

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

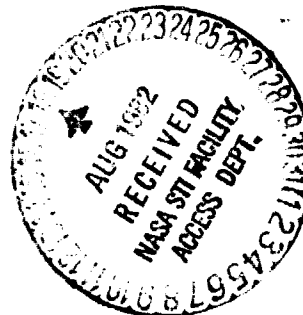
NASA TECHNICAL MEMORANDUM

NASA TM-76891

THE GEOSTATIONARY ORBIT AND DEVELOPING
COUNTRIES

E. Rodriguez Medina

Translation of "La Orbita Geostacionaria Y Los Países En
Desarrollo", (Paper presented at the United Nations'
Regional Seminar on Space Applications organized in
preparation for the Second United Nations' Confer-
ence on the Exploration and Utilization of Outer
Space for Peaceful Purposes, Quito, Ecuador,
19-23 April 1982) (UNISPACE 82), Colombia,
1982, pp 1-9



(NASA-TM-76891) THE GEOSTATIONARY ORBIT AND
DEVELOPING COUNTRIES (National Aeronautics
and Space Administration) 10 p
HC A02/MF A01

N82-30321

CSCI 12A

Unclass

G3/13 28710

ORIGINAL PAGE IS
OF POOR QUALITY

STANDARD TITLE PAGE

1. Report No. NASA TM-76891	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle THE GEOSTATIONARY ORBIT AND DEVELOPING COUNTRIES		5. Report Date MAY 1982	6. Performing Organization Code
		7. Author(s) E. Rodriguez Medina	8. Performing Organization Report No.
9. Performing Organization Name and Address SCITRAN Box 5456 Santa Barbara, CA 93108		10. Work Unit No.	11. Contract or Grant No. NASw- 3542
		12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546	
13. Type of Report and Period Covered Translation		14. Sponsoring Agency Code	
15. Supplementary Notes "La Orbita Geostacionaria y Los Paises en Desarrollo", (Paper presented at the United Nations' Regional Seminar on Space Applications organized in preparation for the Second United Nations' Conference on the Exploration and Utilization of Outer Space for Peaceful Purposes, Quito, Ecuador, 19-23 April 1982) (UNISPACE 82), Colombia, 1982, pp 1-9			
16. Abstract It is shown that the geostationary orbit is becoming congested due to use by several countries throughout the world, and the request for use of this orbit is increasing. The International Telecommunications Union has reported that there are 188 geostationary stations in operation. A desire is expressed for an equitable distribution of stations on this orbit.			
17. Key Words (Selected by Author(s))		18. Distribution Statement Unclassified - Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 8	22. Price

ORIGINAL PAGE IS
OF POOR QUALITY

THE GEOSTATIONARY ORBIT AND
DEVELOPING COUNTRIES (COLOMBIA)

Ernest Rodriguez Medina

We cannot but express our pleasure at the interest #1 shown in this Seminar on the topic of the Synchronous Geostationary Space. Things could not be otherwise, since it has become one of the most relevant, transcendent and vital areas of the Unispace 82 agenda. The draft of the Final Report of this Conference acknowledges explicitly indeed that we are dealing with a limited natural resource of vital importance for space applications, and therefore its use must be regulated and planned.

For many years now, Colombia and the Equatorial countries have been calling the attention of the world to the danger of a saturation of the Geostationary Orbit and its spectrum and have also denounced the monopolistic usurpation of the resource by the great technological powers on the basis of the principle of "first come, first served" questioned a few minutes ago by Professor Dieter Felske himself.

Nevertheless, our intervention is motivated by the desire to present a few specifications which we consider indispensable for such a highly qualified audience as the one constituting this seminar, to establish a valid criterion on the important topic which preoccupies us.

From the scientific point of view, the Equatorial countries consider that the Synchronous Geostationary Orbit (O.S.G.) (O.S.G.) represents a physical entity related to the reality /2 of our planet, since its existence depends exclusively on its relation to the gravitational phenomena caused by the Earth. That is why we consider that it must be separated from ultra-terrestrial space. It is apparent that its physical and technical attributes are unique and are subject only to those phenomena taking place only in the Equatorial plane passing through the Equatorial countries.

We claim this planning and this regulation because the geostationary orbit as a limited resource is becoming congested and is being occupied with an "appropriation" criterion of the slots (places) alleging priority of use. Meanwhile the request for the use of services has increased; the technological trends, instead of preserving the orbit, are saturating it and causing interferences, and what is most serious, there is no possibility of redistributing the orbital positions as temporarily assigned by the ITU.

But since we are among technicians and scientists, we would like to demonstrate practically our assertions. Let us con- /3 sider the following:

The Demand is Increasing

In its Twenty-First Report, the International Telecommunications Union mentions that the updated list of geostationary stations, with settled orbital position, has already reached 138.

A study conducted by NASA itself has come to the conclusion that the international demand for satellite communications will

ORIGINAL PAGE IS
OF POOR QUALITY

be increasing ten-fold between 1982 and the year 2000. Other specialized publications, analyzing the increasing effort to obtain facilities for satellite communication, as compared with the present supply, calculated that in the next decade there would be requests for the use of 2,000 transponders. A satellite of the telecommunication type has today 12 transponders.

The successful Space Shuttle system will be tripling the number of geostationary satellites during the decade. It will also be able to install large geostationary platforms which would have greater capacity, mass and power. For the rest, the technological tendency to use increasingly numerous and powerful satellites for domestic use, maritime control, private activities and cable television will aggravate an already critical situation.

The demand has become so apparent that the United States Federal Communications Commission itself proposed to reduce to half the space between satellites, decreasing from 4 to 2 the longitude of separation of slots on the orbital arc. /4

In 1985, in accordance with the predictions of COMSAT, it is calculated that more than 50 additional satellites will be placed on the Geostationary Arc. The scientific director of COMSAT himself, Mr. Walter Morgan, describes to us the situation: "For years there were no major problems: suddenly the demand exceeded the supply and everybody wants to get onto the carousel. We have reached a point when interested parties are fighting for the same location on the orbit." This struggle has converted the orbital geostationary arc into a real business of settled real estate. The increased value of the slots and the leasing

of transponders has reached astronomical figures.

Herein lies the cause of one of the facts which demonstrate best that the O.S.G. is a resource which has a danger of saturation and depletion by congestion: Why does one degree in the geostationary orbit have such a high value, while a degree in the elliptical or heliosynchronous orbits have no significant commercial value?

The Technological Tendency Will Permit the Geostationary Orbit to Absorb the Increase in Demand

This cannot be asserted, for two reasons:

- a. The technology to extend the capacity of the orbit, including the use of higher bands, is very costly and the projects are still chimerical.
- b. The budget allocated by the powers to technological research has decreased, not only because of financial cutbacks, but inflation of costs.

On the contrary, the present technological trends are for transmission with digital signals. But the experts consider that the UIT has not appreciated the fact that these technological trends may rapidly render useless the allocation plans based on services. /5

While digital technology underlies all the UIT strategy of regulation based on services, the technology of "Spot beams" is causing the disappearance of the distinction between the services of radiobroadcasting and fixed satellites, the two competitors for orbital positions and the allocation of frequencies in the 12 GHz band. This technique is going to need real constellations of satellites and distribution systems, to be able

to share efficiently the width of the band. This does not mention further integrated circuits, another technological trend which erodes the regulations by service of the UIT. Large scale integration permits the programming of the circuits in such a manner as to achieve a wide frequency range.

And what can we say of the technology planning to industrialize space and to use it with programs of scaled economy? A single space platform for solar energy would have 50 K².

Redistribution of Orbital Positions

A study conducted by the UNO in preparation for the UNISPACE 82 Conference, informs us "that because of limitations with regard to satellite sites, they are not distributed uniformly over the Geostationary Orbit, and it is unlikely that they can be so in the future". /6

It is clear that this is impossible as things are now. The problem of congestion has become critical in areas of dense international traffic.

In the Western hemisphere and the Atlantic Ocean, in the arc between 4 and 150 degrees longitude, 44 satellites are stationed! Not to speak of other segments which are equally saturated for identical reasons. And what can we say of the most often used frequencies? We need only refer to the same list of satellite stations of the UIT to see that most of them operate at 4/6 GHz: the "most pure", "clean" and most economically accessible one. The other bands do not guarantee the same quality, unless costly and sophisticated equipment is used.

But the most serious element in the problem resides in the practical appropriation that the technological powers have made

ORIGINAL PAGE IS
OF POOR QUALITY

of the slots in the orbit. They have arrived there to stay! They talk of provisional orbital positions, but the truth is that when a satellite completes its years of service (seven on the average) it is replaced by another operated for the same interests and belonging to the same owner.

Thus a technological monopoly has been established taking over the preferred sites of the O.S.G. and remaining indefinitely in them.

This is technological development without either technical planning or legal regulation which allows the consolidation of this usurpation.

The Equatorial countries do not claim that technology must be frozen, nor that right be converted into a barrier to scientific development.

/7

What we want is for order to be established and account be taken of an equitable distribution of the orbital segment, taking into consideration the increasing future needs of the world and the legitimate interests of the countries located under the orbital arc.

We must preserve the orbit for our developing countries, whose scientific and technological development do not permit present access under conditions equal to those of the technological powers.

There is one item of information on technological development which speaks for itself: out of 4,643 space objects now in active operation, 2,697 belong to the United States; 1,786 to

ORIGINAL PAGE IS
OF POOR QUALITY

the Soviet Union; 42, to Japan; 32, to France; while only 7, 2 from Indonesia and 5 from India, belong to the Third World.

We can understand that the equitable use of the O.S.G. has become a need of the developing countries.

The Equatorial countries will have no satisfaction if within two decades, in the absence of the regulations requested, the 120 developing countries are obliged to struggle under disadvantageous conditions in the face of serious facts to attempt to free themselves from the dependencies and inequalities created in the economic and commercial field.

In the year 2000 it will not be easy to fight for a New International Space Order, just as today it is never easy to achieve /8 a New World Economic Order anywhere.

Martin Luther King has a sentence which sheds light on the route we must take:

"We will never be able to climb up, if we do not bend our back."
Quito, 22 April 1982

ORIGINAL PAGE IS
OF POOR QUALITY

APPENDIX

The graph established by the "American Institute of Aeronautics and Astronautics" shows clearly the density of the present occupation of the orbit by geostationary satellites.