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Development Meeting on the Manufacture
of Telecommunications Equipment
(including low-cost receivers for sound
broadcasting and television)

Vienna, 13 - 24 October 1969

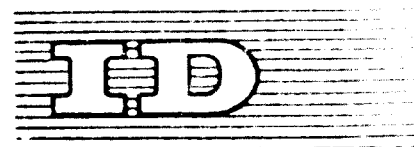
PROMOTION OF THE MANUFACTURE OF LOW-COST SOUND
AND TELEVISION RECEIVERS IN DEVELOPING COUNTRIES 1/

by

Chuhei Anazawa
Managing Director of the Radio Engineering
Association, Tokyo, Japan

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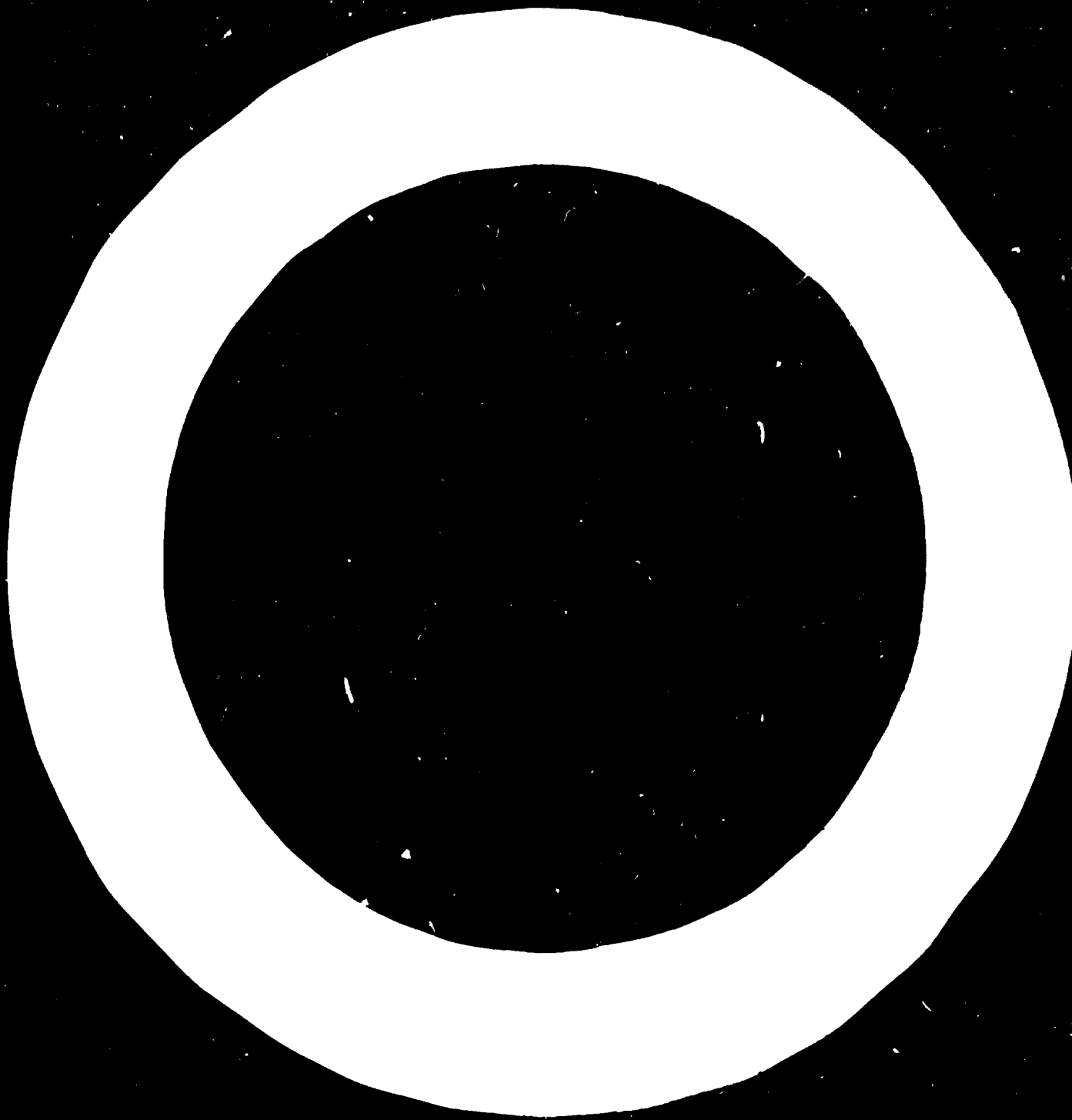
Addendum 1 ^{1/}

by

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In connection with my paper, page 30 III TRIM 1, concerning the Japanese effort to co-operate with developing countries, I should like to supplement the following: that there is an organization called "Japan Telecommunications Consulting Association" (JCTA).

This Association aims at promoting co-operation between Japan and all other countries of the world for the development of telecommunications in all divisions. Therefore, it is composed of public and private organs and enterprises for all sectors of telecommunications in Japan.

It is devoted to the consulting service in regard to the management, planning, designing, manufacturing, research and training for telecommunications: it is ready to extend economic and/or technical co-operation to the development of telecommunications enterprises in all countries.

In order to achieve the objective, this Association will perform the following business: -

- (1) To meet the demand for technical consultations and, when necessary, send a specialist or a team of specialists to aid in the construction and operation of telecommunications, including telegraphy, telephone and broadcasting.
- (2) To offer supervisors for telecommunications construction works.
- (3) To offer specialists for examination of telecommunications equipment and material.
- (4) To introduce Japanese manufacturers for telecommunications in connection with joint ventures with the countries abroad.
- (5) To introduce Japanese research organizations to take part in joint research works on telecommunications with the countries abroad.

- 1 -
- (6) To provide training to foreign technicians and engineers, or help them receive such training in Japan.
 - (7) To offer technical data of various kinds.

This Association so far has dispatched eleven telecommuni-
cations missions, 39 technical teams and 116 consultants to the
countries of the world since the establishment in 1953. On the
other hand, 119 leaders in the field of telecommunications have
been invited by the Association.

This Association, thus has come to establish contacts with
nearly all the countries of the world.

I. RADIO

1. Brief History In 1963, I had submitted at the Asia Electronics Conference held in Tokyo, the following paper describing the brief history in Japan for studying the question of low-cost radio sound receiver and the status quo of the question at that time:

"From its inception, the United Nations Educational, Scientific and Cultural Organization (UNESCO) was concerned with the reconstruction of Radio Broadcasting, in developing countries, along with other information Media, such as News Agencies, Newspapers and Periodicals, Film and Television. The United Nation was keenly interested in it, and at the Conference of Freedom of Information, held at Geneva in 1948, recommended to the Economic and Social Council that a study be made of all appropriate measures so that the general public can obtain radio receiving sets at low price.

"In connection with the question of the production of low cost receivers for use in the developing countries, a Japanese delegate expressed his opinion, at the 18th Session of the U.N. Economic Commission for Asia and Far East (ECAFE) meeting, held in Tokyo in

1958, that he would be happy to extend assistance and cooperation to the countries of the region, either in form of bilateral technical cooperation agreements or through participation in joint enterprises. If these countries are prepared to accept imports of radio receiver components within framework of such a cooperative agreement. He also expressed the view that this would meet the needs of these countries of the region which find it difficult to purchase completed radio receiver from abroad due to balance of payment.

"In the same year, at the Administrative Radio Conference held in Geneva, it was proposed by a representative of UNCTAD that a study might usefully be made of the possibility of designing low cost standardized receiver to meet the needs of the new and developing countries.

"The International Telecommunication Union (ITU) adopted a recommendation to answer this proposal, and the question was transferred to the study programme of the Comité Consultative International Radio-electrique (CCIR), and invited it to draw up the performance specification for one or more types of sound broadcast receiver suitable for production in large quantities at the lowest possible cost, with a view to enabling the population of developing countries, in which for economic, geographical or technical reasons there are few receivers, to take advantage of the broadcasting.

"CCIR had drawn up two recommendations in 1963, one for the per-

formance specification of low cost sound broadcast receivers for individual listeners, and the other, that for community listening of groups of up to 200 individuals. In these recommendations the receivers are subdivided into two or three types: a low sensitivity MF receiver (for individual listeners only); a combined MF/FM receiver, a medium sensitivity VHF FM receiver. These receivers would be available for either mains or battery operation.

"Prior to this recommendation, a special group for studying low cost receiver was set up, in the Electronics Association of Japan, consisting of members of parties to study the question, and after repeated consultations, it was agreed that there is no objection to the CCIR recommendations and we would be ready to consider the manufacture of the set at a reasonable cost when the prospect of the project is clear.

"As to the appropriate cost for each type of the receiver it is complicated too much to answer, because it varies with many factors such as the quantity of production required for a single model, conditions of commercial transactions and so forth. As a matter of fact, Japanese export of radio receivers had increased year by year, especially the rate of increase of transistor receiver was remarkable. The performance characteristics of the receivers varied very much in accordance with the price of the set, while many models have far better characteristics than that specified in the CCIR recommendation, others are below in some respect.

For instance, the overall acoustic fidelity or the selectivity was rather inferior to that specified.

"The major reason for such a situation is that the practical realization of the receiver is not always or right away, widely according to the actual conditions of the location concerned. There might be some cheaply made radio receivers of less expensive type, with rather inferior selectivity and insufficient immunity against the out-of-band interference even they do not entirely correspond to the ICB specification.

"I have stated so far about the production of completed low cost ICB receivers for export. However, there is left alternative measures to attain the aim of UNISCO. The alternative measures are how industries or assembly plants could be set up by the developing countries. I have not touched further upon this point up to present, because it involves several technical and economical problems to be solved.

"It is reported, however, that this study could be made by "Two man mission" consisting of a radio engineer and an industrial engineer or economist, sponsored by UNISCO in cooperation with ITU and ECATE. As this mission is expected to visit some Asian countries this year to observe the project under way we will be able to team up with the mission to promote the project more rapidly to carry out the expected goal of the UNISCO."

At the next Asia Electronics Conference held in Tokyo in 1965, I

had submitted again a paper, describing the status quo of the work of Japanese special group as follows:

"As you know, I submitted a paper entitled 'On the low cost receiver' at the IBSI Conference, in which I described briefly the history of the international meetings in connection with the question of low cost receiver and, at the same time, introduced the text of the CCIR Recommendations on the technical specifications for various low cost receivers. My opinion at that time was that we had better, for further studies, wait the outcome of the report of the survey mission, under the auspice of the UNESCO in corporation with the ITU and the ECARF, and our special study on this question had broken off for the time being.

"The survey mission was dispatched to Thailand, Malaysia, Philippines, Indonesia, India, Pakistan and Afghanistan, in the spring of 1964, with following tasks:

- a) In the light of existing and planned broadcasting services in the countries covered by the mission, make a market study of the potential demand for radio receivers in different price ranges, of both the domestic and community type.
- b) Survey the present status of, and future trends in, light engineering and assembly industries in the countries of the region, with a view to determining possibilities of present or future manufacture or assembly of low cost receivers.

- c) Advise on the present status of, and future trends in, radio maintenance facilities and marketing organizations, particularly in rural areas in the countries of the region.
- d) Examine the problems involved in the manufacture of complete receivers or certain component parts along standardized lines by established industries in the more highly developed countries of the region as in other parts of the world, taking in consideration the performance specifications adopted by the Technical Assembly of the U.N.
- e) Examine the possibility of pooled bulk orders by governments or manufacturers in the region, for component parts or completed sets, in order to give sufficient incentive to the established manufacturers, to install machinery for mass production of components for standardized low cost receivers on a large range basis and thus achieve the lowest possible cost.
- f) Investigate government policy in the countries visited, with regard to manufacture, assembly or importation of radio receivers, particularly such matters as import controls, customs and excise duties, patent rights, royalties, etc.

"It is said that the survey mission has drafted the report (called hereafter "Report") and sent it to the UNESCO, but we have not yet any UNESCO observation on the Report, nor the future measures to be taken

by the UNESCO on the question at the present, and we are awaiting them to resume tasks of our working group to comply as far as possible with the object of the UNESCO.

I am sorry that we have not got any response nor comments to this Report up to the present, and having received the letter from Mr. F. Morvan, Officer-in-Charge of the Industries Section of the ITC, to prepare a report I have submitted this report. Consequently, the enclosed report covers the main part of the Report, but at the same time for the present, and I should be glad to have any questions or comments in connection with the Report, and would like to take counsel with the attendees to take further steps towards the goal of UNESCO.

2. Administrative and Financial Policy

It is repeated in the Report that the promotion of the low cost receiver is impeded by the government and some other agency's policies on account of the fact that the radio receiver is not regarded as an essential item for living, but more in the nature of luxury than a necessity. Consequently, rates of import duties are high, even near embargo for the completed sets. Although there may be some justification for the import of assembling materials for the development of local industries. The rate of excise tax is also generally the highest which is leviable on luxury goods. The allocation of foreign exchange for the import of machinery and

equipment is listed at a lotter. In many countries, there are government sponsored financial corporations and other similar agencies which provide foreign exchange loan for the import of goods, but there again, the radio receivers industry is neglected. Similarly, many countries have credit arrangement with foreign countries, World Bank loans and the like, for foreign exchange required for industrial development, but these facilities are also neglected to the radio receiver industry. Thus the first requisite, the report concludes, for the success of the project for low cost receiver in the developing countries would be

"The radio industries should be categorized as one of the essential industries and rightly placed in the list of priority. All the facilities available to other essential industries shall be available to the radio industry as well."

I do agree the recommendation, although in my affair there might be other essential industries such as electrification, river works, etc. However, priority of radio industries, in my opinion, is not the least essential for the elevation of culture in developing countries. I should like to add, in this connection, that I have heard some Japanese agencies have dispatched a bilateral mission, comprising an advice for the establishment of the broadcasting transmitting network of some countries. However, I am sorry to say that advice were given to the matters of transmitting sides only, and measures for promoting the industrialization for the appropriate radio

receiver to correspond to the advice were not given. I assume, perhaps, the question was not included in the agreement. I should like to propose that in such a case hereafter, a provision in connection with the industrialization of radio receivers should be included in the agreement.

3. Industrial Policy

It is stated in the Report that sound radio manufacturing and assembly industries are fairly developed in some countries, and the level of radio receiver production in the countries visited is tabulated, with the notice that the figures do not reflect correct production capabilities as it was observed that quite a number of manufacturing and assembling receivers are not utilising their production facilities to the full. Explaining that in some cases the production was less than 50% of the capacity because of variety of the types produced, and it is proposed that government's urgent action is necessary to be taken in assessing production capacities on realistic bases. The proposition continues that the re-assessment of the capacities alone would not alter the situation, unless foreign exchange allocation for the import, as mentioned in Para. 2 were fully realised, and the Report adds low cost receivers, in hundred of thousand, if not million, production cost would not be reduced drastically. I am of the same opinion on the question of mass production, as I wrote a paper submitted to the Asia Electronics Conference in 1962 that the cost

of low cost receivers depend largely on the quantity of production required for a single model.

With regard to the manufacture of component, the Report urges early establishment of standard component for meeting the requirement of the mass production. It reports that cost of components made in manufacturing is much higher, mentioning for an example in a radio receiver, the total costs of components account for as much as 70% of the cost of production. The Report continues, because of free imports of components have not been permitted, the only alternative is to produce them locally. But there is a large number and variety of specialised raw materials. These raw materials have to be imported and their availability to the local manufacturers is limited, here again, to the extent of foreign exchange allocation. The Report compares here the ratio of cost of the imported component and that of locally produced component as high as 70% when compared with c.i.f. component costs. According to a manufacturer in some country the c.i.f. costs of all components (imported) required for assembling a good quality single band 4 transistor medium wave receiver is approximately \$9, but the landed cost of the same after paying duties is about \$15. If all the components are obtained locally, the cost is about \$18.

After all the Report recommends

- 1) Production capacity for components, particularly standard components.

should be planned on a much larger scale, keeping in view the enormous potential demand for low cost receivers.

- 2) The imports of the specified raw materials should be allowed duty free.
- 3) To the extent these components have to be imported to make up the gap between actual requirements and indigenous production. Possibility of reduction of import duty, or abolishing completely, should be considered in so far as single band medium receivers are concerned.
- 4) It is essential that the local manufacturers adopt the most modern techniques and keep abreast with the latest researches, and where necessary, technical "know how" arrangement with foreign manufacturers be sought and encouraged.

Foreign exchange credit facilities available under various schemes operating within the countries are not generally extended to the radio receiver and radio component industry for the import of the plant, machinery and equipment,

As mentioned above it is necessary that the radio component industry is included among the essential industries protected in the matter of foreign exchange allocation - both of the import of capital goods and recurring requirement of the specialized raw materials.

The Report recommends that, as a first step, manufacturers should reduce the number of models and rationalise their production. This

would enable them to plan for mass production runs resulting in overall economy and reduction of cost. Breaking particularly of low cost receivers. Possibility of common standard design for items such as cabinet, fittings, knobs by all the assemblers should be considered. If these items were mass produced, it would mean considerable saving in cost. After all, the cabinet and other fittings are not a fundamental in the performance of radio receivers such loss in low cost receivers.

It is pointed out in the report that the repair and servicing facilities for radio receivers in the cities and towns appear to be satisfactory, but there are general complaint that charges for the repair are high. Users of the radio receiver are not, generally speaking, have a thorough knowledge with the nature of defects that develop in the receiver, and the extent of the repair or replacement of the parts that are necessary, with the result that they have not any means to assess whether the charges reasonable or not. List of price of standardized spare parts required for the replacement should be shown, and the rate of repair charge should be indicated in the radio repairing and servicing shops. Additional facilities for repairs and maintenance are desirable to be provided extensively in areas other than cities and towns with the increase of the receivers in the village. One of the main difficulties in maintaining properly equipped repair shops seems to be the limited availability of essential testing instruments and equipments. Import of

adequate quantities of them will have to be imported if their local production is not sufficient. A set, portable, alignment instrument should be laid down in respect of testing equipment if the possibility of improving such repair shops is to be considered. Radio clubs, technicians and traders associations are in evidence in almost all countries visited and their leadership in this matter are desirable.

4. Technical Policy

As I understand, the CCIR Recommendations on "The Performance specification for low cost sound broadcasting receivers" and "Performance specification for low cost sound broadcasting, Community listening" are to be regarded as criteria of the technical characteristics. As a matter of fact, the receivers with lower characteristics may be used without any complaint practically according to the site where the listening is carried out. Needless to say, the choice of an appropriate radio receivers are determined in accordance with the e.r.p. of the transmitting station, their location, topography etc., and therefore, the appropriate receivers can not be determined unless we know the broadcasting network, whether actual or planned, of the country concerned. Unfortunately, we have not detailed information, and it should be left to the governments or radio broadcasting organisations of the country concerned who would, I hope, establish pertinent measures to provide broadcasting stations throughout the country.

It is often reported in the Report that attention should be paid to the problems arising out of the over-concentration of broadcasting stations in and around the capital cities of some countries, and this is a natural state of affairs when broadcasting is left completely in hands of profit-seeking commercial broadcasters, and listeners are suffering from their cross-modulation owing to the improper assignment of frequencies or frequency drift of the stations concerned. This regrettable conditions are, in my opinion, to be attributed to some extent the neglect of the duties of the government regulatory agency, except the case where the receiver is out of order. If the agencies took an appropriate measures, such lamentable conditions would not have happened, and the listeners had better ask the servicing agency to remedy the fault of the receiver.

As to the question of frequency allocation, the Report is suggesting one problem in the long run. Especially a nation with common borders with numerous neighbours can not treat a medium wave as its own exclusive problem. Judging from the development of the medium waves used by broadcasting stations of these areas, the day when they will be plagued with mutual interference will be upon them sooner than expected. It would be most desirable if some international organization, with the cooperation of the countries in the region, examine this in all respects and come to agreement in the matter of transmitting stations and their power rating in their respective countries. I have personal opinion for this question, but I

could refrain from expressing my opinion, as it does not concern directly this meeting. However, I agree with the proposal of the Board, in favor of the use of VHF broadcasting in special cases.

I should like to propose wired diffusion systems, although it may not be thought directly as a question of low cost receiver, for the early realization of availability of radio broadcasting in some part of developing countries. The cost of the installation of the wired diffusion system in crowded rural housing communities would be considerably reduced, if we compare it with the cost needed for the individual reception of radio receiver. In addition, the system will be available for the local distribution of information and intercommunication as mentioned below:

In 1939, the Nippon Hoso Kyokai (NHK) had carried out the test of the wired diffusion systems, in 57 villages throughout Japan at various places where the village families were not rich enough to provide radio receiver in their homes. A few years later, this wired diffusion system were put in operation by some agricultural cooperative associations because the system cost was lower than to have the home receivers individually set up. Later the system was developed to broadcast educational programs such as village community bulletins, various community news, and messages of disaster such as storms, floods, fires, etc., by providing microphones at the receiving center, which is generally located in the office of the agricultural association, villager's public hall and so forth, from where the

only the radio broadcast programs, especially those addressed for farmers for their cultures were relayed. But these informations mentioned above were transmitted. Later, in 1937, a microphone was added to some of the subscribers' home, so that the bilateral and multilateral telephone communication could be carried out among the subscribers within the system. More later, in 1938, a telephone switchboard was equipped in the receiving center to let all subscribers may utilise the system as a telephone network. Thus, the first system which started as a receiving center to rediffuse radio programs has developed to the broadcasting and telephone equipment connecting subscribers in the community.

These system became very popular in rural community areas since then and the increase trend of subscribers in recent years is shown in Table 1..

Table 1.

Number of systems and their subscribers of the Wired Broadcast
Telephone System.

Year	No. of Systems	No. of Subscribers
1957	1,032	562,013
1958	1,617	921,775
1959	1,963	1,211,207
1960	2,242	1,559,513
1961	2,518	1,887,013
1962	2,623	2,141,729
1963	2,649	2,393,949
1964	2,599	2,635,927
1965	2,438	2,906,493
1966	2,462	3,138,761
1967	2,374	3,226,416

II. TELEVISION

1. Brief History

Although the UNESCO was concerned with the promotion of the television media for the developing countries, from its inception, the substantial work of defining the specification for low cost television receiver was started when the following Resolution 13 was adopted by the ECAR in 1967.

Resolution 13

Considering,

- (a) Resolution 163 (VIII) adopted by the Economic Commission for Africa at its Eighth Session, Lagos, 13 - 25 February 1967.
- (b) that the advantages of television should be made more easily available to the populations of the countries where at present the density of receivers is particularly low for economic, geographic or technical reasons;
- (c) that, to this end, it is desirable that efficient television receivers would prove most useful to local receiver manufacturers by assisting them to produce suitable receivers having an agreed adequate standard performance at the lowest possible cost;

Decides that following question should be studied:

to draw up performance specifications for one or more types of television receiver, suitable for production in large quantities

- 1 -

at the lowest possible cost, the receiver to meet the requirements
applying to the countries mentioned in para. (b)?"

The report of the Study Group E, para. XII in connection with this
question was circulated for comments to member Administrations. It is under
discussion at present, in Geneva, and it is expected that the Recommen-
dation would be adopted in 1970.

2. Policies

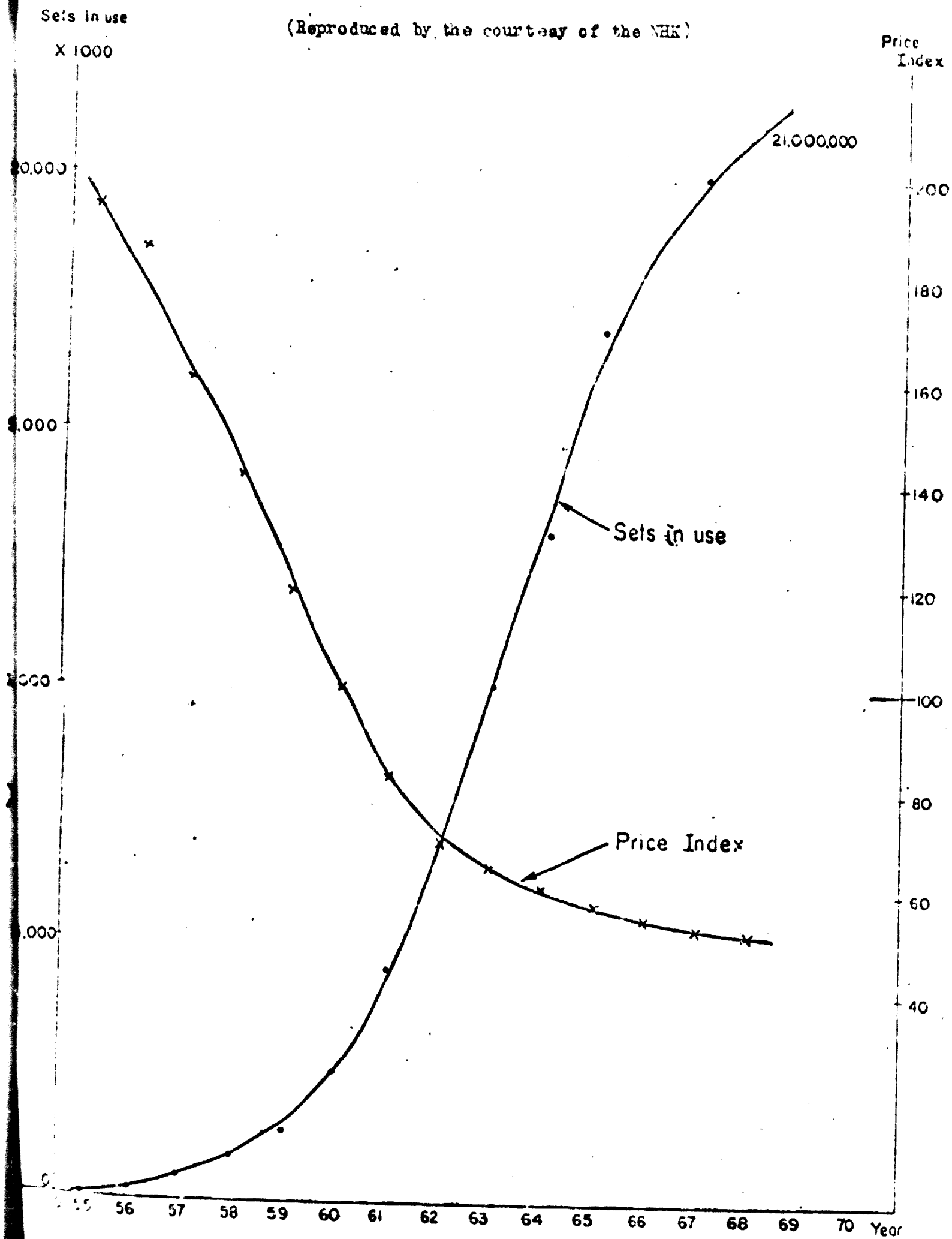
Various policies in connection with carrying out the plan would
be applicable to those mentioned in Part I. However, their contents will
be more complicated because of the fact that the cost will be much higher,
and it will take more years to get the air of the UNESCO (two acts per
100 persons). I am afraid, in particular, that the industrialization of the
manufacture of the large C. R. 1. in some developing countries would be the
difficult question, because it is necessary to invest large amount of
money compared with the production. I am of opinion that the promotion
of the B type (community viewing) be recommended first, for some countries
though there is a question of maintenance with low cost in the site where
there is no power supply mains.

3. Cost of TV Receivers

3.1. The appropriate cost of television receivers depends not only on the manufacturing techniques but also on various other factors, such as industrial situation, standard cost of living and the developmental stage of the broadcasting industry of the country in question and so forth. I can not discuss, therefore, the question of cost of television receivers without taking into consideration these factors. However according to our experience, Fig. 1 shows the relation in Japan between the trend of popularization of television receivers and that of their prices. As can be seen from this Figure, about 15 years ago when the television broadcasting started in Japan, the prices of the television receivers was extremely high, because the manufacturing techniques was still in the early stage of development and also because the mass production system had not yet been established. Later on as the television receivers were more and more popularized in Japan, the production system was established on a mass basis and the price was reduced by approximately one half in five years. After that, however, the pace of reduction of cost slackened so that it took more ten years for the price to come down by another half. It now appears that the price of television receivers has almost reached its bottom. With the great improvement, however, made in the performance of the television receivers, particularly in the stability, reliability and so forth, the television receivers of today are

Fig. 1 Relation Between Sets in Use and Price Index

(Reproduced by the courtesy of the NHK)



by far the better in quality than those of the days when television broadcasting had started in Japan. When we compare the performance required for in the CCIR draft report for a low cost TV receiver with the typical performance of the television receivers sold now in Japanese market, we find that these receivers meet the requirements mentioned in the CCIR draft.

3.2. We have studied the solid-state television receivers sold on the Japanese market from the viewpoint that the most desirable type for group viewing in a region where no commercial electricity is available would be the one with minimum failure rate and minimum power consumption with a fairly large screen. As a result, we have found that almost all solid-state television receivers with a 30 inch class picture tubes are manufactured by several TV manufacturers, although they are so designed as to be used with commercial powerlines. But it would not be difficult to modify the receivers to make them operative with batteries.

3.3. As to the relations between the screen size and the price, the cost of the television receiver may be considered as largely dependent on the size of the picture tube, because the cost of picture tube accounts for a large portion in the manufacturing cost of a television receiver.

As an example to show such situation, we have give in the Figure

2. the relations between the picture sizes and the average prices of standard products from several TV receiver manufacturers. Although the price of picture tube largely depends on the quantity in demand, the manufacturing technique for a larger picture tube is in many aspects more difficult than that for the smaller models. Consequently, the production cost of the former is higher as compared with that of the latter. For this reason, even if a TV receiver with large picture screen may be desirable for group viewing, it would not be advantageous from the viewpoint of cost. From the Figure 2, you will see that the cost of two sets of 23-inch receivers more than covers that of three 17-inch type sets.

3.4. As a method of receiving TV signals in a region where no commercial electricity is available, we can suggest a model combining a solid state TV receiver and battery and DC generator (or AC generator and battery charger). This is shown in Fig. 3. Regarding this model, let us assume that the power consumption of the solid-state TV receiver of 19-inch class picture size is 60W, and that 24V source (two 12V car batteries are connected in series) is used. Then, as this will result in current drain of 2.5A, it would be possible, with the use of car battery of 60AH (discharging rate 20hrs), to use the TV receiver 3 hours a day and for about one week, with the batteries of capacity as mentioned above.

Furthermore, if a DC generator of 24V 20A output is used to charge

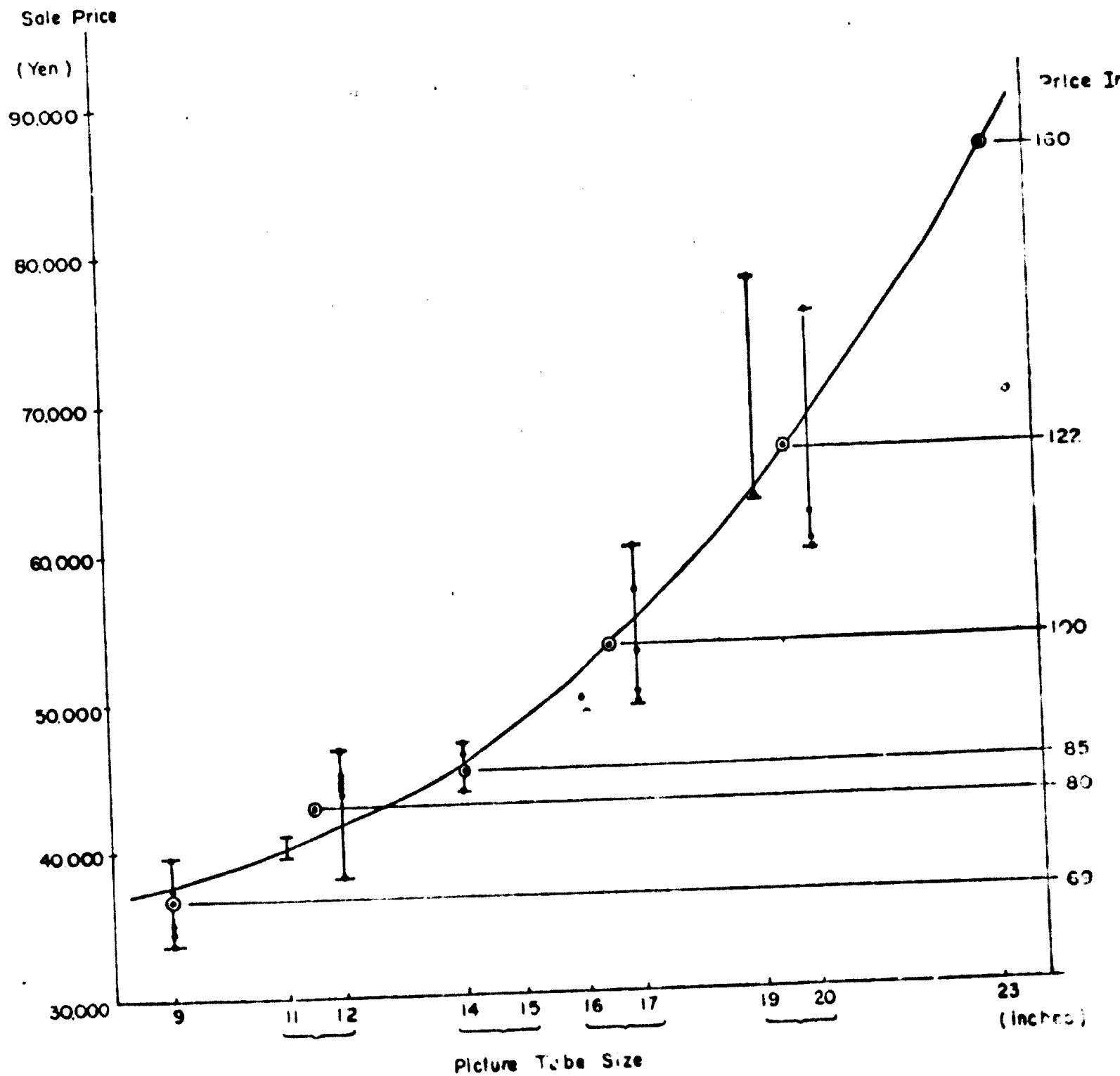
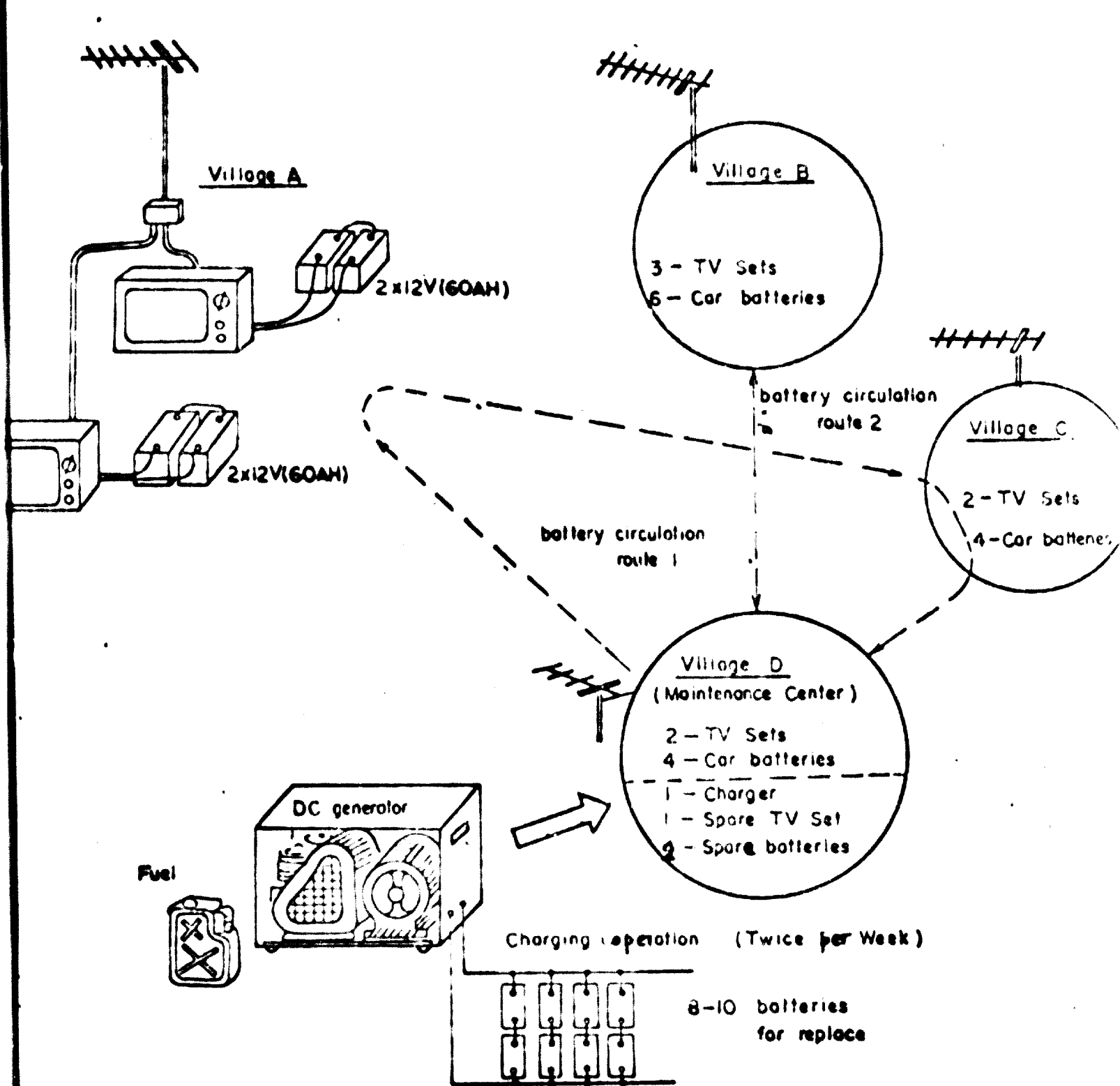


Fig. 2 Relation Between Set Price and Picture -Size
 (Reproduced by the courtesy of NHK)

Fig. 3 A Model of TV Reception in Villages
(Reproduced by the courtesy of the NKK)



the spare battery, as many as 10 to 12 batteries (for 4 to 5 TV receivers) can easily be charge at a time. Therefore, if the charging of batteries is done twice a week, it would not involve too much work to charge the batteries for 10 TV receivers.

The Table 2 shows the estimate of initial cost and running cost (not including freight charge, import duty, installation costs, etc.) for such a model facility as described above.

**Table 2. Cost Estimation of Model Facilities
for TV Reception in the Villages
(Reproduced by courtesy of the NHK)**

Initial Cost	Quantity	Cost
20 Type Solid-state TV Receiver	941*	1,700US\$ at 170US\$
Car Battery	18+2*	500 at 25
DC Generator (24V, 20A)	1	270
<hr/>		
Total		2,470US\$

Annual Running Cost (5-year depreciation)

Fuel (1800 litres)	280.00US\$
Maintenance (10% of initial Cost)	250.00
Depreciation (5-year)	500.00

Total	per year	1,030.00US\$ (114.5 dollars per set)
	per month	86.00US\$ (10 dollars per set)

III. TRAINING

1. Special attention should be given to the training of personnel for radio industries, both for transmitting and receiving facilities.

Although all developing countries have their training facilities themselves, it might be advantageous for them to send experts abroad, or receive experts from foreign countries to cope with the rapid growth of radio techniques in other countries.

Japanese experts have been sent abroad or received many students from developing countries on government or organization basis. The experts were sent to some developing countries for the purpose of contributing to radio industries, e.g., technical assistance through the ITU, surveyer teams for planning the TV network project of some countries, training of technicians, etc., and accepted personnel for the purpose of attending training courses, e.g., TV engineering course, TV Broadcasting management course, etc..

2. It might serve as a reference that The Radio Engineering Association has been carrying out the examination, qualifying the television (including recently the color TV receivers) serviceman, for the purpose of protecting consumers, throughout the country, since 1959, and about 26,000 certificates have already been awarded. The certified personnel are adopted by several radio manufacturers or by sales shops all over the country. In addition to the certificate, an identification card, showing

certification number and photograph is issued too, to those ask it, to show individuality in case of necessity.





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