INSTRUCTIONS

MAGNE-BLAST AIR CIRCUIT BREAKERS

TYPES

AM-5-100-3
AM-5-150-3
AM-5-250-0
AM-5-100-4
AM-5-150-4
AM-5-250-1

WITH

MS-10, MS-10A AND MS-10B MECHANISMS

Switchgear

GENERAL ELECTRIC
SCHENECTADY, N.Y.

CONTENTS

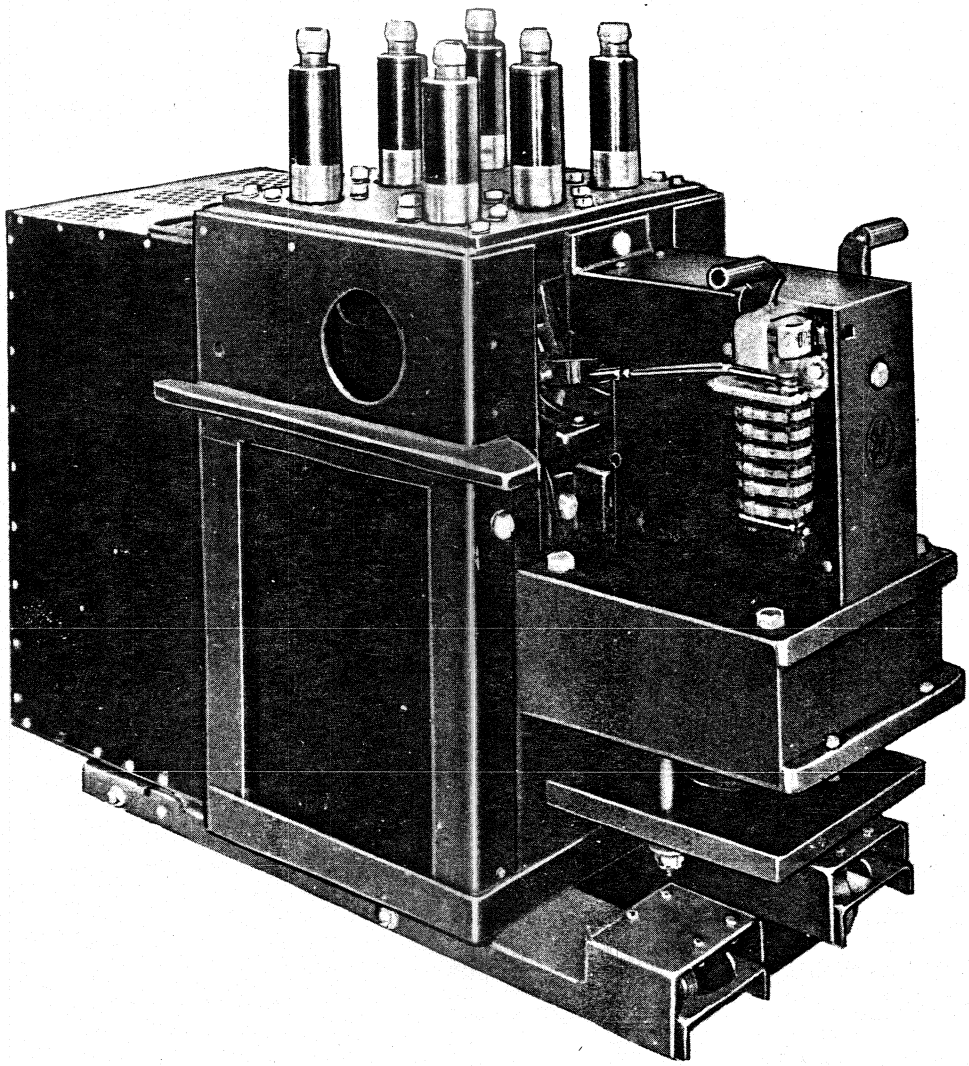

FIG. 1
MAGNE BLAST AIR CIRCUIT BREAKER, TYPE AM-5-250
WITH MS-10B MECHANISM, ARRANGED FOR USE IN
METAL CLAD EQUIPMENT UNIT.

(800242b)

MAGNE-BLAST AIR CIRCUIT BREAKERS

TYPES AM-5-100 AM-5-150 AM-5-250
WITH MS-10 MS-10A & MS-10B MECHANISMS

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

GENERAL INFORMATION

The Magne-Blast Air Circuit Breaker shown in Figure 1 is a triple pole single throw breaker with integral operating mechanism and is arranged for application in Vertical Lift Metal Clad Switchgear.

RATING

One or more of the above breakers is available in 600, 1200, or 2000 ampere current ratings and all are designed for application at a maximum circuit voltage of 5000 volts. Within the published interrupting current range, the interrupting capacity of the breaker on a duty cycle basis consisting of two closing - opening operations with a time interval of 15 seconds between then is as follows.

AM-5-100	-	100,000 KVA
AM-5-150	-	150,000 KVA
AM-5-250	-	250,000 KVA

OPERATING CHARACTERISTICS

The Breaker-Mechanism combination is designed only for electrical closing and the Maintenance Closing Lever is supplied only for use in making adjustments. NEVER ATTEMPT MANUAL CLOSING WITH THE BREAKER IN SERVICE, for under such conditions, sufficient closing force and speed cannot be applied.

The MS-10 solenoid mechanisms are trip free and will operate satisfactorily over the standard ranges for closing and tripping voltages as discussed later under CONTROL.

When the solenoid coil is energized, the armature is driven upwards and the plunger rod threaded into the armature raises the roller carried by the set of links fastened to the operating crank. This action rotates the crank and closes the breaker contacts. After the armature and linkage have reached the end of their travel, a prop rotates into position under each end of the pin through the roller and the mechanism is held in the closed position. The solenoid coil is de-energized by the relay which is actuated by the cut-off switch at the end of the armature stroke, and the armature is returned by gravity to its original position.

When the trip coil is energized, the trip plunger forces the latch off of the roller causing the linkage to collapse which allows the opening springs to rotate the main crank and open the contacts. During the opening stroke, auxiliary switch contacts open to interrupt the trip coil circuit. After the breaker is open, the mechanism linkage returns to its normal position, and a spring resets the trip latch.

In case the trip coil is energized while the breaker is closing, the trip plunger forces the latch off the trip roller allowing the mechanism linkage to collapse and the breaker to re-open. The armature completes its closing stroke, however, and the coil is de-energized as in a normal closing operation.

When the breaker is tripped under load or short circuit conditions, the opening springs act to swing the contact arms downward, parting first the primary contacts, then the intermediate contacts, and then the arcing contacts. Magnetic forces of the Blowout Coils, together with an air stream from the "Boosters" drives the arc from the contacts out along the diverging Arc Runners into the "Interleaving" Arc Chutes. The tapered fins that project alternately from the two opposite inner surfaces of the chute deflect the arc into a gradually deepening serpentine path. This lengthening and consequent cooling action rapidly increases the electrical resistance of the arc to cause interruption. In the higher KVA ratings, the hot exhaust gases are cooled while passing through the Muffler at the end of the arc chute. An easily removable Box Barrier encases the interrupting units, and provides insulation between phases and from each phase to the grounded frame.

CONTROL

For electrical operation, control power may be from either an Alternating or Direct Current source. In the case of Alternating Current, it is necessary to use a Copper-Oxide Rectifier to supply the Direct current required by the closing coil.

Operating ranges are given on the mechanism nameplate. Ordinarily, standard ranges apply and are as follows:

STANDARD CLOSING & TRIPPING VOLTAGE RANGE

Nominal Voltage	Closing Range	Tripping Range
125 V.DC.	90-130 V.DC.	70-140 V.DC.
250 V.DC.	180-260 V.DC.	140-280 V.DC.
220 V.AC.	180-240 V.AC.	180-240 V.AC.

SHIPPING - UNPACKING - STORAGE

SHIPPING

Each Circuit Breaker is carefully inspected and then is packed by workmen experienced in the proper handling of electrical switchgear.

Immediately on receipt of a Circuit Breaker, an examination should be made for any damage sustained during shipment. If injury or rough handling is evident, a damage claim should be filed at once with the Transportation Company, and the nearest General Electric Company's Sales Office should be notified promptly.

UNPACKING

The breaker should be removed from the crating with sufficient care so that no damage will result from rough handling. It frequently happens that "loose parts" associated with the apparatus are included in the crate. Care should be taken to make certain that these parts are not overlooked.

After the Breaker has been removed from the crating, the brace and steel hooks, holding the Box Barrier in position, should be removed and discarded. The red painted hexagonal head shipping bolts holding the top of the box barrier to the frame should be replaced by the thumb screws shown in Figure 5. Two wood strips, or blocks, have been placed in the slots between the vertical front barrier and the frame of the breaker to prevent the box barrier from coming in contact with the rear bushings while in shipment. THESE STRIPS MUST BE REMOVED before the box barrier can be properly put on and the breaker put in service.

STORAGE

It is advisable that the Breaker be set up immediately, but if it must be stored, it should be kept in a clean dry place, free from corrosive gases or fumes. During construction work, particular care should be taken to protect this apparatus from moisture and cement dust as this combination has very corrosive effects on many parts. All machined parts except those on the contacts should be coated with heavy oil or grease to prevent rusting.

INSTALLATION

Outline, wiring and all other drawings relating to dimensions, electrical connections, and control should be on hand so that points in question are readily settled as they arise. Before any installation work is done, consult these drawings and the Instruction Book for the "Metal-Clad Switchgear".

The complete Breaker Mechanism unit has already been assembled, adjusted, inspected, and tested at the factory in accordance with the detailed adjustments listed under the section OPERATION AND MAINTENANCE; It is possible, however, that unusually rough handling or transportation may have caused some loosening or disturbance of the apparatus to warrant a rechecking and in some cases, readjustment.

Before proceeding, the following precautions should be noted:

PRECAUTIONS

Make certain that all Control Circuits have been de-energized. .

Make certain that the Primary Breaker Circuits are open and effectively grounded.

Never work on either the breaker or mec while in the closed position unless the Prop a Latch have been wired or blocked to prevent accidental tripping.

INSPECTION

1. Check all nuts, bolts, screws, and cotter pins to make certain that they are properly tightened.
2. Inspect all wiring and make certain that no damage was done during installation. Check all terminals, screws, and connections and test the circuits for possible short circuits or grounds.
3. Position the maintenance closing lever under the solenoid armature and push down on the handle to close the breaker. With a screw driver (CAUTION: Keep the finger clear of the linkage as accidental tripping or fast movement could cause severe injury) rotate the prop from under the closing roller pin with maintenance operating handle pushed all the way down, and then raise the handle to open the breaker. Operate in this cycle of slow close and slow open operation several times, making certain that all parts are working freely.
4. Check the operating voltage for both the closing coil and trip coil to determine if, with line drop, it is within the limits specified on the nameplate. In the case of a rectifier operated mechanism, the D. C. voltage across the coil terminals with full closing coil current flowing should be 110 volts. Adjustment is possible by means of the tap resistor in the rectifier A. C. line. For detailed description of this adjustment refer to Instruction Book on Copper Oxide Rectifiers for Circuit Breaker Closing Service.

LUBRICATION

During assembly at the factory, all wearing parts and bearing surfaces on both the breaker and mechanism have been coated with a film of medium soft lubricating and rust resisting greases. All main bearing surfaces such as the prop face are lubricated with G. E. Lubricant D50H1C (Lubriplate #110); Roller bearings with G. E. Ball Bearing Lubriplate D50H1E; Pivots of the contact arms with G. E. Lubricant #5485 (Socony-Vacuum #323).

In the case of an overhaul or repair where the breaker and mechanism parts have been disassembled, it is recommended that these greases (or similar) which are available in 1 lb. or 5 lbs. cans be used.

After the foregoing items have been checked, and any adjustments that may have been required are completed, the Breaker may be placed in service.

OPERATION AND MAINTENANCE

Dependable service and safety of power distribution equipment is based on the unfailing performance of the circuit breaker.

To maintain such service, it is recommended that a definite schedule be set up and adhered to for the purpose of properly lubricating the wearing parts. A dependable and observing attendant can be expected to forestall mishaps by reporting loosened nuts, scored surfaces, and other evidences of possible trouble.

In addition, but at less frequent intervals, periodic inspection should be made at which time the apparatus should be given such servicing as may be found desirable or necessary. In case of highly repetitive operation, it is recommended that the first Periodic Inspection be made after not more than 500 operations to determine whether there has been any loosening up of parts. The interval between later Periodic Inspections should depend on operating conditions and should be determined by experience.

PERIODIC INSPECTION

At this time a thorough inspection should be made of all parts of the breaker and mechanism.

Contacts

After removing the box barrier, the contacts on the two outside phases can readily be inspected. The contacts on the center phase can be seen with the aid of a mirror and flashlight. If the contacts are in good condition, there is no need of removing the arc chute. If, however, the surface of the contacts need smoothing up with a fine file or sandpaper, the arc chutes can be removed as described under the heading REPLACEMENT OF PARTS.

Arc Chute

If the arc chutes are removed for contact maintenance, and are for any reason disassembled for inspection, the following points should be noted:

1. Scale formed over the surface of the chute must not be removed, but any loose particles collected in the chute or box barrier should be blown out.
2. Cracks which have formed in the fins of the arc chute are to be expected in ceramic materials of this type when subjected to the severe heat of an arc. These cracks do not interfere with the operation of the device in any way and should be disregarded. If the chute has had any mechanical injury due to dropping or accidental striking which has resulted in actual breaking off of fins, replacment of the chute is necessary.

Insulation Parts

The insulation parts on the breaker should be kept clean and dry. Smoke or dust collected between inspection periods should be wiped off, and if dampness is apparent, heaters should be installed to insure dryness.

Bushings

The surface of the bushings should be smooth and unscratched. If the insulation surface should become damaged, it should be well cleaned and then re-touched with either 1170 clear varnish or 1202 (clear) or 1210 (brown) glyptal. Allow to dry smooth and hard.

Mechanism

Careful inspection should be made to check for loose nuts or bolts and broken cotter pins. The latch surface should be inspected for wear and the surfaces of the rollers should be inspected for chipping or other evidences of damage. Lubrication should be done in accordance with the instructions under the heading LUBRICATION.

ADJUSTMENTS

Adjustments described herein should be referred to on periodic inspection of the breaker, and should be followed whenever it becomes necessary to repair or replace parts that have become worn or defective in service.

Instructions for the replacement of parts will be found under the later heading of REPLACEMENT OF PARTS.

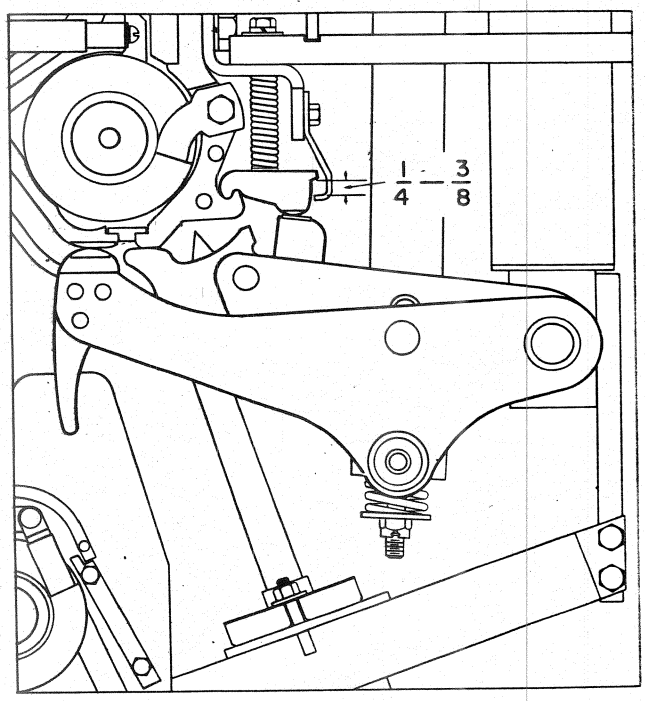

Fig. 2

Primary Contacts

On closing the breaker, the primary contact fingers should raise 1/4" to 3/8". (See Fig. 2) This can be adjusted by means of the operating rod adjusting screw. To adjust, open the breaker, and

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after removing the cotter pin in one end of the shaft through the top of the operating rods, slide the shaft free of the rod to be adjusted. Loosen the check nut on the operating rod adjusting screw and shorten the screw to increase the primary contact travel or lengthen the screw to decrease the primary contact travel (1/2 turn of the eye bolt gives approximately 5/64" change in the contact). Replace the check nut, shaft, cotter pin, and close the breaker to check the adjustment.

Intermediate Contacts

Close the breaker until the intermediate contacts first touch. The gap between the primary contact fingers and the movable primary contact block should be 5/16" to 1/2" on the 600 and 1200 Ampere sizes. (See Fig. 3) On the 2000 Ampere Breakers, this gap should be 5/16" to 7/16". This dimension has been set in the factory and no adjustment is provided. If enough material has been eroded away to make this clearance too small, the contacts should be replaced.

Arcing Contacts

Close the breaker until the arcing contacts just touch. The gap at the intermediate contacts should be 3/8" to 1/2" on the 600 and 1200 Ampere Breakers. (See Fig. 4) This gap should be 15/32" to 19/32" on the 2000 Ampere Breakers. The arcing contacts have been set in the factory and no adjustment is provided. If enough material has been eroded away to make this clearance too small, the contacts should be replaced.

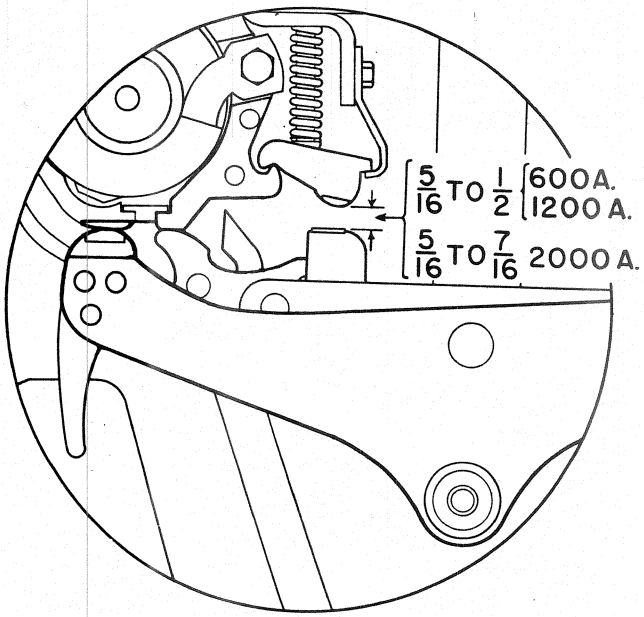

Fig. 3

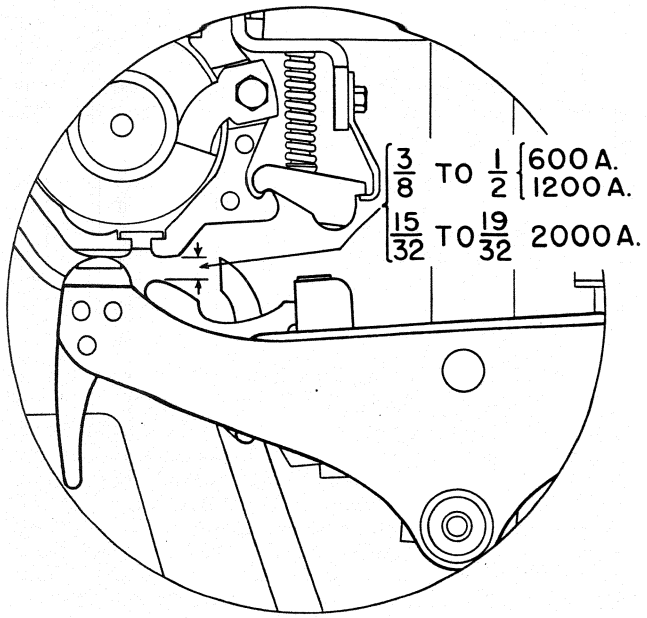

Fig. 4

Contact Gap

With the breaker tripped from the closed position, the gap between the primary contacts should be 3 3/8" ± 1/16". To change this gap, loosen the set screw holding the combination opening spring guide-buffer stop (See Figs. 6, 7 or 8) and then screw the guide-stop into, or out of the plate which holds it. Turning the stop out toward the back of the mechanism increases the primary gap. Note: A change in this adjustment may require a change in the "Plunger Clearance" described later, and the adjusting nut on the end of the opening spring should also be changed so that the length of the spring, with the breaker closed, will not be materially affected.

Latch Wipe (See Figs. 6, 7 or 8)

The wipe of the latch on the trip roller should be from 3/16" to 1/4". This can be determined easily by putting a film of grease on the latch, closing the breaker part way, and tripping, to adjust, add or remove washers under the head of the stop bolt located near the top of the latch on the trip coil frame.

Prop Clearance (See Figs. 6, 7 or 8)

With the breaker closed as far as possible with the manual handle, the clearance of the pin through the closing roller over the prop should be 1/32" to

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(M-6496-4)

3/32". This can be adjusted by dropping the closing coil and screwing the plunger rod into or out of the armature. Note: Two set screws are used to lock the plunger rod in position in the armature. If the rod adjustment is changed, the rod must be spotted in the correct position and the set screw replaced.

Latch Clearance (See Figs. 6, 7 or 8)

The clearance between the trip latch and roller with the breaker open should be approximately 1/32" to 1/16". This can be adjusted by means of the stop bolt in the front of the mechanism frame near the bottom. The lock nut should be fastened securely if any adjustment has been made.

Plunger Clearance

With the breaker in the open position, there should be approximately 1/8" to 1/4" clearance between the plunger and closing roller. To change this clearance, the nuts on the armature plate guide bolts can be run up or down to change the at-rest position on the MS-10 and 10B, and on the MS-10A, washers may be added or removed from between the coil bottom plate and the straps which support the armature in the at-rest position.

REPLACEMENT OF PARTS

Before maintenance or replacement of contacts, the arc chutes must be removed.

Arc Chute Removal

To remove an arc chute, first loosen the bolts through the slots in the two upper pole pieces. Then remove the two cap screws (one on each side of chute) fastening the lower end of the chute to the booster cylinder support. Finally, while supporting the weight of the chute, remove the two cap screws at the top of the chute (through the upper pole pieces and into the top of the arc runner) which will allow the chute to slide out along the slots in the upper pole pieces.

Primary Contacts

The primary contacts are designed to carry the normal load current with a minimum amount of heating and are provided with an inlaid block of silver to minimize the effects of wear. The stationary contacts consist of fingers mounted with associated springs and stop plate on the support casting carried by the rear bushing. The fingers may be replaced individually, or as is usually the case, the assembled casting may be replaced.

The movable primary contact is carried on the blade hinged at the front bushing. To replace because of wear or because of burning on the intermediate contact also carried by this blade, the following steps should be followed:

1. Remove the cotter pins in the pin fastening the lower end of the operating rod to the primary contact blade and slide the pin through the holes in the arcing contact side flanges.
2. Remove the bolt, spring and thimble at the blade hinge being careful not to lose the washer between the arcing contact and the primary contact blades.
3. Close the breaker part way with the maintenance operating lever and withdraw the contact blade and buffer assembly.

Reassemble the replacement parts making certain that the silver washers are replaced between the primary contact and arcing contact side flanges and that all cotter pins are replaced. If a new hinge bolt has been used, or if it seems desirable for any other reason, the pressure at the hinge joint should be checked by measuring with a spring balance the force required to swing the contact arm. This torque should be between 40 and 60 pound-inches.

Intermediate Contacts

The movable part of the intermediate contacts is carried by the primary contact blade and may be replaced as described under Primary Contacts. The stationary intermediate contact is the lower face of the primary finger support casting as previously described under Primary Contacts.

Arcing Contacts

The movable arcing contact is hinged at the front bushing and is removed along with the primary contact blade as previously described under Primary Contacts.

The stationary arcing contact is carried by the first section of the upper arc runner. To remove this, first remove the arc chute and the mycalex insulation on each side of the upper runner. The lead fastening the first blowout coil to the primary contact casting should be removed, and the bolts passing through the lower end of the rear bushing to support the runner assembly should be removed. With the upper runner assembly removed, the first section of the runner can be replaced. On reassembly of the runner assembly, on the bushing, care must be taken to replace all insulation in the proper position.

RENEWAL PARTS

The parts most subject to wear in ordinary operation and to damage or breakage due to possible abnormal conditions are listed with catalogue number in these Renewal Parts Bulletins.

AM-5-100-3.....GEF-3485
AM-5-100-4.....GEF-3485

AM-5-150-3.....GEF-3486
AM-5-150-4.....GEF-3486

AM-5-250-0.....GEF-3487
AM-5-250-1.....GEF-3487

When ordering renewal parts, address the nearest sales office of the General Electric Company and give the quantity of each item desired, and catalogue number from the Parts Bulletin.

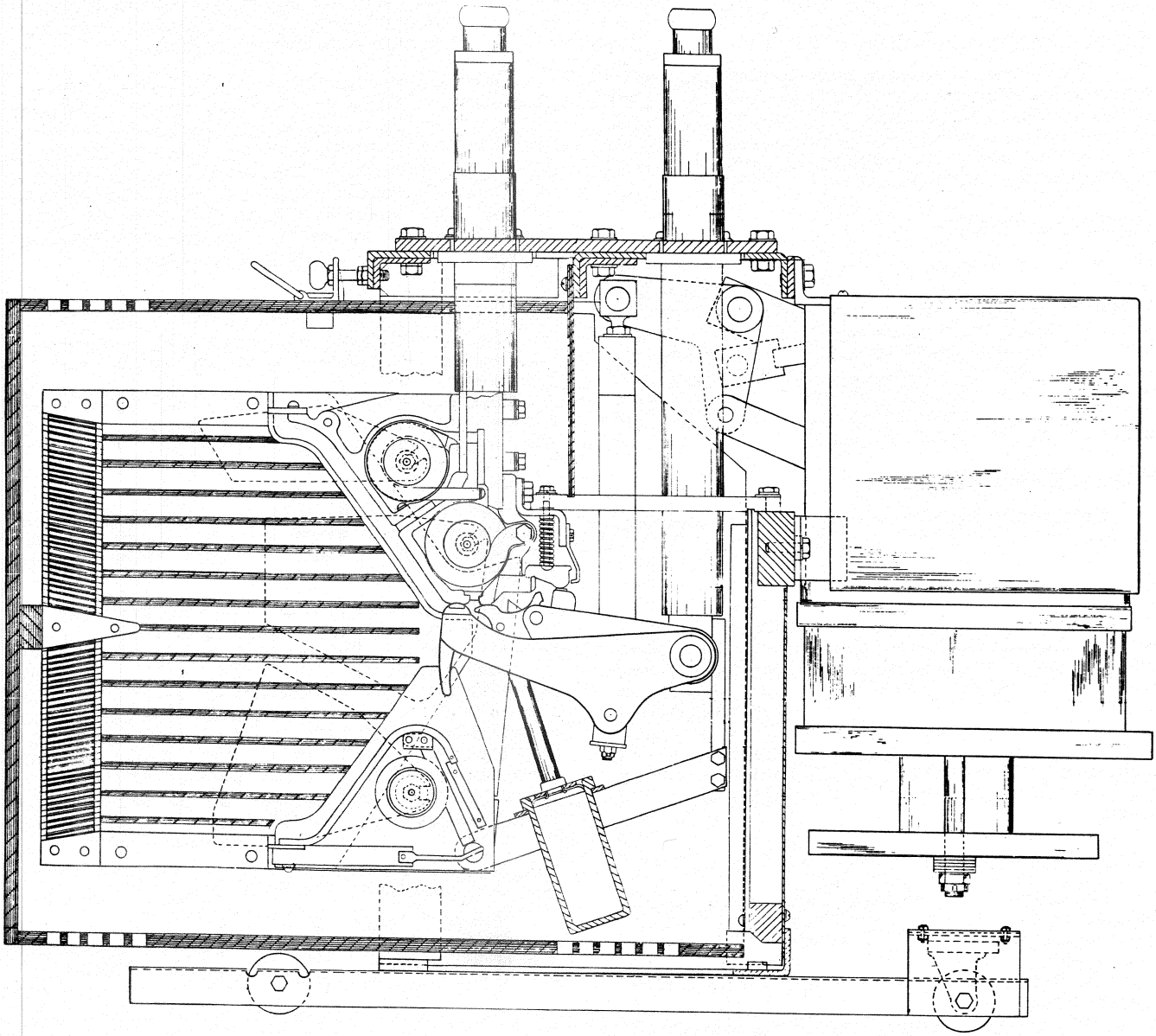

FIG. 5

CROSS-SECTIONAL VIEW OF AM-5-250 MAGNE-BLAST BREAKER.
SHOWN IN CLOSED POSITION.

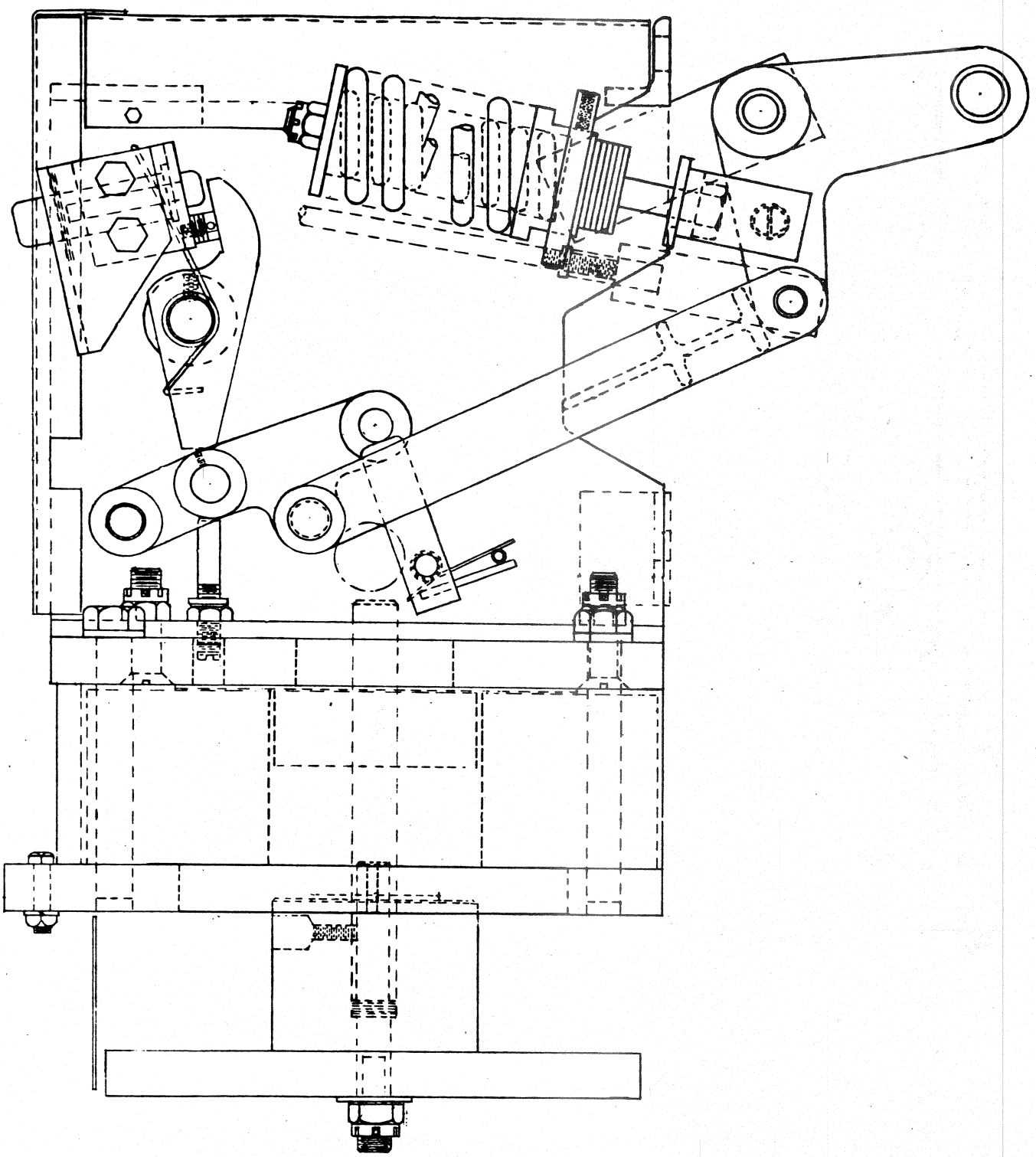

FIG. 6

VIEW OF MS-10 SOLENOID MECHANISM SHOWN IN CLOSED POSITION.

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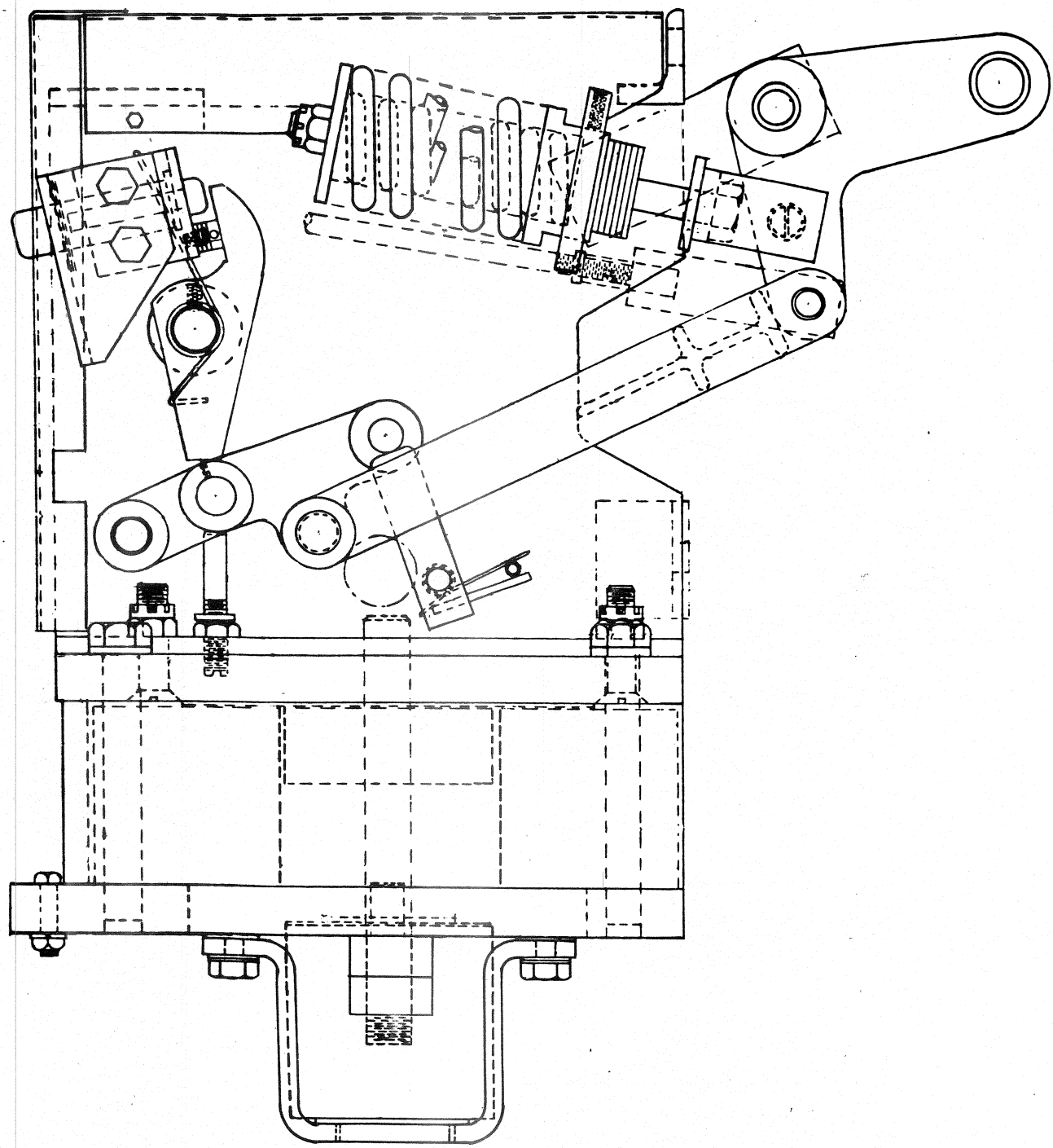

FIG. 7

VIEW OF MS-10A SOLENOID MECHANISM SHOWN IN CLOSED POSITION.

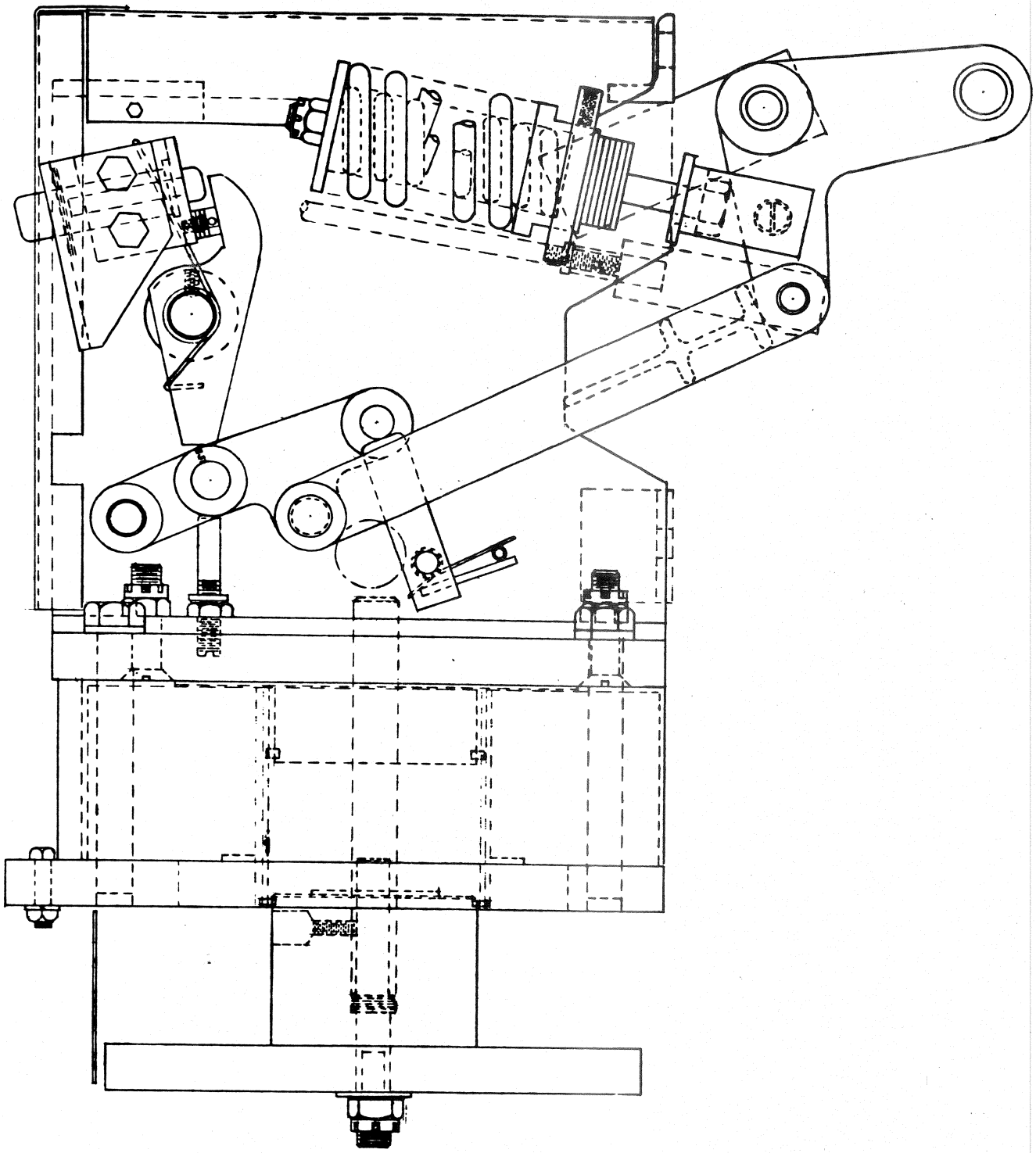

FIG. 8

VIEW OF MS-10B SOLENOID MECHANISM SHOWN IN CLOSED POSITION.

IF YOU REQUIRE SERVICE

IF AT ANY TIME you find it necessary to repair, recondition, or rebuild your G-E apparatus, there are 26 G-E service shops whose facilities are available day and night for work in the shops or on your premises. Factory methods and genuine G-E renewal parts are used to maintain the original performance of your G-E apparatus. If you need parts only, immediate shipment of many items can be made from warehouse stock.

The services of our factories, engineering divisions, and sales offices are also available to assist you with engineering problems. For full information about these services, contact the nearest service shop or sales office listed below:

APPARATUS SERVICE SHOPS

Atlanta, Ga.....496 Glenn St., S.W.
*Baltimore 30, Md.....920 E. Fort Ave.
Buffalo 11, N. Y.....318 Urban St.
Charleston 28, W. Va..306 MacCorkle Ave., S.E.
Chicago 80, Ill.....849 S. Clinton St.
Cincinnati 2, Ohio.....215 W. Third St.
Cleveland 4, Ohio.....4966 Woodland Ave.
Dallas 2, Texas.....1801 N. Lamar St.
Denver 5, Colo.....3353 Larimer St.
Detroit 2, Mich.....5950 Third Ave.
Houston 1, Texas.....1312 Live Oak St.
Johnstown, Pa.....841 Oak St.
Kansas City 8, Mo.....819 E. 19th St.
Los Angeles 1, Calif.....6900 Stanford Ave.
Milwaukee 3, Wisc.....940 W. St. Paul Ave.
Minneapolis 1, Minn.....410 Third Ave., N.
New York 14, N. Y.....416 W. 13th St.
Philadelphia 23, Pa.....429 N. Seventh St.
Pittsburgh 6, Pa.....6519 Penn Ave.
St. Louis 1, Mo.....1110 Delmar Blvd.
Salt Lake City 9, Utah...141 S. Third West St.
San Diego 1, Calif.....2045 Kettner Blvd.
San Francisco 3, Calif.....1098 Harrison St.
Seattle 4, Wash.....1508 4th Ave., S.
West Lynn 3, Mass.....920 Western Ave.
Youngstown 3, Ohio.....121 E. Boardman St.

* Convenient G-E Renewal Parts Center for over-the-counter purchases of industrial parts, located at same address.

APPARATUS SALES OFFICES

Akron 8, Ohio.....335 S. Main St.
Albany 1, N. Y.....90 State St.
Allentown, Pa.....1014 Hamilton St.
Amarillo, Texas.....701 E. Fifth St.
Atlanta 3, Ga.....167 Spring St., N.W.
Bakersfield, Calif.....211 E. 18th St.
Baltimore 1, Md.....39 W. Lexington St.
Bangor, Maine.....77 Central St.
Beaumont, Texas.....398 Pearl St.
Binghamton, N. Y.....19 Chenango St.
Birmingham 2, Ala.....600 N. Eighteenth St.
Bluefield, W. Va. P.O. Box 447, Appalachian Bldg.
Boston 1, Mass.....140 Federal St.
Buffalo 3, N. Y.....535 Washington St.
Butte, Mont.....20 West Granite St.
Canton 1, Ohio.....700 Tuscarawas St., W.
Cedar Rapids, Iowa.....203 Second St., S.E.
Charleston 28, W. Va..306 MacCorkle Ave., S.E.
Charlotte 1, N. C.....200 S. Tryon St.
Charlottesville, Va.....123 E. Main St.
Chattanooga 2, Tenn.....832 Georgia Ave.
Chicago 80, Ill.....840 S. Canal St., P.O. Box 5970A
Cincinnati 2, Ohio.....215 W. Third St.
Cleveland 4, Ohio.....4966 Woodland Ave.
Columbia 23, S. C.....1225 Washington St.
Columbus 15, Ohio.....40 S. Third St.
Dallas 2, Texas.....1801 N. Lamar St.
Davenport, Iowa.....511 Pershing Ave.
Dayton 2, Ohio.....25 N. Main St.
Denver 2, Colo.....650 Seventeenth St.
Des Moines, Iowa.....418 W. Sixth Ave.
Detroit 2, Mich.....700 Antoinette St.
Duluth 2, Minn.....14 W. Superior St.
El Paso, Texas.....109 N. Oregon St.
Erie 2, Pa.....10 E. Twelfth St.
Evansville 19, Ind.....123 N.W. Fourth St.
Fairmont, W. Va.....511 Jacobs Bldg.
Fergus Falls, Minn.....102 W. Lincoln Ave., P.O. Box 197
Fort Wayne 2, Ind.....127 W. Berry St.
Fort Worth 2, Texas.....408 W. Seventh St.
Fresno 1, Calif.....Tulare and Fulton St.
Grand Rapids 2, Mich..148 Monroe Ave., N.W.
Greenville, S. C.....106 W. Washington St.
Hagerstown, Md.....Professional Arts Bldg.
Hartford 3, Conn.....410 Asylum St.
Houston 1, Texas.....1312 Live Oak St.
Indianapolis 4, Ind.....110 N. Illinois St.
Jackson, Mich.....120 W. Michigan Ave.
Jackson 1, Miss.....203 W. Capitol St.
Jacksonville 2, Fla.....237 W. Forsyth St.
Jamestown, N. Y.....2 Second St.
Johnson City, Tenn.....334 E. Main St.
Johnstown, Pa.....841 Oak St.
Kansas City 6, Mo.....106 W. Fourteenth St.
Knoxville 08, Tenn.....602 S. Gay St.
Lincoln 8, Neb.....1001 "O" St.
Los Angeles 54, Calif.....212 N. Vignes St.
Louisville 2, Ky.....455 S. Fourth St.
Madison 3, Wisc.....111 S. Hamilton
Manchester, N. H.....839 Elm St.
Medford, Ore...2015 E. Main St., P.O. Box 1349
Memphis 3, Tenn.....8 N. Third St.
Miami 32, Fla.....25 S.E. Second Ave.
Milwaukee 3, Wisc.....940 W. St. Paul Ave.
Minneapolis 2, Minn.....12 S. Sixth St.
Mobile 13, Ala.....54 St. Joseph St.
Nashville 3, Tenn.....234 Third Ave., N.
Newark 2, N. J.....744 Broad St.
New Haven 6, Conn.....129 Church St.
New Orleans 12, La.....837 Gravier St.
New York 22, N. Y.....570 Lexington Ave.
Niagara Falls, N. Y.....253 Second St.
Norfolk 10, Va.....229 Bute St.
Oakland 12, Calif.....409 Thirteenth St.
Oklahoma City 2, Okla....119 N. Robinson St.
Omaha 2, Nebr.....409 S. Seventeenth St.
Pasco, Wash.....421 W. Clark St.
Philadelphia 2, Pa.....1405 Locust St.
Peoria 2, Ill.....410 Main St.
Phoenix, Ariz.....435 W. Madison St.
Pittsburgh 22, Pa.....535 Smithfield St.
Portland 3, Maine.....477 Congress St.
Portland 7, Ore.....920 S.W. Sixth Ave.
Providence 3, R. I.....Industrial Trust Bldg.
Raleigh, N. C.....304 So. Salisbury St.
Reading, Pa.....31 N. Sixth St.
Richmond 17, Va.....700 E. Franklin St.
Riverside, Calif.....3972 Main St.
Roanoke 11, Va.....202 S. Jefferson St.
Rochester 4, N. Y.....89 E Ave.
Rockford, Ill.....110 S. First St.
Rutland, Vt.....38½ Center St.
Sacramento 14, Calif.....1107 Ninth St.
St. Louis 2, Mo.....112 N. Fourth St.
Salt Lake City 9, Utah.....200 S. Main St.
San Antonio 5, Texas.....310 S. St. Mary's St.
San Diego 1, Calif.....861 Sixth Ave.
San Francisco 6, Calif.....235 Montgomery St.
San Jose, Calif.....177 W. Santa Clara Ave.
Savannah, Ga.....16 Drayton St.
Seattle 11, Wash.....710 Second Ave.
Shreveport 39, La.....803 Jordan St.
Sioux City 13, Iowa.....507 Sixth St.
South Bend 11, Ind.....112 W. Jefferson Blvd.
Spokane, Wash.....S. 162 Post St.
Springfield, Ill.....607 E. Adams St.
Springfield 3, Mass.....1387 Main St.
Syracuse 2, N. Y.....113 S. Salina St.
Tacoma 1, Wash.....1019 Pacific Ave.
Tampa 6, Fla.....1206 North A St.
Toledo 4, Ohio.....420 Madison Ave.
Trenton, N. J.....214 Hanover St.
Tulsa 3, Okla.....320 S. Boston Ave.
Utica 2, N. Y.....258 Genesee St.
Washington 5, D. C.....806 Fifteenth St., N.W.
Waterbury 89, Conn.....111 W. Main St.
Waterloo, Iowa.....716 Water St.
Wheeling, W. Va.....40 Fourteenth St.
Wichita 2, Kan.....200 E. First St.
Wilmington, Del.....1326 Market St.
Williamston, N. C.....Town Hall
Worcester 8, Mass.....507 Main St.
York, Pa.....56 W. Market St.
Youngstown 3, Ohio.....25 E. Boardman St.

Hawaii: W. A. Ramsay, Ltd., Honolulu **Canada: Canadian General Electric Company, Ltd., Toronto**

APPARATUS DEPARTMENT, GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y. ②

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