A WINDOW OPEN ON THE WORLD

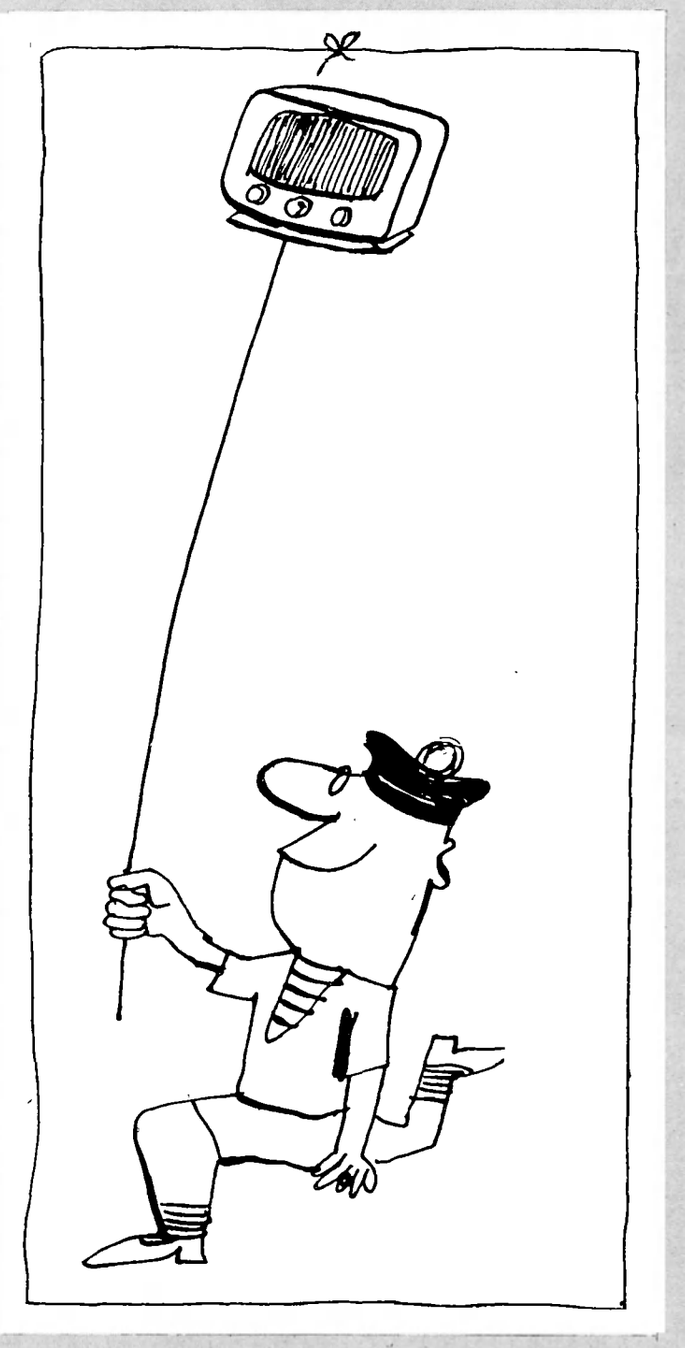
The UNESCO Courier

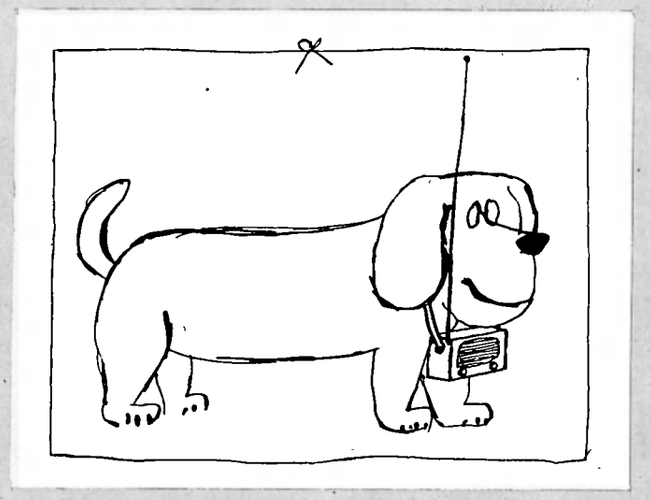
BROADCASTING without barriers

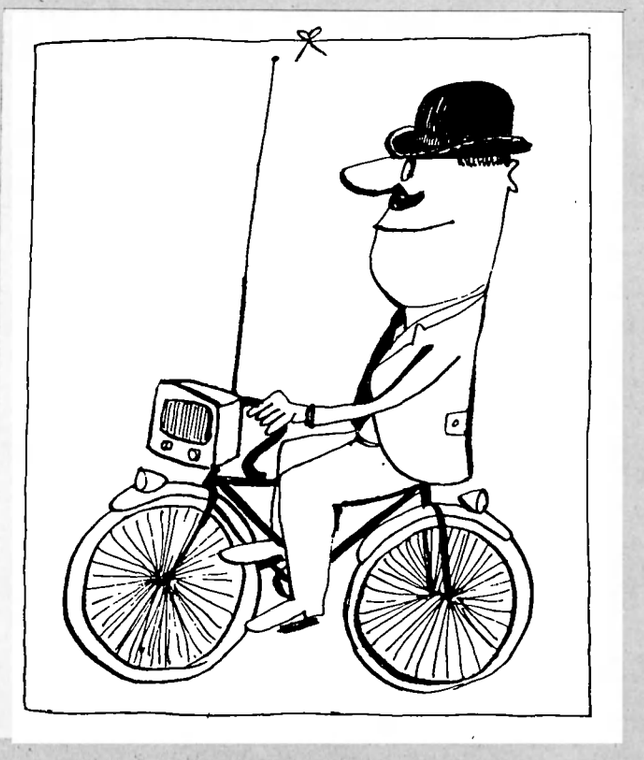
SEPTEMBER
1959
(12th year)

Price: 1/-stg. (U.K.)
30 cents (U. S.)
60 francs (France)

THE LIGHT PROGRAMME *by Siné*







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SEPTEMBER 1959
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Contents

No. 9

BBC, London

COVER PHOTO

Since 1955 radio sets have outnumbered copies of daily newspapers sold around the world. Radio receivers now number an estimated 350 million and newspapers under 300 million. Photo shows Hisato Okuse, " Miss Japan 1958 ", speaking from the BBC, London to listeners in the Far East. With 90 transmitters and 15 million receivers, Japan is now one of the world's major broadcasting countries. The Japan Broadcasting Corporation is rapidly developing closed circuit radio among farming and fishing communities and plans to cover all Japan with a frequency modulation service within five years.

Published monthly by
The United Nations Educational, Scientific and Cultural Organization

Editorial Offices
Unesco, Place de Fontenoy, Paris 7e, France

Editor-in-Chief
Sandy Koffler

Associate Editors
English Edition : Ronald Fenton
French Edition : Alexandre Leventis
Spanish Edition : Jorge Carrera Andrade
Russian Edition : Veniamin Matchavariani

Layout & Design
Robert Jacquemin

Sales & Distribution Offices
Unesco, Place de Fontenoy, Paris 7e

All correspondence should be addressed to the Editor-in-Chief.

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THE UNESCO COURIER is published monthly (12 issues a year) in English, French, Spanish and Russian. The United States of America edition is distributed by the UNESCO Publications Center, U.S.A. 801 Third Avenue, New York 22, N.Y., Plaza 1-3860. Second-class mail privileges authorized at New York, N.Y. (M.C. 59.1.139 A)

Annual subscription rates: $ 3.00 ; 10/-stg. ; 600 Fr. frs. or equivalent.

FREEDOM TO LISTEN

by George A. Codding Jr.
University of Pennsylvania

JUST four short decades ago, the voice of broadcasting was little more than a whisper coming from half a dozen experimental stations in Europe and America operated by men inspired by an idea and a hope. A small but equally devoted band of amateurs, who had painstakingly created their own primitive receivers, were the only ones to hear that whisper. Good music and up-to-date news were not the objective for which these individuals searched, but simply a few spoken words or a snatch of unidentifiable music being hurled miraculously across space.

Today broadcasting is one of our most important means of mass communication. Over 9,000 transmitters and more than 300 million receivers are available to bring the voice of broadcasting into the lives of mankind. Radio is an instantaneous and efficient method of keeping people informed of important events no matter where they occur.

The listener in Japan can have reports of a top-level conference over his local station in the time it takes for interpretation and translation of the proceedings directly by short wave from the United Nations building in Geneva. The sports fan in Argentina can follow the progress of his soccer team just as easily whether it is playing in Buenos Aires or at the Olympic games in Melbourne. It is also an inexpensive way of bringing the world's greatest music and drama directly into the homes of a widely scattered and heterogeneous audience.

Above all, radio is the ideal instrument for promoting the free exchange of ideas and attitudes between nations and their peoples. European listeners, for example, can pick up broadcasts from several neighboring countries with a normal type of medium-wave set. With a slightly modified receiver, they also can receive short-wave broadcasts of talks and commentary directly from the far corners of the globe. So important has broadcasting become that the nations of the world have affirmed through the United Nations and UNESCO that freedom to listen is an essential corollary to man's right to freedom of opinion and expression.

Different countries have adopted different methods of bringing the advantages of broadcasting to their peoples. In the United States and most of South America the free enterprise system is in common application for domestic needs. Government interference is kept to a minimum and the competitive spirit is relied upon to provide a varied programme fare. Radio is financed by the sale of time to advertisers.

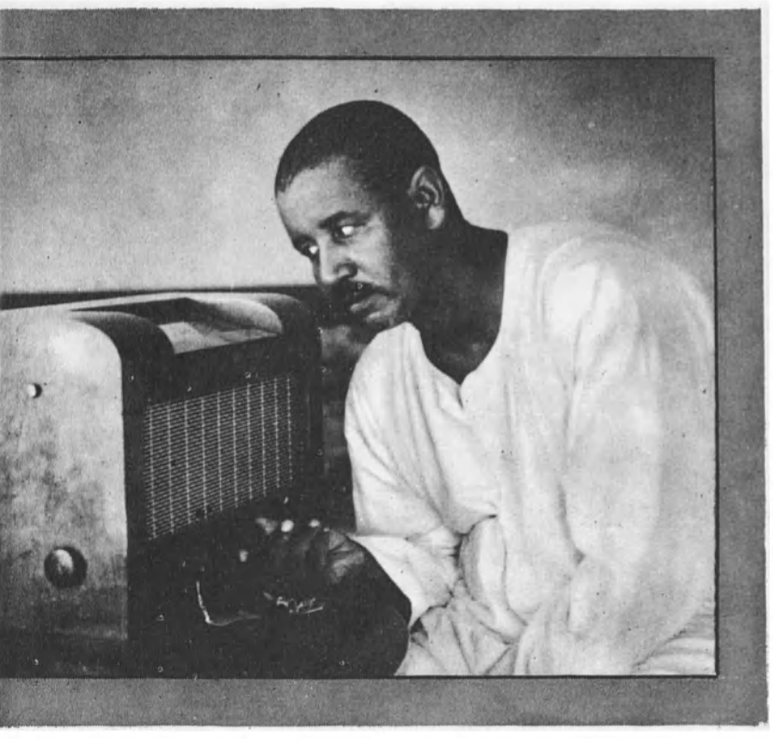
In most of the rest of the world broadcasting is regarded as a public service. The authorities seek to enable everyone to listen to one, two, or three national programmes of varied content. In order to bring some broadcasting to every citizen, there is a tendency to establish a fairly comprehensive coverage throughout their territory, even if some of the stations would be "uneconomic" by commercial standards. The cost of the service is met by license fees on receivers, reinforced where necessary by government appropriations.

Bigoted propaganda machine or source of unbiased news

SOME countries, like Canada, use a combination of the two systems in order to ensure that there will be both adequate coverage and certain cultural standards in a variety of programmes. Broadcasting for foreign consumption, on the other hand, is almost exclusively a state function, whether only a few hours of programmes are transmitted per day, as in the case of Iceland and Thailand, or whether the external services operate "around the clock" as in the case of several of the larger countries. Responsibility is usually shared between the foreign affairs branch of the government and a governmental operating agency, and the expenses are met by state grants.

No matter what system is used, the pervasiveness, immediacy and intimacy of radio place a heavy burden on those who control its use. By design or accident broadcasting can be turned into a wearisome, bigoted governmental propaganda machine, or it can be used to present unbiased news and to help the listener to understand his neighbour's problems. It can also be transformed into a mere outlet for "popular" music and singing commercials, at best just another background noise of modern civilization, or it can be used to widen cultural horizons and to aid in educational advancement. Constant vigilance is necessary to keep broadcasting from sliding into either of these undesirable extremes.

There are several serious obstacles—economic, technical and political—that impede the most effective use of broadcasting and thus deny far too many the freedom to listen. Probably the most important is the lack of success in making broadcasting facilities, especially receivers, available to all parts of the world. While Europe and



North America have a fairly adequate distribution of receivers—half of the world's total being in the United States alone—and South America is in a relatively good position, the condition is still shocking in many parts of Asia and in most of Africa.

In Asia, with the exception of certain countries bordering on the Mediterranean in the west, and Japan and the Philippines in the east, the average number of receivers per 100 persons rarely exceeds six, and in some areas there are less than one per 100 inhabitants. In Africa, with the exception of Algeria, Egypt, Morocco, Tunisia, and the Union of South Africa, few countries have as many as one receiver per 100 inhabitants.

It is important to note that the areas which do not have adequate broadcasting facilities are those where the need is the greatest. While lack of adequate transportation may make it difficult or even impossible to distribute newsprint, books or film, radio can communicate over long distances despite mountains, rivers, and jungles. Broadcasting can also overcome economic barriers that exist in most underdeveloped countries. After the costs of installation have been met, the maintenance of a broadcasting service is relatively inexpensive in relation to the area that it can cover and considerable use may be made of local resources. Film and newsprint, on the other hand, are expensive and must be purchased from abroad in the currencies of the major producers. The third and most important advantage of radio is that it can inform and educate whether or not the listener is literate. As Unesco has pointed out, the countries which are poor in information media are also those where the level of illiteracy is the highest.

The expansion of broadcasting to meet the needs of underdeveloped areas, and perhaps even its continuation on the same level in more fortunate areas, depends upon the solution of another basic problem. The radio spectrum is used by many services in addition to broadcasting—ships, aircraft, telegraph and telephone, and amateurs, to mention but a few—and new ones are being introduced. Since the radio spectrum is limited, and the appetites of the radio services are not, over the years it has become more and more crowded especially in some of the more desirable frequency bands. The interference between stations that has resulted is so serious in certain bands that the future of broadcasting as well as other radio services is actually in serious danger.

One possible remedy has been explored by the International Telecommunication Union (ITU), the world's guardian of the radio spectrum. At its first post-World War II conference in 1947, it decided to draw on the experience of the European broadcasters and establish a world international frequency list in which all available frequencies would be assigned to countries on the basis of their individual needs. In addition, an International Frequency Registration Board was to be created with the duty of assuring that any future operating changes would cause no interference to the stations operating according to the new list.

After eleven years of exhaustive labour in which the technical representatives of almost every country met time and time again, the ITU still has not reached the objectives set for itself. Limited success was obtained in assigning frequencies in the low and medium bands where most domestic broadcasting is carried out, but there was almost complete failure in the bands with long-range propagation characteristics, especially those used for broadcasting directly from one nation to another. The reason lay in the fact that the total requirements submitted greatly exceeded the spectrum space available. Some requirements were most certainly legitimate but others were exaggerated in the hope that a minimum would remain after bargaining; still others were inflated to provide for any possible expansion in the future.

The position of high frequency broadcasting was further complicated by the division of responsibility in most international services between the telecommunication or broadcasting authorities responsible for programming and operating and the non-technical and political government departments which oftimes decide the areas to be covered, the languages to be used, and the times

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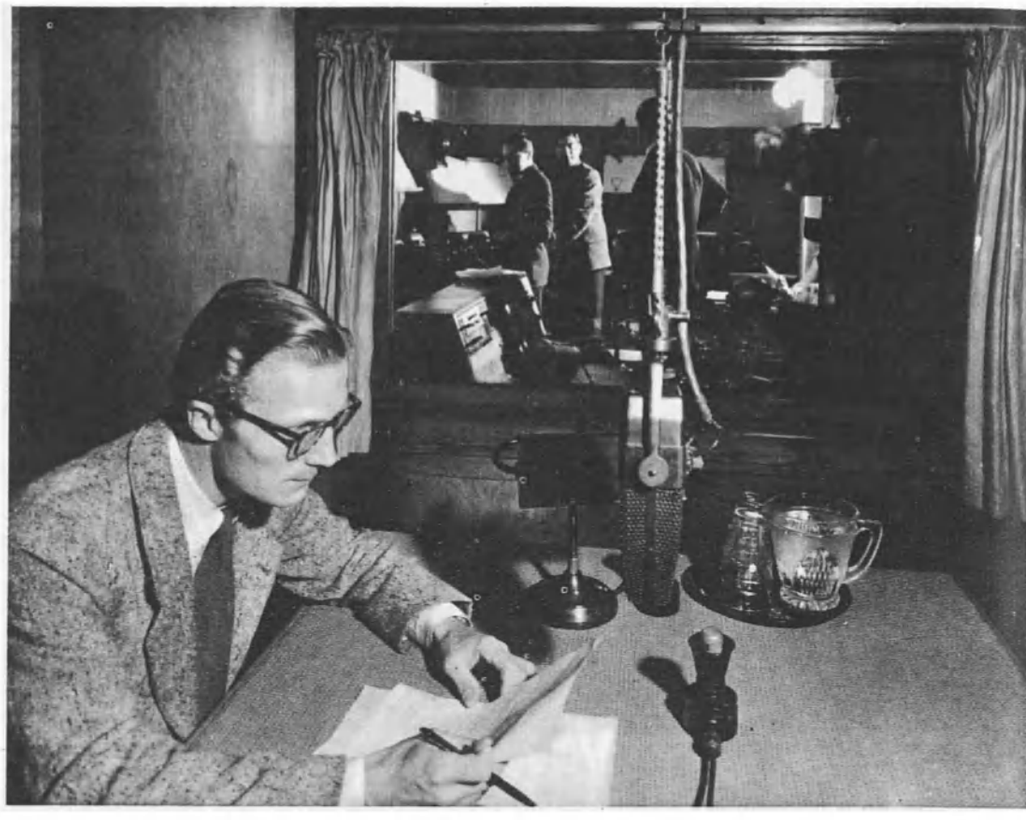
© BBC, London

INSIDE VIEW of a soaring radio mast at the British Broadcasting Corporation's Very High Frequency transmitting station, near Norwich, England. The Very High Frequency Band has only come into large-scale use for broadcasting within the last ten years. All frequency modulation stations, and most television stations operate within this band.

FREEDOM TO LISTEN

(Continued)



STUDIO DEADLINE. Announcer gives last minute look at news script while producer and scriptwriter check production readiness in control room seen in background.

of transmission. Whatever the reason, the countries of the world have so far failed in this endeavour. Fortunately, another opportunity to reach agreement will present itself when the nations of the world meet this fall in Geneva for the second post-World War II ITU Administrative Radio Conference. (See page 8.)

There is another approach to the technical problem of radio which can perhaps aid in the quest for a political solution: frequency spectrum conservation. If the limits of the desired frequency bands cannot be enlarged, the frequencies available should be used in the most effective manner. Many radio services have found the means of reducing the frequency space used by their transmissions to permit a greater volume of traffic within their allocated bands through time sharing, geographical sharing and the introduction of new technical methods such as single side band emissions.

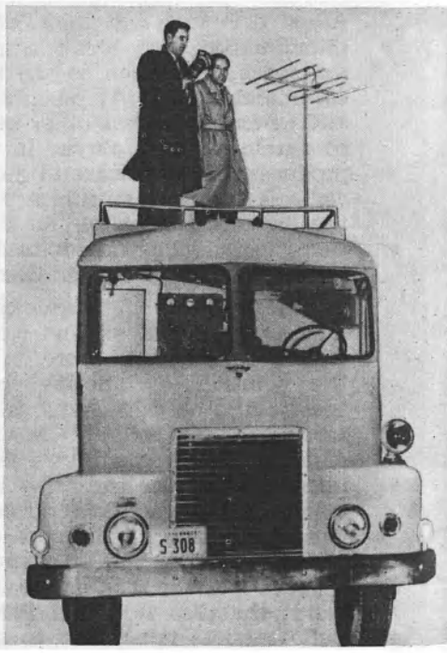
An excellent example is the short-range mobile services employed by fire prevention, police, public utilities, taxis and other similar organizations. In the past few years the spectrum requirement for one channel of the mobile service has been reduced by a quarter and equipment has been developed that may permit a further reduction of one half, or even one sixteenth of what was previously considered necessary.

Of all the radio services, broadcasting has perhaps done the least in this respect. Even if it is conceded that the special nature of broadcasting has prevented such action in the past, the perfection of frequency modulation (FM) broadcasting in the very high frequencies opens the door to an effective contribution. In 1947 the ITU assigned an additional band to broadcasting in the newly developed very high frequency area of the spectrum. Later it was found that the use of the FM technique on

PROPHET OF THE 'ELECTRIC' AGE

In the 1880's Albert Robida, French artist-writer, amused his readers with imaginative pictures of the "Electric Age" which in reality bears strong resemblance to the 20th century's "Electronic Age". In his drawings, Robida depicted such modern developments as television entertainment, television advertising, radio news broadcasts and music recordings. A far-seeing drawing by Robida (right) showed a news correspondent broadcasting an eyewitness report to a distant audience from the back of a camel via radio. Today Robida's dream is an everyday event with the camel replaced simply by the mobile broadcasting units and staffs of roving radio reporters (far right).

USIS photos



these frequencies provided the man at the receiver with clearer and better listening and there was a decided reduction in the possibility of interference from other transmitters operating on or near the same frequency.

If very high frequency FM broadcasting could be introduced wherever practicable throughout the world for local broadcasting needs, as it is being done in some countries in Europe, the medium waves could be made available for national coverage and even intermediate range international broadcasting. This in turn could free many of the high frequencies, which are now being used for national or medium range international broadcasting, for their proper use as long-range services. The savings that could result from such a procedure could relieve much of the present pressure in the medium and high frequency bands, thus contributing materially to solving the frequency problem as a whole.

If broadcasting does not find a method of giving the listener the service that he desires and deserves he may turn to a competitor such as wired broadcasting. Basically, this service consists of picking up broadcast programmes from a central point or exchange, and distributing them by wire to those subscribing to the system. The principal advantages claimed by the wire broadcasters cover most of the situations where regular broadcasters are failing in their duty to the listener. There is little or no interference from other stations and electrical apparatus, and the general cost to the subscriber is low.

The great disadvantage of wired broadcasting is, of course, that the listener has no say in the selection of programmes and must take what the organization chooses to give him. The man with the regular radio set, on the other hand, has a much greater choice of local programmes and if equipped with a high frequency band can roam the ether to pick up broadcasts directly from other countries. If broadcasters do not adopt the necessary innovations to assure that radio remains an effective means for the exchange of ideas, wired broadcasting may become a serious competitor.

At this point a word is due about radio's new challenger, television. Obviously if television is destined to replace broadcasting in the near future there is less need to spend the time and effort necessary to give the broadcasting a new lease on life. Although the experience available to date is fragmentary, it is definitely reassuring to radio. In the first place it has been found that in the few countries where television coverage now is close to equalling that of radio the purchase of radio sets has

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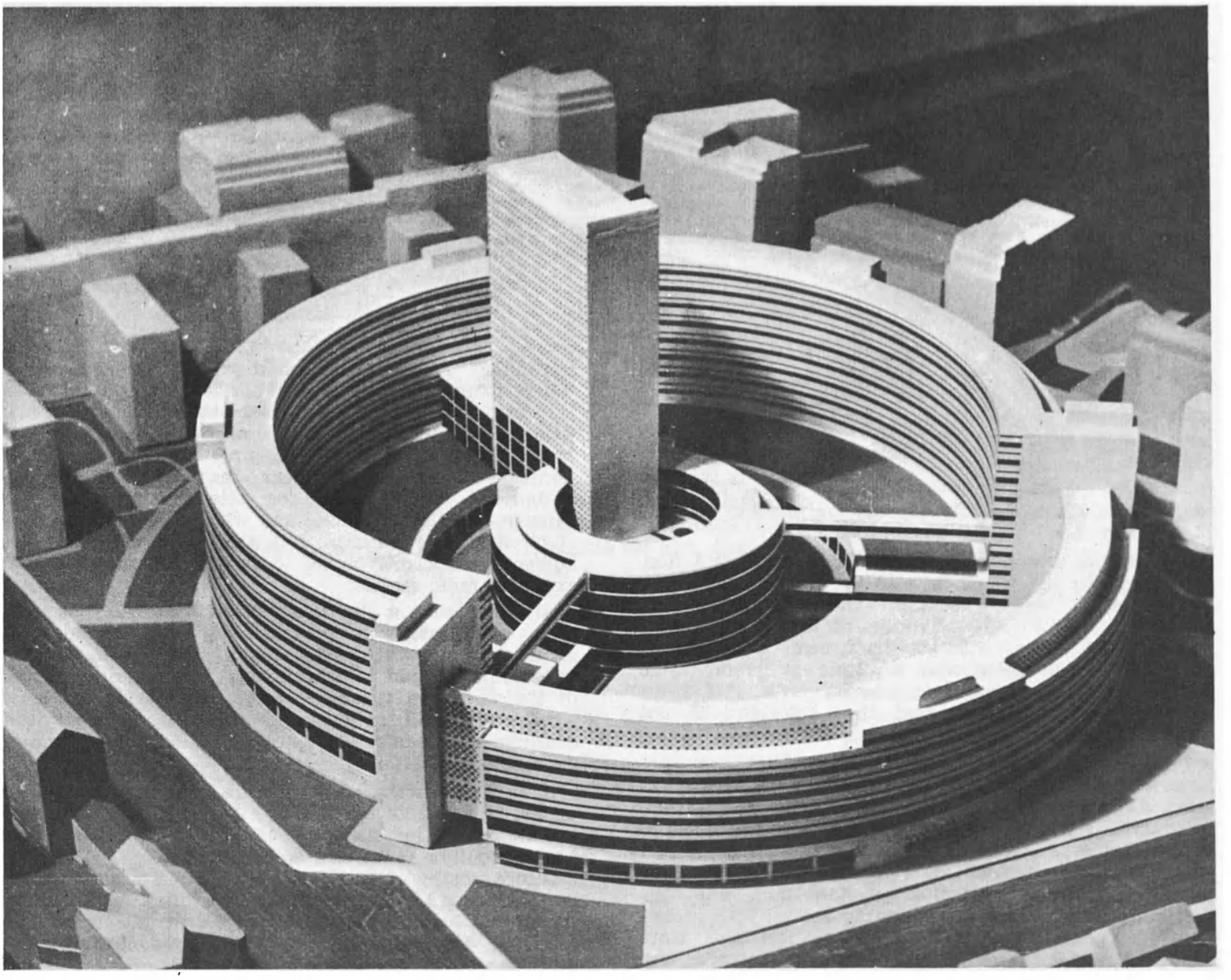
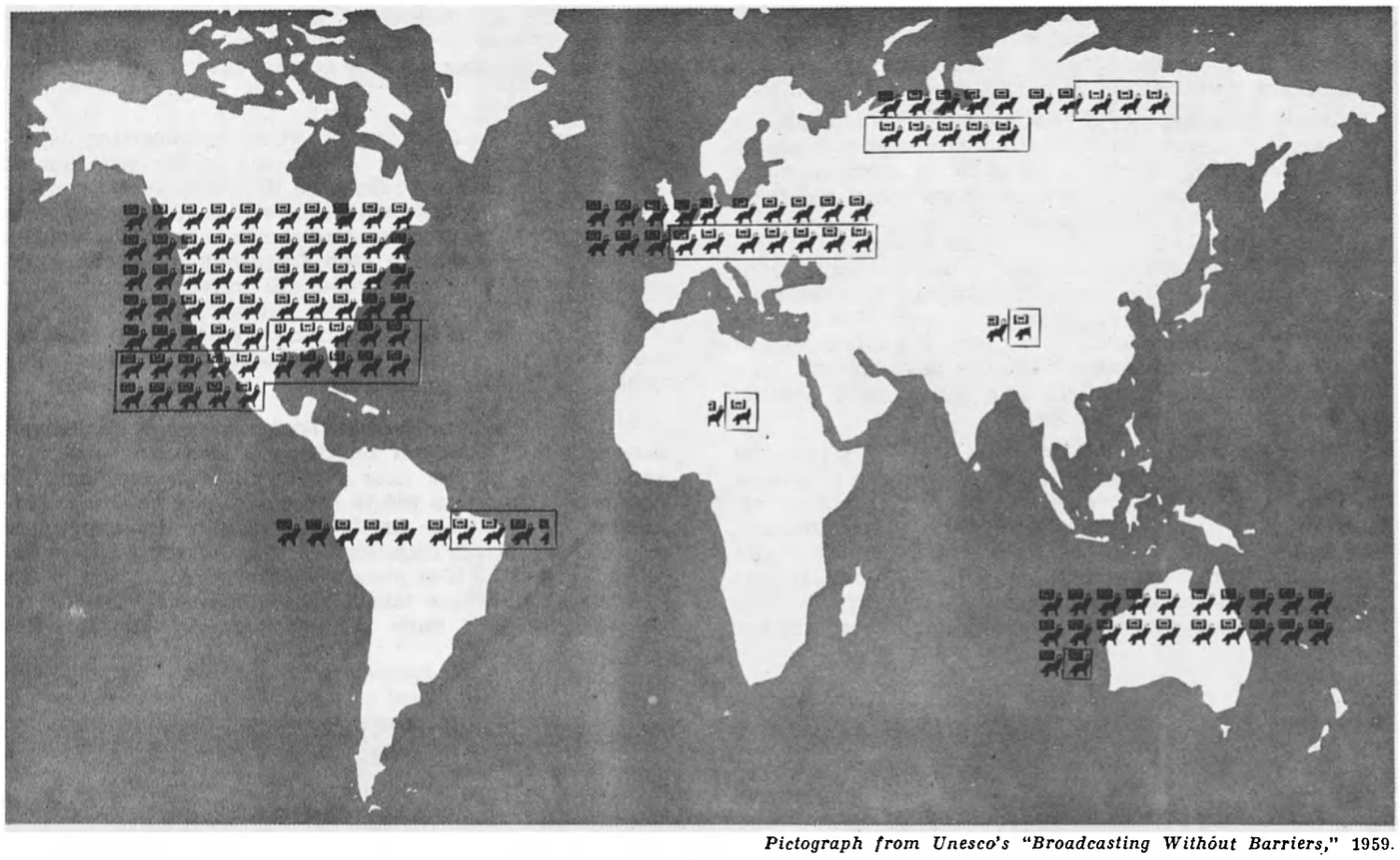


RADIO CITY IN PARIS. A huge circular structure nearly 500 feet in diameter which is now rising on the right bank of the Seine in West Paris will be the new headquarters of French radio. When completed it will have 15 special studios for musical, theatrical and variety performances, five large halls for shows with live audiences (one hall will seat 900 people) ; a vast collection of books, scores, recordings and other background and documentary material ; a central recording section ; two special halls for televised variety programmes ; a special section for the production of cultural and artistic programmes intended for listeners outside France.



Pictograph from Unesco's "Broadcasting Without Barriers," 1959.

The world total of receiving-sets is estimated at over 350 million. These sets are unevenly distributed, however. One half of them are located on the North American continent alone. Another third are distributed throughout Europe, with the greatest concentration in the West, and the remaining sixth are scattered over Asia, Africa and the Near East. The United States is in first place both from the point of view of total receivers (160 million) and density (88 per 100 inhabitants). Second place in total number of receivers belongs to the U.S.S.R. (33 million), although second place in density goes to Canada with 56 receivers per 100 population. In contrast Ethiopia and Eritrea have only 16,000 receivers for a population of some 20 million or an average of 0.1 per 100 people. Even India with over a million receivers has an average of only 0.3 per 100 people. Map above shows distribution of world's radio receivers, each symbol representing one receiver per 100 inhabitants. Boxed symbols indicate increases between 1949 and 1956.

FREEDOM TO LISTEN

(Continued)

not declined but to the contrary has continued to increase at a steady rate.

The obvious reason is that television's extra attraction, the appeal to the visual, is also its greatest drawback. Those people whose vocations demand visual concentration cannot take advantage of television as they can of broadcasting. Further, there seems to be a great number of individuals who continue to prefer radio because they believe it can do a better job in such fields as news and music, or find that television is not compatible with leisure pursuits such as reading.

There is also an economic factor that must not be overlooked. Television is extremely expensive in relation to broadcasting, as concerns both upkeep and programming. In addition it is a voracious consumer of talent. Underdeveloped countries and those areas where the economy is weak will have to wait a very long time indeed for the introduction of television, and the possibility of achieving saturation on a level with broadcasting is exceedingly remote. There are also more advanced countries, for example Norway, Australia, and New Zealand, where geographical difficulties and scattered populations will delay television expansion and where the final achievement of television coverage will be measured not in years, but in decades.

Even where adequate coverage is achieved, it seems unlikely that 24-hour programming, as is the case in several large cities in the United States, or even continuous 12-hour programming, will be practicable. Where commercial television is not adopted, the European plan of restricting television to the evening leisure hours, with perhaps a few minutes of "telecasting" in the morning or at noon, will probably be continued. Consequently, it seems clear that even where the authorities can provide for television coverage as extensive as that of radio, and where the same number of families have television sets, there still will remain an audience sufficiently large to justify a continuing and extensive radio service.

Although such a situation will most probably demand some adjustment in programming and changes in emphasis, radio will continue to be an essential medium of information and entertainment. In the larger portion of the world, on the other hand, where such an ideal situation is still only in the dim future, radio will continue to be the most important all-around medium of mass communication.

If any conclusion can be drawn from an examination of the situation of broadcasting today it is that broadcasting is one of the most important means of mass communication at mankind's disposal and if it is to have a future worthy of its potentialities positive action must be taken by all concerned. It is everyone's responsibility to see that broadcasting facilities, both transmitting and receiving, are available to all. It is everyone's responsibility to see that the programmes that are offered contain all that is necessary to provide the listener with means of enriching his life. It does not follow, of course, that the listener will always take advantage of the best in broadcasting, but if he does not have access to radio, and to a choice of good programmes, he is being denied the basic right to listen.

TRAFFIC JAM ON THE BROADCASTING BANDS

by Julian Behrstock

THE African villager who joins his neighbours to hear local broadcasts on the community set and the uptown New Yorker who twirls the dial of his high-powered short-wave receiver in a skyscraper apartment alike have a stake in a world radio conference which opened in Geneva, Switzerland, in August.

This conference, sponsored by the International Telecommunication Union (ITU), will gather together government officials and radio broadcasters from 100 countries. During four months in Geneva, they will seek to hammer out agreement on pressing problems affecting the role of radio in the world today.

The problems concern both transmission and reception of broadcasts. Competition between countries in expanding their overseas broadcasting services in recent years has hindered agreement on an orderly system for the international allocation of frequencies. Meanwhile, new stations are being built, more powerful transmitters are coming into operation and rival transmissions increase. Pirating of frequencies and jamming add to the difficulties of the listener.

Wanted ! 400 million sets

A problem of a different kind is experienced by nearly 60 per cent of the world's people, most of them in Asia and Africa, who lack efficient, low-cost receivers to pick up even local broadcasts. Community sets, inconvenient for many listeners and often costly because of high taxes, are the only means of reception in many areas. Nearly 400 million receivers would have to be mass-produced to assure an individual set for each family in the under-developed countries (For one example see "Saucepan Radio", page 26).

These will be among the questions preoccupying delegates to the ITU's Administrative Radio Conference, the first such conference to be convened in eight years. They are also a major concern of UNESCO, dedicated as it is to promoting the use of broadcasting, and all the other means of mass communication, for the free flow of information and ideas.

UNESCO has sent its Member States a series of four proposals for possible submission to the Radio Conference. The principal proposal urges that agreement be reached on a sound plan for distribution of high frequencies—the frequencies used for long-distance broadcasting. It suggests that procedures should be established by which the ITU could assist radio services in making more effective use of frequencies. Consultation with each other through the ITU would enable them, for example, to minimize the occurrence of broadcasts at the same time and on the same frequencies, which results in little more than noise for the listener.

The Geneva conference will mark a further and perhaps decisive step in an effort dating back more than 30 years to reach world agreement on frequencies. Since 1928, when a first international frequency list was drawn up, a series of conferences has sought to put a plan into effect. It became progressively more difficult to cut up the pie as governments made mounting requests based on expanding radio services. Demands for high frequencies have been three times in excess of available resources.

Today the great majority of States maintain international broadcasting services beaming numerous programmes daily on high frequencies to all parts of the world. Despite the vast expenditure of time, money and effort, the audience remains small and in some areas is numbered only in thousands or even hundreds of listeners. Broadcasters themselves will be the first to acknowledge the crying need for agreement on frequencies, schedules and programme exchanges.

UNESCO has drawn these points to the attention of its Member States in urging remedial action at the Geneva Conference. Such action, says UNESCO, would help broadcasting achieve "its great potentialities as a vehicle for the exchange of information and ideas throughout the world".

A second UNESCO proposal deals with the interference hindering even local reception of broadcasts in some areas as a result of overcrowding of the low and medium frequency bands. The experience of a number of countries, particularly in Europe and North America, has shown that frequency modulation (FM) broadcasting in the very high frequency band may be expanded for use in local broadcasting, relieving much of the burden in other bands. It provides the listener, moreover, with a high quality signal relatively free from interference. UNESCO recommends that FM be introduced more widely.

Remove crushing taxes

THE widespread need for radio receivers in the under-developed countries is the object of a third proposal. It suggests that the ITU and UNESCO explore the possibility of designing a robust, wideband, inexpensive receiver, with standardized parts. A study would be made of the feasibility of pooling markets to encourage mass production of receivers of this kind.

Even in some of the more advanced countries, radio receivers are still a luxury, due to their high original price, cost of upkeep and the imposition of import duties and sales taxes. A UNESCO survey shows that some 85 countries levy import duties on radio receivers; these charges often represent 50 per cent or more of the value. Reduction of duties and sales taxes is accordingly suggested in UNESCO's fourth proposal.

Indications are that all four proposals suggested by UNESCO will be sponsored by governments and submitted to the Administrative Radio Conference. Their adoption would help to improve conditions for both transmission and reception of radio broadcasts, making this a better medium to entertain, enlighten and link people all over the world.

RADIO 'HAMS': AN INTERNATIONAL FAMILY

by

David

Gunston

In almost every corner of the globe, in living rooms, dens, attics and special "shacks", 260,000 radio "hams" maintain a vast network of personal contact by voice or Morse Code. Most amateurs use self-built apparatus costing from £25 to £50. Right, a very elaborate set-up operated by a U.S. amateur in California.

J. B. Knight Jnr., U.S.A.

USIS

ALL AGES AND PROFESSIONS are numbered among the more than one quarter of a million amateur radio operators scattered over the globe. Above, Leonard Ross of Tujunga, California, who was believed to be the youngest ham operator in the world when in 1953 he passed the General Licence class test at the age of eight. To pass the test he had to demonstrate his ability to send and to receive at least 13 words of Morse code a minute. Photo shows Leonard, aged eight, operating the equipment in his radio shack.

No study of communications in the modern world would be complete without an account of the unique contribution of amateur short-wave radio enthusiasts, or "hams," who form a great army of private individual communicators. In almost every corner of the globe, in living-rooms, dens, offices, cabins, attics, cubby-holes and outbuildings (all universally referred to as "shacks") some 260,000 licensed operators maintain a vast network of personal contact by voice or Morse Code signals that is entirely free from political or propaganda influence.

Daily, hourly in fact, "hams" are in touch with fellow-enthusiasts of both sexes and all ages in countries near and far. It is an achievement without parallel, impossible to envisage even fifty years ago, and the contribution towards fuller international understanding and goodwill cannot be measured.

Official Soviet photo

SOVIET 'HAMS' in 1958 received and sent 854,000 cards, known as QSL-cards, which are the amateurs' method of confirming the establishment of two-way radio contact. Here two novice "hams" at the Pedagogical Institute in Karaganda, Soviet Kazakhstan, are seen assembling one of ten ultra-short wave transmitters which they are building as a gift for rural schools. They are members of a special radio club where they study the international "ham language", operate their radio station and join in contests and shows of self-built radio equipment.

Amateur radio—and every "ham" will stress the vital importance of his status—is primarily a hobby, but as such must be the only one duly defined by an international treaty drawn up by 90 nations. At the International Radio-Communications Conference held in Atlantic City, U.S.A., in 1947, it was defined as: "A service of self-training, intercommunication and technical investigations carried on by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest."

Most amateurs, however, would probably define their compelling interest more simply as "the practice of two-way, short-wave radio-communication, not as a business or means of profit, but as a spare-time hobby pursued for the pleasure to be derived from an interest in radio technique and construction, and for the ensuing friendships with like-minded individuals throughout the world."

Strictly speaking, the description "amateur" in this connexion is not applied to any neophyte or dabbler with radio apparatus, but only to duly licensed transmitting operators whose stations, or "rigs", have the official sanction of their respective governments. Whatever the connotation in other spheres, in the field of amateur radio the prefix is a mark of distinction, superior knowledge and accomplishment, and very much a cachet to be achieved. In addition, there are large numbers of persons with no desire to become transmitters operating under official license, but who follow the hobby purely as listeners using short-wave receivers. They are known in "ham" parlance as SWLs (short-wave listeners).

The pursuit is just about as old as radio itself. It had its beginnings in the very earliest days of the invention. Around the turn of the century, when vague details of the newly-born art of wireless telegraphy, as it was then known, began to filter through to scientific journals and beyond, technically-inclined persons began to feel the first glimmerings of the very real fascination that now absorbs the attention of over a quarter-of-a-million people.

Marconi considered himself an amateur, and when he finally succeeded in spanning the Atlantic Ocean by radio in 1901, small groups of youthful experimenters in many countries resolved to find out for themselves how it was done. Initially, their work was crude and limited: they were at first fortunate in sending and receiving wireless waves over distances of a few feet. Gradually the range increased to yards and eventually to many miles as new detectors, new circuits and new aerial antennae were constantly tried out.

Transmitting to the moon

AMATEUR radio began long before there were short-wave bands fitted as a matter of course to ordinary radio sets, indeed long before radio receivers were widely known at all. Oddly enough, the first "hams" were eventually to prove that messages could be sent and received all over the world on low power by using the very short waves which the experts said were useless, and the period 1921-1926 witnessed epoch-making discoveries in the field.

Amateurs in many scattered countries demonstrated that high-powered transmitters such as are used for normal daily long-and medium-wave transmissions or programme broadcasts were unnecessary when wavelengths below 100 metres were adapted for world-wide communication. This brought the hobby within the scope and purse of ordinary folk everywhere, and although large sums can easily be spent on short-wave radio equipment, most of today's amateurs operate on apparatus they have built themselves costing less than £50, whilst there are many small but complete and reasonably efficient stations constructed by their owners for half of this figure or even less.

Naturally, keen operators may spend more than these figures renovating or extending their equipment, and the annual turnover in apparatus, though not essential, may be large. Surveys show that whereas about 80% of amateur transmitters are home-made and the rest are bought ready-made, the reverse is the case with receivers. This is because the modern superheterodyne radio receiver is such a complex and precise instrument that elaborate factory equipment is needed to construct it. So receiving sets are usually cheaper and better-made than those built at home, whereas transmitters are costly when made

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RADIO 'HAMS'

(Continued)

commercially, and are best modified to local needs when built by the operator himself.

However, apart from practical and financial considerations, many "hams" have no wish to deprive themselves of the sheer creative delight of seeing the fruits of their own hands perform the continuing miracle of transporting their voice or code signals across enormous distances and bringing back the immediate reply of a kindred spirit perhaps on the other side of the globe.

Nowadays the range of well-equipped amateurs is limited only by the dimensions of the earth, and in fact not always by that. Several "hams" have managed to transmit signals to the moon and record their reflection, whilst many operators have tracked the various earth satellites, and continue to work as monitoring stations for this purpose. Naturally, conditions vary with the seasons, the weather, the time of day and sunspot influence, but to talk with friends many thousands of miles away is a daily occurrence for all "hams". The most important factor in securing good results is the choice of the most suitable frequency band for transmissions, for each wavelength has its own peculiar properties.

Although nowadays many official broadcasting stations as well as ships and aircraft use the short-waves, almost every country—by international agreement—allots amateurs certain fixed bands, outside the limits of which they must not operate. However, every amateur is allowed at any time to choose the band he wishes to use and he is also allowed (subject to certain band-planning schemes designed for the general good) to select his own frequency and to change it when he desires.

'DX hounds' & 'ragchewers'

This is an important point on the more crowded short-wave-bands since it allows the keen amateur to search for and then use a clear frequency (or "channel"), then should heavy interference be experienced later, to move immediately to another position on the same band. With code signalling, it enables what is known as "singlechannel operation" (with both stations on approximately the same frequency) to be used. Every short wave-band has its limitations and problems, but while they are never too great to allow free operation, the amateur has always some new field to conquer.

Most "hams" have equipment that will operate by voice or by Morse Code, with roughly half the messages being transmitted by each method. Code work requires less complex apparatus and may include the use of specialized codes like the International Q Code which reduce the language barrier. All licensed amateurs have to prove their proficiency in Morse Code before they are allowed to operate. Indeed, no one in any country can expect to secure his amateur license without preliminary study, application and practice, though self-training is not difficult.

Most countries insist on written as well as practical tests, and there is usually an age-limit of 16 or 18, though several countries have reduced this to 14 or even 12. The United States, Japan, Ireland and Israel are noteworthy exceptions to this rule, fixing no age limit. Again, most but not all countries insist on their operators possessing citizenship: Germany, Finland, Morocco and Chile being among the exceptions here.

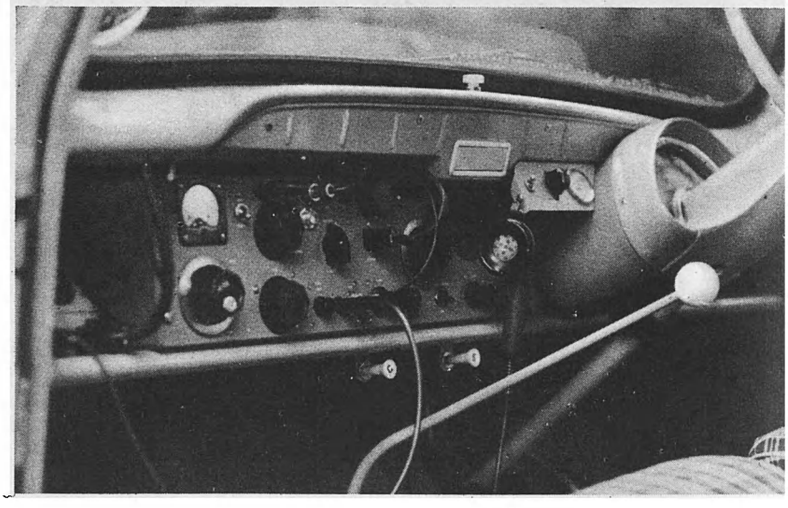
How many "hams" are there in action today? The American Radio Relay League, largest member-body of the International Amateur Radio Union, currently estimates that there are rising 260,000 of them, of which 190,000 are in the United States and its possessions. There are at least a few amateurs in every country, and the countries of Eastern Europe and the U.S.S.R. are no exceptions.

Amateur radio ignores the existence of frontiers and though the fact is not generally realized, there are today perhaps 10,000 "hams" in the Soviet Union, freely communicating with the rest of the world. Only in the reluctance of national amateur radio societies in the Communist countries to join the IARU does the shadow of politics fall across the encouraging picture. At present, only the Polish and Yugoslav societies are members. Czechoslovakia was formely a member, but resigned some years ago because the IARU headquarters in the U.S.A. refused to print the Stockholm "Peace Appeal" in their Calendar Bulletin.

At present, some 54 countries have their own member-societies affiliated to the International Amateur Radio Union, with three others under consideration. India is a particularly welcome new admission, with about 200 operators, while other representative countries (with approximate number of amateurs) are: France, 2,800; Brazil, 9,000; Poland, 250; South Africa, 2,000; Cuba, 900; Mexico, 900; Venezuela, 320; Canada, 8,000; Japan, 5,200; Great Britain, 8,500; Yugoslavia, 300; Spain, 830 and Germany, 5,000. In addition to these, there are organized groups of amateurs in such widely-separated places as Hong Kong, the Philippines, Austria, Costa Rica, Iceland, Peru, Syria, Uruguay, Malaya, Colombia, Burma, Ecuador, Finland, Australia and the Belgian Congo.

HAM ON WHEELS. More and more amateur radio enthusiasts are turning their automobiles into mobile radio stations by installing equipment like that shown below. Right, Canadian radio "ham" operates a short-wave mobile unit. In Britain too, aerials like the one on the rear of this car are becoming a familiar sight. Amateur station number is carried on bumper bar.

Photos T. Holloway, England



To the outsider, the amateur radio movement would seem to be a particularly well-organized one, with flourishing if small national societies (all distinguished, in true amateur radio fashion, by their initials—PZK (Poland), EDR (Denmark), USKA (Switzerland), etc.—in almost all countries. Banded together into the well-organized IARU they seek continual improvement in "hams" relations with their governments, arrange international agreements affecting radio communications and in the words of the IARU's Constitution, "the encouragement of international fraternalism". International Conferences have in fact

been successfully held in Madrid (1932), Cairo (1939), Atlantic City (1947) and the next World Radio (International Telecommunications Union) Conference is due to be held at Geneva in the summer and autumn of this year.

But what, on the personal level, of the "hams" themselves? What do they talk about, and how do they contribute towards international understanding? Most licence regulations expressly forbid the dissemination of any messages of political, religious or commercial content, leaving the amateur free to talk on personal and technical matters to his heart's content. In actual fact, innumerable individual topics are daily discussed over the ether, with radio equipment and performance easily the most popular!

Despite its high degree of specialization, amateur radio consists of many phases of activity. An experimenter will chat about his "rig" and compare endless notes with others. A "DX hound" (DX meaning long-distance) is a kind of angler of the ether, always hoping to pick up some rare or remote station in another part of the world.

A "ragchewer", or born gossip, is content to talk for hours on end about his country and home, the weather, his friends, his fellow-amateurs and the like. A "traffic-handler" will spend much of his time at his station in the clear service of others, relaying messages free of charge for the general public, simulating a regular communications system with national trunk lines and feeder networks for possible emergency need, though all amateurs rise to the occasion when difficulties or disasters occur.

Wherever there is a large-scale natural or man-made disaster, with the frequent disabling of telephone and commercial radio systems, amateurs step into the breach to provide substitute communication links to the affected areas. For example, an earthquake may cut off local rescue teams from the outside world, to which they can be speedily linked by radio "hams", or in cases of fire or explosion nearby amateurs can direct calls for help swiftly to the right quarters when other means of communication are out of action. This actually happened in the Texas City disaster of 1947 when, had it not been for radio amateurs, communication links would have been non-existent and rescue work gravely delayed. In the disastrous floods in Eastern England in January and February 1953, "hams" set up an emergency network which operated continuously in conjunction with the police and ambulance services.

Many "hams" in Europe, South Africa and America have assisted expeditions and similar ventures by providing constant radio links. The famous Kon-Tiki expedition of Thor Heyerdalil was in regular contact with amateurs in many countries as it drifted across the Pacific, while more recent Arctic and Antarctic teams have benefited not only by radio links provided by amateurs, but by the regular relaying to their distant outposts of personal messages from the homes of the men themselves.

Many others make a special point of relaying such messages at fixed times to servicemen of their country stationed in remote places, even the North Pole. Eighteen-year-old Julius Madey, of New Jersey, U.S.A., winner of the 1958 General Electric Edison Radio Amateur Award, was cited for relaying more than 12,000 messages for American servicemen at isolated Antarctic, Arctic and South Pacific posts, and once through his station a young mother announced the birth of her baby directly from her hospital bed to her husband in Antarctica. Another American amateur who was also specially commended recently for his public services was 54-year-old Kenneth M. Blaney of Sacramento, California, who spends twelve hours a day handling messages and recording important data on the Explorer satellites.

Amateurs win a race for life

When the inspired French film "Race for Life" (*Si tous les gars du monde...*), which received the British Film Academy United Nations Award for 1957, was released, its story of help provided in a case of sickness at sea by a chain of "hams" all over the world, bringing an injection serum to the North Atlantic by means of messages relayed via Togoland, Paris, Munich, East Berlin and Norway, was viewed by many critics with scepticism.

It provided, in fact, a typical instance of just how amateurs can and do provide help in emergencies, and was based on actual occurrences. Furthermore, whilst making the film, director Christian Jaque was personally involved in a like case, wherein a French "ham" picked up an urgent call sent out by two amateurs in Brazil. They were sending out a call for information on the correct dosage of a new antidote not then in general use they had received from Peru. Within the hour, the details from Paris were in the hands of the Peruvian doctor.

Many other amateurs assist their governments in service and civil defence work, notably the Military Amateur Radio System in the U.S.A. (MARS), which provides a nationwide communications network consisting entirely of amateurs upon which the services can rely in an emergency. Some "hams" aid coastguards, police and weather forecasters, report on traffic problems, speed the rescue of men from wrecked ships and aircraft, even assist in the training of young people and the blind in electronics.

In addition to these practical services, amateurs constantly further the development of the art and science of radio by their experiments and observations. Being usually unencumbered with ponderous knowledge, they sometimes get to the heart of a technical problem quicker than the professionals, while advances in many fields of electronics, radar and long-distance radiotelegraphy have originated in "shacks" all over the world.

From the schoolboy in Chilé and the mining engineer in Australia to the missionary in Samoa and the student in Lithuania, the growing army of "hams" is a truly dedicated group with a spirit of human service hard to equal.

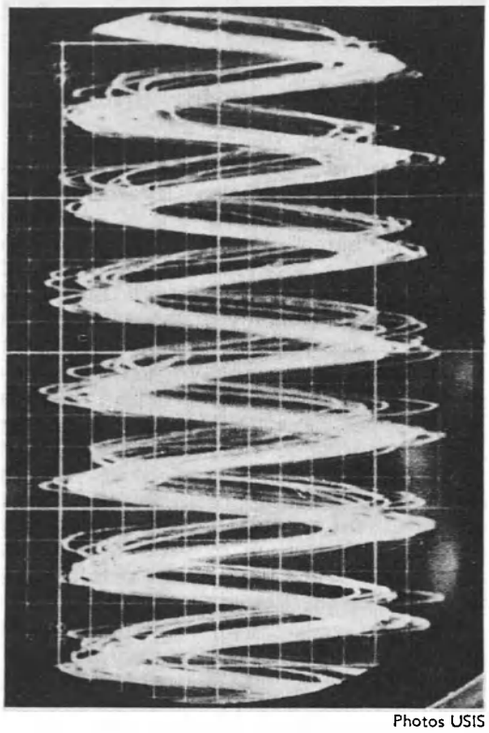
INTO OUTER SPACE ON RADIO WAVES

by Werner Buedeler
Fellow of the Royal Astronomical Society

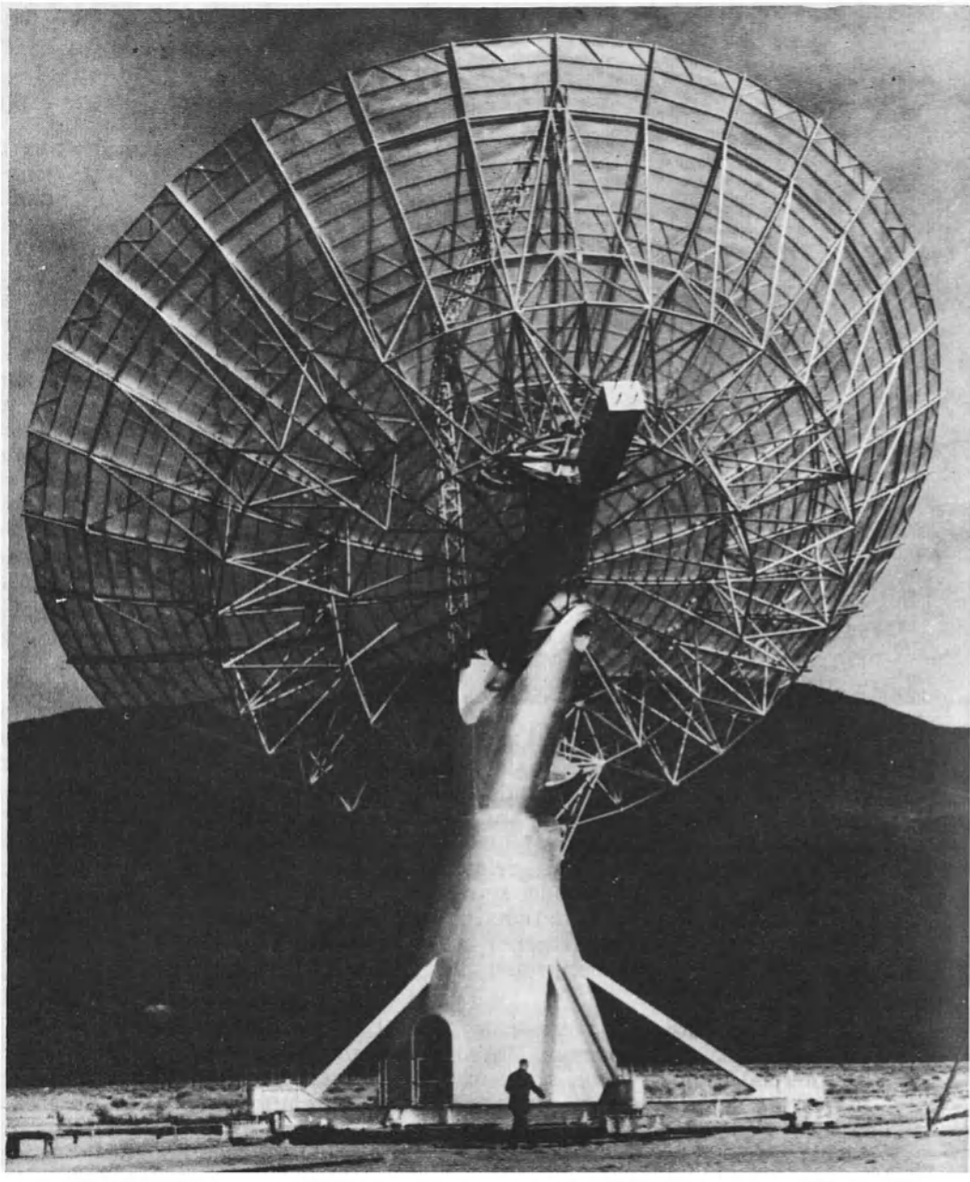
Only for the past thirty years have astronomers known that radio waves, one of man's most useful servants on earth, are being created within stars and in inter-stellar space as well. Since the end of the Second World War, however, these "messages" from outer space have been recorded and scientifically evaluated. In this way, a new science—radio-astronomy—has come into being.

In the same way that the ordinary astronomer observes the stars through his telescope, the radio astronomer listens to strange sounds giving him information about electronic processes in the solar corona (that is, the outer region of the sun), invisible phenomena in the centre of our own galaxy, and the expansion of the universe. Special receiving antennae, occasionally of tremendous, size, have been constructed in order to pick up the faintest noise from cosmic space.

Radio astronomers have obtained such a wealth of new information in recent years that radio telescopes have now become almost standard equipment in many observatories. Radio-astronomy has enabled scientists to discover colliding galaxies in space and the remains of supernovae which exploded thousands of years ago. By carefully recording cosmic noise (the name now given to radio signals from outer space) they can trace interstellar clouds of hydrogen, masses of this lightest of all elements which are distributed among the stars. Recording the electromagnetic or radio waves "broadcast" by interstellar hydrogen on a precise wavelength (21.1 centimetres) has enabled astronomers to prove that our own Milky Way has spiral arms like those which other galaxies in space were already known to possess. Today, radio-astronomy is one of science's most flourishing and exciting fields.



Photos USIS



EAR ON THE UNIVERSE. Giant antenna (right) is one of two 90-feet diameter saucer-shaped "ears" which work as a team at a California observatory, picking up waves from radio-active stars up to 30,000 million light years away. Some day they may be used to track and guide space ships as they speed far out into the universe. Above, radio signals from the "Explorer" satellite launched in January last year. This is how the first few seconds of its flight were recorded on the graph of an oscilloscope at one of a network of 10 powerful Minitrack radio stations in Australia, Cuba and the U.S.A. set up to receive the satellite's radio messages which it relayed during its globe-circling trips.

First, astronomers discovered radio communication in space (it does not consist of "messages" sent by living beings on other planets but of crackling sounds and noises relayed back and forth between atoms). Then they tried to send man-made radio waves into space. Shortly after the Second World War, they succeeded in establishing radio contact with our nearest cosmic neighbour, the moon. With the help of a powerful transmitter, a radar signal was flashed toward the moon and received almost three seconds later when it returned to earth after bouncing off the moon's surface. This confirmed earlier calculations of the distance of the moon from the earth (it averages 238,600 miles). As we know that the speed of all electromagnetic waves whether light waves, radio waves or X-rays is always 186,000 miles per second, it was an easy task to calculate this distance on the basis of the time which elapsed between the broadcasting of the radar signal and its return to earth.

Making radar contacts with the moon is almost routine today and, like radio astronomy, it tells us more about this body in space which man himself might reach in the near future. In the same way, astronomers have tried to "contact" the sun, Mars and Venus.

Radio waves in outer space came into their true glory, however, with rocket exploration of the upper atmosphere and the launching of artificial earth satellites. Here, man was able to send a transmitter into space for the first time and to receive its messages. The Sputniks, and the Explorer, Vanguard, Discoverer and Score satellites all had their own special transmitters telemetering back to earth information on physical phenomena in space — such as temperature and intensity of cosmic rays and ultraviolet solar radiation (which does not penetrate to the ground). A wealth of new information was gained.

Then, with the launching of the Score satellite roaring into space aboard a 70-foot Atlas rocket weighing 115 tons, a human voice recorded on a tape (the voice of the President of the United States) was transmitted back to earth from the world beyond. Simple as it may look to the layman, this experiment answered many questions for scientists and spurred thinking in terms of true communication satellites.

A few years ago, an American telephone company had already calculated that within the near future, communication satellites used as relays for transatlantic telephone calls and world-wide television service would be feasible, even from a business viewpoint. Three such satellites circling the earth in a 24-hour orbit (this means that they would need 24 hours to go around the world and thus they would appear stationary from any given point on earth if they orbited in a west-east direction) could transmit a television programme to any part of the world. Very-high-frequency radio, now limited by the short range of VHF waves requiring costly relay stations every 30 miles, would also benefit from such satellites.

The art of communication in space is still young and we have much to learn before man can flash messages from one side of the globe to the other via a space satellite or even a relay station on the surface of the moon But the many successes which have been achieved in so short a period of time prove that communication is no longer restricted to our own planet.

THE TALKATIVE SATELLITE

Running on solar batteries, the radio transmitter of "Vanguard I" is still functioning a year after it was launched and it has created a rather unusual problem for American scientists: they just don't know how to make it shut up. Dr. John Hagen, director of the Vanguard rocket programme, has commented that there is no way of stopping it and it is now interfering with the transmission of radio messages from other satellites. American scientists are now looking for a way of turning off the sun-powered radios aboard the Vanguards. Future satellites may be equipped with remote control off-on switches.

CALLING THE FLYING DOCTOR. In the vast open spaces of Australia radio is a vital link for people who live beyond the reach of the ordinary medical services. Thanks to radio links between isolated homesteads and the centres run by the Royal Flying Doctor Service, people in practically every area of the continent can ask for advice and obtain treatment. Above, farmer's wife takes down the doctor's instructions by radio. Pedal-operated generators are now generally replaced by batteries. Australia also has its "schools of the air" for children living far from town. The classroom of the two boys (below) is their living-room with receiver-transmitter. They live on an isolated sheep station and can talk to their teacher miles away as easily as if she were in the same room.

Photos Australian News and Information Bureau

PIONEERS OF RADIO

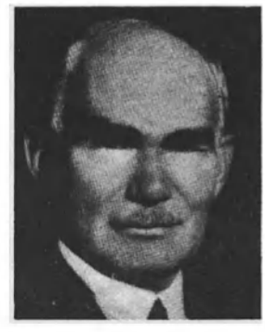
The story of radio is in no way the result of one man's genius. Rather it is the accumulation of a whole series of discoveries of scientists, engineers, physicists, chemists and philosophers of many nations, who in exploring the secrets of nature made electricity and electromagnetism accessible to mankind. On these pages we present only a few of the pioneers of radio.

HEINRICH HERTZ, German physicist and electrical engineer (1857-1894) discovered electromagnetic waves which are the basis of modern radio, television and radar. Studying cathode rays, Hertz proved that these would penetrate thin sheets of metal.

EDOUARD BRANLY, French physicist (1844-1940). His advance research led to the invention of the "Coherer" unit in 1890. The Coherer made wireless telegraphy, as it is known, possible.

NIKOLA TESLA (1857-1943), naturalized American of Yugoslav origin. Between 1890-93 he devised a system of wireless communication using high frequency alternators to produce long waves, to light lamps and send signals at a distance. He used metallic plaques to form condensers for reception. He invented a system of transmitting electric power without wires, the Tesla coil and condensers—vital to radio.

LEE DE FOREST (1873), American engineer who invented the vacuum tube in 1906—an invention considered as great as radio itself. By amplifying a weak current, it made it possible to magnify radio waves to audibility and to receive TV and radar images. It opened the way to the whole field of electronics.



RCA

W. H. BRATTAIN (1902) AND J. BARDEN (1908)

American physicists who won 1956 Nobel Prize for Physics for their invention of the transistor in 1948. Rapidly replacing the vacuum tube, the tiny amplifier uses differences in atomic structure to create an electron current using a hundred thousandth of the power needed by the tube.

Bell Telephone Laboratories

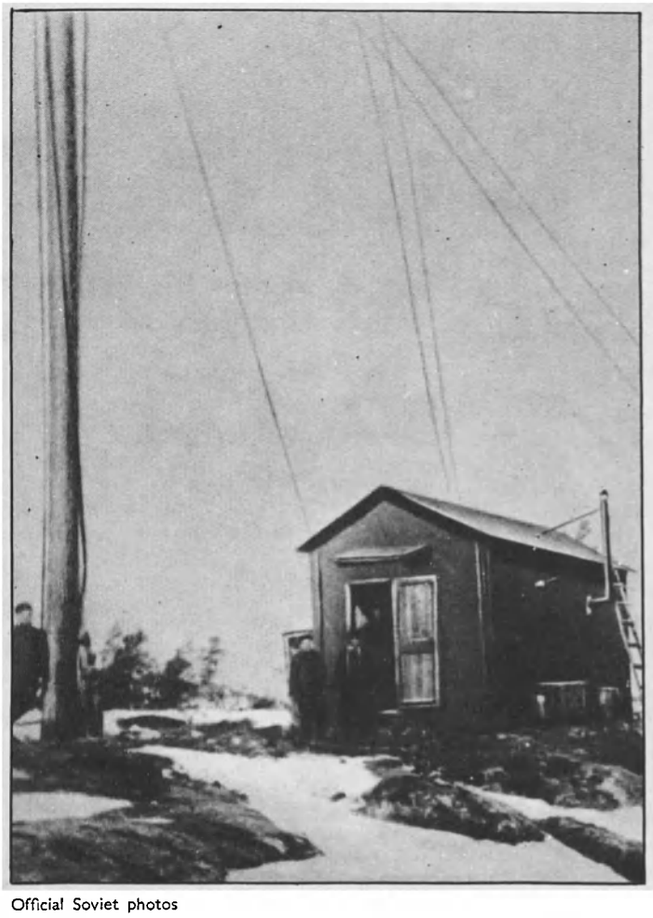
The stamps on these pages are reproduced from Radio Philatelia *by Herbert Rosen, a history of telecommunications told through stamps (publisher : Audiomaster Corp., 17 East 45th Street, New York 17. $2.00).*

Aleksander Popov

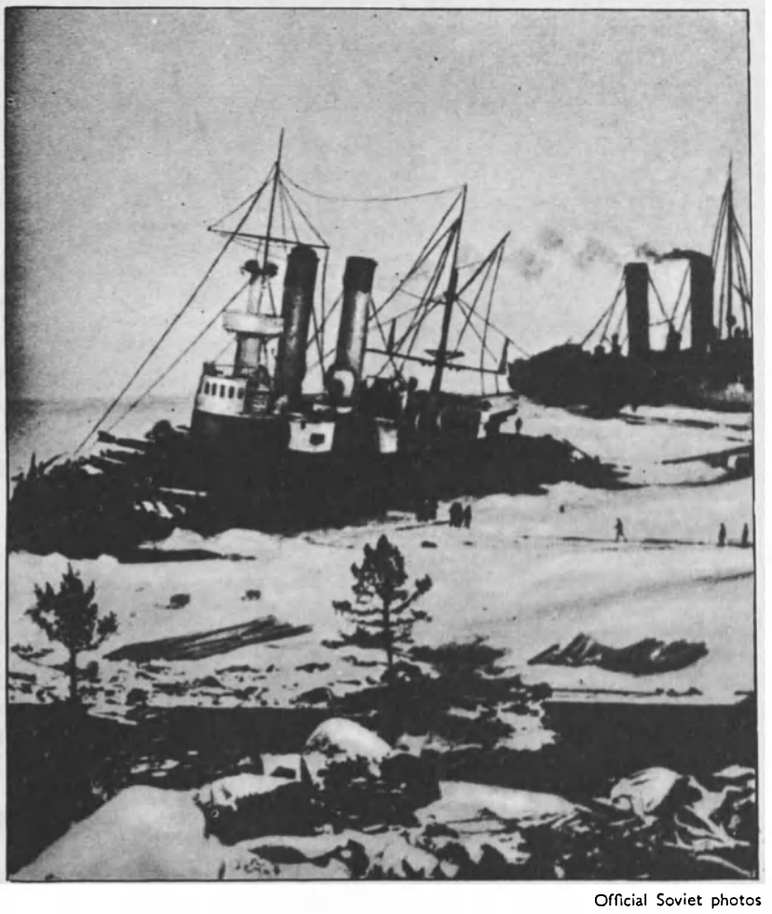
This year the Soviet Union celebrates the centenary of the birth of Aleksander Popov (1859-1905) whom it considers the inventor of the first radio receiver. In May 1895, Popov demonstrated before the St. Petersburg Physical Society an apparatus for receiving electrical air waves, then known as hertzian waves. Later the same year he created a "lightning recorder" to detect and register the discharges of electrical storms at some distance. Popov's experiments were inspired by the works of Faraday, Maxwell, Lodge, Hertz, Branly and Tesla. He predicted that if man could reproduce an electrical disturbance of the type emitted by electrical storms he might be able to communicate across space. Popov's first radio transmission took place in 1896. In November 1899, a Russian warship, the General-Admiral Apraksin ran aground near Gogland Island. To facilitate salvage operations, Popov and his assistant P. Rybkin were called upon to set up radio communication between the island and the stricken vessel. Early the next year, a wireless telegraph circuit was put into operation. Photos show, left, the radio station on Gogland Island; right, battleship Apraksin aground off the island, and behind it the ice-breaker Yormak.

Guglielmo Marconi

It was Guglielmo Marconi (1874-1937) who took out the first patent ever granted for a system of wireless telegraphy, in June 1896, and who was the first to use and develop radio communication on a commercial basis. Marconi's experiments had begun several years before in the vegetable garden of his father's farm in Italy, where as a boy of 20 he watched experiments by Prof. A. Righi with electromagnetic waves. After unsuccessfully attempting to interest the Italian Govt. in his work, Marconi reached England in 1896. His apparatus combined an improved Righi oscillator and Sir Oliver Lodge receiver circuit with a Morse Apparatus and a 30-metre antenna. In July 1896 he succeeded in sending and receiving a signal over a distance of 100 yards, later between two land stations, and from ship to shore and shore to ship, then between two ships at sea. In 1898, Marconi bridged the English Channel connecting England and France and in 1901 spanned the Atlantic between Newfoundland and England. Photos show kite-aerial he raised in Newfoundland (right), and radio operators with early Marconi installation on board a British lightship in 1898 (left). The wireless was used to bring help to the ship when it was damaged in a storm a month later and when it was rammed by a freighter in a fog, thus convincing shipping people of the value of radio.



Official Soviet photos



Official Soviet photos

Marconi Wireless Telegraphy Co. Ltd

COI. London

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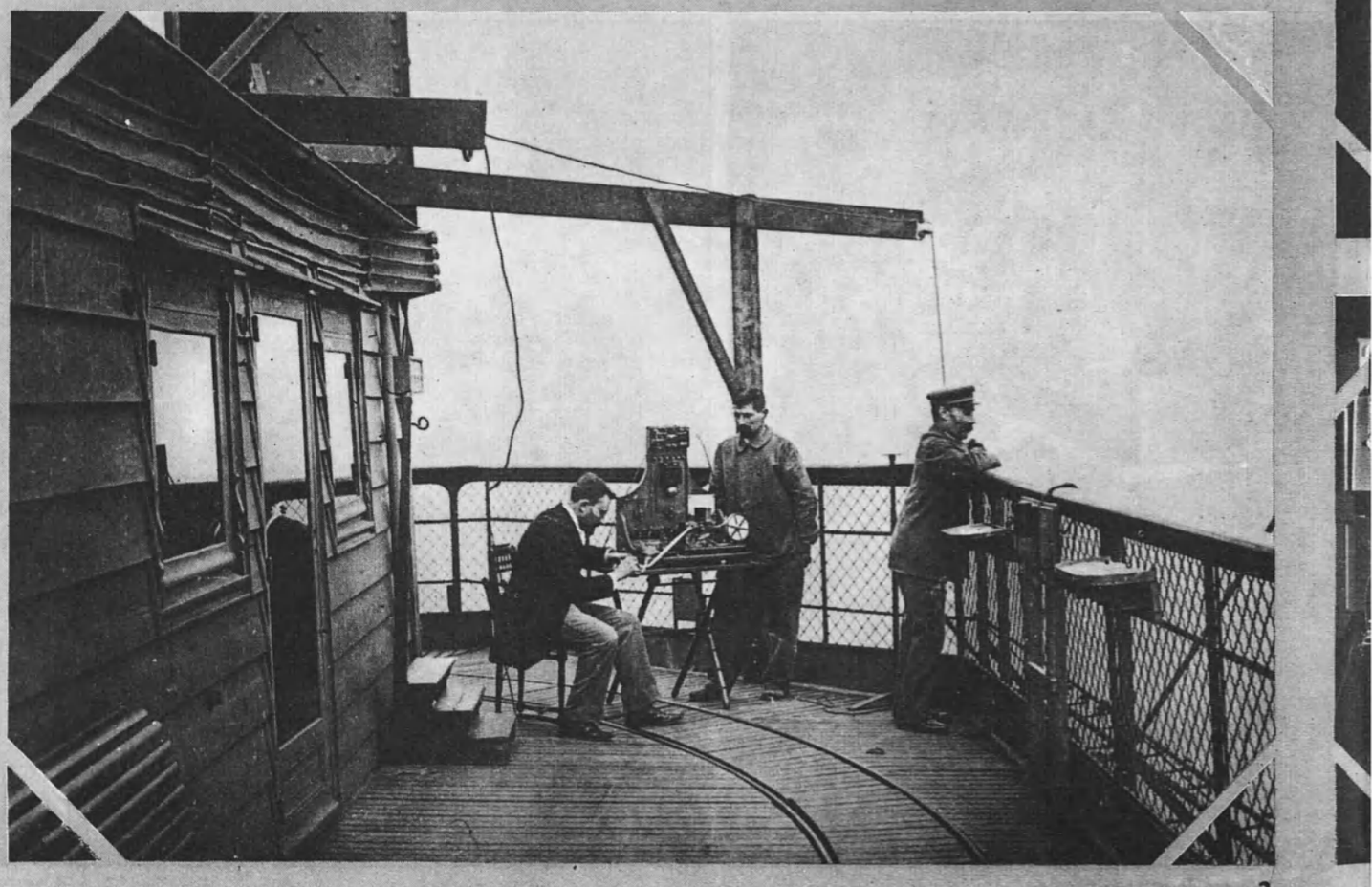

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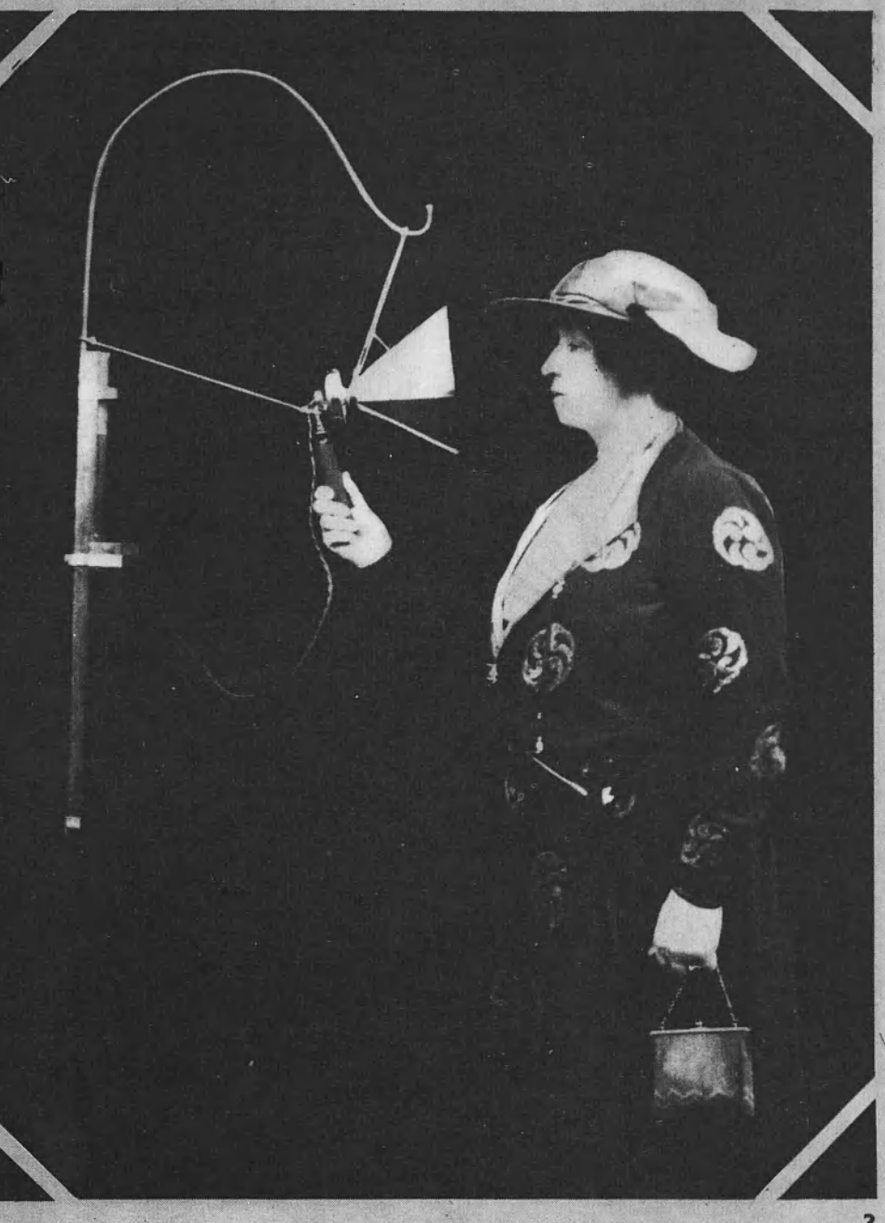
SNAPS FROM THE FAMILY ALBUM



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1. In the 1920's, when broadcasting was taking its first hesitant steps, this photograph was "hot news". It shows Rosine, one of the celebrated Dolly Sisters, dancing on a French beach to the rhythm of music picked up from the ether.

© Viollet, Paris

2. A machine for sending wireless telegraphy messages was installed on the top platform of the Eiffel Tower on July 29, 1898, and experimental transmissions were made. In the same year, the Frenchmen Ducretet and Roger established communication across Paris from the Eiffel Tower summit to the Panthéon.

© Viollet, Paris

3. Dame Nellie Melba, the famous Australian soprano, sings into a microphone set up at Marconi's works on June 15, 1920. This was the occasion of first broadcast programme of public entertainment to be presented in Great Britain.

Marconi International Communication Co.Ltd.

4-5. Microphones were massive, box-like affairs when these photos of the cast in a radio play were taken in the studios of the British Broadcasting Corporation in 1928. The latest thing in feminine headgear at the time was the toque—worn well down over the ears.

BBC photos

4

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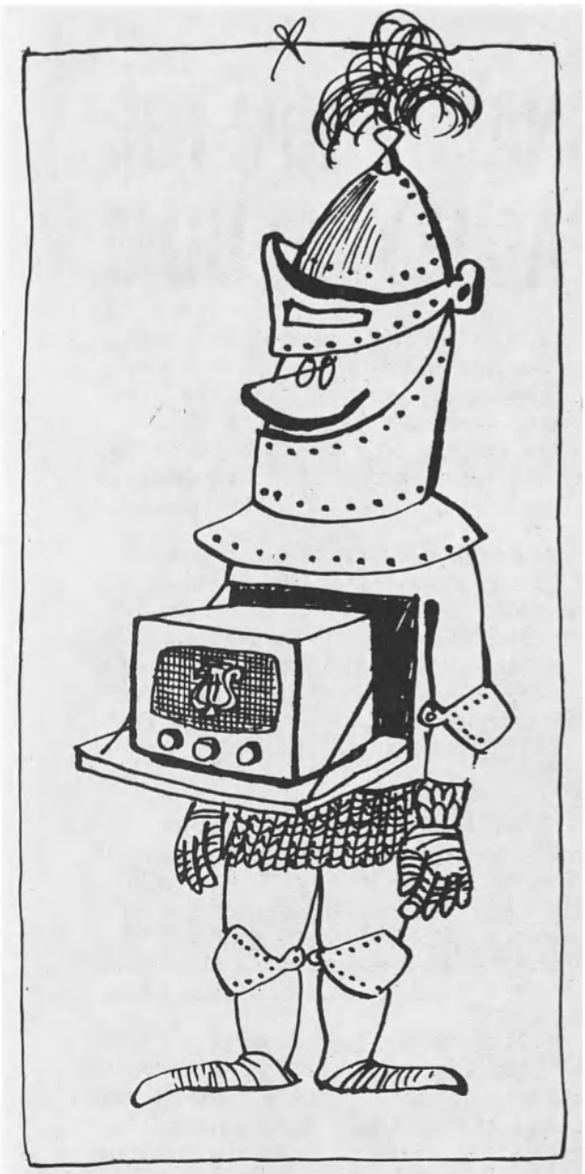

THE LIGHT PROGRAMME

by Siné

THE COBRA AND THE ELECTRONIC CHARMER

One of the most feared of all poisonous snakes is the cobra, the "hooded terror" of India, whose bite spells certain death. Each year these creatures are responsible for most of the 20,000 deaths caused by snake bites on the Indian sub-continent, and the bite of the king cobra has been known to kill an elephant in three hours. Yet despite all the dangers associated with it, the cobra is the favourite of snake charmers. A few simple notes played on the charmer's flute and the cobra rears itself up, its curious hood extended, and begins to sway in time to the music. Some people believe that snake charmers possess secret powers and that it is not the music that captivates the cobra but rather the charmer's motions with his flute. A recent experiment in India, however, showed that once a cobra is trained to dance to the music of a flute, it will do so even when the flute-playing charmer is replaced by an electronic instrument. A Swiss reporter-photographer, Pierre Pittet, recorded the flute-playing of a snake charmer and then played the recording in front of a cobra. As these photos show, the reptile immediately rose up and went into its dance... it was hearing "its master's volce".

RADIO'S MAGIC EYE ON THE RIVER THAMES

by Martin Chisholm

© Camera Press, London

A great step forward in the movement that is going on all over the world to speed up the turn-round of shipping in the ports has been taken with the opening in recent weeks of a new radio information service at Gravesend, on the River Thames, the gateway to the Port of London. This service which has been designed to give shipmasters and pilots every piece of information that they may need about the state of the river at any hour of the day or night, and particularly in fog, has been made possible by the conclusion at the Hague in 1957 of the International Maritime Agreement on the allocation of V.H.F. frequency modulated wavebands.

Gateway to the port of London

THE Thames, with one of the longest systems of docks and wharves in the world, traces a winding course of fifty miles from its seaward end to London Bridge which is the upper limit of navigation for practically all seagoing vessels. Gravesend, twenty-four miles up-river from the sea is a focal point for all shipping bound to or from the docks because it is here that vessels have to pass the customs and the port health authorities and it is here, too, that they pick up or put ashore their sea or river pilots. The channel at Gravesend is under half-a-mile wide and it has to carry a tremendous volume of shipping. As many as eighty vessels or more may pass through on a single tide.

For just over ten years the Port of London Authority, which controls the tidal sections of the river, had been using amplitude modulated radio equipment to give information to ships but, with the conclusion of the Hague agreement on V.H.F. frequencies a very much more efficient service giving better quality of speech together with freedom from noise and interference became possible and as a result the new Thames Navigation Service, which may well become a prototype for port radio services all over the world, was brought into being. Its facilities are available free to any ship equipped with even very simple V.H.F. radio equipment. This equipment is not limited in its uses to the Thames service; it can equally well be used with radio services already established or planned for ports in other countries, and, of course, it can be used, too, for direct speech between ship and ship at sea, and for public telephone correspondence ashore.

Panoramic view of all river traffic

THE great advance that has been made in planning and equipping the Gravesend station is that facilities for the reception of information, for broadcasting it to ships and for a radar scan of some of the busiest and most important sectors of the river, are all housed in one very carefully designed operation room. Because the Trinity House pilots who take ships up the river to the docks or down it to the sea are as much concerned as the ships' captains themselves with the state of the channel and the traffic on it, the Navigation Service building has been

erected close alongside the pilot pier and there is direct access for pilots from their own rooms on the pier to a gallery in the operation room where they can study a panoramic plan of the whole river from London to the sea.

This panoramic plan occupies the whole of one wall of the operation room and below it is the radar scan which keeps watch over Gravesend reach at night and in fog. Eventually further radar scans will be installed so that thirty-one miles of the river can be kept constantly under watch.

The operation room is linked by telephone to the various docks from which programmes of the docking and undocking of ships are received. These programmes are noted alongside the river plan. Constant radio touch is kept, too, with the Port of London Authority's launches which report movements of shipping inwards and outwards and other essential information such as where vessels are anchored in the river, where dredgers are working, the position of wrecks, or where pile-driving operations are being carried out.

Robot 'watchdogs' of tide and visibility

All this information is noted on the illuminated river plan. The state of the tide is noted, too, as well as the degree of visibility at various points. Eventually data about tide and visibility which are at present received by telephone, will be automatically relayed by radio link from distant recording instruments which will keep it up to date from moment to moment.

Once in every half-hour, day and night, the duty officer working from the information on the plan prepares and broadcasts a short bulletin on the state of the river. For the remainder of the time the service is available at any minute to answer queries from any ship that calls it up. The caller makes contact on the international "calling and safety" channel and he is then directed to switch over to one of the four radio channels at present in use, two for the western and two for the eastern section of the river. Eventually the number of channels will be extended to three for each section.

A tanker, for instance, which is deeply laden, may want information that is accurate to within inches of the depth of water at one of the oil jetties lower down the river. The Gravesend radio service can give it within a few moments. Or, again, a steamer moving in poor visibility or at night, may pick up on its radar

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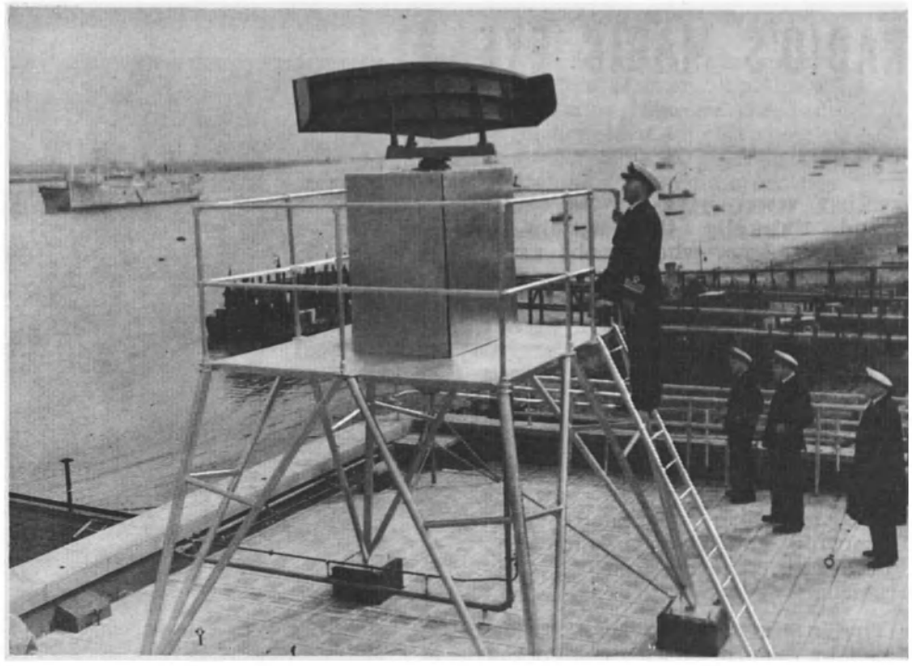


© A' Court Photographs, London

The port of London can boast a unique radio information service for shipping which may well become a prototype for port radio services all over the world. A special operations room has been built where movements of all traffic are plotted by radar (above) on a huge panoramic wall plan (left) of the whole river from London to the sea. Using VHF radio equipment, officers (below) flash vital information to all vessels on the Thames (opposite).

Photos © Fox Photos, London

RADIO'S MAGIC EYE

(Continued)

another vessel lying on its course ahead. Naturally the captain is anxious to know whether the vessel seen on his radar is moving or not, and he is anxious to know it quickly. He can call the Information Service and at once the radar scan at Gravesend picks up the two vessels and makes a check. Within a very short time the duty officer is able to tell the enquirer whether the ship he has spotted is moving or at anchor. The radar scan can also show the line along which a particular vessel is moving and give an indication whether it is heading clear of any obstacle.

The Information Service is linked direct by teleprinter with the Port of London's head office and movements of shipping are relayed immediately they occur. This is likely to result in making the publication of ship movements both simpler and quicker. Another function of the Service is to pass information at once to customs and port health authorities as well as to the pilots waiting to take vessels in and out.

Pioneering for better port radio services

It is perhaps here as much as in the giving of information to the ships themselves that the Service will help to speed up movement. On a busy tide there may be several ships awaiting clearance at the same time, with more following up astern of them. Anything that enables customs officers and port doctors, as well as the waiting tugmasters, to get on with their work smoothly and quickly is bound to assist in keeping all traffic on the move.

As yet the Thames Navigation Service is only at its beginnings. It has been planned for flexible development and very full statistics are being collected of the ways in which it is used. These will give a pointer to future modifications and extensions. In setting up thls service the Port of London Authority is pioneering new ground and looking to the future. At the present time comparatively few ships out of the whole of the world's tonnage that uses the Thames are equipped with the necessary V.H.F. radio sets, but the expectation and the belief is that once the facilities that are available become more widely known installations will be made on a rapidly growing number of vessels belonging to many nations of the world.

Municipal Museum, The Hague.

Openbaar Kunstbezit.

Openbaar Kunstbezit.

THE MUSEUM INSIDE THE RECEIVER

Teyler Museum, Haarlem.

EVERY Monday after the evening meal, thousands of people in the Netherlands turn on the radio and go on a guided tour of some of the art masterpieces in their country's great museums. The guides on these broadcast tours are prominent art connoisseurs, museum directors or art historians who tell listeners about the origin of a particular work, the significance of its composition and beauty, about the artist who made it, its period of origin and so on.

Gathered around the radio, families (left) follow the talks with the aid of a reproduction of the work being presented. Well over 90,000 people joined the "art by radio" club last year. In return for a small fee subscribers receive in advance four reproductions of the works to be discussed every month—colour reproductions of paintings, reproductions in black and white of drawings, sculpture, graphic work and an occasional example of applied work.

Works are selected to offer characteristic examples of alternately old and contemporary artists such as Rembrandt's "The Return of the Prodigal Son" (below left) and "Portrait of the Artist's Wife" by Paul Citroen of the Netherlands (opposite page). Subscribers also receive texts of the broadcast commentaries and special binders which enable them to assemble at each year's end a personal collection of 40 reproductions and related texts.

This project, now a firm favourite on the Netherlands Radio network, was started by a group of art historians and artists who founded a non-profit organization called *Openbaar Kunstbezit* (Our Art Heritage) which arranges the broadcasts. This form of museum visiting at home has proved a real boon to many who are too old to travel, to the sick and those who live in isolated places. Subscriptions cover schools, sanatoria, hospitals (opposite page, below) youth welfare centres—and even prisons.

Members are also provided with a free pass giving them access to over 50 museums in the Netherlands. Museum attendance has risen by an estimated 50,000 to 60,000 since the broadcasts began, and for days after some broadcasts many people can be seen studying the original of the work of art presented over the air.

Through the letters it receives, the Foundation has regular confirmation that its work is opening the door to art and culture for many people. An 82-year-old listener recently wrote: "You do more than television, for besides the voice you give us the colours and the image is not gone when the programme ends. My album remains my treasured possession to which I turn again and again."

CENTRAL AFRICA'S 'SAUCEPAN SPECIAL'

by Peter Fraenkel

THE challenge to the Central African Broadcasting Station was immense and exciting: to bring education by radio to 7 million Africans. We were the first in Africa to try this and there were no precedents we could follow.

The station had had its beginnings in 1941, first at Kitwe, then at Lusaka, the capital of Northern Rhodesia. It then broadcast mainly war-news to the Africans of the territory. After the war its range was extended to Southern Rhodesia and Nyasaland and its broadcasts became primarily educational. It remained a government-run station until 1957 when it became part of the Federal Broadcasting Corporation of Rhodesia and Nyasaland.

The problems were many: for one, we had to use nine of the languages of the Rhodesias and Nyasaland—and even that left out large minorities.

But even more difficult was a problem that broadcasting stations in most other countries do not even have to think of: radio receivers.

At the end of the last war there were two or three hundred community receivers in welfare halls and mission-stations and at administrative centres, but hardly any Africans had sets of their own. These community receivers had not proved a success.

Our pioneer staff set out to try and have a set made that Africans could afford to have in their homes. The requirements were unusual: it had to be a short-wave set because only short waves can cover economically the immense area of the Rhodesias and Nyasaland—an area larger than that of the British Isles, France, all of Germany and Holland together (485,000 square miles). It had to be a battery set because few African houses have electricity. But above all it had to be cheap.

Such a set did not exist and it took the first director, Harry Franklin, three years to find a firm which could be persuaded to make one. In the end a company specializing in batteries agreed to produce one for him. It turned out to be a sturdy, round little set which looked like a saucepan on its side, and that is why they called it the "Saucepan Special". (The original "Saucepan Special" has now been replaced by another model of different shape.)

In 1948 twenty sample sets were flown out to Northern Rhodesia and within a few days they had been snapped up by Africans who paid £ 5 ($ 14) for the set and 25/- ($ 3.50) for the battery. The manufacturers sent their manager to investigate further and when he visited the new owners unexpectedly, he was met with such overwhelming enthusiasm that the company decided to go into mass production.

'I have the whole world in my hut'

THE sets were bought up faster than they could be manufactured and over the thatched huts of neglected villages and over the concrete-box houses of urban "compounds" aerials started to rise, dozens, hundreds, thousands and within a few years, tens of thousands.

Letters started to arrive at our broadcasting station in Lusaka in ever increasing numbers—some typed neatly, others scrawled painfully in one of the many vernaculars of the land.

> *"I have pleasure in telling you that ever since my life I have never had anything which could please my life better than the wireless I have got."*

> *"Broadcasting is to Africans as the great invention of printing was to European countries in the Renaissance era... We are no longer isolated."*

> *"Nowadays I will be enjoying a lot if I don't die quickly. I do enjoy very much listening to my set although I don't get satisfied (satiated) as I do when eating "nsima" (Maize meal porridge)."*

> *"I feel proud when I switch on my Saucepan Special and have the whole world in my hut."*

Before long the languages of Central Africa had been enriched by a new word—"wayaleshi"—the local way of pronouncing (the English word) "wireless".

We experimented with many types of programmes: There were discussion programmes in which the participants were a dozen or two "men in the street"—recorded in remote villages and urban beer-halls, on farms and in mines—some of them educated and sophisticated, others illiterate and traditionalist. There was a serial about a Copperbelt family, designed to let our audience identify itself with the hero who suffers the common experiences of recent migrants to the towns and solves his problems in an intelligent, modern way. There were radio refresher courses for rural teachers who are normally cut off from all mental stimulation.

Blind historians found a great new audience for the oral traditions of their tribes through our station. We persuaded shy, timid African women to discuss marriages and what could and did go wrong with them. Soon we were surprised to receive letters of comment from women, some from illiterates dictated to better-educated husbands. There was something stirring when the voiceless women of Central Africa came to write their opinions to broadcasters who were

not members of their family or clan, but total strangers.

We had many spectacular successes. But far more, we learnt from our failures. One of these we had with slogans.

Originally we had imagined that as broadcasting became less of a novelty our listeners would become more sophisticated. What we had left out of account was the increase in the number of listeners. As radio-ownership spread down the social pyramid the average standard of sophistication became lower. It all coincided with the increasing industrialization of the Rhodesias and the rapid increase in African incomes. Radio was becoming a "must"—a coveted symbol of status. We had to simplify and simplify still more.

That was when we decided to try slogans—hammering home a few simple lessons with repetitive little verses, not unlike advertising in commercial radio. Since ours was a public service station and carried no advertising, our audience had no experience of this approach—nor had we broadcasters.

For our first campaign we selected the advantages of education for girls and the dangers of the common house-fly.

I got together a team of helpers, among them an African author who was then working on a collection of proverbs in the Bemba language. I suggested that these might be useful. We might hook the new teaching-matter on to the known, traditional wisdom.

The others suggested we should use the traditional form, too. The chief or elder who uses a proverb never says the entire saying. He says one half, the other is added by the man he is speaking to. One says: "A garden does not grow by itself..." the other adds: "Unlike teeth in the mouth." (In other words, it needs effort.)

Theme and variations on a proverb-slogan

THIS was the pattern we decided to follow, having the second half chanted by a small chorus. Before many minutes had elapsed the five or six of us were scribbling away enthusiastically at possible proverb-slogan combinations. In the end we recorded a number, including the following. (The words in italics were spoken by a chorus of three.)

"Young trees: *they make the future forest.*

Let us educate little girls: *tomorrow they are the young mothers.*"

Another:

"Though it's small: *yet it's a heavy load.*

The fly: *though small, is dangerous.*

It gives us disease: *You, kill that fly!*"

We broadcast these and similar slogans for several weeks, then tried to assess their effect by interviewing listeners. Our interviewers chanted the first half and then—wherever they went—the remaining words were supplied word-perfect. But only very few listeners understood what we were trying to get at.

The better-educated townsfolk knew all about the need for female education and about the dangers of the common housefly.

"You are quite right", said one, "there are many reasons why women should be educated. They are like the front wheel of a bicycle and the one behind are the men. As a bicycle cannot run with one wheel, so we men cannot raise the country lonely."

However, these new townsmen—in most cases only a decade or two out of their villages—were completely bewildered by the proverbs. First they ignored them, but when the interviewers pressed them they tried to interpret them literally.

In remote villages we found the opposite reaction. The proverbs were known and commented on at length, but these villagers saw no connexion between them and our new lessons.

Yet all those interviewed had been regular listeners. Since these slogans were designed largely for the illiterate townsmen who might become listeners if incomes continued to rise, we decided to extend the enquiry.

We brought groups of such potential listeners into our studios, played them recordings of the slogans and tried to get their reactions. It took a long time to overcome their suspicions, but when at long last their reactions came, they were even more startling. There were many different reactions, but they all had one thing in common: they were deeply allegorical. Nothing was ever interpreted literally:

"You speak wisely," said one, "though small, yet it's a heavy load. The fly is small, but it brings disease. It's like this: One man can spoil the happiness of an entire village. He may be a witch. He brings fear and hatred and suspicion among the people. He may even give the chief an illness by his witchcraft. "Kill that fly" means we should send such a man out of the village. One such man can spoil an entire village. Though it's small, yet it's a heavy load."

There was much that we had to learn the hard way... by trial and error!

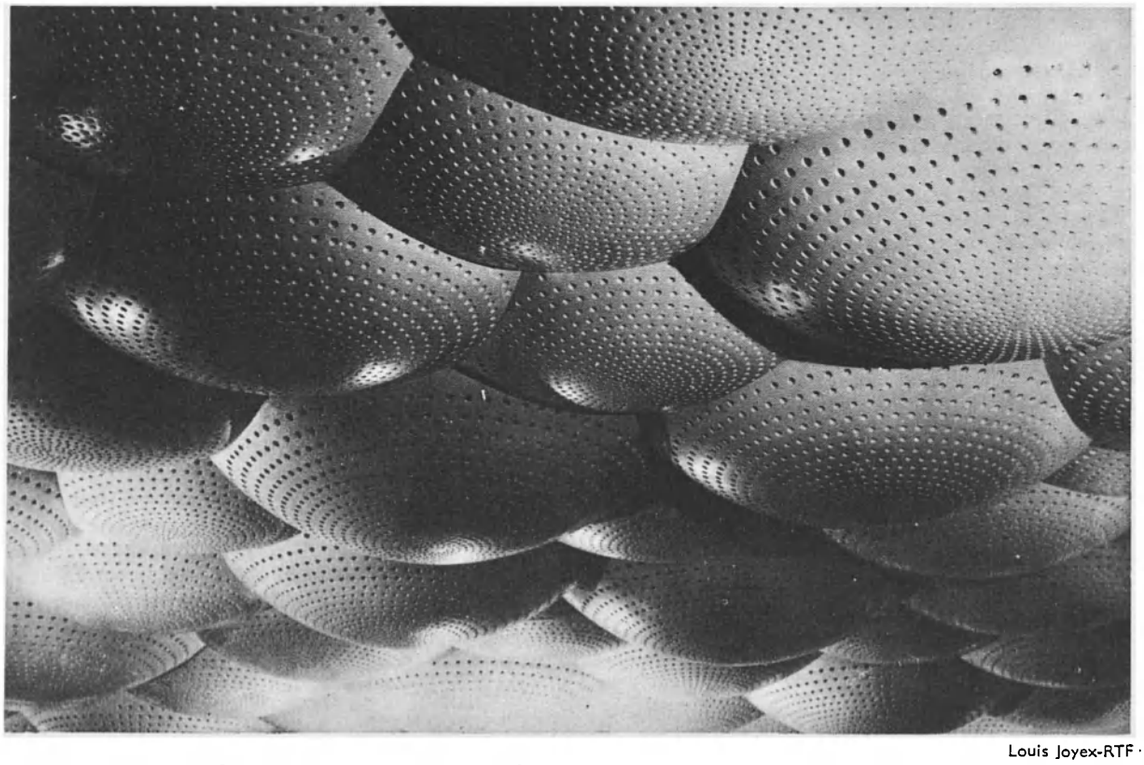
Northern Rhodesia Information Service

A STURDY LITTLE SET, the "Saucepan Special", helps to bring education by radio to seven million people in Rhodesia and Nyasaland. Since the first of these low-priced battery sets was put on the market in 1948, tens of thousands of aerials have risen above thatched hut villages and concrete houses of urban compounds. For the people of the two territories radio has become a "must". "Broadcasting is to Africans as the great invention of printing was to European countries... we are no longer isolated", wrote one listener to the Central African Broadcasting Station in Lusaka. Broadcasts go out in nine languages and listeners themselves take part in discussion programmes. The original "Saucepan" model shown here has been improved and has a different shape.

Peter Fraenkel, who has long been associated with the Central African Broadcasting Station, is the author of "Wayaleshi," a newly-published book devoted to the work of this radio station at Lusaka. (Publisher: Weidenfeld & Nicolson, London; price: 21/-.)

A LITTLE LESS NOISE, PLEASE

by M. H. Thompson



Louis Joyex-RTF

GIANT 'GOLF BALLS' studding the ceiling of a French broadcasting studio are one of the many kinds of sound absorbing materials used nowadays in acoustics. Cheap and easy to apply, they range from stone-like tile with the appearance of travertine marble, to wood fibre tile punched full of holes and blankets of absorbent mineral wool rolled in long strips. Opposite page, general view of same studio ceiling.

To hear or not to hear... That is the problem.

Haven't you heard people say they couldn't hear a lecture well because the acoustics were so bad? These people wanted to hear. On the other hand, haven't you heard people say they couldn't sleep a wink all night because some noise kept them awake? (Maybe it was only a cat rubbing his whiskers.) At any rate, these people didn't want to hear. Music from the Hi Fi is wanted while, at the same time, traffic noise is not.

Furthermore, loud noises that constantly assault our hearing organs produce fatigue, while certain other sounds are pleasant without our realizing just why. Physiologically the ear is built to take only so much noise. Nature's sounds are usually muted—the ripple of a brook, the song of a bird, the mooing of a cow. Civilization's are often the opposite—the wail of a siren, the din of traffic, the roar of aeroplanes in the sky. There are other reasons too why we would preserve one sound and suppress another. Hi Fi, for example, can be merely high finance unless the high fidelity sounds are truly heard, which they cannot be in many noisy rooms. The problem then is to hear or not to hear, and involves a knowledge of the laws of sound or the science of acoustics.

Ancient Greeks studied acoustics but a Frenchman coined the name

The word *acoustics* is from the Greek and means "to hear". Ancient Greeks were aware that sound somehow arises from the motion of parts of bodies and is transmitted by the air through some undefined motion of the air and in this way, striking the eardrums, produces the sensation of hearing. Aristotle emphasized that in hearing actual motion of the air is involved. Pythagoras in the 6th century B.C. studied the origin of musical sounds and discovered that of two stretched strings fastened at the ends the higher note is emitted by the shorter string and that if one has twice the length of the other the shorter will emit a note an octave above the other.

Joseph Sauveur, who pioneered in the study of sound in the early 18th century, first used the name "acoustics" for the science of sound. Today the word means the properties of a room which make it conducive to ready and faithful transmission of sound. Also, as to present-day nomenclature, acoustic refers to things distinctly related to the functions of sound, such as acoustic absorption, acoustic response, and acoustic spectrum (the range of frequencies or wave lengths that are audible). "Acoustical" refers to associated things, such as acoustical tile, treatment, engineers, instruments.

In the 19th century more work was done in the science of acoustics. Lord Rayleigh learned something about how sound is propagated, its speed in various mediums, such as air and fluids and solids, and the determination of pitch and its dependence upon frequency of vibration. But even with his research, and that of Sauveur and a few other men, acoustics remained a little known science until after 1895.

Up until then a room with good acoustics was more or less an accident. When such a room or auditorium was found, architects copied the design to try to get another room or auditorium with equally good acoustics. Sometimes they succeeded and sometimes they didn't. But about this time there lived a man who was a member of the Harvard University physics faculty, and he became interested in the science of acoustics and began to study more about sound absorption.

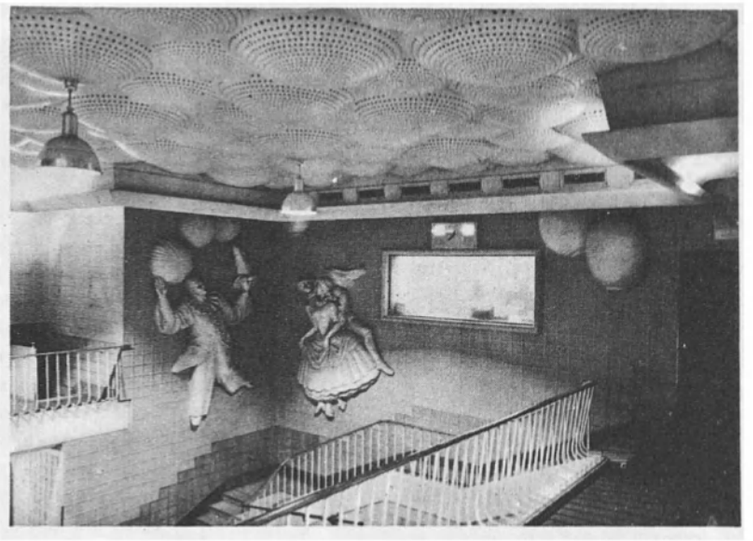
The new Fogg Auditorium of the University of that time

had been copied after the Sanders Theatre in Boston, which had very good acoustics. But in spite of that the Fogg Hall was a failure acoustically. So this physics professor, W. C. Sabine by name, undertook to learn what had gone wrong. He learned that the Fogg Hall hadn't supplied seat cushions and when this was done the acoustics were almost perfect. But his search and research didn't end there.

As he learned more about the laws of sound, he began to establish standards of measurements and units of acoustic energy. He finally established a unit, later called a "sabin" after his own name in recognition of his work. It is the amount of sound energy lost to a room through one square foot of open space such as an open window. The energy is minute. It takes the combined power of about fifteen million voices to equal one horse-power, a unit of work equal to 550 foot-pounds per second.

In time Sabine found that the easiest way to work with sound energy was to convert it to electrical energy, where units and procedures of measurement were already well established. This changed acoustics from the realm of architecture to electrical engineering. But until the invention of the vacuum tube just before World War I minute values of electricity were extremely difficult to handle or measure, and only the amplification of these minute energies to measurable amounts made the study of sound possible in all its phases.

Briefly expressing sound power in the electrical unit of the watt, and remembering that the average light bulb takes 100 watts of energy, we find that the human voice at conversational levels equals .002 watts, the clarinet .05, the trumpet .3, and the bass drum 25 watts of sound power. While the sound power of energy is minute, yet so enormous is the range of the human ear that the ratio between the intensity of the least noise we can hear—a baby's breath, for instance—and the greatest sound intensity we can stand without pain or injury, is one thousand million to one.



Naturally such ratios would require long strings of zeros in any calculation relating to sound, so the physicist and the acoustical engineer use a sort of mathematical shorthand, employing the logarithmic unit of the decibel.

Much of the science of sound cannot be explained easily to the average person. Information is buried in technical journals of limited circulation or in textbooks so technical that they serve only the acoustical engineer or the advanced student of physics.

Confused noises bounced from the walls, floor and ceiling

But the average person can understand something about acoustics by comparisons. Most of us know that we hear best in a quiet location out of doors. Here voice or music is heard in natural beauty. This is true because outdoor sound can travel freely in all directions, unconfused by echoic repetition of sounds previously uttered. In an enclosed space, however, the walls, floor and ceiling do not absorb the sound as do the grass and shrubbery and open sky of a quiet location outside. Sound is reflected back to mingle in confused noise.

In fact, at a distance of more than a few feet we hear not so much by the direct sound from the source as by the sound reflected from room surfaces. And at the rear of some auditoriums the reflected sound may be nine-tenths of the total reaching the listener. In its many reflections en route the sound is changed in quality by having more of some tones than of others removed or absorbed by the reflecting surfaces. Thus sound plays in our daily lives a part scarcely less important than motion and light, and rooms present acoustical problems.

And the problems of suppressing unwanted sounds without altering the quality of the wanted sounds are scientific problems. For each room of known intended use there is a correct amount of acoustic absorption at each pitch of sound, which absorption will suppress unwanted echoes while at the same time preserving without distortion the maximum of wanted sound. The difference between this correct amount of absorption at each frequency and that already existing in the room itself—its boundaries and furniture and occupants—is the amount that must be supplied by the acoustical treatment.

To suppress an unwanted sound wave—make it work

For each occupied room there is a correct distribution of the total acoustic absorption in the vertical, transverse, and longitudinal directions. It is essential that absorption and reflection shall be so distributed as to diffuse the sound as well as to absorb some of it. Calculation of these factors for the room on the drawing board requires some mathematics and much reference to graphs and tables already in existence, and often involves the construction of a scale model. Precision instruments and acquired skill are also used. If the room turns out to provide maximum distribution of undistorted voice or music with a minimum of unwanted echo, that room is said to have good acoustics. Perhaps more accurately we would call it a quiet room, a room free from unwanted sound.

Not only are new buildings constructed to the laws of acoustics but old buildings are worked over at the advice of acoustical engineers to eliminate noise. For instance, many auditoriums built twenty-five years or more ago have echoes so intense that an ordinary voice on the stage can't be understood more than half way back; and there are places where the echoes from the back wall cancel out the voice from the stage and make music sound quite unnatural.

Thus buildings, both old and new, are acquiring better acoustics by both sound proofing and sound conditioning. True sound proofing is keeping sound out; sound conditioning is absorbing sound that is already in. The first requires mass, thickness and weight of the barriers; the latter requires light porous material such as acoustical tiles and boards.

In fact, noise control is possible because of the development of cheap and easily applied absorbent materials, and these are of great variety, ranging from stone-like tile with the appearance of travertine marble, through wood-fibre tile punched full of holes, to blankets of absorbent mineral wool rolled in long strips. The materials are all indexed as to sound absorption at each of six octaves of the piano keyboard, flame resistance, light reflection, and weight per square foot.

Certainly there is plenty of choice but the very plethora of available materials makes a proper choice more imperative. Moreover, the cost per square foot may range from 25 cents to $1.50, which also makes choice—the wrong one—expensive. So it is up to the acoustical engineer to advise about the product too.

CONTINUED ON NEXT PAGE

LESS NOISE, PLEASE
(Continued)

The drum: 500 times more power than the clarinet

Scientifically, by the use of acoustical absorbent materials, the energy in the sound wave is changed into some form of *work done* so that the energy is no longer apprehended as sound. For instance, in fibrous materials the filaments making up the tile or board are set in motion by the sound waves and the energy required to make them move is *work done*. Hence this is energy lost to the sound wave. Or movement of the fibres may cause friction which is dissipated as heat and again the energy has been converted into something else and is no longer sound.

Because there are so many different types of sound-absorbing materials, all good, and so many ways of applying them, and because they vary from type to type in the amount of sound they absorb at different frequencies (pitch) of sound, great care is necessary in choosing the right material and its method of mounting for the particular room, or occupancy, or expected sound levels encountered.

Too much proofing leaves the room hollow & boomy

For example, suppose a room is being designed for orchestra practice. The instructor must be able to hear each instrument as a separate sound source if he is to correct mistakes of each player. Expressing the sound power in the electrical unit of the watt, the drum would release 12,600 times as much power into the room as the human voice, and 80 times the power of the trumpet and 500 times the power of the clarinet. Usually the notes of the clarinet are several octaves above the drum.

Whatever acoustical material is applied in the room must of necessity give a lot of absorption at the low frequencies of the drum if its enormous power is not to drown out the higher pitches entirely. Since most acoustical tile of the sort usually applied in stores and offices is six to ten times as absorbent at high frequencies as at low ones, they must be ruled out of this particular job.

And not only is the selection of the kind of material important but the placing of the material is just as important. Also, the exact quantity of material is *necessary* too. If too much treatment is applied, usually the echoes are gone, that's true, but the remaining sound is often badly distorted as to pitch, for most materials reduce the high pitched sounds far better than the low ones, so that what is left for us to hear is the low pitched tones, and the room then sounds hollow and boomy.

False ceiling cures the problem of three orchestras in one

Thus each job has its own special problems for the acoustical engineer to solve. It may be interesting to know how one acoustical engineer solved the problem of noise in one auditorium. This public auditorium was built years ago. The room was 110 feet by 70 feet with a ceiling only 20 feet high, and the stage on the long side.

The echoes were so intense that an ordinary voice on the stage couldn't be understood more than half way back, there were three rows in the middle where the echo from the back wall cancelled out the voice from the stage, and the only expedient had been to put so much power behind a loud speaker that the resultant roar, while annoying in the extreme, did force enough clear sound out over the floor that speech was at least partly intelligible. But a dance band generated so much echo that in the corners one could hear double and triple beats. Some bands wouldn't play in the hall, so an acoustical engineer was called in to solve the problems.

With electrical instruments he made exhaustive measurements of the sound and echoes, explored the hidden structure of the walls and ceiling, and contrary to the procedure followed in 99 % of such problems, specified a ceiling hung 17 1/2 inches below the original one, in an aluminium gridwork of channels, and put into the grid sheets of Fibreglas 2' × 4' in symetrical patches that totalled less than one-third of the ceiling. He filled in the rest of the area with sheets of sheetrock the same size as the fibreglas, then had the whole ceiling painted.

SOUNDING OFF BEHIND THE MIKE

Few background noises are the real thing on radio. A crackling fire may be only cellophane being crumpled, something moving in the bushes merely twisted straw, a body blow a fist punching a rubber sponge. Sound effects can imitate almost any noise, but nothing can duplicate the sound of water except water itself. Photos show (1) diving and splashing effects; (2) staircase, half stone half wood, used for effects. Staff is shown how not to fall down stairs; (3) submarine commander (rear) shouts instructions while actors lie on floor to give right acoustics for scene taking place in dinghy at sea; (4) effects men imitate creaking of ship's rigging during storm at sea and breaking up of the mainmast while woman in background plays effects records of howling winds and raging seas; (5) a duel... with electronic firearms! Two actors fire the "guns" but the shots come from the two little grey boxes being adjusted by effects woman; (6) agile feet and hands are needed to start right sound effects recordings listed under "train", "cheers", "drums".

Also on the walls, in several selected areas that were reflecting the measured echoes, he glued large panels of fibreglas, 3/4" thick to absorb the sound. Now in the auditorium, a listener can understand a low voice on the stage at any place in the room provided the audience is between 200 and 1,000 people. And dance bands that have played there before and after treatment call it "wonderful."

Sound control does not apply to auditoriums only. Corrections extend to commercial buildings too. As the world became noisier the problem of sound control began to apply in factories, in office rooms, and in busy public places. Machinery has contributed to much of this noise, including many typewriters in one room, or addressographs, for instance. The human voice has done its share to make places noisy too. It has been ascertained that noise made at a restaurant by 250 women having lunch registered 75 decibels. Sound engineers have looked into the household too and what they have found in the way of noise is startling. In the ordinary house, radio, TV sets, defective refrigerator motors, vacuum cleaners and the like produce much unwanted sound.

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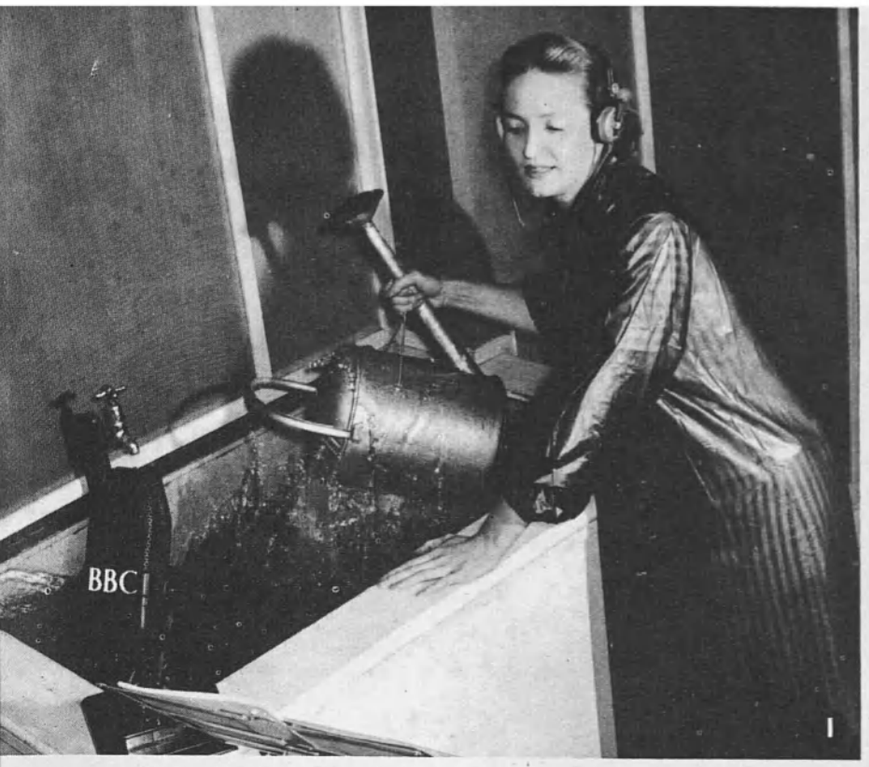

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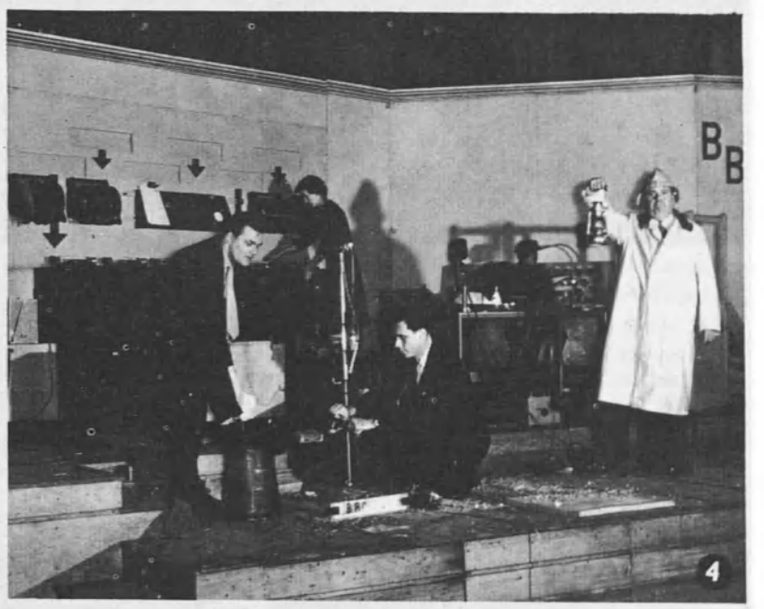

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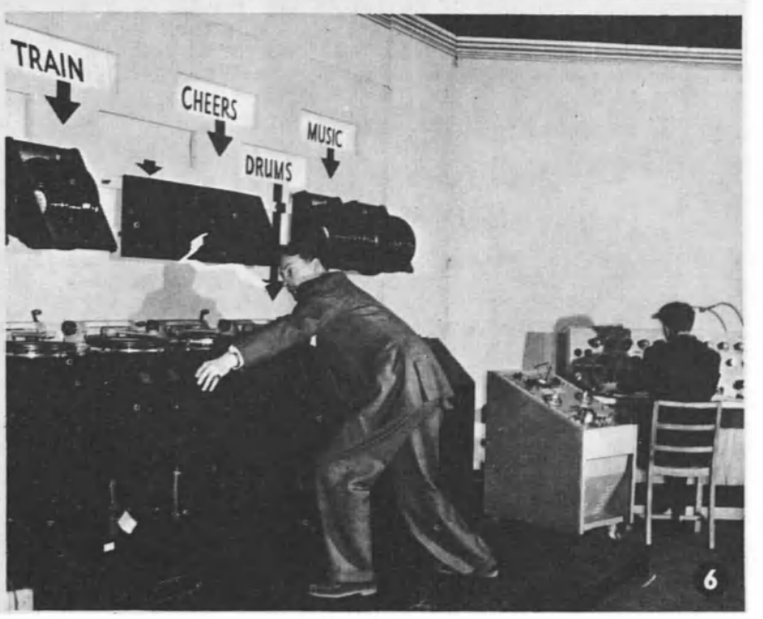

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The range of waves known as the electromagnetic spectrum is like a long piano keyboard. The string struck by each white key vibrates at half the rate of the string eight notes higher, so that for each octave, frequency doubles and wave length halves. About 50 octaves represent the electromagnetic spectrum.

COI, London

No doubt more and more in the future truly acoustical architecture will be applied even to homes, especially to those in the higher cost brackets, so that annoying noises can be kept to a minimum. And perhaps some acoustical engineer will devise some inexpensive gadgets that could be mailed to home owners with instructions for use in rooms much as the engineer uses equipment on his jobs.

Then a consulting-by-mail business could be built up to help people with their problems of noise control. The home owner could draw a rough plan of the room, its furnishings, and give the number of people usually occupying it, etc. He would report the results of the simple tests taken with the gadgets, and a suitable treatment could be recommended for a modest fee at probably far less cost than the usual risky allover-ceiling coverage so often used.

Acoustics are for 'do it yourself' amateurs

UNTIL then, however, people who can't afford acoustically engineered rooms can learn lessons from the facts now known about the laws of sound to help keep down noise.

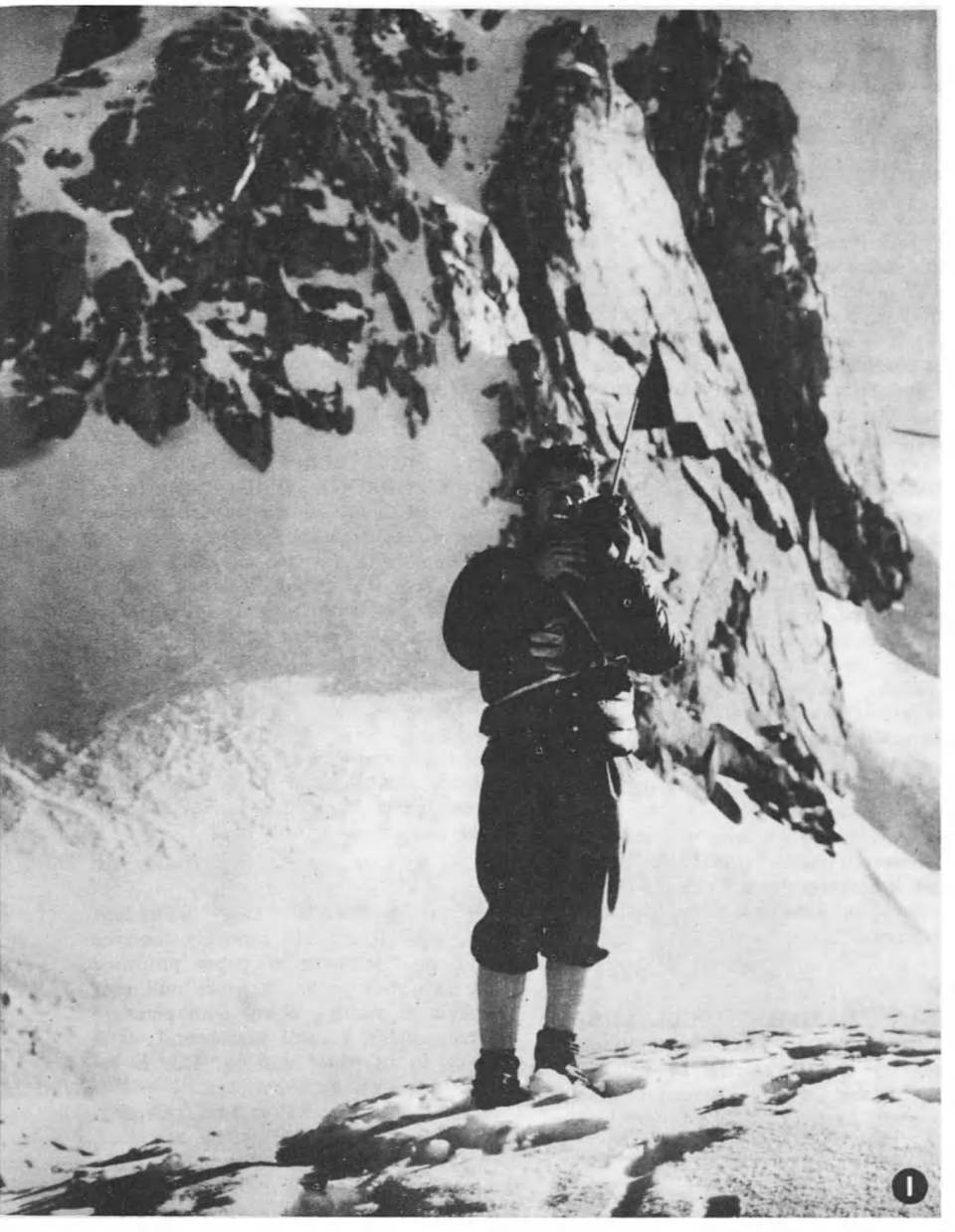
A basic principle in reducing noise is to attack it at its source. If the kitchen is the noisiest place, then an entire ceiling of acoustical tile will accomplish as much as a 40 per cent reduction of noise, thus vastly reducing the amount available for transmission to other areas of the house. The next step is to make a sound trap between noisy areas such as the kitchen or rumpus room and the bedrooms or study where quiet is wanted. This can often be accomplished by covering the ceiling and upper two feet of the walls of a connecting hallway with acoustical material.

In the living room a complete ceiling of acoustical tile or other material would kill or distort the quality of music from the radio and TV. Here acoustical "damping" of sound must be obtained on two walls that intersect each other—not on walls opposite each other. In fact, the main causes of poor hearing conditions in such rooms are parallel wall surfaces of plaster or plywood. So acoustical material could be used on adjoining walls, not parallel, to cut down noise. Or if one can't afford acoustical material, if one wall has heavy lined window drapes, one can experiment with a heavy wool blanket on the adjoining wall. A tapestry can be hung over the blanket. But home owners who think a mere ceiling of acoustical tile will solve their problem are more often disappointed than pleased, for they usually ruin it so far as hearing phonograph or radio music is concerned.

There are a few more pertinent facts about cutting down noise in the home. If the telephone bell bothers you, you might try cutting a little square of sponge rubber to fit underneath it. The same trick will work for a radio or TV set or a noisy typewriter. A pad of sponge rubber under them will keep the sound from traveling down the table and along the floor. However, it won't affect the sound that comes out of the speaker. Radios and phonographs should be set in *a corner* for best sound. A sponge rubber rug under a carpet will cut down the noise of clattering feet. Rugs themselves, as well as pads under them, are a help in this respect.

In fact, the ancients used rugs, draperies, and pillows to cut down noise. They didn't know why, but a lot of the trouble comes when sound bounces about the room. The noise hits a hard surface and flies off in a different direction. Any type of soft covering that will absorb this extra sound will make a big difference in personal comfort. Curtains or drapes around the windows help. Weather stripping on doors and windows help keep out traffic noise. Shrubbery or a row of trees on the outside will help too. Windows facing the street should be double weight or plate glass to cut down noise. Double thick ceiling plaster will cut out the noise of aeroplanes three times better than rock wool heat insulation would do.

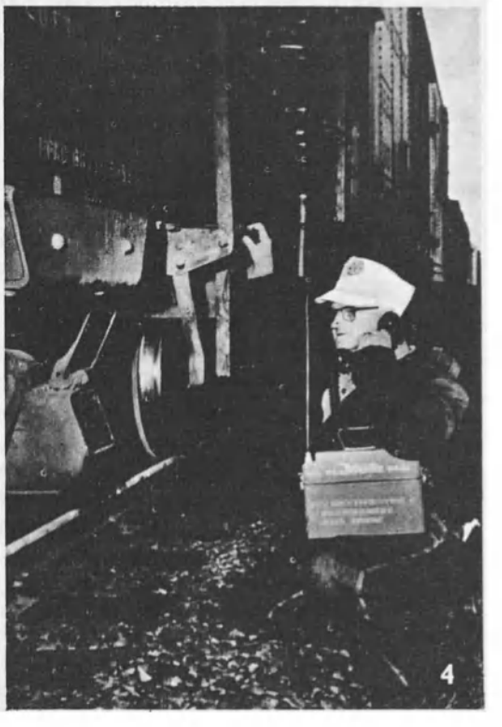
A little common sense, too, can protect your hearing from jarring noises. Keep the radio tuned down, also the TV. Wear ear plugs (made especially for noise) if construction or other loud continuous noise is going on near you. Anyone can have some extra pillow around to help absorb noise. For noise, according to the dictionary, is unwanted sound and quiet is freedom from noise. And nowadays "Quiet Please" can mean a lot more than telling someone not to make noise. It can include the whole gamut of acoustical data in all its scientific phases.



MIGHTY HANDY THAT WALKIE-TALKIE

As equipment becomes more compact and yet more powerful the vast possibilities of radio are being exploited in innumerable ways. Photos here show farmers, film-makers, explorers and railwaymen using radio to make their work easier, safer and more efficient. (1) French film-maker uses "walkie-talkie" transmitter-receiver while shooting a mountain-climbing documentary on some of the most difficult and dangerous French Alpine peaks. (2) French explorers observing the giant lizard of Komodo (largest of the lizard tribe; sometimes 12 feet long) in Borneo, communicate with colleagues in other hidden observation posts. (3) Russian farmer reports back on progress made with harvesting. (4) Railwayman in the United States uses two-way portable radio to give instructions to other crew members of a long goods train.

(1) Production Filmartic-Marcel Ichac
(2) Thomson-Houston
(3) Official Soviet photo
(4) USIS



From the Unesco Newsroom...

FROM PRINT TO BRAILLE BY COMPUTER : Exciting new prospects for blind readers are being opened up by one of the latest applications of electronic computers. With the aid of one of these machines, a 300-page book can now be translated into Braille in one hour—a task which would take almost a week for several skilled translators to complete. It takes about two years to train specialists of Braille whereas the new method does not require a knowledge of Braille on the part of the operator. The machine translates 4,000 words a minute.

■ **BUDDHIST ART IN JAPAN:** *A new album - "Japan: Ancient Buddhist Paintings" - has just been published in the* UNESCO *World Art Series which offers high-quality colour reproductions of works not previously well-known outside their own countries. Devoted to works painted between the 8th and 12th centuries, the album offers an impressive overall view of Japanese Buddhist art which runs from mystical images to realistic portaits. The album is published by the New York Graphic Society, Price:* $ 18 ; £ 6 7. *O.;* 8,850 *Fr. Frs.*

SAHARA SOIL-LESS FARMING: Tomatoes, cabbages, radishes, lettuce, maize and groundnuts can be grown in desert sand without any special shelter and with only a small quantity of irrigation water, the French National Centre for Scientific Research has just revealed following its "soil-less farming" experiments at Colomb-Bechar on the edge of the Sahara. Actually it is farming without humus. The process consists of placing a layer of sandy gravel and plant nutrients in a big concrete trough. The sand is regularly "nourished" through plastic tubes. Only three litres of water per day and per square metre are required.

■ **U.S. SIGNS 'FREE FLOW' PACT :** *The United States has signed the* UNESCO*-sponsored Agreement on the duty free importation of educational, scientific and cultural materials which eliminates customs duties on books, newspapers, magazines, works of art, geographic maps and musical scores. Customs exemption is also granted to newsreels, educational films, sound recordings and scientific apparatus when destined for approved institutions. So far* 31 *countries have ratified the Agreement; it becomes operative in the United States upon ratification by the U.S. Congress.*

IRAN RATIFIES' 'CULTURAL RED CROSS' PACT: The Convention and Protocol for the Protection of Cultural Property in the Event of Armed Conflict was recently ratified by Iran, the 29th country to do so. The Convention was adopted in 1954 by a conference convened under Unesco's auspices. Under its terms, nations undertake in the event of armed conflict to safeguard as well as to respect cultural property located on their own territory or that of other contracting parties.

■ **JOURNALISM CENTRE EXPANDS PROGRAMME:** *The International Centre of Higher Education in Journalism created two years ago at Strasbourg University on the initiative of* UNESCO *is expanding its activities, and from December will be offering six-month courses in methods of teaching journalism. Until now it has run a one month training course each year for teachers of journalism, covering methods of newsgathering and presentation, and the journalist's role in relation to radio, television and film. Thirty-four participants from* 25 *countries attended the last course of this kind.*

PAPER FROM CORN STALKS: Israeli businessmen will probably soon be writing on "home-made" paper produced from corn stalk pulp. A paper mill near Tel Aviv is pushing ahead with plans to use corn stalks, a local agricultural waste product, in its paper making. This is believed to be the first commercial use of corn stalks in paper manufacture. Depending on the kind of paper being produced, corn stalk and cereal straw pulp will constitute between 20 % and 100 % of the final product. Israel's growing need for paper is reflected in the fact that it now ranks third in the world in the per capita publishing of books.

■ **SCIENCE-MINDED JAPANESE :** *In Japan the number of young people studying science and technology is increasing far more rapidly than the number of students taking arts degrees, reports the International Bureau of Education in a recent survey. Last year, out of every fourteen Japanese students, nine were studying science and only five literature, as compared with* 1957 *when the proportion was exactly the reverse.*

EDUCATION FOR THE NUCLEAR AGE

THE pressing educational problem of training technical and scientific personnel for the world's ever-expanding industrial and technological installations and in particular for the development of peaceful uses of atomic energy was discussed recently at two important international conferences convened by Unesco jointly with other organizations.

This year's annual Unesco-International Bureau of Education Conference at Geneva discussed aspects of the training of technical and scientific personnel: financial, administrative, educational, as well as social. These included the use of funds for training, long-term planning to put an end to the shortage of qualified personnel, increasing the number of technical training institutions, and the study of social measures—fellowships, housing, employment offices—likely to stimulate the recruitment of future candidates. Delegates studied a survey of these problems in 50 countries and drew up a recommendation to Ministries of Education designed to promote bigger training programmes.

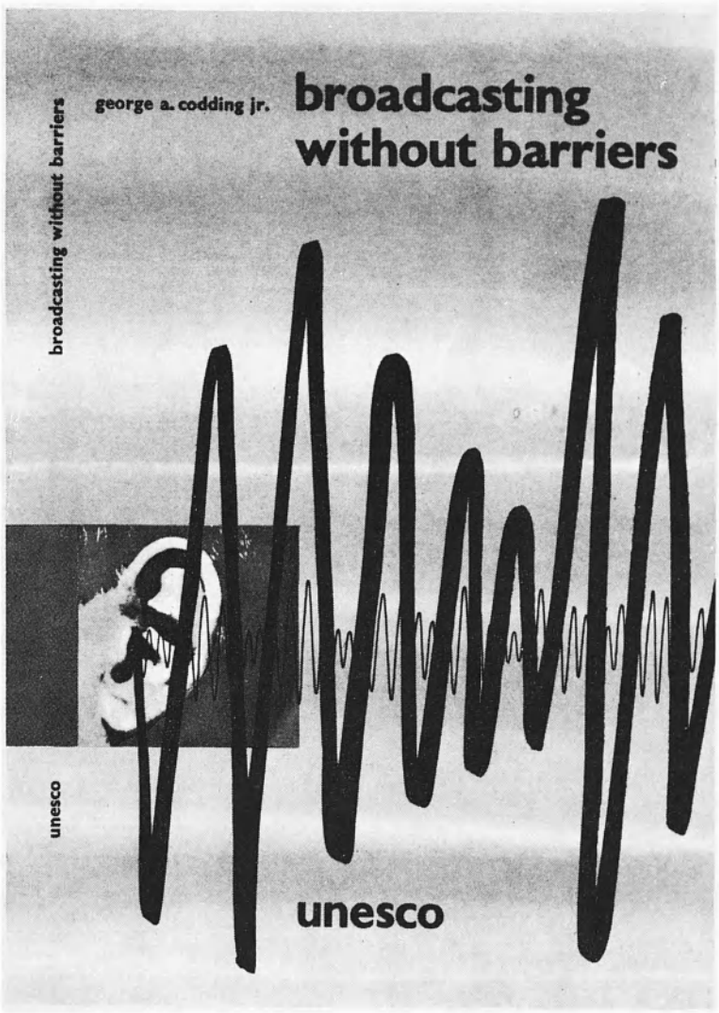
A the French Centre for Nuclear Research at Saclay, near Paris, scientists from 30 countries discussed educational problems specifically concerned with the development of atoms for peace. In technically advanced countries there is a lack of trained manpower to meet the needs of rapid nuclear development, both in nuclear science technology and in the operational phases of atomic energy. Delegates discussed the role of universities, engineering colleges, nuclear research centres and international organizations in the education of nuclear personnel. Special attention was given to the need to train more health physicists and to introduce nuclear science at the secondary school level.

★

MIRACLE AT ROTTERDAM

We apologize to readers for an error made in the last issue. The caption on pages 18/19 identified the sculpture in the centre photo as the work of Anne Grimalden of the Netherlands. This sculpture is the work of the Norwegian artist, Anne Grimdalen, and was a gift from Norway to the city of Rotterdam.

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.



Just published

Unsurpassed in speed, range and economy, radio broadcasting is an ideal means of informing and entertaining the world's peoples and promoting the free flow of ideas between countries. But many obstacles impede its effective use.

The development of broadcasting in various regions has been extremely disparate, with the result that 60 per cent of the world population still lacks adequate transmitting and reception services. Broadcasting organizations and industries have not always kept pace with technical advances, with the changing requirements of public interest, or with the challenge of the new medium, television. Insufficient effort has been made to promote the international exchange of programmes. And finally, failure to agree on the rational use of frequencies for broadcasting has hindered expansion in the advanced as well as the less advanced countries.

These problems are examined, and solutions suggested in this study, which is an indispensable aid to everyone interrested in the progress of broadcasting, nationally and internationally. It contains pictographs, photographs and an extensive bibliography. A Unesco publication; obtainable from Unesco's Sales Agents, see below.

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OPERATION POCKET RADIO

Recent air disasters have shown how difficult it is for rescue services to locate survivors, especially when the aircraft has come down in the sea. They have also highlighted the work of rescue services in many parts of the world and new efforts to improve techniques and devices for locating and rescuing victims of shipwreck or aircraft crashes.

Typical of such research is Operation "Porpoise" carried out in the Mediterranean by the French Search and Rescue Service to test equipment used by survivors of an imaginary transport plane making a forced landing in the sea.

Thirty volunteer "survivors" were put into two aircraft dinghies somewhere between the French coast and Corsica and as soon as the alarm was given three aircraft took off to search for them. The survivors made use of medium radio transmitter-receivers then in current use and also a new Ultra-High-Frequency apparatus operating on short waves and shown in the photos on this page taken during Operation "Porpoise". Five hours after the theoretical forced landing, the dinghies were located by a radio-fix from the searching aircraft.

The tiny Ultra-High-Frequency transmitter-receiver, which gave convincing proof of its effectiveness, weighs only 1 lb. and can be held in the hand. It works on transistor batteries and its transmitting range despite its size and short two foot aerial, is 100 kms. Unlike older equipment, the new transistor sets require no cranking of generators and are instantly ready for use even by physically exhausted victims.

Photos Thomson-Houston