RADIO NOISES AND THEIR CURE

PRICE TWENTY-FIVE CENTS

Filterette
(REGISTERED)

MANUAL

The Radio Interference Problem
And Its Solution

SECOND EDITION

TOBE DEUTSCHMANN CORPORATION
FILTERETTE DIVISION
CANTON, - - - - - - - - MASS.

Printed in U. S. A.

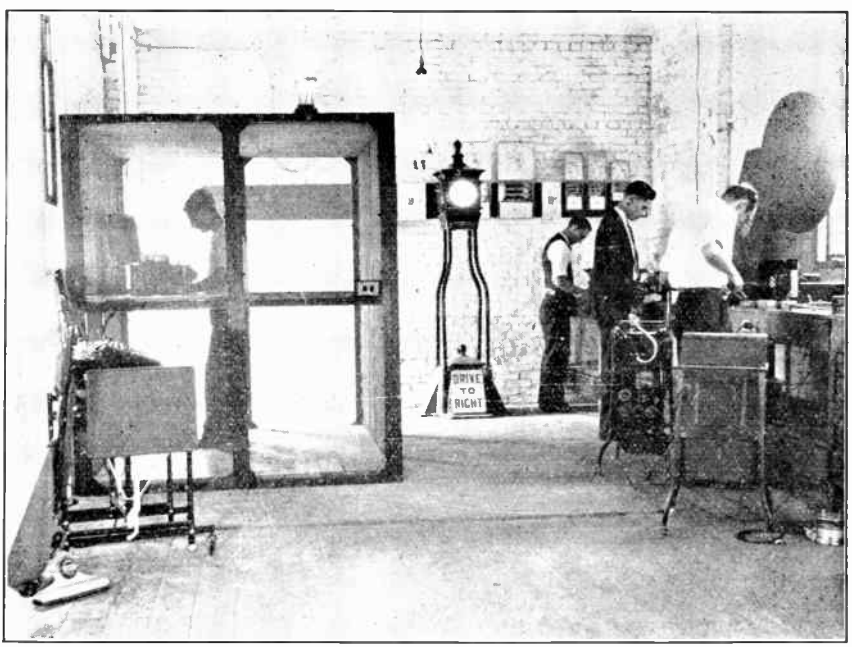
ENGINEERING SURVEY DIVISION

Cities and towns desirous of minimizing radio interference in their precincts can now engage Tobe Engineers by the day at a nominal charge. The service includes location and description of the cause of interference, and, at the option of the owner, installation of preventive devices, or filterettes, to quell the disturbance permanently.

The Tobe Deutschmann Corporation will be glad to enter into correspondence with municipalities regarding all phases of radio interference. Inquiries will be treated as personal correspondence, and the utmost done to furnish accurate, helpful information, irrespective of whether the correspondent proposes to engage engineers or not.

MANUFACTURERS' LABORATORY SERVICE

TOBE will gladly design and build into your product a sample filterette. Break down your sales resistance with this label.



PARTIAL VIEW OF INTERIOR OF TOBE INTERFERENCE LABORATORY

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Introduction to Second Edition

We wish to express here our gratitude to the public for the reception which it has given this manual. The first edition of ten thousand copies was exhausted in a few weeks, and has necessitated a second edition of fifty thousand copies, of which a substantial proportion is already allotted to back orders.

In view of such manifest interest in the subject of radio interference, we take pride in having sponsored this movement as far back as 1925. At that time, when radio interference had hardly been seriously considered, this corporation, then the Tobe Deutschmann Company, was preparing to meet the need for interference prevention devices which, it foresaw, would be inevitable with the growing refinements of radio.

That year Tobe developed Interference Filters Number 1 and Number 2, the first of a line which numbers now more than seventy different models. In no time the demand by manufacturers and the public for Filterettes compelled the establishment of a special interference laboratory, the only one of its kind in existence, manned by a staff of engineers trained specifically in this subject, the elimination of radio interference.

Valuable indeed has been the splendid cooperation of many and various manufacturers, who by submitting their apparatus to the Tobe Interference Laboratories have made it possible for thousands to secure improved radio reception. Among the most prominent companies listed on the broadcast listener's roll of honor are:

American International X-Ray Co.
American Gas Accumulator Co.
Griswold Safety Signal Co.
New York Power and Light Corp.
Ritter Dental Manufacturing Co.
Tokheim Oil Tank & Pump Co.
American Signs Corporation
Automatic Signal Corporation
National Cash Register Co.
Penn Power and Light Co.
Emerson Electric Mfg. Co.
Essco Manufacturing Co.
International X-Ray Co.
Crouse-Hinds Co.
Delco Light Company
Thomas Edison, Inc.
Electrol Inc.
Engeln Electric Co.
Fairbanks Morse Co.
Gilbert & Barker Co.
May Oil Burner Corp.
May-O-Zone Corp.
B. F. Sturtevant Co.
Super Heator Oil Co.
Victor X-Ray Co.
Williams Oil-O-Matic

As a result the above companies offer apparatus which does not interfere with radio reception, thanks to the Tobe Filterettes which have been designed expressly for them.

Finer motor cars brought about today's highways. Finer radio sets are creating a similar demand for cleared traffic in the broadcast band. The "ether sanitation" of radio, to quote Mr. Orestes H. Caldwell, of the Federal Radio Commission, is the most important task to which all who have the interests of this great industry at heart must dedicate themselves. This corporation stands always ready to serve you. Write us your problems, consult our engineers on questions of filterizing, we ask only to be permitted to serve you and that vaster public which awaits the day when radio interference, as such, shall have been reduced to the irreducible minimum.

TOBE DEUTSCHMANN, President.

The Tobe **"Filterette"** magazine, containing latest developments in the suppression of Man-made-static, is published monthly in "Radio," a leading magazine.

Tobe Deutschmann Corporation will pay one dollar toward your subscription, (regular price $2.00) to keep you informed and enlist your support of this movement.

Receive every month newest discoveries in radio interference, service men's data sheets, filing portfolio, and other advantages of this leading magazine. Send your dollar to Tobe Filterette, Canton, Mass. This is a high-class trade publication, not sold on newsstands. You can not buy it except through subscription.

Don't delay, **Send your dollar now.**

.....1930

TOBE DEUTSCHMANN CORPORATION, Canton, Mass.

Gentlemen:

Here is my dollar. Match it with your dollar—send them both to "RADIO" so that I can get the magazine each month for a year.

Name .....

Address .....

RADIO NOISES AND THEIR CURE

What causes noises in radio sets?
How can I tell what causes the noises I am getting?
Is there any way to stop them?
How much would it cost to get rid of the noises?

Questions like these are on everyone's lips today. You will find the answers in the pages of this book.

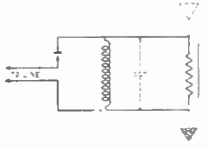
Q. Every time I turn on my radio set I hear noises, crackling, snapping, roaring, whistling, or growling: What causes this?

A. One of three things is to blame:

1. Natural Static.
2. Man-made-static, or Interference.
3. A broken or defective part in the set.

Q. What is natural static?

A. Natural Static is a series of electrical discharges caused by disturbances in the atmosphere such as thunderstorms, northern lights, heat lightning, dust storms, etc.

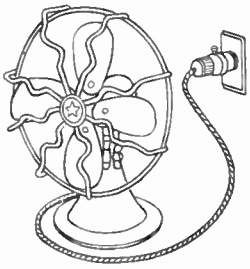


Q. What is Man-made-static or Interference?

A. "Man-made-static" or Interference is an electrical disturbance caused by the operation of certain types of electrical apparatus or appliances. Electrical apparatus having a make and break contact, (the brushes and commutator of a motor, for example) contains the essentials of a spark transmitter, such as is used to send out wireless messages. Even a loose or dirty connection is sufficient to cause trouble. The electric disturbances thus sent out may travel to the set through the air or along wires such as the wiring in your house. Usually they reach the set in both of these ways.

Q. What is meant by a broken or defective part in the set?

A. A radio set is like a chain: break or weaken one of the links and the chain is only as good as that link. One poor tube in the most expensive set can and will completely ruin the tone quality of the set, no matter what its cost. A single loose connection, a broken wire, or any defective part is sufficient to drown out the programme completely or even make the set absolutely silent.



FAN

Q. How can I tell which of these three causes is responsible for the noise in my own set?

A. If possible, listen to the same station on some neighbor's set which is as good as or better than your own. (If your set is better, it may get noises which your neighbor's set is not sensitive enough to receive). If your neighbor's set is as good as or better than your own, and it does not get the noises at all, it would be well to have your set looked over by a competent service man.

Q. How can I tell whether the noise I am getting is due to natural static?

A. You are most likely to get natural static when electrical disturbances such as thunderstorms, heat lightning or dust storms are in the air. If you get the noise only on such occasions, while on fine days you are not bothered, it is probably due to natural static.

Q. Why is it that I sometimes get a lot of noise when I am listening to a station which is far off, and do not notice it on nearby, or local stations?

A. The signal from a distant city must travel hundreds of miles. During this journey various factors operate to absorb its signal energy and strength and, as a result, by the time it reaches your set, it is not so strong as the local signal. Now, there is always a certain amount of electrical disturbance present in the air, and this causes what is known as the noise-level. The strong local signal is naturally much more powerful in relation to the noise level than the weaker signal from the distant station. We can hear the local station so clearly that we can keep our volume control much lower than we do when listening to the distant station. This, of course, means that we are making the set less sensitive, and so in this way it amplifies less signal and less noise. But when we want to bring in the distant station loud enough to listen comfortably, we have to make the set so sensitive (by turning up the volume control) in order to bring in this distant signal that it brings in more noise at the same time. If you listen to stations farther and farther away, the noise finally becomes so great in proportion, that it drowns out the program completely.

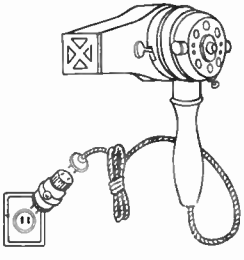
REFRIGERATOR

Q. How can I make sure whether my set is to blame for the noises?

A. Shut off the set. Remove the antenna and ground wires. Now take a small piece of wire, or a nail, connect the antenna and ground posts with it, and turn on the set again. Then antenna system has now bee removed, and any noises you now hear are due either to radio interference coming in over the electtric light lines or to a defective part in your set. If it is a battery set, using no eliminators, and you still get the noise, it is undoubtedly due to a defective part in the set. If it is an electric set, the noise may be due either to interference or to a defect in the set.

Q. If my set is electric or uses eliminators how can I tell whether the noise is due to interference or to a defective part?

A. Having connected antenna and ground posts together, plug a good line filter (Tobe Filterette No. 110 P. O. is excellent for this purpose) into the wall socket, and plug your set into the line filter. Now turn on the set. If the noise has stopped, it was caused by radio interference coming in over the power lines, and the line filter is now keeping it from getting into the set.



HAIR DRYER

Q. If the line Filter has not stopped the noise with the antenna and ground systems disconnected, what is causing the noise?

A. If the line filter has not stopped the noise with the antenna and ground systems disconnected, have your set looked over for a defective part.

Q. If the line filter has stopped the noise should it be left on the set permanently?

A. Yes, or the noises will be heard as before.

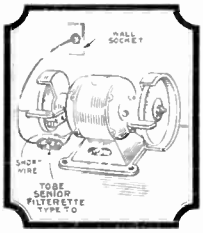
Q. How can I stop noises caused by natural static?

A. There is no way to stop noises caused by natural static. It is important for the reader to remember this. There are hundreds of devices on the market which promise to get rid of "Static," but stop and think: the biggest radio manufacturers in the world, the companies who sell you your radio set, **do not**

put these devices on their sets when they sell them to you. Why? Because they know that they cannot be depended upon to work.

The first thing anyone thinks of when he hears about static for the first time is "something to go on the radio set." He doesn't know that the biggest companies in the world have been seeking for years to find such a device. When it is found, if it ever is found, you will read the news of it on the front page of every newspaper in the country.

Don't waste your money trying "static" eliminators. If you are really interested, study up on the subject in the library, but save your money.



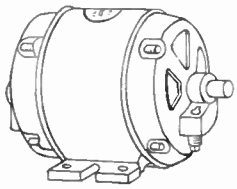
Q. How can I tell whether the noises I am getting are due to man-made static?

A. If you have made the tests described above for natural static, and for defective parts in your set, and get the same noises as before, not just on stormy days but every day or night, then the chances are that man-made static is the cause of your trouble.

Q. What are some of the things that cause man-made static and how are these recognized by their sounds in the speaker?

A. Most types of radio interference have a characteristic sound. Listen carefully to the noise you are getting and see which of the following classes it comes under. Opposite each class of noise is a list of the kinds of electrical apparatus which are most likely to cause such a noise. You can then go hunting for a similar electrical apparatus somewhere in the neighborhood of your radio set.

WHIRRING, CRACKLING, BUZZING, HUMMING, DRONING, WHINING



MOTOR

Sounds like these generally indicate radio interference which is being caused by an electric motor. Sometimes when the motor starts and stops, the sound will start low and rise in pitch until the motor reaches its full speed when the whine will remain at a certain steady pitch, usually rather high. This is especially true of commutator type motors. Repulsion starting induction

running motors may have a sputtering, whirring, crackling, buzzing or humming sound. When such sounds are heard hunt for one of the following:

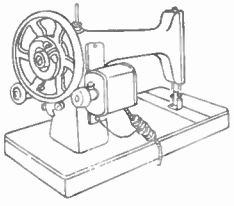
Adding machines
Automatic towels
Barbers' clippers
Beauty parlor devices
Billing machines
Cash registers
Dental engines
Dishwashers
Dough Mixers
Drink Mixers
Electric Addressing Machines
Electric Computators
Electric Elevators
Electric Refrigerators
Electric Vibrators
Fans
Farm Lighting Plants
Floor Polishers
Generators
Hair dryers
Humidifiers
Massage machines
Motor brushes
Motor generator sets
Portable electric drills
Printing presses
Sewing machines
Shoe dryers
Small blowers
Small fans
Starting commutators
Telephone magnetos
Toy electric trains
Vacuum cleaners
Valve grinders
Washing machines

WHISTLES AND SQUEALS

Sounds of this sort generally indicate radio interference which is being caused by oscillation. Often the whistle or squeal starts high, dips to a low note and mounts again to a high pitched squeal which may vanish entirely or remain at a steady, high-pitched whistle. Hetrodyning broadcast stations have a sort of bubbling whistle, and can be recognized by the fact that they usually occur at the same spot on the dial. You can only write to the Radio Commission about this: the listener himself is powerless to act. Old-fashioned radio sets which tune by the "squeal" of the wave, usually cause the squealing sound to be heard by all radio sets in the vicinity. The addition of a stage of radio-frequency amplification will stop this. Or, if you are not familiar with radio, we can explain it best by saying that if you add one more tube, you will not only stop your neighbors from being disturbed by the noise, but will make your set get many more stations, and play them much louder than at present. Look for:

Defective or incorrect value of filter condenser in superheterodyne.
Grid and plate leads are so paralleled that there is an inductive pick-up between them.
Grid-leak is too high.
Heterodyning broadcast stations—two stations of almost the same wave length are operating at the same time so that the waves combine to form a "beat."
Inductive pick-up of a loop.
Intermediate stages of a superheterodyne in oscillation
Regenerative sets improperly tuned.
Set is picking up the squeal from a set in the neighborhood.
Some r. f. stages are not neutralized.
Too much regeneration.

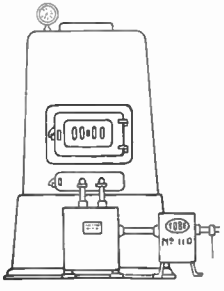
RATTLES, BUZZES, MACHINE-GUN FIRE.



SEWING MACHINE

Sounds of this sort generally indicate radio interference which is being caused by telephone dialing, buzzers, or doorbells. It is not generally steady, but stops and starts. Short rattling sounds like machine-gun fire and varying slightly in length indicate telephone dialing. Look for:

Annunciators
Automobile ignition systems
Buzzers
Dental laboratory motors
Dial telephones
Doorbells
Sewing Machines
Switchboards
Telephone dials
Vibrating rectifiers



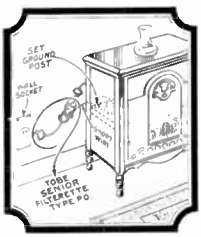
OIL BURNER

VIOLENT HEAVY BUZZING OR RUSHING SOUND

Sounds of this sort generally indicate radio interference which is being caused by high-frequency apparatus. Such noises will usually be heard over a large area, a whole town, even, and often are so loud that they drown out the radio program completely. Look for:

Air purifiers
Battery chargers
Diathermy machines
Doctors' apparatus
Dust precipitators
Flour bleaching machinery
High-frequency apparatus
Insulation testers in cable plants
Ozone devices
Rotary spark gap of transmitting station
Steady oil-burner spark ignition
Violet ray
X-Ray

CRACKLING, SPUTTERING, SNAPPING, SHORT BUZZES OR SCRAPING

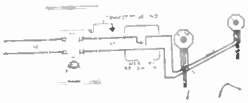


Sounds of this sort generally indicate radio interference which is being caused by one or more loose connections. Sometimes the sounds are especially noticeable when the room is jarred or shaken by footsteps, street cars or traffic. Look for:

Bad connections
Buffer condensers of eliminator defective
Burrs on plate of variable condensers
Corroded or loose connections in radio sets
Defective light-sockets
Elevator control
High tension lines
Leaky cables
Loose connections in floor lamps, appliance cords, broken heating elements, etc.
Power lines grounded on branches
Street cars
Trickle charger in operation
Wet insulators

TOBE Filterette

CLICKING



Sounds of this sort generally indicate radio interference which is being caused by some sort of make-and-break connection, such as a thermostat, especially if it comes at fairly steady intervals. Look for:

Arcing across anode leads of eliminator rectifier, across prongs of rectifier-tube socket, or across output of eliminator or power transformer.

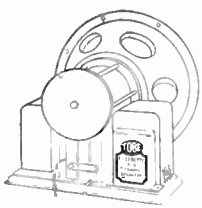
Buffer condenser in eliminator shorted
Shaving mug heaters
Elevator control
Flashing signs
Heaters,
Heating pads
Incubators
Irons
Mercury arc rectifiers
Ovens
Percolators
Defective resistors in eliminator
Short wave clicks
Sign flashers
Soldering irons
Telegraph relays
Traffic signals
Typewriters, electric
Voltage fluctuation of power line

HEAVY VIOLENT BUZZING, USUALLY SHORT.

Sounds of this sort generally indicate radio interference which is being caused by arcing of a spark across a gap. This may occur as a short noise or a steady one. Look for: Arc light, Automobile ignition, Breaks in third rails, Electric car switches, Electric cigar lighters, Electric elevators, Moving picture machines, Pole chargers (Telephone Interrupted), Street car switches, Street lights, and Toy electric trains.

STEADY HUMMING

Sounds of this sort generally indicate radio interference which is being caused by improperly filtered alternating current. Such humming is often the fault of your set or eliminator. Look for:



Dynamic speakers improperly filtered
Faulty construction of set or eliminator
Filter condenser blown or shorted
Ground on set poor
Improper wiring
Poor tubes
Wiring parallel with power line

General Instructions for the Installation of Filterettes

The following general instructions apply to the installation of all Tobe Filterettes. If careful heed is taken of these instructions no further information should be required for the suppression of the most stubborn case of interference. However, many practical pointers which have been discovered by experiment are outlined under specific headings to aid the service man in the speedy elimination of interference from the more common sources.

The fundamental rule for installation of any Filterette is that the leads between the Filterette and the apparatus to which it is connected be kept as short as possible, and that the return wire from the Filterette be connected in the most direct manner possible to a carefully cleaned part of the interference creating apparatus. (In this connection it should be noted that the return connection provided on the Filterette is not the ground connection. In many cases carrying this connection to a water pipe or to a driven ground will result in an increase rather than a decrease of interference. The reason for this is that a considerable difference of radio frequency potential may exist between the frame of the apparatus and the so-called ground connection, and interference may be radiated from all points which are at a different potential from that at which the interference is originating.)

Filterettes can be secured from all dealers and jobbers or through General Electric, Westinghouse and Graybar distributors. Should you encounter any difficulty in obtaining them, write us. We shall be glad to fill your order direct, upon receipt of 25% cash; balance to be paid C. O. D.

TOBE Filterette

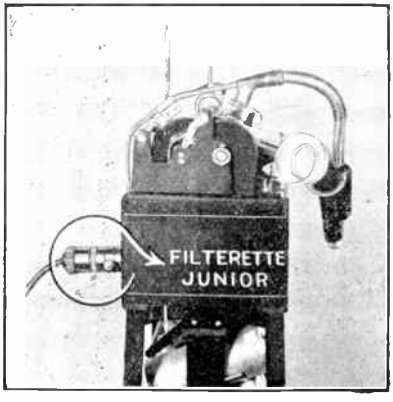
TOBE FILTERETTE JUNIOR

The Filterette Junior is of the simple capacitive type, and is designed for ease of application to small electrical appliances such as are commonly attached to the power lines by means of a cord and plug.

Vacuum cleaners, egg beaters, sewing machines, and drink mixers are among the common offenders which may be silenced by proper use of Tobe Filterette Junior.

In many cases satisfactory elimination of interference from small appliances may be obtained by plugging the Filterette Junior into the receptacle from which the appliance is supplied with current and inserting the attachment plug of the appliance in the receptacle provided on the Filterette.

Should this procedure fail to eliminate the interference, a wire should be run from the binding post on the Filterette to a carefully cleaned part of the frame of the appliance.

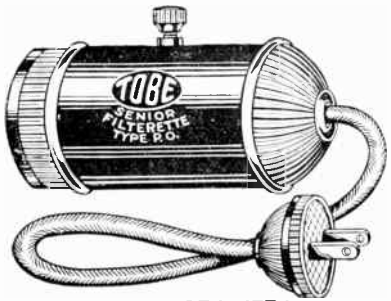


Provided the receiver or antenna lead-in is in close proximity to the interference creating appliance, such installation of the Filterette may not prove satisfactory. Under these circumstances it will probably be necessary to locate the Filterette closer to the source of the interference. This is accomplished by cutting the attachment cord of the appliance and inserting the Filterette at the point where the cord is cut.

If it is desired to determine the effect of such connection without actually cutting the cord, this may be done by locating the appliance directly beside the receptacle to which it is normally connected and coiling the attachment cord into the smallest space possible. The Filterette may then be attached in the manner first described, and the effect of its closer location to the interference source may be noted.

TOBE FILTERETTE JUNIOR ..... **PRICE $3.50**
110 Volts A. C. or D. C.

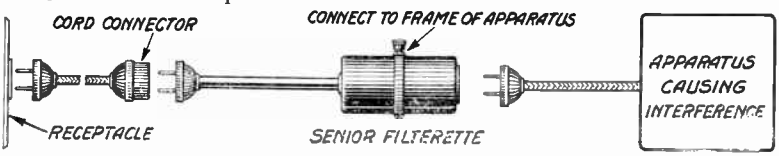
TOBE FILTERETTE SENIOR



SENIOR FILTERETTE
LINE FILTER (TYPE P. O.)

The Filterette Senior is of the inductive capacitive type, and is designed for application to electrical appliances of the classification mentioned in the description of the Filterette Junior, but of a type creating a more intense form of interference than may be suppressed by the Filterette Junior.

Tobe Filterette Senior Line Filter (Type P. O.) may be transferred from one appliance to another by the simple means of removing the attachment plug of the appliance from the receptacle provided on the Filterette Junior, disconnecting the return wire from the binding post on the Filterette, inserting the attachment plug of the other appliance in the receptacle of the Filterette, and connecting a wire from the frame of the appliance to the Filterette binding post. This renders the type P. O. particularly adaptable to use when several appliances which may be creating interference, but which are not likely to be operated at the same time, are located in one establishment. The Tobe Filterette Senior when connected direct to the radio set acts as a direct line filter, thus serves as an effective blocking device to all electrical disturbances that may enter the radio set from the power line.



Maximum benefit is obtained from the use of this Filterette when it is located as close as possible to the source of the interference. This installation may best be accomplished by inserting a separable cord connector (Hubbell No. 6116, Benjamin No. KT-130, Bryant KT-130, or equivalent) in the attachment cord of the apparatus, and connecting the Filterette as shown in the above sketch.

Since the Filterette Senior is of the inductive-capacitive type, it is important that its current rating be observed.

Tobe Filterette Senior P. O. ..... Price $7.50

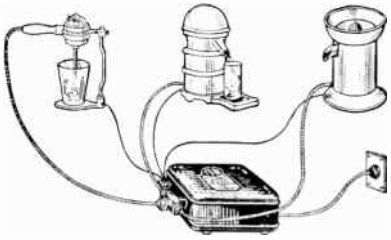
110 volts A. C. or D. C.

TOBE FILTERETTE TYPE 110-PO.

Tobe Filterette Type 110-PO is of the inductive-capacitive type and is particularly designed for application to household appliances operated from repulsion-induction or direct current motors.

Electric refrigerators, dish washers, etc., usually require the application of this Filterette. The construction of this unit is such that it may readily be applied to apparatus which is normally connected to the power line by means of an attachment cord and plug. It is provided with a receptacle for ease of connection to the offending apparatus, with an attachments cord and plug for connection to the power line, and with a binding post from which a wire must be run to a carefully cleaned part of the frame of the interference creating apparatus.

Another application for Filterette No. 110-PO is at a soda fountain, for handling a number of small appliances which may be located close together so that all attachment cords are short. If such an application is to be successful, each of the attachment cords should be shortened as much as possible, and a wire should be run from the binding post of the Filterette to the frame of each of the appliances.

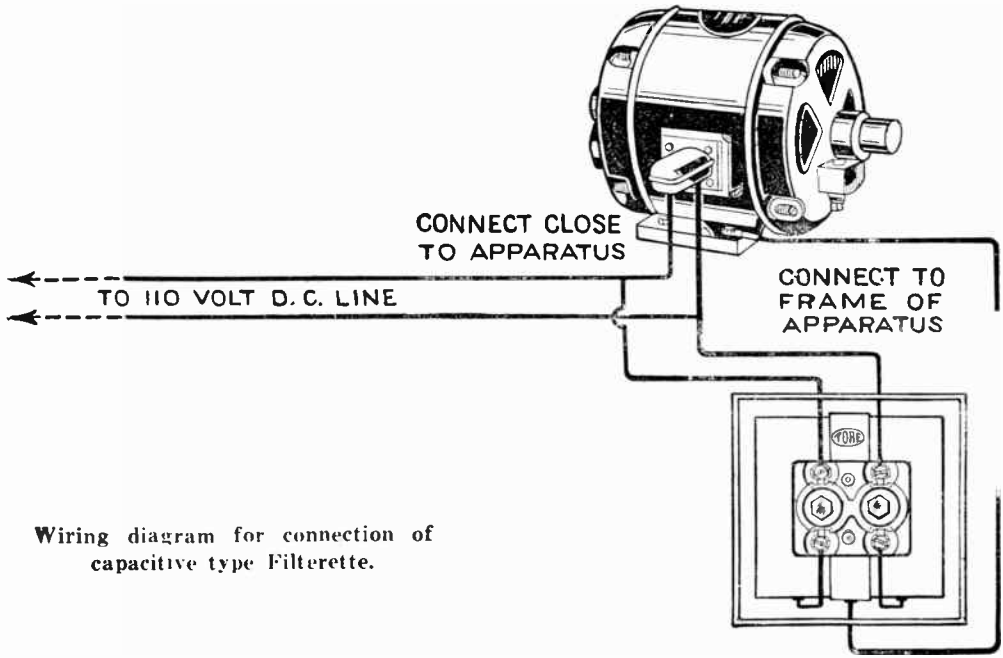


The Tobe Filterette No. 110 P. O. is recommended for use on large radio sets as a direct line filter. This Filterette when attached direct to the radio serves as an effective blocking device to prevent all electrical disturbances from entering the set from the power line.

Tobe Filterette No. 110-PO ..... Price $12.50
110 Volts A. C. or D. C., 5 Amperes

CAPACITIVE TYPE FILTERETTES

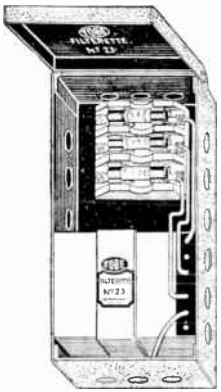
Filterettes of this type should be connected directly across the terminals of the generators or motors creating interference as shown in the accompanying diagrams. If maximum benefit is to be obtained from a capacitive type Filterette its connecting leads must be kept short, and its return lead must be connected to the frame of the machine causing the interference, and to the conduit carrying the leads to the machine.



Wiring diagram for connection of capacitive type Filterette.

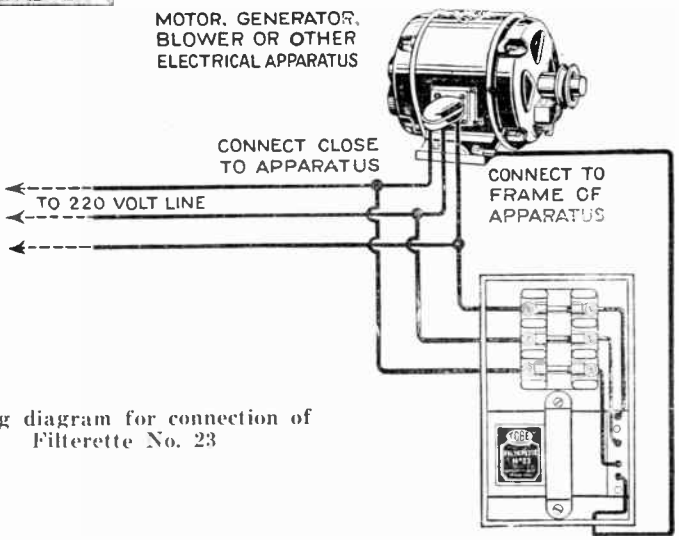
CAPACITIVE TYPE FILTERETTES UNDER THIS CLASSIFICATION ARE THE FILTERETTE JUNIOR, FILTERETTES NOS. 10, 11, 20, 22, 23, 55, 56 AND 60.

TOBE Filterette



THREE PHASE WORK

A special Filterette has been designed for three-phase work. This Filterette is known as No. 23, and its appearance is shown in the accompanying cut. Filterette No. 23 should be installed in accordance with the suggestions in the preceding paragraph. Particular care must be taken that both return connections are used. since satisfactory results will not be obtained if either of the return wires is left unconnected.

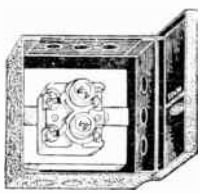


Wiring diagram for connection of Filterette No. 23

The size of the machine to which the Filterette is attached does not necessarily govern the efficacy of the use of the Filterette.

In many cases we have found that a 25 KW Generator created considerably less interference than a ½ H. P. motor, and that a capacitive type Filterette would completely eliminate the interference from the larger machine and have very little effect on

the interference from the smaller machine. In general, it may be stated that capacitive type Filterettes are satisfactory for application to generators and to motors, although there are circumstances which sometimes require that a Filterette of the inductive capacitive type be applied to either type of machine.



As long as the voltage rating of the Filterette is not exceeded, it may be applied to machines covering a wide variety of current ratings. This is due to the fact that the construction of the Filterette is such that the current rating of the interference creating apparatus has little or no bearing on the type of Filterette used.

Tobe Filterette No. 10 ..... Price $10.00
110 Volts D. C., 5000 Watts

Tobe Filterette No. 11 ..... Price $10.00
110 Volts A. C., 5000 Watts

Tobe Filterette No. 20 ..... Price $15.00
220 Volts D. C., 10,000 Watts

Tobe Filterette No. 22 ..... Price $15.00
220 Volts A. C., 10,000 Watts

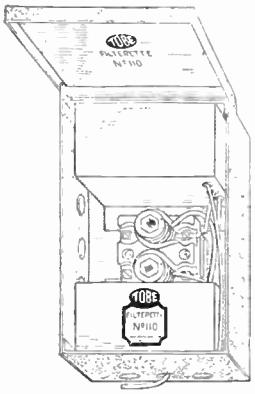
Tobe Filterette No. 23 ..... Price $20.00
For 220 volt 3 phase A. C., 110-220 volt single phase, 3 wire, A. C. or 110-220 volt 3 wire D. C. systems. For use in applications similar to the No. 22 where 3 wires are required instead of 2.

Tobe Filterette No. 55 ..... Price $25.00
For 440 or 550 volts A. C. motors, or other electrical apparatus requiring capacitive type filters capable of operation on potentials between 250 and 550 volts A. C.

Tobe Filterette No. 56 ..... Price $35.00
For 440 or 550 volts 3 phase A. C. systems. For use in applications similar to the No. 55 where 3 wires are required instead of 2.

Tobe Filterette No. 60 ..... Price $25.00
For 600 Volts D. C., 25,000 Watts

INDUCTIVE-CAPACITIVE TYPE FILTERETTES



Filterettes of this type should be connected in series with the leads to the interference creating apparatus, and should be mounted as close as possible to it. The return wire from a Filterette of this type should, of course, be as short as possible, and should be connected to a carefully cleaned part of the frame of the machine.

In practically all cases, a Filterette of this type will be found more satisfactory than one of the simple capacitive type. In some cases, however, the advantage of the inductive capacitive type over the capacitive type is so slight as to be negligible.

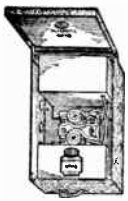
Care must be taken in the installation of a Filterette of this type that neither the voltage nor current rating of the Filterette is exceeded. Refer to chart below for proper Filterette to use.

INDUCTIVE-CAPACITIVE FILTERETTE CHART

Filterette No.	Volts A. C. or D. C.	Amperes	Price
Senior P. O.	110	5	$ 7.50
Senior T. O.	110	5	$ 7.50
110	110	5	$15.00
110 P. O.	110	5	$12.50
131	110	10	$20.00
132	110	20	$30.00
133	110	30	$42.50
134	110	40	$57.50
135	110	50	$75.00
221	220	5	$20.00
231	220	10	$30.00
232	220	20	$40.00
233	220	30	$52.50
234	220	40	$67.50
235	220	50	$85.00

TOBE Filterette

OIL BURNERS

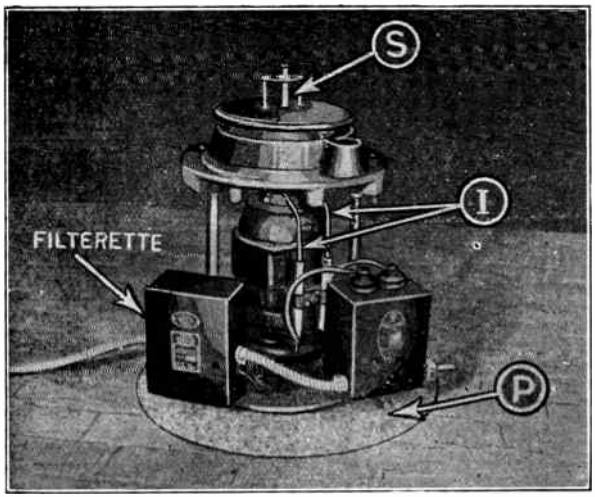


Q. What parts of an Oil Burner may cause radio interference?

A. Interference may be caused by the pump motor, by the ignition system, or by a portion of the temperature control apparatus.

Q. How may motor interference be traced?

A. The interference due to the pump motor is usually in the form of a crackling or scratching noise, which remains at a steady intensity during the entire period that the Oil Burner is in operation. This type of interference is particularly likely to occur when the motor is operated from direct current. If the motor is operated from alternating current, the interference should not be continuous.



TOBE FILTERETTE
ATTACHED TO A SUPERHEATOR OIL BURNER

Q. Why is this the case?

A. This is due to the type of motor commonly employed. This motor is usually of the repulsion starting, induction running type, and should create interference only during the starting period or when the brushes are in contact with the commutator. Provided the motor is in good electrical and mechanical condition, continuous interference should not be created by this type of motor. If such interference is found, the motor should be carefully inspected before a Filterette is applied, since it is likely that the motor is being overloaded or that it is in need of lubrication

or cleaning. If the motor is of the type in which the brushes remain in contact with the armature and the brush circuit is opened by means of a centrifugal switch, a slight continous interference will probably be noticed.

Q. How may interference from the motor be suppressed?

A. Tobe Filterette No. 110 should be connected directly at the power input to the motor, as shown in Figure 1. The return lead from the Filterette should be connected to a carefully cleaned part of the motor frame, and the entire Filterette installation should be made in accordance with the National Electric Wiring Code.

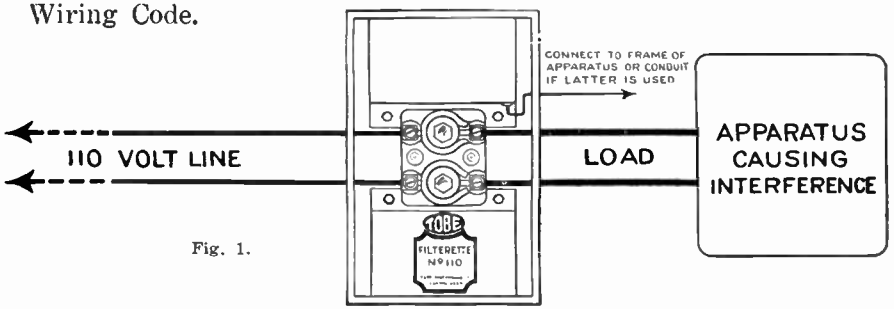
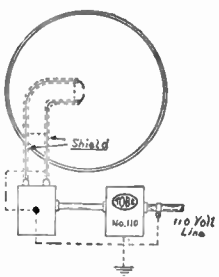


Fig. 1.

Q. How does the heat control apparatus create interference?

A. The only type of heat regulating apparatus which consistently causes objectionable radio interference is that which employs a small motor. This is usually of the series-wound type, and generally causes an interference which is heard as a loud roaring noise, usually lasting from 20 to 100 seconds.



Q. How may interference from this apparatus be suppressed?

A. A capacitive type Filterette such as Tobe Filterette No. 11 is usually satisfactory for suppressing the interference from this type of apparatus, although in extreme cases, a Filterette of the inductive capacitive type such as Tobe Filterette No. 110 is required. In either case the Filterette should be connected directly at the power input to the motor, and its return lead should be connected to a carefully cleaned part of the motor frame.

Q. Do thermostatic heat controls cause interference?

A. Sometimes. It may be that the contacts open slowly so that an arc is produced, causing interference.

Q. How may this interference be suppressed?

A. This condition may usually be overcome by an adjustment of the apparatus. It is not advisable to cover up an inherently wrong condition such as this by use of a Filterette.

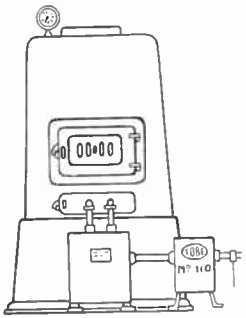
Q. Do all ignition systems cause radio interference?

A. No.

Q. How many types of ignition system are used?

A. There are two major divisions: Gas and Electric. Gas ignition, of course, causes no radio interference.

Q. In what way is interference from electrical ignition systems indicated?



A. This interference is usually heard as a loud roaring noise, which may continue from 15 to 60 seconds, or during the entire period during which the oil burner is in operation. The duration of the interference from the ignition system will be dependent upon the type of electric ignition employed.

Q. What are the classifications of electrical ignition?

A. Electrical ignition may be either continuous or intermittent. If it is continuous, the interference will, of course, be in evidence during the entire period that the Burner is in operation. If intermittent ignition is used, the interference will be noticeable only for a short time at the starting period.

Q. What type of Filterette will suppress this interference?

A. Tobe Filterette No. 110 is the unit commonly found successful for preventing the feed back into the power line of the high frequency disturbance created by an Oil Burner ignition system.

Q. Will this Filterette completely eliminate the interference from electrically operated Oil Burner ignition systems?

A. In some cases it will, but under most conditions additional precautions are required.

Q. Why is this the case?

A. Because the interference caused by high tension spark systems for ignition is transmitted in two ways:

1. By conductive coupling to the power line.

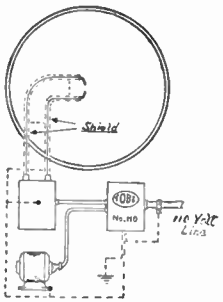


Fig. 2

2. By direct radiation from the high tension leads of the ignition system.

Q. How may this interference be suppressed?

A. As previously stated, the use of a Tobe Filterette No. 110 will prevent the feed back of interference into the power line. The direct radiation may be suppressed by application of suitable shielding to the high tension leads.

Q. How may this shielding be applied?

A. Before discussing this point, we must distinguish between the two methods used for connecting the ignition system:

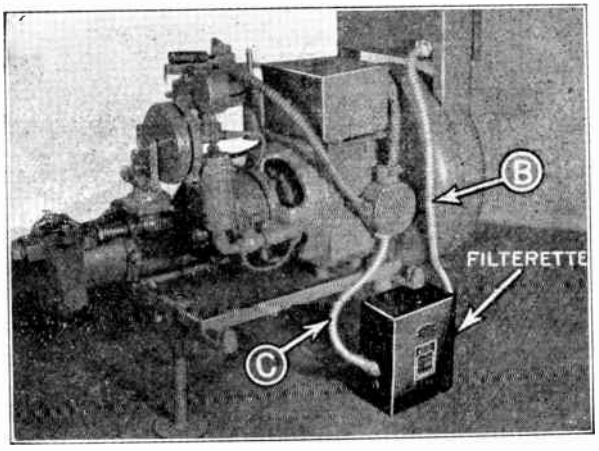
The first and more easily handled, employs two separate leads from the transformer to the spark plug.

Shielding of this type of ignition system is accomplished by enclosing each of the high tension leads in a separate flexible metal conduit. The two conduits must be electrically connected together at both ends, and in the middle, and should also be electrically connected to the metal case of the ignition transformer and to the fuel tube of the Oil Burner. Before applying the shielding the high tension leads should be covered with rubber tubing. This tubing is not used for insulation purposes, but rather to provide suitable spacing between the shielding and the conductor so that no damping of the spark will occur. Care must, of course, be taken that the shielding does not come in contact with either of the terminals of the ignition transformer or with any part of the spark plug.

The second method employs a single lead from the transformer to the spark plug, the return connection being made through the metal frame of the Oil Burner.

When this type of ignition system is used, the same type shielding is applied to the single high tension lead. It is sometimes necessary to experiment a bit in the method of connecting the shielding to the oil burner frame in order to secure a maximum of benefit from the shielding. It is usually found, however, that when the shielding is electrically connected to the fuel tube of the Oil Burner, complete elimination of radiated interference results.

In some cases it has been found that the presence of as much



TOBE FILTERETTE ATTACHED TO A WILLIAMS OIL-O-MATIC BURNER

as ½" of unshielded high tension lead will allow the radiation of considerable interference. For this reason, it is advisable that a metal housing be constructed so that the transformer terminals are completely enclosed and the shielding is bonded to this metal housing. This procedure should effectively suppress any radio interference which might be directly radiated from high tension leads of the ignition system.

Q. Must a separate Filterette be used for suppressing the interference from each part of the Oil Burner installation?

A. No. A single No. 110 Filterette so connected that it is carrying the entire load of the Oil Burner (Fig. 2) should satisfactorily suppress the interference from all parts of the Oil Burner. When a single Filterette is used, its return wire should be connected to the frame of each motor, and to the metal case of the ignition transformer.

Q. Is not a separate ground connection required for a Filterette?

A. No. In fact it is not advisable to make such a connection. The loose wire provided in the Filterette is correctly termed a return lead, and should be connected to the frame of the interference creating apparatus at a point as close as possible to that at which the interference is arising. In some cases it has been found that the use of a separate ground connection or a long return connection to the Filterette would cause an apparent increase in interference.

One of the cardinal rules for successfully eliminating radio interference is that which states that all leads between the Fil-

terette and the apparatus to which it is being applied should be kept as short as possible and the return connection to the Filterette should be run in the most direct manner possible to a carefully cleaned part of the frame of the interference creating apparatus.

Q. How may the exact source of the interference from an Oil Burner installation be determined?

A. Any of the parts of the burner may be operated independently, and the amount of interference during this independent operation may be observed. Care should, of course, be taken that the fuel supply is shut off before this experimental work is done, otherwise, a dangerous situation may arise.

Q. If, after following the instructions given, the interference still exists, what further steps should be taken?

A. Particular care should be given the arrangement of all leads between the Filterette and the Oil Burner in order that there may be no coupling between input and output leads or between input leads and the return wire. Special attention should be given the manner in which the return wire is connected to the frames of the various devices in the Burner. The leads from the temperature control apparatus should be so arranged that they do not couple with any of the leads which may be carrying interference currents. When the temperature control relays are energized from a small step-down transformer the primary of this transformer should be connected at the line side of the Filterette. In extreme cases it may be necessary to connect a capacitive type Filterette across the thermostat leads. This condition, however, rarely exists, and should it be encountered, full details should be sent to Tobe Deutschmann Corporation of Canton, Mass., who will make special recommendations.

Tobe Filterette No. 110 ..... Price $15.00
110 Volts A. C. or D. C.—5 Amp.

Tobe Filterette No. 11 ..... Price $10.00
110 Volts A. C.

Tobe Filterette (Williams Oil-O-Matic) ..... Price $15.00

Tobe Filterette (Superheator) ..... Price $15.00

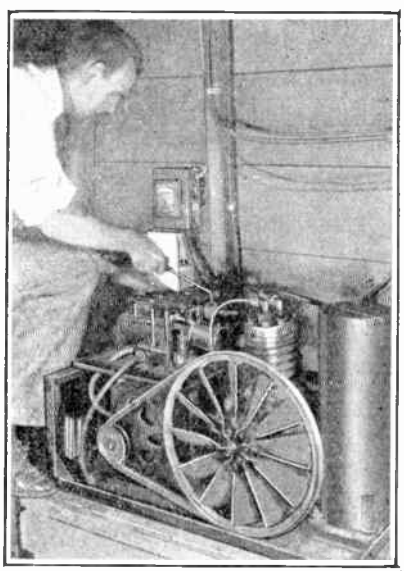
Tobe Filterette (Electrol) ..... Price $15.00

TOBE Filterette

ELECTRIC REFRIGERATORS

Q. Do electric refrigerators cause radio interference?

A. When A. C. operated electric refrigerators are in perfect electrical and mechanical condition, they do not cause radio interference except during a period of a few seconds only when motor is starting, that is, while the motor is attaining its running speed. The motor used with an electric refrigerator is commonly the repulsion-starting, induction-running type employing a centrifugal switch which cuts out the starting mechanism when the motor has attained its normal speed. However, when the motor has been in operation for some time, it is likely to become a creator of radio interference. This condition may be remedied by a thorough overhauling of the motor. However, due to the location of the motor, it is exposed to dirt and moisture and consequently, such overhauling would have to be done frequently. For this reason it is expedient to apply an external device for the elimination of the radio interference.



INSTALLING A FILTERETTE ON A COMMERCIAL REFRIGERATOR

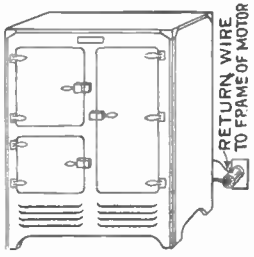
Refrigerators operated from direct current are likely to cause continuous interference.

Q. How may the interference from this type of refrigerator be eliminated?

A. Provided the refrigerator is operated from a 110 volt line, Filterette No. 110, which is of the inductive capacitive type may be applied to suppress the radio interference. If the refrigerator is operated from a 220 volt line, Filterette No. 221 should be the correct type.

Before applying a Filterette, however, a careful check should be made to determine the current and voltage requirements of the machine in order that the Filterette installed may not be overloaded.

TOBE Filterette



TOBE SENIOR FILTERETTE ATTACHED TO AN APARTMENT HOUSE REFRIGERATOR

Q. How should the Filterette be installed?

A. The Filterette should be mounted as close as possible to the motor and its return wire should be connected to a carefully cleaned part of the motor frame.

If the refrigerator is of the type which is connected to the power supply by means of a cord and plug, Filterette Senior or No. 110 P. O. may be used depending upon size of motor. If this is done, the Filterette should be plugged into the receptacle from which the refrigerator was supplied with power, and the attachment plug of the refrigerator should be inserted in the receptacle provided on the Filterette. A wire should also be run from the binding post on the Filterette to a carefully cleaned part of the motor frame.

Care should be taken that no coupling exists between the input and output leads to the Filterette and that all leads between the Filterette and the interference creating apparatus are kept as short as possible.

Q. If interference is in evidence after the Filterette has been applied, what steps should be taken?

A. If, after the recommended Filterette has been carefully installed, some interference exists, it is likely that this interference is not being created by the motor.

Certain types of refrigerator employ a spring suspension for the mounting of the motor. In some cases a weakening of one or more of the springs will cause a periodic contact between the motor frame and the refrigerator frame. The result of this contact will be a fairly steady interference, which may appear to be caused by the motor, due to the fact that it is noticeable only when the motor is in operation. This interference, of course, may not be suppressed by use of a Filterette but will require mechanical adjustment of the apparatus.

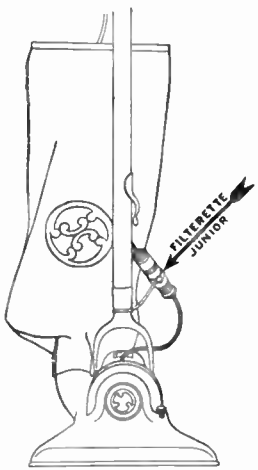
Tobe Senior Filterette T. O. or P. O. ..... Price $7.50
Tobe Filterette No. 110 P. O. ..... Price $12.50
110 V., A. C. or D. C. 5 Amp.
Tobe Filterette No. 110 ..... Price $15.00
110 V., A. C. or D. C. 5 Amp.
Tobe Filterette No. 221 ..... Price $20.00
220 V., A. C. or D. C. 5 Amp.

TOBE Filterette

HOME APPLIANCES

Q. What apparatus in the home besides the Oil Burner and Refrigerator may be responsible for radio interference?

A. The vacuum cleaner, sewing machine, dish washer or clothes washer, electric mixer or beater, heating pad, small fan and all appliances employing small motors are likely to create considerable radio interference.



Q. How may the interference from this apparatus be suppressed?

A. In practically all cases a Filterette Junior connected at the power receptacle from which the device is supplied with current, and having its return connection made to the frame of the apparatus, will provide complete elimination of the interference.

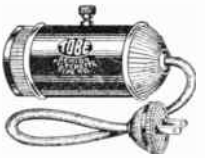
Q. If, after the application of the Filterette Junior, some interference remains, what procedure should be followed?

A. The Filterette should be connected so that the connecting lead between the Filterette binding post and the frame of the machine is not over six inches in length. This, of course, may be done experimentally by coiling the attachment cord of the machine into the smallest possible space.

If this procedure is found effective, the cord should then be cut close to the motor and the Filterette inserted in the cord. If the interference persists, a Filterette of the inductive-capacitive type will be required. The Filterette Senior T. O. is the correct type for this purpose, and is so constructed that it may readily be connected at the point where the cord was cut.

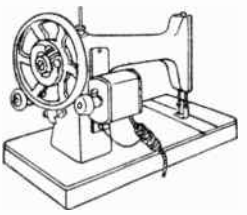
For most household apparatus a Filterette Senior connected in the same manner as the Filterette Junior will handle the most stubborn cases of interference.

TOBE Filterette



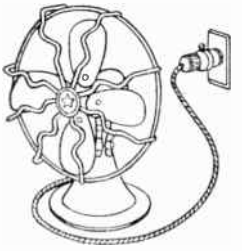
Q. What will govern the choice of a Filterette for application to household appliances?

A. As a rule, the smaller household appliances employing series-wound or universal motors may be effectively silenced by means of the Filterette Junior. Larger appliances, employing repulsion-induction motors, will require the use of inductive-capacitive type Filterette. In many cases the Filterette Senior will be suitable for application to these devices. However, before applying this Filterette, careful note should be made of the voltage and current requirements of the apparatus for which the Filterette is required in order that a Filterette having sufficient current carrying capacity may be used.



Q. Why not apply a Filterette to the receiver rather than to each of the appliances in the house?

A. Although the interference from household appliances is fed back into the power line, it is seldom impressed on the receiver through its connection to power line. This may be proven by disconnecting the antenna and ground from the receiver and short-circuiting the antenna and ground posts of the set.



When this is done, no signal either broadcast or interference should be heard. This indicates that the interference is being introduced into the receiver through the antenna and ground system rather than through the power supply. It is, therefore, obvious that the interference must be prevented from being fed back into the power line from which it may be radiated to the antenna system of the receiver.

Tobe Filterette Jr. ..... Price $3.50
110 V.—A. C. or D. C.

Tobe Filterette Sr. ..... Price $7.50
110 V.—A. C. or D. C. 5 Amp.

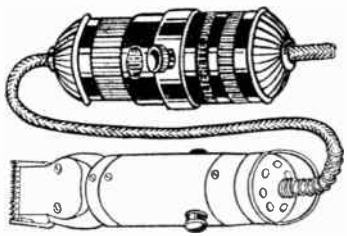
Tobe Filterette No. 110 P. O. ..... Price $12.50
110 V.—A. C. or D. C. 5 Amp.

TOBE Filterette

BARBER'S CLIPPERS

Q. How may interference from barber's clippers be suppressed?

A. In practically all cases a Filterette Junior installed as close as possible to the motor which operates the clipper will provide satisfactory elimination of the interference. In some cases, however, a Filterette of the inductive-capacitive type, such as the Filterette Senior, is required. This Filterette should, of course, be installed in the same manner as the Filterette Junior.



Q. What governs the choice of the Filterette?

A. There is no hard and fast rule by which you may determine whether to use the Filterette Junior or Filterette Senior. In general, however, it may be said that if any sparking is visible when the clipper is in operation, a Filterette Senior will be required for suppressing the interference from this apparatus.

Q. Where should the Filterette be installed.

A. In some cases the Filterette may be installed at the end of the attachment cord of the apparatus, but it is usually advisable to cut the attachment cord at the motor and insert the Filterette at this point.

Q. Must the Filterette be grounded.

A. No. In many cases the return wire may be omitted. When it is used it should be connected to the motor frame rather than to ground.

Tobe Filterette Jr. .....Price $3.50
110 V.—A. C. or D. C.

Tobe Filterette Sr. . ...Price $7.50
110 V.—A. C. or D. C. 5 Amp.

TOBE Filterette

CASH REGISTERS

Q. Why does a cash register cause interference?

A. Radio interference from a cash register is caused by the motor used for its operation.

Q. How may this interference be eliminated?

A. In practically all cases this interference may be suppressed by use of a Filterette Junior.

Q. How should this Filterette be applied?

A. The Filterette should be plugged into the power receptacle to which the cash register is connected. The attachment plug from the cash register should then be plugged into the Filterette Junior. A wire should be run from the binding post on the Filterette Junior to the frame of the operating motor. In some cases the motor is inaccessible. In such cases, the Filterette return wire may be connected to the metal frame of the register.

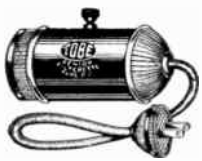
Care must be taken that the return connection is made to a portion of the register frame which is in contact with the motor frame.

Q. Suppose the use of a Filterette Junior at the Power receptacle does not completely eliminate the interference?

A. Should this condition exist, it may be due to the radiation of interference from the attachment cord. This condition may be remedied by cutting the cord at a point close to the machine and inserting the Filterette Junior at this point. The return connection from the Filterette should be made in the manner previously described.

Q. If, after this has been done, the interference persists, what is the next step?

A. Such a condition rarely exists. However, should it be encountered, a Filterette of the inductive capacitive type installed as in the preceding paragraph will eliminate all of the interference. Tobe Filterette Senior is the model recommended for this work.



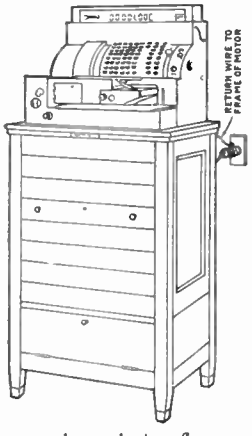
Q. Is the return connection from the Filterette always necessary?

A. No, but in most cases its use will be found to provide more satisfactory elimination of the radio interference.

Q. Will the Filterette be harmed if the return connection is not used?

A. No, if the interference is eliminated without the use of

the return connection, this connection may be omitted with complete safety.



Q. May one Filterette be used for suppressing the interference from several pieces of apparatus?

A. In some cases a single Filterette may be used for suppressing the interference from several devices, although its use is not likely to be as satisfactory as though a single Filterette were used for each machine. The reason for this is that the machines are likely to be separated a considerable distance, which, of course, means that the attachment cords will be fully extended, thus providing the maximum length of lead from which interference may be radiated. It is obvious that the presence of several long leads carrying interference currents may allow the radiation of sufficient interference to minimize the effect of the Filterette.

Q. What other store or office appliances may create interference?

A. Most of the electrically operated apparatus used in an office is likely to create radio interference. Adding machines, billing machines, dictaphones, counting machines, and mailing machines are all likely to be responsible for some radio interference.

Q. How may interference from this apparatus be suppressed?

A. In most cases the procedure described for suppressing radio interference from an electrically-operated cash register may be used with complete satisfaction for suppressing interference from other store or office equipment. In some cases, however, it may be found that a more effective type of Filterette than either of the two previously recommended may be required. Should this be the case, Filterette No. 110 P. O. is recommended, and, doubtless, will provide complete elimination of the interference.

Tobe Filterette Jr. ..... Price $3.50
110 V., A. C. or D. C.

Tobe Filterette Sr. ..... Price $7.50
110 V., A. C. or D. C. 5 Amp.

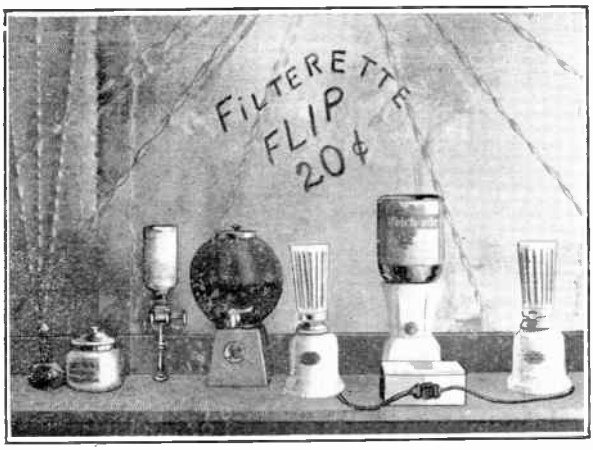
Tobe Filterette No. 110 P. O. ..... Price $12.50
110 V., A. C. or D. C. 5 Amp.

TOBE Filterette

SODA FOUNTAINS

Q. What apparatus used in a confectioner's store or on a soda fountain is likely to create radio interference?

A. Interference in these locations may be caused by drink mixers or fruit juice extractors. The method of suppressing interference from drink mixers or fruit juice extractors is simple. Most of these devices employ series-wound or universal motors, and may be effectively silenced by use of a Filterette Junior connected at the power receptacle from which the apparatus is being supplied with current. Some drink mixers, however, and most fruit juice extractors create a somewhat more intense interference than may be suppressed by use of the Filterette Junior. These devices, however, may be made radio interference free by use of the Filterette Senior connected in the same manner as the Filterette Junior.



TOBE FILTERETTE No. 110 P. O. INSTALLED AT A SODA FOUNTAIN

Q. Must a separate Filterette be used for each device?

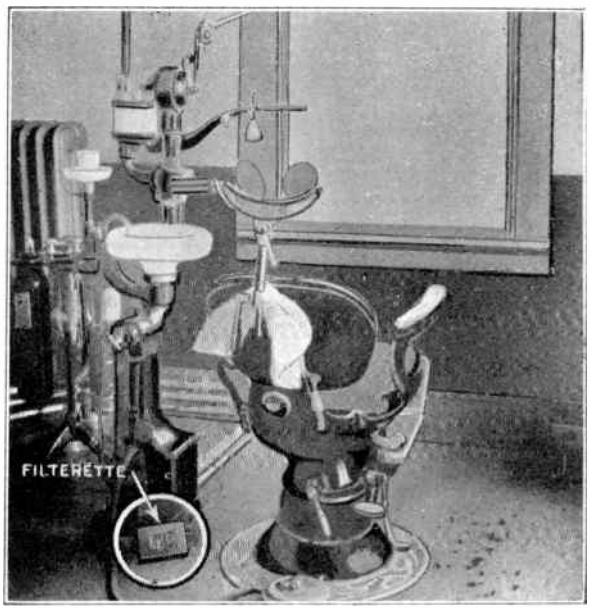
A. Not always. A practice commonly found satisfactory for soda fountains is the use of a single Filterette No. 110 for suppressing the interference from several drink mixers. These devices usually require from ½ to 1 ampere, at 110 volts, and are usually located close together so that several such devices may be connected to a single Filterette No. 110 P. O. with leads not over 2 feet in length. A return connection from the Filterette should, of course, be made to the frame of each of the motors.

Tobe Filterette Jr. ..... Price $3.50
110 V., A. C. or D. C.

Tobe Filterette No. 110 P. O. ..... Price $12.50
110 V., A. C. or D. C. 5 Amp.

TOBE Filterette

DENTAL MOTORS



TYPICAL DENTAL ENGINE INSTALLATION
FILTERETTE MUST BE MOUNTED CLOSE TO BASE OF ENGINE

Q. What type of interference is created by a dental engine?

A. The interference from this source is in the form of a high-pitched whine varying in pitch with the variation of speed of the dental engine.

Q. How may this interference be suppressed?

A. Filterette No. 110 PO is particularly well suited for application to dental engines to suppress this interference.

Q. How is the Filterette installed?

A. Insert the attachment plug of Filterette No. 110 PO in the wall receptacle. Insert the attachment plug of the dental engine in the receptacle provided on the Filterette. Connect a wire from the binding post on the Filterette to a carefully cleaned part of the dental engine frame. Coil the attachment cord of the dental engine into the smallest possible space, in order that the likelihood of interference radiation from this cord may be minimized.

Q. What other dental apparatus may cause interference?

A. The high speed laboratory motor may also be an offender.

Q. How may interference from this source be identified?

A. This interference is usually in the form of a steady clicking, and is due to the operation of the centrifugal governor used for maintaining the motor at a constant speed.

Q. How may interference from this type of apparatus be suppressed?

A. A Filterette No. 110 PO installed in the same manner as previously described should provide complete elimination of the interference from this source. If satisfaction is to be obtained, however, the lead between the Filterette and the motor should not be over 4" long, and the Filterette should be so located that it is not affected by the field of the motor.

Should the application of Tobe Filterette No. 110 PO fail to provide elimination from a motor of this type, the position of the Filterette with relation to the motor should be varied, since this relation usually has a material bearing on the benefit obtained from the Filterette.

Tobe Filterette No. 110 PO .....Price $12.50
110 Volts A. C. or D. C., 5 Amperes

FLOUR BLEACHERS

Q. What type of interference is created by a flour bleacher of the type commonly termed "continuous arc electrifier?"

A. The interference created by a flour bleacher of this type is similar to that created by the electric ignition system of an oil burner, and is heard as a steady roaring.

Q. How may this interference be suppressed?

A. A Filterette of the inductive-capacitive type, such as Tobe Filterette No. 231, should be connected directly in series with the power input to such a machine to prevent the feed back of interference into the power line. This Filterette should be connected at the load side of the switch controlling the bleacher. Its return wire should be connected to a carefully cleaned part of the bleacher frame.

Q. What shielding of the high tension side of the apparatus is required?

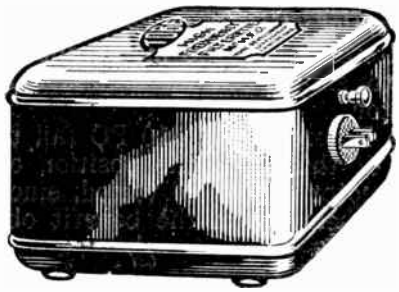
A. Since most flour bleachers are so constructed that the entire high tension system is enclosed in the metal housing of the machine, additional shielding is seldom required.

Q. What governs the choice of the Filterette used with a four bleacher?

A. The Filterette, which must be of the inductive-capacitive type, should be designed to carry the maximum current required by the bleacher, and should bear the same voltage rating as the bleacher.

TOBE Filterette

DIATHERMY APPARATUS



Q. What types of electro-medical equipment cause radio interference?

A. Perhaps the most persistent offenders are Diathermy machines commonly used by doctors, and the so-called Violet Ray machine used in the home.

Q. How is interference from either type of apparatus indicated?

A. The operation of a Diathermy machine produces a fairly high-pitched roaring sound which may vary in frequency and intensity as the machine is adjusted. Interference from this type of apparatus is usually peaked at some point on the dial, although it is probable that if the receiver is located in close proximity to the source of the interference, the intensity will appear to be the same over the entire broadcast band.

Interference from the home operated Violet Ray apparatus is in the form of a heavier roaring sound varying somewhat in intensity from time to time and having no definite wavelength.

Q. How may the interference from diathermy apparatus be suppressed?

A. Due to the peculiar intensity of the interference from this type of apparatus, a special type of Filterette is required for preventing the feed back of this interference into the power line. The usual capacitive type or inductive-capacitive type Filterette is of little value in suppressing interference from this type of apparatus.

The special Filterette for high frequency apparatus is known as No. 1 HFO, and is designed for operation at 110 volts, 60 cycles, and not over six amperes.

Q. Will the use of this Filterette effectively suppress the interference from high frequency apparatus?

A. No. In addition to using this Filterette, a shield must be provided completely enclosing both the high frequency machine and the patient taking the treatment.

Q. Why is this shielding necessary?

A. In addition to the interference which is fed back into the power line, high frequency waves are radiated directly from the secondary side of the machine. These waves may not be eliminated since they are responsible for the efficacy of the treatments given by the apparatus.

The secondary radiation may be picked up by electric light wires, telephone wires, annunciator wires, or any other building wiring, and may be carried for a considerable distance on these wires, thus spreading the interference over a wide area.

The shielding of the apparatus confines the secondary radiation to a restricted area and prevents its being picked up in building wiring.

Q. Would not the shielding alone be effective in suppressing this interference?

A. No. Although this shielding would restrict the secondary radiation, enough interference would be fed back into the power line to cause considerable disturbance.

Q. Would the construction of a metal housing surrounding the machine and embodying the line filter provide complete elimination of the interference?

A. No. The shielding must enclose both the machine and the patient taking the treatment, since the application of the electrodes to the body of the patient causes the patient to act as a broadcast antenna so that if complete elimination of the interference is to result, the patient also must be enclosed within the shielding.

Q. How may this shielding be accomplished economically and safely?

A. The use of solid metal is not recommended for shielding of this type. Copper or galvanized iron screen has been found entirely satisfactory for shield construction.

The Tobe Deutschmann Corporation of Canton, Mass., is in a position to furnish a carefully constructed shield sufficiently large to contain both Diathermy apparatus and patient.

Q. May a telephone be located within the screen?

A. No. All wires entering the shielded booth must pass through the special Filterette, which is located at the point where the power wires enter the booth. The construction of the Filterette is such that it may not be used with the telephone.

Q. Are these precautions required when the home Violet Ray outfit is used?

A. Yes. Although the disturbance from such a device may not be carried over so wide an area as that created by Diathermy apparatus, it is transmitted in the same manner both as regards feed back in the power line and secondary radiation. It is, therefore, necessary that the same methods of suppression be followed.

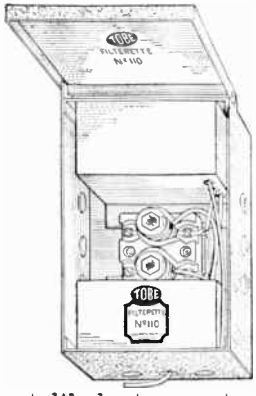
Q. Are there any cases in which the Filterette alone may prove effective?

A. Yes. If all wiring within the building in which the high frequency apparatus is located is completely shielded, if the service lines to the building are underground, and if no receivers are operated within 500 feet of the apparatus the use of Filterette No. 1 HFO without the screen may be effective.

Tobe Filterette No. 1 HFO .....Price $35.00
110 V.—A. C., 60 Cycles, 6 Amp.

Tobe Hi-Frequency Screen: Price on application

MOTOR GENERATOR SETS AND ROTARY CONVERTERS



Q. What type of interference is created by a Motor Generator Set?

A. The interference created by a Motor Generator Set is usually heard as a high pitched crackling, varying slightly in intensity from time to time. This interference originates at the D. C. end of the machine when it is used for converting direct current to alternating current, and may originate at either the D. C. or A. C. end when the machine is used in changing alternating current to direct current.

Usually, however, A. C. to D. C. Converters employ 3-phase motors, which are not likely to create radio interference.

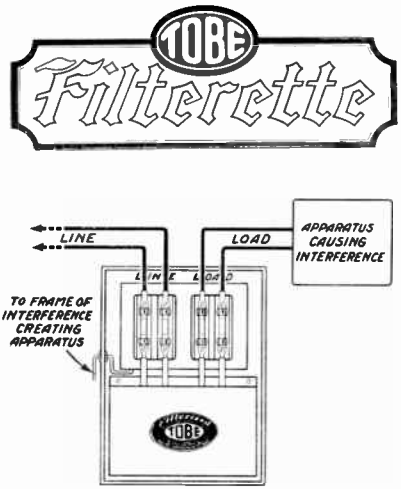
Q. How may interference from a machine of this type be suppressed?

A. The procedure necessary for suppressing interference from a Motor Generator Set will vary with the type of apparatus used and the location and manner in which it is installed. As a rule, it is necessary that a Filterette of the inductive-capacitive type be applied at both the D. C. and A. C. ends of the machine, although in some cases a capacitive type Filterette at one or both ends may prove satisfactory.

Q. How may the type of Filterette or Filterettes for application to a Motor Generator Set be determined?

A. This determination must be made experimentally. For suppressing the interference due to small D. C. to A. C. Converters such as are commonly used for the operation of radio receivers, electric phonographs, Neon signs, and certain types of electric refrigerators, it is practically always necessary that Filterettes of the inductive-capacitive type be used.

Since the majority of these machines are rated at 500 watts or less, Filterette No. 110 is the type most commonly used. One of these Filterettes should be connected directly in series with the input leads to the machine and should be so located that the connecting leads between the Filterette and the motor are not over 8" in length.



The return wire from the Filterette should be connected in the most direct manner possible to a carefully cleaned part of the motor frame.

Another No. 110 Filterette should be connected directly in series with the output leads from the generator and installed in the manner previously described.

The use of these two Filterettes should effectively prevent the radiation of any radio interference from this apparatus.

Q. Why, if the interference is created at the D. C. end of the machine, must a Filterette be used at the A. C. end?

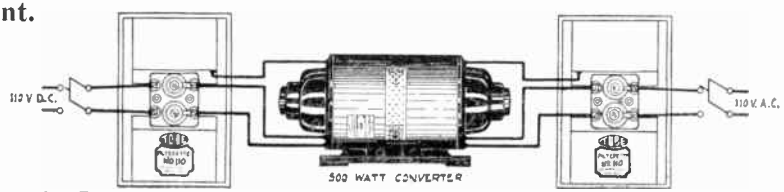
A. Although the interference is created at the D. C. end of the machine, and it is fed back into the D. C. power lines from which it may be radiated, it may also be carried by the A. C. power lines, due to the coupling between the A. C. and D. C. ends of the machine. This, of course, means that if complete suppression of the interference is to be obtained, a Filterette must be applied at the A. C. and as well as the D. C. end of the machine.

In view of the fact that the interference may be transferred from one circuit to another, it is obviously necessary that all long leads to the machine should be filtered. In some cases a rheostat for obtaining voltage control may be located at some distance from the machine. It is likely that interference will be carried by the leads to the rheostat and radiated from them to such an extent that objectionable interference will be present even though Filterettes are applied at both D. C. and A. C. ends of the machine.

This condition is remedied by locating the rheostat directly at the machine or filtering the rheostat leads by means of Tobe Filterette No. 110.

TOBE Filterette

Q. Are two Filterettes required for suppressing interference from a machine for converting alternating current to direct current.



A. In some cases, yes. However, since the interference created by a direct current generator is usually less than that created by a direct current motor, we sometimes find that the application of capacitive type Filterettes to machines of this type is entirely satisfactory.

Assuming, for example, that the machine in question is a 1.0 K. W., 110 volt, generator, driven by a three-phase, 220 volt motor, a No. 10 Filterette connected at the D. C. end, and a No. 23 Filterette connected at the A. C. end, should be satisfactory for suppressing whatever interference may be created by this apparatus.

If this procedure does not provide complete elimination of the interference, an inductive-capacitive type Filterette (No. 131) at the D. C. end of the machine will probably complete the elimination of the interference.

It is important that the Filterette used conform with the voltage and amperage rating of the apparatus to which it is to be applied. Refer to chart below.

Filterette No.	Volts	Volts or Amperes	Price
10	110 D. C.	5,000 Watts	$10.00
20	220 D. C.	10,000 Watts	$15.00
23	220 A. C.	15,000 Watts	$20.00
110	110 D. C. or A. C.	5 Amp.	$15.00
131	110 D. C. or A. C.	10 Amp.	$20.00
132	110 D. C. or A. C.	20 Amp.	$30.00
133	110 D. C. or A. C.	30 Amp.	$42.50
134	110 D. C. or A. C.	40 Amp.	$57.50
135	110 D. C. or A. C.	50 Amp.	$75.00
231	220 D. C. or A. C.	10 Amp.	$30.00
232	220 D. C. or A. C.	20 Amp.	$40.00
233	220 D. C. or A. C.	30 Amp.	$52.50
234	220 D. C. or A. C.	40 Amp.	$67.50
235	220 D. C. or A. C.	50 Amp.	$85.00

TRAFFIC CONTROL APPARATUS

Q. What types of traffic control apparatus cause radio interference?

A. Both the flashing beacon used as a warning signal at dangerous crossings and the synchronized or progressive form of traffic control apparatus may cause radio interference when operated electrically.

Some flashing traffic beacons are gas operated, and, of course, do not cause radio interference.

Q. How may interference from a flashing traffic beacon be identified?

A. Interference from a device of this type will be in the form of a steady clicking corresponding to the flashing of the signal. This clicking may occur from 50 to 80 times per minute.

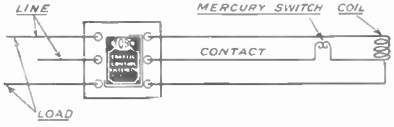
Q. Over how great an area may this disturbance be noticed?

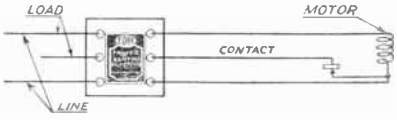
A. This depends on the manner in which the flashing beacon is installed and on the manner in which the power and telephone wiring is carried. If all wiring is exposed, and particularly if the leads between the flasher mechanism and the load are long, the interference may be in evidence at a distance as great as one mile from its origin. However, it is usually noticeable only within a few blocks of the beacon.

Q. How may this interference be suppressed?

A. Special Filterettes have been developed for application to various types of flashing beacons and can be supplied by the Tobe Deutschmann Corporation of Canton, Mass., on receipt of the manufacturer's name, and model number of the flasher, and information as to the load being controlled by the switch mechanism.

Filterettes No. 1-DOA, 1-DOC, 1-DOE, 1-DOG are designed for application to flashing beacons requiring not over 2½ amperes intermittently.





Q. How are these Filterettes installed?

A. The universal traffic beacon Filterette, with optional connections is shown in the accompanying cuts. Either of the connections shown may prove satisfactory.

Q. How is interference from synchronized traffic control apparatus indicated?

A. This interference usually consists of a steady clicking, usually at such frequency as to constitute an almost continuous roar, punctuated by heavier clicks as the various indicating circuits are switched on and off.

Q. Over how great an area may this interference be noted?

A. Since a synchronized traffic control system may extend for several miles, the interference will probably be noted over the entire area in which the traffic control system is in operation.

Q. How may this interference be suppressed?

A. The treatment of this problem requires specialized knowledge and instruction as to the installation of Filterettes which are designed for application to specific types of apparatus.

These Filterettes may be supplied on receipt of the manufacturer's name, and model number of the traffic control apparatus, and complete information as to the manner in which the apparatus is installed, the number of relay circuits, the load on each of the switching circuits, and the voltages at which the apparatus is operated.

Tobe Filterettes for application to flashing traffic beacons. All models ..... List Price $15.00
110 Volts A. C. or D. C. 2½ Amp. Intermittent

1 D O E	For mercury switch mechanism of Essco Flashing Traffic Beacon. 110 volts A. C. or D. C.
1 D O A	For mercury switch mechanism of A. G. A., Flashing Traffic Beacon.
1 D O C	Far application to mercury switch mechanism of Crouse-Hinds Flashing Beacon.
I D O G	For mercury switch mechanism of G. E. Flashing Traffic Beacon.

Tobe Traffic Signal Filterettes are used and endorsed by the Massachusetts State Highway Commission.

NEON SIGNS

Q. Do Neon signs cause interference?

A. A steady burning Neon sign in good condition should cause no radio interference. If a sign of this type appears to be causing interference, it should be carefully inspected for broken bushings or other defects. In many cases an accumulation of dirt on the glass tubing of the sign will result in the passage of minute currents causing radio interference. A thorough overhauling of the sign should be all that is required to eliminate the interference. If interference is being caused by the flashing on and off of the sign, the same treatment as required for any flashing sign should be followed.

SIGN FLASHERS

Q. What types of sign flasher create radio interference?

A. Practically all types.

Q. How is this interference distributed?

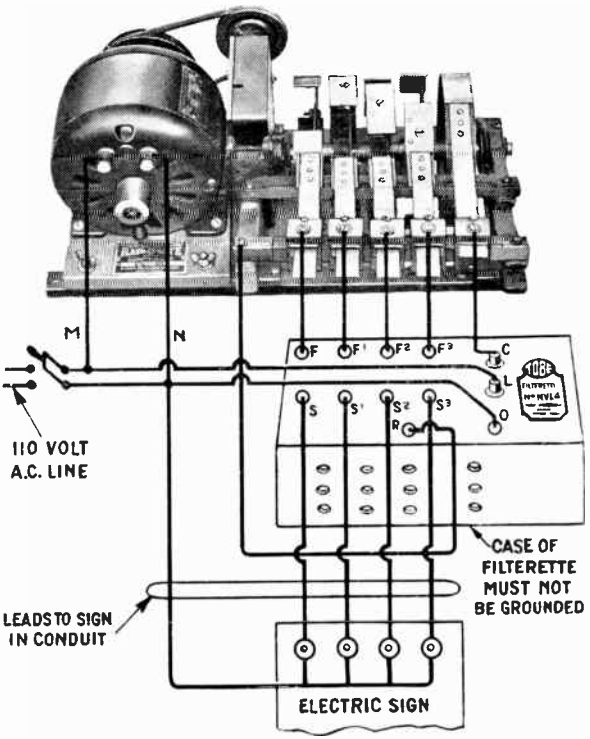
A. This interference may be conductively imposed on the power lines to the flasher mechanism or on the leads between the flasher and the sign, and may be distributed along and radiated from either the power line or the load leads.

Q. How may the interference from the various types of sign flasher be suppressed?

A. The simplest type of sign flasher is the thermostatic button designed to be placed under the lamp in a receptacle. It is not advisable to attempt to eliminate the interference from a flasher of this type, since a Filterette for this purpose would be considerably more expensive than the flasher. However, certain types of small illuminated display employ several thermostatic flashers controlling a total load of approximately 500 watts. These flashers are usually installed in the same housing with the load which they control, and may usually be quieted by use of a single Filterette of the inductive capacitive type, such as Tobe Filterette No. 110, connected directly at the power input to display.

The suppression of interference from small mercury switches is described in considerable detail under the heading of Traffic Control Apparatus. For controlling sign loads heavier than may be controlled by a thermostatic switch, flashers of the mercury switch or rotating drum type are in common use. When the flasher is so located that the load leads are relatively short, it is often possible to eliminate whatever interference is created by use of a Filterette of the inductive capacitive type, connected directly to the power input to the flasher mechanism.

Such an installation is usually most effective when the flasher mechanism is insulated from the ground, and the return wire from the Filterette is connected to the frame of the flasher mechanism. This procedure will often result in complete elimination of interference, even when the leads between the flasher mechanism and the sign are of considerable length. Usually, however, a great deal of interference is radiated from these load leads so that a different type of Filterette installation is required. The installation of such a Filterette must be such that the interference is not only kept out of the supply line but is also prevented from reaching the load leads.



WIRING AND CONNECTIONS, FILTERETTE TYPE NYL-4

Q. How may the proper type of Filterette for application to a sign flasher be determined?

A. In practically all cases, it is advisable to use a Filterette of the NYL-4 type. This Filterette is most commonly supplied to handle 10 amperes per circuit, at 110 volts, and may be obtained to meet the specific requirements of any sign flasher.

Q. How is this Filterette installed?

A. This Filterette must be mounted as close as possible to the flasher mechanism and must be insulated from the ground and from the flasher mechanism. The flexible leads coming from the outlets marked "F" must be connected to the terminals of the flasher mechanism. The lead from opening "C" connects to the common terminal of the flasher mechanism. The leads from the openings marked "S" are connected to the load and the lead from the opening marked "L" connects to the line wire which would normally be connected to the common terminal of the flasher mechanism. The lead from opening "R" must be connected to a carefully cleaned part of the flasher frame, and that from opening "O" must be connected to the opposite side of the line from that to which lead "L" was connected. When this Filterette is installed in accordance with these instructions, complete elimination of interference due to the feed back into the line or the radiation from the load leads should result.

Q. Does the motor used for operating a sign flasher create interference?

A. No. In practically all cases, this motor creates no interference. However, should it be found that interference is being created by the motor, lead "M" should be connected to the lead coming from "C" instead of being connected as shown.

Q. How may the interference from a flasher having more than four contacts be suppressed?

A. Standard practice provides the construction of four contact units. This means that if a flasher is required for operating more than four circuits, several four circuit flashers may be combined. When this is done, a Filterette of the NYL-4 type should be applied to each four-circuit section. A condition frequently encountered is the use of three-wire 110-220 volt wiring systems. When applying Filterettes to a flasher installed on such a system, the lead "O" should be connected to the neutral wire of the system.

Tobe Filterette Type NYL-4 ..... Price $38.00
For 110 Volts A. C. or D. C., 4 circuits, 10 Amps. Per Circuit

FARM LIGHTING PLANTS

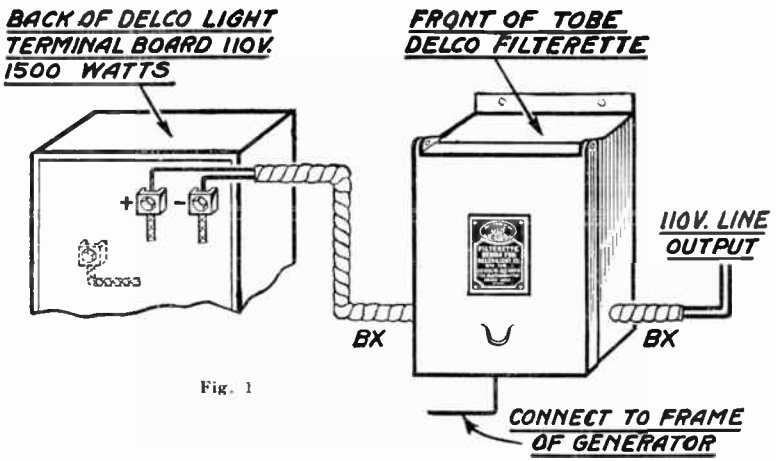


Fig. 1

TOBE DELCO FILTERETTE ATTACHED TO 110 VOLT, 1500 WATT, DELCO AUTOMATIC FARM LIGHTING PLANT.

Q. What causes interference from a farm lighting plant?

A. The interference from a farm lighting plant is due partly to the ignition system of the gas engine employed as prime-mover for the generator and partly to the D. C. Generator.

Q. How may the interference from the generator be suppressed?

A. Tobe Delco Filterette type DM 110 designed especially for application to the Delco Farm Lighting Plant is readily adaptable to any 1500 watt 110 volt farm lighting plant. This Filterette should be connected directly in series with the output leads from the generator as shown in Figure 1, and the return wire from the Filterette should be connected to a carefully cleaned part of the generator frame. This Filterette consists of two sections; the first for connection in series with the output leads from the generator as previously described, and the second for connection in series with the common input lead to the distributor. The second section of the Filterette is provided with a plug terminal and socket which

facilitates connection to the distributor. This Filterette is plugged into the distributor head as shown in Figure 2 and the common lead is plugged into the socket on the Filterette. On rare occasions, it may be necessary to shield the high tension leads. This may be done by wiring the ignition system with a shielded wire now on the market, and by constructing a metal housing completely enclosing each spark plug and electrically connected to both the engine block and the shielding of the ignition wiring.

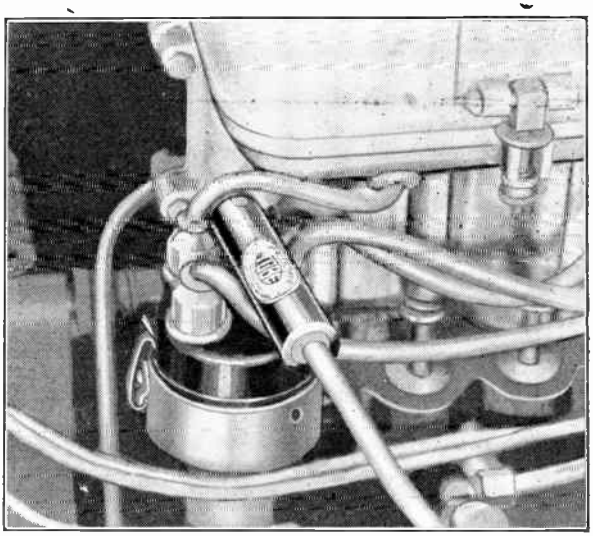


Fig. 2

APPLICATION OF TOBE FILTERETTE TYPE DM-110 IGN to 110 VOLT 1500 WATT FARM LIGHTING PLANT.

All wiring must be carried in conduit or BX, and the output leads from the generator must be carried on the side of the motor away from the ignition system.

Q. Under what circumstances may the use of this Filterette not result in complete suppression of the interference?

A. In some cases a starting switch is located at a considerable distance from the lighting plant. When this is the case, a No. 10 Filterette must be connected at the plant, directly across the leads to the switch, to prevent the interference from being carried along the switch leads and radiated from them, thus minimizing the effect of the other preventive devices installed.

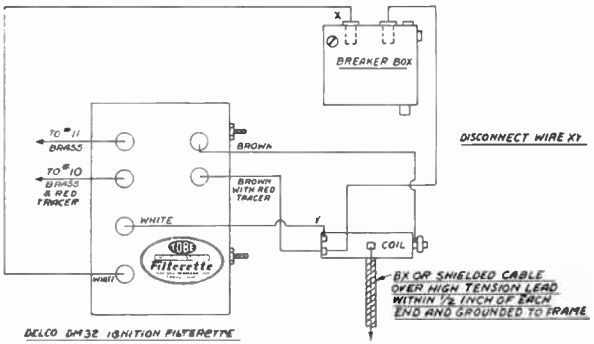


Fig. 4

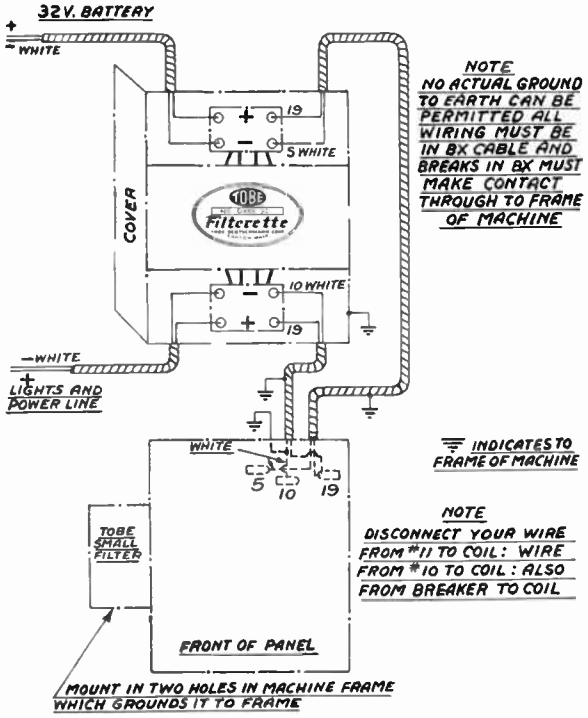


Fig. 5

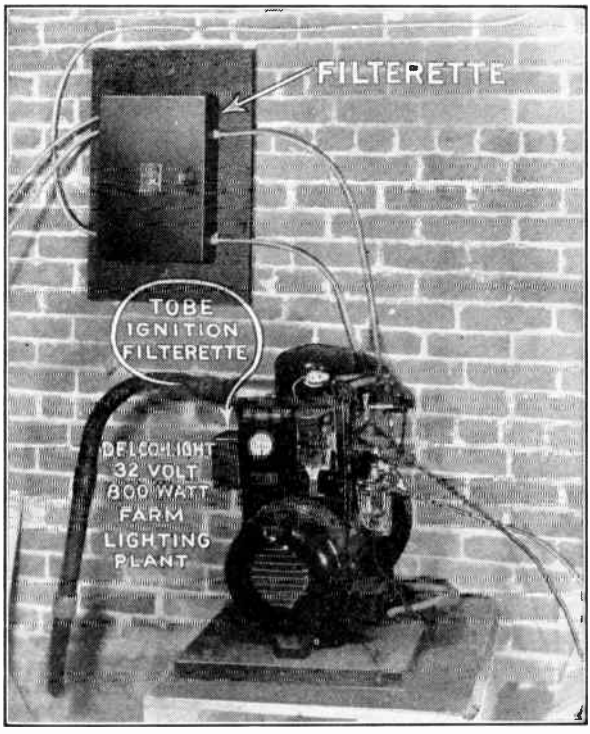


Fig. 3

TOBE FILTERETTE ATTACHED TO DELCO-LIGHT 32 VOLT, 800 WATT FARM LIGHTING PLANT.

Q. May the same Filterette be applied to a 32 volt plant?

A. No. A special, two-section Filterette known as type DM-32 has been designed for application to the Delco 32 volt 800 watt lighting plant. This Filterette and its installation are shown in Figures 3, 4 and 5.

Tobe Filterette type DM 110 for application to 110 volt, 1500 watt D. C. farm lighting plants, Price, complete $38.00

Tobe Filterette type DM-32 for application to 32 volt 800 watt D. C. farm lighting plants....Price, complete $45.00

INTERFERENCE ORDINANCES

Q. By whom should the expense of Filterette installations be borne?

A. The answer to this question is usually determined by local conditions, the best solution generally being obtained by cooperation between the owners of the offending apparatus and the broadcast listeners whose reception is being affected by the apparatus. In view of the fact that benefits are being received by the broadcast listener, he should be willing to contribute his share toward the Filterette installation.

However, the owner of the interference creating apparatus has, of course, some responsibility toward his community, and should, therefore, be willing to contribute his share toward making his own apparatus interference free.

The following quotation from the government bulletin, "State and Municipal Regulation of Radio Communication," recently issued by the Legal Division of the Federal Radio Commission, illustrates the attitude shown by many owners of interference creating apparatus:

"There are also industrial activities which cause interference with radio reception. For example, "Precipitator" devices, which are designed to control smoke and noxious fumes by the creation of an intense electrical field within the stack, are, in effect, radio transmitters. Interference is also caused by arc welders, portable drills, motors and generators, bell ringers, thermostats, and starting contacts.

Practically all these devices can be cured of their interference effects by repair or the addition of filtering attachments. In this connection, each industry is greatly concerned with the maintenance of public good will as well as efficiency in its own processes. The occasion when a manufacturer refuses to correct an abuse once it is called to his attention is so rare that certainly mere local legislation is not the most effective weapon. Instances are known to every radio trades association where manufacturers have gone to expense aggregating thousands of dollars purely for the purpose of eliminating radio interference. Surely, it would not be expected that merely because of the passing of an ordinance by a community, an industry should go to prohibitive expense."

Q. In the event that the owner of the offending apparatus refuses to cooperate, how may legal steps be taken to compel him to apply interference eliminating devices?

A. In many cases local ordinances may be drawn to compel owners of disturbing machinery to suspend its operation, or to adjust it so that no interference will be created.

Q. How drastic may these ordinances be?

A. These ordinances must be so drawn that they will not conflict with any Federal laws and should be so phrased as to

be inapplicable to persons who are not guilty of willful or negligent disregard of the radio reception rights of the community.

Another quotation from the previously mentioned bulletin of the Federal Radio Commission illustrates this point:

"The spark and the arc, together with their accompanying radio interference, are found in hundreds of appliances in common use. In some such appliances the disturbance is a necessary part of the apparatus. Examples of this are X ray, violet ray, and diathermic machines.

In these cases radio interference is cured or prevented by the insertion of attachments which prevent the flow of the radio-frequency impulses back into the power lines for general dissemination. In other devices, the interference is not necessarily produced by the operation of the device and is due only to improper design or to a defect which has developed. Devices of this character are heating pads, vibratory battery chargers, electric sign "flashers," and motors and controls such as those used in vacuum cleaners, electric refrigerators, washing machines, elevators, and innumerable other devices.

The holding of a householder to a criminal or penal responsibility because of the mere ownership or operation of a device within this classification is certainly unjust.

In many cities, however, ordinances of general application have been enacted where the real purpose has been to reach individual offenders who knowingly and persistently operate interference-producing devices of wide effect, refusing to attach corrective apparatus or to make repairs.

As to such persons, ordinances are valid if reasonable. In such applications the ordinances are in nowise burdens on interstate commerce but are rather in aid thereof. They come within the power of the State to prevent and abate nuisances.

Q. Can electrical apparatus be purchased free from causing radio interference?

A. Another quotation from the previously mentioned bulletin of the Federal Radio Commission illustrates this point:

Whether the device causes interference through lack of "choke" or "filter" attachments or through improper design, the cure for the interference lies in the education of the manufacturer. Many brands of devices have become specifically known as interference producers and this reputation is compelling manufacturers to improve their construction. Already a large number of such appliances carry the guarantee of the maker that they will not produce interference with radio reception. The importance of the work along this line of trades associations has been tremendous and the time will soon arrive when this type of interference will no longer exist.

Q. What ordinances are recognized as enforcible?

A. The following model ordinances drawn by the Legal Department of Federal Radio Commission are designed to provide a maximum of benefit to the broadcast listener with a minimum of hardship to the individual owners of electrical apparatus and to harmonize with Federal laws.

APPENDIX A

AN ORDINANCE PROHIBITING ELECTRICAL INTERFERENCE WITH RADIO RECEIPTION, AND PROVIDING FOR PUNISHMENT FOR THE VIOLATION THEREOF

Be it ordained by .....

Section 1. That it shall be unlawful for any person, firm, copartnership, association, or corporation knowingly or wantonly to operate or cause to be operated, any machine, device, apparatus, or instrument of any kind whatsoever within the corporate limits of the city of....., between the hours of .....o'clock, ...m., and 12 o'clock midnight, the operation of which shall cause reasonably preventable electrical interference with radio reception, within said municipal limits: Provided, however, That X-ray pictures, examinations, or treatments may be made at any time if the machines or apparatus used therefor are properly equipped to avoid all unnecessary or reasonably preventable interference with radio reception and are not negligently operated.

Sec. 2. That this ordinance shall not be held or construed to embrace or cover the regulation of any transmitting, broadcasting or receiving instrument, apparatus, or device used or useful in interstate commerce or the operation of which instrument, apparatus, or device is licensed or authorized by or under the provisions of any act of the Congress of the United States

Sec. 3. That every person, copartnership, association, firm, or corporation violating any of the provisions of this ordinance shall, upon conviction, be punished by fine of not less than .....dollars nor more than .....dollars, or by imprisonment in the city jail for not less than .....days nor more than ..... days or by both such fine and imprisonment. Each day during which such such violation continues shall constitute a separate offense.

Sec. 4. That this ordinance shall take effect, etc. (here follow requirement of State laws).

APPENDIX B

AN ORDINANCE PROHIBITING THE OPERATION OF MECHANICAL DEVICES, MACHINES, APPARATUS, OR INSTRUMENTS TO INTENSIFF OR AMPLIFY THE HUMAN VOICE OR ANY SOUND OR NOISE BY WHICH THE PEACE OR GOOD ORDER OF THE NEIGHBORHOOD IS DISTURBED OR PERSONS OWNING, USING, OR OCCUPYING PROPERTY IN THE NEIGHBORHOOD ARE DISTURBED OR ANNOYED

Be it ordained by .....

Section 1. That it shall be unlawful for any person, copartnership, association, firm, or corporation knowingly or wantonly to use or operate, or to cause to be used or operated, any mechanical device, machine, apparatus, or instrument for intensification or amplification of the human voice or any sound or noise in any public or private place in such manner that the peace and good order of the neighborhood is disturbed or that persons owning, using, or occupying property in the neighborhood are disturbed or annoyed.

Sec. 2. That every person, copartnership, association, firm, or corporabe punished by fine of not less than .....dollars nor more tion violating any of the provisions of this ordinance shall, upon conviction, than .....dollars, or by imprisonment in the city jail for not less than .....days nor more than.....days, or by

both such fine and imprisonment. Each day during which such violation continues shall constitute a separate offense.

Sec. 3. That this ordinance shall take effect, etc. (here follow requirement of State laws).

Q. May special funds be collected by means of a tax or license fee for radio receivers or transmitters to provide for the enforcement of such radio ordinances?

A. No. In this regard the Legal Department of the Federal Radio Commission has expressed the following opinion:

Such ordinances are void. No tax may be levied by State or municipalities on the privilege of engaging in the business of transmitting or receiving radio communications. Both transmission and reception are required to carry on communication. Neither can be dispensed with. Each is essential to intercourse and both a transmitter and receiver are indispensable in effecting interstate commerce. A privilege tax on transmitting or receiving would be a tax on an indispensable instrumentality of interstate commerce. The right of a State to collect such a tax is denied in Atlantic and Pacific Telegraph Co. v. Philadelphia (190 U. S. 160, 47 L. ed. 995).

Q. What municipalities or states now have legislation affecting the operation of apparatus likely to create radio interference?

A. The following is a partial list of municipalities now having interference ordinances against needless disturbance of radio reception, or taking the matter under advisement.

Independence, Kansas.	State of Maine.
El Paso, Texas.	St. Paul, Minn.
Marinette, Wis.	Los Angeles, Cal.
Miles City, Mont.	City of Two Harbors, Mich.
Lake Placid, N. Y.	Portland, Ore.
Reading, Pa.	Dumright, Okla.
San Bernardino, Cal.	Braintree, Mass.
Sioux Falls, S. D.	Brattleboro, Vt.
Stockton, Cal.	Beverly, Mass.
Fairfield, Iowa.	Sault Ste. Marie, Mich.
Boonville, N. Y.	Millville, N. Y.
Warsaw, Ind.	Wausau, Mich.
Bay City, Mich.	Joplin, Mo.

Send ten cents to Tobe Deutschmann Corporation for information concerning forming a radio interference club in your locality and copy of model ordinance which has been used in other cities for the suppression of radio interference.

TOBE

TRADE MARK

A Manufacturer can have no greater faith in his products than to guarantee their faithful operation, and with such guarantee Tobe products are sold

1930

PRICE LIST

FILTERETTES - CONDENSERS
ACCESSORIES

This Catalog Supersedes all Previous Price Lists and Bulletins

Prices subject to change without Notice

TOBE DEUTSCHMANN
CORPORATION

Pioneers and Leaders in the Manufacture of Technical Apparatus

CANTON, MASS.

TOBE Filterette
THE RADIO NOISE REMOVER
Endorsed by the Nation

CONVENIENT PLUG-IN FILTERETTES

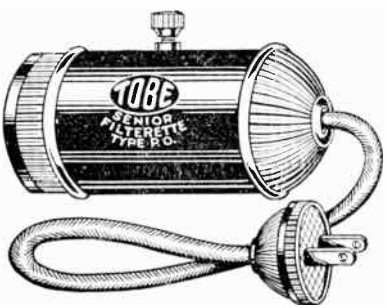
TOBE FILTERETTE JUNIOR

An ideal Filter for small motors such as are used for electric fans, hair dryers, barbers' clippers, vacuum cleaners, cash registers, etc. Plugs into the line, and it is necessary only to run a small wire from the binding post on the Filterette to any part of the motor frame. Interference is eliminated at once.

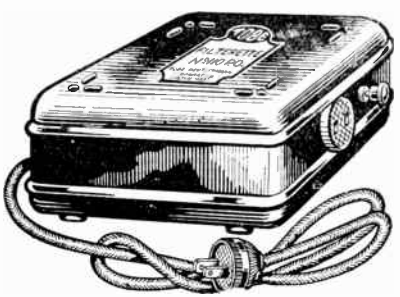
Maximum potential 110 volts A. C. or D. C.
Maximum load 500 watts.

Price $3.50

TOBE LINE FILTERETTES



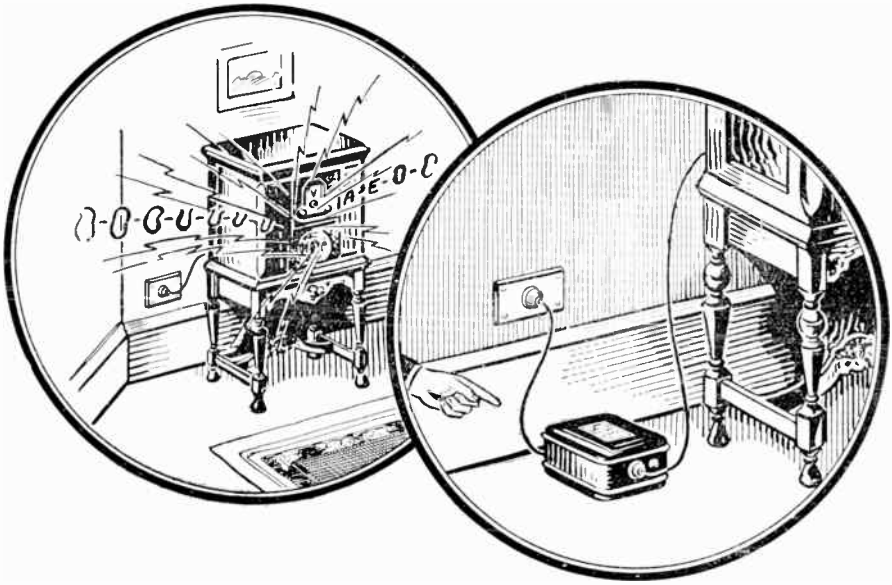
TOBE SENIOR FILTERETTE, TYPE P. O.
Price $7.50
Maximum Potential 110 volts A. C. or D. C.
Maximum Current, 5 Amperes



TOBE FILTERETTE NO. 110 P. O.
Price $12.50
Maximum Potential 110 volts A. C. or D. C.
Maximum Current, 5 Amperes

TOBE Filterette

TOBE LINE FILTERETTES



Radio noises which perhaps you are blaming on "static" may in reality be caused by the operation of some electrical appliance in your home. The sewing machine, the dish-washer, the oil-burner, the refrigerator, fans, vacuum cleaners, hair dryers, drink mixers, all these may be spoiling your radio reception.

Are the electrical disturbances in your neighborhood being carried by "DIRECT WIRE" right to your set? Tobe Line Filterettes instantly cut down the noises which are being telephoned to your set over the electric light wiring in your home.

Line Filterettes may be used in either of two ways: they are

1 Installed on the radio set itself or

2 Installed on the electrical appliance causing the noise.

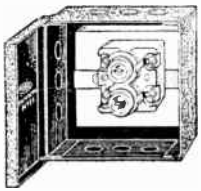
TRY THE FILTERETTE ON OUR RADIO SET FIRST. If the Senior does not stop the noise, the 110 P. O., more than twice as powerful, may serve to cut down the noise to a point where it is no longer noticeable.

Should the interference require more drastic methods of suppression, shut off each appliance, keeping the radio set running. You can tell which appliance is causing the noise, because when the offending appliance is shut off the noise automatically stops. The Line Filterette should then be installed on the appliance, as directed.

TOBE Filterette
THE RADIO NOISE REMOVER
Endorsed by the Nation

FILTERETTES FOR INSTALLATION IN STANDARD WIRING CIRCUITS

TOBE FILTERETTE NO. 10



For 110 volt D. C. motors, generators, chargers, house lighting plants, etc. For use in D. C. circuits only. Must not be used in A. C. Circuits.

Maximum potential
110 volts D. C.
Outside dimensions: 7″x6⅜″x3⅛″
Price $10.00

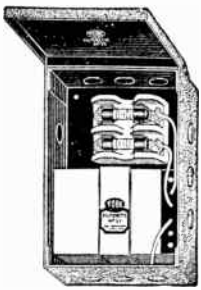
TOBE FILTERETTE NO. 11

For 110 volt A. C. motors, generators, chargers, transformers, house lighting plants, etc.

Maximum potential 110 volts A. C.
Outside dimensions: 7″x6⅜″x3⅛″
Price $10.00

TOBE FILTERETTE NO. 20

For 220 volt D. C. motors, generators, chargers, house lighting plants, etc. For use in D. C. circuits only. Must not be used in A. C. circuits. Maximum Potential 220 volts D. C.
Outside dimensions 10″x6⅜″x3⅛″.
Price $15.00



TOBE FILTERETTE NO. 22

For 220 volt A. C. motors, generators, chargers, transformers, house lighting plants, etc.

Maximum potential 220 volts A. C.
Outside dimensions 10″x6⅜″x3⅛″.

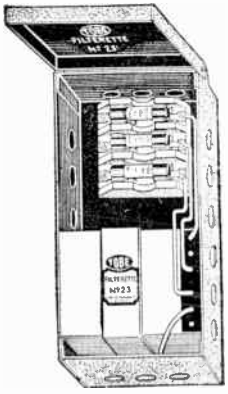
Price $15.00

TOBE

Filterette

THE RADIO NOISE REMOVER

Endorsed by the Nation



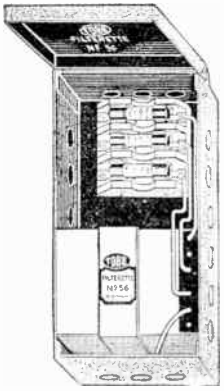
TOBE FILTERETTE NO. 23

For 220 volt 3 phase A. C. 110-220 volt single phase, 3 wire A. C. or 110-220 volt 3 wire D. C. systems. For use in applications similar to the No. 22 where 3 wires are required instead of 2.

Maximum potential 220 volts A. C.
Outside dimensions
13″x6⅜″x3⅛″
Price $20.00

TOBE FILTERETTE NO. 55

For 440 or 550 volts A. C. motors, or other electrical apparatus requiring capacitive type filters capable of operation on potentials between 250 and 550 volts A. C. Maximum potential 550 volts A. C. Outside dimensions 13″x12⅜″x4⅛″. Price $25.00.



TOBE FILTERETTE NO. 56

For 440 or 550 volts 3 phase A. C. systems. For use in applications similar to the No. 55 where 3 wires are required instead of 2.

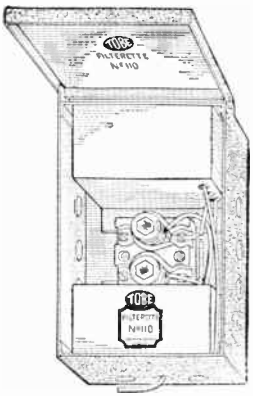
Maximum potential 550 volts A. C.
Outside dimensions
13″x12⅜″x4⅛″
Price $35.00

TOBE FILTERETTE NO. 60

For 600 volt D. C. motors, generators or other electrical apparatus requiring capacitive type filters capable of operation on potentials between 250 and 600 volts D. C. For use in D. C. circuits only. Must not be used in A. C. circuits.
Outside dimensions 13″x12⅜″x4⅛″
Maximum potential 600 volts D. C.
Price $25.00

TOBE Filterette
THE RADIO NOISE REMOVER
Endorsed by the Nation

INDUCTIVE-CAPACITIVE FILTERETTES



TOBE FILTERETTE NO. 110

For all types of 110 A. C. or D. C. electrical apparatus which require a combined inductive and capacitive type filter. Essential for certain types of refrigerators, oil burners, chargers, electric signs or blinkers, electric heating pads, dental motors, and properly shielded violet ray and diathermy apparatus.

Maximum current 5 amperes
Outside dimensions 10″x6⅜″x3⅛″

Price $15.00

TOBE FILTERETTE NO. 221

For all types of 220 volt A. C. or D. C. electrical apparatus which require a combined inductive and capacitive type filter. For use in applications similar to the No. 110 where a Filterette capable of operating at a higher potential is required.

Maximum current 5 amperes.
Outside dimensions 13″x9⅜″x3⅛″
Price $20.00

Nos. 131 to No. 135 and Nos. 231 to No. 235 are for application to large apparatus requiring inductive-capacitive Filterettes.

Type	Rated Voltage	Maximum Current	Price
131	110 v. A. C. or D. C.	10 amps.	$20.00
132	110 v. A. C. or D. C.	20 amps.	$30.00
133	110 v. A. C. or D. C.	30 amps.	$42.50
134	110 v. A. C. or D. C.	40 amps.	$57.50
135	110 v. A. C. or D. C.	50 amps.	$75.00
231	220 v. A. C. or D. C.	10 amps.	$30.00
232	220 v. A. C. or D. C.	20 amps.	$40.00
233	220 v. A. C. or D. C.	30 amps.	$52.50
234	220 v. A. C. or D. C.	40 amps.	$67.50
235	220 v. A. C. or D. C.	50 amps.	$85.00

TOBE SPECIAL MANUFACTURERS' FILTERETTES.

The following items, which constitute only a few of the many filterettes designed especially for manufacturers by this corporation, are available only to authorized service departments of the specified manufacturers, on order. They are not available for general distribution, and this company does not recommend their installation except by accredited service men of the respective manufacturers.

TOBE FILTERETTES FOR OIL BURNERS.

WO 110 For Williams Oil-O-Matic Burner
SH 110 For Super Heator Oil Burner.
E. 110 For Electrol Oil Burner

All models, Price $15.00.

TOBE FILTERETTES FOR DELCO FARM LIGHTING PLANTS

DM 110
DM 110 IGN — For 110 volt, 1500 watt D. C. farm lighting plants, Price, includes two units, $38.00

DM 32
DM 32 IGN — For 32 volt, 800 watt D. C. farm lighting plants, Price, includes two units, $45.00

TOBE FILTERETTES FOR RITTER DENTAL ENGINES

For the Ritter Dental Engine, the Tobe Filterette 110 PO is especially recommended.

TOBE FILTERETTES FOR FLASHING TRAFFIC BEACONS

In many suburban districts the flashing beacons, which are installed at danger points, prove a source of radio interference. This interference is usually in the form of a periodic clicking which may be in evidence for a distance of a mile or more from the beacon.

Obtain name of flasher manufacturer, current and voltage rating of the switch mechanism. The correct Filterette may then be determined by reference to the list below.

TOBE FILTERETTE A. G. A. TYPE 1 D. O. A.

Designed especially for application to mercury switch mechanism of the A. G. A. Flashing Traffic Beacon.

Outside Dimensions: 2⅞"x3"x3½"

Price $15.00

TOBE FILTERETTE G. E. TYPE 1 D. O. G.

Designed especially for application to mercury switch mechanism of the G. E. Flashing Traffic Beacon.

Outside dimensions: 4¾"x3"x4⅜"

Price $15.00

TOBE FILTERETTE CROUSE-HINDS TYPE 1 D. O. C.

Designed especially for application to mercury switch mechanism of the Crouse-Hinds Flashing Traffic Beacon.

Outside dimensions: 4¾"x3"x4⅜"

Price $15.00

TOBE FILTERETTE ESSCO TYPE 1 D. O. E.

Designed especially for application to mercury switch mechanism of the Essco Flashing Traffic Beacon.

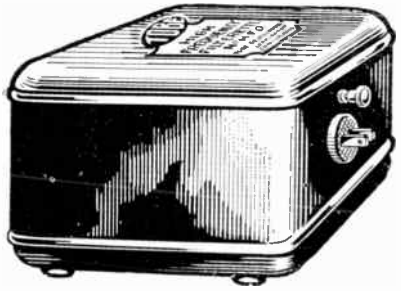
Outside dimensions: 4¾"x3"x4⅜"

Price $15.00

TOBE Filterette
THE RADIO NOISE REMOVER
Endorsed by the Nation

TOBE FILTERETTE AND SCREEN FOR HI-FREQUENCY APPARATUS

TOBE DIATHERMY FILTERETTE



Designed for use in conjunction with Tobe Hi-Frequency Screen for eliminating radio interference created by Diathermy apparatus.

Maximum potential: 110 volts
A. C. 60 cycles
Maximum load: 660 watts
Maximum current: 6 amperes

Outside dimensions: 7″x6″x5″

1 H. F. O. For Engeln, Victor, Acme-International, Fischer, and McIntosh Diathermy apparatus $35.00

TOBE HI-FREQUENCY SCREEN FOR DIATHERMY USE

Specially designed for preventing direct radiation of radio interference created by Diathermy apparatus. Must be used in conjunction with Tobe Hi-Frequency Type Filterette.

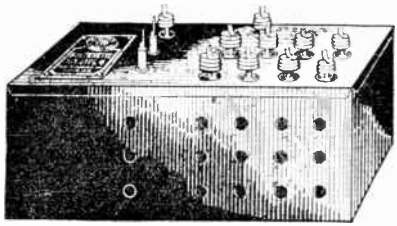
Outside dimensions: 7′x6′x6′6″

Price on application

TOBE Filterette
THE RADIO NOISE REMOVER
Endorsed by the Nation

TOBE SIGN FLASHER FILTERETTE

Type NYL-4



The TOBE FILTERETTE NYL-4 is the result of extensive research work in the Tobe Laboratories on all types of electrical flashing devices and is recommended and designed for application to 110 volt sign flashers with 1 to 4 break contacts, handling not over 10 amperes in each circuit.

The TOBE FILTERETTE NYL-4 is provided with a primary Filterette and 4 secondary Filterette sections, adapatable to all types of flashing signs operated by a motor driven switching apparatus.

Outside dimensions 13"x6"x5". Weight 16 lbs.

One TOBE FILTERETTE NYL-4 should be used for each 4 circuit section in a multiple section flasher installation.

Tobe Filterette NYL-4 110 volts, ...Price $38.00

Tobe Filterette NYL-4 220 volts, ...Price $50.00

TOBE CONDENSER AND ACCESSORY SECTION

TOBE TIPON VACUUM MICA CONDENSER

TOBE Mica Condenser of standard grid-leak size, fitting the ordinary grid-leak clip. Contains an accurately calibrated Mica-insulated Condenser element, sealed into a glass tube in a high vacuum, and thus permanently protected from change or deterioration. Complete with two mounting clips.

0.0002 Mfd., 0.00025 Mfd., 0.0003 Mfd., 0.0004 Mfd. 0.0005 Mfd., and 0.0008 Mfd. 40c each.

0.001 Mfd., 0.002 Mfd., 0.0015 Mfd., 0.0025 Mfd., 50c each.

0.003 Mfd., 0.004 Mfd., 70c each. 0.005 Mfd., 50c each. 0.006 Mfd., 80c each.

TOBE BY-PASS FILTER CONDENSER

This model of the TOBE By-Pass Filter Condenser supersedes a former type. The case is more compact, easier to mount, and is made of metal instead of Bakelite or compound. This makes it possible to ground the case, something which cannot be done with an insulating material. Dimensions: 2½"x1½"x⅞". 300 volts D. C.

Type 350-A, .5 Mfd ....$.0.90 Type 301-A, 1.0 Mfd. $1.25

The Official Browning-Drake Set Specifies a 0.5 Mfd. of this rating

TOBE TINYTOBE CONDENSERS

TINYTOBE Condensers are made for constant operating voltages up to 1000 volts D. C. They are of extremely small size,—a very valuable feature in use, because of the small space often allowed for by-passing condensers. Moreover, because of their smallness and lightness, they require no support other than that of the wiring to which they are attached.

.0007 Mfd., .0001 Mfd., .00015 Mfd., .00025 Mfd., .0003 Mfd., .0004 Mfd., .0005 Mfd., .0007 Mfd., ...35c each

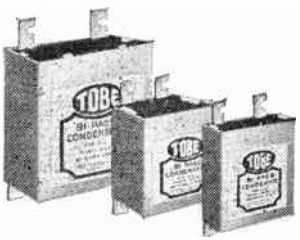
.001 Mfd., .0015 Mfd., .002 Mfd., .0025 Mfd., .0003 Mfd., .004 Mfd., ...40c each

.005 Mfd., .006 Mfd., .0075., Mfd., .008 Mfd., ...45c each

.01 Mfd. .....55c each

.02 Mfd., .03 Mfd., .04 Mfd., .05 Mfd. .....60c each

TOBE BY-PASS CONDENSERS AND FILTER CONDENSERS



The TOBE By-Pass Condensers are for use where working voltage does not exceed 200 volts.

TOBE Filter Condensers are for use in filter circuits of plate supply units, in B-Eliminators and in power amplifiers where the D. C. working voltage runs up to 300 volts.

The 4.0 Mfd. is especially adapted for use in output devices where voltage does not exceed 300 volts.

By-Pass Types	sizes	List Price	Filter Types	sizes	List Price
210....0.1	Mfd.....	$0.60	310....0.1	Mfd.....	$0.70
225....0.25	Mfd.....	.70	325....0.25	Mfd.....	.75
250....0.5	Mfd.....	.75	350....0.5	Mfd.....	.90
201....1.0	Mfd.....	1.00	301....1.0	Mfd.....	1.25
202....2.0	Mfd.....	1.75	302....2.0	Mfd.....	1.75
204....4.0	Mfd.....	3.50	304....4.0	Mfd.....	3.50

311....2x0.1 Mfd.....$1.50

TOBE 400 LINE

SHORT PATH HIGH-VOLTAGE CONDENSERS

TOBE 400 Condensers are so named because of being designed for continuous operation on 400-volts D. C.

They are of the short-path type, cased in the characteristic silvered metal container, of compact shape, occupying minimum space on the baseboard, with strong lugs for attachment.

The terminals are of the unique TOBE type, situated at the base of the can, one above the other, so that the condensers may be arranged in a bank with minimum wiring.

No. 401 — 1 Mfd. — $2.00 No. 402 — 2 Mfd. — $2.75
No. 404 — 4 Mfd. — $4.50 No. 411 — 2 x 0.1 — $2.00

TOBE 600 LINE

Condensers For Amertran and Similar High Voltage Power Packs

This extremely rugged, extra-high voltage condenser is designed for continuous operation without possibility of breakdown in all high-voltage power amplifier units operating up to 1000 volts D. C.

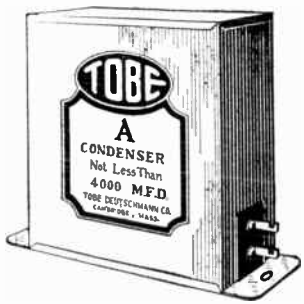
Containers are finished with the familiar TOBE silvered finish, and terminals.

No. 650 — 0.5 Mfd. — $2.00 No. 602 — 2.0 Mfd. — $4.50
No. 601 — 1.0 Mfd. — $2.50 No. 604 — 4.0 Mfd. — $7.50
No. 611 — 2 x 0.1 Mfd. — $2.75

TOBE 1300 LINE HI-VOLTAGE SURGPROOF CONDENSERS

A new type condenser guaranteed to operate at rated voltage and carrying an Iron-Clad Replacement Guarantee. No better condenser available for Hi-Voltage Power Pack work, especially designed for use with two UX-250 Power Tubes in Push-Pull, or the UX-245 Power Tube. The 1300 Line New Surgproof Condenser has safe working voltage of 1300 volts D. C. We recommend these condensers for any high-voltage amplifier. These condensers are not designed for Transmitting.

No. 1301 — 1 Mfd. $3.50 No. 1302 — 2 Mfd. $6.00
No. 1304 — 4 Mfd. $11.00



TOBE 4000 MFD. A-CONDENSER

Within a space of but 5"x5"x1½" the Tobe A-Condenser has 4000 microfarads. Its life appears to be indefinitely long when used at 12 volts or under.

Connect a Trickle Charger to Condenser and Dynamic Cone Speaker for energizing fields of the latter. Just four wires required.

This condenser retains its original capacity.

Tobe A-Condenser, 4000 Mfd. .....**Price, $7.00**

TOBE FILTERETTE FOR DYNAMIC SPEAKER

For Low Voltage Dry Disc Recitifier (12 v)

Designed for application to dynamic speakers to suppress the hum set up in the speaker field by the field-energizing current. This annoying hum is entirely eliminated by the smoothing effect of the Filterette.

Tobe Filterette Type DA outside dimensions 5"x5½"x1½"

D A - 1 2,000 Mfd. .....Price, $5.00
D A - 2 4,000 Mfd. .....Price, $7.00

TOBE VACUUM TIPON LEAKS

"The Changeless Resistors in a Vacuum"

A new resistor free from induction and capacity:—independent of voltage, atmospheric change or temperature.

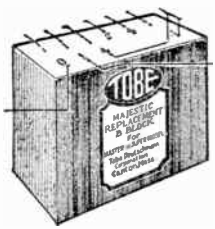
10,000, 20,000, 25,000, 50,000 ohms .....$ .75
100,000, 250,000, 500,000 ohms ..... .50
1, 1.25, 1.5, 2 to 10 megohms ..... .50

TOBE UNCASED SURG-PROOF CONDENSERS FOR GENERAL REPAIR AND POWER-PACK WORK

Immediate delivery on Surgproof Condensers without metal casings for general service and repair work. These condensers are of Surgproof type and are unconditionally guaranteed to operate for a period of one year without breakdown when used at their rated voltage for pulsating D. C. or straight D. C. work (not an A. C. condenser). They are self-healing; in that should a surge take place the condenser will not be damaged.

Service men, set builders and general repair shops will find these Surgproof condensers ideal. They will not break down.

Type No.	Capacity	Voltage	Size		
331	1 Mfd.	300 v.	4x1½x⅜	inches	$ .75
332	2 Mfd.	300 v.	4x2 x½	inches	1.45
441	1 Mfd.	400 v.	4x1¾x½	inches	1.10
442	2 Mfd.	400 v.	4x2¼x⅞	inches	2.15
661	1 Mfd.	600 v.	4x2 x⅝	inches	1.45
1101	1 Mfd.	1000 v.	4x2 x⅞	inches	1.75
1331	1 Mfd.	1300 v.	4x2 x1⅛	inches	2.25



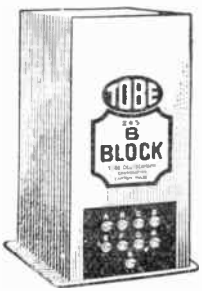
TOBE MAJESTIC A AND B ELIMINATOR REPLACEMENT CONDENSER BLOCKS

For "A" Outside dimensions 7½"x3"x1 1-16"
Price $10.00
For "B" Outside dimensions 5¾"x2⅝"x1", 4-4-2-1-1-1.-1.-1. mfds. Master or Super Models
Price $10.00
Dry high-capacity condensers fully guaranteed for one year.

TOBE REPLACEMENT CONDENSERS

For "A-B-C" power packs using 171 and 280 tubes. Designed for use in Majestic, Mohawk, Sonora, Zenith electric sets. Outside dimensions, 4⅞"x1¾"x6¾". Mounted in heavy cardboard container suitable for insertion in standard metal container used in the above sets. Condensers are of "Surg-proof" type with the usual "Tobe" guarantee—for one year.
Each, ...$12.00

High capacity Dry condensers, 4000 mfd. effective capacity for replacement in "A" Eliminator units. Outside dimensions 4¼"x5"x1¼". Two of these condensers are generally required in a standard "A" Eliminator.
Each $5.00



TOBE B BLOCKS

In the construction of plate supply units and B eliminators proper filter condensers are essential.

TOBE B Blocks, combining in a single heavy silvered metal case all the filter condenser capacities required for the various types of plate supply units in demand today, fulfill the most stringent requirements of the most exacting builder.

Type No.	Contains Mfds.	Max. Trans. Sec. Volt	Rectifier Type	List Price
R 171	8-2-2-1-1	300	B H 280	$15.00
R 210	2-2-2-4-1-1	650	281	$18.00
245	2-2-2-1-1-1-1-4	500	280 or 281	$20.00
250	2-2-2-4-1-1-1	650	281	$26.00
280	2-4-4-1-1-1-1	325	280	$18.00

NEW TOBE 1000 VOLT AND 2000 VOLT TRANSMITTING CONDENSERS

The entire line of Transmitting Condensers has been radically altered and highly improve in the redesigning. These condensers are now assembled with interchangeable one-half microfarad capacity sections, each section sealed in an individual container so as to allow ample heat radiation and complete protection from moisture. With this new consturction there is absolutely no danger of breakdown occuring between the container and the condensers.

The cover of the metal container is easily removable so that if for any reason it is necessary to replace one of the sections this can be done readily.

Type	Capacity mfd.	Voltage	Price	Type	Capacity mfd.	Voltage	Price
1110	1.0	1,000	$ 7.50	2220	2.0	2 000	$18.00
1120	2.0	1,000	14.00	2250	5.0	2 000	45.00
1150	5.0	1 000	35.00	*3310	1.0	3 000	15.00
2210	1.0	2 000	10.00	*3320	2.0	3 000	27.00

*Made up to special order—two weeks delivery

IMPORTANT NOTICE

The next edition of this manual will be greatly enlarged, and will contain exceedingly comprehensive data on circuits and filtering systems not included in the present book. Its price will be increased to fifty cents, to meet costs of publishing and enlargement.

If you would like to be notified when this new manual is available, drop us a post-card. We will then notify you of its publication. This is not to be considered in any sense an order, and is not binding on you in any way.

Announcement of the new book will also appear in "Radio."

COUPON

TOBE DEUTSCHMANN CORPORATION.
Filterette Division,
CANTON, MASS.

GENTLEMEN: I wish to receive a Filterette Service Station appointment for my district.

I am—am not—actively engaged in radio or electrical business.

My state—does—does not—require an electrician's license.

I have—have not—such a license.

MY NAME IS .....

MY ADDRESS IS .....