WORLD AIR TRAVEL DEMAND
1950-1980

By

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INTRODUCTION

The Lockheed Aircraft Corporation, as a manufacturer of commercial air transports, is vitally interested in following the development of air travel throughout the world. Reasonable expectations as to the future developments are required as planning inputs for Lockheed's Commercial Air Transport Programs. Lockheed's air travel forecast requirements range from overall projections of world traffic by major areas for broad market planning to more detailed forecasts of individual carriers' city-pair peak traffic to determine each airline's aircraft needs. Generalized area forecasts, for example, U.S. domestic, transatlantic, intra-Europe, serve as the basis for specific airline and city-pair forecasts, while the city-pair forecasts provide feedback to the more generalized area forecasts.

This discussion will cover total world traffic as distributed over broad major flows. We, at Lockheed, usually forecast total world scheduled traffic as reported by the International Civil Aviation Organization (ICAO). While ICAO statistics are available on a global basis, these show domestic and international traffic by country of airline registration and do not reveal the actual traffic flow. For example, traffic between Taipei and Hong Kong carried by TWA would show up under U.S., while passengers carried by Japan Air Lines over the same route would show up under Japan.

Lockheed has compiled a twenty-year history of the actual world's major air traffic flows as a basis for forecasting the future of world air travel. In addition to the basic data sources (ICAO, IATA, EARB, OAA, airport and civil aviation authorities, immigration and tourist organizations), individual airline traffic statistics have also been used to help allocate traffic over specific flows.

Since the environment within which the airline industry operates is very dynamic, you can see how essential it is to continuously evaluate and update the various forecast results. In this current updating of Lockheed's ICAO world forecast, our goal was to identify and measure all major air traffic flows and still be consistent with ICAO reported traffic data.

SUMMARY

Total World

Total world scheduled air passenger traffic carried by the airlines of the International Civil Aviation Organization (ICAO), excluding the USSR, increased from 17.4 billion passenger miles in 1950 to 237.4 billion in 1970. This represents an average annual growth rate of 14% during the past two decades. The USSR became a member of ICAO in 1970, and Aeroflot – the only Russian airline – reported 49 billion passenger miles for 1970. This traffic, which encompasses both domestic and international travel as well as some non-scheduled flights, is not included in the ICAO world totals shown in this report.

Based on air traffic development over the past two decades and expected changes in future air travel service in the many areas of the world, including the continued expansion of non-scheduled services, world scheduled air traffic will grow at a somewhat lower rate than in the 1960's. Lockheed's forecast of ICAO world scheduled revenue passenger miles amounts to 650 billion in 1980; this represents an average annual increase of 10.6% for the 1970 to 1980 period.

Significant shifts between scheduled and non-scheduled traffic are occurring in various traffic categories. While it is difficult to measure non-scheduled traffic in many areas of the world, we estimate that it amounted to some 50 billion passenger miles in 1970, with about half composed of European inclusive tour traffic and transatlantic traffic. Most of the other traffic is composed of U.S. domestic and military charter.

Assuming the present type of non-scheduled service continues, as well as a decrease in military charter, Lockheed forecasts that non-scheduled passenger traffic will grow at an annual rate of 15% during the 1970's, totaling about 200 billion passenger miles by 1980. Non-scheduled traffic by scheduled, supplemental and charter airlines is expected to increase its share relative to scheduled from 21% in 1970 to 31% by 1980.

Major Flows

For the first time, all major world air traffic flows were analyzed, including those areas for which no systematic traffic statistics are available.

Actual 1970 traffic has been utilized as a base for those areas regularly reporting traffic (ICAO, IATA, EARB, OAA, the U.S. CAB). Estimates have been made for all other major traffic flows on the basis of other available data, such as airport and civil aviation authorities, immigration and tourist organizations and airlines.

Lockheed's forecast of world scheduled traffic was developed by preparing forecasts for about 48 unique traffic flows; these were then combined into 13 major flows. Every effort has been made to reflect realistic traffic growth patterns for these regions based on their own particular characteristics.

FORECASTING METHODS AND PHILOSOPHY

I would like to continue this presentation with a discussion of various techniques used in forecasting. These techniques are applicable to air travel anywhere in the world; and, in fact, most of these techniques are applicable to forecasting in general, regardless of whether it is for travel or other consumer items.

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Philosophy of Forecasting

Before discussing the alternative methods of forecasting, I would like to discuss the "philosophy" of forecasting. The question I would like to introduce is: Can we forecast the future? Can we really know in advance what will happen tomorrow, next week, next summer or even ten or twenty years out? Furthermore, what can we know about the future? In what detail can we know about it, and to what degree of certainty can we foresee the future?

There are several aspects to cover before giving my views. First, there is the role of the forecaster — whether it be an individual, or a group, or some organization that wants knowledge of the future. This plays a very significant role, especially in analyzing and predicting the behavior of people as individuals or in groups. Since the analyst is part of the process that is being analyzed, he cannot detach himself from the analytical process. This is unlike the detachment possible in analyzing and trying to predict physical phenomena, such as the movement of stars or the moon, or experimenting under controlled conditions in a laboratory. The biases, the self-interests, the motivation of the analyst make it almost impossible to be 100% objective.

Another important consideration is that a forecast can be self-fulfilling. Once a forecast is made, if the decision-making officials in the various organizations that are affected plan on the basis of this forecast, it can well be that this forecast will be realized. Forecasts are usually based on certain assumptions of the future; and one of these has to be the required policies that must be undertaken for a forecast to be realizable.

When it comes to forecasting any event involving human behavior, I have come to the conclusion after many years of involvement in this endeavor, that the best we can do is predict what can potentially happen in a broad degree under a given set of circumstances — a given set of assumptions. The greater the detail that we would like to know, the greater the probability of being wrong in the future.

For example, if we want to forecast the number of tourists or air travelers to certain parts of the world, we must first make certain assumptions relating to the general social, political, economic environment, the climate, that is required to make these events potentially happen. Secondly, there must also be assumptions regarding specific policies that are required for certain events to happen.

The former set of assumptions which deal with the broader social, political conditions are usually beyond the control of any one airline or any one single government agency. The latter, however, are subject to the control of an airline or a government agency and something can be done about them.

Therefore, what we ought to strive for are not forecasts, but goals. In other words, let us establish what we want to happen in the future and then determine what we must do to make these things happen. For instance, an airline might determine that it wants to have so many passengers between two cities in a certain time period. Projections of the total traffic potential between these

points would be made on a basis of the most likely economic conditions that would prevail in the time period under consideration. And these assumptions would also need to include fare levels at which this potential demand could be realized.

These factors are usually beyond the control of any one airline, so a very realistic approach must be taken. Nevertheless, given this assumed environment the airline can set up realistic goals of traffic that it would like to achieve within this environment. It would have to establish the proper schedules, service patterns, advertising policies, marketing strategies to achieve this potential, so that the goal they would like to have could be realized.

It may seem that I am taking a very negative attitude with regard to our ability to forecast accurately. However, I would prefer to be positive in stressing that forecasts disguised as goals can be attained with the realization as to the extent to which we can control our own destiny.

Moreover, to be able to determine the impact of our actions on the development of future air travel is no easy task. It requires not only analytical insight into cause and effect, but the ability to measure these effects with some precision.

Regardless of all the hazards of forecasting — and there are many — we must forecast the future. In fact, any decision that is made has an implied forecast associated with it, even though no explicit forecast is made.

I believe, however, that setting up goals enables us to go from the present to the future in a more orderly and efficient manner.

Forecasting Techniques

I would next like to cover some of the forecasting techniques. There are about as many techniques as there are forecasters. Since everyone in the world is a forecaster, there are millions of forecasting techniques. However, I believe these can be put into about four broad groups.

Trend Analysis. The first method of forecasting is trend analysis, or extrapolating from the past into the future. It can be as simple as drawing a line on a piece of graph paper, or it can become more complicated through the use of computerized programs using second and third degree relationships.

Regression Analysis. The next method is regression analysis, in which we try to ascertain the relationships between a dependent variable (the one which you are trying to explain or forecast) and independent variables. In this approach broad economic indicators and service factors have been used to forecast the future of air travel. Again, this method can range from very simple linear relationships of the dependent variables to one independent variable

to a very complex system of multi-correlation techniques using non-linear relationships. However, regardless of how complex any regression analysis is, any form of regression analysis is basically a very sophisticated form of trend analysis. Furthermore, regression analysis, or correlation analysis as it is often called, does not determine cause and effect relationships. It merely says that certain things happen together, and from that we imply that there are cause and effect relationships.

Market Analysis. A third general type of forecast which is a little more sophisticated than regression analysis, I lump under the category of market analysis approach, in which detailed socio-economic characteristics of the population, its income, age, education and occupation are used to determine the future patterns of travel. This method attempts to determine to some degree cause and effect relationships. It also requires, however, a continuing body of detailed survey data.

Simulation Analysis. Finally, the fourth group, which I call simulation analysis, is an attempt to duplicate mathematically the various forces affecting tourism — air travel, or whatever you are trying to forecast. This method is also called econometric techniques, and perhaps it may be a better term, because almost any method that we now use does use to some extent mathematical formulas, and so almost any technique can be called econometric.

Evaluation of Alternate Techniques

An evaluation of these four methods has been made in terms of data requirements, advantages and disadvantages and ease of computerization.

Trend analysis is the simplest. You don't have to have much data. All you need is five or ten years of data on the item you are trying to forecast. It is very fast and very inexpensive, but it is very subjective. In other words, the way you feel today will influence your forecast today. You go home and have a good night's sleep and feel rested and come in tomorrow and you might feel a little cheerier — the sun is shining, the world is well, and you look at it and say, "Gee, why was I so pessimistic yesterday?" and you change the forecast. Also, it can be readily computerized too if you have a long time period of events.

The regression analysis is a little more sophisticated. A little more detailed data is required. In addition to historical data on your dependent variables, you also need historical data on your independent variables. Also, you need forecasts of your independent variables, and this is quite difficult to achieve sometimes. For example, if you have to forecast traffic related to the Gross National Product of a particular country and if that forecast is wrong, obviously, even though your relationship may be perfect, your forecast is not valid. In fact, this was one of our problems in trying to forecast U.S. domestic traffic last year. Most of our forecasts of U.S. domestic traffic

are tied to the economic conditions of the country, and our own forecasters and the government had difficulty in telling us when the turnaround was going to come. So, when the economic upswing lagged, the traffic forecasts associated with it lagged. The problem then is that you have to have good forecasts of independent variables.

The regression method is still subjective in that the years you choose to analyze can significantly affect the results. If you choose ten years which happen to be part of an upswing, you would have one kind of result. If you broadened your base and included fifteen years in which there were several early years of lower growth, you would have a different result. Therefore, even in these mathematical techniques, there is a considerable bit of judgment as to what data to use and how to use it.

Again, I would have to point out that here there is no explicit cause and effect relationship, though we feel that the factors used are likely candidates. We only observe in the past that these various variables reacted to each other in certain ways. Cause and effect relationships are not certain. They are just implied.

One good thing about this method is that you can perform some sensitivity analysis. If I were unsure of what GNP were going to be in the next five years, I could take two or three different growth rates and see the impact on my forecast. This way, at least, we have a band of what the probabilities of reaching the forecast can be. Finally, computer programs for this technique are readily available. In fact, if you buy a computer, they will give you the programs with it.

The market analysis method has tremendous data requirements. Travel survey data are required to get the socio-economic characteristics of travelers and non-travelers over a period of time. A nation's population distributed among the same characteristics must also be available for the survey periods as well as for the future.

These data are not always available and are expensive and time consuming to obtain. Thus, it can take quite a few months to do a forecast for just one area.

This method does have certain advantages in that the data and analyses can be used in determining marketing strategies and advertising policies.

To my knowledge, this method has not been computerized, although I think it could be done relatively easily. Because the data problem is so enormous, it has not been worth the effort to computerize this method.

The simulation technique has not been successfully used to forecast traffic. The question is not only one of techniques or computers. It is primarily the complexity of the real world and the difficulty in attempting to duplicate all the decision-making processes that are involved when people take a trip: Should they take a trip, or spend their income some other way? Where should they go? When? With whom? For how long? Which mode? — ad infinitum.

This process would also have to be followed sequentially by time period, with all the lead and lag relationships. As you can see, the simulation method is at present way beyond us.

LOCKHEED FORECAST OF WORLD TRAFFIC

So much for the discussion of alternate techniques and the problems related to their use. How did we arrive at our world forecast?

As I mentioned earlier, we analyzed all major traffic flows throughout the world. In fact, some 48 different flows were analyzed. In my discussion today, I will cover our total world forecast and several of the major area forecasts, including U.S. domestic, transatlantic and intra-Europe.

Factors Affecting the Development of Air Traffic 1950-1970

Based on the analyses of past air traffic, we feel that the most important factors which influence the growth of air travel are economic conditions, price of air travel and the quality of air service. Specific variables utilized in our forecasts include:

- World's Economy — Constant dollar Gross Domestic Product (GDP) for the major nations.
- Standard of Living — Constant dollar GDP per capita for the major nations.
- Price of Air Travel — Revenue per passenger mile, in constant U.S. dollar prices.
- Quality of Air Service — Average speed, aircraft size and fatality rates.

The rate of growth of the world economies, as measured by various indices, provides the most important factor affecting the rate of growth of air travel. The price of a ticket, especially in relation to other goods and other modes of travel, is also an important and easily measurable factor.

For any given route or market, other factors, such as competitive pressures from other modes of travel, are important in deciding whether a traveler will fly. For predominantly business markets, various factors which reflect how well businesses are doing, such as profitability and rate of production, are reliable for forecasting.

Although these quantitative factors are important in developing suitable air travel forecasting models, it is important to realize that subjective factors,

which may bear heavily on the environment within which the industry operates, must also be included.

During the past two decades, the factors which have had a significant impact on air traffic growth have developed quite rapidly. The world's economy, in constant prices, grew at an annual rate of almost 5% and per capita income at 3%. At the same time, markedly improved air service was offered at considerably lower fares.

World Gross Domestic Product grew at an annual rate of 4.9% between 1950 and 1960. The 1960's showed an identical annual growth rate increase. The U.S. economy grew at an average annual rate of 3.3% from 1950 to 1960 and 4% from 1960 to 1970. GDP of other major industrialized nations grew at a faster rate, with Japan showing a remarkable growth of almost 10% per year for these two decades.

Per capita GDP varies greatly among the world's nations. This measure of the standard of living varies widely among the major industrialized nations, ranging from almost $3900 for the U.S. to about one-third of this amount for Japan. The world average is only $680.00.

The average fare throughout the world decreased by 9% between 1960 and 1970. After adjusting for consumer price level increases, the average fare in 1960 constant dollars decreased a substantial 31%, or an average annual decrease of 3.6%. Some selective fares, such as on the North Atlantic and the Pacific, fell even faster. Comparatively, the 1950's showed general fare level increases, although fares held generally steady on a constant dollar basis.

While the price of an airline ticket decreased substantially, the quality of service, as measured by the speed, size and comfort of the aircraft, has increased with the introduction of jet aircraft. ICAO carriers' average seats per aircraft have increased 7% in the 1960's, from 59 to 101 seats. Speed increased almost 60% for the average aircraft mile flown. This translates into shorter travel times, especially on the longer segments. Together, these two factors — speed and size — result in an aircraft productivity some 2.7 times greater in 1970 than in 1960.

Added comforts and conveniences to the passenger cannot be quantified. In general, the kind of service which the carriers have provided to the passengers during the first decade of jet aircraft has improved. In addition, longer range jet aircraft have opened new markets for non-stop flights, thus reducing total trip time even more.

Safety, a very important psychological factor in air travel, has also shown significant improvement, as measured by the number of fatalities per 100 million RPM's.

In summary, during the past two decades, people's incomes have increased at a fast rate, while fares have gone down substantially (especially in relation to other goods) making air travel more attractive. At the same time, the quality of service has improved, as shown by significant reductions in flying time, added passenger comforts and a significantly greater number of non-stop flights.

Air travel is dominated by Americans and Europeans. From the subsequent discussion of the major factors that influence air travel, this is understandable since the technologically developed areas of the world account for about 90% of world air traffic. These developed areas account for over 80% of the world's economic activity, as measured by the Gross Domestic Product, while accounting for only approximately 30% of the world's population. These areas are characterized by industrialization, high income levels, a high degree of literacy and urbanization. They include most of North America, the temperate part of South America, Europe (including the USSR), Japan, Australia and New Zealand.

The relationship between air travel and population and economic activity may be easily illustrated. The illustrations show that the rate of growth of the world economies provide the most important factor affecting the rate of growth of air travel. Economic activity of a country, measured by Gross National Product, correlates highly with that country's generated air traffic. On the other hand, a large population alone is not the basic requirement in achieving high airline travel. For example, India, the second largest country in terms of population, is substantially smaller on the basis of both GNP and air travel.

The United States, substantially smaller in population than India, is by far the largest in terms of both GNP and air travel generated. The GNP of the U.S. accounts for almost one-third of the total world's GNP. U.S. domestic air traffic plus U.S. citizens traveling outside of the U.S. account for about 55% of the world's air passenger miles.

Forecast of World Air Traffic 1970-1980

Scheduled world traffic is expected to increase 10.6% per year for the 1970 to 1980 period, from 237.4 billion passenger miles to 650 billion. In 1975 it is expected that 390.0 billion passenger miles will be flown, an average increase of 10.4% per year over the 1970 level. The second half of the decade is projected to grow at 10.8% per year.

Scheduled traffic by the world's airlines during 1970's is expected to continue at a fast pace under the impetus of a growing world economy and the introduction of wide-bodied jet aircraft. This rate will be lower than experienced in the 1960's, reflecting our assumption of the continued expansion of non-scheduled air services.

World Gross Domestic Product (GDP) is expected to reach almost $4 trillion (measured in 1964 U.S. dollars) in 1980 compared to the 1970 base figure of almost $2.5 trillion. Thus, we see that world wide economic growth during the 1970's will continue the pattern of the 1960's. The major change is a partial slowdown in Japan's phenomenal growth; despite this slowdown Japan's rate will still be twice the U.S. growth rate. Despite growth in other parts of the world U.S. will still be the dominant economic power, as shown in the pie chart comparison.

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As a result of the anticipated expansion of the Japanese economy, together with a low birth rate, Japan's GDP per capita in 1980 will be 40 percent greater than that of Western Europe. However, Japan's GDP per capita will exceed Europe's, equal Australia's but will still be less than 60 percent of the U.S. GDP per capita. Average world GDP will increase 3% annually from $680 in 1970 to $912 in 1980.

While service factors will continue to improve, these will be at a lower rate than during the 1960's. Passenger comfort will increase; speed will not increase significantly until supersonic aircraft are available for service. The improvement in technology will result in aircraft that are better airport neighbors. The wide-body jets will have quieter and cleaner engines, and the increased capacity will ameliorate airway and airport congestion.

Although aircraft productivity will continue to increase, it will not increase at the rate experienced with the initial introduction of jet aircraft. As indirect costs are expected to increase at a faster rate than direct, fares in current prices will not decrease as during the past decade. Fares, in constant prices, however, are expected to decline. The fatality rate during the past decade decreased to an extremely low level; however, continued emphasis will be placed on improvements in air traffic control procedures, airport landing aids and emergency facilities.

The biggest unknown is the future of non-scheduled traffic including inclusive tour packages. If the scheduled carriers elect to compete with non-scheduled services by reducing fares on scheduled services, our forecast will fall short of actual future scheduled traffic. If, on the other hand, the scheduled carriers elect to compete by substantially increasing their charter operations, our forecast of scheduled traffic will be too high as non-scheduled travel exceeds the forecast 15% growth rate.

Considering these factors, world airline scheduled traffic will continue to grow at a somewhat lower rate than the 13.4% experienced during the 1960's. There are many positive factors that will contribute to the continued growth of air travel throughout the 1970's. At present, a large portion of the adult population has never flown. The continued increase in worldwide real income per capita, more leisure time, and higher levels of worldwide education will spur air travel demand. Pleasure travel is expected to show the most rapid growth in the next decade. Increasing GNP and international trade also will provide a strong impetus to air travel among businessmen. In spite of improvements in communications, there will continue to be no substitute for personal meetings and face-to-face contact in the conduct of business. Highly competitive ground transportation is not expected in the 1970's except for Japan.

The technologically underdeveloped areas of the world (Africa, Asia (except Japan), Central America and the non-temperate areas of South America) will increase their share of the world's population during the

next decade. Even though economic productivity in the underdeveloped areas will be growing at a faster rate than in the developed areas, increases on a per capita basis will be smaller. The bulk of the world's economic activity, and hence air traffic, will continue to be accounted for by North America and Europe, even though air traffic growth rates in the less developed areas will be greater. For this reason, only U.S. domestic, transatlantic and Intra-European traffic will be discussed in detail.

U.S. Domestic Traffic

U.S. domestic traffic during the 1960's increased 12.3% with continental traffic growing at about 12% and mainland to Alaska and Hawaii growing at about 15.5%. This average hides tremendous variations in growth during the past two decades. The past 20 years of domestic traffic, may be broken up into four distinct periods, each with its unique annual average growth rate:

1950-1957	17.8%
1957-1961	5.2%
1961-1968	16.0%
1968-1971	4.9%

1950-1957

The period between 1950 and 1957 was one of uninterrupted growth in passenger traffic. Although there was an actual decline in economic activity in 1954, the airlines were unaffected. During this period, fares in constant dollars (deflated by the Consumer Price Index) fell 17 percent; simultaneously, service improved as represented by a 38 percent increase in average air speed. Direct operating costs per available seat mile declined, and the trunk carriers actually averaged a rate of return equal to or greater than the 10.5 percent standard set by the CAB.

1957-1961

The rate of economic growth slowed down during the 1956-1957 period, and in 1958 GNP actually fell. The result was that, for the first time since 1948, air traffic (in 1958) showed no growth. In addition to the slowdown in the nation's economy, air fares began to increase. Between 1957 and 1961 the airlines increased air fares 11 percent in order to offset rising costs. Costs had increased, despite improved productivity of aircraft, due to the greater capacity required to serve the many new routes awarded CAB. Load factors fell as the airlines continued to increase seat miles, even though traffic growth slowed down. During this period, operating costs were fairly constant; but, due to the decline in the rate of traffic increase, the return on investment dropped sharply, reaching a low point in 1961 with barely more than a 1 percent return, despite a continuing increase in yields.

1961-1968

With the strong upturn in the nation's economy from 1961 onward, traffic grew rapidly, achieving about the same levels of growth as in the early and mid-1950's. As jets became the dominant aircraft, operating efficiencies increased, better service was offered, and direct operating costs per seat mile dropped 16 percent between 1962 and 1968. Air yield, which reached a peak in 1962, started to drop rapidly; the passenger tax was reduced from 10 percent to 5 percent in 1962. As a result, real fares dropped 28 percent. The rate of inflation was less than 2 percent per year during this period of rapid growth. The rate of return started climbing, reaching 10 percent by 1964 and exceeding it in 1965 and 1966.

As airlines achieved high ROI's, the CAB increased competition by putting three carriers on most major routes. Between the increased productivity of the jets and increasing competitive scheduling resulting from the new route awards, available seat miles doubled in the four years between 1964 and 1968. To fill up the seats, the CAB exerted pressure on the airlines to reduce fares, especially through special discount and promotional fares. These fare discounts were probably greater than they should have been; for, while direct operating costs per seat mile were falling, indirect costs began to increase as airlines improved ground facilities and offered better inflight service (movies, improved meals, etc.), and costs associated with congestion began to appear. Airline profits and ROI started falling - the latter falling to 5.5 percent by 1968, even though traffic was growing rapidly.

1968-1971

The slowdown in domestic air traffic from which we have just emerged began during the last half of 1969, even though the year ended up 9.2 percent ahead of 1968. New and often excessive route awards (e.g., nine carriers serving the U.S. mainland to Hawaii) continued into 1969. Seat miles increased 16 percent compared to the 10 percent growth in passenger miles. Economic activity slowed markedly in 1969, and GNP showed only a 2.8 percent increase for the year as a whole. GNP, during the 4th Quarter of 1969, actually fell below the prior quarter for the first time since the 1961-1962 recession. Consumer price increases continued to accelerate during the late 1960's, reaching over 5 percent in 1969. Real passenger fares, ending their six-year declining trend, remained constant as fare increases granted by the CAB roughly equalled the rate of inflation. Nonetheless, airline profits decreased 5 percent and the ROI slipped under 5 percent.

Early in 1970 it had been anticipated that there would be a moderate economic recovery during the second half of the year. In actuality, there was no recovery during 1970; GNP actually declined. Inflation continued unabated; airline costs continued to escalate; real fares increased slightly, and the passenger tax was increased from 5 to 8 percent to pay for airport and airways improvements. Airline profits turned into losses.

Domestic traffic remained virtually static during 1970 and 1971. Trunk carrier traffic actually declined in 1970. The industry was also plagued by strikes of airline personnel as well as air traffic controllers, which

cost the industry about 1 billion revenue passenger miles. In fact, traffic got worse during the second half of 1970, paralleling the pattern of economic activity.

Ironically, the 1970-1971 period resembles the 1958-1961 period when the first generation jets were introduced into service. A slowdown in the economy reduced traffic. Capacity increased, not only due to great competition from new route awards but also due to increased aircraft productivity as B747's were introduced into service. One major difference is the current high level of inflation, a rate of over 5%. Airline costs increased at an even greater rate. Due to reduced traffic growth, the CAB was slow to award further fare increases. The airlines, thus, were squeezed between falling revenues and soaring costs, resulting in their present poor financial condition.

Forecast 1972-1980

The economy finally turned around during the latter half of 1971. Air traffic during the first half of 1971 fell below 1970. Despite the 6% fare increase granted in May 1971, summer traffic was about the same and traffic finally began increasing during the last quarter. The domestic traffic recovery has continued into 1972. The first half is up about 12%, and this rate is expected to continue the rest of the year.

As may be seen from the foregoing analysis, the two most important variables influencing air traffic are the condition of the nation's economy (as measured by GNP) and the price for air service – passenger yield – measured in average revenue (including tax) per passenger mile.

These two independent factors are relatively simple to project on a long-term basis – GNP reflects the general trend of the economy and passenger yields reflect the long-term cost of providing the service.

However, projecting short-term values for these factors is extremely difficult, as to a great extent they reflect Government policy. It is next to impossible to predict the exact timing of various governmental actions.

Nevertheless, our view is that the economy will continue improving through 1973 and 1974. Passenger yields will increase to keep up with inflation, which is expected to continue through the end of 1973. Air traffic will continue a strong upward trend through 1973 and 1974. In the last half of the decade it is expected that traffic will increase at about 9.5% per year.

Our current forecast was prepared using regression analyses. Many independent variables were considered, including: GNP (in both current and constant dollars), disposable personal income (both current and constant dollars), population, unemployment trends, current and constant dollar yields, corporate profits, savings rates, stock prices, retail sales and a quality service index. The variables yielding the best fit of the past were current dollar disposable personal income, constant dollar yields, corporate profits and unemployment.

Our forecast through 1980 is based on a 6.9% annual increase in disposable income, a 7.8% annual increase in corporate profits, a steadily decreasing unemployment rate (e.g., 5% in 1974, 3.8% by 1980) and a yield that remains the same in constant dollars.

Beyond the analysis of past history, there are positive factors which may be expected to contribute to the continued growth of air travel in the decade of the 1970's. Paramount among these is the real need for such service. Gross National Product will increase by over 50 percent in the next ten years. The volume of business resulting from such an increase will provide a strong impetus for air travel among businessmen. In spite of improvements in communications, there will continue to be no substitute for personal meetings and face-to-face contact in the conduct of business. The continued increase in acceptance of air travel by the U.S. population will be accelerated by larger numbers of young people who have been exposed to air travel, either through military service or by youth discount. While about 50 percent of the U.S. population has flown commercially today, this percentage will continue to increase over the next few years.

The influence of increased GNP will be more pronounced when viewed from a per capita basis. With population growing at about 1 percent per year, and GNP in real terms anticipated at 4 percent, one can visualize the increase in disposable income which will result. This increased income, coupled with the push for more leisure time, will spur air travel demand. It is in the area of increased pleasure travel that the most rapid growth in air travel demand will result.

Transatlantic Traffic

Transatlantic scheduled air traffic from the U.S. and Canada to Europe has been one of the fastest growing travel markets in the world. During the 1950's it grew at an average annual rate of over 19%, virtually knocking out sea travel. During the 1960's under the impetus of expanded jet service which not only decreased travel time but lowered fares 36% in constant prices, transatlantic air traffic increased at an average rate of almost 16%.

During the latter part of the 1960's, charter traffic by both scheduled and supplemental carriers grew rapidly. During the 1960's charter traffic averaged 30% annual growth, reaching 26% of the total transatlantic market. The combined scheduled and charter market grew at an annual rate of 18% almost as high as the 19% experienced by scheduled traffic in the 1950's, when the market was first developing.

Our transatlantic scheduled traffic forecast for 1980 of little over a 10% annual growth rate reflects a continuing switch to charter travel. Charter traffic, on the other hand, is expected to grow at an annual rate of almost 17% with the expectation that charter will account for almost 39% of total transatlantic air travel by 1980.

The forecast is based on current types of scheduled and charter services. Continued relaxing of restrictive charter policies would result in an

even faster charter growth rate and in a lower growth rate for scheduled traffic. The new combined scheduled/charter traffic would be higher than the present 12% forecast.

This forecast of scheduled traffic is based on a separate analysis of U.S. and European originating traffic. U.S. originating traffic was found to be related to U.S. consumer expenditures (in constant dollars), total trip cost (including hotels, meals, tours and transportation) and charter traffic. European originating traffic was found to be related to an index of Western Europe GNP (OECD countries) in constant Western European currencies, a weighted index of trip costs in constant currencies and charter passengers.

Our analysis indicates that European originating traffic will grow at a substantially higher rate than U.S. originating traffic. Thus, European originating traffic which represented 36% of the total in 1970 will climb to 45% by 1980. This should go a long way in moderating the directional imbalance that has plagued this market for many years.

Intra-Europe Traffic

Traffic within Europe is the third largest world market. The geographic definition of Europe is that used by the European Air Research Bureau; thus, it includes the entire Mediterranean Basin (i.e., Africa north of the Sahara and the Middle East countries). European traffic to the USSR is included, but the USSR itself is excluded. Also, it includes both domestic as well as international passengers.

Some 28 billion passenger miles were accommodated during 1970, or almost 12% of ICAO total scheduled passenger miles. During the 1950's, this traffic grew at almost 16% per year. During the 1960's, this traffic grew at only 12.5% per year. This drop reflects competition from low-fare inclusive tour charters (IT Charter) that developed rapidly in the United Kingdom, West Germany and in the Scandinavian countries. This traffic is holiday travel destined to the Mediterranean area, primarily to Spain.

European IT charter traffic grew from virtually nothing in 1960 to almost 12 billion passenger miles in 1970, or almost 35% per year; it now represents about 47% of intra-Europe international traffic by Western European carriers. While charter service has generated new traffic, it has also diverted some scheduled traffic in certain markets. Our estimate is that two-thirds of IT traffic was generated and about one-third was diverted from scheduled service.

Charter traffic is forecast to grow at 15.5% during the decade of the 1970's, compared to a 10.5% growth rate for scheduled traffic. On this basis, charter traffic will exceed scheduled traffic in the near future.

It is interesting to speculate what the impact of this kind of service on U.S. domestic traffic would be if it were encouraged within the U.S.

Other Areas

Traffic in the three areas — U.S. domestic, intra-Europe and transatlantic — represents about two-thirds of the world's scheduled traffic and most of the world's charter traffic.

Other important area markets are the U.S. to the Caribbean, transpacific, Europe to the Far East, and within Asia (Japan domestic and intra-Orient) and Australia. It would be too time consuming to go over these in detail at this time. If there are any questions relating to traffic in these areas, I will be glad to answer them.

ONE LAST THOUGHT

Let me sum up briefly, giving a few highlights.

If the future were a simple extension of the past, it would be very easy to forecast; if the future were completely different from the past, it would be impossible to forecast. Fortunately, the future includes both elements; thus, we do have the potential of peering into the future.

I believe that, in spite of all the hazards involved in forecasting and all the negatives that I have given in certain areas of my talk, we can still know the future in broad terms. However, the future can also be made to our liking. I believe we can, by conscious policies, translate goals into actuality. We need broad forecasts of the future to give us the framework to give us the reference of events that are likely to happen. However, what will really happen depends on what we do. We are makers of our own destinies. I really believe that, and I think that is what planning and forecasting are all about. This is to say, you must decide beforehand what you want to do and why you want to do it; then use your analysis in order to determine the impact of what you do.

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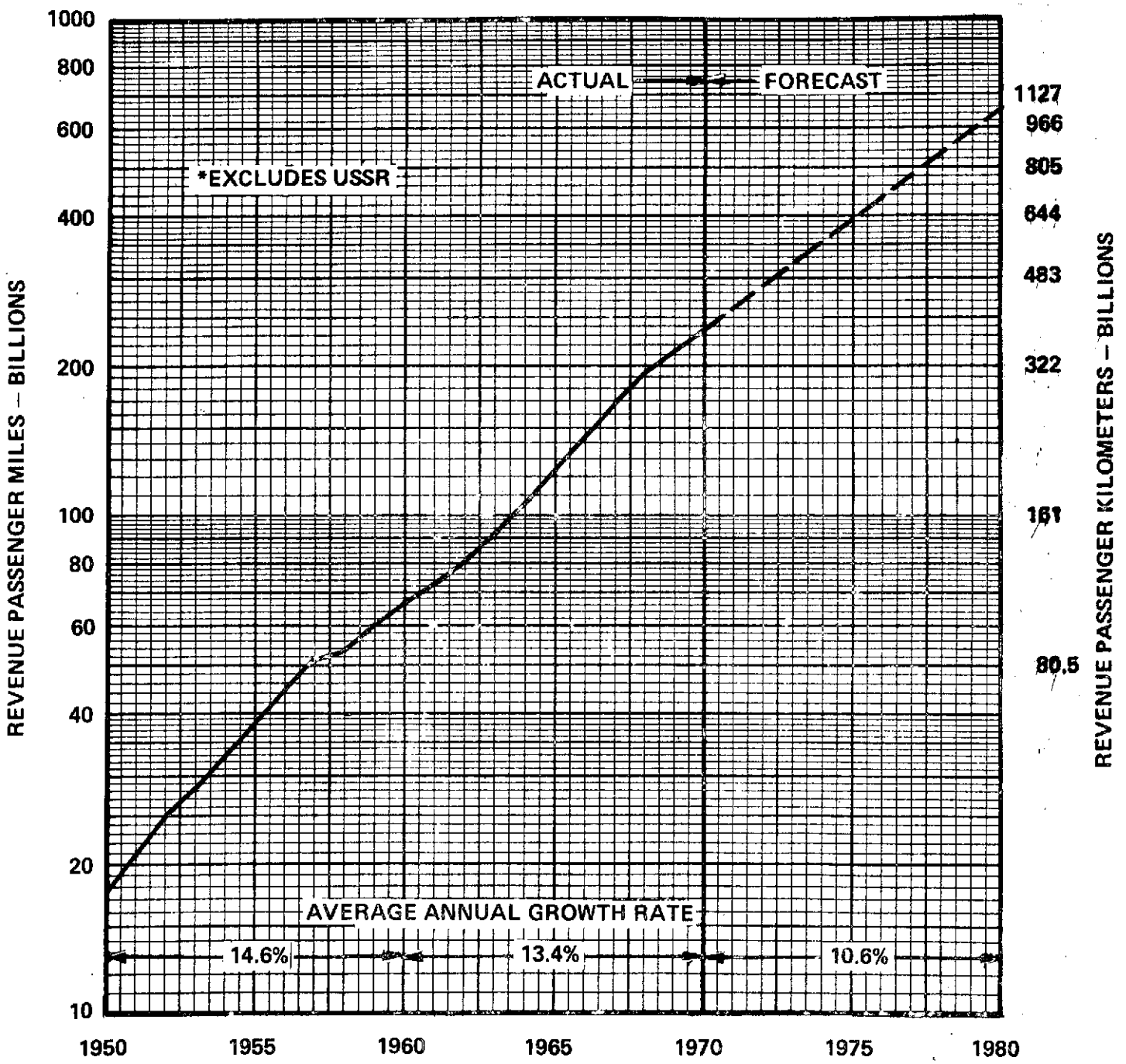
ICAO* WORLD SCHEDULED AIR TRAFFIC
1950–1980



WORLD NON-SCHEDULED AIR PASSENGER TRAVEL

1960-1980

(Billions of Passenger Miles)

	1960	1965	1970	1975	1980	AVERAGE ANNUAL GROWTH RATE (%) 1960-1970	1970-1980
EUROPEAN IT	0.6	3.2	11.9	27.0	50.0	34.8	15.5
TRANSATLANTIC	0.8	2.8	10.5	25.0	50.0	29.5	16.9
OTHER	NA	NA	27.6	53.0	100.0	–	13.7
TOTAL NON-SCHEDULED	NA	NA	50.0	105.0	200.0	–	14.9
ICAO*			237.4	395.0	650.0	13.4	10.6
NON-SCHEDULED AS A % OF ICAO SCHEDULED			21.1%	26.6%	30.8%		

* EXCLUDES USSR

ICAO WORLD* AIR PASSENGER TRAVEL DISTRIBUTED AMOUNG MAJOR TRAFFIC FLOWS

Billions of Passenger Miles in Scheduled Service

AIR TRAFFIC FLOWS [1]	ACTUAL 1960	ACTUAL 1970	FORECAST [2] 1980	AVERAGE ANNUAL GROWTH ACTUAL 1960-1970	AVERAGE ANNUAL GROWTH FORECAST 1970-1980
U.S. DOMESTIC	32.6	104.2	255.0	12.3	9.4
OTHER NORTH AMERICA DOMESTIC	2.1	6.0	15.5	13.4	10.0
U.S./CANADA-LATIN AMERICA/CARIBBEAN	4.2	15.9	42.0	14.2	10.2
NORTH AMERICA – EUROPE	6.9	30.0	80.0	15.8	10.3
NORTH AMERICA – ASIA/OCEANIA	1.8	10.0	41.0	18.7	15.2
INTRA EUROPE	8.7	28.3	79.0	12.5	10.8
EUROPE – SOUTH AMERICA	0.8	3.4	9.5	15.7	10.9
EUROPE – AFRICA	1.2	4.0	8.6	12.8	8.2
EUROPE – ASIA/OCEANIA	2.8	10.6	32.8	14.2	11.9
AFRICA	1.2	2.4	6.8	7.2	11.0
ASIA	2.3	12.5	51.0	17.9	15.1
OCEANIA	1.8	4.5	13.7	9.6	11.8
SOUTH AMERICA	2.1	4.8	11.6	8.1	9.2
OTHER	0.2	0.9	3.5	16.3	14.6
TOTAL – ABOVE	68.7	237.5	650.0	–	10.6
TOTAL – REPORTED BY ICAO	67.8	237.4	–	13.4	–

* EXCLUDES THE USSR

1/ SEE PREVIOUS PAGE FOR DEFINITION.

2/ SEE APPENDIX FOR DETAILED FORECASTS FOR EACH MAJOR FLOW.

COMPARISON OF ALTERNATIVE TECHNIQUES

	TREND ANALYSIS	REGRESSION ANALYSIS	MARKET ANALYSIS	SIMULATION ANALYSIS
DATA NEEDS	• HISTORY OF ITEM TO BE FORECAST	• 7-10 YEARS HISTORICAL DATA INDEPENDENT & DEPENDENT VARIABLES • FORECAST OF INDEPENDENT VARIABLES	• DETAILED SOCIO ECONOMIC DATA OF POPULATION & TRAVELERS • DETAILED TRAVEL DATA FOR EACH POPULATION SUB-GROUP	• PRECISE DATA REQUIREMENTS FOR SPECIFIC TIME PERIODS
ADVANTAGES	• FAST • LITTLE EFFORT	• RELATIVELY SIMPLE MATH CONCEPTS • QUICK • SENSITIVITY ANALYSIS	• ANALYSIS OF WHO DOES AND DOES NOT TRAVEL • MARKETING STRATEGY	• "WHAT IF" ANALYSES • ONCE COMPUTERIZED FAIRLY RAPID RESULTS
DISADVANTAGES	• NOT ANALYTICAL • SUBJECTIVE	• CAUSE & EFFECT UNCERTAIN • YEARS CHOSEN AFFECTS ANALYSIS	• TIME CONSUMING • DIFFICULT TO FORECAST FUTURE POPULATION CHARACTERISTIC IN DETAIL	• TIME CONSUMING TO DEVELOP MODEL • ANALYTICALLY DIFFICULT • ADVANCED MATHEMATICS
COMPUTERIZATION	• SIMPLE PROGRAMS	• MORE COMPLEX BUT READILY AVAILABLE	• DIFFICULT • HAS NOT BEEN DONE	• EXTERMELY COMPLEX

GROSS DOMESTIC PRODUCT

(BILLIONS OF 1964 U.S. DOLLARS)

YEAR	U.S.	CANADA	WESTERN EUROPE	JAPAN	AUSTRALIA	TOTAL WORLD
1950	389.4	24.8	242.9	22.0	12.3	949.4
1960	537.2	36.4	389.9	50.5	17.8	1,535.5
1970	796.0	66.3	598.6	140.0	27.3	2,466.3
			AVERAGE ANNUAL GROWTH RATE (%)			
1950/1960	3.3	3.9	4.8	8.7	3.8	4.9
1960/1970	4.0	6.2	4.4	10.7	4.4	4.9

L-1011 TriStar

GROSS DOMESTIC PRODUCT PER CAPITA

(1964 U.S. DOLLARS)

YEAR	U.S.	CANADA	WESTERN EUROPE	JAPAN	AUSTRALIA	TOTAL WORLD
1950	2,557	1,810	792	265	1,500	375
1960	2,973	2,034	1,164	542	1,728	513
1970	3,879	3,098	1,624	1,353	2,184	680
			AVERAGE ANNUAL GROWTH RATE (%)			
1950/1960	1.5	1.2	3.9	7.4	1.4	3.2
1960/1970	2.7	4.3	3.4	9.6	2.4	2.9

AVERAGE FARE LEVELS

(U.S. CENTS PER PASSENGER MILE)

	ICAO CARRIERS 1/		IN CURRENT U.S. DOLLARS			
YEAR	CURRENT $	CONSTANT $ 2/	U.S. DOMESTIC	TRANS. ATLANTIC	TRANS-PACIFIC	INTRA-EUROPE
1960	6.34	6.34	6.06	7.08	7.47	7.96
1965	5.99	5.62	6.03	5.43	6.31	8.19
1970	5.75	4.39	6.00	4.53	5.40	8.42
1960 TO 1970 CHANGE	-9%	-31%	-1%	-36%	-28%	+6%

1/ EXCLUDES THE USSR

2/ IN 1960 U.S. DOLLARS

ICAO CARRIERS*AIRLINE SERVICE FACTORS AND FARES

YEAR	SIZE SEATS PER AIRCRAFT	SPEED MILES PER HOUR	SAFETY FATALITIES PER 100 MILLION RPM'S	AVERAGE FARES REVENUE (¢) PER PASSENGER MILE CURRENT	CONSTANT**
1960	59	225	1.25	6.34¢	6.15¢
1965	86	291	.56	5.99¢	5.45¢
1970	101	357	.40	5.75¢	4.26¢
PERCENT CHANGE 1960-1970	71%	59%	-68%	-9%	-31%

*EXCLUDES U.S.S.R.

**1958 U.S. DOLLARS

Figure 4

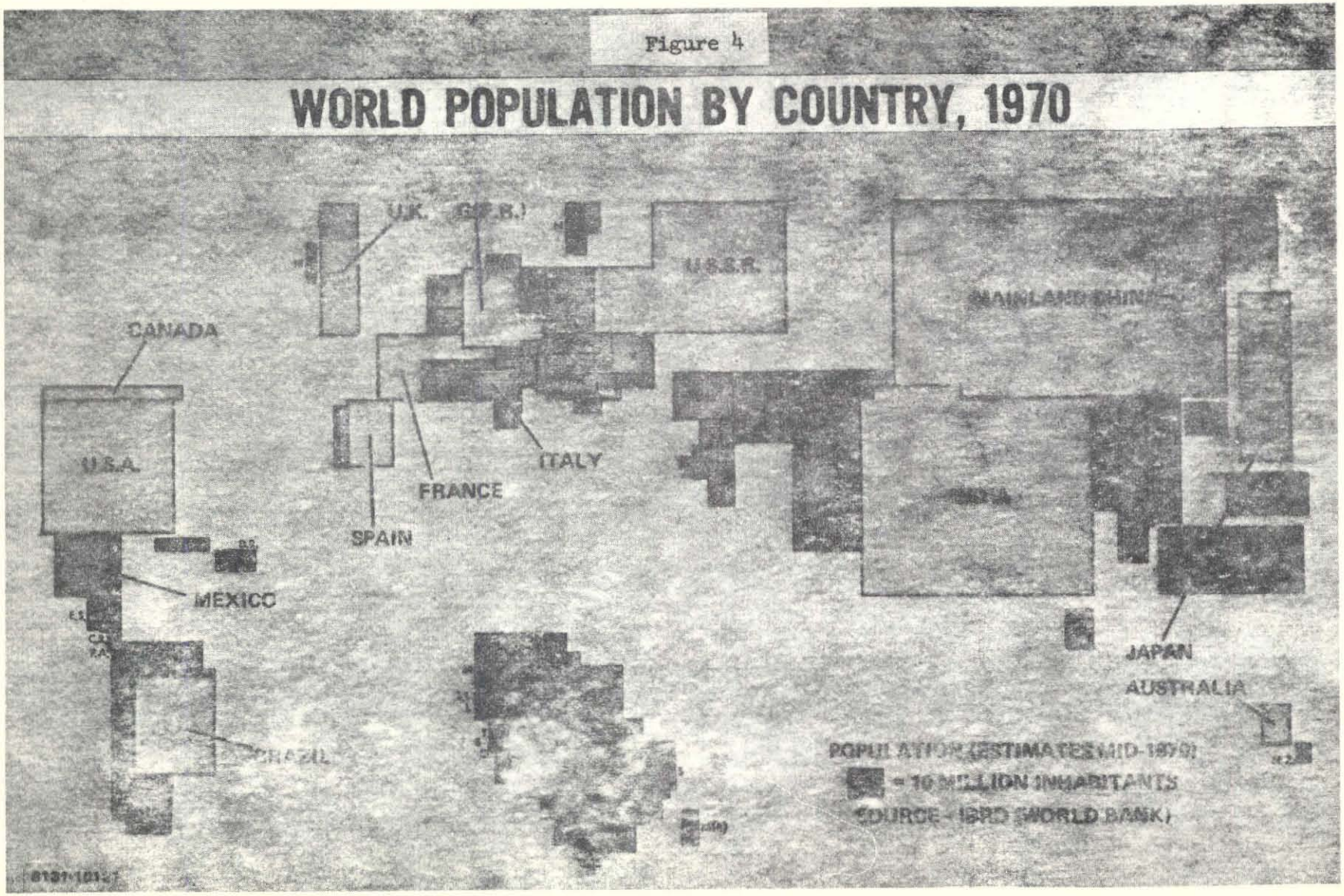

WORLD POPULATION BY COUNTRY, 1970
U.K. (G.B.)
U.S.S.R.
CANADA
U.S.A.
FRANCE
ITALY
SPAIN
MEXICO
JAPAN
AUSTRALIA
POPULATION ESTIMATES MID-1970
= 10 MILLION INHABITANTS
SOURCE - IBRD (WORLD BANK)

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Figure 5

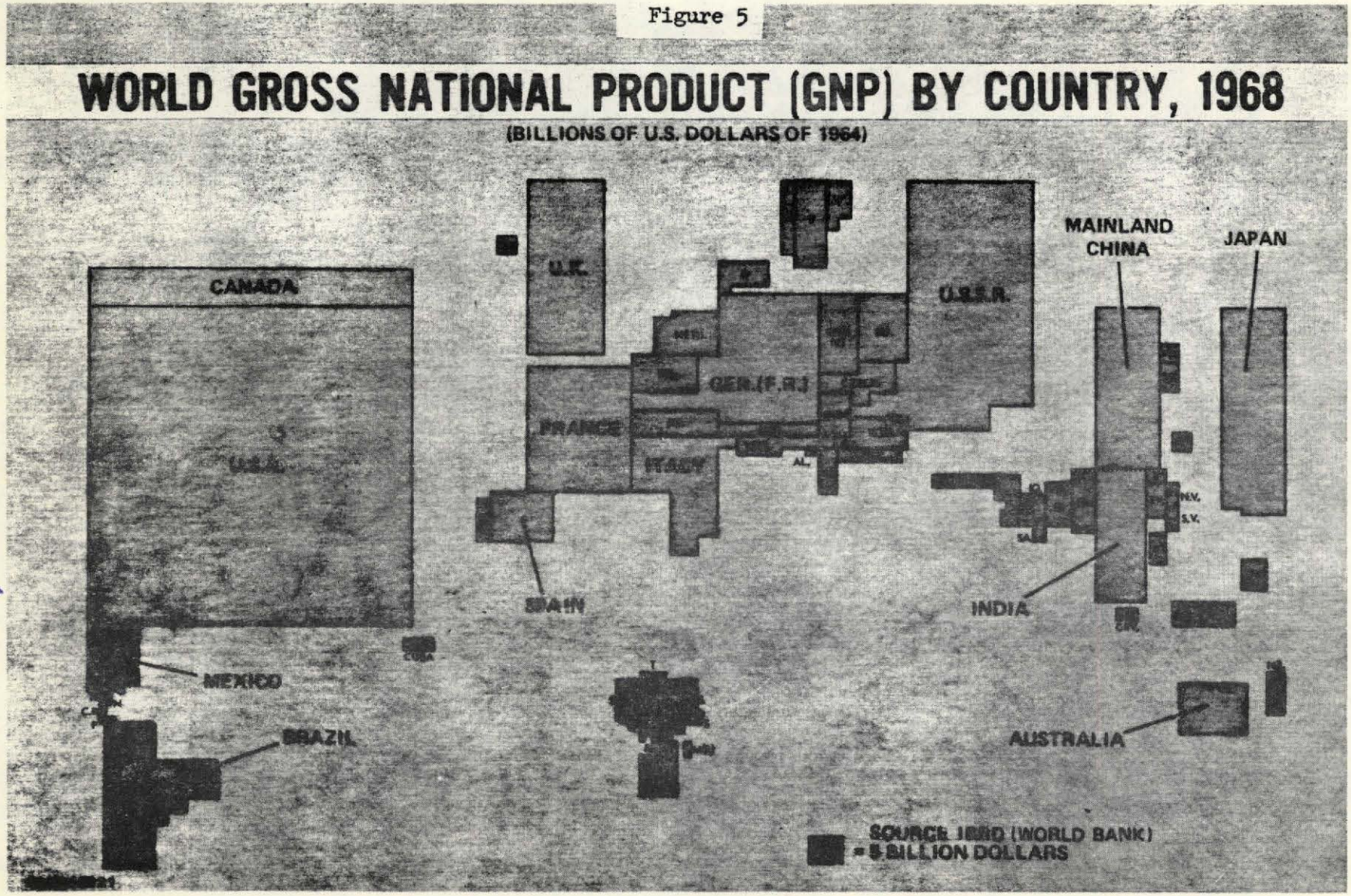
WORLD GROSS NATIONAL PRODUCT (GNP) BY COUNTRY, 1968
(BILLIONS OF U.S. DOLLARS OF 1964)
CANADA
U.S.A.
U.K.
U.S.S.R.
MAINLAND CHINA
JAPAN
FRANCE
GER.(F.R.)
ITALY
SPAIN
INDIA
MEXICO
BRAZIL
AUSTRALIA
SOURCE IBRD (WORLD BANK)
= 5 BILLION DOLLARS

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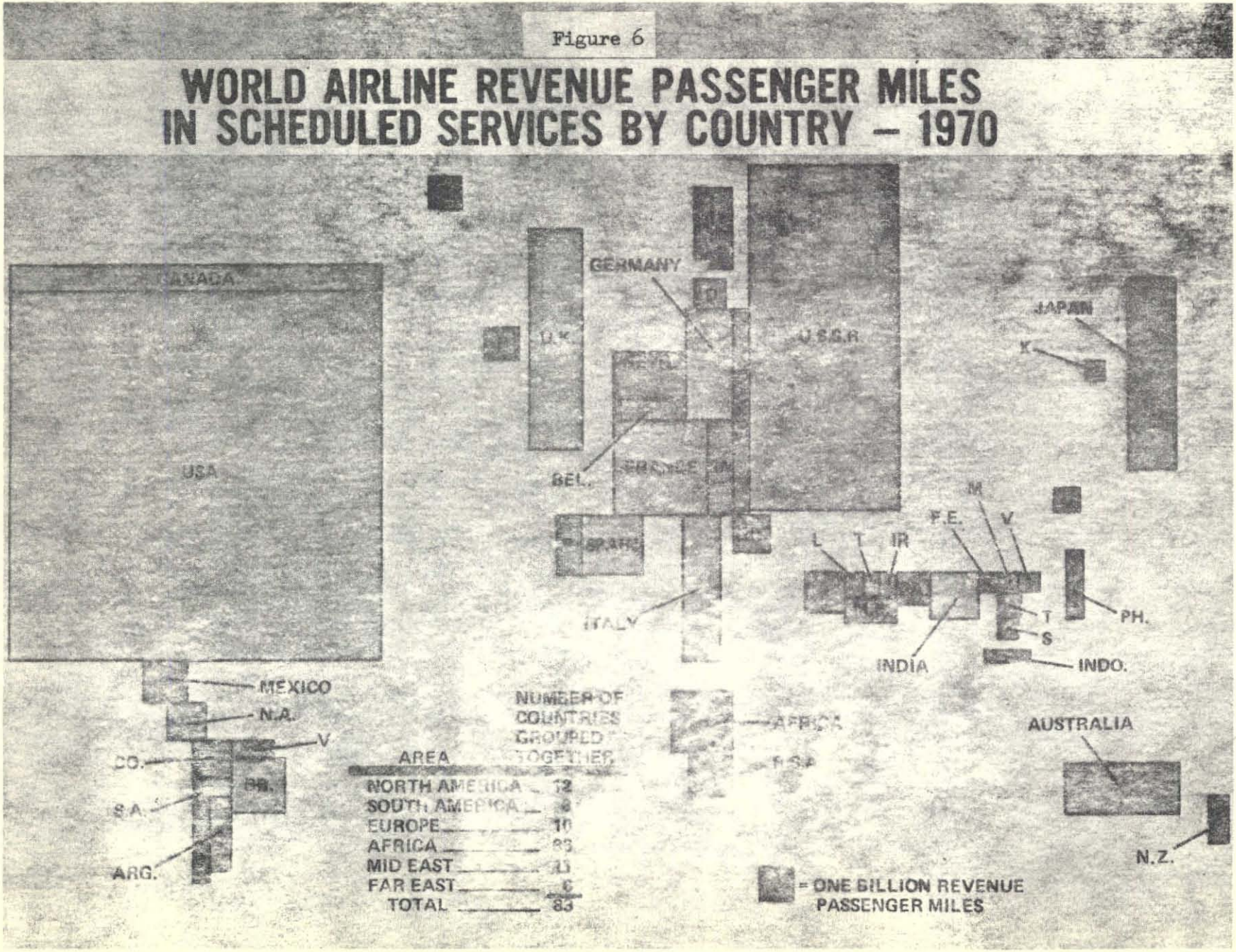
Figure 6

WORLD AIRLINE REVENUE PASSENGER MILES IN SCHEDULED SERVICES BY COUNTRY – 1970



609

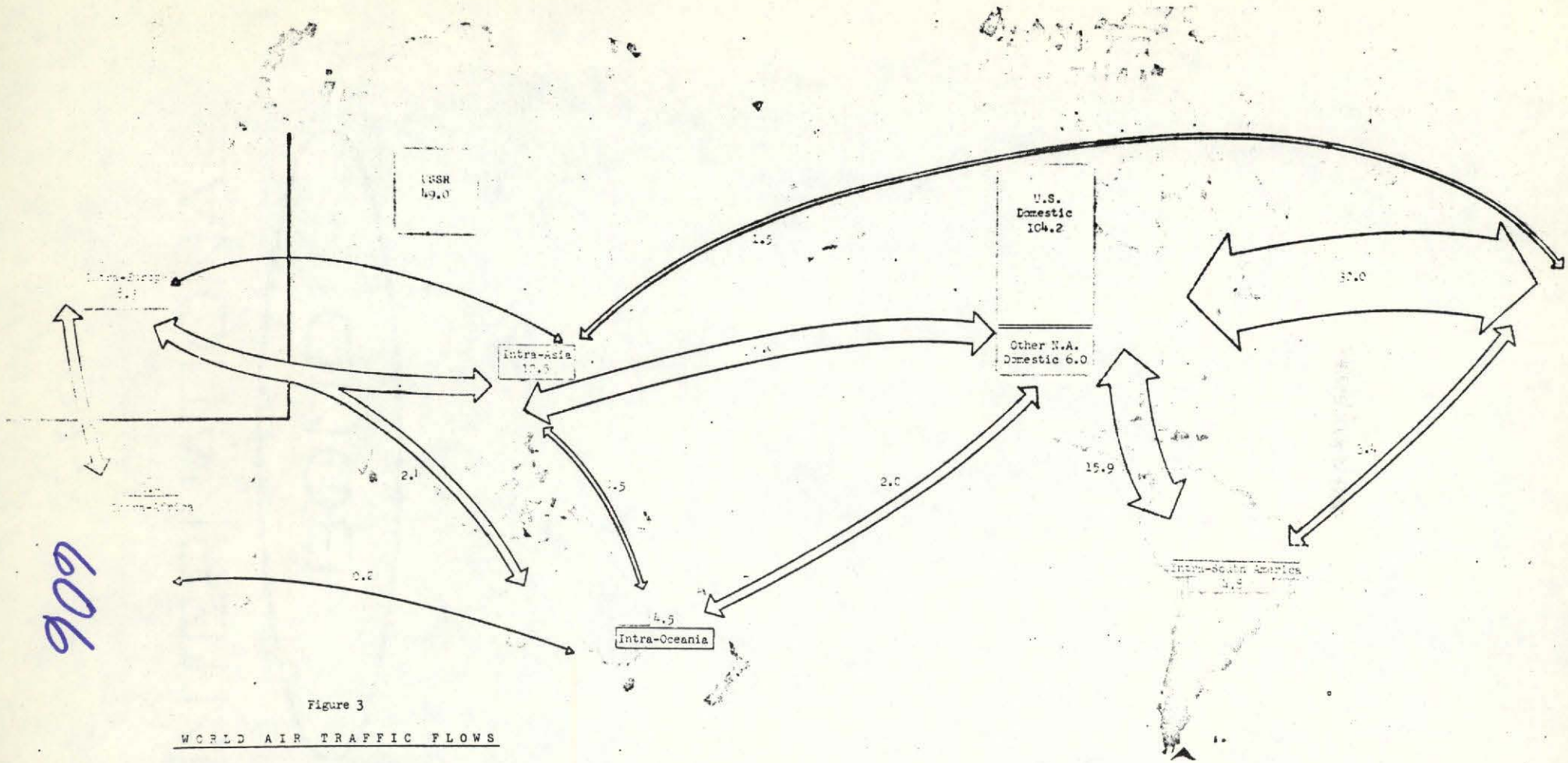


Figure 3

WORLD AIR TRAFFIC FLOWS

BILLIONS OF PASSENGER MILES
IN SCHEDULED SERVICES

1970

GROSS DOMESTIC PRODUCT

(BILLIONS OF 1964 U.S. DOLLARS)

YEAR	U.S.	CANADA	WESTERN EUROPE	JAPAN	AUSTRALIA	TOTAL WORLD
1970	796.0	66.3	598.6	140.0	27.3	2,466.3
1975	963.8	85.5	734.0	210.0	34.0	3,124.5
1980	1,178.0	111.8	904.0	300.0	41.0	3,946.4
			AVERAGE ANNUAL GROWTH RATES (%)			
1960/1970	4.0	6.2	4.4	10.7	4.4	4.9
1970/1980	4.0	5.4	4.2	7.9	4.2	4.8

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GROSS DOMESTIC PRODUCT PER CAPITA

(U.S. 1964 $)

YEAR	U.S.	CANADA	WESTERN EUROPE	JAPAN	AUSTRALIA	TOTAL WORLD
1970	3,879	3,098	1,624	1,353	2,184	680
1975	4,429	3,638	1,921	1,974	2,482	793
1980	5,069	4,235	2,280	2,727	2,770	912
			AVERAGE ANNUAL GROWTH RATES (%)			
1960/1970	2.7	4.3	3.4	9.6	2.4	2.9
1970/1980	2.7	3.2	3.5	7.3	2.4	3.0

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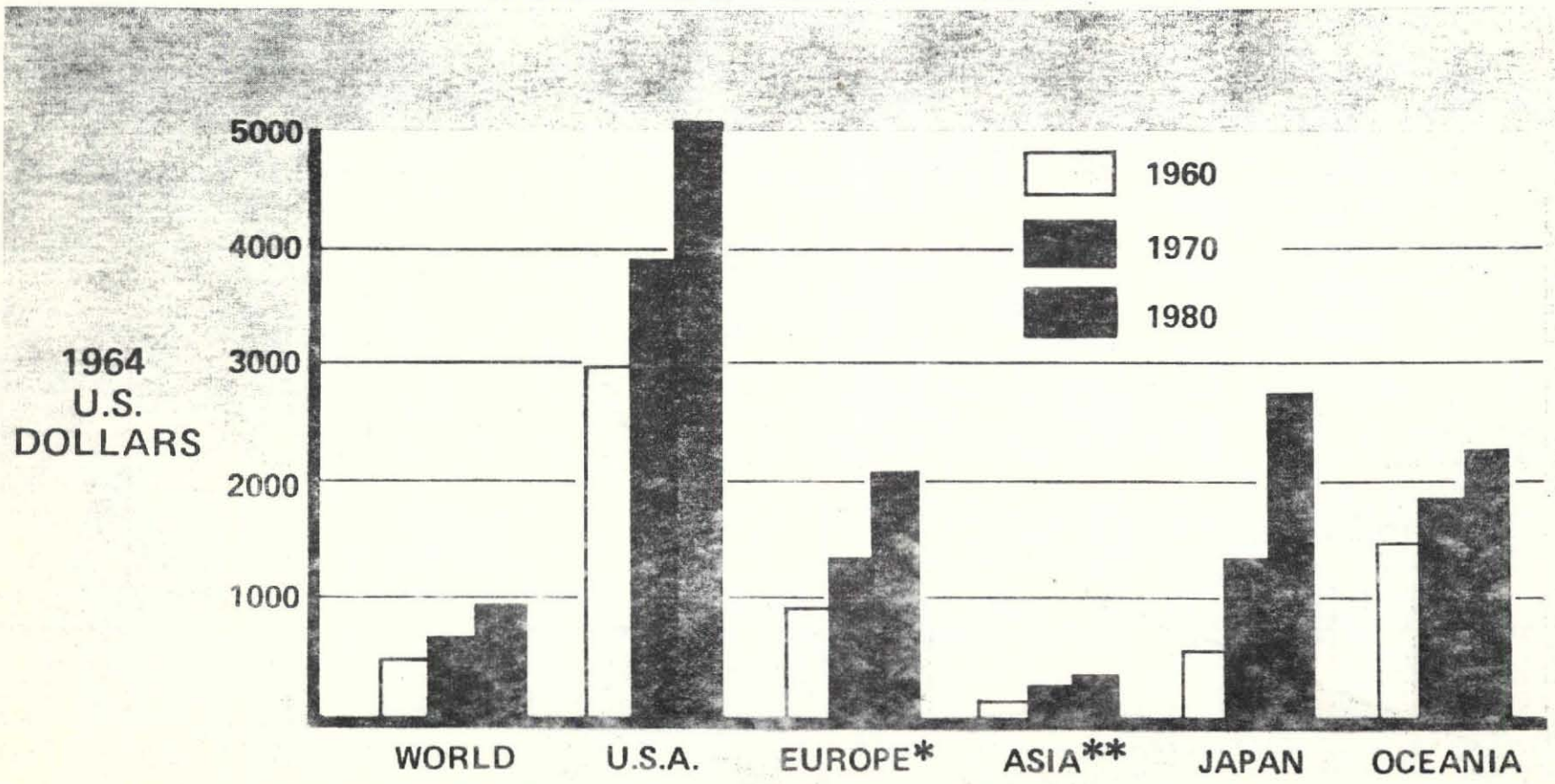
PER CAPITA GROSS DOMESTIC PRODUCT

WORLD AND MAJOR AREAS



* INCLUDES EASTERN EUROPE AND USSR

** EXCLUDES MAINLAND CHINA, NORTH KOREA AND NORTH VIETNAM

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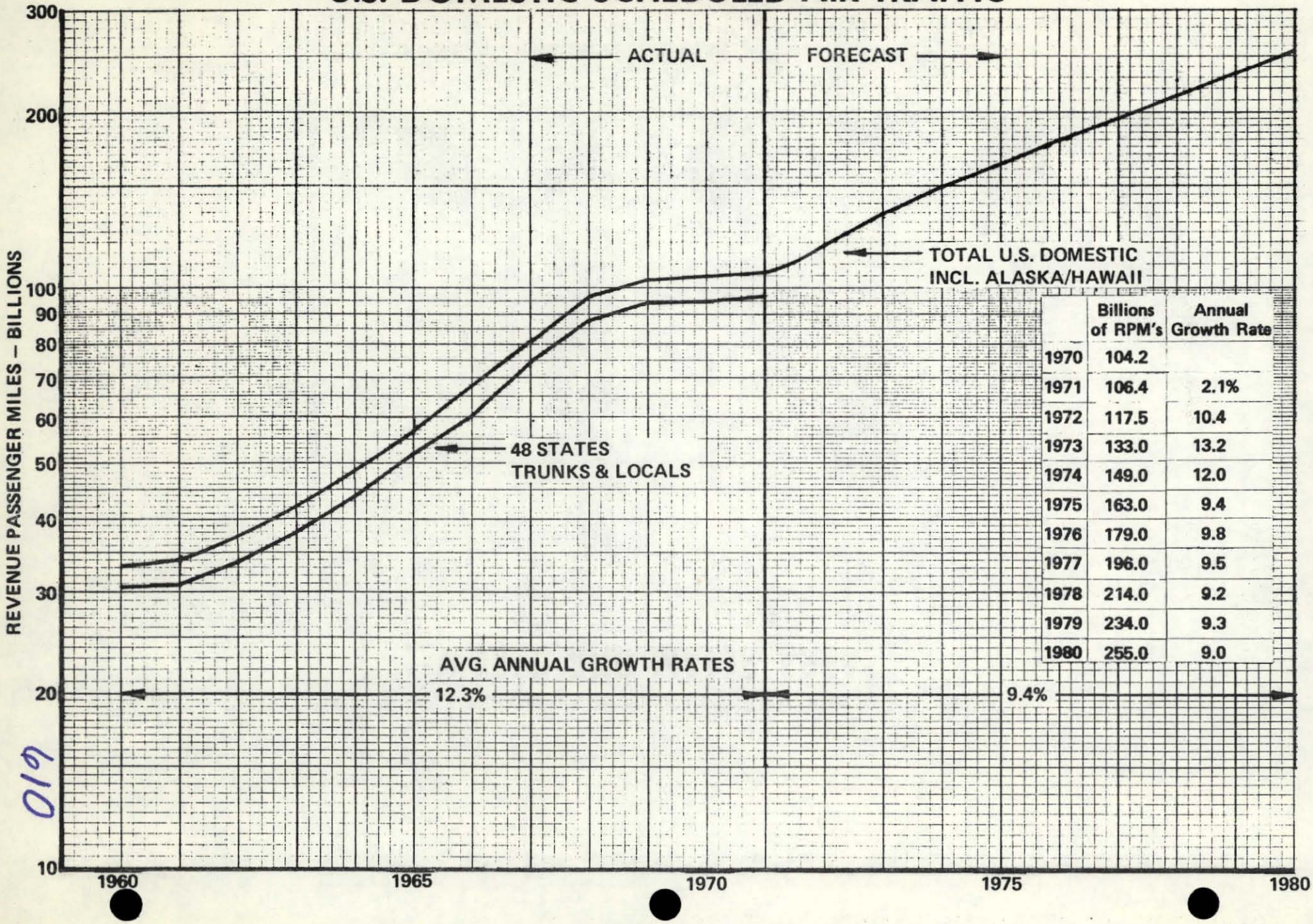
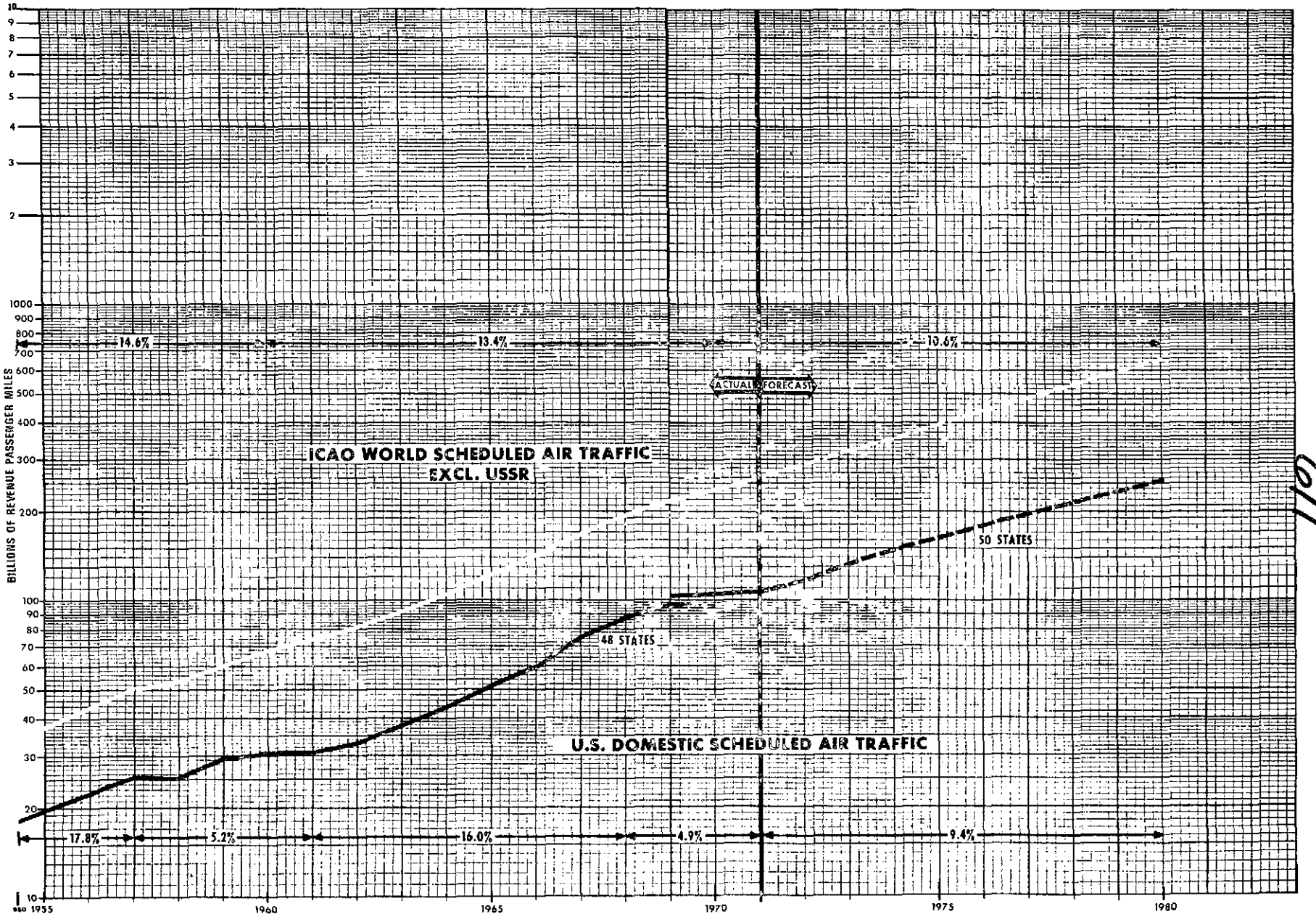
U.S. DOMESTIC SCHEDULED AIR TRAFFIC



	Billions of RPM's	Annual Growth Rate
1970	104.2	
1971	106.4	2.1%
1972	117.5	10.4
1973	133.0	13.2
1974	149.0	12.0
1975	163.0	9.4
1976	179.0	9.8
1977	196.0	9.5
1978	214.0	9.2
1979	234.0	9.3
1980	255.0	9.0

019


BILLIONS OF REVENUE PASSENGER MILES
ICAO WORLD SCHEDULED AIR TRAFFIC
EXCL. USSR
U.S. DOMESTIC SCHEDULED AIR TRAFFIC
50 STATES
48 STATES
ACTUAL
FORECAST
14.6%
13.4%
10.6%
17.8%
5.2%
16.0%
4.9%
9.4%
1955
1960
1965
1970
1975
1980

NORTH AMERICA-EUROPE

SCHEDULED AND CHARTER PASSENGER MILES
(BILLIONS)

YEAR	SCHEDULED	CHARTER	TOTAL	PERCENT CHARTER
		ACTUAL		
1960	6.9	.8	7.7	10 .4
1965		2.8		
1970	30.0	10.5	40.5	25.9
		FORECAST		
1975	49.5	25.0	74.5	33.6
1980	80.0	50.0	130.0	38.5
		AVERAGE ANNUAL GROWTH RATE		
1960/1970	15.8	29.5%		18.1%
1970/1980	10.3	16.9%		12.4%

1/ CHARTER TRAFFIC OR IATA AND U.S. PLUS EUROPEAN CHARTER AIRLINES.

INTRA-EUROPE TRAFFIC

SCHEDULED AND I.T. CHARTER
(BILLIONS)

YEAR	SCHEDULED 1/	CHARTER 2/	TOTAL	PERCENT CHARTER
		ACTUAL		
1960	4.4	.6	5.0	12%
1965	7.7	3.2	10.9	29%
1970	13.6	11.9	25.5	47%
		FORECAST		
1975	23	27	50	54%
1980	37	50	87	57%
		AVERAGE ANNUAL GROWTH RATE		
1960/1970	11.9%	34.8%	17.7	
1970/1980	10.5%	15.5%	13.1	

6/3

1/ SCHEDULED INTRA-CONTINENT INTERNATIONAL TRAFFIC OF THE WESTERN EUROPE SCHEDULED CARRIERS.

2/ INCLUSIVE-TOUR INTRA-CONTINENT INTERNATIONAL TRAFFIC OF THE WESTERN EUROPEAN I.T. CARRIERS.