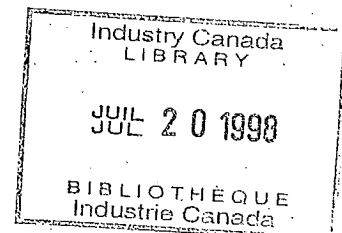


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SATELLITE BROADCASTING SYSTEMS  
FOR NEW & DEVELOPING NATIONS

Political and Economic factors



prepared by Adrian Symonds for the  
Department of Communications  
International Telecommunications Branch

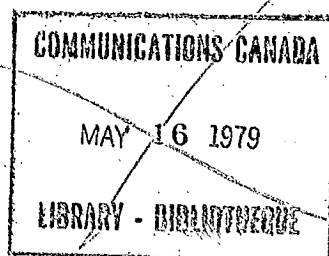


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Summary:

This report describes some of the software problems that a nation will encounter with the implementation of a satellite broadcasting educational system. The stimulus for the report is provided by the fact that several nations are considering this new means of transmitting education as early as the mid-1970's. One nation, India, will embark on a pilot programme in the next two years.

The intent of this report is to analyze several aspects of a satellite-borne education system. The first section of the essay will attempt to establish the effectiveness of television education and relate that effectiveness to case studies encountered in the developing nations. It will be shown how television can be used not only for teaching, but expanding the educational infrastructure and, in short, communicating.

The second section outlines the potential benefits that might occur if indeed a satellite-borne educational system is implemented. Similarly, the third section outlines the potential disorders. In both the second and the third sections, the analysis is theoretical yet based on case studies of existing radio and television projects. As there have been no widescale studies on the effect of nationwide television in the developing nations, the ideas put forth can be only of a speculative nature.

While the second and the third sections are what might occur if the satellite-borne educational system is implemented, the fourth section analyzes the different components, i.e. production centers, administration, training, maintenance, electrification and feedback, that are required to effectively operate such a system. The annex presents a list of on-going and future studies carried out by international organizations which are related to the topics of this report.

The report is specifically written for situations in new and developing nations. It does not go into such refinements as instant-teacher-response libraries, information retrieval systems, centralized computer teaching systems and the like. The latter refinements have not been considered; they are systems presently possible only in the advanced educational and technological nations.

It has been impossible to deal with each section as an in-depth analysis. Rather, it is hoped that this report may dissolve any over-optimism and over-enthusiasm gained by the new advocate of the satellite broadcasting educational system. Education transmitted by satellite is not as simple as building earth stations, launching a communications satellite and giving TV receivers to schools and communities. Unfortunately, the hardware aspects are probably much easier to implement. The real problem arises with the areas covered in this report.

This report has been prepared for the Department of Communications, International Telecommunications Branch. Assistance was also provided by the Canadian International Development Association.

## TELE-EDUCATION

### A) Teaching Students:

Tele-education is effective as an educator. Acquisition of a particular skill does not always require a live demonstration. Television can replace this usual necessity. The actions of a tele-teacher, if attentively observed, may be later repeated by the student. Television learning, however, must be accompanied by periods of practice and correction. <sup>1</sup>

#### i) Niger:

In a case study in Niger, a pilot educational television station was set up. Children from the bush, who had never spoken French, and who had never seen television before were taught in French. There was a combination of the television teacher with classroom monitors. The monitors were not qualified. They performed duties such as controlling classroom order and explaining misunderstandings where possible.

The combination of the television teacher and monitor was effective. In oral French 79% of the students received better than average marks. Similarly in reading 88% faired better than the average, and written 56%. <sup>2</sup>

#### ii) Colombia:

In Colombia, a similar pilot televised educational programme was initiated. The language taught was Spanish. There was, again, a combination of monitor and television teacher. In grade 2 language, grade 5 mathematics and grade 4 natural science, the television students had higher scores. There was no statistical difference between television students and non-television students in grade 3 and 5 natural science, and grades 3, 4, and 5 social science. <sup>3</sup>

The implication of the Colombian and Niger experiences encouraged learning activity at the receiving end of the chain. The programme

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1. Mussen, P.H., Corigar, J.J. and Kagan, J., Child Development and Personality, 1969, pp. 119 - 120.

2. Ibid, p. 76

3. Schramm, W. et al, The New Media Memo to Educational Planners, UNESCO, 1967, I.I.E.P. 66/111 4/A, pp. 72-73.

permitted the student to frame his own learning responses to an expert television teacher, rather than to a lesser qualified classroom teacher.

B) Instructing Teachers:

In the same case study, television education was applied to instruct teachers. Three separate groups involving 1500 teachers were included in the experiment. The first group of teachers took a residence course and afterwards discussed among themselves the subject taught. The second group took just the television course and the third group took the residence course without television aid. The group which combined television with a face-to-face discussion of the subject taught achieved the highest comprehension level taught.<sup>4</sup>

The findings of these three case studies have a dual effect on the educational resource structure in the developing nations. The first has been explained. Television combined with a forum (face to face discussion of the subject) is an effective means of teaching. The highly qualified television teacher can disseminate his teaching abilities to a greater number of students. The second implication affects the teacher in the developing nation. In order to mass educate the people in developing nations a necessary prerequisite is an abundance of qualified teachers. However, the problem is cyclical; if illiteracy is acutely widespread, the potential number of qualified teachers declines. With the few teachers there are, many have perhaps only slightly more education than the students they teach.

India is a good example in order to illustrate teacher qualifications. In 1965-66, 50% of the teachers in lower primary schools had secondary degrees. In higher primary schools 40% were not matriculates. The proportion of trained teachers was 80.5% in Andhra Pradesh, 93.1% in Madras State as compared to 22.4% in Assam, 31.0% in Orissa and 16.3% in West Bengal.<sup>5</sup>

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4. Ibid, pp. 78-79.

5. Not published, Preparatory Study of a pilot project in the use of satellite communication for national development purposes in India, UNESCO, COM/WS/51, 1968, pg. 8.

Satellite educational television promises to alleviate to a certain extent, this problem. The developing nation sends its best teachers to the programming source. The programme center has more resources at hand than the classroom teacher. The television teacher can present a more interesting and a superior quality of education. By the constant presence of a superior teacher in the classroom the monitor must upgrade his own teaching abilities. Therefore, television can upgrade not only the student, but also the teacher in the developing nation.

In view of the lack of teachers in the developing nations, a satellite educational system can extend the existing boundaries of instruction to a greater area with the same number of teachers. The developing nation employs its limited educational infrastructure to an expanded and more effective form. There should be no doubt, therefore, that television is an effective educator. There should also be no doubt that satellite television education could be useful as a development tool for the nation-state.

## II. BENEFITS OF SATELLITE ETV

As a point of fact, advocates of satellite education claim many benefits for this new means disseminating knowledge. 'The Third Canada-Sweden Working Paper on Direct Broadcast Satellites' reports;

"satellite-borne television for educational purposes could in a number of circumstances, serve in campaigns against illiteracy, in securing universal primary education and extending secondary and higher education through assistance in raising the efficiency of the educational system, introducing new subject matters and new methodology and equalizing educational opportunity." <sup>6</sup>

There is a further attempt to describe the positive values of a satellite-borne television system.

"Taken in conjunction with new techniques of tele-education, space communication would enable developing countries to accelerate the educational process.... Furthermore, satellite communication can reinforce links between communities and thus help to strengthen the bonds of national identity and contribute to nation-building." <sup>7</sup>

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6. Not published, Third Canada-Sweden Working Paper on Direct Broadcast Satellites, p. 11-12.

7. Ibid, p. 12.

Needless to say, advocates of a satellite educational system are certainly not pessimistic about the system's potential effects on the nation-state itself. In the report, it will be attempted to illuminate some problems that might occur if these benefits do result. Wilbur Schramm states that communications has four effects on national development:

- 1) It can widen the limited horizons of the people;
- 2) It can raise aspiration and simultaneously can control national aspiration;
- 3) It can focus attention on what or who is important, or what or who is dangerous;
- 4) It can aid the developing nation to create a climate for development.

There will now be an explanation about the implications of these four functions.

A) Widens Horizons:

Satellite education, applied to Schramm's thesis, can widen the horizons of the people on a national level. To see the full effects of such a plan, it is necessary to understand how traditional society tends to isolate the peasant from modernity and its benefits.

Writing about development problems in Burma, the transitional communication process, Lucien Pye states, is bifurcated and fragmented. There is one system which is urban-centered and based on modern technology. It reaches the Westernized segments of the population. There is also a more complex separate system, based on face-to-face confrontation. The two systems are not closely **integrated**.<sup>9</sup>

The urban-based communications permeates the traditional culture in an erratic manner and both systems are fully autonomous. Moreover, the face-to-face communications system provides more communication with the urban center to the village, than one village to another. The end pattern is like the spokes of a wheel, connected to the hub, but without a rim to connect the spokes at the other end.

Thus, each isolated village, each community, each region is **insulated** against change. There can be no widening of a person's horizons because he has been molded by the traditional social structure.

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8. Schramm, W., Communications and Change in the Developing Nations, 1967, pp. 5-32.

9. Pye, Lucien, Communications and Political Development, 1967, p. 26.



i) Niger:

Case studies on mass media reveal one method to solve such a communications process as Pye describes. Robert Lefranc, reporting on Radio Clubs in Niger, observed that people were making new contacts between villages and between peoples of different walks of life.<sup>10</sup> In effect radio had served to fill the communication vacuum between the different villages. By writing to the radio education programme, an effective feedback system was in operation. Villagers realized that a peasant living one hundred miles away had characteristics common to themselves.

The peasant was not just one member of a small village. In fact, his village was an integral part of a larger area. A coherence, a cohesiveness, a larger community was in the making. If the effects of the Niger Radio Clubs were transposed to a national area, via satellite television education, the rim could be added to Pye's description of the communications process in transitional societies. Not only a community, but a national community, linked to the urban centres, could be implemented. This system could serve to dissolve the urban - rural and regional isolation problems in the developing nations. A oneness could be achieved, a oneness that has been vacant in most developing nations.

B) Raises Aspiration:

Schramm continues to illustrate how national development can be aided by communications through raising the aspirations of the people. The programme must illustrate the benefits of improving their life style.

i) Japan:

In a case study of rural television in Japan, the programme content aimed towards raising the aspirations of the peasant. The thirteenth telecast analyzed the differences between the villagers' wishes for improvement and existing facilities. The telecast dealt with the construction of a water supply system. One such positive reaction to the programme was;

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10. Lefranc, Robert, "Radio Clubs in Niger" in New Educational Media in Action. Case Studies for Planners 3; UNESCO, I.I.E.P. 66/111.3/A., pp. 75-76.

"Although in many respects the conditions in the rural village are bad, we now have the hope of improving them and of building a modern village with a clinic and a library as was the case at Nango Village (the facsimile model village)".<sup>11</sup>

The reporter carefully noted, however, that raising the aspirations did not lead the rural peasants to creative actions, but remained only as an eventual possibility in their present day life.<sup>12</sup>

C) Focuses attention on who or what is important:

What is involved then is to persuade the traditional peasant to attempt to attain the eventual possibility. A perceptual change in the traditional person must occur. Eventually a resocialization of the national culture could be the result. The peasant must see himself in another environment. Daniel Lerner states that communications establishes a characteristic of empathy, which provides the ability to see oneself in the other fellow's situation. Mobility and participation are integral parts of empathy.<sup>13</sup>

The effect is that empathy forces the traditional sectors of the society to involve themselves in a totally new learning experience. The need for knowledge tends to counter apathy and suspicion of change.

i) India Farm Radio Forums:

Studying the results of the Indian Farm Radio Forums, V. K. Narayana observed that the peasants formed a village democracy. Groups, at first reluctant to speak their opinions later adopted functions halfway between those of the elected panchayat and the village council.<sup>14</sup> The radio encouraged the peasants to take a more responsive role. The peasants were involving themselves in a decision-making process from which they had previously divorced themselves.

ii) Communist China:

Concerning Communist China, Alan Ping-lin Liu noted that peasants listening to rural radio also underwent a perceptual change.<sup>15</sup> Natural disasters such as floods or drought, could be explained, prewarned and sometimes prevented. This effect can be transplanted to other

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11. -----, Rural Television in Japan, UNESCO, 1960, c. 59/IV.21/A, p.p. 139-140.

12. Ibid, p.

13. Lerner, D., "International Cooperation and Communication in National Development" in Communications and Change in the Developing Nations, edited by Schramm, W., 1967

transitional societies where natural disasters are associated with religious or supernatural explanations. Events explained by the supernatural are associated with lack of knowledge, whether general or scientific. The possibility that a logical explanation can be attained (if there is a logical explanation) cannot be acquired due to the association of the supernatural with fear. Knowledge lessens the impact of fateful, unexplained events. The peasant is more able to control his environments.

As the peasant undergoes a perceptual change,<sup>16</sup> the government must attempt to employ this changing perception and aim for a resocialization of the entire culture. John D. Mitchell explains that socialization must redefine the scope of memberships and affiliations.<sup>17</sup> Secondly, there must be a re-inculcation of ideas, symbols and disciplines that are part of the general culture desired. For example, Mitchell states that the Communist Chinese aimed at breaking up allegiances to the extended family unit and transferring allegiance to a greater responsibility: the state.<sup>18</sup>

D) Creates a Climate for Development:

Finally the combination of widening horizons, increasing aspirations and resocializing the people creates a climate for development. By geographical implication, satellite education will broadcast to a large area. Therefore, the development process is spread in an egalitarian manner throughout the nation. Because the elite controls the programming source, satellite education can effectively focus on different needs which are correlated with each nation's goals.<sup>19</sup> Schramm describes the climate for development to be a nationwide dialogue for upward, downward and lateral information directions to discuss national goals and accomplishments.<sup>20</sup> Such a dialogue, transmitted as a result of satellite transmission, would indeed serve as a sharp contrast to existing communication effectiveness. More important, perhaps a satellite education system would in fact create better conditions to speed up development in transitional societies.

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14. Mathur, J.D., An Indian Experiment in Farm Radio Forums, UNESCO I.I.E.P.

15. Liu, A.P., "Growth and Modernizing Function of Rural Radio in Communist China" in Journalism Quarterly, Vol. 41, 1964, p. 576

16. The Oxford Concise Dictionary defines perception as the "intuitive recognition of ...." Here, perceptual change is used to show that the peasant sees his society not in the traditional sense i.e. family, the extended family, the village etc.

### III. DISORDERS

#### A) Implications:

Education transmitted to national areas cannot be viewed as an isolated variable. Mass education, on the scale that a satellite-borne system would disseminate, will indeed establish many positive effects towards enabling the transitional nations to develop. But on the other hand, there probably will be other unpredictable effects.

It is necessary to view satellite education in context with a total viewpoint. Increasing education, for example, might seriously alter political systems in developing nations. It will now be attempted to avoid the positive aspects of satellite education in relation to development. Rather, it will be explained what could be the effect if indeed the beneficial results of satellite education occurred.

##### i) Raising aspirations:

There is the problem of not satisfying the demands which were raised by new aspirations. There is the problem of new social stratas formed by increasing education. There is the problem of satellite educational content: will it be to educate and inform the people or to spread propaganda and control the people. All of these problems will either strengthen or weaken the power of the political government in power.

The problem of not satisfying demands created by a satellite educational system is an extremely important issue. The government must ensure that the programme content is geared to other related development plans in the nation-state. This fact may be explained by a hypothetical case. A new and developing country institutes a national medical programme. The government decides that small regional clinics staffed by nurses or technicians trained to deal with simple medical problems could better aid the rural peasant than central, complex, urban medical centers.

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17. Mitchell, John, D., "Socialization and the Mass Media in China and Japan" in Journalism Quarterly, Vol. 46, Autumn 1969, p. 576.
  18. Ibid, p. 579
  19. The Concise Oxford Dictionary defines elite to be "The choice part, the best". In reference to this paper, elite signifies the minority of the population which controls the decision making process, be it in a military, economic or political etc. sense.

The government employs the satellite educational system to persuade the people to use the rural clinics. The people can be shown that clinics can issue snake poison remedies; the clinics can provide a better mid-wife than the local one: the uses are multiple and obvious. The problem arises when the people do recognize the benefits of the regional clinic.

"X" percentage of the national budget has been delegated to build and staff regional clinics. Then an adjacent country attacks because of a dispute. Immediately and naturally, the defending nation rallies. The regional clinics are temporarily forgotten. Thereafter, the defending nation minimizes her long-term development problems and maximizes the immediate goals: protect the nation-state. Consequential programmes to build up the army occur. Even after the dispute has ended, the government in power must guard against the dangers of overthrow. As a by-product, the military sector strengthens itself in comparison to other interest groups in the developing nation.

To those who are nationalistically inclined, the diversion of money is a necessary result. The protection of the nation-state's territoriality is the supreme priority. The issue is more negative with those (i.e. the rural peasant) who are not so politically, not so "nation-state", oriented.

The rural peasant has been taught to use the clinic. He recognizes that the clinic's operations should be continued in the region. Suddenly, the clinic's doors are shut. Perhaps his strongest affectations are to his village or his region, rather than to the protection of his nation's territoriality. After a time, the elite must constantly make the peasant aware of the aggressing nation's threat. If the ruling administration fails in keeping up the peasant's fear of the external aggressor, the peasant will become dissatisfied. If the dissatisfaction increases, frustration results.

Although this situation is hypothetical, it is realistic. Any number of variables and any number of nations in the transitional stage can be substituted for the two actors in this conflict. The point is, if aspirations are raised, they must be satisfied by the government.

i) (a) Saudi Arabia:

In essence, it is a question of television content. The reform and developmental problems that face King Feisal in Saudi Arabia are similar to the problems of development in other areas of the Third World. The decisive factor is how fast to reform. In contrast, a major error of the Sultan of Muscat and Oman was that he attempted to restrict any progressive information to the boundaries of his territory.<sup>21</sup> It was an impossible task.

King Feisal recognizes that Saudi Arabia cannot be kept closed. Radicalism too easily breeds on education, travel and the transistor radio. The commentator states,

"Certainly their plans (right-wing princes) to turn back the clock in Saudi Arabia would probably produce the subversion they seek to avoid, for most of it stems from the educated young people who, having seen the social conditions and progress elsewhere in the world, want their own country to travel more rapidly along the road."<sup>22</sup>

ii) Parallelism:

The crux of the issue, therefore, is to somehow use the television media in a mode that is parallel to the development of the nation. For example, the Francophone nation in Africa that wholly imports French programming services can very easily upset their development logistical plan and the development attitudes of the people. Television, for the reasons already

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21. -----, "King Feisal faces the problems of progress" in The Globe and Mail, 24 August, 1970, p.7

22. Ibid, p. 9

explained previously, can easily lead to a 'galloping' development programme that is felt to be needed by the people yet is known to be unattainable by the government. The television, therefore, is most effective when it can pinpoint certain development objectives and subdue or depress other fields that are not yet realistic in the minds of the development planners.

B) Television and Political Power

i) Its present usage:

Television, as has already been illustrated, can create both benefits or problems for the government in the developing nation. The political importance of television has been recognized by the leaders of all the North American political parties. There is no doubt that the Kennedy victory in 1960 was based on its excellent supporting machinery which took advantage of advanced medias such as television. As an example, in retrospect the televised Kennedy-Nixon Debates of 1960 has persistently evoked the opinion that one major drawback afforded Mr. Nixon was his dark, unshaven appearance so enhanced by television.

While the latter factor was indeed a subtlety, the recent American bid by the Senate to limit Presidential time on television reflects the growing fear and respect for the powers of television. In Canada, it is illegal to broadcast any political comments within twenty four hours of a general election.

The reality underlying the phenomenon of television is the persuasive impact of its disseminating powers. Information seen on television is further distributed through meeting places such as the bazaar or the market place. From there the information is carried to and from the villages and cities by the milkman, the merchants, the travellers etc. Indeed, the impact of television cannot only be measured by the number of viewers present for a particular programme. The reception area is carried by oral directives far beyond the immediate boundaries of the receptor.

i) (a) Egypt:

Obviously, it is the politically astute leader who recognizes the influence of the television media. This astuteness is certainly not restricted to rule in Egypt. It was found that the Arabs who listened to his political speeches could not actually understand his message verbatim due to problems of dialect.<sup>23</sup> However, the general atmosphere and intentions of the speeches were received correctly.

(b) Chile:

Fidel Castro has frequently employed television to reassert himself, the Cuban situation and Marxist philosophy. It is significant that Castro is now utilizing TV to press for a Marxist election victory in Chile. Extended commentary on the Chilean election is broadcast regularly by two of Santiago's three television channels.<sup>24</sup> One channel is operated by the Government. More decisively political is the agreement between Santiago's Channel 13 and a Havana channel to exchange broadcasts.<sup>25</sup> Channel 9, operated by the Chilean National University, is mainly run by leftists and Marxists.<sup>26</sup>

The propaganda transmitted centers around the theme that "Chile must not be used as an imperialistic base". Also, Castro takes note that "the historic tensions between Chile and Peru should not be exploited by the United States".<sup>27</sup> It is significant that Salvadore Allende, the leader of the coalition between the Marxists and the extreme leftist parties of Chile, recognized how television can aid in political pursuits.

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23. Information related through interviews.

24. Browne, W. Malcolm, "Castro utilized TV to press for Marxist win in Chile", in the Globe and Mail, 24 August, 1970, p. 9.

25. Note: Salvadore Allende received the highest total percentage of votes on the date of election returns. While television cannot be directly given the credit for the first Marxist free election victory in Latin America, it can be said that television probably did aid in his campaign.

26. Ibid, p. 9.

27. Ibid, p. 9.



Of course the highly significant factor about television is its ability to put the leader in each and every home or village that there is a television receiver. Just as the Canadian Conservative Party Robert Stanfield complained about the diminishing importance of Parliament due to television, Prime Minister Pierre E. Trudeau increased television interviews in the halls and on the steps of the Commons. Television can be concise and direct. There needs to be no misinterpretation by other written medias. The greater the impact of television over radio has previously been explained. Each and every viewer sees the speaker right in front of him, even though the speaker might be miles away.

Television can be of even more importance to the one party states or the authoritarian-type government. Because it is so expensive, especially where a satellite-borne system is planned, the government will have sole discretionary powers on what to transmit.

Television is a media easily controlled by the censor. Perhaps only in nations such as India where there is a highly developed press that is allowed to criticize and urge the government to certain reforms can the impact of television be lessened. Nations that are politically unstable would be foolish to not empower propaganda programmes which reinforce that party's legitimacy to rule.

ii) Formation of new educational stratas:

Satellite education also threatens the elite in another manner: the formation of new educational stratas.

James S. Coleman explains that there are three causes for the formation of an elite in a developing nation.<sup>28</sup> There is a limited or non-existent upward mobility, or none at all, a narrow base educational system, and a rigid stratification system. If there is equal ability for upward mobilization, the apex is fairly closely guarded by those belonging to the prestige

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28. Coleman, James, S., Education and Political Development, 1965, pp. 354-355.

universities such as Harvard, M.I.T., Oxbridge, or Tokyo Imperial University. Finally, if the educational opportunity is equal, but the structure is limited and there are many jobs to be filled, the entering student becomes an accepted part of the elite.

For the majority of the populace, upward mobilization is an impossible task due to the lack of education. Satellite education, while increasing the dynamic character of the nation-state, involves close scrutiny by the government in power.

If a segment of the population is being raised in literacy standards or intermediary technical levels, the best will want to participate in some part of the decision making process. In fact, in most developing nations, there is little or no middle class. The government (or the army) is often the only major employer. The jobs in the government are often awarded by some system of patronage, clan or ethnicity. Therefore, one section of the population is content; one section is discontent. Developing nations are already beset with enough dissenting minorities in their political systems. Satellite education could indeed increase the magnitude of such minority problems. Diversity leading to disintegration rather than unity could be the end product. Nigeria-Biafra and India-Pakistan are two past classic examples of disintegration due to ethnic or religious malignity.

iii) Generational discontinuity:

Another problem facing the leading members of the government in power in the developing nation is generational discontinuity.<sup>29</sup> This generational discontinuity maintains itself between the traditional elite and the first wave of the modern educated new generation and the divisions between the latter and the succeeding generation of better educated and professionally more qualified people.

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29. Ibid, p. 358.

This is a problem that is faced particularly by states that employ ideology as a development tool. In the U.S.S.R. there is always a conflict "X" between the specialized partisan groups, (i.e. the intellectuals, the managerial elite, the military, and the government heads,) and the goals of the party. Here, there is a strong parallel to the one party states of the developing nations.

Specifically in Africa, the ideology of the emerging nation-state centres on anti-colonialism. Succeeding generations do not have as strong a positive affectation towards the struggle for liberation, or "independence". Often the former parent countries relinquished their power to the African elite, (i.e. in the Belgian Congo). The Africans started without experience; inept and inefficient government sometimes resulted. As an integrator, the elite used the negative affection anti-colonialism as a unifying element.

The new partisan groups and the first waves of educated Africans i.e. the government administrators and the military, or the new generation, perhaps feel strongly about the maintenance of the state's independence, yet disagree with the elite's ability to rule effectively. The old generation therefore, faces a threat. The legitimacy of ruling via the 'we-they' syndrome, (nation-state vs. the ex-colonialist, external aggressor, whatever,) diminishes vis-a-vis the competing specialized partisan sub-elite groups. Indonesia is a classic example. Sukarno employed his charismatic abilities to persuade the people that external aggressors were hindering the development process. An army coup finally ended his rule.

It should be noted that by no means will satellite education produce immediate threats to the political power of the present ruling leaders. Universal education even at a primary level is a lengthy undertaking. The effects will not show themselves for a number of years.

iv) Effects of Mass Education:

It is interesting to observe that one of the major causes for the emergence of so many developing nations after the second world war was the introduction of education to the colonial nations. Needless to say, the colonialists did not plan that independence should occur so soon. In retrospect, it is easier to see what happened.

One feature of the French colonial educational system was the policy of assimilation, under which the most intelligent Africans known were given a French type education.<sup>30</sup> The political attitude of assimilation stressed values inspired by the French revolution and the Declaration of Human Rights. It stressed the superiority of French civilization, French cultural heritage, the reason, the common sense, and the righteousness of France.

British colonial education was similar to the French programme in that it stressed Britain rather than the colonized territory. For example, Ayo Oguneheys states that the Nigerian was taught how Britain conquered and governed Nigeria.<sup>31</sup> The few Africans who were sent abroad were taught constitutional law, politics and economics.

In both the French and the British colonial educational systems, the most promising Africans who were sent abroad returned home to eventually participate in the new feelings of nationalization. What other alternative did the indigenous African intellectual have? They were treated as inferiors by the parent countries. They could no longer share the same sentiments with the indigenous people that they had once left. The new African applied the abstract theories taught to them by the parent nations and applied those theories to their indigenous country. Independence in many colonial territories was the result.

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30. Debeauvais, M., in Education and Political Development, ed. by J.S. Coleman, year 1967, p. 80.

31. Ibid, p. 131

Mass education, therefore, will have definite repercussions on the present ruling governments. The Europeans contributed to colonial independence by stressing the wrong type of education and indoctrination. Will the present government leaders who choose to implement a satellite educational system make the same mistake? It is mainly a question of control.

v) Obscure Intentions:

Definitely, a satellite-borne educational system will entail a costly expense. The expertise required is both despairingly diverse and complex. For this reason alone, a developing nation might easily have ulterior motives over and above the educational goals. India might indeed be one of these nations. India's political climate so determines this decision.

People in opposition to Prime Minister Mrs. Indira Gandhi fear that she might bow to public pressure and opt for an independent nuclear deterrent. The election will be in 1972. Leading scientists and technologists recently gave the verdict that a nuclear bomb was "scientifically feasible, politically desirable, strategically inescapable and economically sustainable"<sup>32</sup>

The verdict definitely refers to the fact that Communist China is now a member of the nuclear club. Furthermore, India has never signed any nuclear non-proliferation treaty in which she could have been restricted from developing nuclear weaponry. At present time, the subject of the peaceful uses of underground nuclear explosions is still in the initial stage of development and much work and study require to be done before it can be deployed safely and effectively.

Dr. Vidram Sarabhai, chairman of India's Atomic Energy Commission states,

"Ten to 25 years from now when the population of India would be somewhere between 750 and 1000 million it can hardly be controversial that we would need a very strong base of science and technology, of industry and agriculture not only for our well being but also for our national integration and for ensuring our security in the world."<sup>33</sup>

Moreover, one other source in the Indian government states that an Indian designed satellite will be a reality by 1974-75 and necessary launching capability may be acquired by 1980.<sup>34</sup>

By design, the technology required for peaceful nuclear underground explosion, launching facilities for a communication satellite run to some extent parallel to obtaining a military nuclear strike capability. Unfortunately, Dr. Sarabhai does not list a priority scale for placing science and technology, industry and agriculture, national integration or security in perspective. Neither does he define what intentions are to be gleaned from "India's security in the world".

The communications satellite must be placed in a healthy perspective in relation to the national goals of the developing nation. The usage of the satellite will be determined by whether the goals are long term or short term. If the goals are long term, the satellite will probably be used for developmental purposes.

If the satellite is used for short term purposes, there are strong implications that the goals are nationalistically centred, designed to gain international prestige, and in obvious situations will be used for militaristic purposes, whether defense orientated or not. The use of the satellite system will be determined by the receiving nation. If the nation opts for the short term goals, it may be said that the nation bases its goals on nationalistic emotionalism rather than an objective analysis of its capabilities. It will no doubt hinder other more pressing needs of development.

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32. Dukkai, K. K., "India to launch nuclear tests", in The Ottawa Citizen, 11 August, 1970, p. 5.
33. Ibid, p. 5.
34. Not published, Nerurkar, B.Y., Wireless Advisor to the Government of India, A Long Term TV Plan for India, July 7, 1970, p. 43.

The remaining section of this report will then assume that the developing nation will employ the communications satellite for long term goals. Moreover, the essay will restrict the analysis to only those areas concerned with television. There will be no attempt to explain other uses for the communications satellite.

#### IV) IMPLEMENTATION OF A SATELLITE-BORNE EDUCATIONAL SYSTEM

##### A) Establishing a control unit:

###### i) Nigeria:

A project as large as one instituting satellite education will require intensive cooperation between a number of intra-governmental departments. There is no place for competing agencies in such an expensive project. Such competition in Nigeria caused considerable difficulties. Stations were established by or under the Ministry of Information. The Ministry of Education wanted to broadcast to schools during the daytime hours. However, this involved special crews of technicians, etc. The result was a difficulty in obtaining hours suitable for sharing time between the needs of the two departments.<sup>35</sup>

###### ii) India:

Here there necessitates coordination between the Department of Atomic Energy and the Ministry of Information and Broadcasting, also the Ministries of Education; Health and Family Planning; Communications; Food; Agriculture and Community Development and Cooperation; Tourism and Civil Aviation; and Post and Telegraph. Proceedings have been delayed for approximately a year due to the DAE wanting to employ one stand-by channel that is operated by the Ministry of Post and Telegraph.

It may be suggested here that the agencies involved are not displaying the immediacy and importance of satellite communications but merely a self-centered interest. The solution in part is to establish a committee to coordinate all actions of various ministries. The committee should be represented by only those parties who play a major role in the system. They should be top ranking members in order to allow a full commitment

by their organizations. They should hear reports from other interested organizations which have no decisive power in the committee.

B) T.V. Production Programming:

In relation with the software aspects, much attention must be paid to the programme service. A prevalent characteristic of Third World nations today is the diversity of languages, cultures and religions within each nation state. If developed nations such as Canada and Belgium are to a certain extent unstable due to conflicting ethnic goals, imagine the cleavages existing in some of the developing states. This only compounds the difficulties of applying television to the developing nations.

Upon the realization of the many characteristics of each society, the decision must be made as to which segments should receive priority attention. The programming must cater to the individual, for the individual is much too inflexible to reverse the procedure. Priorities must be decided between local or national needs, rural or urban needs and the type of teaching programme, consulting planners and the villages to be the receivers.

i) Local vs National:

To be effective, the television must speak in the local idiom of the viewer. The television must feed local needs yet streamline those needs towards the national goals. In short, there must be a realization of the multiple sectors in the society. There must be a consideration of such factors as: population density; vocational breakup into agricultural, industrial and intellectual activities; literacy; intellectual level, cultural background and level of receptivity; economic strata; age and sex strata; views, habits, preferences and conditions of viewing; and revenue potential.

ii) Rural vs Urban

Eighty percent of the population of India resides in the villages. It follows that broadcasting to villages should receive a higher priority than to the cities. However, the programming centers, as well as the government agencies, news information services etc.



will be in the city. The administrators will be urban orientated. Therefore, probably the programming service will be directed mainly at the urban clientele.

As an example, one Indian report suggests that a logical format would be :  $21\frac{1}{2}$  hours per week for the intelligentsia,  $15\frac{1}{4}$  hours for the middle strand viewer (urban and rural),  $\frac{1}{2}$  hour per day for teachers, 4 hours per day for students, 2 hours for vocational students and  $6\frac{1}{4}$  hours per week for the teleclub, women and children, social education and youth/sports. There seems to be a disproportionate amount of time transmitted to the highly educated sector (the intelligentsia)

Indeed, there is a common problem in the developing nations. The urban areas are excellerated in development projects vis-a-vis the rural areas. It is a fact that the intelligentsia needs to be exposed to a great deal of information. However, it is the rural area that is stagnant in developmental terms. It is the rural area that requires literacy programmes. It is the rural area that needs to be entertained by a rural **oriented** entertainment. It is the rural area that is falling fast behind the urban areas as the developing nation is falling fast behind the developed nation. It is the farmers' sons that are fleeing to the cities for potential status and more materialistic life. The urban dwellers are not fleeing to the countryside in hope of a better life. It is only logical from a programme content oriented viewpoint that the rural sector should receive rural content. Unfortunately, the opposite will probably prevail.

iii) The School and Television:

There must be decisions made on which level of learning television will concentrate and whether T.V. will replace or supplement the classroom teacher.

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36. Nerurkar, B.Y., Long Term T.V. p. 9.

37. Ibid, p. 1-4 of annex.

iii) a) Who to teach:

An opinion mirrored in private conversations suggests that the illiterate adult should be mainly entertained. If not, vocational training should be considered as a more important goal than teaching the illiterate to become literate.

A UNESCO observer reports "In a country where 70% of the population is still illiterate, but where 40% of the population is under 15 years old, it is apparent that in the long range, the best way to eradicate illiteracy is to provide good elementary education for all children.<sup>38</sup>

In regards to extending and improving secondary education, television could be used effectively for teaching the fields of mathematics and science. These are subjects which lend themselves to a technical proficiency. It is these subjects that in the immediate future concentration must transfix itself.

Similarly, in the teaching of languages, there should be an attempt to foster a national language. The developmental benefits are obvious. There needs to be no assessment of the potentials of a national language.

As the television becomes more comprehensive, the service can support correspondence courses to the isolated students and refresher courses for on-going training programmes, colleges etc. This will depend on direct broadcast and is not yet immediately foreseeable.

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38. Preparatory Study of a pilot project ..... development purposes in India, p. 5.

At present, there exists in India one T.V. station in New Delhi serving 345 schools with 570 sets reaching 200,000 students. There are special programmes for students (30 min/week), programmes with student participation (once a month), rural education programmes (20 min/day) for the 80 community T.V. centres set up around New Delhi and social education programmes for the 101 New Delhi TV clubs (30 min/week).<sup>39</sup>

A comprehensive educational system must commence at the earliest possible moment in the student's life. The child has much less resistance to the ideas of change, and innovation which are so important to the development of the nation. Stress must be laid on the primary level, decreasing in time schedule until the university level.

iii) b) Replace or Supplement the Classroom Teacher:

It must be decided what role the T.V. lecture will perform in the classroom. Generally, the decision will rest on economics, manpower resources, quality of teaching and other local variables. The decision must also take into account the political effect of either decision.

By implementing a satellite ETV system, there will obviously be an expensive capital outlay. Teacher's salaries usually maintain a constant proportion to capital investment. Guy Benevise discusses demands made on the educational budget by teacher's unions.<sup>40</sup> The administrator will probably have to initiate some incentive to encourage teachers to become familiar in the use of ETV. Furthermore, many teachers might fear the introduction of ETV. Will there be any threat to the existence of their jobs? The problem is similar to union opposition to automation. Settlements are often made to ensure that future jobs will be guaranteed or the workers will be replaced in other jobs. There is no doubt that the presently unqualified teacher can see ETV to be an educational competitor.

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39. ----- "Telecommunications and Education", in the Telecommunications Journal, Vol., 37, VII/1970, p. 28.

To continue the parallel, the television teacher should be presented as only a resource teacher. In no way should the television teacher be represented as a personality figure. Certainly, he must combine some enthusiasm and flair in the teachings. However, if he becomes too dominant a partner in the teaching team (television teacher and the classroom teacher), the classroom teacher might have much difficulty in creating or maintaining a close rapport with his students.

C) Development of the Operational Organization and Construction Period:

i) The Consultant:

An often overlooked but extremely important fact in the logistical plan for implementation of the system is the role of the planning consultant. Much of the system's economic viability rests upon his analysis. Since contracts are awarded on a competitive-bid basis, it should be a natural responsibility that the agent or firm which will do the planning, be acceptable to both the receiving and the donating nations. Caution is required with the agency which gains the confidence of only one party promoting the concept that much money can be saved by taking advantage of his own expertise. However, sometimes the good intentions are coloured by such ulterior profit motives as arranging for an extensive study contract or guiding the award decision on competitive bids towards a preferred supplier.

The result can be costly and time delaying particularly if there is limited co-ordination between the receiving and the donating nations. The cautionary warning above has been by no means an inquisition of private consultants. In Canada, the shortage of consultants in certain areas leads to much mobility between government and private organizations. The point is simply that lack of foresight can cause in retrospect a great deal of delay and expense.

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40. Beneviste, Guy, "Political Obstacles to the Adoption of E.T.V." in Journalism Quarterly, Vol. IV, June 23, 1970, p. 340.

ii) The Operational Organization:

Time must be allotted for the recruitment and training of staff, the advance stockpiling of programmes and the training of all classroom teachers. The operational organization must be phased according to the capabilities of the human resources available, and the requirements for a basic curriculum programme. The phased programme should be managed to ensure that the demand for programmes does not outrun production. It is necessary to phase the programme in harmony with the priorities already outlined.

iii) Construction Period:

For the commencement of construction, a schedule must be adopted and integrated to the whole system. The considerations are buildings and roads, studio and transmitting equipment and receiving sets.

iv) Too Early Implementation:

It should be noted that too many nations rush into ETV simply because of the exciting possibilities the system promises. When the Indian Farm Radio Forums were first instituted at Poona, there was no provision made for expansion. Wilbur Schramm reports that the expansion project lost momentum during the first three years.<sup>41</sup> Thailand moved into radio four years before the programme was first instituted.<sup>42</sup> First, provisions were designed to ensure need and requirements, capabilities and all other organizational requirements were realistic and attainable.

D) Local Receiving Factors:

i) A Need for new schools:

The type of architectural structure will naturally vary not only from developing nation to developing nation but also from region to region and from rural areas to urban areas. That which represents the model urban school or the model

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41. Schramm, W., The New Media Memo to Educational Planners p. 107.

42. Ibid, p. 106.

regional school will serve as a stark contrast to the stereotype rural school. To a lesser degree, the same contrast exists between the North American secondary school and the 'little red school house'.

Some form of separation must exist to limit audio and visual distractions between the students receiving and not receiving the televised instruction. Moreover, probably, the classrooms will be overcrowded in comparison to the North American classroom. The overcrowded conditions do not necessarily present a problem because some form of audio extension (i.e. speakers) throughout the classroom can be placed. Likewise, soundproofing curtain made from local supplies would be sufficient.

The same problems that encourages the construction of new schools in Samoa surface themselves in Latin America. Surveys of teachers' responses reveal that there are not enough seats for the pupils while they are viewing television (one out of three teachers); electrical failures frequently block out parts of the broadcast schedule (more than one out of three teachers); it is impossible to make the viewing room dark enough (one out of three); there is only one set in the school and changing classrooms to use it causes great confusion (more than one out of three).<sup>43</sup>

Certainly some of these problems seem to be quite easily solved through local ingenuity and/or common sense maintenance. However, it is a fact that for approximately one out of every three teachers polled, there existed a tangible annoyance that resulted in the ineffectiveness of television broadcast.

i) a) Samoa:

Perhaps, it is suggestive that in Samoa, many pre-television schools have been replaced by new consolidated school buildings especially designed to complement ETV.<sup>44</sup>

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43. Ibid, p. 113.

44. Ibid, p. 113.

Of course, at the outset of the plan, where it is uneconomically possible to erect schools, existing facilities will have to be used. A UNESCO Expert Mission on India states:

"If radio and television sets are given to the many small villages without schools and if these villages are provided with teaching assistants quickly trained for the specific tasks, children of these villages will not have to wait years for, or perhaps, forego fundamental education".<sup>45</sup>

ii) Textbook Supplies:

The additional textbook supplies will depend to some extent on the type of programming. The more sophisticated learning techniques (i.e. programmed learning) probably will not be implemented due to the high costs involved with producing paper. It might be the custom, as in Trinidad, that notes are not handed out to the student.<sup>46</sup>

iii) Copyright Problems:

Moreover, there is the additional problem of international copyright laws. The great majority of the developing nations must import the textbook supplies that they need. Only a minority of school children can afford to provide themselves with adequate books of instruction. The solution is obviously to produce books more inexpensively. However, then the authors and publishers will be paid a smaller royalty for translation into the native language.<sup>47</sup>

Again, the developing nations are walking a treadmill. If they do not try to keep up with the developed nations, they will fall into the abyss. It is all the developing nation can do to maintain its speed on the treadmill, let alone run faster. The developing nations need books, periodicals, even television programmes. BIRPI and UNESCO

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45. Unpubl., Preparatory Study ..... development purposes in India, UNESCO, 1968 COM/W5/5, p. 5.

46. Not published, An Educational Television System for the Government of Trinidad and Tobago, 31 October, 1968, p. 30.

are attempting to establish an international copyright law for all types of information transmission. The result perhaps is that the developing nations may face less expensive educational costs for supporting medias.

However, there has to be some instructional link(s) between the production centre and the teacher. Assume as a fairly accurate assessment of teaching credentials in the developing nations that the majority of teachers will be non-qualified. There necessitates at least some instructional material sent from the production centre to the instructor, explaining what goals are to be accomplished in the lesson and/or an explanation of possible questions that might be asked by the student. Otherwise, if the teacher's instruction material is not delivered, there is a reduction of effective interpersonal communications between the teacher and the student. Therefore, the programme's usefulness diminishes.

iv) Mail and Transport:

If the mail is reliable and the transport is reliable, the system will probably run effectively. However, as outlined above, a dependable shipping-delivery mechanism is mandatory. If transportation and therefore mail is haphazard, the construction of adequate routes will have to be commenced. The alternative is to have a buffer storage structure with pre-supplied support lesson material. The amount of storage (i.e. days, one month, etc.) would depend on the reliability of the transportation service. This would decrease the reliance on independable road systems, but again, it would pose an unexpected cost. More serious, however, is the fact that any sudden adjustments in the current programming schedule would become cumbersome.



v) Choosing the Location of the Receiver:

When dispersing the receiving sets, the planners should try to integrate television programming with local development campaigns. In this manner, different development campaigns can be supported instead of nullified by television. For sampling techniques, village groups near the test television villages should be selected to enable comparison of television's effects upon their societies.

vi) Electrification:

The following section is an analysis of the possible solutions of providing reception for television in non-electrified areas.<sup>48</sup> It is a step-by-step analysis which follows consistently from:

1. conditions necessary to operate a power supply;
2. the types of power supply methods;
3. a correlation between the types of methods employable with each condition;
4. costs of power supply methods;
5. and finally, the best methods to use when correlated against cost, degree of complexity of each method and ability to operate the power supply under the least restrictive conditions.

It appears rather optimistic in the number of people that can simultaneously watch a 23" TV screen in comfort in a tropical climate. However, a number of 50 people maximum would seem more correct than the 150 people assumed in the report.

vi) a) TV as compared to Radio:

The differences between electrification for radio reception and television reception are many. For comparatively large pictures, i.e. 23", an

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48. Not published, Report on the Problems Involved in Providing for Community Reception of Television in Non-electrified Areas of Developing Countries, and an Examination of Possible Solutions, United Nations Industrial Development Organization, 1969, WG. 15/24.

external electrical supply will be needed, or in the case of non-electrified areas, the power supply will have to be included as part of the television receiver installation. In non-electrified areas, the economic considerations will consist of the initial cost (of the combination of power supply, television receiver) and the running costs.

Current TV receivers manufactured in the industrialized nations use 17" to 23" picture tubes. Already, the all solid state receiver is available at almost equivalent prices as the tube only receiver.

Because many of the television sets will be placed in vallages for community viewing, it follows that there will be many people watching the programmes. The mathematical formula  $n = \pi \times \frac{d^2}{a} \times \frac{\theta}{180}$  is used to determine the number of viewers who can clearly watch the TV set. With a 23" rectangular screen, the number of viewers at an absolute maximum, is 150. For educational purposes, the number of viewers is 30-35.<sup>49</sup>

\* where d = viewing distance

θ = viewing angle

and a = area allotted to each viewer

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49. Ibid, p. 7.

vi) b). Choice of Power Supply:

There are nine possible methods of power supply to a television receiver in a non-electrified area. The methods will depend on whether the following conditions can be satisfied. They are:

- 1) the accessibility to an electric supply for battery charging;
- 2) the availability of gasoline and oil;
- \* 3) the existence of winds of adequate velocity;
- 4) the ability to maintain an engine-alternator;
- 5) the ability to change and maintain a battery locally;
- 6) and the ability to maintain a floating battery. Pg. 37

\* Note: re 3) A generator powered by wind velocity has the major disadvantage that it does not provide power if the wind velocity falls below a minimum value determined by the generator's design, i.e. 11 mph for 50 watt power.<sup>50</sup>

The following table represents the various types of power supply methods that are available in the non-electrified areas. The first method is practical for the tube type receiver while only the other eight methods can be used for the all-transistor receiver. The nine methods are listed in the following table:

Method 1	Description
1	Engine/alternator for use with a tube type receiver
2	Engine/alternator for use with all-transistor receiver
3	Battery alone-recharging by transport to an electrified area
4	Battery alone-recharging by a local engine/generator combination using normal charging
5	Battery alone-recharging by local engine/generator combination using fast charging
6	Engine/generator plus floating battery
7	Battery alone-charged by pedal generator
8	Wind-driven generator plus floating battery
9	As method 8 with pedal generator as stand-by. <sup>51</sup>

50. Ibid, p. 32.

51. Ibid, p. 37.

The following table represents the type of method(s) to be used in correlation with the conditions:

CONDITION	Method								
	1	2	3	4	5	6	7	8	9
Access to electricity supply			X						
Availability of petrol and oil	X	X		X	X	X			
Existence of winds								X	
Ability to maintain petrol engine	X	X		X	X	X			
Ability to charge battery locally				X	X		X		X
Ability to maintain a floating battery						X		X	X

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The following table represents assumption of costs in American dollars on the costs of the various items involved. The initial cost, the annual running expenses and the annual depreciation charges are listed.

Item	Initial Costs	Annual Running Expenses	Annual Depreciation Charges
Battery transport	---	90	---
Peddalling labour	---	60	---
Engine/generator	180	60	60
Wind-driven generator	360	---	36
Pedal generator	180	---	18
Quick charger	220	---	22
90 amp.-hr. battery	36	---	36 or 18 *
60 amp.-hr. battery	30	---	30
10 amp.-hr. battery	20	---	20 or 5 *

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\* Depending on expected life of battery.

52. Ibid, p. 38.

53. Ibis, p. 40.

To provide a basis of comparison between the different methods, the next table under 'Differences' illustrates annual changes and the initial cost of running each of the methods Nos. 2 to 9 to the corresponding values of Method 1.

Method	Total Initial Costs	Total Annual Charges	Differences	
			Initial Costs	Annual Charges
1	360	120	0	0
2	420	120	60	0
3	300	120	-60	0
4	456	96	96	-24
5	676	82	316	-38
6	440	125	80	5
7	440	98	80	-22
8	636	54	276	-66
9	816	---	456	---

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It should be understood that costs of batteries, engine alternators, wind charges etc. are highly variable depending on transportation costs, local manufacture, quantity of production, etc. Quality with respect to local manufacture can fluctuate widely. The order of preference in this conclusion will therefore not be the same for every country.

From the above table, it is shown that method 3 is the cheapest because it will take five years before the next cheapest method to compete in price. Similarly, the most expensive methods are 4, 7, 8, 6, 2, 5 (in ascending order).<sup>55</sup>

vi) c) Order of Preference:

The next table (below) correlates the order of preference against the initial cost, the running costs, the degree of complexity involved (i.e. skill required in maintaining and operating each of the methods) and the ability to operate a power supply under the least restrictive conditions (i.e. those explained after Choice of Power Supply).

54. Ibid, p. 41.

55. Ibid, pp. 41-42.

Order of Preference	Description of Method	Requirements
1	Battery alone - charging by transport to an electrified area.	Shipment to an electrified area for a transport (plus charging) cost not exceeding about 1.70 dollars.
2	Wind-driven generator plus floating battery.	(a) Winds of requisite velocity during most of the year. (b) Acceptance of a four-year period for recovery of additional initial costs.
3	Battery alone - charging by local engine/dynamo.	(a) Availability of fuel. (b) Ability to maintain gasoline engine. (c) Acceptance of four-year recovery period.
4	Engine/alternator alone.	(a) Availability of fuel. (b) Ability to maintain a gasoline engine.
5	Wind-driven generator/battery plus pedal generator as stand-by.	Preferences Nos. 1—4 not possible.
Possibly 2/3	Battery alone - charging by pedal generator	Pedalling labour available at about 8 cents an hour.

To complete the installation, an antenna will be needed and a connection of the receiver to the power supply. Cost will vary according to the strength of the signal available and the distance of the power supply from the receiver.

It should be noted that in a satellite television system, many receivers will obviously be placed in the rural areas. It is hoped that this step by step analysis of the possible solutions to electrification for television in non-electrified areas has outlined this problem. The planner must consider the problems of electrification because the initial estimate of transmitting effective reception might drastically overreach the allocated budget.

While the information reported here on electrification is recent, attention must be paid to the fact that it is a strictly technical report. Possible solutions have been presented. However, the technology of electrification depends a great deal on the motivation of the maintenance crew and the operators. Therefore, the order of preference should be based on maintenance considerations rather than initial cost. Only when the necessary maintenance skills have been developed over the years should the hard approach of minimum cost be applied. The point is that the technology must not be divorced from any other facet of the television system. There are just too many interrelating factors that influence each other both directly and indirectly.

As an example, much publicity was recently given to the \$200 earth station designed at Stanford University stating that most of it can be mass produced locally, using unskilled labor and primitive techniques.\* Only six special parts, totalling \$21.75 would have to be imported. This optimism seems rather unjustified when the complexity of the "local" manufacture involves building a 2.6 GHz FM receiver and remodulator to convert the signal to a VHF vestigial sideband output. Moreover, there is no information on items such as the cost and availability of these "local" parts, maintenance factors, and its use with differing TV receivers. In short, it is a system which seems to be designed in a North American laboratory without simulating the conditions prevalent in the developing nations. Yet, it is heralded as a major new technological innovation.

\* See annex C.

E) Systems Maintenance, Training and Feedback:

i) Maintenance Philosophy:

This is a factor which could be placed under production, distribution or reception. However, if a breakdown occurs, the greatest effect is felt at the receiving end. There is poor or no reception. The administrators must design a practical maintenance philosophy that is relevant to the characteristics that describe the plight of the developing nation, not the developed nation. There are simply too many case studies which illustrates that poor maintenance transforms a potential development tool into a frustrating, costly and ineffective device.

i) a) Niger:

One of the problems that Niger encountered with educational television was the lack of a well-trained maintenance staff. Only twenty-five percent of the total number of sets were operative.<sup>57</sup> In some countries, receiving sets have to be sent to the capital cities where they remain for several months before being returned. In others, a travelling maintenance service, as in Samoa and Maharashtra State in India serves as a good solution.<sup>58</sup>

The problem of maintenance is many sided. Maintenance needs an effective feedback system so as to know when a set needs repairing. To train a maintenance technician requires on the spot instruction or the sending away of students to foreign countries. Both are costly. However, if the developing nation sends away a 'maintenance student', there is one less person on the existing staff. The difficulty of acquiring a good maintenance service is compounded by the variety and improvement of technical equipment. More of maintenance training will be explained in 'Basic Technical Training' subsequently.

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57. W. Schramm, The New Media Memo, p. 31.

58. Ibid, p. 107.



i) b) Possible Solutions:

The obvious solution is to train more people in the technical field. Until then, it is advisable to estimate that maintenance standards will decrease from a central 'expert factory overhaul unit' to the farthest limit of set locations. Reception sets should be solid state and designed on a module basis with a replacement for each module. If the central overhaul unit is reliable to the degree that repaired sets will work, and similarly if travelling maintenance crews can be relied upon, there is no problem. If there is any doubt about dependability, the malfunctioning part should be discarded. This method seems wasteful and expensive, but ineffectual repairing coupled with other complications justifies the expense.

This next section represents segments of the operational organization that must permeate the entire satellite communications system. The two topics are training and feedback.

ii) Training:

a) Production Staff:

In India's telecommunication educational system, there exists the Staff Training School, which graduates 200 candidates per annum. Since 1966, this particular school has been assigned the responsibility for television training. On-the-job training augmented by occasional workshops and courses is the main curriculum. Of the 200 graduates, naturally not all are trained in the television field. Refresher courses are provided for AIR personnel. Investment in telecommunications training is 0.07% of the total All-India Radio (AIR) budget.<sup>59</sup>

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59. Not published, Telecommunications and education, p. 28.

In 1968, AIR had available 136 staff trained for television operation. After the fourth year plan, an estimated 350-450 newly trained personnel above the 1968 figure would be needed.<sup>60</sup>

Agencies available for training in foreign countries in association with AIR have been those such as the Columbo Plan, USAID, West German Television, Japanese Broadcasting Corporation, Imperial Relations Trust and the Ford Foundation. Until 1967, 20 AIR personnel have had overseas training in television.<sup>61</sup>

The same problem that exists in teaching teachers is present in teaching technicians. Existing technicians quickly fall behind technological progress due to the lack of information. Canada can contribute to the alleviation of this problem by training technicians to train other technicians. Therefore, the special skills can be disseminated to a greater receptive pool.

ii) b) Teachers:

Included in training should be teachers. Unfortunately, even in Canada it is the rare person who combines both education and broadcasting experience. It should be noted that one CYC project involves a radio broadcasting project called Kenomadiwan which tries to integrate the local Indian into the community. The plan is to staff the station with employees who have a comprehensive knowledge of the communities involved and personal contacts with the people in the area.<sup>62</sup>

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60. Unpub. , Preparatory Study ..... development purposes in India, p. 28.

61. Ibid, p. 27.

62. ----- , "Self Help by Radio" in The Globe and Mail, 28 July, 1970, p. 25.

While it might be impossible to have personal contacts in the production unit with the surrounding area due to India's situation, certainly an intimate knowledge of broadcasting and school curricula and local conditions would be a necessity.

ii) c) Related Fields:

Similarly, as production will involve such topics as health education, agriculture, rural improvement etc., it might be beneficial to consider the training of experts in such areas vis-a-vis television broadcasting. These people who would have an intimate knowledge of the two fields could be available on a part-time basis to the production centres.

In India, training problems in the visual media are lessened to a certain extent by the well-established Film Institute at Poona. The India movie industry exports its products to many other nations in the Third World. India is much more fortunate than other developing nations in this respect. She has a group of people who are familiar with the visual mass media and the Indian culture. Indeed, there would be less transitional resistance from cinema to television than from radio to television.

Another integral member in the educational infrastructure that will need to be newly trained is the supervisor. His functions have primarily been the usual supervisory functions, i.e. checking teaching standards, listening to local teacher problems in respect to the curriculum and the student. However, he will now have to acquire a workable knowledge of programming in respect to his

previous educational duties. The more teleclubs, the more rural villages that are adopted into the new media boundaries will necessitate increased supervision and therefore increased training.

ii) d) Scarborough College Failure:

An example of the need of training many people who have different capacities in respect to television is the failure of T.V. Lectures at Scarborough College in Toronto. Despite the high technical resource base, despite an optimism in the potential use of ETV, despite the high teacher qualifications, one of the primary reasons for its failure was "the use of televised lectures instead of television lectures."<sup>63</sup> The coordinator of the media services, Douglas Todgham stated:

"It (T.V.) is a very precise medium, and the viewer has a low tolerance for programmes that are too long, lack contact or visual impact or have poor sound quality."<sup>64</sup>

If Scarborough College ETV can fail, what are the prospects for the undertrained, understaffed ETV structure in the developing nation.

ii) e) Basic Technical Training:

Specific attention should be paid to the middle level technician. The task is to produce people who are competent enough to handle specific equipment yet versatile enough to be diversified. In training, there must be a balance between specialization and systems training. With the general knowledge obtained from systems training, the specialization can be induced by inservice training.

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63. McKegney, Thomas, "Why T.V. Lectures didn't work at Scarborough College", in the Globe and Mail, 21 July, 1970, p. 1.

64. Ibid, p.1.

Malaysia uses this system. There is a two year 'sandwich' scheme of training unit courses at the Telecommunication Training Centre. The courses are then interleaved with work periods in the field.<sup>65</sup> This scheme is very similar to the Co-operative Course of Engineering at the University of Waterloo. At the end of the training course, the trainees are sorted into six specialities and are required to specialize in the special subject. The choice of the course is determined by the needs of the administration, and the preference and aptitude of the trainee. Thirty-seven weeks divided into five segments are spent on formal training at the TTC, with the remainder on field work.<sup>66</sup>

There is also an Editorial Unit attached to the Centre which collects, standardizes and reprints, if necessary, training instructions.<sup>67</sup> The instructions are then distributed not only to trainees, but to the administration at large. Developing nations might take advantage of Malaysia's system and duplicate some aspects of it. However, the establishment of a centre such as the Malaysian TTC should be considered as only the beginning of primary investments in telecommunication training. There can be no shortsighted investment in this area. It should be emblematic to state that if a television does not work, the public are not going to watch it.

It should be further noted that although the TTC is a worthwhile attempt at establishing the basis for an effective maintenance structure, due to the incredible technological advances in the television media alone, it is easy to see how even the TTC faces an almost impossible task. The level of technical competence and ability required is comparable to a completely different level in the developed nations. However, even though it is a frustrating task, it is necessary to acquire a fundamental technical education before bridging the higher echelons of technological competence, which is the prevalent level in the developed nation.

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65. Richards, Collin, "Telecommunications Training in Malaysia" in the Telecommunications Journal, July 1970, p. 415.

66. Ibid, p. 415.

67. Ibid, p. 416.

iii) Coordination:

Wilbur Schramm states,

"In a country like India, where democratic participation is genuinely sought, a lively and critical free enterprise system is encouraged to conduct a two way dialogue with the government. Efforts are made to create innovations in communication structures - decentralized government institutions, informal networks of extension service and local information, and the like - in order to bring more of the villagers into the process of decision making".<sup>68</sup>

If the press, the informal extension services, the decentralized government institutions, etc. provide some feedback to the central government, the teacher, the supervisor, the maintenance technicians and the coordinators between different government interests will have to serve as components of the feedback network in the satellite education network.

In effect there can be no one way communications network. The uni-directional pattern can best fit at least an authoritarian rule. However, the more fragmented the government structure i.e. central, state, city orientated laws, and the more fragmented the social pattern, i.e. different languages, different religions, etc., the greater the need for an effective feedback pattern.

The requirement of an effective feedback system again supports the prerequisite of a coordinated administrative agency. There is a great benefit in having a production staff being told by area supervisors reporting to them that certain programmes are not 'identifying' with the student in 'x' areas. If the programme content then fulfills the identification but there coincides a simultaneous poor reception, the accomplishment of the identification is nullified by poor reception. It is easy to see that the departments delegated with maintenance responsibilities must also be tapped to other feedback systems.

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68. Schramm, W., Communications and Change, p. 24.

iii) a) Tri-directional Information Flow:

If there can be no single coordinating agency, there must not only be a bi-directional feedback system, but also a tridimensional feedback system. The feedback will travel to the responsible agency, and then on a horizontal line through the different departments. Only then can one precise response filter down from the executive.

In effect there should exist directional information flows between the politicians and the administrators, the administrators and the technicians, the teachers and the programmers, the programmers and the samplers and the supervisor. No field should be compartmentalized. The less the compartmentalization, the less antagonism or rivalry will be promoted between each agency. The free flow of information that will hopefully inundate the people will also exist within the communication administering organ.

b) Supporting Medias:

The employment of alternate media systems, notably radio broadcasting, should serve to support the feedback system created for the television network. Where television can illustrate how 'x' town organized an agricultural commune, radio can unite the different villages at the receiving end to exchange problems that are similar or differing to the problems of the facsimile village 'x'.

c) Total System Approach:

There can be no symbolic 'ivory tower' in a satellite educational system. However, the ironic factor is that a system as complex as satellite based education will probably lead to a somewhat bureaucratic nature in controlling the system. One can only hope that if Parkinson's Law does indeed come into effect, efficient feedback mechanisms shall increase proportionally.

V. CONCLUSIONS

1. For effective operation, it is mandatory that all sectors, i.e. the production centers, the policy makers, the planners, the training and maintenance divisions, the teachers and the television viewers, be exposed to the two-way flow of information. If any sector is not included, a complete feedback system cannot be achieved. In the end, the television viewer will suffer the consequences.
2. The goals of the satellite-borne educational system cannot be achieved without complete consideration of both the hardware and the software aspects. The two parts do not work separately. There must be complete integration of the two elements.
3. A premature implementation of the satellite-borne educational system will invite failure in the attempt to achieve the desired goals. There must be a simultaneous implementation programme of all other factors that effect the ultimate operative efficiency of the system.

VI. RECOMMENDATIONS:

The following recommendations are included in the event that Canada is considered as the donating country directly, or indirectly through the World Bank.

1. Canada should examine the motives, i.e. to what extent are the motives solely politically oriented, of the nation (s) which request assistance for establishing a satellite-borne educational system.
2. Canada should examine the ability of the receiving nation to operate and maintain both the hardware and the software aspects of the system. Canada should know whether the receiving nation has the adequate capability to operate even the most minor sector of the system.
3. Canada should be prepared to include aid in the following areas: production centres, printing machinery, school supplies, technical field assistance, technical training and consultants to organize the feedback system.
4. Canada should ensure as a prerequisite to the donation of Canadian aid for this system that there be a centralized 'project control unit' in order to co-ordinate all aspects of the system.



VII.

REFERENCES

- Benevista, Guy, "Political Obstacles to Adoption of E.T.V.", Agency for International Development, Vol. IV, June 23, 1970.
- Coleman, James S., Education and Political Development, (Princeton, N.J., P.U.P.), 1967.
- Coombs, Phillip H., The New Media Memo to Educational Planners 3, UNESCO, 1967: I.I.E.P. 66/ 111.4/ A.
- Deutchman, Paul J., "Mass Media in an Underdeveloped Village", in Journalism Quarterly. Vol. 40, 1963 Winter.
- Fougeyrollas, Pierre, "Television and the Social Education of Women", in Reports and Papers on Mass Communication, UNESCO I.I.E.P./MC 66.XVII.50A.
- Halak, J., The Analysis of Educational Costs and Expenditure, Ed. by W. Schramm, UNESCO, I.I.E.P. 66/111.3/ A.
- Harbison, Frederick, Economic and Social Aspects of Educational Planning, UNESCO, SS.66/ D.25a/ A 1964.
- Hult, John L., Broadcast Opportunities with Satellites and CATV, And Their Control in the Public Interest, (The Rand Corporation, Santa Monica, Cal.), 1970.
- Jordan, Paul, Communications Satellites Technology and Economic Development, (The Rand Corporation, Santa Monica, Cal.), 1969.
- Lefranc, Robert, "Radical Clubs in Niger", in New Educational Media in Action: Case Studies for Planners 2, Ed. by W. Schramm, UNESCO, I.I.E.P. 66/.111.3/ A.
- Lefranc, Robert, "Radiovision as an Aid to Literacy Teaching in Niger", in New Educational Media in Action: Case Studies for Planners 3, UNESCO, I.I.E.P. 66/111.3/ A.
- Liu, Alan Ping-Liu, "Growth and Modernizing Function of Rural Radio in Communist China", in Journalism Quarterly, Vol. 41, 1964.
- Liu, A.P-L., "Movies and Modernization in Communist China", in Journalism Quarterly, Vol. 43, 1966.

References Cont'd

- Lowry, Dennis, "Broadcasting's Expanding Social Role in Mexico", in Journalism Quarterly, Vol. 42, 1969.
- Mathur, J.C., "An Indian Experiment in Farm Radio Forums", UNESCO, 1960.
- Menum, V.K. Narayana, "Space Communications for Developing Nations", in Communications in the Space Age, Ed. by W. Schramm, UNESCO, COM. 66/D.64/ A.
- Mitchell, John D., "Socialization and the Mass Media in China and Japan", in Journalism Quarterly, Vol. 46, Autumn 1969.
- Mussen, P.H., Child Development and Personality, (Harper and Row, N.Y.), 1969.
- Nerurkar, B.Y., Long Term T.V. Plan for India, (Dept. of Communications Wireless Planning & Co-ordination Wing, New Delhi - 1), No. T / 11014 / 2 70 LR. Vol. 11, July, 1970.
- Scott, Andrew M., "The Nation State in Transition", in The Functioning of the International Political System, (The Macmillan Company, N.Y.), 1967.
- Schramm, Wilbur, Communications and Change in the Developing Nations, (East-West Center Press, Honolulu), 1967.
- Schramm, W., The New Media Memo to Educational Planners, 1967, I.I.E.P. 66/111.4/ A.
- Vaisez, John, The Costing of Educational Plans, UNESCO, I.I.E.P. 66 / 11.6 / A 1967.
- UNESCO, Report on the Problems Involved in Providing for Community Reception of Television in Non-electrified Areas of Developing Nations, and an Examination of Possible Solutions, ID/WG. 15/24, 16 October 1969.
- "Telecommunications and Education" in the Telecommunication Journal, Volume 37-VII/1970.
- Draft Programme and Budget for 1971-1972, UNESCO, General Conference, Sixteenth Session, Paris, 1970, CFS.70/11.6 16A.
- Third Canada-Sweden Working Paper on Direct Broadcast Satellites.
- Rural Television in Japan, UNESCO, 1960, MC.59/IV-21/A.

Other Information was obtained through newspaper articles, periodicals and interviews.

The following appendix represents existing ETV programme development. The description should present an adequate appraisal of each nation in their attempt to employ ETV in their development plans. Overseas territories are not included. The report is taken from "Telecommunications and Education" in the Telecommunication Journal, Vol. 37-VII/1970.

Present Employment of ETV in the Developing Nations:

Argentine Republic: Three television educational programmes:

- Television Technical School under the National Council of Technical Education.
- Television Primary School under the National Educational Council.
- Television Secondary School under the Ministry of Culture and Education.

Burma: \*

Cameroon (Federal Republic of):\*

Central African Republic:\*

Ceylon:\*

Chad (Republic of the): Nil (no television)

Chile: The Educational Research and Experimental Centre (Ministry of Education) is responsible for educational television. Two pilot schemes for teaching Spanish and physics to 3rd year classes in the secondary schools, to operate from August 1970. Number of pupils will be about 50,000. Duration planned: 4 years.

Television channels of various universities: cultural programmes (languages).

Closed circuit: The Educational Research and Experimental Centre uses closed-circuit television for completing teacher training and in universities for the same purposes.

Congo (Democratic Republic of the): Teaching programmes, educational broadcasts: i.e. educational and cultural programmes.

In the near future, scientific broadcasts are planned.

Cyprus (Republic of): Programmes on the following subjects: geography (economic and physical) biology, the human body, physics and English by T.V.  
Age: 2nd and 3rd secondary school classes.  
Lessons recorded on video tape, with commentator and film strips.  
Coverage: the whole of the island.

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\* Where statistics are not given, they were either not reported or non-existent.

Dahomey (Republic of):\*

Dominican Republic: Plans have been started for ETV.

Ecuador: General cultural programmes on the subjects of art, language, political affairs and cultural themes.

Ethiopia:\*

Ghana: Two hours daily to secondary schools and teacher training colleges.

Greece: ETV.

Guatemala\*

Guinea (Republic of):\*

Haiti (Republic of):\*

India (Republic of): At present, 1 TV centre in New Delhi Programme for middle and higher grades in New Delhi; secondary classes in collaboration with the State Education Department. Broadcasts during school hours on school subjects. 570 sets installed in 345 schools in New Delhi reaching 200,000 students. Special programmes for teachers (30 minutes per day). Programmes with student participation (once a month). Rural educational programmes, 20 minutes a day for the 80 community TV centres set up around New Delhi. Social education programmes for the 101 TV clubs (30 minutes a week) around New Delhi.

Iran:\*

Ivory Coast (Republic of): Under consideration, first degree education television project.

Jamaica: Programmes by the Jamaica Information Service (3 hours per week), art, news, literacy. Literacy section of the Local Development Agency: twice a week (30 minutes). Programmes for the Senior Departments of primary schools and in junior secondary schools. Programmes for inservice-training of teachers, 330 out of 766 schools.

Kenya: (EAPT) Broadcasts for schools; projected in a University of the Air for graduate level.

Kuwait:\*

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\* Where statistics are not given, they were either not reported or were non-existent.

Malagasy Republic: ETV in the district surrounding the capital; projected is an extension of same.

Malawi:\*

Morocco (Kingdom of):\*

Nauru (Republic of):\*

Niger (Republic of):\*

Phillipines (Republic of the):\*

Saudi Arabia (Kingdom of):\*

Senegal (Republic of the): Pilot project by Senegal with UNESCO collaboration in 1963. In 1965, beginning of television broadcasts on hygiene, nutrition and health, and ETV.

Sierra Leone:\*

Singapore (Republic of): ETV programmes are broadcast on one television channel throughout the day during school terms from Mondays to Fridays and during the morning on Saturdays (27 hours per week)

Somali Republic:\*

Sudan (Republic of the): Language courses, cookery lessons, safe driving techniques.

Syran Arab Republic: ETV: three half-hour courses daily, except Friday.

Thailand:\*

Viet-Nam (Republic of):\*

Zambia (Republic of): 26 hours per week, proposed extension of service.

ANNEX B

1. ITU/CCIR

Within the ITU, the General Secretariat had a meeting of experts on the matter of cost factors relating to satellite broadcasting systems in January 1970.

As an outflow of this meeting, the CCIR at its XII Plenary Assembly created the Interim Working Party PLEN/2 to study cost factors and relative acceptability of satellite broadcasting systems for new and developing nations. The I.W.P. plans to have its next meeting in January 1971 in Geneva.

2. A.I.A.A.

The American Institute for Aeronautics and Astronautics at its conferences (which meet every two years) devotes special sessions and panel discussions to the subject of satellite broadcasting systems. These conferences are highly technical and are attended by the leading experts in the field. The conferences set milestones in the development of communications technology.

In addition to the technical aspects, the panel discussions delve deeply into the social, political and economic factors associated with satellite broadcasting systems. The next meeting will be in April, 1972, in Philadelphia.

3. UNESCO

UNESCO is mainly involved in the social and educational impact of broadcasting in general.<sup>1</sup> Included are seminars on technical training, use of audio-visual techniques, book development and conferences on communications.

1. Draft Programme and Budget for 1971-1972. UNESCO, General Conference, Sixteenth Session, 1970, CFS. 70/11-16A., p. 285.

## news

# \$200 station tunes in satellites

A \$200 earth station, composed of a die-cast receiver housing and an easily assembled sheet-metal reflector, could bring satellite signals to remote areas of the world.

So say two PhD candidates—James Janky and Robert Taggart of Stanford University—who have designed the simple microwave receiver system for use by developing nations. The system can be mass-produced by unskilled labor, using locally manufactured parts and relatively primitive techniques, the designers say.

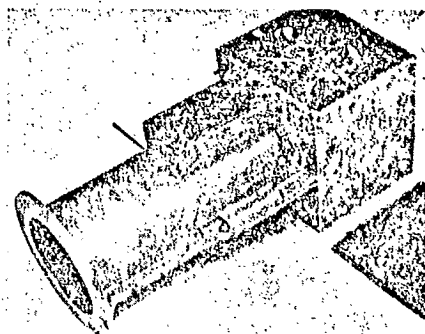
The design, which was described at the International Conference on Communications in San Francisco, is simple, using common and readily available electronic components. Some parts, however, would have to be imported: a mixer diode, a step-recovery multiplier diode, a FET for the i-f amplifier, a power oscillator transistor, an IC limiter and a quartz crystal. The total cost of these special parts comes to \$21.75, the designers say. Many de-

veloping countries have manufacturing facilities for the remaining components and this should give them incentive to adopt the system, Janky feels.

The receiver electronics have been built into a four-piece, die-cast housing, which is mounted at the focus of a quasi-parabolic antenna. The assembly requires no additional machining.

The 7-foot diameter parabolic antenna is novel in that it can be fabricated with little effort. It is made from 10 flat aluminum petals stamped by a sheet-metal process, and has an efficiency of 57% with 33 dB of gain. The extruded rims on adjoining petals are held in place by snap tabs. The rims provide convenient attaching points for mounting, and feed supports. No technical training other than assembly instructions is necessary.

The fm receiver consists of the antenna, an adaptor (which detects a satellite signal at 2.62 GHz and converts it from fm to am), and

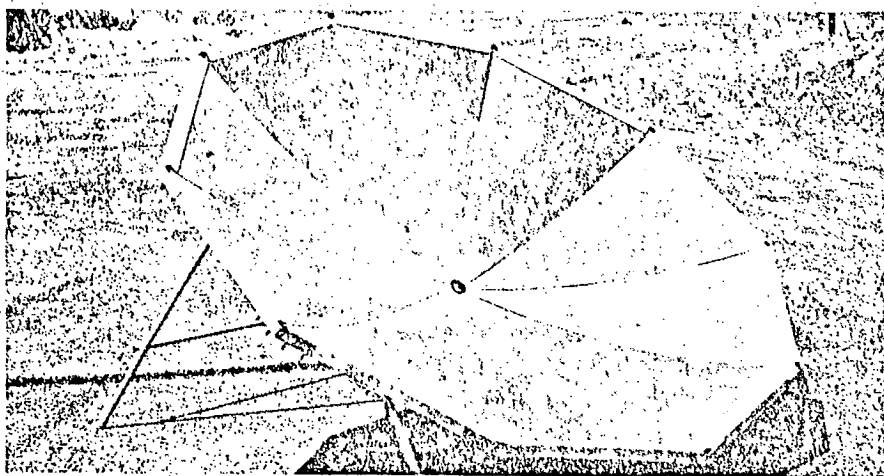


**Mixer-feed housing with interdigital filter** requires only  $\pm 0.004$  inch tolerance to achieve a proper response. The assembly can be die-cast without any additional machining.

an ordinary TV set. The received signal enters a combined mixer-feed cavity, where it mixes with a 2.5-GHz LO signal from a crystal-controlled source. The down converted signal at 120 MHz enters a low noise (1.5 dB) preamp and is further amplified by a six-stage i-f chain. The signal passes to a limiter, and then a discriminator, for recovery of the baseband am-fm TV signal. An oscillator mixer then translates the baseband signal back into the appropriate channel.

Dr. Heinrich Haymerle, Austrian Representative to the United Nations, and chairman of the U. N. Committee on Peaceful Uses of Outer Space, told the conference:

"The possibility to relay radio and television programs via satellite to large areas which hitherto could not be reached opens new dimensions and raises entirely new problems. Broadcast via satellite offers opportunity to the developing nations, permitting the acceleration of national programs of integration, economic development, agriculture, education, community development, health and culture."



The 7-foot diameter reflector is aimed by a compass along a direction predetermined by the latitude and longitude of the site and the satellite location. Elevation angle is adjusted by moving the A-frame rear mount for the best TV picture. Snap tabs hold the antenna petals together.

LIBRARY CARD

IX.

SATELLITE BROADCASTING SYSTEMS  
FOR NEW AND DEVELOPING NATIONS

30 Sept. 1970

Political and Economic Factors  
by Adrian Symonds

Contents: Tele-education;  
Benefits of satellite ETV;  
Disorders of same: dissatisfactions,  
political objectives.  
Implementation problems: TV production  
programming, local receiving factors,  
software, maintenance, feedback.  
Conclusions.  
Recommendations.

Prepared for the Department of Communications,  
International Telecommunications Branch, Ottawa, Canada.



