



Westinghouse

Types GO-B, GO-1-B and GO-2-B Oil Circuit-Breakers

15,000 and 23,000 Volts-600 and 1200 Amperes

Manually or Electrically Operated



FIG. 3-DE-ION GRID ASSEMBLY, FOR 600 AMPERE GO-1-B, 15 AND 23 KV. AND GO-2-B 15 KV. CIRCUIT-BREAKER

General

The types $G \bullet B$, $G \bullet B$ and $G \bullet B$ breakers are designed for outdoor service and comply with all standard requirements. When properly installed and maintained they will give satisfactory service. The interrupting capacities of these breakers have been verified by testing laboratories and field installations.

The GO-1B and GO-2B breakers are equipped with "Dc-ion" Grid contacts (See Figs. 3 and 4.) The arc interruption arc interruption takes place in the "De-

bers supported from the terminals. The device consists of a series of insulated plates having interspersed plates of magnetic material, all so disposed and vented that the arc is moved laterally into pockets where it vaperizes the oil. The resultant gases are then forced transversely through the conducting gases of the arc stream in such a manner as to de-ionize them and extinguish the arc.

The G●-B breakers uses the "De-ion" interrupter contacts (sec Fig. 5). The takes place in the "De-ion" Grid cham- ion" Interrupters. They are the results

of innumerable laboratory tests, and indicate remarkable interrupting ability with the advantages of small space requirements. These interrupters consist essentially of two fibre insulated iron plates, one on each side of the arcing contact, and connected at the top by a small iron bar.

As the contacts part, the magnetically controlled arc is moved outward away from the arcing contacts. This driving force on the arc lengthens it considerably more than is represented by the contact separation. This driving action forces the arc continually against a wall of cool oil, thereby increasing the restriking voltage necessary for reignition along the arc path.

Shipment

The breakers are shipped completely assembled with all attachments and auxiliaries mounted in place. Do not remove the crating until the breaker reaches its permanent location.

Installation

- 1. Remove the crating and frame skids.
- 2. Mount the breaker on its foundation. The four foundation bolts should be left loose until the frame is properly leveled by inserting shims under the feet. The breaker must be perfectly level.
- 3. Remove the tie wire from the mech-



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FIG. 5-DE-ION INTERRUPTER ASSEMBLY FOR GO-B CIRCUIT BREAKER

anism trigger and allow the breaker 10. Remove the undrilled conduit ento open slowly. trance plate from the bottom of the

- 4. Remove the tanks and examine the inside for evidence of moisture or foreign matter. Flush with benzine. Tanks should not be lowered in wet weather without provision for keeping moisture out of them. The internal parts of the breaker should be protected as well.
- Examine the contacts to see that they are clean and in alignment. For adjustments, see section covering "Adjustments".
- Operate the breaker by hand several times, watching each pole and the operating mechanism to be sure that all parts move freely.
- 7. Install connections to the breaker studs. All contact surfaces should be cleaned and should be free of burrs. The terminal studs are not designed to carry undue cable or bus bar loads. An excessive strain, which at first may have no apparent effect, will eventually loosen the porcelain weather casing and permit moisture to enter the breaker.
- 8. With the tanks removed, fill them with oil in accordance with name plate instructions or if more desirable, the oil can be added through a filling plug located in the breaker top after the tank has been bolted in place. Be sure to replace the filling plug and to see that tank is drawn up even and tight all around. See that the oil level is at the proper height on the oil gauge.
- 9. Connect the breaker frame to ground through the grounding pad provided on the breaker frame. The National Electric Code requires grounding cable to have one-fifth the main circuit capacity, except that it must never be smaller than No. 8 and need not be larger than No. 0, B & S gauge.

0. Remove the undrilled conduit entrance plate from the bottom of the mechanism housing and drill for the conduit entrance as desired.

11. Connect the control and transs former circuits to the proper pointon the terminal blocks, as shown on the diagram supplied (Ref. Fig. 6).

When the breaker is located a considerable distance from the battery or transformer, allowance should be made for the voltage drop between the battery, or transformer, and the terminals of the operating coil to secure proper operation at minimum control voltage. The bushing type current transformer_name plate should be used as an indication of the proper taps to use, although the proper taps will be determined by the loading. It is always necessary to determine the proper taps by test. The following tables indicate the primary current necessary to trip the breaker for several standard attachments. Always be sure the transformer secondary connections are completed before impressing primary current on the breaker,

Check the operation of the breaker by operating it electrically, if for electrical operation.



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FIG. 6-TYPICAL DIAGRAM FOR RECTOX-SOLENOID OPERATION

Adjustments

These breakers used the wedge and finger type "De-ion" grid or interrupter contact shown in Figs. 3, 4 and 5. They are designed with sufficient pressure to carry rated current without the temperature rise exceeding A.I.E.E. limts.

GO-1-B to GO-2-B, 600 Amperes— The contacts are non-adjustable and are set properly at the factory. The distance between the top of the "De-ion" grid top plate and the top of the moving contact should be 15% inches with the breaker closed. This dimension is only for new parts. Some allowance must of course be made when the contacts burn. The moving contacts are tipped with a special arc-resisting tungsten alloy to insure long life. This can only be replaced at the factory.

When fitting new stationary contact fingers the adjustment should be so made that the distance between the fingers is $\frac{5}{16}$ inch. See Fig. 3. The fingers should also be adjusted symmetrically with respect to the slot in the grids.

GO-2-B, 1200 Amperes—The auxiliary contacts (Fig. 4) are adjustable by turning the bracket up or down on the lift rod. With the breaker in the closed position the distance between the contact cross bar and cross bar bracket should be $\frac{5}{32}$ inch. It is important that this dimension be maintained.

These contacts make silver to silver contact and it is unnecessary to use an abrasive to keep them bright. In fitting new contacts it is unnecessary that perfect line contact be obtained. With the soft material (silver) good contact is obtained after a few operations. If it is necessary to renew the silver surfaces, use solder of at least 300°C. melting point. Use only "pure silver." Coin silver is unsatisfactory.

The moving contacts are tipped with a special arc-resisting tungsten alloy to ensure long life. This can only be replaced at the factory.

The adjustment of the stationary contact arcing fingers is the same as the 600 ampere breakers.



FIG. 7-GO-1-B CONDENSER BUSHING, 23,000 VOLTS



GO-B----The contact arrangement is shown in Fig. 5. The main and arcing contacts are both of the butt type, the 1/4-inch lead of the arcing contacts being maintained by the thickness of the copper on the arcing tips. The contact pressure on the main contacts is obtained by a compression spring. With the breaker closed the top of the main moving contact should be 1/4-inch below the shoulder on the lift rod end. If necessary to adjust, loosen the lift rod end and screw the assembly up or down as necessary.

It is important that the 1/4-inch dimension be maintained as this determines the main contact pressure.

The main contacts make silver to silver contact and it is therefore unnecessary to use an abrasive to keep them clean. The oxide of silver does not increase the contact drop. In fitting new contacts it is unnecessary to secure perfect line contact; with the comparatively soft material (silver) good contact is secured after a few operations, as the silver flows slightly under pressure.

If the silver contacts on the moving contacts are replaced, use solder of at least 300°C. melting point. Use only "pure silver", coin silver is unsatisfactory.

General:

Vertical and rotational adjustment of the contacts is secured by loosening the clamping bolt of the stationary contact foot and rotating the foot into alignment. If necessary to rotate the contact foot a complete turn, it will be necessary to remove the stationary contact bracket (with "De-ion" grid attached). Before rotating the foot a wedge should be driven into the saw cut to spread the foot. Never attempt to force the contact foot as the copper may "gall"

A limited amount of horizontal adjustment can be secured by adjusting the three clamp flange bolts on the top of the pole unit. This is done by loosening one or two bolts and tightening the remaining bolts. The bolts loosened should be checked for tightness after adjustment.

Before completing any adjustments, make sure that the contact support is turned so as to secure the minimum amount of friction or rubbing, between the moving contact and the stack or interrupter.

When removing the copper oxide from the contacts use sandpaper or a fine file. Do not use emery cloth; the particles of emery are electrical con- paper and revarnished with three coats



FIG. 9-Type SA-3 MECHANICALLY TRIP-FREE SOLENOID AND HOUSING

ductors and any particles remaining ower the insulating value of the oil.

Caution-Remember do not use an labrasive on silver contacts.

"De-ion" Grid Stacks-It is important that the arrangement of the plates in the "De-ion" grids be correct. Should it be necessary to renew parts of the stacks, it is recommended that they be returned to the factory for repair or completely new assembled stacks supplied.

"De-ion Interrupters"-The "De-ion Interrupters" control the are and quickly extinguish it by de-ionization. These devices need little attention other than an occasional inspection. They must be kept securely tightened and properly aligned so that the moving contacts move freely and do not rub causing excessive friction. The fibre insulation is affected very little by the arc action but should be inspected occasionally and replaced if excessive deterioration is found.

Terminal Bushing-The surface of the bushing insulation should be smooth and well varnished. If the varnished surface is damaged or questionable, it should be smoothed off with fine sand of good quality, clear, air-drying Spar varnish. Each coat should be allowed to dry for 24 hours.

Mechanical-Do not try to adjust the contacts by changing the toggle adjustment. The toggle of the breaker is set at the factory and should not be disturbed. The correct setting is 7/8inch off center for the standard breaker. Refer to Fig. 10. Excessive overtravel of the contacts is prevented by the set screw stop in the top of the main casting. This stop should be set to secure $\frac{1}{16}$ inch clearance between the top of the pole unit main lever and the bottom of the set screw. This clearance can be approximated by screwing the set screw down until it touches the main lever, and then backing off one turn.

Maintenance

Points to be Observed in Maintenance---

- 1. Before making any adjustments, make sure that all lines are electrically dead.
- 2. Be sure the breaker frame is grounded.
- 3. Do not operate the breaker excessively with the operating mechanism when the tanks are removed.

- especially after short-circuit. Sce that the contacts are properly aligned.
- 5. After making any adjustments, operate the apparatus carefully by hand to make sure that it operates smoothly and correctly.
- 6. Inspect the oil after severe faults, If it shows signs of moisture, carbonization or dirt, filter and retest it.
- 7. Remove all oil and thoroughly clean the tanks, tank liners, lift rods, terminal bushings, etc., at least once a year.
- 8. Occasionally inspect and tighten clamping nuts around bushings on top of breaker.
- 9. Any pitting of the contacts should be smoothed, or, if badly burned, the contacts should be replaced.
- 10. Keep the bearing surfaces of the mechanism and breaker units adequately oiled.
- 11. Operating Mechanism-For instructions covering the Type SA-3 solenoid mechanism, see Instruction Book 5567.

Insulating Oil

Dielectric tests of the oil should be made every three months, to show if it is reasonably good for circuit-breaker work. Samples should not be taken until the oil has remained undisturbed for at least four hours. In testing for indication of water, take the sample from the bottom of the tank. If for indication of carbon, and after a heavy short-circuit, take the sample from the surface of the oil.

The care of the insulating oil in circuit-breakers is of the utmost importance in their successful operation. Contamination by dirt, moisture, metallic particles, lint, etc., all reduce the dielectric strength, upon which the operation and current-interrupting ability largely depend. Consequently, the most careful attention should be given to keeping the oil clean, not only in filling the tanks originally but in later maintenance or other work on the breakers which might involve opening the tanks.

Only the highest grade, such as Wemco "C" or other approved oil, should be used in the breakers. The oil should be new or at least thoroughly reconditioned by means of a filter press or centrifuge. In any case, before using, it should be given a dielectric test which should show

4. Examine all contacts frequently a minimum of 22,000 volts (preferably 25,000 to 30,000) measured between 1-inch diameter discs spaced .1 inch apart.

> Before filling, the tanks should be thoroughly cleaned, and flushed out with insulating oil. The same treatment should be given the inside of the top of the breaker and the operating linkage and contact system. In doing this, rags which will leave lint should not be used as lint absorbs and holds moisture.

> The same care should be used during inspection or maintenance work on the breaker, which should preferably be done only under favorable weather conditions. If the oil is to be reconditioned following operation of the breaker under short-circuit, the tank and entire inside

of the breaker should be cleaned before work merely involves lowering or re-moval of the tank moval of the tank, care should be taken to keep the tank covered until it is replaced so that dirt, dust, metallic particles, etc., cannot fall into the oil.

The above precautions may appear academic to those familiar with the maintenance and operation of oil circuit-breakers, but a little more than ordinary care in oil-handling will be well repaid in reliable and dependable operation for which the breaker is designed and built.

For instructions as to the care and testing of insulating oil, see Instruction Book 5336.



FIG. 10-TOGGLE MECHANISM





Type GO-B, GO-1-B and GO-2-B Breakers DATA APPLYING TO 600-5 AND 1200-5 TRANSFORMERS ACTUAL PRIMARY CURRENTS NECESSARY TO PRODUCE 5 AMPERES IN SECONDARY FOR ATTACHMENTS INDICATED 60 CYCLES



ORDERING INSTRUCTIONS

When ordering Renewal Parts, always specify the name of the part wanted as shown on the illustrations in this Instruction Book, giving Shop Order Number and the type of Oil Circuit-Breaker, as shown on the name plate. For example:

One Moving or Stationary Contact Complete, 600 Amperes, for Type GO-B Oil Circuit-Breaker, S. O. 30-F-171, shown in Instruction Book 5816, Figure 2.

To avoid delays and misunderstandings, note carefully the following points:

1. Send all correspondence and orders to the nearest Sales Office of the Company.

State whether shipment is to be made by freight, express or parcel post. In the absence of instructions, goods will be shipped at our discretion. Parcel post shipments will be insured only on request. All shipments are at purchaser's risk.
 Small orders should be combined so as to amount to a value of at least \$1.00 net. Where the total of the sale is less

3. Small orders should be combined so as to amount to a value of at least \$1.00 net. Where the total of the sale is less than this, the material will be invoiced at \$1.00.

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RENEWAL PARTS DATA

Recommended Stock of Renewal Parts for TYPES GO-B, GO-1-B AND GO-2-B OIL CIRCUIT-BREAKERS **Outdoor Service**

Manually or Solenoid Operated—Frame Mounting

600 or 1200 Amperes-15 or 23 KV.-3 Pole-Single Throw

FOR ILLUSTRATION OF PARTS SEE FIGURES 2, 3, 4, 5, 6 AND 9

The following is a list of the Renewal Parts and the quantities of each that we recommend should be stocked by the user of this apparatus to minimize interrupted operation caused by breakdowns. The parts recommended are those most subject to wear in normal operation or those subject to damage or breakage due to possible abnormal conditions. This list of Renewal Parts is given only as a guide. When continuous operation is a primary consideration, additional insurance against shutdowns is desirable. Under such conditions more renewal parts should be carried, the amount depending upon the severity of the service and the time required to secure replacement.

TYPE GO-B OIL CIRCUIT BREAKER	

Breakers in use up to and including	• • • • • • • • • • • •	1	5
Name of Part	No. Per 3-Pole Breaker	Recomp For S	nended Stock
Breaker Complete Breaker Pole Unit Complete	1 3	0	0
Bumper Spring Moving Contact Complete	3	0	1
Lift Rod Main Moving Contact	33	0	1
*Main Moving Contact Spring Moving Arcing Contact Breaker	33	0	1 0
Moving Arcing Contact Moving Arcing Contact Spring	6 6	6 2	12 6
Stationary Contact Complete.	6 6	0	02
Main Stationary Contact. Stationary Arcing Contact.	6	0 6	12
Oil Tank Complete	3	0	
*Oil Gauge Glass	3	0	
*Type SA.3 Solenoid Operated Mechanism	5	0	
*†Closing Coil	1	0	
*{Rectox Rectifier	1	0	0

Not illustrated. When ordering, specify identification number stamped on part. Parts indented are included in the part under which they are indented.

TYPE GO-1-B AND GO-2-B OIL CIRCUIT BREARERS

Breakers in use up to and including		1	5
Name of Part	No. Per Breaker	Recommended For Stock	
Breaker Complete. Breaker Pole Unit Complete. Moving Contact Complete. Lift Rod Stationary Contact Complete. Condenser Bushing Stationary Contact Complete. Condenser Bushing De-ion Grid Stack.	1 3 3 3 3 6 6 6 6		0 0 1 0 1 1 0 2 0 0
Stationary Contact Finger Stationary Contact Finger Spring Stationary Arting Horn Oil Tank Complete Oil Tank. *Oil Gauge Glass. Tank Liner. *Type SA-3 Solenoid Operated Mechanism. *TClosing Coil. *TTrip Coll. *TRectox Rectifier. Current Transformer 600/5.	12 12 6 3 3 3 1 1 1 1	12 4 0 0 0 0 0 0 0 0 0 0 0 0 0	24 12 12 0 1 1 1 0 1 1 0
Current Transformer 1200/5.			:

Not listed on illustration. When ordering, specify identification number stamped on part. Parts indented are included in the part under which they are indented.

Ordering Instructions on Page 9

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- IULSA, OKLA., 303 East Brady St. UTICA, N. Y., 113 N. Genese St. WASHINGTON, D. C., 1216 "K" St., N.W. WATERLOO, IOWA, 328 Jefferson St. WICHITA, KANSAS, 233 So. St. Francis Ave, WICHITA, KANSAS, 233 So. St. Francis Ave, WICHITA, KANSAS, 243 Southbridge St. YORK. PA., 143 S. Geotge St.

July. 1938

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Other Agent Jobbers

CINCINNATI, OHIO, The Johnson Electric

ABILENE. KAN., Union Electric Co. AKRON, OHIO, The Moock Electric Supply

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Co. BLUEFIELD, W. VA., Superior-Sterling Co. BUFFALO, N. Y., McCarthy Bros. & Ford CANTON, OHIO, The Moock Electric Supply

CO. CHATTANOOGA, TENN., Mills & Lupton

Supply Co. CHICAGO, ILL., Hyland Electrical Supply Co.

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zxBLOOMFIELD, N. J., Clearfield Ave.
BOSTON, MASS., 101 High St.
BOSTON, MASS., 235 Old Colony Ave., S Boston Mass.

BOSTON, MASS., 235 Old Colony At S. Boston Mass.
*BUFFALO, N. Y., 295 Main St.
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*CINCINNATI. OHIO, Third & Elm Sts.
*CLEVELAND, OHIO, 1216 W. 58th St.
*COLUMBUS, OHIO, Gay & Third Sr.
*DAVLAS, TEXAS, 209 Browder St.
*DAVENPORT, IOWA, 206 East Second St.
*DES MOINES, IOWA, 218 West Second St.

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 *HOUSTON, TEXAS, 1314 Texas Ave.
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 *IACKSON, MICH., Consumers Power Bldg.
 *KANSAS CITY, MO., 101 W. Eleventh St.
 *LOS ANGELES, CALIF., 420 S. San Pedro St.
 *LOUISVILLE, KY., 332 West Broadway
 *MEMPHIS TENN. 130 Madison St. *MEMPHIS, TENN., 130 Madison St. *MILWAUKEE, WISC., 546 North Broadway

•MINNEAPOLIS, MINN., 2303 Kennedy St.

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 SALT LAKE CITY, UTAH, 10 West First South St.
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 SAN FRANCISCO, CALIF., 60 Federal St.
 SEA TILE, WASH., 603 Stewart St.
 SEATTLE, WASH., 3451 East Marginal Way
 ST. LOUIS, MO., 411 No. Seventh St.
 ST. LOUIS, MO., 1219-21 Gratoir St.
 SYRACUSE, N. Y., 109 So. Warren Street
 *TOLEDO, OHIO, 245 Summit St.
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STATION KDKA, 510 Grant St., Pittsburgh, ra. STATION WBZ, 271 Tremont St., Boston, Mass. STATION KYW, IG19 Walnut St., Philadelphia, Pa. STATION WBZA, Hotel KimbaI, Springfield, Mass. STATION WOWO, 925 So. Harrison St., Fort Wayne, Ind. STATION WGL, 925 So. Harrison St., Fort Wayne, Ind



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/*EDMONTON, 10127, 104th St., Armstrong Block, Edmonton, Alberta, Can.
*PORT WILLIAM, 112 McVicar St., Fort William, Ontario, Can.
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xz "HAMILTON, Hamilton, Ontario, Can.
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Industrial Relations

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NEW YORK, N. Y., 173 E. Eighty-Seventh St OMAHA, NEB., 117 N. Thirteenth St. PHILADELPHIA, PA., 3001 Walnur St. PITTSBURGH, PA... 3702 Fifth Ave. *ROCHESTER, N. Y., 41 Chestnut St. SAN FRANCISCO, CALIF., 870 Market St.

