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ABSTRACT

The population explosion and the trend to urban-suburban living means that 80% of the nation's population lives on less than 10% of the land. A long-term solution to this problem calls for a total change in our population distribution as well as our life style--and the key to this plan lies in new applications for existing communication technologies. The plan must induce 100 million Americans to remain in or move to rural areas by offering them employment opportunities educational and health services, and social, cultural, and recreational pursuits in these areas. A study is now taking place for developing an undeveloped area around Windham, Conn. If employment opportunities in service industries are developed around Windham, communications technologies can help in these ways: connect the local hospital with large medical centers through two-way broadband circuits, provide adult education via satellites, and provide televised entertainment through satellite. Development of a new rural society where people live where they work would help reduce enormous and increasing needs for fuel and energy. (JK)

The New Rural Society

Presentation by
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President and Director of Research
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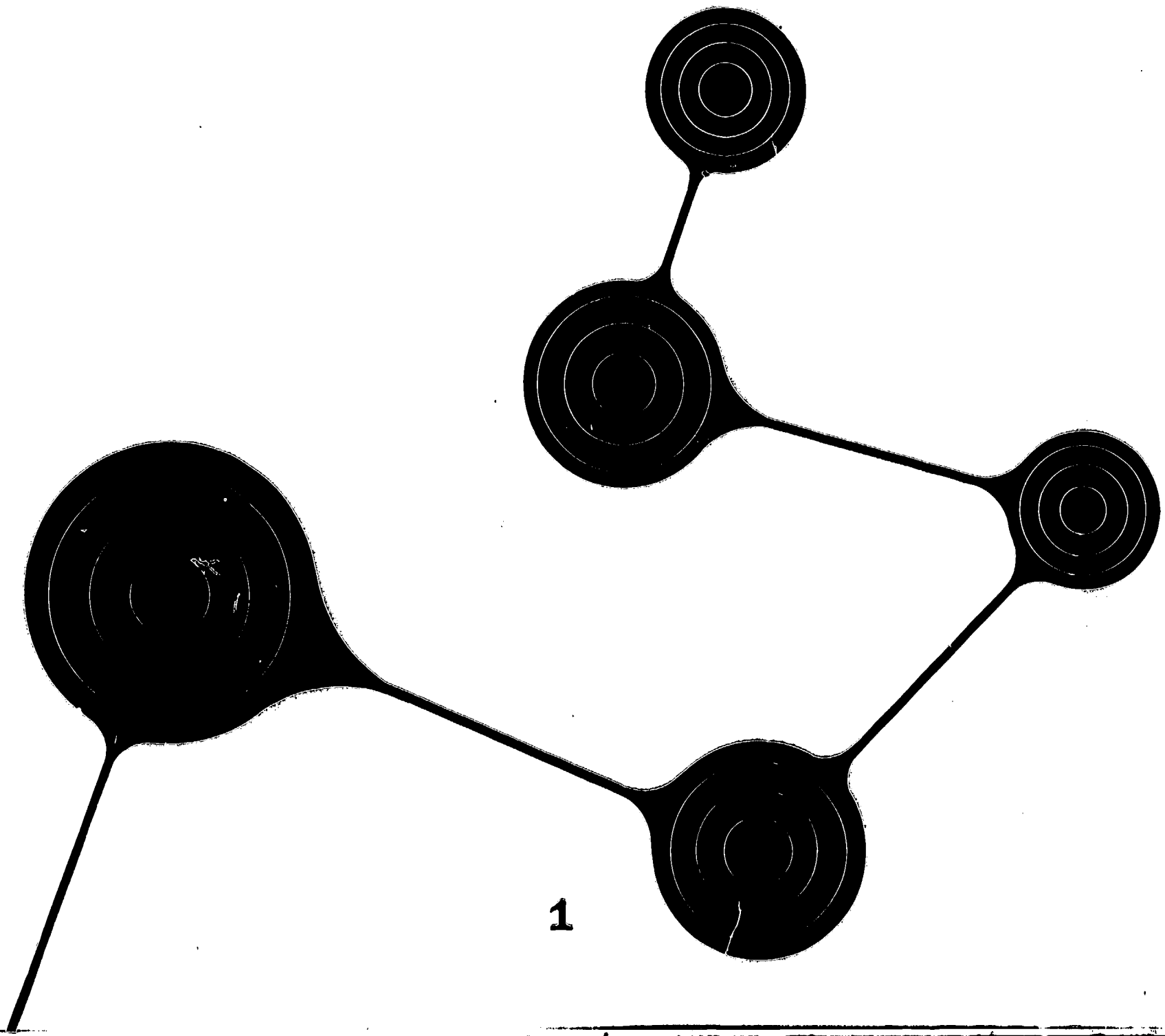
Stamford, Connecticut
1972



The following lecture entitled "The New Rural Society" was presented by Dr. Peter C. Goldmark, a Poynter Fellow of Yale University and President and Director of Research of Goldmark Communications Corp., a subsidiary of Warner Communications Inc.

The lecture was sponsored by Yale University's 1972 Seminars in Modern Journalism.

I welcome this opportunity to share with you my deepest concerns and also my hopes for the future.

First, let me quote Huxley, who said: "As I peek into the future, it doesn't work."

I agree with Huxley, but I think it is worthwhile to try to make it work. Thus, I would like to talk about the crisis of our environment and how communications technology can help to preserve it and even improve it.

I am using Environment in its broadest sense -- the world around us which involves people, our natural resources, our life style and, of course, our ecology. This total environmental problem is probably the greatest issue we have ever faced; it is ominous, elusive and it could be fatal to our civilization unless we deal with it promptly and effectively.

Let's pinpoint first where we are today in human history -- in terms of science, people and, above all, change.

Ten thousand years ago the world population was no greater than New York City's today -- namely ten million people. Too few people for the world, far too many for New York City. Yet, the human brain had the same size and capacity as we have today -- namely one-and-one-half liters. Human behavior and man's general physical characteristics were no different than they are today and during the succeeding 9,800 years, which brings us into the 19th Century A.D., all changes were extremely gradual.

At the time America was discovered -- to be sure by accident -- the entire world population was only 50 million more people than there are in the United States today (Fig. 1). The world population today exceeds three billion.

The significance of this is that during 9,000 of our 10,000-year history, population doubled only every 2,000 years. Even when America was discovered, the rate at which the population doubled was roughly 600 years. Today, the world population increases by a factor of two in 35 years, and this rate is still growing. What is alarming is the increase in the rate of change. Mathematically speaking, this exponential curve represents a growth produced by an increasing exponent.

The fastest man could travel until the 19th Century was roughly 25 miles per hour -- on horseback or behind horses. Today the figure is 25 thousand miles (Fig. 2).

Life expectancy until recently was about 30 years. It is now passing the 72 mark in the Western world (Fig. 3).

The only explosives known were relatively harmless compared with what we detonated from 1945 on (Fig. 4).

While we note a sudden rise in these curves during the past 150 years, we should pinpoint an all important date still buried in relative tranquility. This was the year 1455, when Gutenberg invented the movable type printing press. This event, which was dormant during all of mankind's previous history has, probably more than any other event, caused the sudden, dramatic acceleration in the rate of change in all fields.

There is a profound cause and effect relationship here which is worth exploring:

It was not until the twilight of the eighteenth century that printing and book publishing came into general use (Fig. 5).

In the following two centuries, the number of books published rose rapidly from two million to a total of 50-million different titles today. This exponential growth -- mirroring the impact of Gutenberg's discovery -- was followed by an unprecedented upsurge in scientific and technological development.

There were many men and women dedicated to science long before modern history, but they had no way to communicate their discoveries and ideas except by the slow process of word-of-mouth. Once scientists could read about the work of others they no longer duplicated each other's efforts, but carried on from where scientists before them left off. As a result, the human brain burst forth with discoveries, inventions and theories at an unprecedented rate, leading to modern science and technology and an unplanned environment.

When we combine the brief span of accomplishments by modern civilization into a single graph, and plot them on the scale of human history over the past 10,000 years, the curve shoots up almost vertically, pointing at infinity (Fig. 6). We can look at this sudden and frightening increase in the rate of change equally as the measure of how rapidly we use up our resources and our environment, and how far we are from planning ahead.

Recently, Dennis Meadows and his colleagues at M.I.T. showed with their computer study, as many have feared, that mankind faces a probable collapse of society within not much more than 100 years if we continue our current life style and industrial output at its current rate.

The M. I. T. study shows vividly what happens to these exponential upturns we have just seen if we don't act immediately -- and I mean act now -- and plan for a radical change.

Unless we do, the curves we have seen will not continue to grow exponentially. They will take a sudden downturn to the year 2100, by which time pollution and the depletion of our non-renewable resources will probably bring about a rapid end of our civilization.

In order to counteract these trends, we must slow down radically the population growth as well as our insatiable appetite for material goods and growth. We must begin to emphasize quality rather than quantity, and our material goods -- automobiles, television sets, and other appliances -- must be designed to last much longer than today's products.

Regarding population increase, the exponential curve in the first graph is controlled by two feed-back loops: the growth is determined by a positive loop, representated by the birth rate. The second loop is the negative feed back, carrying the mortality rate. This latter loop is not functioning too well, inasmuch as life expectancy has more than doubled during the last 200 years -- chiefly due to science. We can only operate on the positive feedback loop and curtail the birthrate. Here the M. I. T. study calculated that together with other major adjustments, an average number of children of two per family on a worldwide basis could avert the predicted collapse.

Ironically, science and technology have unwittingly transported modern civilization into the crisis we now face. But I believe there is still time to redirect the ominous trends through immediate and concerted planning and action.

The M. I. T. study provides solutions to the productivity, population and pollution problems we will face, but does not deal with the social crisis in which we already are involved. However, scientists and engineers can indeed apply their talents and efforts toward social engineering problems. At the same time, these solutions must also apply to the preservation of our non-replenishable resources as well as the reduction of pollution and our industrial output.

For the past three years, I have had the opportunity to head a study at the National Academy of Engieering in Washington. The work has been supported by the government, and a major purpose has been to examine how communications technology can change our present pattern of living and successfully alter the grim picture of our future.

The crisis projected is best illustrated by the rapid deterioration of life in the large metropolitan urban and suburban concentrations where 80 percent of the nation's population is virtually trapped -- living on less than 10 percent of the land. At the current rate, two-thirds of the people in the United States by the year 2000 will live in 12 major urban centers. More than half of them will be concentrated in three megalopolies comprising only a few percent of the country's total land area. Figure 7 shows this on the left side. The right-hand map shows the migration from rural areas towards the large cities and this map is almost a photographic negative of the first one.

A long-term solution to this problem calls for a total change in our population distribution as well as in our life style -- and the key to this plan lies in new applications of existing communications technologies.

As one of the most basic requirements, people must be provided with the choice of whether they wish to live and work in a large city or in a rural environment. This option does not exist today. Thus our plan must induce some 100 million Americans to remain in, or move to attractive rural areas. A small step has been made in this direction through so-called new towns, several of which have already been built. But this is not the answer since a new town would have to be completed every third day for the next 30 years. We must move on a much more massive scale which can be accomplished only through the planned development of thousands of existing American small towns.

Towards this objective, we have designed a model based on 3,000 existing communities ranging in population from 5,000 to 100,000 people, capable through carefully planned growth to accommodate 100 million people over the next 30 years (Fig. 8).

We know that the major problems of the large cities -- problems such as crime, poverty, pollution, traffic, health, education, etc. -- also exist in small communities, but they are on a much smaller scale and are manageable.

Our studies, for example, reveal that the incidence of crime per unit population increases with the size of cities. The same is true of pollution. Both of these are non-linear effects and can be shown graphically (Figs. 9 & 10).

The question we face is: Why do people migrate from rural areas, and why don't urban residents move there?

Here are some of the main reasons:

- Lack of suitable employment opportunities
- Inadequate educational and health services
- Lack of social, cultural and recreational pursuits

In each of these areas we found that communications technology can improve conditions considerably, but we have to seek new approaches. Take employment for example. A growing number of businesses have moved some of their divisions or even their entire operations out of big cities but, unfortunately, they haven't moved them much farther than the suburbs. As a result, the metropolitan concentrations now spill beyond the city limits, adding to the overall environmental problem. It turns out that one major reason why companies do not move greater distances is the fear of inadequate communications between these components.

We therefore proposed a study coupled with experimentation and feasibility testing to demonstrate that imaginative applications of telecommunications will enable business and government units, separated over wide distances, to function effectively and perhaps even derive additional operational advantages.

This study -- the first of its kind in the nation -- has just begun. The project, entitled "The New Rural Society," is funded by the United States Department of Housing and Urban Development and is being conducted under the aegis of Fairfield University in Connecticut. My own company is instrumental in carrying out the technical phases of the communications processes under a contract with Fairfield University. The University is deeply interested and involved in these studies, and I am particularly pleased to have the support and enthusiasm of the Rev. William C. McInnes, President of Fairfield University, who for many years has been identified with professional leadership on social and educational issues.

The National Science Foundation is sponsoring a portion of the project which enables a number of states to participate in the proceedings.

The first phase of this study comprises a thorough analysis of current office practices and procedures. We will concentrate primarily on service industries, as these would appear to be the best candidates for placement into rural areas. Also, forecasts show that employment in

service industries will increase steadily during the next 30 years, while in manufacturing manpower needs will remain steady or even decrease.

Following the office studies, we will substitute these procedures with special communication links and equipment for experimenting in back-to-back studios simulating actual transmission systems. As the next step, actual two-way point-to-point broadband circuits will be employed, located between the capital of Connecticut, Hartford, and the area designated as the center of our experiments.

One interesting aspect of the communications study has already emerged -- namely, the underutilization of audio techniques, particularly when coupled with instantaneous visual displays, and the creation of spatial sound images. Novel applications of two-way video techniques are also contemplated together with new ways of generating and distributing remotely hard copies.

Through the cooperation of the Governor of Connecticut, a geographic area was designated as the center of the project where a joint planning effort is underway with community leaders and regional planners to study methods for establishing the New Rural Society. This section of Connecticut is called the Windham Planning Region, located in the Northeastern portion of the State. It is composed of 10 townships with 65,000 people occupying 300 square miles. Windham is an underdeveloped region from an economic standpoint, averaging 200 people per square mile -- which is less than one third the average population density of Connecticut.

Conversely, large cities like New York have a population density of 26,000 people per square mile. According to the findings of the Human Rights Commission, the density in some of New York City's worst ghettos is so bad, that at this level of crowding the entire population of the United States could be concentrated in just three of Manhattan's boroughs.

The map of Connecticut in Figure 11 with its 169 townships shows the population concentration now and in the year 2000 and the uneven distribution between rural and urban centers in the state. The experimental area for our project is also shown.

We have stated earlier that providing employment opportunities and choice is important. We must also ensure that there will be adequate health services for the increased population.

The national average of physicians per 1,000 people is roughly one, which is the same for the entire state of Connecticut. But in Windham there is approximately one-half physician per 1,000 people. We hope to be able to show that the services of the local physicians and the local county hospital can be extended through the increased use of paramedical personnel. Such techniques as mobile teleclinics equipped with two-way, point-to-point microwave communication links

for visual, audio and diagnostic use will be explored. It is also contemplated to interconnect the local hospital with one of the large medical centers in Hartford through fixed two-way broadband circuits capable of carrying video, sound and instrumentation signals in both directions. This would provide greater stimulus for local physicians in Windham through access to complex diagnostic data and equipment as well as to seminars and discussion of special cases.

It is recognized that in many areas in the United States mobile teleclinics, attended by physicians' assistants, will be able to serve a larger number of patients near their homes and schools through pre-screening and thus extend the effectiveness of available physicians and of the hospital facilities.

Access to higher or continuing adult education in rural areas is another paramount requirement. The plan here is to apply the same telecommunications techniques we are developing for business and to link large educational centers with a number of small satellite campuses located in or near the newly expanded towns. A small but capable faculty will combine local instruction with full participation in the activities of the distant central university through two-way electronic access so that seminars, lectures and examinations together with data and library access, can create a complete and viable local teaching program. Through the new two-way cable television systems all of these learning opportunities will be brought to the homes.

The aspect of the overall project that needs to be carefully considered and applies to business as well as to education, has to do with face-to-face communication. It is not the intent of the project to discourage or minimize personal contacts when these are essential. Studies have shown that substituting telecommunications for all personal contacts in business on a nationwide basis would only reduce travel by approximately 18 percent. The paramount objective is for most people to live and work closeby and in an attractive, stimulating environment. Travel, for establishing face-to-face meetings, for business, government or educational pursuits should be encouraged and will in no way detract from the benefits that can be derived from the New Rural Society plan.

The development of suitable employment choices, health care and education, still leaves the rural areas isolated and deprived of cultural and recreational opportunities existing in the big cities, such as theatres, concerts, museums, lectures, sporting events, etc.

To counter this imbalance we propose the design and the implementation of the ENT-SAT system ("Entertainment Satellite"). Under this plan use would be made of the contemplated domestic synchronous satellite communication system located so that it could service the entire United States, including Alaska. The ENT-SAT would relay live performances from Broadway theatres, from operas, concerts, sports events, political, religious and educational meetings,

to all cities and towns in America using a new high-resolution color television system designed specifically for this purpose.

If the community already has, or plans to have, a local cable television operation, the cable franchise holder could receive the ENT-SAT signals and present the special-events programs to the community on a fee or subscription basis, in two forms: in existing or in special theatres, using large screen, high-resolution television projection equipment, and also over the local cable television system having special broadband channels suitable for the high-resolution television signals.

The reason for selecting a new high-resolution color television system for the ENT-SAT system is two-fold: First, the live performances transmitted will not be specially produced for television and often will have more detail than could be resolved with the current commercial television standards. The second reason is that these programs would also be projected onto large theatre screens requiring greater resolution.

The cable television subscribers would have the choice to rent or buy dual standard color television sets which would be able to receive the current commercial television transmissions as well as the new high-definition color signals.

Let us now examine how the New Rural Society program will influence the trends which are threatening our civilization. Regarding our oil requirements; at the current rate of consumption, by 1985 fifty percent of our oil will have to be imported from foreign countries. I need not elaborate on the consequences.

Under the New Rural Society Plan, living and working in the same community will save large amounts of gasoline and only generate negligible amounts of pollutants, because there will be little or no need to commute. People must be encouraged to go on foot, to use bicycles, small automobiles and small delivery vehicles. Indispensable to such radical changes will be the processes of education in order for every American to realize that what is at stake is the world of our children and grandchildren.

Concerning another essential resource, the generation of sufficient electric energy is bordering on a national crisis. The use of electricity per household has almost doubled during the past 10 years and to a large extent urban life is the culprit. In rural areas, there is less need for air-conditioning and there will be no huge building complexes consuming large amounts of electric power for elevators, light and other services. As an example, New York City's newest skyscraper, the "World Trade Center," consumes as much electric power as a city of 120,000 people.

The problem associated with gigantic power generating plants required by the large cities could be relieved through the use of many smaller local plants, using other means of producing electricity. For example, there exists now a coal-to-gas conversion method, using strip-mined coal, which is our most abundant source of energy. The sulfur dioxide pollutants are eliminated in the gas conversion process. This type of plant is particularly suitable for smaller units -- towns up to 200,000 inhabitants.

In order to live through the next centuries as a civilized nation, many of the needed changes in our life style will have to be radical, require a redirection of technology, and a great deal of education. But time is short and we cannot invent, we must innovate. We have already made all the necessary inventions.

Finally, let us remember that while we have learned to communicate across space and under water, on records and on tape, by wire and by radio, we must still perfect that most important form of communication -- from man to man.

# # # #

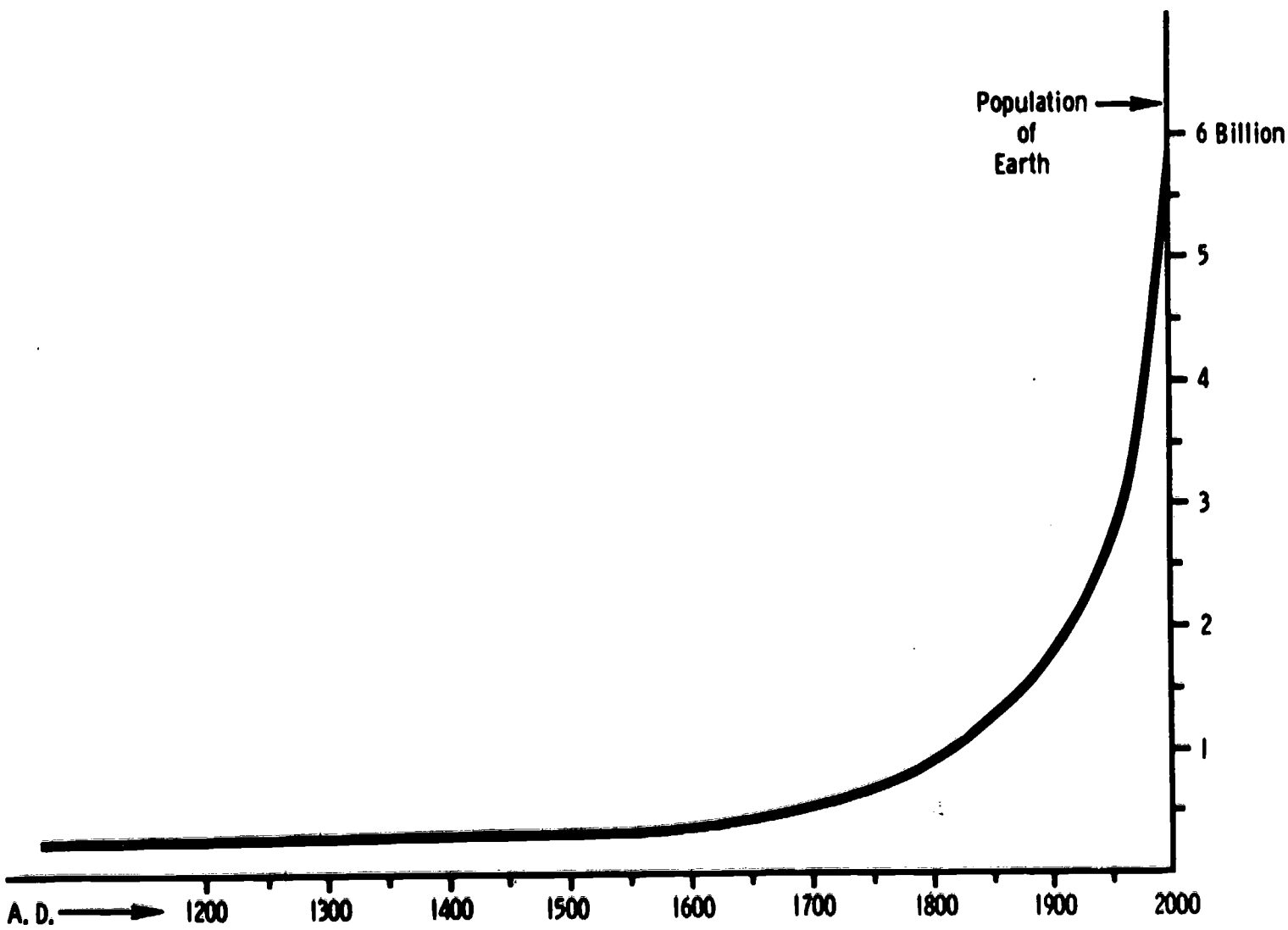

Population of Earth
6 Billion
5
4
3
2
1
A. D.
1200
1300
1400
1500
1600
1700
1800
1900
2000

FIGURE 1

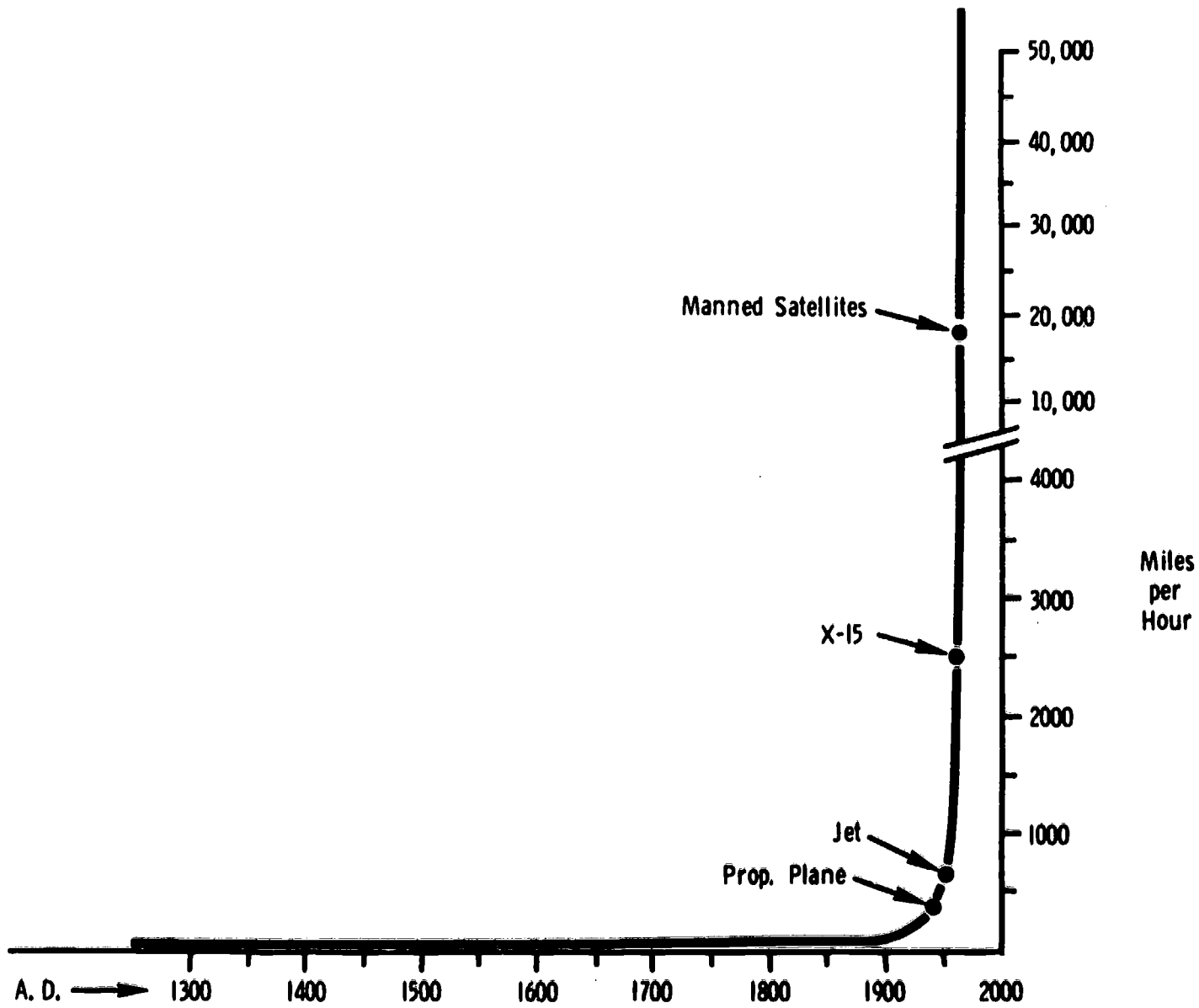

50,000
40,000
30,000
20,000
10,000
4000
3000
2000
1000
Miles per Hour
Manned Satellites
X-15
Jet
Prop. Plane
A. D.
1300
1400
1500
1600
1700
1800
1900
2000

FIGURE 2

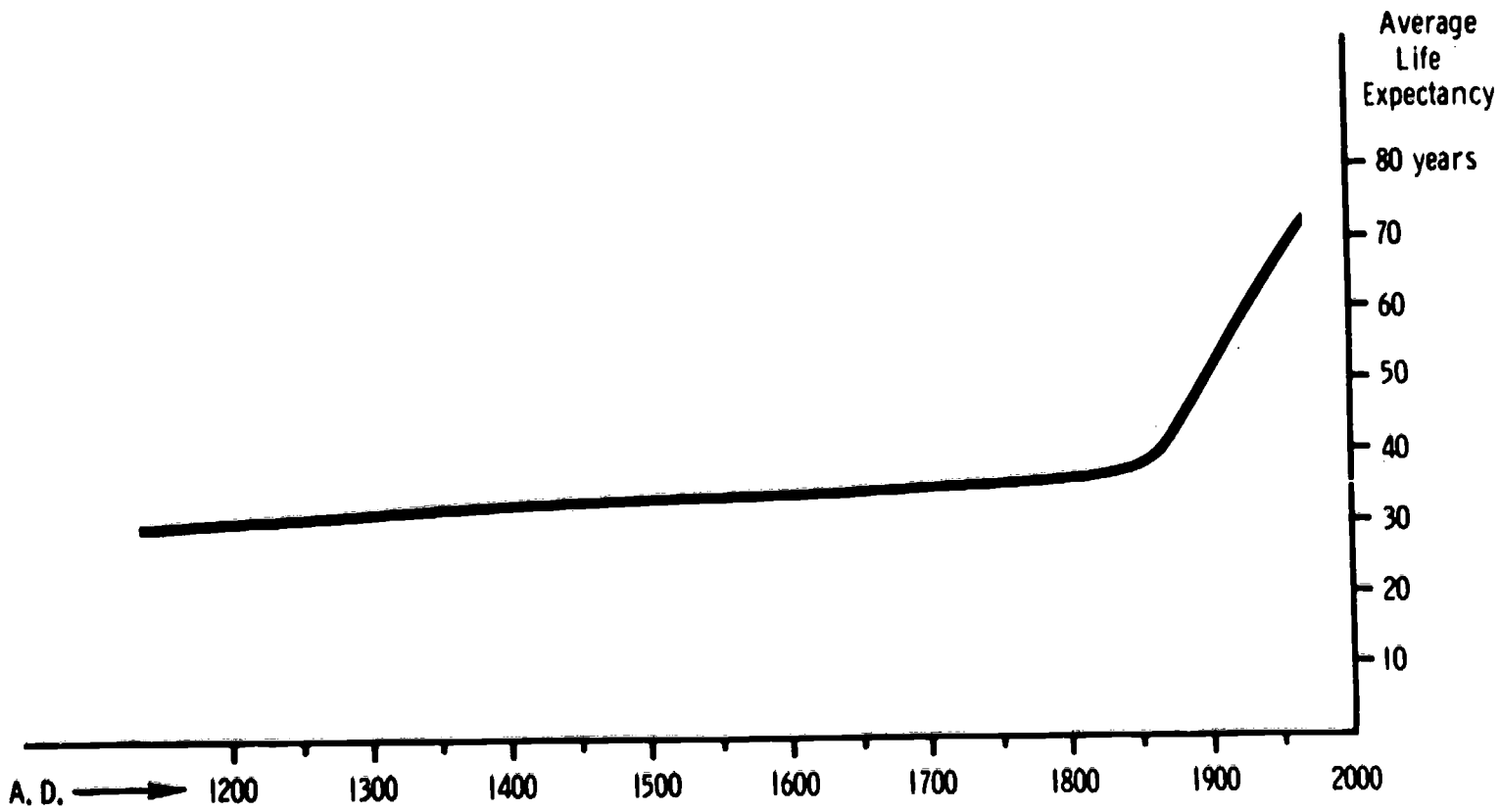

Average
Life
Expectancy
80 years
70
60
50
40
30
20
10
A. D.
1200
1300
1400
1500
1600
1700
1800
1900
2000

FIGURE 3

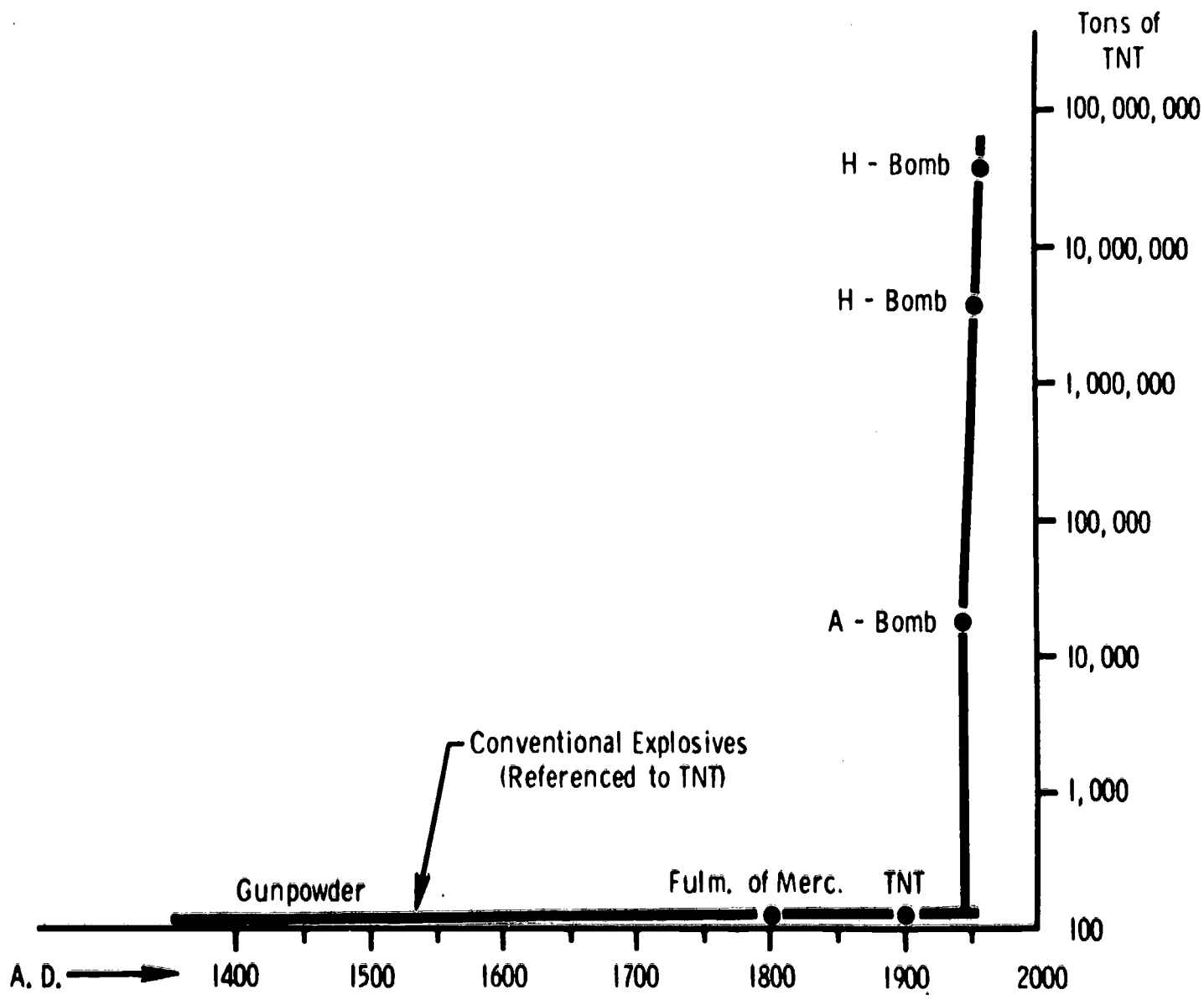

Tons of TNT
100,000,000
10,000,000
1,000,000
100,000
10,000
1,000
100
H - Bomb
H - Bomb
A - Bomb
Conventional Explosives (Referenced to TNT)
Gunpowder
Fulm. of Merc.
TNT
A. D.
1400
1500
1600
1700
1800
1900
2000

FIGURE 4

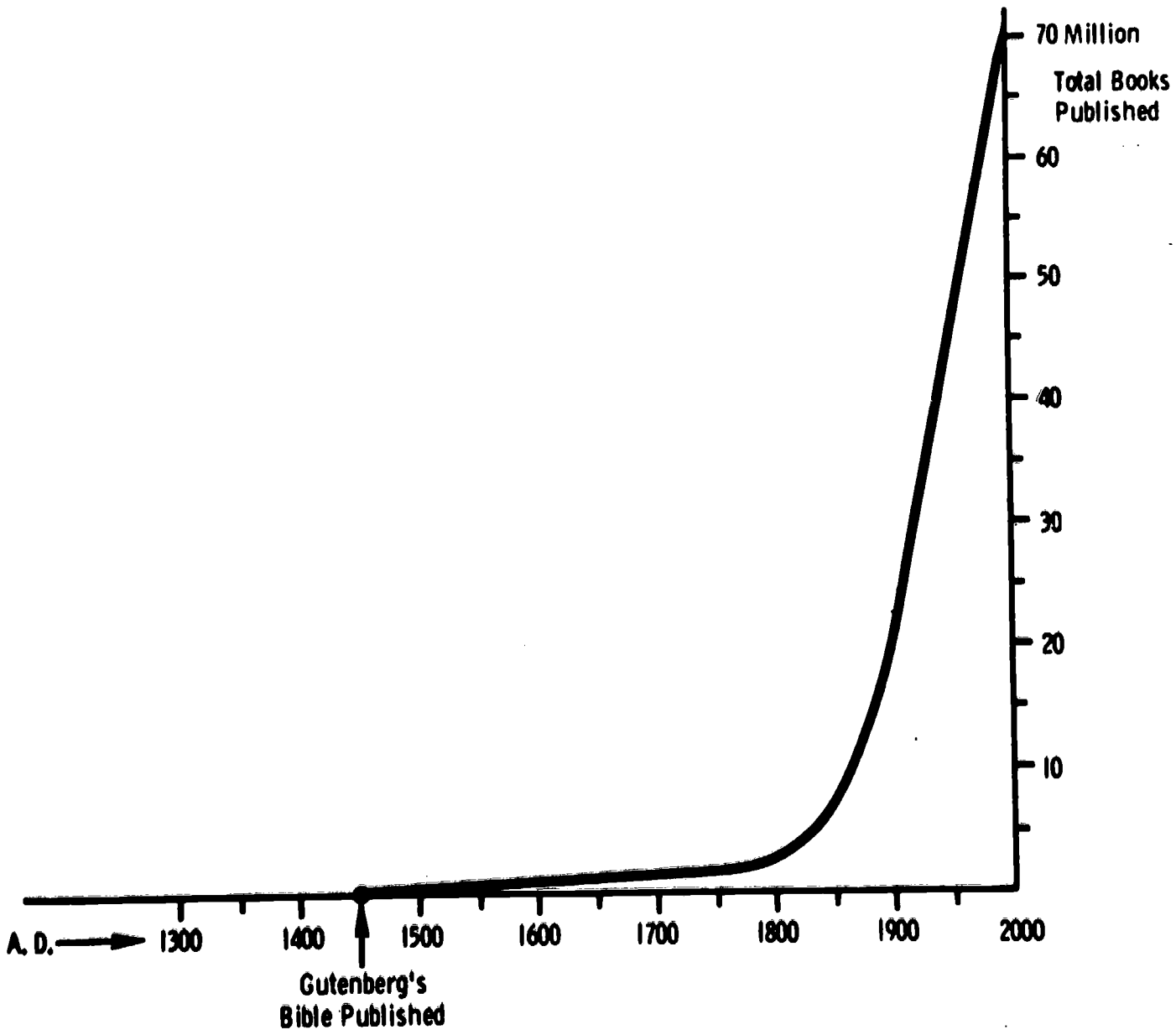

70 Million
Total Books
Published
60
50
40
30
20
10
A. D.
1300
1400
1500
1600
1700
1800
1900
2000
Gutenberg's
Bible Published

FIGURE 5

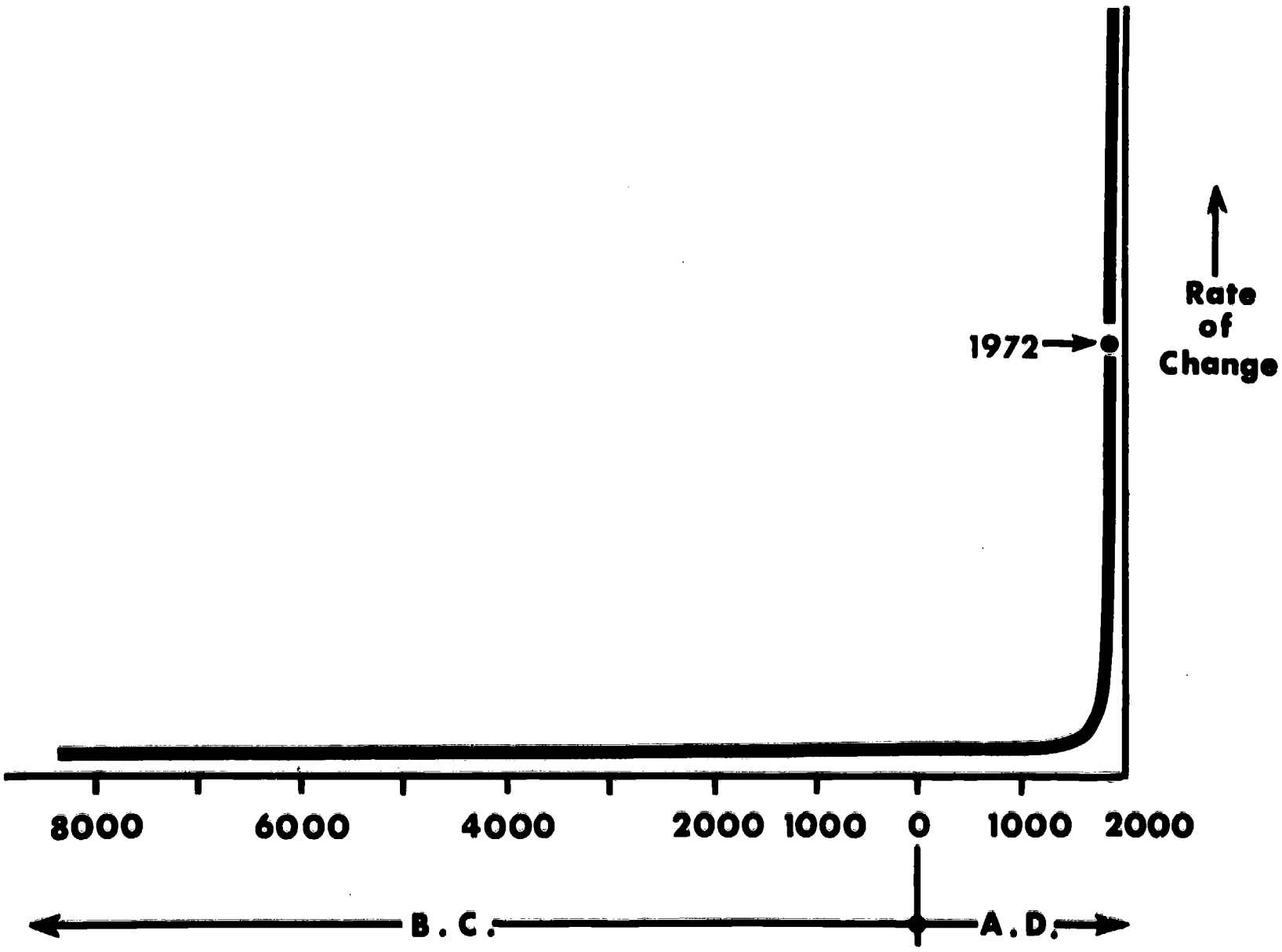
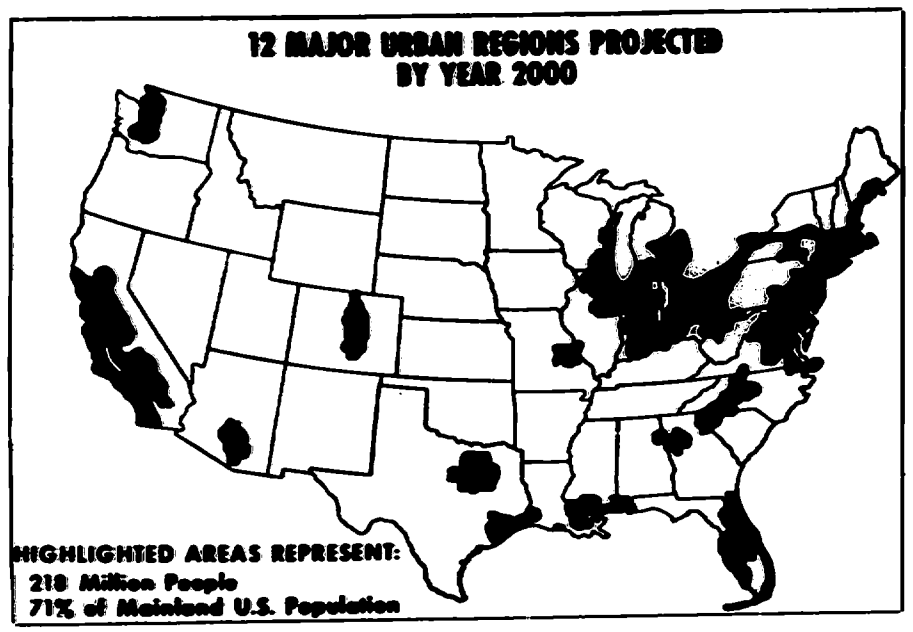


FIGURE 6


12 MAJOR URBAN REGIONS PROJECTED
BY YEAR 2000
HIGHLIGHTED AREAS REPRESENT:
218 Million People
71% of Mainland U.S. Population

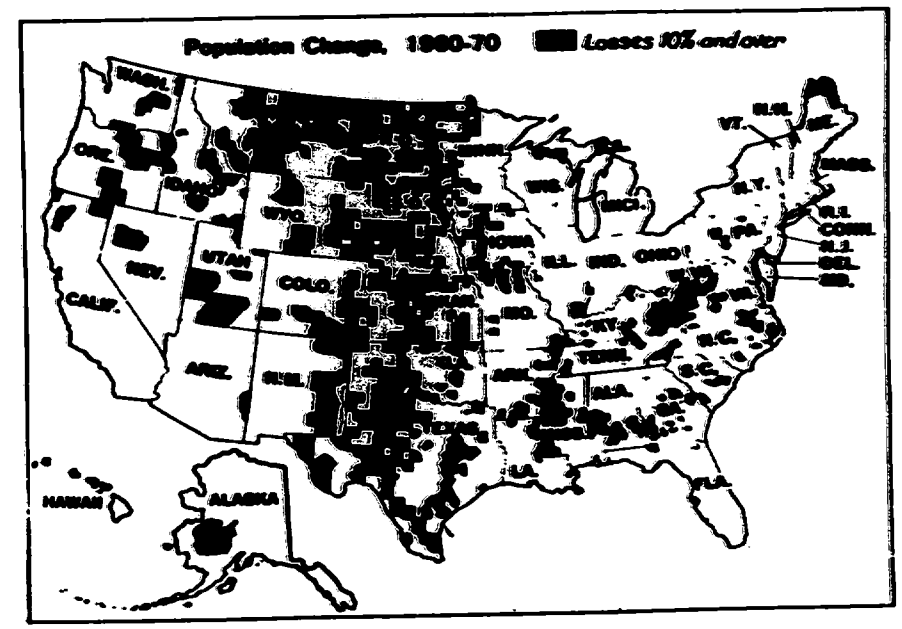
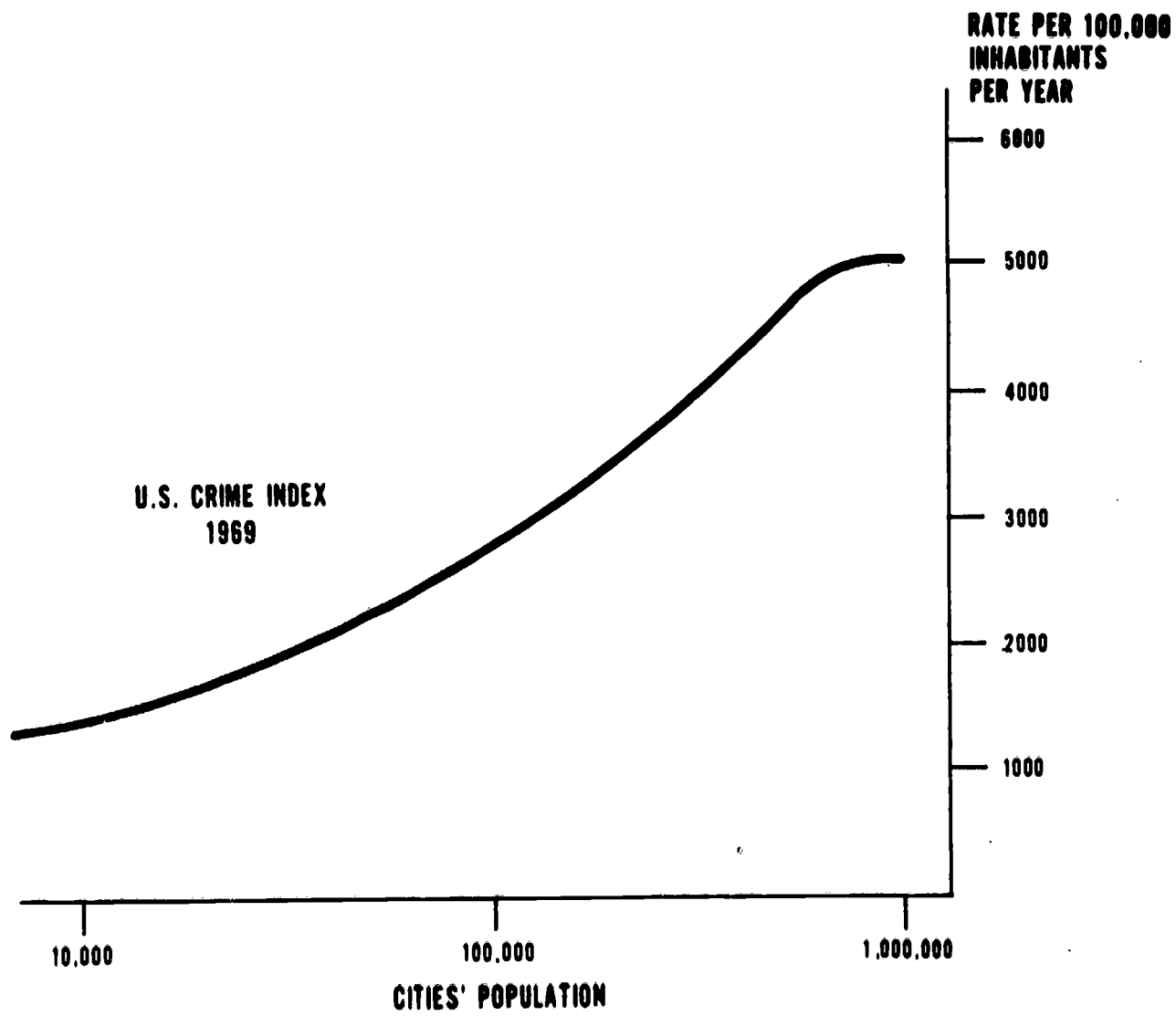

Population Change, 1960-70
Losses 10% and over
CALIF.
ARIZ.
UTAH
COLO.
HAWAII
ALASKA

FIGURE 7

Population Growth Model for Small Cities

City Size by Population	Number of Cities in 1960	Total Pop. in 1960	Additional Population Growth req'd over 30 yrs		Uniform Yearly Population Growth Rate per cent	Yearly Pop. Growth Avgd over 30 yrs	Add'l jobs needed per yr. avg'd over 30 yrs (family = 4 members)
			per cent	people			
50,000-100,000	201	14,000,000	50	7,000,000	1.5	1,100	275
25,000-50,000	432	15,000,000	200	30,000,000	3.75	2,310	577
10,000-25,000	1,134	17,500,000	200	35,000,000	3.75	1,030	260
5,000-10,000	1,394	9,780,000	290	28,000,000	4.75	670	168
	Total population accommodated over next 30 years			100,000,000			

FIGURE 8



SOURCE: UNIFORM CRIME REPORTS-1969
FBI

FIGURE 9

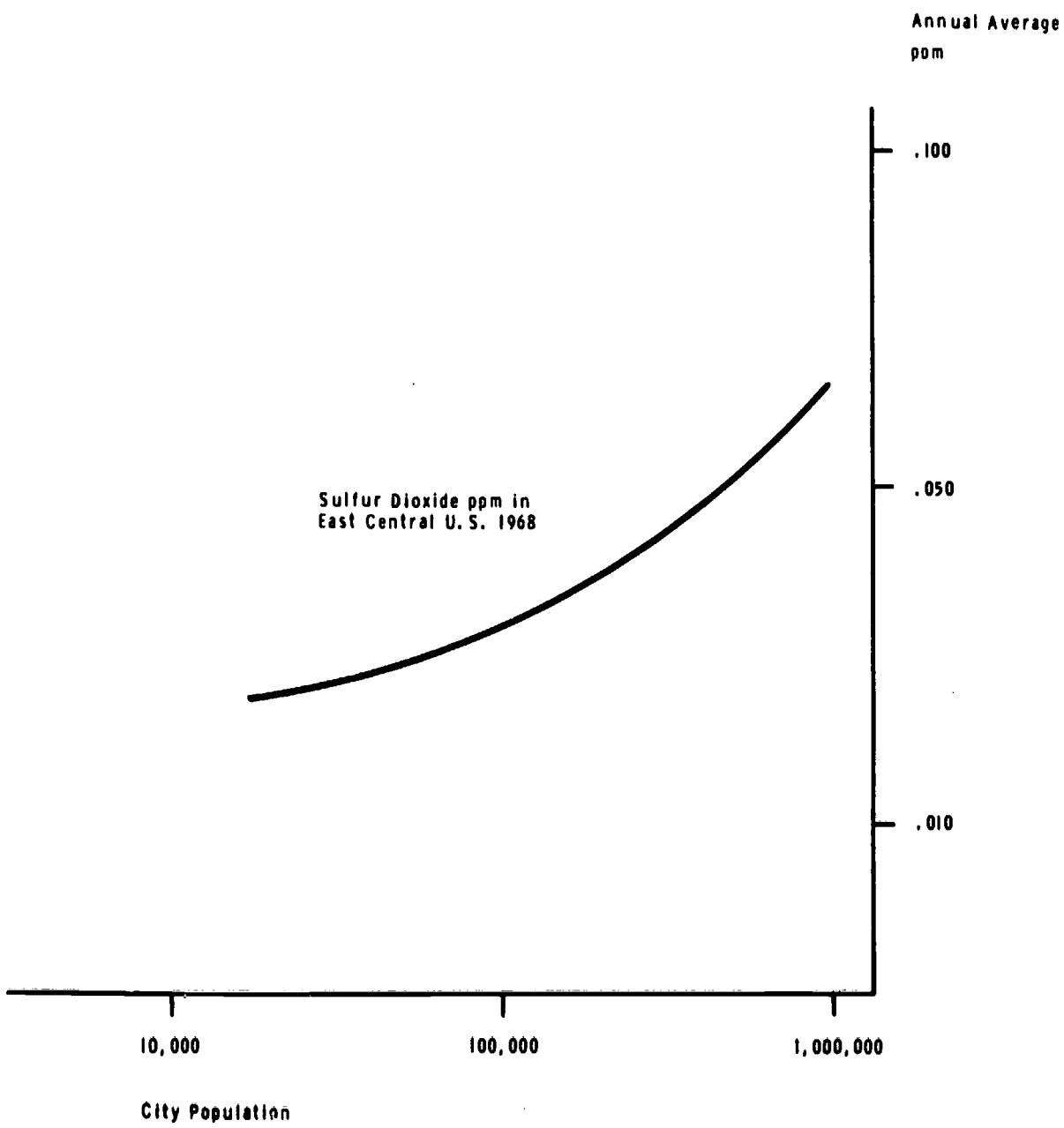

Annual Average
ppm
.100
.050
.010
Sulfur Dioxide ppm in
East Central U.S. 1968
10,000
100,000
1,000,000
City Population

FIGURE 10

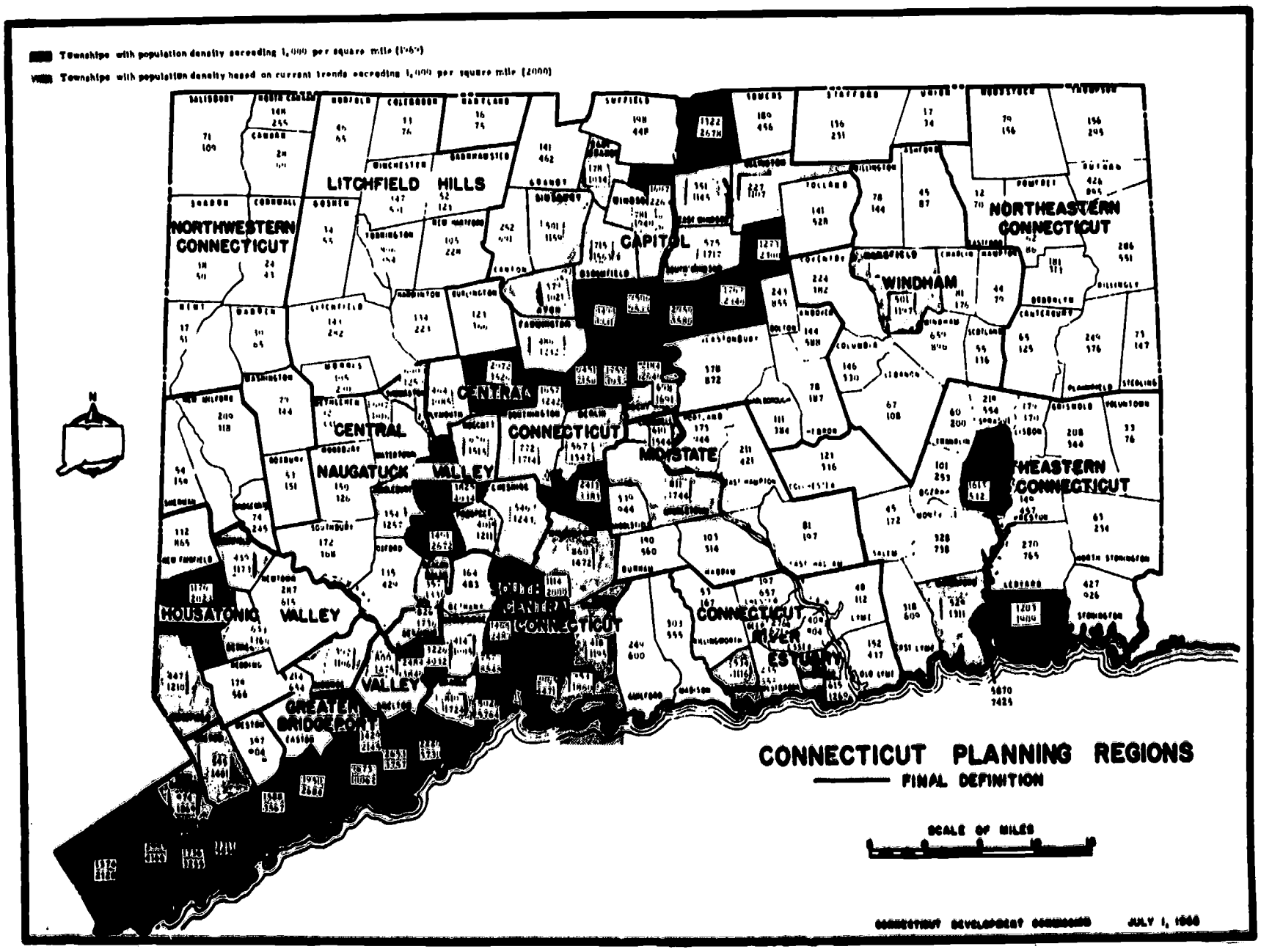

Townships with population density exceeding 1,000 per square mile (1965)
Townships with population density based on current trends exceeding 1,000 per square mile (2000)
LITCHFIELD HILLS
NORTHWESTERN CONNECTICUT
NORTHEASTERN CONNECTICUT
CAPITOL
WINDHAM
CENTRAL CONNECTICUT
NAUGATUCK VALLEY
MIDSTATE
HOUSATONIC VALLEY
CONNECTICUT RIVER ESTUARY
GREATER BRIDGEPORT
CONNECTICUT PLANNING REGIONS
FINAL DEFINITION
SCALE OF MILES
JULY 1, 1966

FIGURE 11