

# HCL GAS ABSORBERS

## For Westinghouse Inerteen Transformers

### INSTRUCTIONS

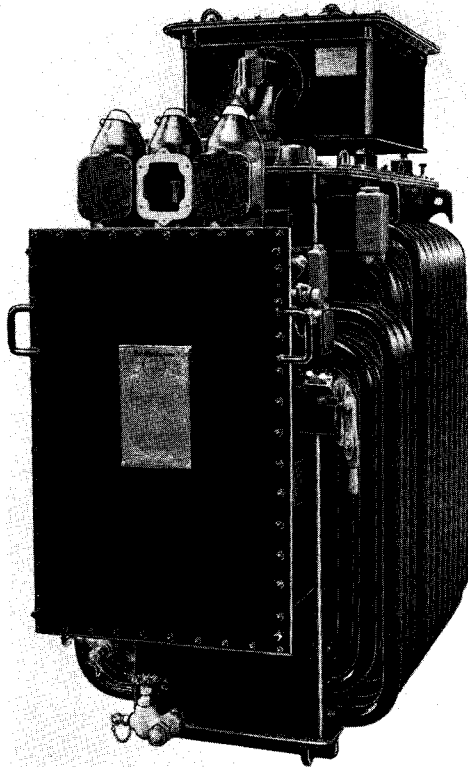


FIG. 1—NETWORK TRANSFORMER WITH GAS ABSORBER

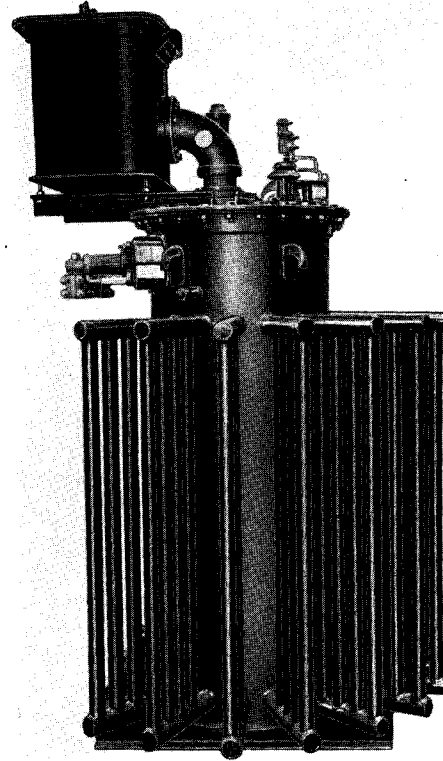


FIG. 2—TYPE SL TRANSFORMER WITH GAS ABSORBER

### GENERAL

When an arc takes place in an Inerteen insulated transformer, HCL gas is liberated. When such transformers are placed in buildings without enclosing in a vault near passages through which people pass, the National Board of Fire Underwriters require that transformers in excess of 25 Kv-a. shall be furnished with a pressure relief vent and the gases must be absorbed by some means or pressure-relief vent connected with a flue or chimney to carry the gases outside the building.

The Westinghouse HCL gas absorber for transformers is a device designed to absorb the gases generated by an arc taking place in Inerteen. The device consists of a diaphragm protected pressure chamber in which is placed soda-lime which is very active in absorbing HCL gas. A diaphragm between the transformer air space and the absorber

case ruptures at approximately 15 lbs. per square inch above atmospheric pressure allowing the HCL gas to enter the absorber. If the soda-lime becomes saturated and the pressure continues, the diaphragm between the absorber case and atmosphere ruptures to relieve the pressure. Periodic inspections should be made of the diaphragms as one or both may be ruptured due only to increased gas pressure in the transformer case caused by heavy overloads.

Ruptured diaphragms should be replaced as soon as possible to prevent moisture from getting into the transformer. If there is any evidence of presence of hydrogen chloride gas the transformer should be de-energized immediately and an investigation made.

### CONSTRUCTION

There are two typical designs of absorbers. One is of rectangular construction as shown in Figs. 1, 2 and 5 con-

nected to the cover by an elbow and used on network and large SL distribution transformers. The other is of cylindrical construction as shown in Figs. 3 and 4, mounted directly on the cover in place of the relief device and used on small type "S" round tank distribution transformers or any transformer where the amount of Inerteen is relatively small and not over 40 lbs. of absorbing material is required.

Soda-lime Westinghouse material #2958-2, the active material contained in the absorber is placed in copper screen cells for convenience in loading. These cells are supported and baffled so that the gas may contact a large area quickly and progressively to obtain maximum absorption.

It is customary to supply two relief diaphragms on each gas absorber. One diaphragm separates the absorber from the transformer and permits the transformer gases to exhaust into the ab-



FIG. 3—TYPE S TRANSFORMER WITH GAS ABSORBER

sorber when excessive pressure develops within the transformer. The other diaphragm seals the absorber from the atmosphere but allows the gases in the absorber to escape to the atmosphere in event the quantity of gas liberated is too great for the absorber to handle.

### SHIPMENT

The HCL gas absorbers are usually shipped separately with the absorbing compound in sealed containers, except on small transformers the absorber may be shipped completely assembled and ready for service with the absorbing compound in place. When new and in proper condition for use, the compound appears dry. Containers should not be opened until the absorber is to be prepared for service.

Diaphragms are assembled in place and the complete absorber-assembly pressure tested for leaks at the factory. The outer diaphragm assembly is shipped with a plug in the vent connection or with a hood of spun metal over the exhaust opening. A pipe connection is not furnished when the hood is supplied. The inner diaphragm assembly is protected by a blind flange during transit when it is necessary to ship the absorber separate from the transformer.

A set of spare diaphragms, gaskets and the necessary cement are shipped with each absorber.

Round tank absorbers are usually shipped completely assembled with the proper amount of absorbing compound in place and mounted on the transformer. No installation work is required.

### INSTALLATION

In order that the freshness of the absorbing compound be maintained, it is necessary to fill the cells when the absorber is installed; therefore, the absorber cover is not cemented in place at the factory.

### Caution

The absorbing compound is strongly alkaline, and it will attack clothing, particularly woolen materials. Rubber gloves should be worn when handling the compound since direct contact with the skin will cause irritation. Affected parts should be immediately and generously washed with water.

The absorber should be made ready for service in a relatively dry atmosphere.

If a plug and blind flange are used for shipment they should be removed when the absorber is placed in service.

Use only gaskets and gasket cement M-#7386-1 as furnished with the absorbers.

### Rectangular Absorbers

The gas absorber in the rectangular housing is shown in Fig. 5. To install this absorber, first remove the absorber cover and take out the coils.

See that gasket surfaces of the tank and cover are smooth and clean. Thoroughly brush gasket cement on the tank gasket surface. Place the cover gasket in position and apply weights or other means to obtain good adhesion of the gasket to the metal surface. The gasket should be allowed to set approximately one-half hour before the weights are removed. Loosely pack the cells full of compound and immediately place them in the tank. Apply cement to the top surface of the gasket, put the cover in place and immediately bolt the surfaces together with uniform pressure.

When possible, test for leaks by blowing out the absorber with nitrogen until all air is removed. Close all openings and develop a pressure inside the absorber of not more than 7 lbs. per square inch. Care should be used in making this test since the diaphragm will rupture at a pressure of approximately 15 lbs. per square inch.

Mount the absorber in position on the transformer or other location as the installation requires by adjusting the supports for alignment. Remove the blind flange from the absorber and put the gasket in place with cement.

Remove the blind flange from the manhole relief device cover on the transformer. (See Fig. 6 for a sectional view of the relief device on the transformer.) This relief device is shipped from the factory with all gaskets properly cemented in place with the exception of the pipe flange gasket.

Cement the pipe flange gasket and bolt down the pipe flange with uniform pressure. Bolt the pipe elbow to the absorber with uniform pressure making any final adjustments in alignment of absorber tank required.

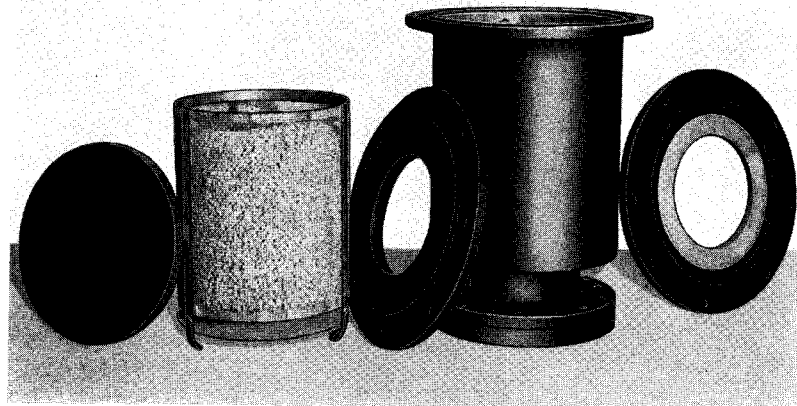


FIG. 4—EXPLODED VIEW OF GAS ABSORBER

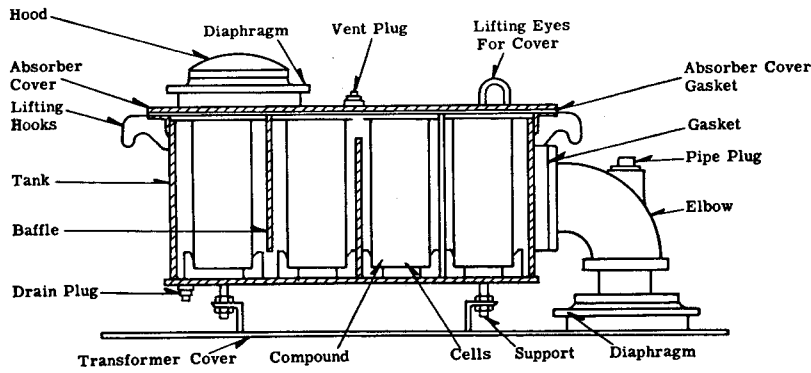


FIG. 5—SECTIONAL VIEW OF RECTANGULAR TANK ABSORBER

Test the newly made gasketed joints by developing a pressure of 7 lbs. per square inch inside the absorber. Care must be used in making this test since the diaphragm ruptures at 15 lbs. per square inch pressure. Keep the pressure test plug on the transformer open during the test.

If a pipe plug connection has been supplied over the outer diaphragm this plug should be removed.

### Round Tank Absorbers

No installation work is required on the round tank absorbers, since they are shipped completely assembled with the proper amount of absorbing compound in place.

## MAINTENANCE

If the Inerteen has been arced and if both diaphragms are ruptured, the presence of hydrogen chloride gas may be noted by slight irritation of the nose and eyes. The transformer should be de-energized immediately and an investigation made, if there is any evidence of the presence of hydrogen chloride gas.

Periodic inspections of relief diaphragms are recommended. The outer diaphragm may be inspected by removing the spun metal hood that normally covers this diaphragm. If a pipe plug connection has been supplied over the outer diaphragm, this plug should be removed. To inspect the inner relief diaphragm on the rectangular tank absorber, remove the pipe plug in the pipe elbow. To inspect the inner diaphragm in the round tank absorber, it is necessary to remove the absorber from the transformer cover.

The diaphragm may also be tested by applying nitrogen to the absorber

at a pressure of 7 lbs. per square inch with the pressure test valve on the transformer open.

### Rectangular Tank Absorber

If either diaphragm is ruptured, the absorber should be opened and the compound and inside of absorber checked for presence of moisture. Whenever the cells are removed, the tank should be cleaned and wiped dry of moisture. It is recommended that the compound be replaced if there is any indication of moisture.

Use only gaskets and gasket cement as furnished with the absorbers.

### Replacement of Broken Diaphragm

Refer to Fig. 6 for instructions relative to replacement of a broken inner diaphragm. Remove the pipe flange hexagon nuts that hold the pipe flange to the transformer. The elbow may be disconnected from the absorber or the absorber may be detached from the transformer in order to lift the pipe flange clear of the relief diaphragm as-

sembly on the transformer. Remove the base hexagon nuts and base lock washer which releases the base of the relief device. The complete relief device assembly may now be lifted off the hand-hole boss on the transformer cover. Remove the wire that holds the diaphragm pressure ring hexagon nuts in place. This will permit the diaphragm pressure ring hex nuts and lock washers to be removed. Remove the broken diaphragm taking care to clean out all particles of glass. Remove all parts of the sealing gasket. Make sure that all gasket surfaces are smooth and clean.

The replacement process begins by applying cement to both sides of a new sealing gasket and setting this gasket in place. Put a new glass diaphragm in place, being sure that both gasket and diaphragm are centrally located in the supporting flange. In placing gaskets, keep excess gasket cement off the diaphragm and out of the gap between glass and steel. Lay the cushion gasket in place over the diaphragm and assemble the pressure ring over this gasket. Replace diaphragm pressure ring lock washer and hexagon nuts and tighten the pressure ring with uniform pressure. In order to obtain this uniform pressure, tighten alternate nuts until lock washers are nearly compressed. The other nuts should then be tightened in a similar manner. This alternate nut tightening should be continued until the face of the pressure ring is against the metal gasket stop. After diaphragm is clamped, wire diaphragm clamping ring nuts by passing through the hole in stud provided for that purpose.

Before replacing the complete diaphragm assembly check the base gasket and substitute a new one, if necessary.

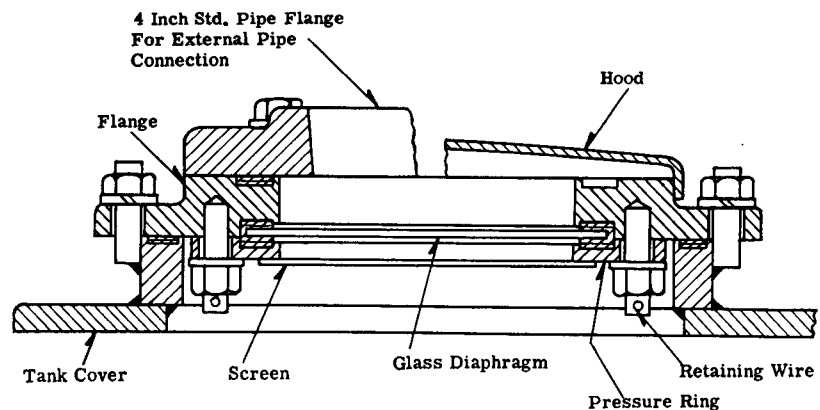


FIG. 6—WESTINGHOUSE PRESSURE RELIEF DEVICE—SECTIONAL VIEW

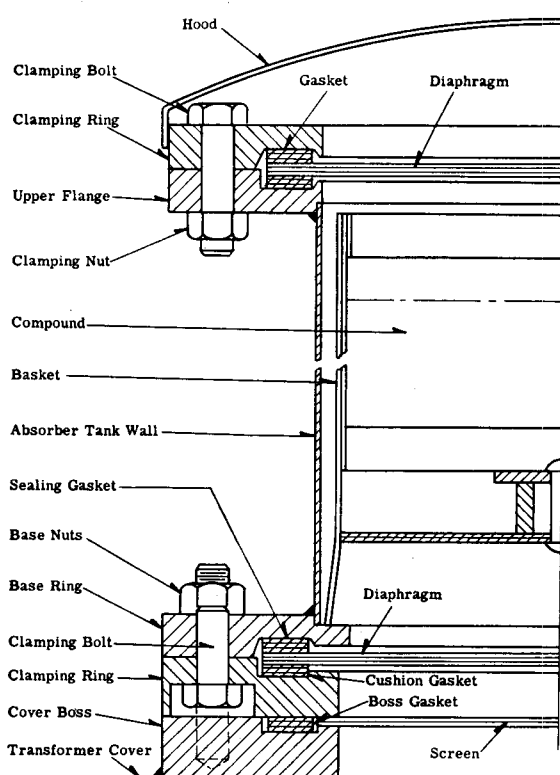


FIG. 7—CROSS SECTIONAL VIEW, ROUND TYPE

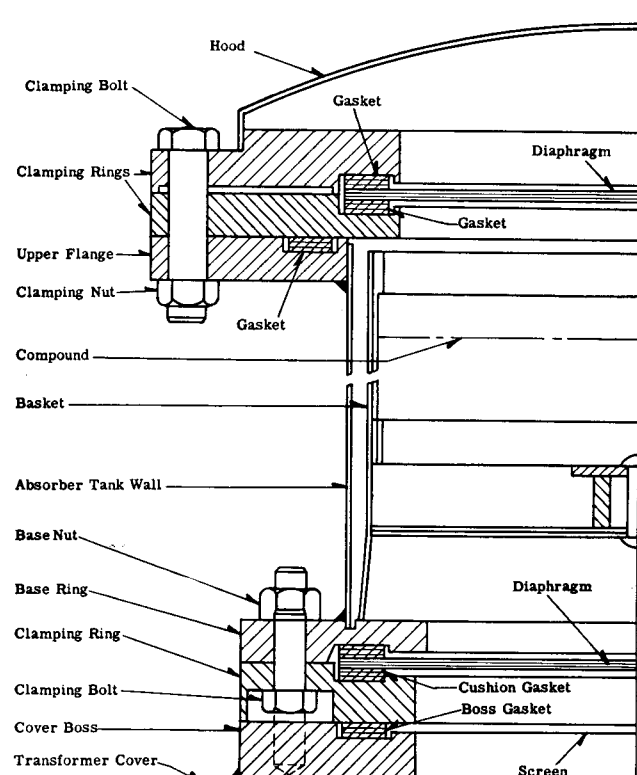


FIG. 8—CROSS SECTIONAL VIEW, ROUND TYPE, FLAT COVER BASE

Place complete assembly in position over the cover boss and clamp with uniform pressure.

Before assembling the pipe flange over the relief diaphragm assembly check the pipe flange gasket and replace, if necessary. It is recommended that all gasketed joints be pressure tested as described under installation of gas absorbers.

In event that the outer diaphragm requires replacement the detailed procedure will be similar to that described for the inner diaphragm except that removal of the complete absorber assembly is not necessary and to expose the diaphragm it is only necessary to remove the spun metal hood. As described above, the complete relief diaphragm assembly can be removed by removing the base clamping nuts and lifting off the diaphragm relief device assembly. Follow the replacement procedure described for the inner diaphragm.

### Round Tank Absorbers

For transformers requiring forty pounds of absorbing material or less, a round tank absorber is supplied. Sectional views of these types of absorbers commonly used on type "S" Inerteen

transformers, are shown in Figs. 7, 8 and 9. Fig. 9 is a cross-sectional view of a round tank absorber supplied with Type "S" Inerteen transformers.

Visual inspection of the absorbers will tell the customer what type of gas absorber has been supplied on his transformer. For example, Fig. 7 can be identified by noting that the hood covers the heads of the bolts at the top of the absorber while in both Figs. 8 and 9 the heads of the bolts at the top of the absorber are exposed. Fig. 8 may be identified visually by noting the exposed bolt heads and the flat boss on the transformer cover. Fig. 9 may be recognized by the cover boss which is more than twice as high as the flat cover box supplied on the transformer cover with the types of absorbers in Figs. 7 and 8.

A periodic inspection of both diaphragms is recommended. To inspect the upper diaphragm it is only necessary to remove the spun metal hood at the top of the absorber. To inspect the lower diaphragm remove upper diaphragm and lift out the basket containing absorbing compound. If the condition of the diaphragm is satisfactory replace the compound and close the absorber as quickly as possible.

If either diaphragm has been ruptured the absorbing compound should be checked for presence of moisture. If the absorbing material is found to be damp, it will be necessary to replace it with a new dry material. However, do not prepare to replace the compound until the lower absorber diaphragm has been sealed in and tested. It is not desirable to keep the compound exposed to the atmosphere any longer than necessary.

Replacement of the lower diaphragm for the absorber shown in Fig. 7 is accomplished by first removing the base nuts that hold the complete absorber assembly to the cover boss of the transformer. Lift off the absorber. At this point it is well to remove the basket that holds the absorbing compound in order to inspect the compound for the presence of moisture. Remove the upper flange clamping nut which will release the top clamping ring and also the upper diaphragm and upper diaphragm gaskets. The basket containing the absorbing compound may be lifted out and compound inspected. If compound is satisfactory it should be kept in a dry place until absorber is ready. Unscrew the lower diaphragm clamping bolts which

will release the lower diaphragm clamping ring. Remove all particles of broken glass and broken sealing gasket. Clean out the gasket seat in the gas absorber base. Cement a new sealing gasket in place, taking care not to use an excessive amount of cement. Apply cement to the surface of the sealing gasket next to the diaphragm. Put in a new diaphragm centering it carefully and keeping excess cement off the diaphragm surface. Replace the cushion gasket (without cementing) and assemble lower diaphragm clamping ring over the cushion gasket. Pull up the clamping ring by tightening the hexagon head clamping bolts with uniform pressure. Cement a new cover boss gasket in place and bolt down the absorber assembly with uniform pressure. Test for leaks by applying 7 lbs. per square inch pressure to the gas space of the transformer. Pressure may be applied through the upper filter press connection (if available) or through the filling plug in the cover. Use dry nitrogen, in applying this pressure, if available.

After the gasketed joints have been found to be leak-tight the basket containing dry compound should be placed in the absorber. If necessary to replace the compound fill the basket with new dry compound to within one inch of top of basket. Replace the top gaskets and upper diaphragm. Tighten the upper diaphragm clamping nuts so as to apply uniform pressure to the upper diaphragm. Replace the hood.

If the absorber is the one shown in Fig. 8, periodic inspection of the diaphragms should be carried out similar to that described for the absorber in Fig. 7. The upper diaphragm may be inspected by removing the hood at the top. Remove the hexagon nuts and bolts at the top of the absorber. This will release all clamping rings, gaskets and the diaphragm at the top of the absorber. The basket may now be lifted out and the lower diaphragm inspected. If diaphragms are satisfactory, replace the basket containing the absorbing compound and immediately close the absorber.

When necessary to replace the lower diaphragm, proceed as described for the replacement under Fig. 7. This may be done easily since the construction of the lower end of absorber, Fig. 8, is identical to that found in Fig. 7.

When necessary to replace the upper diaphragm remove the clamping nuts and bolts at the top of the absorber. This releases the complete assembly. Since no cement is used on the gaskets at the top of the absorber it should not be necessary to replace these gaskets. Remove all particles of broken glass from the absorber. Replace the upper gas absorber gasket. Assemble the diaphragm clamping rings, diaphragm gaskets and diaphragm per Fig. 8. Clamp the assembly with uniform pressure using the upper diaphragm clamping nuts and bolts.

If the absorber supplied with the transformer is the one described in Fig. 9, inspection may be carried out by removing the nuts and bolts at the top of the absorber and releasing the upper diaphragm assembly. Removing the hood at the top of the absorber will permit inspection of the upper diaphragm. Removing the basket containing absorbing compound will permit inspection of the lower diaphragm. If condition of diaphragms is satisfactory replace the compound immediately and close the absorber.

When necessary to replace the lower diaphragm, remove the cover boss nuts that hold the absorber assembly to the

transformer. (Refer to Fig. 9). At this point it is a good plan to remove the basket containing the compound from the absorber. To remove the basket first remove the nuts and bolts at the top of the absorber and lift off the top assembly. The basket of compound should then be lifted out and if found satisfactory should be kept in a dry place until absorber is ready.

Remove the wire at the bottom of the gas absorber. Remove lower diaphragm clamping rings, nuts and lock washers. Lift off the lower diaphragm clamping ring. Take particular care to clean out all broken pieces of glass and old sealing gasket. Remove any pieces of glass caught by the screen. Clean all gasket surfaces thoroughly. Cement in a new sealing gasket. Do not use an excess amount of this cement. Apply cement to the surface of the sealing gasket next to the diaphragm. Put in a new diaphragm centering it carefully and taking care to keep excess cement off of the diaphragm surfaces. Replace the cushion gasket and assemble the lower diaphragm clamping ring over this gasket. Replace the lock washers and clamping nuts. Tighten the nuts with uniform pressure by means of alternate nut tightening. Tighten alternate

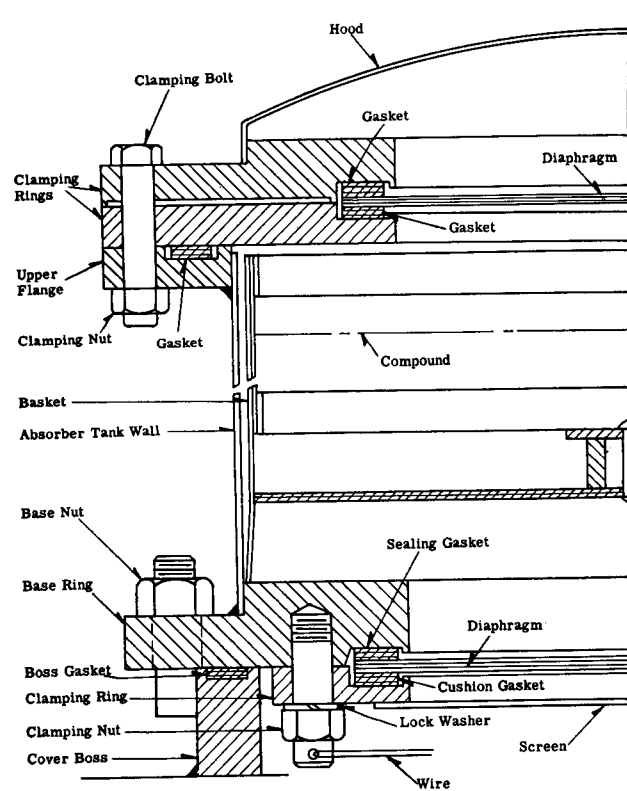


FIG. 9—CROSS SECTIONAL VIEW, ROUND TYPE, HIGH COVER BOSS

nuts until the lock washers are slightly compressed. Continue this alternate nut tightening until the clamping ring is against the gasket stop. Wire the clamping nuts by placing in holes provided for the purpose. Check the condition of the handhole boss gasket on the transformer and cement in a new gasket if necessary. Replace the gas absorber assembly on the transformer and bolt to the transformer with uniform pressure. Pressure test the new gasketed joints by applying 7 lbs. per square inch of dry nitrogen to the gas space of the transformer. This pressure may be applied through the upper filter press connection (if available) or through the filling plug in the cover.

After the gasketed joints have tested satisfactorily replace the basket of compound. If new compound is required, fill the basket loosely with new dry compound to within one inch from the top of the basket.

Assemble top pressure rings and gaskets in accordance with Fig. 9. Normally none of these gaskets should have to be replaced since they are not cemented in place. Put in a new upper diaphragm if necessary. Tighten the upper assembly with uniform pressure until clamping rings are pulled against gasket stops. Replace the spun metal hood at the top of the absorber.

## RENEWAL PARTS

The most common renewal parts for Westinghouse Gas Absorbers are:

1. Cement--M-7386-1
2. Absorbing Compound (Sodium Calcium Hydrate) M-2958-2
3. Spare Gaskets

When information is required concerning a gas absorber write to the nearest Sales Office or Service Department, giving serial number of transformer of which the absorber is a part. This serial number will be found engraved on the nameplate attached to the transformer.

**Westinghouse Electric & Manufacturing Company**  
Sharon Works, Sharon, Pa.



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- †\*SALT LAKE CITY, UTAH, 346 A Pierpont Ave.
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- †SEATTLE, WASH., 1051 First Ave., So.
- xSHARON, PA., 469 Sharpville Ave.
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- \*TOLEDO, OHIO, 245 Summit St.
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- \*YORK, PA., 143 So. George St.
- \*YOUNGSTOWN, OHIO, 25 E. Boardman St.

Where address and P. O. box are both given, send mail to P. O. box, telegrams to address indicated.

## WESTINGHOUSE AGENT JOBBERS

Westinghouse Electric Supply Company—Headquarters—150 Varick St., New York, N. Y.

Fully equipped sales offices and warehouses are maintained at all addresses.

- ALBANY, N. Y., 454 No. Pearl St.
- ALLENTOWN, PA., 522 Maple St.
- †\*ATLANTA, GA., 1299 Northside Drive, N. W.
- AUGUSTA, MAINE, 90 Water St.
- BALTIMORE, MD., 40 South Calvert St.
- BANGOR, MAINE, 175 Broad St.
- BINGHAMTON, N. Y., 87 Chenango St.
- BOSTON, MASS., 88 Pearl St.
- BURLINGTON, VT., 208 Flynn Ave.
- BUTTE, MONTANA, 50 East Broadway
- CHARLOTTE, N. C., 210 East Sixth St.
- CHICAGO, ILL., 113 North May St.
- CLEVELAND, OHIO, 6545 Carnegie Ave.
- COLUMBIA, S. C., 915 Lady St.
- CORPUS CHRISTI, TEXAS, North end of Mesquite St.
- DALLAS, TEXAS, 405 No. Griffin St.
- DAVENPORT, IOWA, 402 E. Fourth St.
- DES MOINES, IOWA, 1400 Walnut St.
- DETROIT, MICH., 547 Harper Ave.
- DULUTH, MINN., 308 W. Michigan St.
- †\*ERIE, PA., 1013 State St.
- EVANSVILLE, IND., 201 N. W. First St.
- FORT WAYNE, IND., 612 S. Harrison St.
- FORT WORTH, TEXAS, 210 Jones St.
- GRAND RAPIDS, MICH., 511 Monroe Ave. N. W.
- GREENVILLE, S. C., 226 Pendleton St.
- HOUSTON, TEXAS, 1903 Ruiz St.
- INDIANAPOLIS, IND., 137 S. Pennsylvania St.
- JACKSONVILLE, FLA., 37 South Hogan St.
- LOS ANGELES, CALIF., 905 East Second St.
- MADISON, WISC., 1022 E. Washington Ave.
- MEMPHIS, TENN., 366 Madison Ave.
- MIAMI, FLA., 11 N. E. Sixth St.
- MILWAUKEE, WISC., 546 N. Broadway
- MINNEAPOLIS, MINN., 215 South Fourth St.
- NEWARK, N. J., 49 Liberty St.
- NEW HAVEN, CONN., 240 Cedar St.
- NEW YORK, N. Y., 150 Varick St.
- NORFOLK, VA., 320 City Hall Ave.
- OAKLAND, CALIF., Tenth & Alice Sts.
- OKLAHOMA CITY, OKLA., 850 N. W. Second St.
- OMAHA, NEB., 117 North Thirteenth St.
- PEORIA, ILL., 412 S. Washington St.
- PHILADELPHIA, PA., 1101 Race St.
- PHOENIX, ARIZONA, 315 West Jackson St.
- PITTSBURGH, PA., 575 Sixth Ave.
- PORTLAND, OREGON, 134 N. W. Eighth Ave.
- PROVIDENCE, R. I., 66 Ship St.
- RALEIGH, N. C., 319 W. Martin St.
- READING, PA., Fourth and Elm Sts.
- RICHMOND, VA., 301 South Fifth St.
- ROANOKE, VA., 726 First St., S. E.
- ROCHESTER, N. Y., 1048 University Ave.
- SACRAMENTO, CALIF., 20th and "R" Sts.
- ST. LOUIS, MO., 1011 Spruce St.
- ST. PAUL, MINN., 145 East Fifth St.
- SALT LAKE CITY, UTAH, 235 West South Temple St.
- SAN ANTONIO, TEXAS, 1211 E. Houston St.
- SAN FRANCISCO, CALIF., 260 Fifth St.
- SEATTLE, WASH., 1051 First Ave., So.
- SIOUX CITY, IOWA, 1005 Dace St.
- SPOKANE, WASH., 152 So. Monroe St.
- SPRINGFIELD, MASS., 46 Hampden St.
- SYRACUSE, N. Y., 961 W. Genesee St.
- TACOMA, WASH., 1115 "A" St.
- TAMPA, FLA., 417 Ellamae St.
- TERRE HAUTE, IND., 234 So. Third St.
- TOLEDO, OHIO, 1920 N. Thirteenth St.
- TRENTON, N. J., 444 S. Broad St.
- TULSA, OKLA., 307 East Brady St.
- UTICA, N. Y., 113 N. Genesee St.
- WASHINGTON, D. C., 1216 "K" St., N. W.
- WATERLOO, IOWA, 328 Jefferson St.
- WHEELING, W. VA., 1117 Main St.
- WICHITA, KANSAS, 233 So. St. Francis Ave.
- WILLIAMSPORT, PA., 348 W. Fourth St.
- WILMINGTON, DEL., 216 E. Second St.
- WORCESTER, MASS., 17 Mulberry St.
- YORK, PA., 143 S. George St.

\* Sales Office † Mfg. and Repair Shop x Works ‡ Warehouse § Merchandising Products Only z Headquarters ¶ District Eng. and Service Dept.

† Changed or added since previous issue.  
HP DOP. SEP. BA Spl.

January, 1942