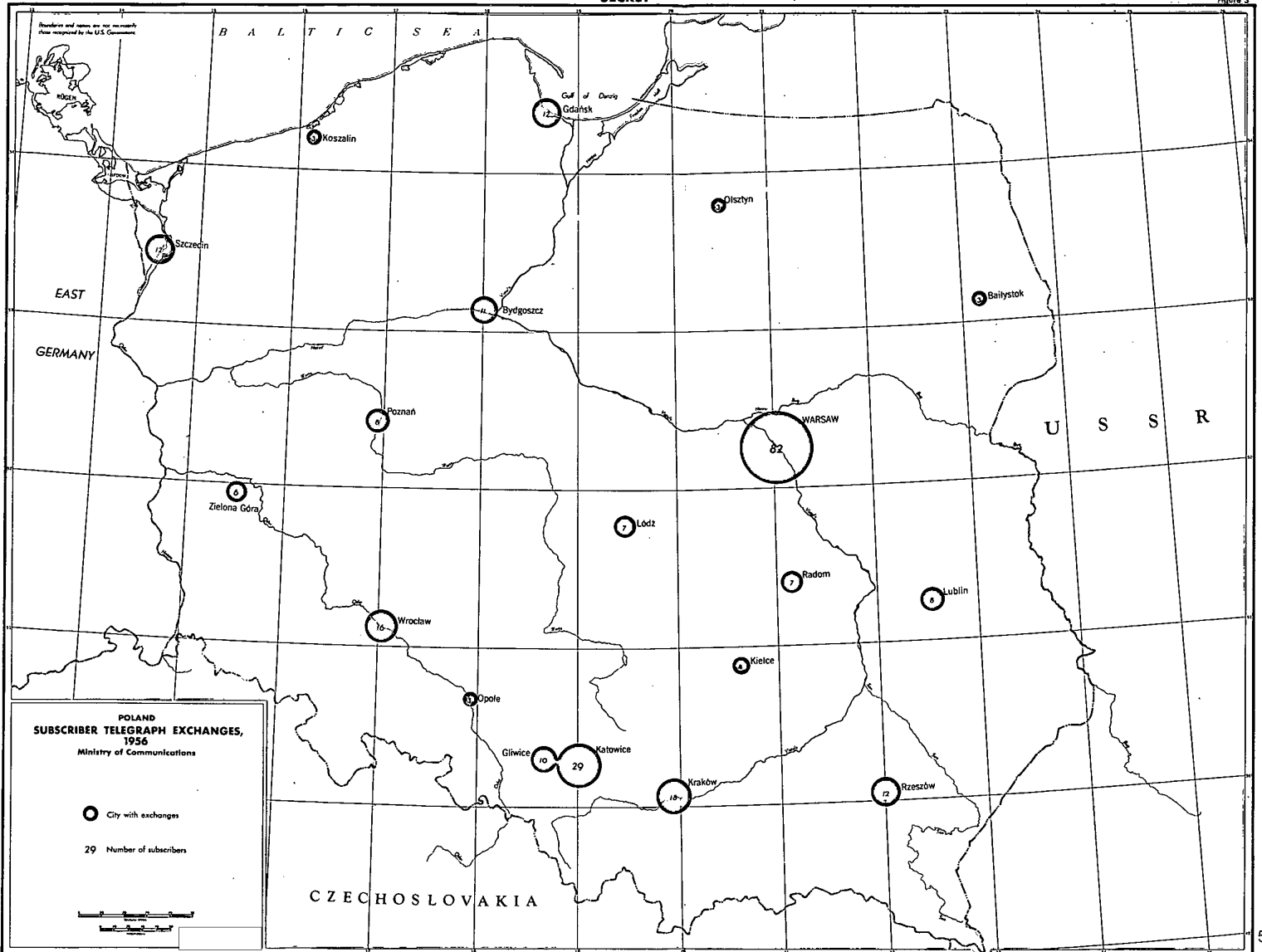
	Million Units										
	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Telegrams	7.2 <u>b/</u>	5.7 <u>b/</u>	6.0 <u>c/</u>	7.2 <u>d/</u>	7.9 <u>d/</u>	8.7 <u>d/</u>	9.3 <u>c/</u>	9.9 <u>c/</u>	10.3 <u>d/</u>	10.8 <u>e/</u>	10.6 <u>f/</u>

- a. All data are rounded to the nearest hundred thousand.
b. 115/
c. 116/
d. 117/
e. 118/
f. 119/

The volume of regular telegraph traffic will probably stabilize at about its present level for the next 2 or 3 years. As new equipment is introduced and the efficiency of the network improves, probably after 1960, a small growth in the volume of regular telegraph traffic can be expected.

The Ministry of Communications introduced TELEX to provide domestic and international telegraph service for state enterprises in 1953. 120/ At the beginning of 1956 the TELEX system, as shown on the map, Figure 3,* had grown to 19 exchanges in different cities and was providing service to 254 subscribers. 121/ By 1957, there were 365 subscribers and a total of 840 teletype machines in the network. 122/

* Following p. 24.



SECRET

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TELEX connections are available to several Soviet Bloc countries and to Western Europe. Negotiations were under way in 1957 to procure the equipment required to connect the Polish TELEX network, using radio facilities, with the RCA teletype network in the US. 123/

TELEX traffic volume is recorded in minutes of operating time rather than in number of messages sent, as in regular telegraph. The following tabulation shows TELEX traffic volume for 1956 and 1957 124/:

<u>Time Period</u>	<u>Thousand Minutes</u>
First half of 1956	9,580
Total for 1956	18,700
First half of 1957	13,400
Estimated total for 1957*	26,800

The planned growth in the number of teletype machines for use in the TELEX network is as follows 125/:

<u>Year</u>	<u>Number of Teletype Machines</u>
1957	840
1958	1,200
1959	1,800
1960	2,700
1961	3,275
1962	3,850
1963	4,425
1964	5,000

The planned growth in teletype machines represents a 495-percent increase for the 7-year period 1958-64. Assuming the same ratio of teletype machines to subscribers as in 1956, it is estimated that these machines could provide service to 2,200 subscribers by 1964.

The interurban telegraph channels operated by the Ministry of Communications for regular telegraph and TELEX service appear to be adequate. There could be some channel overloading during peak hours of

* Estimated by assuming that the figure for the second half of 1957 would be the same as that for the first half of 1957.

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use, but this overloading is probably not serious. The plans for an increase of only 600 channels for the telegraph system by 1967 further substantiate the belief that existing channel capacity is adequate. 126/

Plans for the telegraph system for 1958 and 1959 call for the expenditure of 11 million zlotys for teletype machines, manually operated exchanges, and multiplexing equipment. Long-range plans for 1960-75 provide for an expenditure of 110 million zlotys, 40 percent of which will be spent in the first 5 years, 35 percent in the second 5 years, and 25 percent in the last 5 years. These investment expenditures are to provide regular telegraph facilities for 600 post and telecommunications offices and TELEX facilities for 4,000 to 5,000 subscribers. 127/ The planned growth will be substantial, with emphasis being given to the development of the TELEX network. Because it is likely that this planned growth will be realized, it is estimated that the future needs for telegraph service of the socialized and private sectors of the economy will be met.

C. Common Telephone and Telegraph Facilities.

The telephone and telegraph services of the Ministry of Communications of Poland are provided by common facilities consisting of wireline, microwave radio relay, and point-to-point radio networks. The wireline network is predominant. The microwave radio relay network will become more significant in the future. The domestic point-to-point radio network is maintained almost exclusively as a backup for the wireline network. The international point-to-point radio network provides telecommunications service to areas not served by international wirelines.

1. Wireline.

The wireline network of Poland, as shown on the map, Figure 4,* provides domestic telephone and telegraph service to all urban areas and most rural areas of the country. 128/ It is also used to relay radio-broadcasting programs between major cities. 129/ There are international wireline connections to the USSR, East Germany, and Czechoslovakia and submarine cable connections to Denmark. 130/ The submarine cable to Denmark is composed of two single conductor cables which carry telegraph traffic. Plans indicate that this submarine cable is to be replaced by 1960 with a coaxial cable which will carry both telephone and telegraph traffic. 131/ It is unlikely, however, that the two single conductor cables will be replaced, because of the high cost of their removal and their utility for backup use.

The wireline network consists of open wire and multiconductor cable lines with multiconductor cable predominant. The multiconductor

* Following p. 26.

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cables, which contain from 50 to 200 pairs of wire, have an average of 113 pairs. 132/ Some of these cables are specially constructed to relay radiobroadcasting programs. Multiplex equipment, providing 3 and 12 channels, is used on the wireline network. 133/

The wireline network will probably not be expanded to any great extent, because of the extensive plans for the construction of a microwave radio relay network. The construction of a coaxial cable is planned to begin in the spring of 1959 between Lodz and Poznan. 134/ It can be expected, however, that 12-channel multiplex equipment will be added to some of the wireline circuits now using 3-channel equipment.

2. Microwave Radio Relay.

The first microwave radio relay line in Poland, between Warsaw and Lodz, became operational in February 1957. 135/ The Ministry of Communications plans to install an extensive microwave radio relay network in Poland. As shown on the map, Figure 5,* this network eventually will connect all major cities within Poland, and, in addition, connections will be available to Czechoslovakia, East Germany, and the USSR. 136/

The microwave radio relay network is to be used initially to relay television programs. The planned network will enable programs to be exchanged among domestic television stations and between Poland and the rest of the European Satellites and the USSR. In addition, connections through East Germany and Czechoslovakia will enable Poland to participate in the television network of Western Europe. The first international line is to be completed soon between Katowice and Ostrava, Czechoslovakia. 137/

By using additional equipment, the microwave radio relay network could be used to carry telephone and telegraph traffic. Also, a microwave network with this capability could be adapted readily for military purposes, especially air defense, and might well become an integral part of a Soviet Bloc-wide microwave network for this purpose. It is believed, therefore, that the planned microwave network will be of major importance in the future.

3. Point-to-Point Radio.

a. Domestic Network.

The domestic point-to-point radio network of Poland consists of 38 stations, as shown on the map, Figure 6.* 138/ The stations

* Following p. 28.

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are evenly distributed throughout the country, with major stations located in province capitals and subordinate stations located in outlying areas. The facilities are capable of carrying both telephone and telegraph traffic and can be integrated with the wireline network. Although the point-to-point radio facilities have limited capacity for handling traffic, the disposition of the stations is such that in the event of disruptions of wireline connections to province capitals, minimum telecommunications needs could be met. There are no indications that the network is to be expanded or that it is to be used for other than emergency purposes.

b. International Network.

The international point-to-point radio facilities of Poland consist of two principal radio stations located at Warsaw and Katowice. These stations provide radiotelephone and radiotelegraph circuits to 30 foreign countries. 139/

50X1

All of these circuits are shown on the map, Figure 7.*

In addition, international point-to-point radio facilities are located at Gdynia, Krakow, Radom, and Swinoujscie. 141/ The radio stations at Krakow and Swinoujscie reportedly are reserve stations employed only when facilities in Warsaw and Katowice are inoperable. 142/ It is possible that the Gdynia and Radom stations also fall into this reserve category.

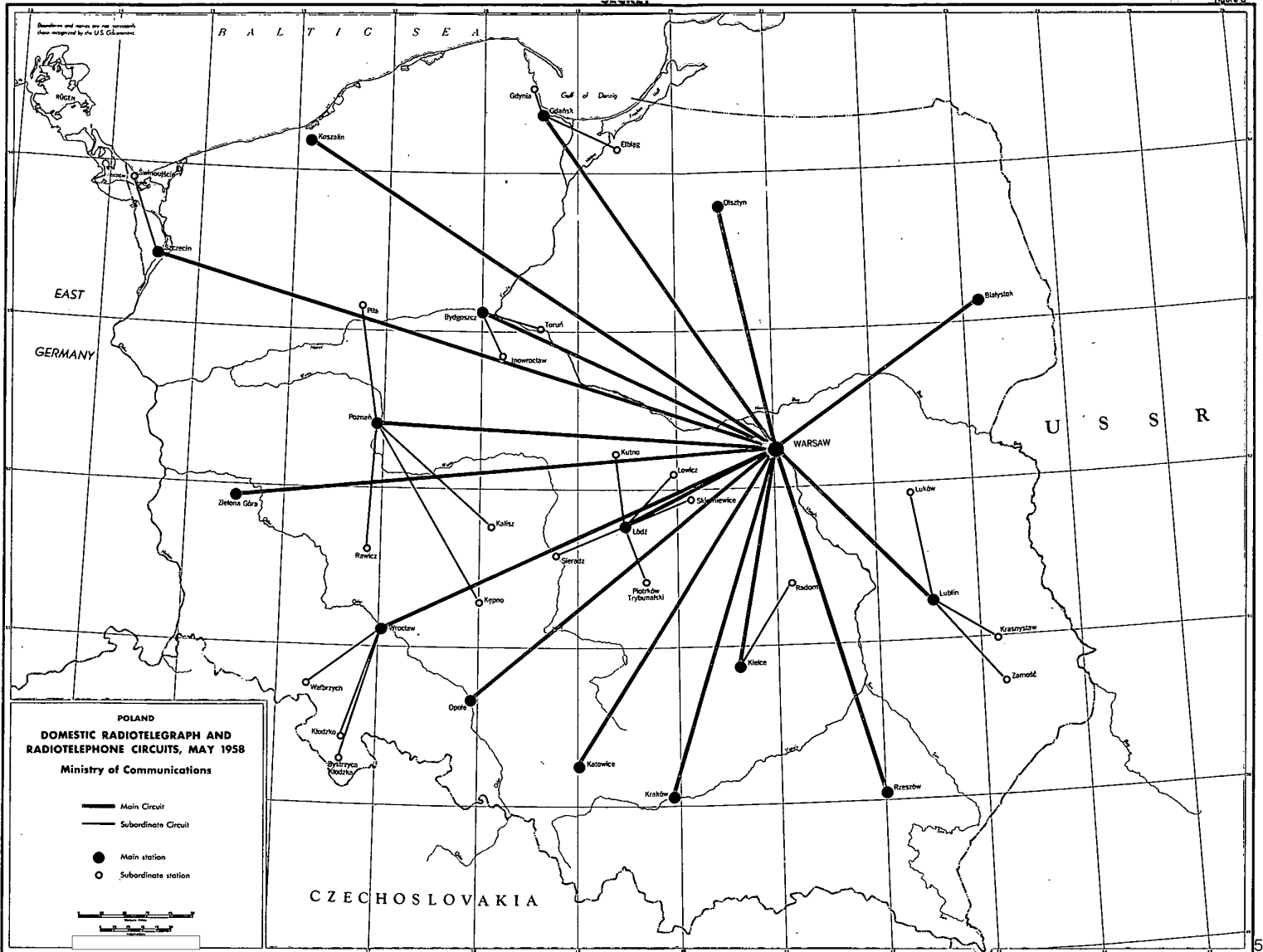
The point-to-point radio facilities located at Warsaw and Katowice are believed generally to fulfill the international point-to-point radio requirements of Poland. Negotiations were underway with West Germany in November 1957 for telegraph terminal equipment capable of providing a maximum of four teletype channels. This equipment is to be used on the circuit between Warsaw and New York. This is the only known improvement planned in the international point-to-point radio network of Poland. 143/

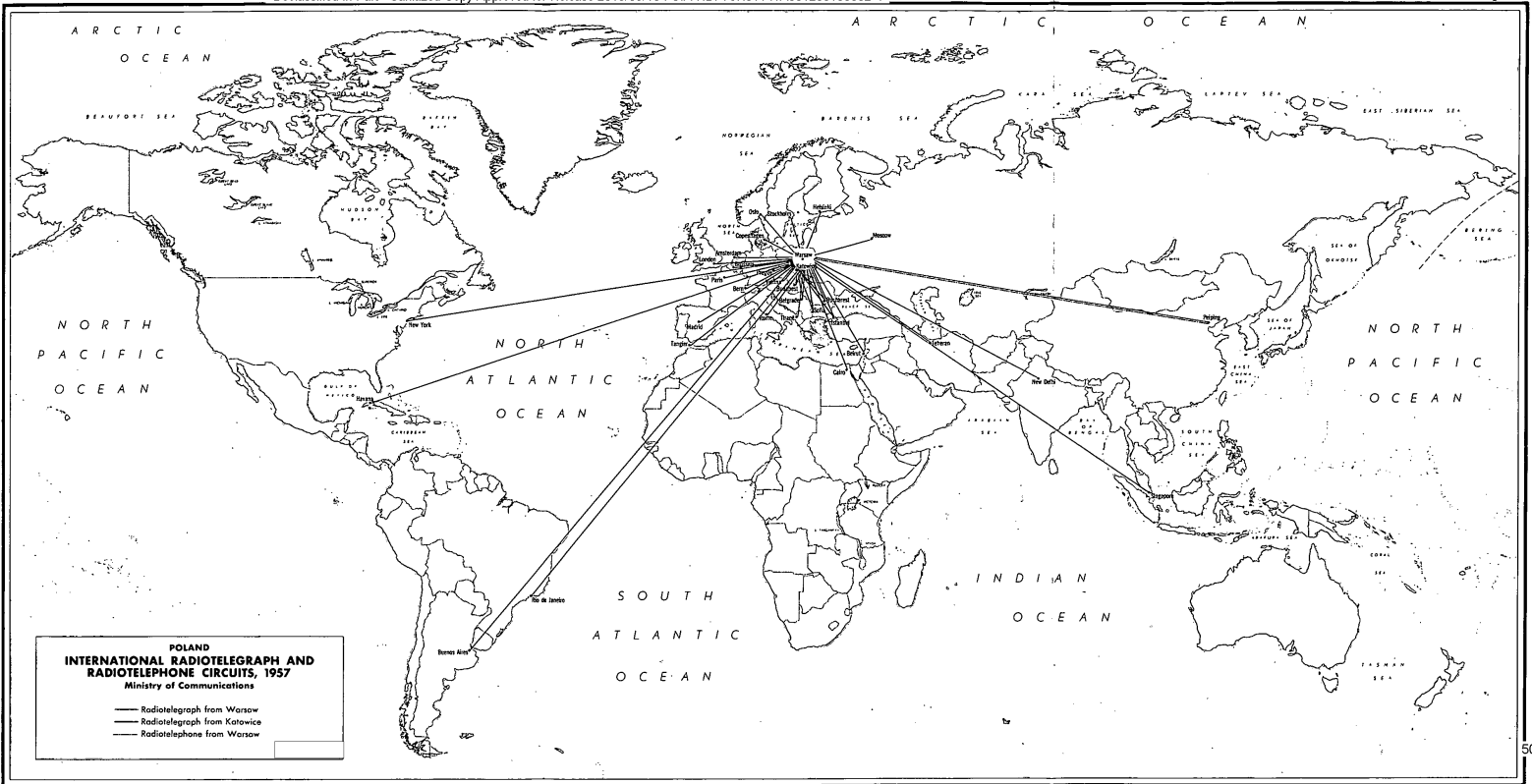
V. Broadcasting System.

The broadcasting system of Poland is composed of radio, wire-diffusion, and television networks. The most extensive of these is the radiobroadcasting network, which includes both amplitude modulated (AM) and frequency modulated (FM) stations. Domestic AM radiobroadcasting coverage extends to all areas of the country. International AM radiobroadcasting coverage is directed primarily to North and South America and Europe. FM radiobroadcasting coverage is very limited, consisting of only three stations.

* Following p. 28.

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The wire-diffusion network in Poland, although less extensive than the radiobroadcasting network, is well developed, especially in rural areas. The Polish television network is in the initial stages of development, and coverage is limited.

Of the slightly more than 4 million broadcast reception points in Poland, radiobroadcast receivers represent about 62 percent, wired loud-speakers 37 percent, and television receivers less than 1 percent of the total.

Future emphasis on broadcasting in Poland will be directed primarily toward expanding the transmission and reception base of the AM and FM radiobroadcasting and television services.

A. Radiobroadcasting.

The domestic radiobroadcasting network of Poland was reconstructed completely after World War II. As shown in Table 14* and Table 15,** the network has grown from 10 stations in 1947, providing service to more than 500,000 radiobroadcast subscribers, to 22 stations in 1957, providing service to 2.5 million subscribers. 144/*** The location of the domestic radiobroadcasting stations is shown on the map, Figure 8.****

The annual growth of radiobroadcast subscribers has been at a relatively high rate, with the exception of that for 1952. The over-all increase in the number of subscribers for 1947-57 was about 390 percent. The percent of radiobroadcast subscribers in rural areas to total subscribers has remained relatively constant, increasing from 20 percent of total subscribers in 1947 to only 23 percent in 1957. The number of licensed subscribers for 1954-56, by province, is shown in Table 16.†

The 22 domestic radiobroadcasting stations operating in 1957 consisted of 3 FM and 19 AM stations. FM radiobroadcasting is a recent development in Poland, as all FM stations began operations in 1957. The most significant feature of AM radiobroadcasting since 1947 has been the growth of relay stations to improve radiobroadcasting coverage in rural areas and the conversion of 12 jamming transmitters to AM radiobroadcasting service in 1957. 145/

* Table 14 follows on p. 30.

** Table 15 follows on p. 31.

*** In addition to radiobroadcast subscribers, there are estimated to have been as many as 600,000 unlicensed subscribers in 1957.

**** Following p. 30.

† Table 16 follows on p. 32.

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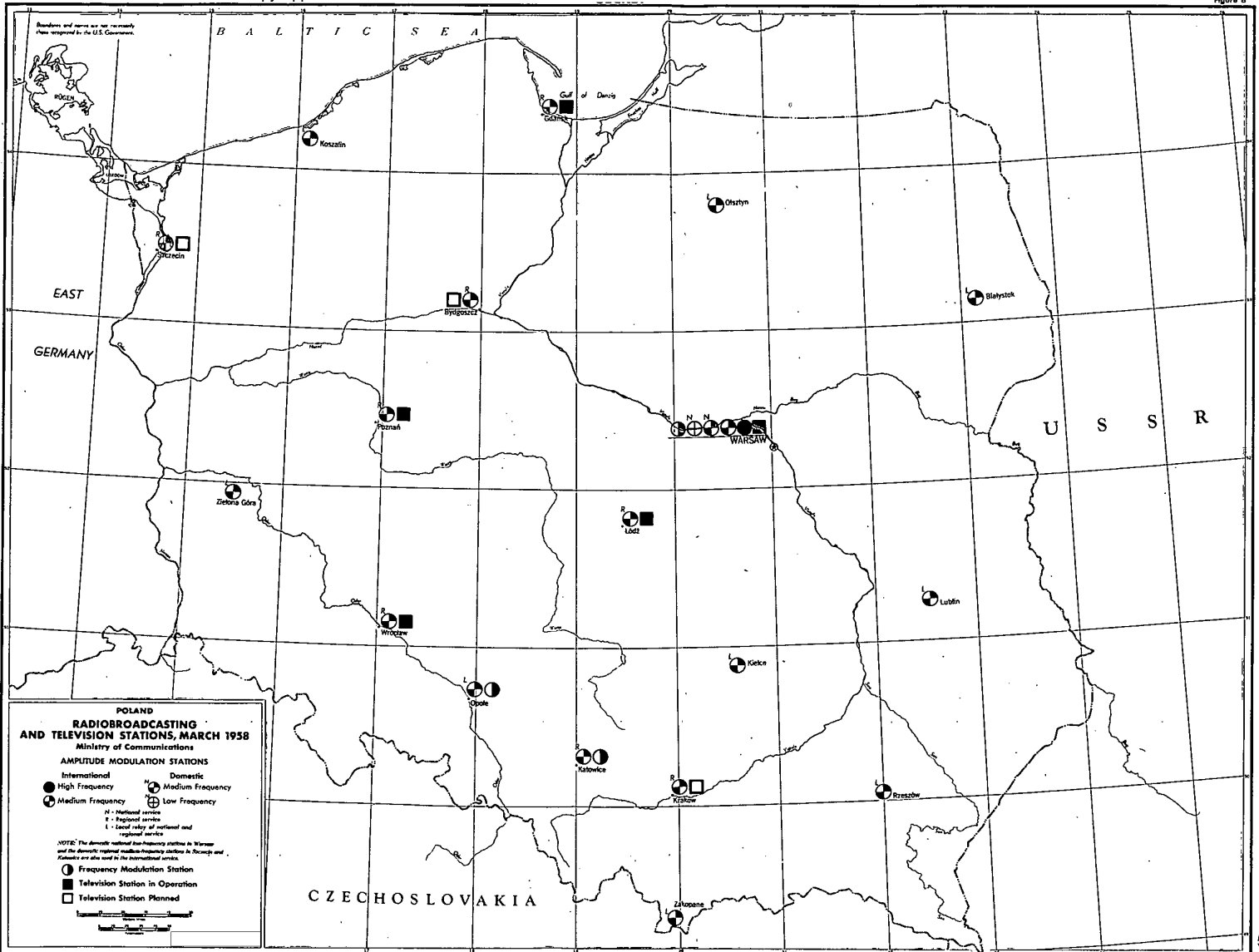
Table 14

Estimated Number of Domestic Radiobroadcasting Stations and Transmitters
in Poland
1947-57

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	Units
Radiobroadcasting stations												
Amplitude modulated (AM)												
National	1 a/	1 a/	2 b/	2 c/	2 d/	2 c/	2 d/	2 e/	2 e/	2 f/	2 g/	
Regional	9 a/	9 a/	8 b/	8 c/	8 d/	8 c/	8 d/	8 e/	8 e/	8 f/	10 g/	
Relay	0	0	2 h/	2 h/	2 h/	3 h/	6 h/	8 e/	8 e/	8 f/	7 g/	
Subtotal	<u>10 a/</u>	<u>10 a/</u>	<u>12 b/</u>	<u>12 b/</u>	<u>12 b/</u>	<u>13 c/</u>	<u>16 d/</u>	<u>18 e/</u>	<u>18 e/</u>	<u>18 f/</u>	<u>19 g/</u>	
Frequency modulated (FM)	0	0	0	0	0	0	0	0	0	0	3 i/	
Total radiobroadcasting stations j/	<u>10</u>	<u>10</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>13</u>	<u>16</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>22</u>	
Transmitters												
Number g/	N.A.	N.A.	22	N.A.	N.A.	19	20	N.A.	22	21	33	
Power (kilowatts) g/	N.A.	N.A.	623	N.A.	N.A.	725	760	N.A.	820	N.A.	1,256	

a. 146/
 b. 147/
 c. 148/
 d. 149/
 e. 150/
 f. 151/
 g. 152/
 h. Derived by subtracting national and regional radiobroadcasting stations from total AM radiobroadcasting stations.
 i. 153/
 j. Derived by adding AM radiobroadcasting stations and FM radiobroadcasting stations.

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Table 15

Estimated Number of Radiobroadcast Receiver Subscribers in Poland
1947-57

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Urban subscribers (thousand)	412 a/	543 a/	601 b/	716 b/	867 b/	894 b/	1,003 b/	1,166 b/	1,302 b/	1,533 b/	1,925 b/
Percent of total	80	81	81	80	83	82	80	79	79	77	77
Rural subscribers (thousand)	100 a/	127 a/	143 c/	176 c/	175 c/	200 c/	249 c/	310 c/	347 c/	470 c/	575 d/
Percent of total	20	19	19	20	17	18	20	21	21	23	23
Total subscribers (thousand)	512 a/	670 a/	744 c/	892 c/	1,042 c/	1,094 c/	1,252 c/	1,476 c/	1,649 c/	2,003 c/	2,500 e/

a. 154/

b. Derived by subtracting the number of rural subscribers from the total number of subscribers.

c. 155/

d. On the assumption that the percentage relationship of rural subscribers to total subscribers which existed in 1956 continued, this percentage was applied to 1957.

e. 156/

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Table 16

Estimated Number of Radiobroadcast Receiver Subscribers
in Poland, by Province (Voevodztvo)
1954-56

	Thousand Units								
	1954 a/			1955 b/			1956 c/		
	<u>Urban</u>	<u>Rural</u>	<u>Total</u>	<u>Urban</u>	<u>Rural</u>	<u>Total</u>	<u>Urban</u>	<u>Rural</u>	<u>Total</u>
Metropolitan subscribers									
Warsaw	150		150	158		158	174		174
Lodz	87		87	97		97	109		109
Provincial subscribers									
Warsaw	46	17	63	48	17	65	54	25	79
Bydgoszcz	71	17	88	79	22	101	92	30	122
Poznan	105	21	126	114	26	140	133	36	169
Lodz	30	8	38	32	10	42	38	13	51
Kielce	30	9	39	33	7	40	40	11	51
Lublin	28	10	38	30	11	41	32	14	46
Bialystok	17	3	20	18	4	22	21	6	27
Olsztyn	20	12	32	22	16	38	26	22	48
Gdansk	77	16	93	88	17	105	105	23	128
Koszalin	19	14	33	21	18	39	26	23	49
Szczecin	36	11	47	42	13	55	50	17	67
Zielona Gora	23	16	39	25	19	44	33	27	60
Wroclaw	101	46	147	120	53	173	148	71	219
Opole	21	28	49	23	31	54	28	44	72
Katowice	209	52	261	247	51	298	298	64	362
Krakow	75	20	95	82	22	104	99	32	131
Rzeszow	22	9	31	23	10	33	27	12	39
Total subscribers	<u>1,167</u>	<u>309</u>	<u>1,476</u>	<u>1,302</u>	<u>347</u>	<u>1,649</u>	<u>1,533</u>	<u>470</u>	<u>2,003</u>

a. 157/b. 158/c. 159/

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The stations of the AM radiobroadcasting network consist of 2 national, 10 regional, and 7 relay stations. Relay stations are used to provide service in areas where national and regional coverage is inadequate. Programs of relay stations originate primarily from national or regional radiobroadcasting stations.

The State Radio Committee prepares three domestic programs. Program 1 is transmitted on the low-frequency national station in Warsaw. Program 2 is transmitted on the medium-frequency national station in Warsaw and also by regional and relay radiobroadcasting stations throughout Poland. Program 3, originating in Warsaw, is transmitted by the three FM radiobroadcasting stations. In addition to these programs, the regional radiobroadcasting stations originate programs of interest to their respective areas.

The number of hours of operation of national, regional, and relay AM radiobroadcasting stations during 1954-56 are shown in Table 17.* The hours of operation of national and relay stations have grown moderately over the period shown. Regional stations, however, registered a 30-percent drop in hours of operation in 1955. This drop is believed to be a result of a change in reporting procedure and does not, as such, represent an actual drop in the hours of operation.

International radiobroadcasting programs originate in Warsaw and are transmitted on low, medium, and high frequencies to North America, South America, and Europe. 160/ The accompanying chart, Figure 9,** illustrates the percent of international radiobroadcasting hours by target area, and Figure 10** illustrates percent of international radiobroadcasting hours by language. 161/

Until recently, Poland made a major effort to broadcast its programs to many areas of the world. Although the number of foreign-language programs was extensive, the poor choice of broadcasting frequencies and the low power of many high-frequency transmitters resulted in small foreign audiences. 162/ The small size of the audiences as well as the economic situation of Poland led to the elimination in early 1958 of international radiobroadcasts in Yiddish, Russian, Greek, Turkish, and Serbo-Croatian. 163/ The elimination of these languages should enable Poland to direct its international radiobroadcasting effort more effectively in the future.

Plans for the domestic AM radiobroadcasting network indicate that emphasis will be directed toward improving the reception and technical quality of broadcasts. The national low-frequency radiobroadcasting station in Warsaw will soon receive a 300-kilowatt (kw)

* Table 17 follows on p. 34.

** Following p. 34.

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Table 17

Estimated Hours of Operation of Radiobroadcasting Stations
in Poland a/
1954-56

	Hours		
	<u>1954 b/</u>	<u>1955 c/</u>	<u>1956 d/</u>
National stations e/	N.A.	13,201	13,650
Regional stations			
Bydgoszcz	1,017	719	719
Gdansk	902	622	750
Krakow	1,205	801	896
Lodz	1,006	606	566
Poznan	1,034	725	785
Katowice	2,270	1,575	1,683
Szczecin	1,072	613	726
Wroclaw	1,320	1,092	915
Subtotal	<u>9,826</u>	<u>6,753</u>	<u>7,040</u>
Relay stations f/	2,389	2,574	2,712
Total stations	N.A.	<u>22,528</u>	<u>23,411</u>

a. Radiobroadcasting from amplitude modulated (AM) radiobroadcasting stations only.

b. 164/

c. 165/

d. 166/

e. Including two stations located in Warsaw.

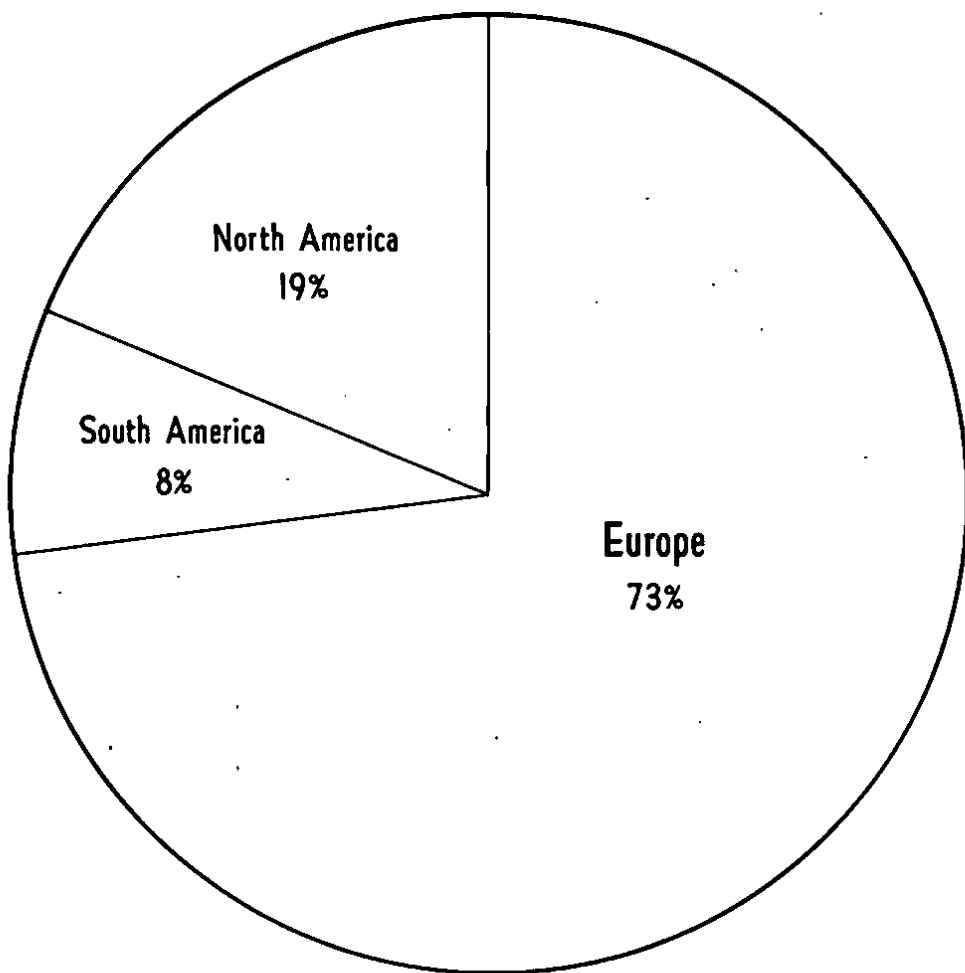
f. Including eight stations.

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Figure 9 50X1

POLAND
PERCENT
OF INTERNATIONAL RADIOMBROADCASTING
HOURS, BY TARGET AREA, 1957



50X1

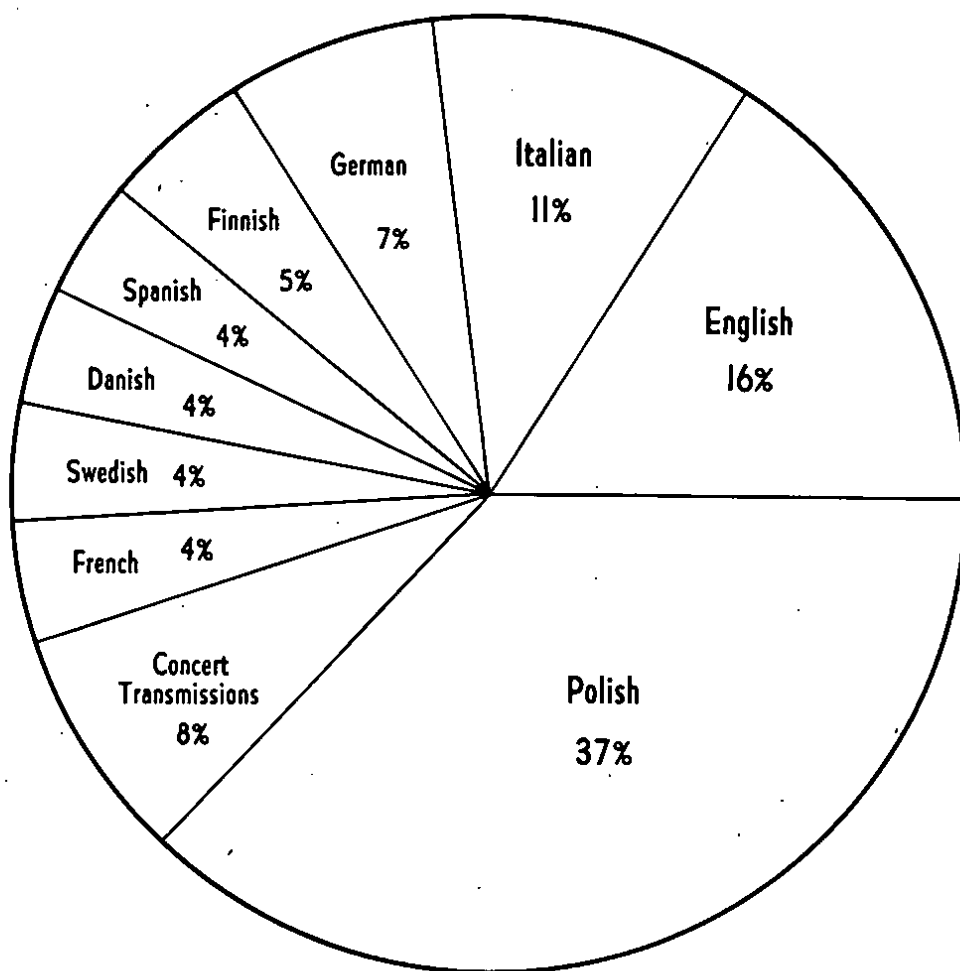
26935 9-58





Figure 10 50X1

POLAND
PERCENT
OF INTERNATIONAL RADIOBROADCASTING
HOURS, BY LANGUAGE, 1957



50X1

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transmitter which, added to the present 200-kw transmitter, will greatly improve the coverage of Program 1 throughout Poland. To improve medium-frequency radiobroadcasting transmissions in 1958, Poznan will receive two 150-kw transmitters, and the power of the radiobroadcasting transmitters of Szczecin will be increased from 50 to 100 kw. Lublin will receive the present 30-kw transmitter of Poznan, Lodz will receive a more modern transmitter than its present 10-kw transmitter, 167/ and a new medium-frequency radiobroadcasting station will be open in Dabrowa in 1959. 168/ In addition to these planned improvements in AM radiobroadcasting service, the FM radiobroadcasting service will be increased from the 3 FM stations presently in operation to 9 FM stations by 1961 169/ and to 16 FM stations by 1965. 170/

The number of AM and FM radiobroadcast receivers available to the public should be greatly increased by 1960. Large planned investments in the radiobroadcast receiver manufacturing industry should provide the domestic market with an ample supply of receivers. By 1960 the number of AM radiobroadcast receivers is to be more than 3.4 million 171/ and the number of FM radiobroadcast receivers approximately 400,000. 172/

B. Wire-Diffusion.

The wire-diffusion network of Poland is second only to that of the USSR. After its inception in 1944 the wire-diffusion network grew rapidly to a peak in 1956 of more than 1.5 million wire-diffusion subscribers. The small drop in the number of subscribers in 1957, as shown in Table 18,* reportedly was caused by the poor quality of wire-diffusion transmissions. The Ministry of Communications is currently under a great deal of criticism and pressure to improve the situation. 173/

A major shift in the proportion of rural wire-diffusion subscribers to total subscribers occurred between 1948 and 1956. In 1948, rural subscribers represented only about 27 percent of the total number of subscribers, whereas in 1956 they represented 51 percent. Figure 11** 174/ illustrates the growth in number of urban and rural wire-diffusion subscribers.

The Five Year Plan (1956-60) provided for substantial development of the wire-diffusion network. 175/ Recent statements by the Ministry of Communications, however, indicate that previous large-scale investment expenditures in the wire-diffusion network will not be continued until some time after 1960. As a consequence, the plan for expanding the network has been largely abandoned, and instead, emphasis has been shifted to improving the technical quality of wire-diffusion transmissions. 176/

* Table 18 follows on p. 36.

** Following p. 36.

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Table 18

Estimated Number of Wire-Diffusion Subscribers in Poland
1947-57

	Thousand Units										
	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Subscribers	147 a/	293 a/	415 b/	572 b/	705 b/	907 b/	959 b/	1,106 c/	1,319 b/	1,509 b/	1,480 d/

a. 177/b. Figures for 1949-53 include radio headphones and radiobroadcast crystal sets. 178/c. 179/d. 180/C. Television.

Television was first introduced experimentally in Warsaw in 1952. 181/ The Warsaw station began regular program transmissions in 1956 and was followed in the same year by the Lodz television station. 182/ In 1957, 2 additional stations, located at Poznan and Katowice, became operational, bringing the total to 4 operating television stations at the end of the year. 183/

In early 1958 it was reported that television stations in Gdansk and Wroclaw began operation and that stations in Szczecin and Krakow were under construction. 184/ In addition, plans call for a station to be built at Bydgoszcz, but the completion date is unknown. 185/ If all planned stations are completed by the end of 1960, Poland will have nine television stations in operation. These stations, as shown on Figure 8,* will provide television coverage for major population centers of Poland.

Television programs have been relayed from Warsaw to Lodz since February 1957 by means of microwave radio relay facilities. As the microwave radio relay network is further expanded, television programs will be exchanged between other stations. In addition, the microwave radio relay network will make possible the exchange of television programs between Poland and the USSR, East Germany, Czechoslovakia, and the television network of Western Europe.

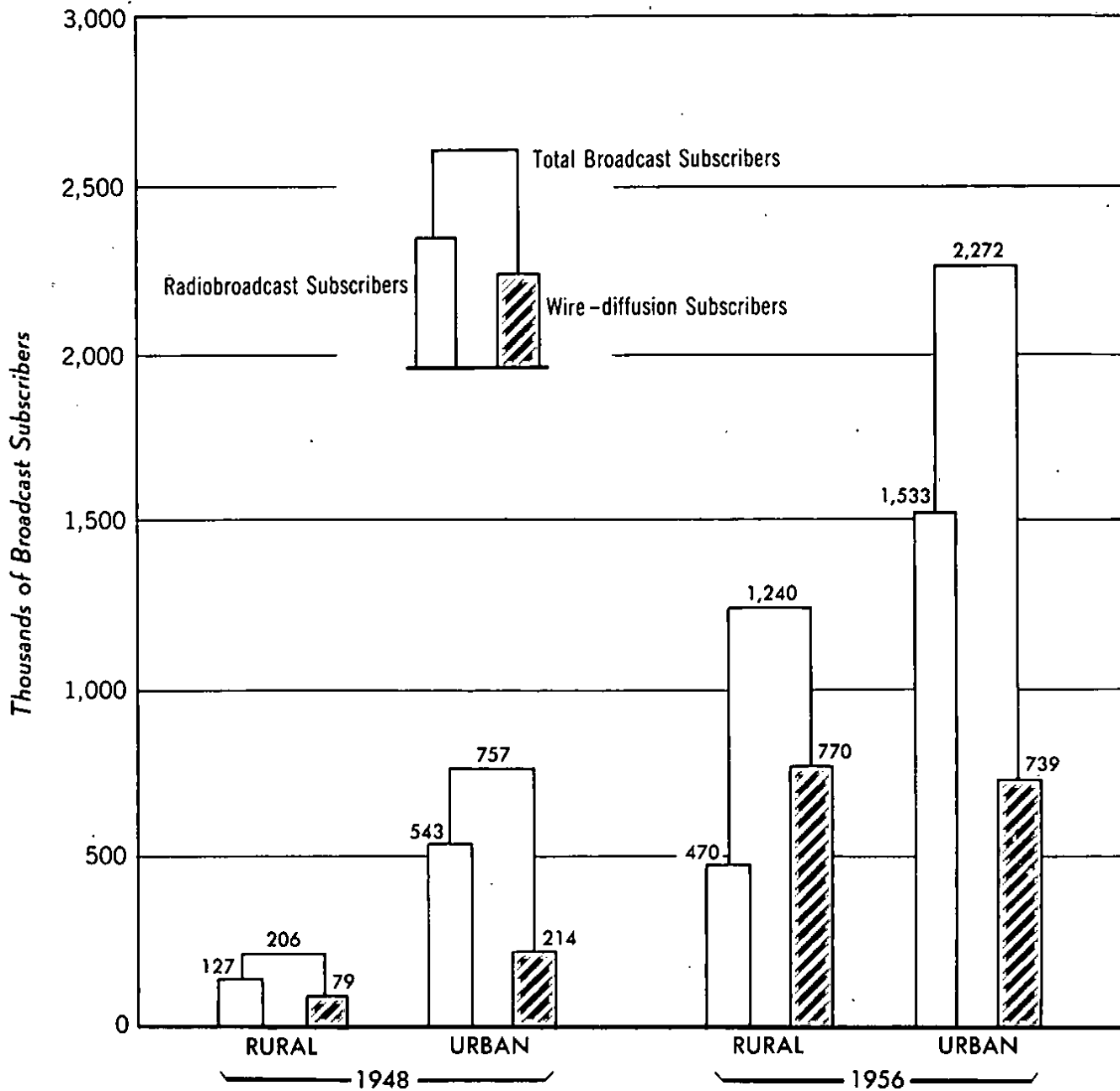
The number of television receivers in use, as shown in Table 19,** is small. By the end of 1957, Poland had only 22,000 television receivers,

* Following p. 30, above.

** Table 19 follows on p. 37.

POLAND GROWTH IN NUMBER OF URBAN AND RURAL BROADCAST SUBSCRIBERS*

1948 and 1956



*Radiobroadcast Subscribers and wire-diffusion Subscribers.

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most of which were located in Warsaw. Plans for the expansion of television in Poland envisage 150,000 to 400,000 receivers in use by the end of 1960. 186/

Table 19

Estimated Number of Television Receivers in Use in Poland
1954-57

	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>
Receivers	200 <u>a/</u>	300 <u>a/</u>	5,755 <u>b/</u>	22,142 <u>c/</u>
a.	<u>187/</u>			
b.	<u>188/</u>			
c.	<u>189/</u>			

Poland must make considerable progress before television can be enjoyed by the majority of the population. As is the case in other Soviet Bloc countries, plans for this medium are extensive, and indications are that there is a strong desire to expand television at a rapid rate.

VI. Future Trends.

The future development of post and telecommunications services in Poland will not be as great as that outlined originally in the Five Year Plan for 1956-60. The decrease in the rate of development was caused by insufficient increases in investment funds to maintain past rates of growth for all services. As a consequence, the Ministry of Communications has had to reevaluate its investment program. A result of the reevaluation has been a reduction in the investment expenditures for the radiobroadcasting and wire-diffusion networks. Investment expenditures for the expansion of the telephone and telegraph systems and for the television and microwave radio relay networks, however, are believed to have remained unchanged. The present economic reorganization is not expected to cause any appreciable changes in the investment program.

Although some policies of the Gomulka government were responsible for reductions in investment funds, other policies have resulted in improved operations of the Ministry of Communications. The emphasis of the

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Gomulka government on profitability has improved the operation of the international radiobroadcasting service by reducing radiobroadcasting coverage that could not be maintained adequately by Polish facilities. In another instance, prices charged for telephone and telegraph services were placed on a more realistic cost basis by rate increases. The continuation of this trend toward more efficient operation should lead to better utilization of the resources of the Ministry of Communications. It is believed that future courses of action of the Ministry of Communications will be as follows:

1. It is certain that there will be an expansion of the television transmission and reception base.
2. It is certain that there will be an expansion of the AM radiobroadcasting reception base.
3. It is certain that there will be a continued growth in TELEX service.
4. It is certain that there will be an expansion of the regular telegraph network.
5. It is certain that there will be an increase in the capacity of the interurban telephone and telegraph network through the continued development of microwave radio relay and the use of carrier frequency telephone techniques.
6. It is certain that there will be an improvement in the technical quality of wire-diffusion broadcasts.
7. It is certain that there will be an expansion of the FM radiobroadcasting transmission and reception base.
8. It is almost certain that there will be a continued growth in the number of telephone subscribers.
9. It is possible that there will be a further reduction in the number of employees in unproductive positions.

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APPENDIX A

GLOSSARY OF TECHNICAL TERMS

Amplitude modulation (AM): The process by which a selected carrier frequency is varied in magnitude (amplitude) by other frequencies that contain the information to be transmitted in telecommunications. (See Frequency modulation.)

Apparatus: Instruments, machines, appliances, and other assemblies used in providing a telecommunications facility.

Automatic (as an adjective): Of or pertaining to any process involved in producing telecommunications service which does not require direct, immediate human assistance.

Band (of frequencies): The entire range of frequencies between two numerically specified frequency limits. The magnitude of this range is a limiting factor on the amount of information that can be transmitted in telecommunications. With respect to frequencies of the radio spectrum as a whole, the International Telecommunication Union has for convenience divided the whole radio spectrum into eight major bands, as follows:

Frequency Bands		
Range	Type	Corresponding Wave* Band
30 kc** and below	Very low frequencies (VLF)	Myriametric waves
30 to 300 kc	Low frequencies (LF)	Kilometric waves
300 to 3,000 kc	Medium frequencies (MF)	Hectometric waves
3,000 to 30,000 kc	High frequencies (HF)	Decametric waves
30,000 kc to 300 mc***	Very high frequencies (VHF)	Metric waves
300 to 3,000 mc	Ultra high frequencies (UHF)	Decimetric waves****
3,000 to 30,000 mc	Super high frequencies (SHF)	Centimetric waves****
30,000 to 300,000 mc	Extremely high frequencies (EHF)	Millimetric waves****

* Waves are undulating disturbances: a sound wave is a disturbance in the air, which is an elastic medium, and an electric wave is a disturbance in any medium whatever. The number of waves per second is the frequency of a given wave. Because the speed of wave propagation is considered to be constant, the length of a given wave is in inverse relation to its frequency: the longer the wave length, the lower the frequency, and the shorter the wave length, [footnote continued on p. 40]

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Cable: A bundle of sheathed, insulated wires and/or coaxial tubes, used as a telecommunications medium. It is sometimes referred to as "multiconductor cable."

Carrier (as an adjective): Of or pertaining to a technique for dividing a circuit, lane, supergroup, group, or channel into portions which can be used independently of and simultaneously with all other portions. Different frequencies or different pulses are selected for each portion to "carry" the information to be transmitted, after alteration by the information frequencies. The carrier itself need not be transmitted.

Channel: A portion, electrical or physical, of a telecommunications circuit, lane, supergroup, or group which can be used to transmit information independently of and simultaneously with all other portions. A channel may be used to provide two or more subchannels.

Circuit: A telecommunications connection between two or more distant points by a wire, cable, or radio medium facility used to carry information. The circuit is the fundamental telecommunications connection between distant points. By the application of appropriate techniques, a circuit may be arranged in many different combinations to meet the need for various kinds and quantities of telecommunications service. In its simplest form a circuit may carry only single telecommunications units in sequence. In its most complex form it may by apportionment carry simultaneously thousands of telephone channels and telegraph subchannels; a number of television programs; and other specialized kinds of service, such as high-fidelity broadcast programs, radar signals, and data-processing signals.

For the most complex application, a circuit is often arranged into lanes, each of which can carry, in 1 direction, 1 television program or 600 telephone channels. In turn, these 600 telephone channels are subdivided into 10 supergroups of 60 telephone channels each. Each supergroup is subdivided into 5 groups of 12 telephone channels each. One or more telephone channels may be further subdivided into three to twenty 60-word-per-minute teletype subchannels. Other specialized kinds of service may be accommodated by combining two or more telephone channels.

the higher the frequency. Wave length is usually measured in linear units of the metric system.

** Kilocycles per second, or 1,000 cycles per second.

*** Megacycles per second, or 1 million cycles per second.

**** It is becoming common usage to refer to waves (frequencies) in these three bands as "microwaves."

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Coaxial (as an adjective): Of or pertaining to a modern telecommunications cable medium technique using one or more tubes (sometimes called "pipes"). Each metal tube surrounds a conducting wire supported concentrically by insulators. The space in the tube usually contains nitrogen gas under pressure. Generally, coaxial cable is used for the transmission of information in complex form, such as radar, computer data, or television signals, and/or for the transmission of telephone channels and telegraph subchannels. A single tube usually carries information in only one direction at a time. The capacity of a tube depends in part upon the distance between repeater stations. In the standard facility, which may have from 2 to 8 tubes in the cable, a single tube carries a lane of 600 telephone channels or 1 television lane, for which the repeater station spacing is about 7 statute miles. In a new developmental coaxial cable facility, a single tube may carry 3 lanes of a total of 1,800 telephone channels or 3 television lanes, for which the repeater station spacing is expected to be about 3 statute miles.

Electronics: A general term used to identify that branch of electrical science and technology that treats of the behavior of electrons in vacuums, gases, or solids. Today, telecommunications makes extensive use of electronic technology.

Facility: An association of apparatus, material, and electrical energy required to furnish telecommunications service.

Facsimile (as an adjective): Of or pertaining to a telecommunications (telegraph) service in which photographs, drawings, handwriting, and printed matter are transmitted for graphically recorded reception. In one method (Type A), images are built up of lines or dots of constant intensity. In another method (Type B), images are built up of lines or dots of varying intensity, sometimes referred to as "telephoto" and "photoradio."

Feeder (as an adjective): Of or pertaining to telecommunications facilities of relatively low capacity which join facilities of relatively high capacity. (See Main.)

Frequency: The rate in cycles per second at which an electric current, voltage, wave, or field alternates in amplitude and/or direction. (See Band.)

Frequency modulation (FM): The process by which a selected carrier frequency is varied in frequency by other frequencies that contain the information to be transmitted in telecommunications. (See Amplitude modulation.)

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Functional (as an adjective): Of, pertaining to, or connected with special, unique, or particular telecommunications facilities managed and operated by a single agency, organization, company, department, committee, ministry, or other entity, in contrast to the facilities of a basic system.

Group: A number of channels (usually 12) or subchannels combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit, lane, or supergroup.

Ionosphere: Those layers of the earth's atmosphere occupying the space about 210 statute miles in thickness extending from about 30 statute miles above the earth's surface to the outer reaches (exosphere) of the atmosphere. Reflection from these layers makes possible long-distance transmission of radio signals. The layers, however, are responsible for fading of signals, skip distance, and differences between daytime and nighttime radio reception. They are also used as a scattering reflector for ionosphere scatter-transmission techniques to transmit to distances of about 1,000 to 1,500 statute miles.

Joint facility: A telecommunications facility owned, controlled, or operated by two or more agencies, organizations, companies, departments, committees, ministries, or other entities.

Lane: A 1-way portion, electrical or physical, of a 2-way telecommunications circuit which can be used independently of and simultaneously with all other portions. The largest lane today can handle 600 telephone channels or 1 television program. In some applications the direction of a lane may be reversed.

Leased (as an adjective): Of or pertaining to the direct operation by a user of a telecommunications facility owned by another agency.

Line: A general term used to delineate a telecommunications circuit facility (wire, cable, or radio).

Main (as an adjective): Of or pertaining to telecommunications facilities at and between principal cities and centers which have relatively high capacity compared with feeder facilities. (See Feeder.)

Medium: Any substance or space that can be used practically to transmit a form of electrical energy for the purpose of providing telecommunications service.

Microwave radio relay (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications employing radio frequencies higher than 300 mc. These frequencies do not normally afford

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practical direct transmission to great distances, principally because they do not bend well around the earth's surface and because they do not reflect well from the ionosphere. They are, however, capable of reliable transmission from horizon to horizon (line-of-sight) by the use of special antennas which concentrate the radio energy and give it desired direction. Great distances can, in consequence, be reached by this technique by the interposition of relay stations along the route of the line with a spacing interval of from 25 to 40 statute miles, depending upon terrain conditions. This technique can be employed practically to carry from a small number of telephone channels and telegraph subchannels to thousands of such channels and subchannels through 2 or more lanes and to carry 1 or more television and other specialized lanes and channels. (See Band.)

Mobile (as an adjective): Of or pertaining to a telecommunications facility which is intended to be operational while in motion or during halts at unspecified points. (See Portable.)

Modulation: The process of altering a carrier frequency or carrier pulses by other frequencies or pulses representing the information being transmitted.

Multiplex (as an adjective): Of or pertaining to the combining of information signals, modulated or unmodulated, of two or more lanes, supergroups, groups, channels, or subchannels for transmission over the same circuit.

Network: An interconnection, electrical or physical, of two or more circuits or portions thereof for the purpose of facilitating telecommunications service.

Point-to-point (as an adjective): Generally, of or pertaining to telecommunications service between fixed points, using the radio medium.

Portable (as an adjective): Of or pertaining to a telecommunications facility which can be readily moved from place to place but is not normally operational while in motion. (See Mobile.)

Private (as an adjective): Belonging to or concerning an individual person, organization, institution, or activity; not public or common.

Pulse: A spurt of electrical energy of extremely short duration (usually measured in millionths of a second), yet capable of being used in telecommunications to transmit information.

Quad: In a multiconductor telecommunications cable, the physical association of a group of 4 conductors in any one of various arrangements for the purpose of providing 2-way multichannel operation.

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Reception base: The aggregate telecommunications receiving facilities employed in providing a broadcast service.

Route: The geographical path followed by a wire, cable, or radio line.

Scatter (as an adjective): Of or pertaining to a radio medium technique in modern telecommunications by which energy in radio frequencies above 30 mc is deliberately scattered into one or the other of two reflecting portions of the atmosphere (troposphere and ionosphere) at a predetermined angle such that a usable portion of the energy arrives at the desired receiving location. This technique is especially applicable to regions in high latitudes (Arctic and Antarctic) where facilities of other media suffer from the rigors of weather and terrain and where the conventional long-distance radio media of the lower frequency bands (200 kc to 30 mc) are subject to serious disruptive propagational anomalies. (See Band.)

Subchannel: A portion, electrical or physical, of a telecommunications channel which can be used independently of and simultaneously with all other portions. An appreciable number of telephone channels can usually be subchanneled to carry from three to twenty 60-word-per-minute teletype subchannels on each telephone channel so employed.

Subscriber: Any customer who directly operates telecommunications apparatus in obtaining telecommunications service.

Supergroup: A number of groups (often five) combined (multiplexed) electrically in building up the total capacity of a telecommunications circuit or lane.

System: All of the facilities and networks managed by a single agency, organization, company, department, committee, ministry, or other entity in rendering either functional or basic telecommunications service.

Telecommunications: Transmission, reception, or exchange of information between distant points by electrical energy over a wire, cable, or radio medium facility to produce telephone, telegraph, facsimile, broadcast (aural and visual); and other similar services.

Teletype (as an adjective): Of or pertaining to a technique for effecting telegraph service by the use of an apparatus similar to a typewriter in which information is transmitted by keyboard and received by type printer on a roll of paper, on a roll of tape, or by perforations on a roll of tape; or both. (Sometimes called a "teleprinter" or "teletypewriter.")

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Transmission base: The aggregate telecommunications transmitting facilities employed in providing broadcast service.

Transistor: A modern device which is capable of performing in a solid (germanium or silicon) many of the functions performed by the conventional electronic tube in a gas or vacuum.

Troposphere: The layer of the earth's atmosphere occupying the space from the earth's surface to a height of about 6 statute miles. This layer is used as a scattering reflector for tropospheric scatter transmission techniques to distances of about 200 to 500 statute miles.

Wave guide (as an adjective): Of or pertaining to a telecommunications medium, now under development in several countries, which may be capable of transmitting extremely large amounts of conventional and complex information. It consists of a circular or rectangular hollow metallic tube in which electrical energy travels in the form of waves, much as do sound waves in a speaking tube.

Wire diffusion: Distribution of broadcast programs by a wire or cable medium to wired loudspeakers.

Wired loudspeaker: A telecommunications loudspeaker which receives from a distribution point one or more broadcast programs by a wire or cable medium.

Wireline: A general term used to identify a line consisting of either an aerial cable (and/or separate wires) or underground cable, used as a telecommunications medium.

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APPENDIX B

METHODOLOGY

Much of the statistical data in this report was developed from information contained in statistical yearbooks of Poland for 1949, 1955, 1956, 1957, and 1958.

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[Redacted]

[Redacted] it is believed that the official Polish data given in this report are reliable.

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The lack of adequate data on revenue and investment made the development of Tables 1, 3, and 5** somewhat tenuous, and thus the figures in these tables should be treated with caution.

[Redacted]

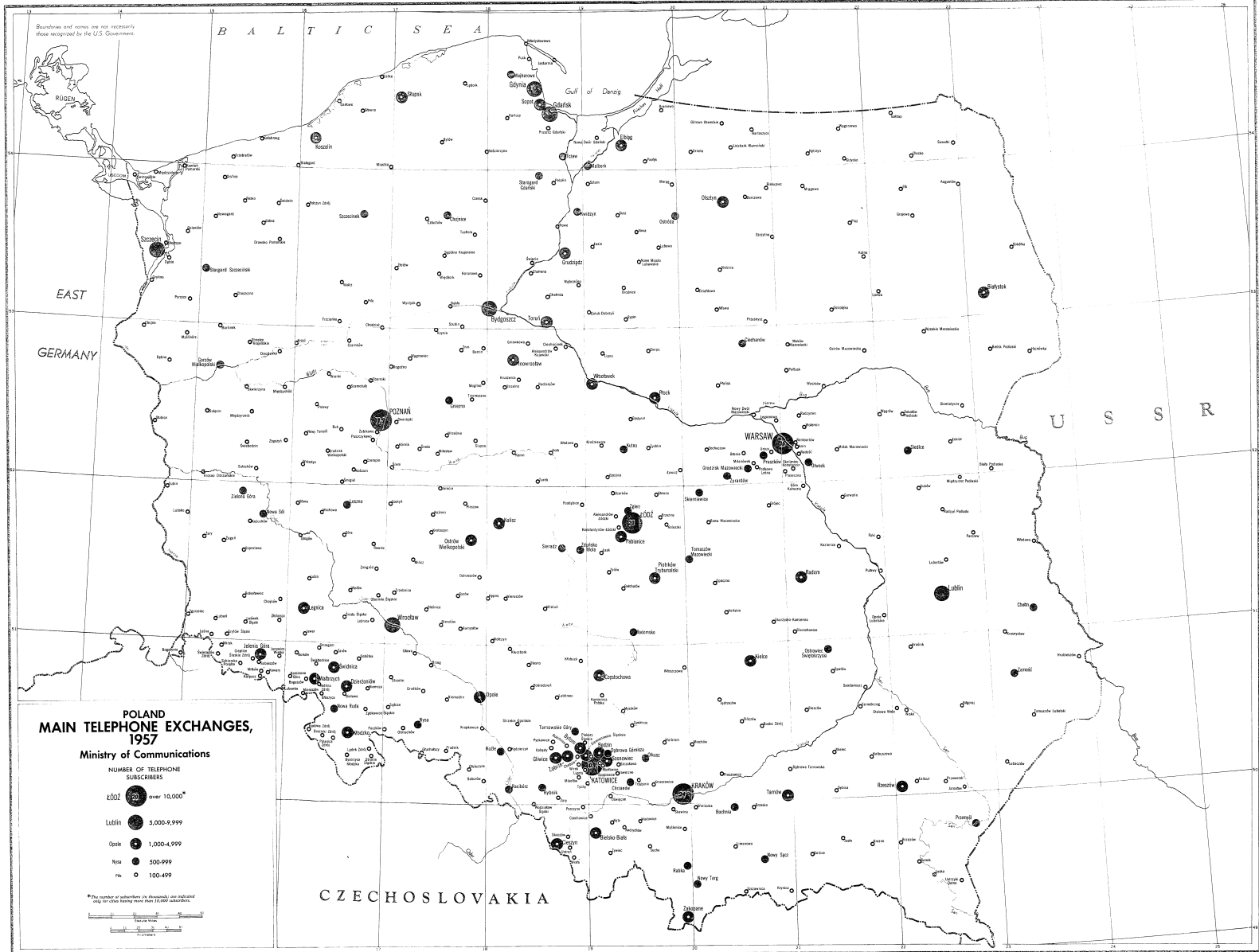
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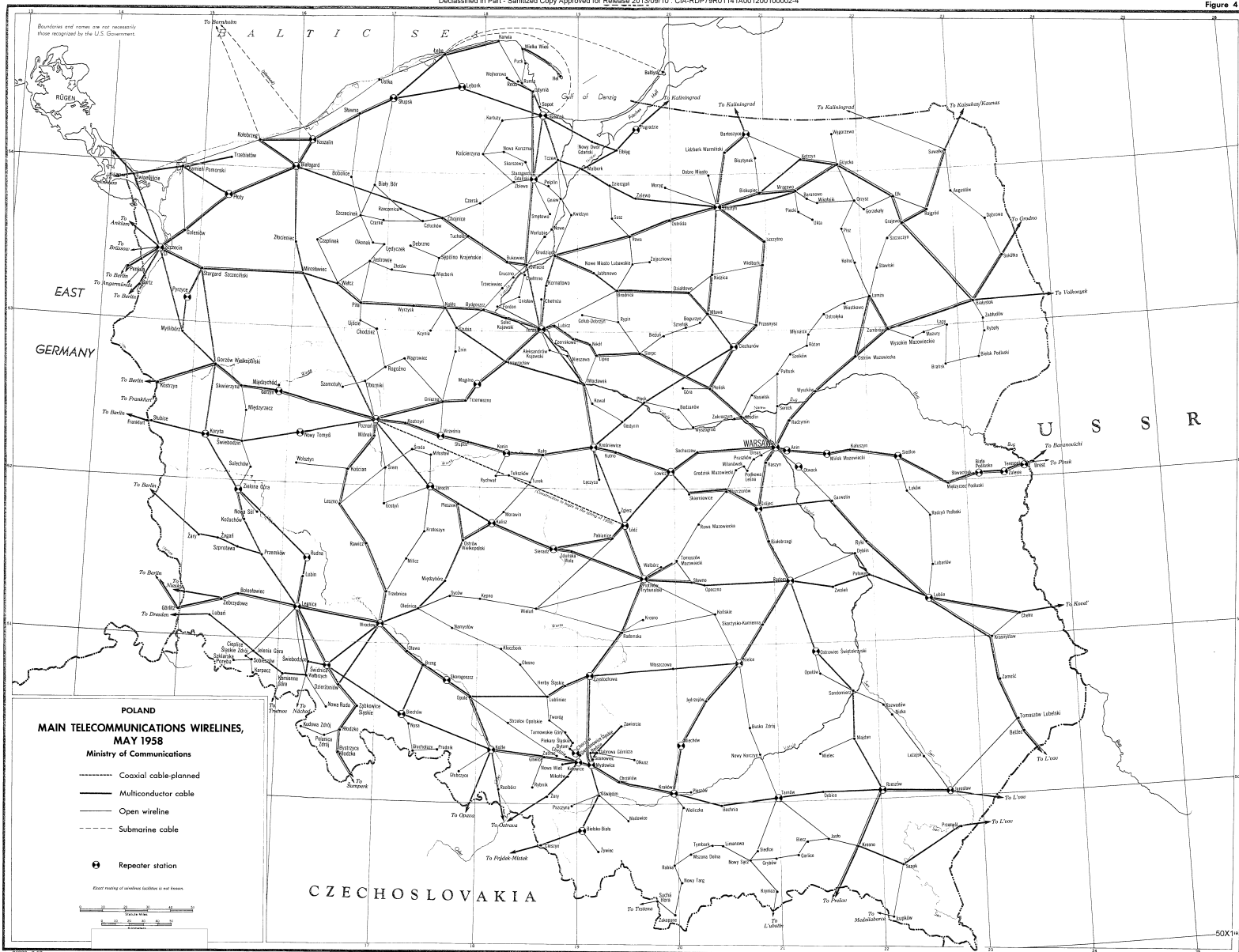
* Pp. 23, 24, 31, and 36, respectively, above.
** Pp. 6, 8, and 11, respectively, above.

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