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Watch Your Lightning Arrester

It Will Not Help and It May Hinder Your Set

By HORACE V. S. TAYLOR

THE firemen subdued the flames, but the man who was struck by lightning never regained consciousness." That is the report on a big fire, following a lightning stroke, where no arrester had been used.

Will that ever happen to your house? Not if you use the equipment which is required to prevent it by the Board of

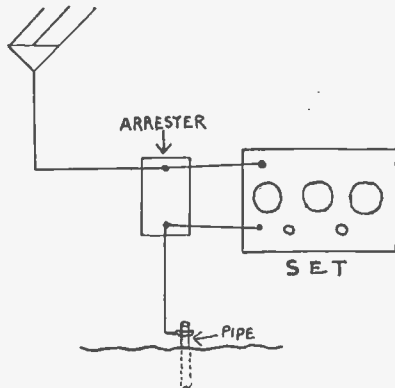


Fig. 1. This is the Method of Connecting an Arrester Recommended by the Fire Underwriters.

Fire Underwriters. Indeed that is the only thing a lightning arrester is used for, since it does not help at all in the operation of your set. As a matter of fact it may even make the music worse as we shall explain a little later on.

Don't Need to Cut It Up

The connection for a lightning arrester is very simple. You will find only two terminals or binding posts—one marked G for ground and the other A for aerial. When hooking up the unit it is not necessary to cut your wires to the set, but instead they may be a continuous

length. In that case just insert a loop underneath the binding post as shown in Fig. 1. Of course if you prefer it does no harm to end the aerial or ground at the arrester and then run short, separate leads to the receiver. The only disadvantage is that you will have to bother with two wires under each binding post.

With this connection made how does the unit act? Nearly 100 per cent of the time it does not act at all. The radio waves come down in the aerial through the lead-in and across to the set, as shown in Fig. 2. The arrester here does not make a bit of difference and might just as well be thrown out on the dump for all the good it does your set. No current flows through it, and it is as good as an insulator holding the aerial and ground leads apart.

When Dynamite Lets Go

Now let us suppose that a thunder storm arrives on the scene. Then we have a different story. A flash of lightning is seen. Maybe it does not strike

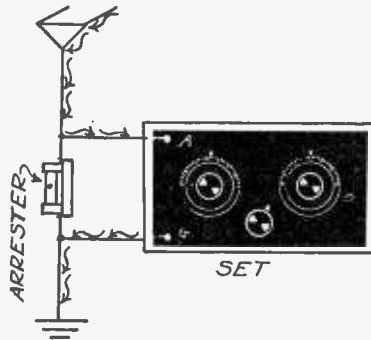


Fig. 2. The Radio Waves Completely Ignore the Arrester.

your aerial, but if it occurs within a few hundred feet then a powerful shock will be felt in your system. It is something like an explosion. You do not need to carry a stick of dynamite right in your pocket to feel the explosion when it lets go. You will know all about it, although it may be fired one or two hundred feet away.

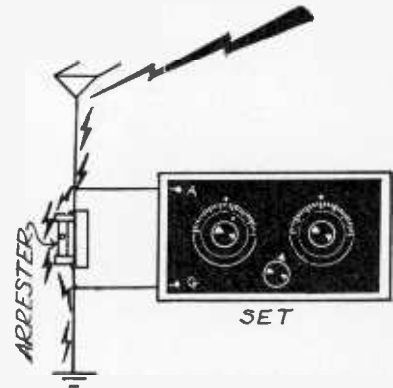


Fig. 3. When a Stroke of Lightning Rushes Down the Aerial, Set is Protected.

This shock to your aerial from the lightning stroke is manifested by a tremendous surge of current down the aerial. How will it reach the ground? We must think of it something like a body of water when a dam breaks. The little stream along the bottom of the valley, which normally carries the overflow from the dam, cannot begin to handle the vast rush of angry water. As a result houses and trees which stand in the path are overwhelmed and swept away. In the same way if you depend on the coils and connections in-

side your radio set to carry off the stream of electricity then you must expect to find melted copper and a ruined set inside the cabinet.

Safety Valve That Doesn't Work

If you have taken the precaution to install an arrester as Fig. 3 illustrates, then the tremendous current will pass through it direct to ground and your set and the house itself will be saved from injury. From this you can see that the arrester is intended only as a safety valve, and may never be called on to do anything as long as it is connected to your aerial. However, if you are so fortunate as never to experience such a stroke of lightning, don't blame the arrester because it never works.

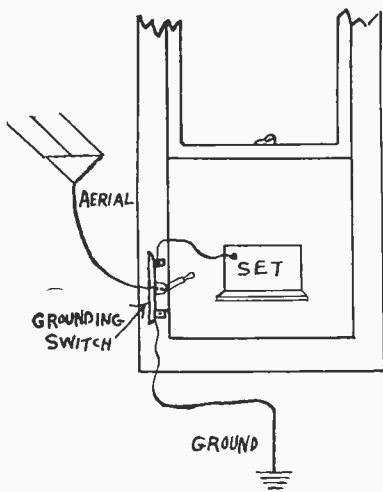


Fig. 4. Hooking Up a Ground Switch. This Disconnects the Set.

In this connection it may be well to mention that you are wasting your money foolishly if you are paying a fire insurance premium. That is, it is foolish unless you have one of these units, which the underwriters require. When you take out a policy it is in the form of a contract in which the insurance company agrees to pay you so much if your house burns down and in return for their promise you agree to pay a yearly premium and also to follow the rules of the company in regard to the electrical equipment you use.

They Won't Pay for Fire

If you break your contract by neglecting to install an approved arrester, then the insurance people are not bound by law to carry out their part of the contract if the building catches fire. But

suppose in the event of a conflagration you are able to prove that it caught in the daytime under a clear sky (no lightning), from a cigarette which was left smouldering? The insurance company will say "Very interesting, but what has that to do with us?" In other words, the big companies feel that you have no right to endanger the property and lives of your neighbors by using an unprotected aerial, and so they are not morally bound to pay your losses. As already explained, they are not legally bound either.

Of course, this discussion applies only to outdoor aerials. If you use an inside antenna or a loop lightning cannot reach it anyway unless it has already struck and entered the house and by that time it would be too late. The installation which has no outside wires does not need any protection at all.

Do Not Substitute Switch

As an added precaution, many people install a ground switch, Fig. 4. The advantage is that if anything should go wrong with the arrester or if an unusually severe direct stroke of lightning should occur on your aerial, the switch will carry off the current without endangering the apparatus. It is not a bad idea to use such a grounding switch, but it must be in addition to the arrester. The latter is connected from aerial to ground in the usual manner.

The reason that the switch is not enough to satisfy the insurance men is

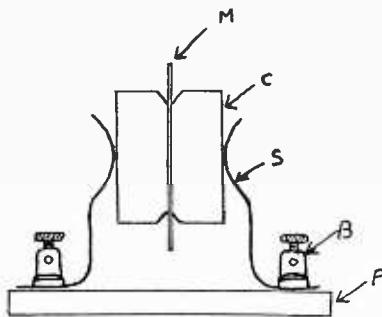


Fig. 5. Here is a Diagram of the Most Popular Type of Arrester.

this. Suppose you get accustomed to throwing the blade down each night and thus grounding the aerial. This happens night after night for months with perfect safety. But one evening you were going to a dance or had the toothache, or perhaps the baby got the colic, and as a result you forgot to throw the switch. That night there happened

to be a thunderstorm, and lightning struck the aerial. The insurance company not being a charitable institution, would naturally object to standing the loss because you had neglected to install an arrester. That is why they advise using a grounding switch in addition. But they demand that you install an arrester in any case.

Millions of Volts Pressure

How does this unit do its work when called on to discharge a flash of lightning? The operation is easy to follow. There are always two conducting plates which are connected to the aerial and ground respectively. Between these plates is an insulator which will break down at 500 volts or less. Since the potential of the thunderstorm is up in the millions or hundreds of millions of volts, the charge of electricity will jump across the gap and be discharged safely into the earth.

There are two general classes of arrester. The first, which is the more com-

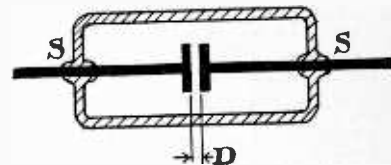


Fig. 6. This Vacuum Type is More Efficient, but Costs More, Too.

mon, is illustrated in Fig. 5. The two conducting plates, C, are made of carbon and are held in place by the springs, S. In order to separate them exactly the right distance a thin sheet of mica, M, is interposed between. This mica sheet is cut away from the center so as to allow an air gap from carbon to carbon. Of course, the length of the path between the two blocks is exactly equal to the thickness of the mica sheet. Carbon is used for electrodes since when it burns it becomes a gas (carbon dioxide) and so does not short circuit across. If metal were used here it would melt and the drop which formed would be likely to touch across and so short circuit the gap.

Glass Tube with Nothing in It

The other type of arrester is displayed in Fig. 6. Here the two electrodes are supported by the stems, SS, which are sealed into a glass tube. The space inside the tube is exhausted to form a moderate vacuum. Such a vacuum is quite conducting, and so the distance,

D, between the electrodes is much greater in this form of arrester than in that of Fig. 5, where air is the separator. Of course, this wide spacing makes the electrodes much easier to assemble without accidentally touching.

Both these types of arresters are quite popular. The construction of Fig. 5,

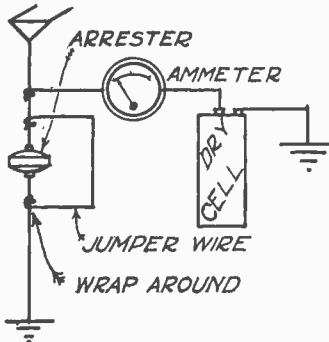


Fig. 7. If This Test Shows That the Arrester is Shorted, Scrap It.

since it does not use a glass vacuum tube, is considerably cheaper and so it has a wider appeal. Fig. 6, on the other hand, is less likely to get out of order and is probably a higher class device. The operation of both is just the same.

Nothing to Do with Radio

As already mentioned, this unit is not supposed to have anything to do with radio. If it has any effect at all on your set or its operation, it will be a disadvantage, rather than a help. It should have no conductivity at all for radio waves. If it does carry any current, you can easily see from Fig. 1 that it is robbing the set itself of whatever energy happens to pass through it. There are a good many arresters, however, which right now are stealing energy from their sets.

Maybe your own unit is weakening the signals which you are so anxious to catch. It pays to test this out every once in a while. A good method is shown in Fig. 7. Disconnect the aerial and ground leads and connect an ammeter and one or more dry cells in series as shown. The ammeter may be the style used for testing dry cells, which will cost around 75 cents or one dollar. The diagram shows one side of the battery connected to a separate ground, but it is not necessary that such an additional ground be used—the one to the arrester will do just as well.

Testing Out the Tester

It is well to put a jumper wire around the arrester as shown, in order to make sure that your meter and coils are properly connected. With the jumper in place the meter ought to show a reading. If it does not, then inspect the circuit for trouble, and adjust until a pronounced indication is seen. Then remove the jumper wire and again read the meter. It should be showing zero. If it indicates any current at all, it means that there is a leak in your aerial direct to ground.

Such a leak is most likely in the arrester, but not necessarily so. The next step is to take the leads off this unit's binding posts. If the meter continues to show current, then there is trouble somewhere in the aerial itself and not in the arrester. But if the reading is now zero, then it proves that the trouble lies in a defective arrester. In that case it is hardly worth trying to fix it, as a good approved unit can be bought for from 50 cents to \$1.50.

Testing with the Phones

Another method of testing the arrester appears in Fig. 8. This uses a pair

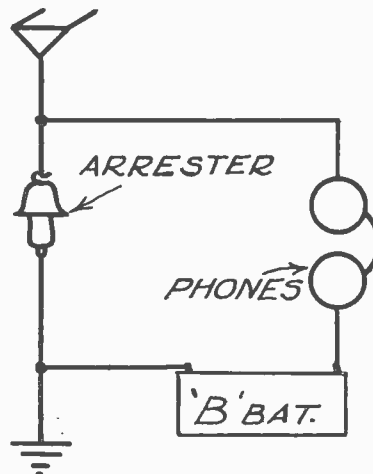


Fig. 8. This is a Simpler Test as to Condition of the Arrester.

of phones as an indicator instead of an ammeter. Your 22 or 45-volt "B" battery will serve well as a source of current. Connect your apparatus as shown and then listen with the phones while you make and break a contact on the battery. A pronounced tapping heard in your ears will show that the lightning arrester is short circuited.

This test is considerably more sensi-

tive than that shown in Fig. 7. Indeed it is almost too good in this respect as you are likely to hear a small amount of noise in the phones, owing to leakage, even when the arrester is in good shape. It requires a little practice to be able to pick out the noise from such a defective device and not be confused by the great sensitiveness of the phones. If you are in doubt you repeat the test with the arrester disconnected. If the same small click is heard as before, you will know that it does not come from a short circuited unit.

Look Out for Petticoat

In conclusion, a few words might be said as to where this device should be installed. The regulations allow this to be put either outdoors or inside the house, provided it is close to the place where the lead-in enters the building. However, an arrester intended for indoor use is not well protected from the weather and should not be used outside. Models which will stand the rain are usually shaped with a petticoat as illustrated in Fig. 8. This allows the water to drip off around the edges and keeps a large part of the surface dry. If it were to get wet all over, then the water would form a conducting layer, which would partially short circuit the device to the detriment of your radio program. Of course, such short-circuiting would not reduce the efficiency of the arrester in performing its real job—conducting a lightning flash safely to ground.

A HUSKY THREE-YEAR-OLD

WEAF, the broadcasting station of the American Telephone and Telegraph Company, which has grown from a group of five people to an organization of eighty-five, celebrated the beginning of its fourth year of operation on Saturday, August 15. The evening was of particular interest, since many of the singers and musicians who were heard on the first few weeks of the programs three years ago attended this reunion party.

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