that we were kept in touch with the movements of the 'plane, was not indispensible. Throughout the critical part of the trip the radio was out of action, while on the return the equipment saved many otherwise anxious moments. The failure of the Southern Cross in her hop across the North-west of Australia, shows the very practical utility of the weighty equipment in difficult circumstances.

THE Marchese de Pinedo's wireless set weighed about one-twentieth of his fuel; that is to say, he only sacrificed 100 miles of his cruising range by taking it. Yet he was forced down on to a heavy sea three or four times this distance from the Azores, and was towed into port as a direct result of his wireless appeal for help.

To come nearer home, Carr and Gillman, the heroes of the Far East attempt, who so narrowly escaped death in the Persian Gulf, after drifting in shark-infested waters for hours, might have maintained unbroken communication with the world at large, if they had sacrificed two or three of the fifty hours which it was possible for them theoretically to remain in the air.

These examples seem to indicate that the long-distance aviator is best advised to select a big machine capable of enormous "lift" to which the addition of 100lb. or so of wireless gear will not be an insuperable handicap, if he risks all on the elimination of the last ounce of weight, his chance of escape in case of mishap over the ocean must remain very slight. The toll of the Atlantic suggests that the risk is not worth while.

Almost Unknown in U.S.A.

ONE can easily understand why some Americans have not carried wireless. In their country it is almost unknown to aviation. The reason is not far to seek. Over there it is the exception for a flight to be over water, and apparatus to dispatch SOS signals is unnecessary. When a machine develops trouble it lands as best it can, and establishes any connection desired by ordinary telephony..

In this country every regular service route crosses the Channel or North Sea, making it imperative to be able to call for help in an emergency. The result is that our pilots are used to wireless, while Americans, speaking broadly, are not.

Transmitting and receiving sets are standard on all Imperial Airways machines, and telephony is carried on practically all the time, either with Croydon or the other terminus. As a rule the pilot inquires the best height at which to cross the Channel, this depending on the air currents at the moment.

There is a world of difference between theory and practice. To make a flight as safe as possible one should certainly take wireless; but the Atlantic flight is a gamble in any case, and it is easy to understand that after weeks of irritating delays, a man might prefer to take a sporting chance, "back his bus," and—take petrol!

Securing Optimum Volume

Reasons why Signals vary in Intensity

MOST listeners know that at every broadcasting station there is a control room, with an engineer on duty all the time broadcasting is in progress. His duty is to control the volume, toning down the too loud passages or giving extra amplification when the sounds which reach the microphone appear to be too weak.

So skilfully is the work of the control engineer done that seldom is it realised how carefully he must be on the watch against underloading and overloading. If you doubt this you can easily make a test for yourself. The next time a strange speaker is announced to give a talk listen to his opening words and probably you will hear the control engineer at work.

After the pleasant voice of the announcer introducing him ceases it is probable that the opening words of the new speaker are spoken either too softly or too loudly. But before half a dozen words have been uttered he has been toned up or toned down to about the same strength as the announcer's voice, and at that strength the control engineer will hold him to the end of his talk, neither too soft nor too loud.

It is not often realised that many other varying forces are at work beside the control engineer, and that all day and all night the broadcasting which comes to your set is being carried across channels that are constantly tending to vary the volume of the reproduction.

Night and Day Differences.

THE words "all day and all night" were used advisedly, for here we have a very important volume control which affects all broadcasting. If one lives quite close to a station he may not realise the difference between day and night transmission heard on the same apparatus, but every country listener knows that when the sun is up the volume goes down, daylight reducing the range of every transmitting station to about half its night strength.

It is only during the hours of darkness that the distant stations start to climb in on a small receiver, and many a long-distance enthusiast sits up till two or three in the morning because he has found that the later the hour the better is his range of reception. This day-and-night effect operates in the general as well as in the particular sense, so during the dark and cloudy winter days reception is far superior to that obtainable in the bright summer weather.

Although the effect of better range during darkness is now so well known, it escaped notice for years after wireless was introduced, and was first appreciated by Marconi in a long-distance test voyage on his yacht the Elettra. This voyage was undertaken after his successful attempt to span the Atlantic by wireless from Poldhu to Newfoundland, and it is a remarkable fact that this astounding trans-Atlantic feat was carried out during daylight, because those responsible were not aware of the far greater likelihood of success after the sun had set! (The real cause of day and night variations is the Heaviside Layer, which has received attention in a previous issue.)

The Effect of Rain.

MANY listeners have noticed that their strength of reception seems to fall off during wet weather, but this is not a true volume variation in the same class as light and darkness. Generally when signals fall off in wet weather it will be found that the insulators are either inadequate in size or number, and that the rain is forming a conductive path across them to earth. The effect would be to leak a certain proportion of the signals away, so it is hardly fair to class this among nature's volume variations, as the provision of insulators which remain dry will completely remove these symptoms.

Out of Tune.

ALL the foregoing affect the signal before it reaches the set. But in the set itself we have many volume controls in addition to the particular components which are so labelled. Most of these apply particularly to the valve sets, but even the crystal types have the effect of detuning.

Everyone has noticed that throwing the set out of tune results in a marked drop in signal strength. The reason for this is that although broadcasting will always reach the aerial (provided that it is within range), the effect of it will only be at a maximum when the tuned circuits are adjusted to exactly the same frequency as the distant station's.

At short distances there is a breakthrough effect which may lead the listener there to suppose that tuning is not very important, but all listeners who live a long way from the nearest station will have noticed how greatly the results improve when the tuning is set exactly right

In every valve set there are many other factors besides tuning which affect the strength of reproduction.

The basis of the operation of every valve set is the provision of suitable "A" and "B" batteries or other source. Everything that goes on in the receiver depends upon these, and obviously the ideal plan for even output would be an absolutely steady source of supply.

The Voltage Drop.

IN practice both battery voltages vary, and to a surprising degree in both cases. Everybody knows that a 4-volt valve must not be supplied direct from a 6-volt accumulator or the extra voltage will ruin it. But not every listener realises that his "6-volt" accumulator does not remain steadily at 6 volts, being more than this figure when newly charged and considerably less before it is recharged.

A good voltmeter will show that the voltage when a newly-charged cell is first in use is 2.2, and this falls slowly all the time that the accumulator is supplying current until it drops to 1.8, when results fall off quickly, and it becomes incapable of supplying the current demanded of it. One is accustomed to think of accumulator