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JUNE 1953

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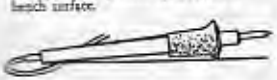

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Type 020	20 meter	$ 8.40
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JUNE, 1953

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SIDEBANDS

As you may have gathered in the cartoon above, mobile is the subject on the tip of almost every tongue now that the warm weather has arrived.

Every issue of the radio magazines has more and more space devoted to wonderful and comparatively inexpensive mobile gear to fill every need .... equipment that makes the Old Timer reminisce a bit about the old loop modulated oscillator he used to use on five meters a long, long time ago. And makes him think too, about his home grown gear back in the days when only three or four makers were turning out a receiver that was worth its salt.

There have been a great many changes for the better in the past quarter century, and the progress of the field of radio has been nothing short of phenomenol. And the end has not yet been reached. There will be thousands of new ideas in the years immediately ahead which will be just as startling as those in the years just past.....!

One of the most important events in the ham radio calendar of activities is to take place within a few hours of the time you are reading this column. That activity is Field Day, 1953, and again we urge a last minute re-consideration if you have decided not to participate this year. Participation brings with it a practical experience in working under tough conditions - an experience which could stand you in good stead when the going gets rough.

If you don't believe it, ask authorities about the work done by ham radio ops in the recent tornadoes in Sarnia, Michigan and Ohio, in which some 133 people lost their lives. Hams pitched in - gave a helping hand where it was badly needed, and thereby increased respect for all members of our large and growing group.

Yessir, Field Day can contribute a great deal to your own peace of mind, if you get in there and find out what it's all about. Field Day is teamwork, and that's what we need during disaster.

Amateur Radio in Soviet Russia

LICENSING SYSTEM AND CALLSIGN SIGNIFICANCE

For some years, two British amateurs with a knowledge of the Russian language and access to radio periodicals published in the U.S.S.R. have been observing the processes of Amateur Radio in the Soviet Union. This is the first authentic post-war survey of the subject, and is compiled entirely from Russian sources. The next instalment will deal with the annual contests held and DX certificates issued by Iron Curtain countries, including also a review of the Russian magazine "Radio," with a description of a typical Russian club station, and translations of various types of the Russian QSL's held by many operators in this country. To safeguard their sources of information, and for other obvious reasons, the authors of these articles are being given the protection of anonymity. Readers may be assured, however, that this does not in any way detract from the reliability of what they have to tell.—Editor.

ALTHOUGH Russian scientists had foreseen the possibility of wireless communication before the beginning of the present century, it was not until 1926 that permits were issued for the operation of amateur transmitting stations in the sense we know. The first of these licences went to one Fedor Alekseevich L'vov, who was given the call R1FL and operated a home-built transmitter in the town of Nizhniy Novgorod—since renamed Gorkiy—about 250 miles east of Moscow. In the following year a new callsign system was adopted consisting of the prefix EU or AS (depending on whether the station was located in Europe or Asia), followed by a number 1-Ø on somewhat similar lines to the present system, and finally a two-letter suffix in the normal sequence AA—ZZ. By the end of 1928 some 40 calls had been issued and there were by then amateur stations in most of the major cities and towns of the Soviet Union.

Then in 1934 the system was again altered and the general prefix U was adopted, with the special prefixes UE, UK and UX denoting Experimental, Club and Expedition stations. Few of the pre-war operators are active to-day, but some notable exceptions are Vadim Vostryakov, UA3AM, who was first licensed in 1927; N. V. Kazansky, UA3AF, who previously held the call U4AM; N. A. Baykuzov, UA3AG, ex-U3AG, who is also Chief Editor of the Russian journal *Radio*, which frequently reprints articles from *Short Wave Magazine* without acknowledgment; and A. F. Kamalyagin, ex-U3EB/U1AP—now UH8AF.

It will probably astonish many readers to know that at present the number of active amateur stations in the USSR totals no more than 750, which is roughly the same number as were authorised by 1939. On the other hand, no less than 30% of the issued amateur calls are held by radio clubs, factories and collective farms (Kolkhozes), thus affording operating experience to a far greater number of enthusiasts than would be possible if they were individually owned.

Licensing System

Operating permits are required for use of any short-wave equipment, whether transmitting *or receiving*, and these are obtainable from an organisation know as DOSAAF—the All-Union Voluntary Society for Co-operation with the Army, Air Force and Navy. Amateur Radio is merely one small offshoot of this organisation, which covers a very wide range of activities. As its name implies, membership is entirely voluntary—that is to say, anyone not requiring a ticket need not become a member! Three types of licence are issued: Novice, Class II and Class I, depending on the applicant's qualifications. Briefly, a Novice Class licence permits operation on the 160- and 80-metre bands only with a maximum input of 10 watts, a Class II ticket allows operation on 160, 80, 40 and 20 metres with a maximum input of 40 watts; while the Class I permits entitle the holder to the use of all bands, including 21 and 28 mc, with 200 watts input, CW or phone. In addition, all classes are permitted to use the Russian 85-87 mc band for Phone or CW.

No charge is made for operating permits and postage on QSL cards is free! Amateur working is allowed on an inter-Union basis, but contacts outside the U.S.S.R. can only be made with stations in Poland, Bulgaria, Roumania, Czechoslovakia, Hungary, Albania, the Russian-occupied Zones of Germany and Austria, and with China and Manchuria. In several of these countries there are, at present, no active amateurs. As will be well-known, for many years Russian amateurs were also permitted to work stations in any part of the

world, but this privilege was withdrawn in May, 1951—hence WSEM !

Callsign Pattern

The greater part of the Soviet Union is known as the Russian Soviet Federated Socialist Republic and the callsign districts within this area consist of UA1, 2, 3, 4, 6, 9 and Ø. For administrative purposes each of these districts is divided into *oblasts* which correspond roughly to our counties. In most cases the oblast is named after the principal city therein which forms the capital of the oblast. In the following list of oblasts the exceptions to this rule are followed with the name of the capital in brackets:

UA1: Leningrad, Archangel, Pskov, Novgorod, Vologda and Murmansk.

UA2: Kaliningrad — formerly East Prussia.

UA3: Moscow, Gorky, Ivanovo, Tambov, Tula, Smolensk, Bryansk, Vladimir, Voronezh, Ryazan, Kursk, Kaluga, Yaroslavl, Orel, Kalinin, Kostroma and Velikye Luki.

UA4: Stalingrad, Penza, Kuibyshev, Ulyanovsk, Mari (Ioshkar-Ola), Udmurt (Izhevsk), Mordov (Saransk), Chuvash (Cheboksary), Saratov, Kirov and Tatary (Kazan).

UA6: Rostov, Krasnodar, Crimea (Simferopol), Kabardin (Nalchik), Astrakhan, Dagestan (Makhach-Kala), N. Osetin (Dzau-Dzhikau), Stavropol and Grozny.

UA9: Sverdlovsk, Chelyabinsk, Komi (Syktyvkar), Bashkir (Ufa), Altai (Barnaul), Molotov, Kurgan, Novosibirsk, Tomsk, Omsk, Tyumen, Chkalov and Kemerovo.

UAØ: Khabarovsk, Krasnoyarsk, Chita, Primorsky (Vladivostock), Irkutsk, Yakutsk, Tannu-Tuva (Kyzyl) and Buryat-Mongolia (Ulan-Ude).

It is, perhaps, not generally known that the letter following the numeral in Russian call-signs is a direct indication of the oblast in which the station is located—in the case of collectively-operated stations which have a 3-letter suffix the K which follows the numeral should be ignored. Table I can be used to obtain the location of any Russian amateur station using the prefix UA. Thus UA9FB would be located in Molotov Oblast, while UA4KAB would be in Stalingrad, UA2KAW in Kaliningrad, and so on. In the case of the non-federated republics, *viz.*, the Ukraine (UB5), Byelo-Russia (UC2), Azerbaijan (UD6) and others, these are also divided into oblasts, but the system is *not* used in the allocation of call-signs; therefore, calls such as UB5AA, UB5AB or UB5AC may well be found to emanate from widely separated oblasts of the Ukraine.

Before leaving the geographical aspect a note on the Zone angle may be of interest to the DX-minded fraternity. The information given below is the result of discussion with *CQ*—originators of the Zone scheme—and is therefore believed to be accurate for Zone computing purposes. Briefly, then, the U.S.S.R. is incorporated in the following DX Zones:

Zone 15—All UA2, UP2, UQ2 and UR2.

Zone 16—All UA1 except Franz Josef Land and Novaya Zemlya both of which are in Archangel Oblast.
All UA3, UA4, UA6; UA9—Bashkir and Chkalov only.
All UB5, UC2, UN1 and UO5.

Zone 17—UA1—Novaya Zemlya (Archangel obl. only); UA9—Sverdlovsk, Chelyabinsk, Komi, Kurgan, Molotov, Omsk, and Tyumen oblasts.
All UH8, UI8, UJ8, UL7 and UM8.

Zone 18—UA9—Novosibirsk, Tomsk, Kemerovo and Altai only.
UAØ—Krasnoyarsk, Irkutsk, Chita and Buryat-Mongolia.

Zone 19—UAØ—Khabarovsk, Yakutsk, Primorsky and northern half of Sakhalin I. (Khabarovsk obl.)

Zone 21—All UD6, UF6 and UG6.

Zone 23—UAØ—Tannu Tuva only.

Zone 25—UAØ—Sakhalin I. (Khabarovsk obl.) southern half only.

Zone 40—UA1—Franz Josef Land (Archangel obl.) only.

From the foregoing it will be seen that the Soviet Union occupies all or part of nine of the DX Zones. *(To be continued)*

Mobile radio hams in Virginia have the benefit of the State's first departure from its regular licensing system: special call-letter license plates. Amateurs with fixed stations only were not accorded the privilege so there is incentive for more W4's to "get rolling."

Predicting VHF Conditions

THE WEATHER AND PROPAGATION EFFECTS ON TWO METRES

A. H. HOOPER (G3EGB)

The title of this article is a bold one, but if it is carefully studied, present theory on the mechanism of VHF propagation can be related to weather effects, enabling predictions to be made which could be tested by results. With the steadily increasing population of the VHF bands, more attention will come to be directed towards establishing the distances over which reliable communication is possible. A working knowledge of current VHF propagation theory —which is what this article covers — then becomes essential if the conclusions drawn from a study of results are to be of any value.
—Editor.

THE spread of amateur activity in the 144 mc and 432 mc allocations throughout the European area, together with the development of efficient equipment, has made evident the fact that in this part of the radio spectrum extended propagation over many hundred miles can occur at times. That such propagation is related to weather conditions is readily apparent. The incidence of propagation beyond visual range at metric and centimetric wavelengths has been the subject of considerable investigation during recent years, and as a result, the meteorological conditions necessary for such propagation are fairly well established. These conditions are usually observed at intervals of six hours, but are available at the time only in the indirect form of weather forecasts. From an understanding of the meteorological processes involved, however, and from simple local observations, it is often possible to decide upon the prospects of anomalous propagation. Like the author, most amateurs, no doubt, have only a limited amount of time for the several phases of their hobby, and have to strike a balance between operating and constructional activity. It is hoped that the following account will assist amateurs in making the best possible division of their spare time.

Refraction in the Atmosphere

For the longer wavelengths employed by radio amateurs the ionosphere is the controlling factor of extended propagation, but for wavelengths of two metres and less it can be said to have little or no effect. For propagation over the curved surface of the earth we must look for reflection or refraction within the lower atmosphere, and as with light waves, it is vertical changes of refractive index that are significant. Although at radio wavelengths the refractive index varies very little with frequency, the longer wavelengths can respond to the average change of index only over a very great height, and such changes are not in fact sufficient for anomalous propagation to occur. Thus it is only the shorter wavelengths (actually of two metres and less) that can utilise the larger changes of index with height which occur from time to time in shallow layers in the lower atmosphere.

The radio refractive index of the atmosphere depends directly upon air pressure and upon the amount of water vapour present, and inversely upon the absolute temperature. The distribution of air pressure arises from the effect of gravity and is a decrease with height. All water vapour in the atmosphere originates at the earth's surface, being carried aloft by air currents, and tends to decrease in amount with height. Heat in the atmosphere originates to a large extent at the surface of the earth and so temperature, too, tends to decrease with height. In the troposphere, which in these latitudes extends from the earth to between 20,000 and 40,000 feet, the net effect is for a decrease of refractive index with height. The resulting downward curvature of radio waves is insufficient for return to earth. For a greater decrease of refractive index with height and curvature downward again to earth, a sufficiently rapid decrease of water vapour or increase of temperature—a temperature inversion—with height is necessary. The rates of change required are large and it is more usual for lesser rates of change to occur simultaneously in both factors.

When tracing a wave, the important feature is its path relative to the earth's surface, and for this purpose it is convenient to consider the earth as flat. This can be done by suitably modifying the refractive index. When the modified refractive index (usually abbreviated as MRI) increases with height all affected waves bend upwards away from the "flat" earth. Variations in the degree of bending result in

small changes in range achieved. When the MRI is unchanged with height then the radiation paths trace straight lines with respect to the flat earth, and any horizontal radiation continues along the surface of the earth. When the MRI decreases with height, downward bending of low angle radiation towards the earth takes place.

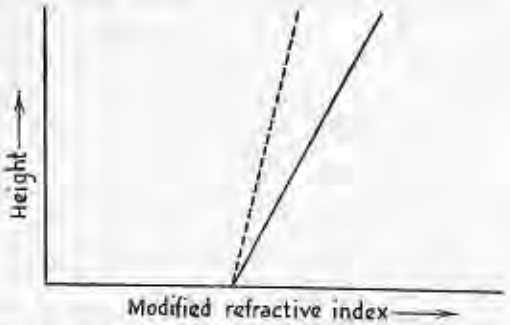

Fig. 1. The Modified Refractive Index (MRI) normally increases with height and, considering the earth as flat, radio waves bend upwards away from it. This concept is necessary to show that for a slower increase of MRI with height, upward bending is reduced and greater ranges result.

In Fig. 1 are two plots of MRI against height. Both full and pecked lines represent "normal" conditions, but in the latter case the range would be somewhat greater than in the former. Fig. 2 shows a decrease of MRI with height in the lowest layer. Such a layer or "duct" will greatly improve the propagation of wavelengths less than a value related to its vertical extent, and will improve to a lesser extent the propagation of longer wavelengths. In Fig. 3, the refracting layer occurs some way above the surface of the earth, but the duct "width" is still measured downwards to the surface, and in this case longer wavelengths can be accepted. The extension of this condition in Fig. 4 illustrates the fact that the lower limit of a duct is that level at which the minimum value of MRI for the layer is regained. In such cases the full benefit is gained only when both transmitter and receiver aerials lie within the duct. Radiation from an aerial placed below the duct will, however, benefit to some extent.

For wavelengths of two metres and seventy centimetres duct widths of 700 feet and 250 feet or more, respectively, are necessary. Such widths have never been observed in the European area and the full benefits of ducting are not obtained at these wavelengths. The shallower ducts which form from time to time permit amateur communication over increased

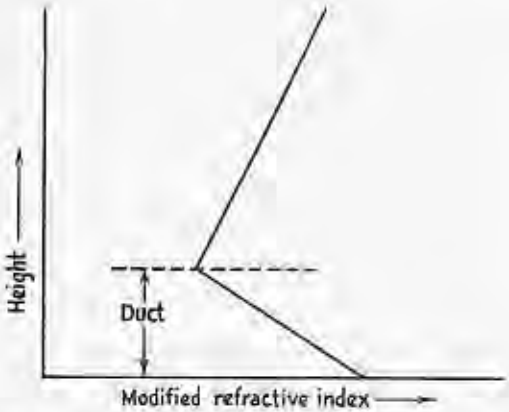

Fig. 2. In a shallow layer, the MRI can decrease with height, and radio waves sufficiently short in wavelength travel for great distances as though in a waveguide or duct. Longer wavelengths can be similarly affected, but only partial guiding occurs, with considerable leakage from the top of the duct.

ranges, but with considerable leakage of radio energy from their upper surfaces. When a duct of the type depicted in Fig. 4 occurs at a higher level in the atmosphere, say, at 2,000 feet or more, it is possible for reflection to occur. Recent investigation suggests that in such cases metric wavelengths are more favoured than centimetric wavelengths, a result directly opposite to that of refraction effects at or near the ground. In such conditions the increase of MRI with height below the reflecting layer will bend radio waves upwards thereby increasing the angle of attack. The higher the layer the greater the angle, until the critical angle is exceeded and reflection ceases. Obviously, then, the layer must not be too high. Owing to the limited effects of ducts upon metre wavelengths it is usually the reflection phenomenon that produces striking instances of anomalous propagation. In cases of reflection from extreme heights, with a distribution below of MRI unfavourable for refraction, a skip effect can sometimes be observed.

Surface Ducts Over Land

The flow of air over the rough surface generally presented by land masses is confused and turbulent. Irregularities in the average flow occur not only in the horizontal but also in the vertical plane, and extend at times as much as 1,500 feet upwards. This thorough mixing, together with pressure changes arising from the vertical motion, results in a steady decrease of temperature with height. The

same mixing results in an even distribution of water vapour with height. The net effect of this normal atmospheric condition is for a gradual increase of MRI with height, and for a small downward bending of radio waves towards the curved surface of the earth. It will be met whenever there is appreciable surface wind. The depth of the turbulent layer varies with the roughness of the earth's surface and with wind speed, being less for a sea area and for lower wind speeds.

The earth is always losing heat by radiation into space. During daylight hours incoming radiation from the sun more than balances this. The quantity of radiation from the sun increases with its elevation above the horizon and reaches a maximum value at noon. As a result, the temperature of the earth's surface undergoes a daily (and seasonal) variation. The temperature depends, too, upon the specific heat of that surface. Heat spreads upwards through the atmosphere from the earth's surface and results in a decrease of air temperature with height, the maximum value at any level being reached at about two hours after noon. At sunset radiation from the earth into space takes control, and its surface cools. This cooling spreads upwards into the lower layers of the atmosphere and results in the formation of a temperature inversion. The vertical extent of the inversion increases rapidly until about midnight and then slowly until dawn. The presence of clouds results in a reduced temperature rise during the day and a reduced temperature fall at night, their effect varying with their amount, thickness and height above surface.

All water vapour in the lower atmosphere originates at the earth's surface. The amount capable of being taken up by air varies with air temperature, and any surplus condenses out as water droplets. In the circumstances considered above, water vapour spreads aloft from the earth during the day, and sets up a decrease with height. With the formation of a temperature inversion after sunset, Fig. 2 represents the change of MRI with height, and anomalous propagation can be expected over the area involved. As cooling continues a temperature will be reached at which the lowest layer of air is saturated. Further cooling results in the excess vapour condensing out, usually as dew. The result is an increase of water vapour content with height over a layer which, as the process continues, becomes deeper and deeper. Fig. 3 illustrates the result. Prolonged cooling will result finally in the less favourable condition represented by Fig. 4. Sunrise reverses the process. With a low water vapour content

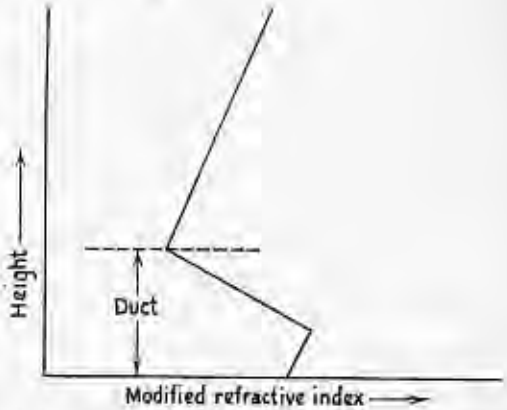

Fig. 3. When the layer of decreasing MRI lifts, the duct will still extend down to the ground providing the value of MRI there is greater than the minimum in the layer. The greater duct " width " improves the propagation of partially guided waves of any given length.

the saturation temperature is lower, and it will take longer for the surface air temperature to cool down to that value, in fact dew may not be deposited until just before sunrise. On such occasions anomalous propagation can continue to improve throughout most of the night.

Owing to the greater specific heat of water, there is little daily change in temperature of the sea and radiation inversions do not develop, being confined therefore to land areas.

For anomalous propagation by this means we need a cloudless night, and under the right conditions there will be little or no wind. The effect will be more marked if there has been little afternoon cloud to impede the daytime temperature rise. The onset of dew, easily detected, indicates the start of a process which leads ultimately to a lifting of the duct beyond aerial height and less favourable propagation conditions. Such propagation is restricted to nightime over land areas, within the settled conditions of high pressure necessary for cloudless night skies. High pressure circulations are slow moving and extend at times for several hundred miles. The right conditions can also develop in the small areas of fine weather travelling along between bad weather areas (depressions). These small areas can give rise to anomalous propagation over restricted paths from a given point for a few hours before the next depression arrives. They are referred to as ridges of high pressure. In Europe, the size of continuous land areas and of high pressure systems is less than in North America, and there is little prospect of European records

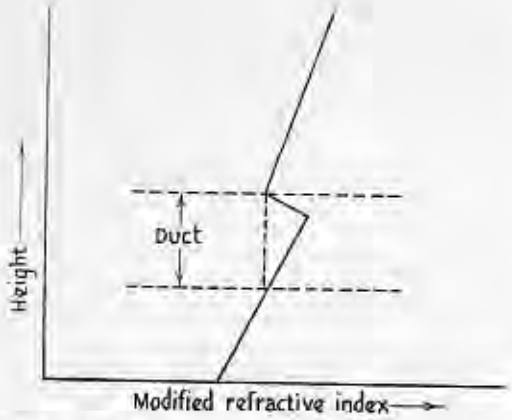

Fig. 4. Lifting of the layer of decreasing MRI often continues until the ground value is less than the layer minimum. In such cases the duct extends downwards only to the level at which the layer minimum is regained. In this case, transmitter and receiver aerials must both lie within the duct for maximum advantage.

equalling those achieved across the Atlantic.

With the aid of two thermometers it is a simple matter to derive the amount of water vapour present. The thermometers should be set up well away from buildings, exposed to the air, but shielded from the direct rays of the sun. The bulb of one is covered with a piece of muslin which is kept moist by placing its free end in a container of distilled water. This thermometer will give a lower reading than the other. The extent of its depression below the normal thermometer is some indication of the amount of water vapour present, the precise quantity being obtained from tables if desired. During night-time cooling it will be found that the dry-bulb thermometer reading decreases more rapidly than that of the wet-bulb thermometer, and that they give approximately the same reading when dew is forming.

Surface Ducts Over the Sea

In passing over the earth's surface a stream of air tends to acquire in the lowest layers the temperature of that surface. The process takes time and changes occur in the lowest layer first, then spreading upwards. When the surface temperature is from warm to cool then an inversion forms in the air stream. For the effect on radio propagation to be appreciable the temperature change must be considerable and the two areas extensive. Only then will the air have time to acquire first the one characteristic and then the other. In European latitudes conditions are favourable in summer-time when the temperature of land areas can become much higher in daytime than that of adjacent sea areas, although usually lower than the temperature of adjacent sea areas at night and during the cooler seasons.

If a stream of day-time heated air sweeps from land out over the sea it is cooled from below and a temperature inversion forms. Additionally, water vapour is then freely available with the result that the air becomes nearly saturated at the surface and has a decrease of water vapour content with height. This condition arises from the horizontal motion of the air and is described as an advection inversion. An area or ridge of high pressure is usually necessary over land for the initial land heating, but winds tend to be light or nil in the centres of high pressure areas and it is towards the edges of such systems and in ridges that the wind will flow strongly enough to spread over appreciable sea areas. It is a day-time phenomenon, and for amateur exploitation must extend across the whole of the sea path considered. Anomalous propagation by this method is limited, therefore, to little more than coast to coast paths during day-time, and then only in the summer months.

Elevated Ducts

At levels higher than those we have been considering the atmosphere is very much colder than near the surface and can contain only a much-reduced quantity of water vapour. It is a feature of high pressure systems that air from high levels sinks slowly towards the surface. In so doing, it undergoes compression and becomes warmer, its temperature eventually exceeding that of the air beneath. The latter is supplied with water vapour from the earth below and is much moister. Once again the desirable features of temperature inversion and decrease of water vapour content with height exist. It is known as a subsidence inversion, and is independent of surface or day and night effects. It can occur over the full extent of a high pressure system. Recent work suggests that the thickness of the layer through which the inversion occurs often favours particularly the reflection of metric wavelengths. In Europe with its broken masses of land and sea, the seekers after long distance VHF communication must rely on this phenomenon. Again, the smaller high presssure systems make it unlikely that distances can equal those achieved in North America.

For anomalous propagation, the subsidence inversion must first develop and then sink sufficiently low, having regard for the MRI structure beneath, for the radio waves to reach

it at less than the critical angle. As it continues to sink it will eventually reach a height insufficient for the ray theory of radio waves to apply. The situation is then as in Fig 4, or even as in Fig. 3, and propagation will be greatly reduced although still somewhat better than normal. It has been estimated that less than one quarter of all subsidence inversions sink below 3,000 feet, and less than one in fifteen below 1,500 feet above the earth. Not all high pressure areas, moreover, remain in existence long enough to develop the subsidence effect. Anomalous propagation by this means then, is an infrequent, although impressive, occurrence.

The existence and sinking of subsidence inversions is readily observed only by means of soundings of the atmosphere, but the amateur can often deduce their arrival below the 3,000 feet level for himself. Within high pressure areas, day-time heating of the earth results in rising currents of air. As they rise they become cooler, the process often being enough for water vapour borne aloft to condense out as cloud. The resulting blobs of cumulus (or heaped) cloud are easily recognised. It is a feature of temperature inversions of much magnitude that rising air currents, and hence cloud, cannot extend upwards through them. As an inversion sinks, any cloud extending upwards to its level is progressively reduced in height. One studies the fine-weather clouds during the afternoon. If their tops are flattish or have a tendency to "mushroom" out horizontally then they are being limited by an inversion. A reduction in their height indicates a sinking of the inversion. Complete absence of cloud in mid-afternoon suggests the existence of a very low inversion, unless the air be very dry. It sometimes happens that the cloud develops during the morning, only to disappear during the afternoon instead of the more usual time of early evening. This is the extreme example of the effect of a sinking inversion upon cloud, and suggests that anomalous propagation is likely to occur during the coming night.

In the conditions existing within a high pressure area an indication of the height of the base of the cloud is given by the depression of a wet-bulb thermometer reading below that of a dry-bulb or ordinary thermometer. The cloud base will be roughly 1,000 feet up for every 2.7 degrees Fahrenheit of difference. Suppose that dry-bulb and wet-bulb thermometer readings are respectively 68.7 and 62.0 degrees Fahrenheit. The wet-bulb depression is 6.7 degrees and the cloud base will be roughly 2,500 feet above the earth. Using a figure obtained in this way and comparing the vertical extent of the cloud with the gap beneath it is possible to estimate the height of the cloud tops, a useful facility when they are being limited by inversion. In the moist air streams that usually cover the British Isles the absence of cloud in mid-afternoon suggests the existence of an inversion aloft, but below the height value deduced from thermometer readings. It should, perhaps, be mentioned that although the exposure of thermometers requires considerable care in order to yield accurate results, readings obtained in locations other than ideal will, nevertheless, form a useful guide.

The writer is unable to suggest the order of height below which a subsidence inversion must sink for reflection to occur and would be glad to receive reports of communication suspected of being by this means. It is an interesting point that although a subsidence inversion may not be low enough to affect propagation directly by means of reflection, it can, by limiting cloud development, assist in the development of a large radiation inversion the same evening, with beneficial results.

Other Conditions

There are several other processes leading to the formation of temperature inversions in the atmosphere, but they usually occur in conjunction with an increasing water vapour content with height. The controlling factors are then in opposition and little modification of the normal MRI distribution occurs. For example, in the phenomenon known as the warm front, warm and moist air can be imagined as sliding up the inclined edge of cold and relatively dry air. It is usually first visible as a high thin sheet of cloud (cirro-stratus) which gradually thickens and lowers until obscured, finally, by rain. A vertical sounding through this frontal surface reveals the unfavourable combination of temperature inversion and increase in water vapour with height. However, the writer has occasionally noticed an inversion of the subsidence type just below the frontal inversion. As the latter sinks over a given spot, the subsidence inversion is, apparently, forced downwards beneath it. This may well be the explanation of reflections observed by some operators for a brief time apparently from the warm front.

Conclusion

In order to assess the chances of anomalous propagation on a given occasion, one has to

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TUNING SYSTEM

The main tuning and bandspread tuning capacitors are connected in parallel on all bands. This arrangement permits bandspread tuning at any frequency within the range of the receiver and a logging scale is provided. One RF Stage is employed on all bands and the trimmer for the 1st RF stage is controlled from the front panel. Dial calibration is as follows:

Band	General Coverage	Bandspread
A	.55 — 1.6 Mc.	
B	1.6 — 4.7 Mc.	3.5 — 4.0 Mc.
C	4.7 — 14 Mc.	6.9 — 7.3 Mc.
D	14.0 — 40.0 Mc.	14.0 — 14.35 Mc.
		26.9 — 30.0 Mc.

SENSITIVITY

One RF and two IF stages are employed in a modern superheterodyne circuit to give the receiver adequate sensitivity, and image rejection.

SELECTIVITY

Approximately 11 KC. at 20 DB down.

CONTROLS

Main tuning; bandspread tuning; band selector; sensitivity; AC on/off—volume; receive/stand-by switch; ANL On/Off switch; tone Hi-Lo switch; CWO pitch; antenna trimmer; AM/CW switch.

TUBE COMPLEMENT

The NC-88 is supplied complete with tubes which are employed as follows:

First R.F. Amplifier	6BA6
Mixer	6BE6
H.F. Osc.	6C4
First I.F. Amplifier	6BD6
Second I.F. Amplifier	6BD6
2nd Detector — A.V.C. Limiter	6AL5
First Audio and BFO	12AX7
Audio Output	6AQ5
Rectifier	5Y3GT

AUDIO SYSTEM

Undistorted Power Output .....1.5 Watts

Frequency Response (at 3 DB points)
Tone Control at Hi .....100 to 4000 C.P.S.

Tone Control at Lo .....100 to 2000 C.P.S.

Output Impedance at phone jack
.....Not Critical for phones.
Will take a 3.2 ohm external P.M. speaker.

A phono input jack suitable for crystal pickup, is provided at the rear of the receiver. To operate, the "Sensitivity" Control is turned to zero.

SIZE:

8¾" high x 16½" wide x 10½" deep. (excluding knobs)

FINISH:

Hammertone Gray enamel.

THE *World Master* NATIONAL NC-88

Presenting A GREAT NEW RECEIVER—

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NC

form a mental picture of the high and low pressure systems and their movement within the area. The weather maps shown by the television service and the weather forecasts distributed by the B.B.C. are the best sources of material, while the maps printed in certain of the daily papers are helpful, although not wholly up to the minute.

Those amateurs lying within high pressure areas and finding rapidly clearing or clear skies together with decreasing wind in the early evening, can expect a radiation inversion to develop, and anomalous propagation to extend over inland paths. Those amateurs operating coastal stations in the warmer months of the year and lying towards the edge of a high pressure area with a fresh wind blowing out to sea can expect a daylight sea path to be possible. All amateurs lying within a high pressure area and noting that fine-weather cloud is rapidly disappearing or non-existent during the early afternoon can hold themselves ready to exploit the long-distance "opening" likely to develop.

Those interested in investigating cases of anomalous propagation after the event, perhaps with view to improving their own predictions, can always obtain weather maps and the results of vertical soundings of the atmosphere from official publications.

At wavelengths greater than about ten metres reliable long range predictions of radio propagation are available to all. Only temporary disturbance occurs — during periods of abnormal sunspot activity. At metric and centimetric wavelengths, radio propagation is closely related to the weather and predictions of propagation conditions, even if issued, could not be for longer periods than are possible for weather forecasts. For the enthusiast whose main concern is the exploitation of long range openings at two metres and less, an understanding of the relevant weather processes can be very rewarding. It is hoped that this article will help operators to formulate their own predictions of VHF radio propagation and at least to avoid the pinprick of being under reconstruction when openings develop.

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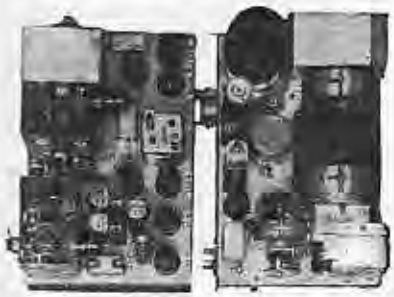

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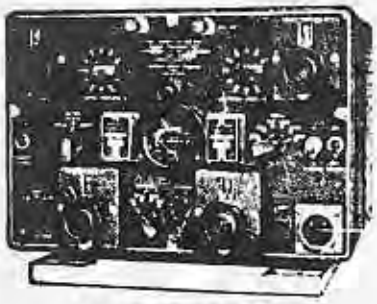

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DX PREDICTIONS

Prepared by C.B. McKee, Engineering Division, CBC International Service

Skywire frequency predictions are for amateur communications on various circuits to almost any part of the world. These tables are for five major areas in Canada, and amateurs who are operating reasonably close to the cities indicated will find these predictions quite adequate.

Figures shown are in megacycles and indicate the band to be used. They are for normal F layer transmission and don't consider Sporadic E which may provide unusual DX openings!

Toronto to: EST	00	02	04	06	08	10	12	14	16	18	20	22
Europe	7	7	7	7	7	7	7	7	7	7	7	7
Africa	7	-	-	-	-	-	-	-	14	7	7	7
Caribbean	7	7	7	14	14	14	14	14	14	14	14	14
S. America	7	7	7	14	14	14	14	14	14	14	14	7
Australia	7	7	7	7	7	-	-	-	-	-	-	-
U.S. - West	14	14	14	7	14	14	14	14	14	14	14	14
U.S. - Central	7	7	7	7	14	14	14	14	14	14	14	14
U.S. - South	14	14	7	7	14	14	14	14	14	14	14	14
Vancouver	14	7	7	7	14	14	14	14	14	14	14	14
Watrous	4	4	4	4	7	7	7	7	7	7	7	7
Montreal	4	4	4	4	7	7	7	7	7	7	7	7
Sackville	7	7	4	7	7	14	14	14	14	14	7	7

Sackville to: AST	01	03	05	07	09	11	13	15	17	19	21	23
Europe	7	7	7	7	7	7	7	7	7	7	7	7
Africa	7	-	-	-	-	-	-	-	14	7	7	7
Caribbean	7	7	7	14	14	14	14	14	14	14	14	7
S. America	7	7	7	14	14	14	14	14	14	14	14	7
Australia	7	7	7	7	7	-	-	-	-	-	-	-
U.S. - West	14	14	7	7	14	14	14	14	14	14	14	14
U.S. - Central	14	14	7	7	14	14	14	14	14	14	14	14
U.S. - South	14	14	7	7	14	14	14	14	14	14	14	14
Vancouver	14	7	7	7	14	14	14	14	14	14	14	14
Watrous	7	7	7	7	14	14	14	14	14	14	14	14
Toronto	7	7	4	7	7	14	14	14	14	14	7	7
Montreal	7	7	4	7	7	14	14	14	14	14	7	7

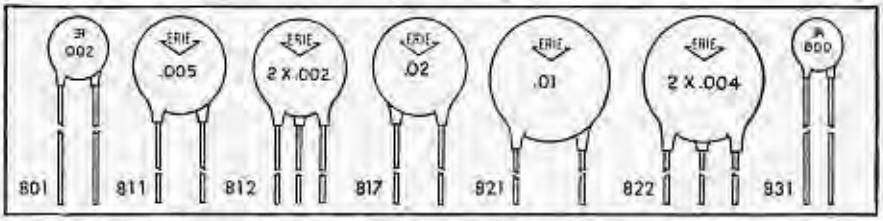
Watrous to: CST	22	00	02	04	06	08	10	12	14	16	18	20
Europe	7	7	7	7	7	-	14	14	7	7	7	7
Africa	7	-	-	7	14	14	14	14	14	14	14	14
Caribbean	14	14	14	7	14	14	14	14	14	14	14	14
S. America	14	14	14	14	14	14	14	14	14	14	14	14
Australia	14	14	7	7	7	7	7	-	-	-	-	-
U.S. - West	14	7	7	7	7	7	14	14	14	14	14	14
U.S. - Central	7	7	7	7	7	14	14	14	14	14	14	14
U.S. - South	14	14	14	14	14	14	14	14	14	14	14	14
Vancouver	14	7	7	7	7	14	14	14	14	14	14	14
Toronto	4	4	4	4	7	7	7	7	7	7	7	7
Montreal	7	7	7	7	14	14	14	14	14	14	14	14
Sackville	7	7	7	7	14	14	14	14	14	14	14	14

Montreal to: EST	00	02	04	06	08	10	12	14	16	18	20	22
Europe	7	7	7	7	7	7	7	7	7	7	7	7
Africa	7	-	-	-	-	-	-	-	14	7	7	7
Caribbean	7	7	7	14	14	14	14	14	14	14	14	7
S. America	7	7	7	14	14	14	14	14	14	14	14	7
Australia	7	7	7	7	7	-	-	-	-	-	-	-
U.S. - West	14	14	14	14	14	14	14	14	14	14	14	14
U.S. - Central	7	7	7	7	14	14	14	14	14	14	14	14
U.S. - South	14	14	7	7	14	14	14	14	14	14	14	14
Vancouver	14	7	7	7	14	14	14	14	14	14	14	14
Watrous	7	7	7	7	14	14	14	14	14	14	14	14
Toronto	4	4	4	4	7	7	7	7	7	7	7	7
Sackville	7	7	4	7	7	14	14	14	14	14	7	7

Vancouver to: PST	21	23	01	03	05	07	09	11	13	15	17	19
Europe	7	7	7	7	7	-	14	14	7	7	7	7
Africa	7	-	-	7	14	14	14	14	14	14	14	14
Caribbean	14	14	14	7	14	14	14	14	14	14	14	14
S. America	14	14	14	14	14	14	14	14	14	14	14	14
Australia	14	14	7	7	7	7	7	-	-	-	-	-
U.S. - West	7	7	7	4	4	7	14	14	14	14	14	14
U.S. - Central	14	14	7	7	7	14	14	14	14	14	14	14
U.S. - South	14	14	14	7	14	14	14	14	14	14	14	14
Watrous	14	7	7	7	7	14	14	14	14	14	14	14
Toronto	14	7	7	7	14	14	14	14	14	14	14	14
Montreal	14	7	7	7	14	14	14	14	14	14	14	14
Sackville	14	7	7	7	14	14	14	14	14	14	14	14

ERIE DISC CERAMICONS®

Erie Disc Ceramicons consist of a flat Hi-K ceramic dielectric with silver fired onto the dielectric. Lead wires are firmly soldered to the silver electrodes, and the unit is given a protective coating of phenolic. Very efficient at high frequencies.



Part No.	Size-Max. Dia.	Capacity	List
831-100	1/4"	10 MMF	.25
831-150	1/4"	15 "	.25
831-220	1/4"	22 "	.25
831-330	1/4"	33 "	.25
801-470	3/16"	47 "	.25
811-680	13/64"	68 "	.25
811-101	13/64"	100 "	.25
811-151	13/64"	150 "	.25
811-221	13/64"	220 "	.25
821-331	1/4"	330 "	.25
821-471	1/4"	470 "	.25
801-681	1/4"	680 "	.25
801-.001	3/16"	.001 MFD	.25
801-.0015	3/16"	.0015 "	.25

Part No.	Size-Max. Dia.	Capacity	List
801-.002	3/16"	.002 MFD	.25
811-.0022	13/64"	.0022 "	.25
811-.0033	13/64"	.0033 "	.25
811-.0047	13/64"	.0047 "	.25
811-.005	13/64"	.005 "	.25
811-.0068	13/64"	.0068 "	.30
811-.01	13/64"	.01 "	.25
821-.01	1/4"	.01 "	.30
817-.02	13/64"	.02 "	.30
812-.001	13/64"	.001 Dual "	.40
812-.0015	13/64"	.0015 " "	.40
812-.002	13/64"	.002 " "	.40
822-.003	3/8"	.003 " "	.45
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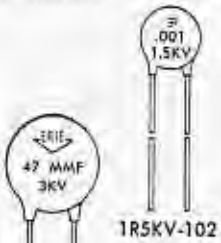
They differ in appearance from lower voltage units in having greater thickness, the degree of difference depending on voltage rating.

1500 VOLTS D.C.W.

Part No.	Size-Max. Dia.	Cap. (MMF)	List
1R5KV-4R7	3/16"	4.7	.30
1R5KV-6R8	3/16"	6.8	.30
1R5KV-100	3/16"	10	.30
1R5KV-150	3/16"	15	.30
1R5KV-220	3/16"	22	.30
1R5KV-330	3/16"	33	.30
1R5KV-470	13/64"	47	.30
1R5KV-680	13/64"	68	.30
1R5KV-101	13/64"	100	.35
1R5KV-151	1/4"	150	.35



DISC CERAMICONS

Part No.	Size-Max. Dia.	Cap. (MMF)	List
1R5KV-221	3/16"	220	.40
1R5KV-331	3/16"	330	.40
1R5KV-471	1/4"	470	.45
1R5KV-681	5/16"	680	.55
1R5KV-102	5/16"	1000	.55
1R5KV-152	13/32"	1500	.65
1R5KV-222	15/32"	2200	.85
1R5KV-332	15/32"	3300	1.05
1R5KV-472	1/2"	4700	1.40
1R5KV-562	1/2"	5600	1.60

3000 VOLTS D.C.W.

3KV-4R7	3/16"	4.7	.50
3KV-6R8	3/16"	6.8	.50
3KV-100	3/16"	10	.50
3KV-150	3/16"	15	.50
3KV-220	13/64"	22	.50
3KV-330	13/64"	33	.50
3KV-470	13/64"	47	.50
3KV-680	1/4"	68	.50
3KV-101	5/16"	100	.55

DISC CERAMICONS

3KV-151	5/16"	150	.55
3KV-221	3/8"	220	.60
3KV-331	3/8"	330	.60
3KV-471	3/8"	470	.65
3KV-681	7/16"	680	.75
3KV-102	15/32"	1000	.75
3KV-152	15/32"	1500	.85
3KV-222	1/2"	2200	1.05
3KV-332	1/2"	3300	1.25

6000 VOLTS D.C.W.

6KV-4R7	15/32"	4.7	1.00
6KV-6R8	15/32"	6.8	1.00
6KV-100	15/32"	10	1.00
6KV-150	15/32"	15	1.00
6KV-220	1/2"	22	1.00

DISC CERAMICONS

6KV-330	1/2"	33	1.00
6KV-151	15/32"	150	1.00
6KV-221	15/32"	220	1.00
6KV-331	1/2"	330	1.00
6KV-471	9/16"	470	1.00

25th Anniversary

Erie Resistor of Canada Limited

1151 Roselawn Ave. Toronto, Ont.

Factories: Toronto, Ont.; London, Eng.; Erie, Pa.

ERIE RESISTOR CORP.

HAMADS

Skywire Hamads must pertain to amateur radio. Rates are 20 cents per word, per insertion for commercial advertisements for profit, and 4 cents per word for all non commercial, non-profit advertisements by experimenters or licensed radio amateurs. Full remittance MUST accompany copy. Print plainly and count address in the total. Do NOT send personal checks unless exchange is included. Mail to Skywire - Toronto.

COMPLETE RIG FOR SALE in sections or as a unit. Have three receivers, National HRO-M, new cabinet, built-in power supply, speaker, and G.E. YRS-1 Single Sideband 13 tube factory built adapter. Also have R-1155A with power supply and speaker, operating, and AR-6 receiver, almost converted, plus power supply for it. Have Motorola vibrator supply, 6vdc input, 420 and 210 output at 100 mils. Also have new BC-696 3 to 4 mc transmitter for FVO. 2 new ACN dials, one type ICN, and one Millen dial of same ACN type. Transmitter is Single Sideband Jr exciter on 5200 kc, with voice control and power unit, feeding mixer, with VFO flip-flop on either 80 or 20m. Final is pair 807's, driven by 6AG7 - and feeding National MB-150 tank coil. A 750 volt power supply for this final is available, complete with illuminated meter and modulator unit, for use with BC-696 or SSB unit. Also have hi-stability VFO unit, no drift and regulated power supply, beautifully housed & a 42 inch blue crackle finish enclosed rack for the SSB rig. HRO coils cover BC band, and bandspread ham bands in set of 6 coils. This is a deluxe rig, carefully built on commercial standards and not thrown together. Must sell to buy property, at once. Will answer all inquiries immediately. If you want a real buy on any piece of this station, write now and make your offer. Must sell without delay this month. VE3BTL. 10 John St. Brampton

SUBSCRIBE TO all your radio and other magazines through radio VE3DEM. RR#1. Dryden, Ont. You name the publication & VE3DEM has it.

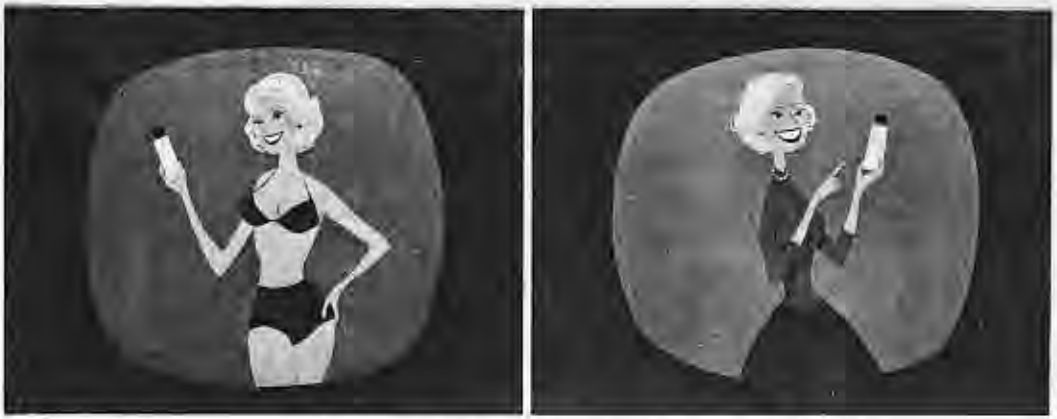
FOR SALE - Ready to operate phone-CW 60 watt transmitter, VFO & Xtal on all the bands, 80 through 10, complete with B&W coils, set of spare tubes. Whole works contained in 1403-J grey Hammerlin Hammond cabinet. Have worked 56 countries on fone - have QSL's on hand. Write for photo and information. Very low price. Must change QTH soon. A. Desmeules VE2AFC/2. 1440 Crescent St., Apartment 4 Montreal, Que.,

COMPLETE STATION - Fast sale! BC-312, converted, hi-gain IF, carrier level, noise limiter, power supply. ARC-5 converted VFO, power supply. Transmitter, 100 watts CW, 50 watts phone and power supplies. Vibroplex Bug, Turner mike, Preamp National Dial, Bach Simpson Wavemeter, Meters, Tubes etc - $175.00 for all. VE3BDN, 617 Glebeholme, White - Toronto, phone HOward 1337.

FOR SALE - Hammond cabinet, 30 inches panel, chassis, Hammond transformers, chokes, bleeders, power supply, meters, and all inquiries answered. W.F. Connell ex-VE1ZE, 225 Vancouver St., London, Ont

OIL FILLED TRANSFORMER - $29.50. Pri. - 115 volts, 60 cycles, Sec. 2300 volts, 750 mils, CT. Compact size. J Milsom - RR#1, York Mills, Ont. - BAl-2842.

FOR SALE - National NC-57 Receiver in perfect condition, Millen Exciter with power supply, 20 watt Hammond Modulator, Astatic JT-40 mike. Best offer takes all or will sell separately. Gord Simpson, 11 Prust Ave., Toronto, Ont. GE. 6052.



This bathing suit saleslady was far less effective than her conservatively clad sister, selling the same product.

What is YOUR *Taste in TV Commercials?*

NBC Launches Project to Study Effectiveness of Program Advertising for Benefit of Sponsors

To the average American who watches television, the commercials are accepted as part of the program. Those which depict bright little cartoon characters performing household tasks with ease and abandon evoke chuckles of appreciation. The more prosaic types capture attention in direct ratio to their informative nature.

It is these very commercials which have provided the financial backing that has put American TV so far in the forefront of video throughout the world. These sales messages from the advertisers sponsoring TV programs have been proved to be among the most potent methods of selling products to the American public.

As such they occupy the time and attention of vast numbers of highly skilled people in the advertising field. A sizable industry is devoted to the production of commercials alone. There are literally hundreds of people of diverse talents engaged in making the finished products that appear on the home TV screen for anywhere from 10 seconds to a full minute. And each of these people is vitally concerned in making sure that the commercial which the public sees will sell the product.

These commercials, professionally done, and inserted into a popular TV show, should ensure the advertiser a large sales return. Yet it has become apparent in the past several years that such is not always the case. John K. Herbert, vice president in Charge of Networks for the National Broadcasting Company, recently stated:

"Our research into sales effectiveness shows wide difference in what television advertisers are getting for their money. We found, for example, that two advertisers were reaching the same number of people at about the same cost. Yet one advertiser was getting eight times as many extra customers as his competitor.

"We at NBC have been concentrating on building great shows. Obviously, that's the most important job we can do for advertisers. However, it appears that, in many cases, improving the commercial may actually produce tremendous sales returns."

Testing Service Inaugurated

With this in mind, NBC authorized a research project by the Schwerin Research Corporation to determine "How to Increase the Effectiveness of Television Commercials." The results of that survey have been made public, and on the strength of those findings, NBC has announced an unprecedented commercial testing service for all its advertisers.

Mr. Herbert in announcing the results of the study

When 10 scenes followed one another rapidly during a commercial, the effect on the viewer was only one third that of the simplified presentation at the right.

and the plans for the testing service, explained:

"NBC's publication of the report and its new service are both designed to help advertisers win even greater returns from their television campaigns. These unique contributions underline our belief that the network has a continuing responsibility to the users of the medium."

The new NBC Commercial Testing Service is available to all network advertisers on a non-profit, cost basis. NBC is making its studios available at specified times for the rehearsal and shooting of rough commercials. These films, unlike the product seen on the air, need not meet finished production standards. Simple sets, a minimum of props and performers, and limited camera work can serve the purpose. The primary objective is merely to determine the relative superiority of various techniques, so that the commercial which will eventually appear on the air will stand a greater chance of selling more goods.

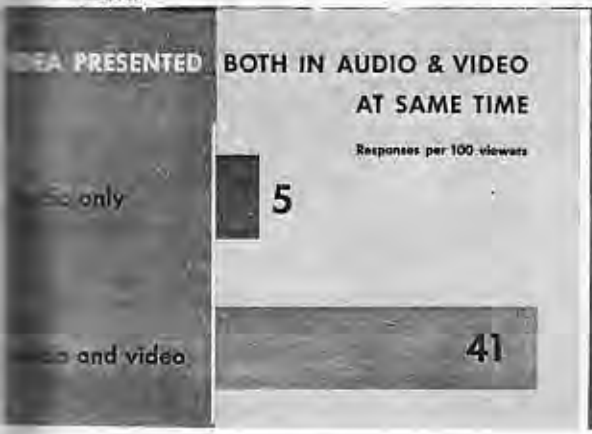
After these rough commercials are made, they are shown to test audiences by the Schwerin Corporation, to determine how well the sales points get across to the public. This audience reaction method is the same as that used in conducting the initial survey mentioned above.

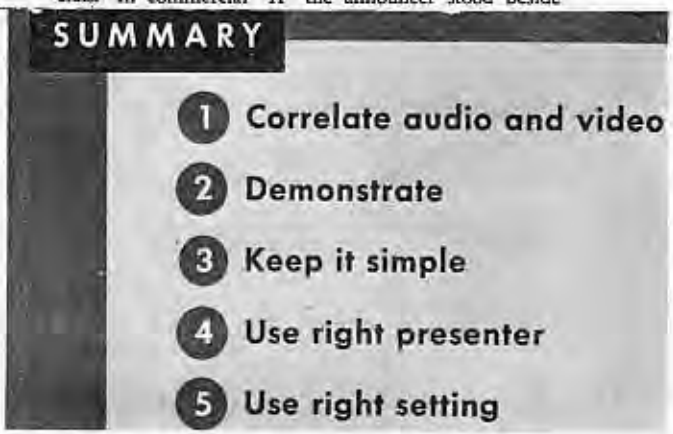
Effectiveness of Television Commercials," were based on audience reactions to approximately 2,000 different TV commercials for several hundred different nationally-advertised products. The purpose was to discover what sales points in each commercial were best remembered and why they were remembered. Immediately after seeing programs in which the commercials had been inserted, viewers were asked to write down the brand name of the product advertised and everything about it they remembered having seen or heard in the commercial. At a later point, they were asked whether they believed certain key claims made in the commercial.

The information thus gained was analyzed and refined into five basic principles—signposts to more effective TV commercials. Stated simply, they are:

1. Correlate the spoken claim with the visual action
2. Demonstrate the product
3. Keep the commercial simple
4. Use the proper "presenter" for the product
5. Keep the setting authentic

The importance of Point One was emphasized in comparing audience reaction to two similar commercials. In commercial "A" the announcer stood beside





What is YOUR *Taste in TV Commercials?*

the product, a household appliance, and spoke of a special feature. Only five out of every 100 viewers remembered that feature. In commercial "B" the same announcer, standing beside the same product, told the same story and pointed to the special feature as he spoke of it. Out of every 100 viewers, 41 of them recalled the feature in this commercial, proof of the impact of having picture and sound tell the same story simultaneously.

The efficacy of product demonstration was proven in reactions to commercials wherein a kitchen cleanser was actually shown in use; in another where a model washed her hair with a shampoo which produced more suds than that used by another model, and in still a third where a side of meat was shown being trimmed away to get down to the choicest portion, which went into a package. In all cases, these demonstrations evoked greater remembrance among viewers than commercials which did not demonstrate.

Simplicity as a virtue in commercials was illustrated in a comparison of two cigarette commercials. The first had all the elements of a major production. Within a period of 60 seconds, it introduced no less than 10 scenes. First an announcer praised the product, then the product was shown, next an athlete gave a testimonial, a second announcer appeared, the product was shown in use, another testimonial was given, etc. This expensive commercial drew only 13 responses from 100 viewers. Simplification to three basic elements—a picture of the product with an unseen announcer's voice, a testimonial by a housewife, and a final closeup of the product—won remembrance from 32 out of 100 viewers.

The use of a proper "presenter" was shown when a pretty girl made the same product speech, fully clothed, in one version and wearing a pin-up type of costume in another. The revelation of her physical charms proved such a distracting element in the latter that only 2 out of 100 viewers remembered the product. In more conservative attire, she won the attention of 13 out of 100 viewers for the product.

The examples cited here are but a few of the thousands which bore out these five basic tenets of constructing an effective television commercial, one that will sell goods. The entire survey, and the new NBC Commercial Testing Service which it fostered are further evidence of the painstaking effort devoted by the network toward giving its customers, the advertisers, fullest value for the money invested in NBC programs.

They Keep Communications Moving . . .

On ship and shore, in tropics and in the arctic, hundreds of trouble shooters, trained by RCA, keep the vital wire-and-radio systems of our armed forces in top working condition.

It's a small world today because of communications. Korea, 8,500 miles away, is our neighbor, Hawaii can be called on the phone, Greenland is easily available—all of these places and many more are "just around the corner" as long as there are enough engineers to keep our highly complex electronics systems operating.

To see that these circuits are not interrupted is the job of the Government Service Division of the RCA Service Company in carrying out its program of assistance to the U. S. Armed Forces and our Allies the world over. Engineers of the Division, under contract to the Army, Navy and Air Force, are working on more than 400 different types of military electronics equipment.

Although the Government Service Division is only a little over two years old, its nucleus goes back to the time before World War II, when the U. S. Government suddenly discovered that it lacked sufficient numbers of well-qualified technicians to cope with the mass of complex electronic equipments being rushed to our field forces.

When the shooting in Korea began, 50 people were assigned by RCA to Government work. This included office force and field engineers. Today, the Government Service Division employs hundreds of persons.

The objective of the Division, as outlined by Pinckney B. Reed, vice-president in charge, "is to provide the best possible electronics-assistance program to the Armed Forces, to make available trained field engineers backed up by the resources of RCA."

As a result of this long-range planning, RCA is prepared to assist in the five basic electronics needs of the Armed Forces: 1) supplying field engineers; 2) preparing technical publications designed and written by specialists; 3) developing training devices to give effective and rapid instruction in electronics fundamentals and military electronics circuitry; 4) working out training programs for military personnel, streamlined through the experience of fieldmen who work with military leaders and RCA experts; and 5) setting up special projects, which include repair and modification facilities, and unusual and specialized engineering operations.

Since three out of ten field engineers eventually turn up overseas, a man, before he is assigned to this Division, must agree to spend at least one year abroad. After signing up, he is put through a six-week indoctrination course at the home office in Gloucester, N. J.

P. B. Reed (right), vice president in charge of the RCA Government Service Division, and engineer Harold Dick stand beside a roadside sign in Tokyo.

Basically, the men are assigned to install, maintain and repair electronic equipment of all types and to instruct military people in its operation, installation and service. Actually, their contributions are limited only by the vision and initiative of the individual. In combat areas, these engineers share the life of soldiers and sailors. In the world's capitals, they learn the language and become a part of the lives of nationals. The ability to get along with strangers, to become integrated quickly into the life around them is of utmost importance to the personal success of field engineers.

Technicians' Deeds Cited by Military

Home office files are loaded with letters from commanding officers of commendation for "special service" by our field engineers. In these reports are the names of men who have helped to accomplish actual combat missions, a number whose standard equipment includes a carbine.

Captain John Taylor, USN, commander of Destroyer Squadron Six, commended the performance of David Rennie, in these words:

"I have noticed that the usefulness of civilian technicians on independent duty of this sort depends greatly on the initiative of the individual concerned . . . Mr. Rennie has displayed such initiative."

A new method of handling low-frequency transmission in the North Atlantic, suggested originally by John Heffernan, an RCA field engineer, was under intensive examination in 1952. If the initial success continues, Heffernan will have made a really significant contribution to the reliability of military communications in this critical area. The problem is of utmost importance, because of the position this installation holds in the global communications network. Heffernan's idea involved the use of pulse detection, coupled with a particular form of loop antenna. The combination shows promise of overcoming such obstacles as magnetic storms and the type of static caused by ice and snow on antennas.

Field engineer Earl Cowden drew an assignment that took him to the Behring Sea.

An RCA expert in maintaining radio teletype machines and circuits imparts his knowledge to U. S. airmen at an unnamed base.

The first wave of Government Service Division engineers arrived in Korea, in September, 1950. Morris Patneaude, one of the first volunteers for front-line duty, landed at a soggy airstrip almost at the same time as the enemy, then thrusting downward from the north. Technical service was a life-or-death matter. With carbine at hand, he followed the fighting front up and down the peninsula, helping to keep communications open through the terrible Korean winter. For his devotion to duty, RCA gave him the Award of Merit, the Company's highest honor which is presented annually to only 15 out of more than 20,000 employees.

When Patneaude was brought home, he was replaced by Chuck Lane who maintained tradition. When rotation turned up his number, Lane refused to come home because "the job is still going on over here."

George Ross, who came back to the States last fall for a visit, after two years in the Far East, is now back at his Yokohama post. He is group leader, inspector and technical advisor in the radar shop, U. S. Signal Corps Depot. One of his special contributions, commended by Brig. General Hammond, was his research on the SCR-548 radar set, during which he tested the effects of high humidity on the accuracy of information fed to warplane gun directors.

Bill Bjorman, also in the Far East, found his second year "more interesting than the first." According to a letter of commendation, "he went into combat areas ... In one instance, his work was responsible for establishing a very critically-required communications link in time to fulfill a classified mission."

John Longenecker covered 50,000 miles of the Pacific on his solo job, flying from one island to another as RCA's representative with the 1808th AACS Wing. He spent a year changing continuous wave (air-to-ground) communications to voice. He did the field work, drew up plans, scrounged hard-to-get equipment, and assisted on-the-spot installation.

Reliability is Essential

Because the field engineer is on his own with an important mission to carry out, reliability is essential. The Company carefully screens each applicant for character as well as technical knowledge and skill. Because they must work at all times with a minimum of supervision, one of the big problems is to keep them from feeling cut off from the Company as a whole.

Refresher courses are held periodically for field men. Once a year, managers and supervisors are recalled to the home office for a conference. They meet with vice-president Reed and his staff, consisting of Col. Mike Fried, assistant; Tom Whitney, operations manager; Paul Melroy, contact negotiations manager; Andy Conrad, chief engineer; Lloyd Yoh, contract administrator; Dick Propst, Air Force contract manager; Louis J. Depass, Army and Navy contract manager, and Jim Jackson, technical publications head.

The biggest user of RCA's services is the Air Force. Under contract with the Air Defense Command alone there are more than 150 engineers assigned to bases and radar sites throughout continental U. S. A. Many more are with the Airways and Air Communications Service. The majority are overseas in Alaska, Canal Zone, Korea, Europe, etc., where they are supervising the installation and servicing of radio and teletype communications gear, and navigational aids.

In Europe and North Africa and in this country, the Tactical Air Command is employing RCA field men on navigational aids, air and ground radar equipment. Many are employed by the Strategic Air Command in this country, Puerto Rico and Okinawa.

The Bureau of Ships has more than 100 men at work with the Atlantic and Pacific Fleets, and at bases overseas in the Atlantic area (Mediterranean, Cuba), Japanese areas and Pearl Harbor. These engineers are installing, maintaining and training naval people in shipborne radar, shipborne and ground station communications, loran and sonar.

In this country, men under contract to the Navy are doing project engineering, producing shipyard guidance plans for installation of electronic equipment on board fighting ships.

Technicians of the RCA Government Service Division explain the circuitry and maintenance procedures of radio equipment to Netherlands' soldiers (left) and to members of the Air Defense Network (right).

ESSCO

TOMORROW'S CONVERTER TODAY!

RME
PEORIA 6, ILLINOIS

NOW! a 5 Band MOBILE CONVERTER

The RME MC-55

For 10-11, 15, 20, 40 and 75 Meters

- HIGH SENSITIVITY. 1.25 micro-volts on all bands.
- THREE GANG TUNING. Individual slug-tuned coils for each band.
- BUILT-IN NOISE CLIPPER. Highly efficient automatic noise-limiter all ready to connect into car radio. Handy IN-OUT switch.
- SEPARATE INPUT CONNECTIONS. An input connector for the regular car antenna, switched from front control knob, does away with loss of "punch" on the broadcast band.
- SMOOTH, SOLID TUNING. 25-to-1 worm gear drive assembly provides smooth, effortless tuning, rock like stability, NO backlash.
- FOUR TUNED CIRCUITS in rf. output stage. Output frequency 1550 kc.
- TRANSMIT-RECEIVE SWITCH. Transmit position removes converter "b" plus, makes 6v available at rear terminal strip for operating relays.
- LOW POWER REQUIREMENTS. All miniature low-drain tube line-up. Requires only 25 ma. at 150-180 volts. Uses 6AK5 rf. amp. 12AT7 osc. and det. 6BJ6 if. amp. 6AL5 noise limiter.
- SMALL, COMPACT AND RUGGED. Easy to mount in any handy location. Attractive cabinet blends nicely in any car. Complete with tubes, connecting cables and instruction sheet.
- LARGE, ATTRACTIVE EDGE-LIGHTED DIAL calibrated for 26.4-30 mc, 21-21.45 mc, 14-14.3 mc, 7-7.3 mc, and 3.5-4 mc.

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CANADA'S FIRST AND FINEST TELEVISION CATALOGUE

Forty-four illustrated pages of T.V. test equipment, accessories, antennae and hardware.

YOU MUST HAVE A COPY

WRITE OR PHONE FOR YOUR COPY TO-DAY.

MC-53

For 2, 6 and 10-11 Meters

FOR 2, 6 AND 10-11 METERS

The many special features of this converter result in outstanding performance and highest stability on these frequencies. Uses 6AK5 rf amp., 12AT7 oscillator and detector, 6BJ6 if amp., 6AL5 noise limiter and OB2 voltage regulator.

Amateur Net **$89.00**

RADELCO

Built For Hardest Mobile Use

SWIVEL BASE. Has adjustable split-ball with positive locking feature to maintain angular adjustment at all times.
Model MB-1 — 3.30

SWIVEL BASE AND SPRING. Spring is of oil-tempered heavy spring steel to withstand toughest shocks, vibration and extreme temperatures.
Model MB-2 — $ 4.85

STURDY STEEL MASTS. Made of chrome silicon steel for exceptional high tensile strength . . . can be bent 90° and still return to original vertical position.

Model			Length
MM-60	NET.	$ 3.95	60"
MM-72		3.95	72"
MM-84		4.10	84"
MM-96		4.65	96"

ELECTRO SONIC SUPPLY CO. LTD.

543 YONGE ST. TORONTO 5. MI-2481

"SERVICE ENGINEERED" TEST EQUIPMENT FOR SERVICEMEN

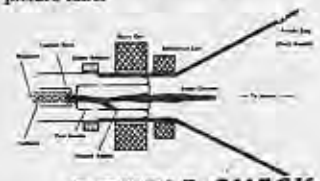
DYNAMIC CATHODE RAY TUBE ANALYZER

MODEL **707**

The Model 707 Cathode Ray Tube Analyzer is the ONLY CRT Analyzer that completely and accurately tests ALL Television Picture Tubes including both magnetic and electrostatic deflected types. It also will analyze oscilloscope, radar, or other special purpose cathode ray tube—without removal from chassis or carton.

This "Dynamic Tube Analyzer" incorporates the most advanced features of design and accuracy. The test method is the newest, most up-to-date means of truly testing and analyzing the condition of a cathode ray tube.

As an added feature Jackson gives you the exclusive LIFE-O-GRAPH. The LIFE-O-GRAPH is a device that is used to determine the remaining normal-use life of any TV picture tube.



DOUBLE CHECK THESE OUTSTANDING FEATURES

BEAM CURRENT:
Beam current test is made to the FINAL anode—not to the grid or any other element, as in common emission testers. Screen intensity varies with beam current, not total cathode emission; therefore, a sensitive VTVM is incorporated to measure beam current. The beam current scale of the meter is designed not only to indicate sufficient or insufficient beam current, but also to give you an accurate forecast of the end of tube life.

GRID TEST:
The beam current may be up to par, but if the grid does not have the ability to cut-off and control it, the tube is useless. The grid test is provided to observe grid control over the beam current. This is a "must" feature of any true CR tube analyzer.

GAS TEST:
Certain amounts of gas in a CRT will render the tubes inoperative. By checking the "gas current" to the FINAL anode, the presence of harmful gases is detected. Presence of gas indicates that the tube should be replaced as the life of the screen and/or cathode will be very limited.

SHORTS TEST:
All elements are isolated for individual inter-element leakage tests. A circuit of high sensitivity is used to give indications of leakage on a neon lamp.

ROLL CHART:
A roll chart is provided for rapid indication of proper selections.

CIRCUIT SELECTOR SWITCHES:
Circuit selector switches are placed on an escutcheon to make them easily accessible for every tube setup and to limit test setting confusion.

FLEXIBILITY:
With the available versatile circuits, every element—regardless of base arrangement—may be checked, not just a limited few. This complete ®Dynamic test flexibility insures against obsolescence as new cathode ray tubes are announced.

TEST VOLTAGES:
Both high and low voltage power supplies are incorporated in this instrument to obtain the voltage necessary for the various test requirements of a cathode ray tube.

VTVM:
To provide true indications of all currents this analyzer is designed around a highly sensitive, balanced bridge type, VTVM. A continuously variable line voltage adjustment is provided to insure you of accurate readings.

METER:
An easy-to-read, full vision meter, designed especially for the CRT Analyzer, includes a line voltage adjust point, a "beam current" range, a "gas current" range, and a reference scale.

CABLE:
One dual-socket cable, incorporating a duo-decal and a di-heptal socket, and a universal adaptor are provided for checking all types of cathode ray tubes.

CASE:
The durable wooden airplane luggage covered carrying case is provided with ample space for storing the cable and adaptors.

PANEL:
The panel is finished in grey Ham-R-Tex with meter case finished in ivory.

AT YOUR LOCAL JOBBERS

JACKSON

Ask your Jackson Distributor or write for free bulletin.

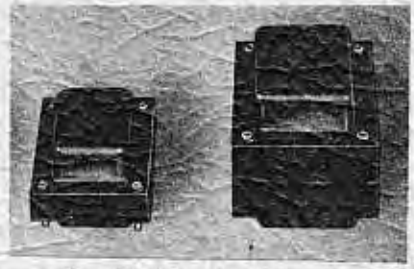
Represented in Canada by
CANADIAN MARCONI COMPANY
ESTABLISHED 1903
830 BAYVIEW, TORONTO, ONTARIO
VANCOUVER WINNIPEG MONTREAL HALIFAX ST. JOHN'S NFLD.

Truly another "Service Engineered" electronic instrument.

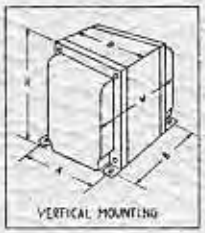
FIND NEW HORIZONS in THE

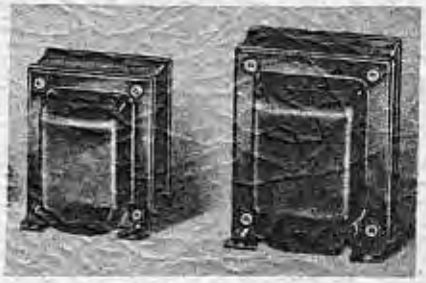
COMPLETELY DEPENDABLE

HALLMARK OF TRANSFORMER QUALITY



POWER TRANSFORMERS





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A COMPLETE LINE OF REPLACEMENT TRANSFORMERS

Write for

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CANADIAN MARCONI COMPANY

836 BAYVIEW AVENUE, TORONTO, ONTARIO

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