

General Electric Company

Schenectady, N.Y.

December, 1922

Bulletin No. IGE-44565A

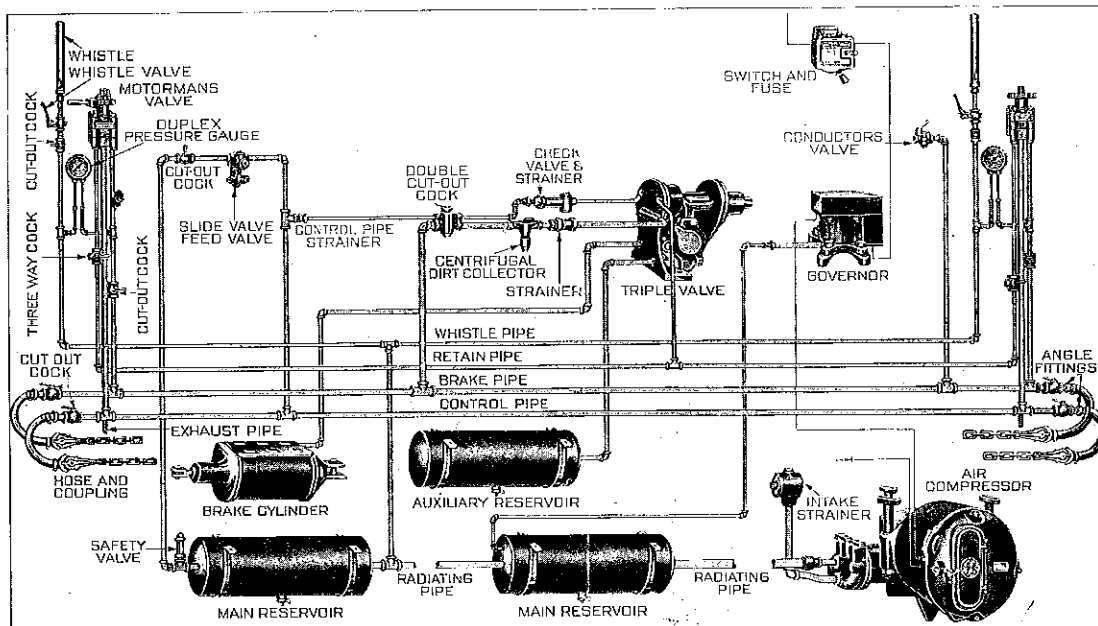
AUTOMATIC VARIABLE RELEASE AIR BRAKE EQUIPMENT

The automatic variable release air brake equipment has been generally adopted as standard for high speed interurban cars which are operated the greater part of the time in trains.

This type of equipment provides a braking effect during retardation that can be main-

The following description of the equipment and its component parts gives a clear understanding of its operation and advantages. The general arrangement of the parts is shown on this page.

The air from the main reservoir is admitted directly to the control pipe on each motor car



PIPING DIAGRAM OF AIR BRAKE EQUIPMENT FOR MOTOR CAR

tained practically constant. The brakes may be quickly applied and released as frequently as desired, and can be partially released after an application has been made. Cars equipped with this system will operate interchangeably with those provided with automatic equipment of other manufacture.

through a feed valve adjusted to reduce the reservoir pressure of 85 or 95 pounds to the standard brake pipe pressure of 70 pounds. The excess pressure is thus confined to the main reservoir and the danger of overcharging the brake pipe and auxiliary reservoir is consequently eliminated.

NOTE.—Data subject to change without notice.

CHAS ATKINS & CO. LTD.
50-52 BIRNIE ST.
ADELPHI
ELECTRICAL DEPARTMENT

IGE-44565A-2 Automatic Variable Release Air Brake Equipment

On account of the fact that the pressures above and below the rotary valve of the motorman's valve are equalized, when in the release and running positions the motorman's valve operates very easily, thus minimizing wear on the rotary valve and seat.

This arrangement has the further advantage of providing automatically for an even distribution of work between the several compressors on a train, without the use of special governing apparatus.

The triple valve is of the quick acting, quick recharge, variable release type, which recharges the auxiliary reservoir directly from the control pipe on each car. This triple valve possesses the following advantageous features:

1. **Quick Recharge**, whereby the maximum braking pressure is always maintained, since the auxiliary reservoirs are charged in the same time as is taken to exhaust the air from the brake cylinders.

2. **Quick Service**, whereby the serial operation of the brakes is rapidly obtained, resulting in shorter stops, and also a saving of air. This is done by venting the brake pipe air to the brake cylinder in service application on the same principle as that used to obtain quick application in emergency.

3. **Variable Release**, which permits of a full or restricted release of the brakes as desired. This feature is especially useful in obtaining the accurate stops so important in stations where individual cars are required to stop opposite certain definite points.

Less air is also used, since it is necessary to make only one application when approaching a station, the brake cylinder pressure then being reduced in a series of steps as the speed of the train is decreased.

4. **High Emergency Brake Cylinder Pressure**, which increases the braking power available in emergency application above the maximum that can be obtained with a full service reduction. This is done by venting to the brake cylinder through a large port some of the air contained in the brake pipe. The

brake cylinder pressure is thereby increased above the maximum that can be obtained with full service application.

A combined check valve and strainer is located in the control pipe near the triple valve. The object of this device is to prevent air from the auxiliary reservoir being exhausted to atmosphere in case of a damaged control pipe connection.

REQUIRED APPARATUS

The following apparatus constitutes a complete double end equipment for a motor car:

Compressor and Auxiliaries

- Motor-driven air compressor
- Intake strainer
- Suspension set

Pressure Regulating Equipment

- Air compressor governor
- Insulating connection
- Feed valve mounted on bracket
- Safety valve

Cab Equipment

- Motorman's valves
- Motorman's valve handle
- Duplex pressure gauges
- 3/4-in. cutout cocks
- 1/2-in. by 3/8-in. 3-way cocks
- Combined switch and fuse

Brake Details

- Brake cylinder complete with push rod
- Auxiliary reservoir
- Reservoir hangers
- Drain cock
- Triple valve (variable release type)
- Triple valve bracket and gasket
- Conductor's valve

Brake Pipe Attachments

- Centrifugal dirt collector
- Branch pipe strainer
- 1-in. cutout cocks
- 1-in. angle fittings
- 1-in. hose and couplings
- Dummy couplings

*Automatic Variable Release Air Brake Equipment IGE-44565A-3***Control Pipe Attachments**

- Control pipe strainer
- Double cutout cock
- Combined check valve and strainer
- $\frac{3}{4}$ -in. cutout cocks
- $\frac{3}{4}$ -in. angle fittings
- $\frac{3}{4}$ -in. hose and couplings
- Dummy couplings

Main Reservoir and Accessories

- Main reservoir
- Reservoir hangers
- Drain cocks
- Cutout cock

Whistle Equipment

- Deep tone whistles
- Whistle valves
- Cutout cocks

The following apparatus constitutes a complete trail car equipment:

Brake Details

- Automatic brake cylinder complete with push rod
- Auxiliary reservoir
- Reservoir hangers
- Drain cock
- Triple valve and gasket (variable release type)
- Conductor's valve

Brake Pipe Attachments

- Centrifugal dirt collector
- Branch pipe strainer
- 1-in. cutout cock
- 1-in. angle fittings
- 1-in. hose and couplings
- Dummy couplings

Control Pipe Attachments

- Control pipe strainer
- Double cutout cock
- Combined check valve and strainer
- $\frac{3}{4}$ -in. cutout cock
- $\frac{3}{4}$ -in. angle fittings
- $\frac{3}{4}$ -in. hose and couplings
- Dummy couplings

The piping diagram on the last page shows the arrangement of the apparatus and connecting pipes. From this diagram it will be noted

that two pipe lines are connected between the cars by the usual hose and couplings, thus making them continuous throughout the train. These pipes (brake pipe and control pipe) provide a means for operating the equipment.

Air Compressor

The air compressor is of the enclosed type and all parts are thoroughly protected from dust and water, and, therefore, no external enclosing box or other covering is needed. It has duplex horizontal cylinders and herringbone gear drive.

In every mechanical and electrical detail, the compressor is designed strictly in accordance with the General Electric Company's standard railway motor.

All bearings and working parts are automatically lubricated from a source—a well formed in the compressor immediately below the gear. This well is supplied through the oil filler, consisting of a projecting elbow fitted with a handle plug so designed that any dirt collected around it is lifted off when it is unscrewed, thus preventing dirt from entering the oil hole. This oil filler is immediately accessible from the side of the car, and of such a height as to insure the proper oil level in the crank case.

The driving gear picks up oil from the well and throws it in a steady stream into an oil pan on the underside of the crank chamber cover. Oil distribution to bearings is effected through large channels formed in the oil pan, from which the oil flows to the various bearings.

No oil waste or oil rings are used, and there are no pipes or small holes to clog with sediment or thick oil.

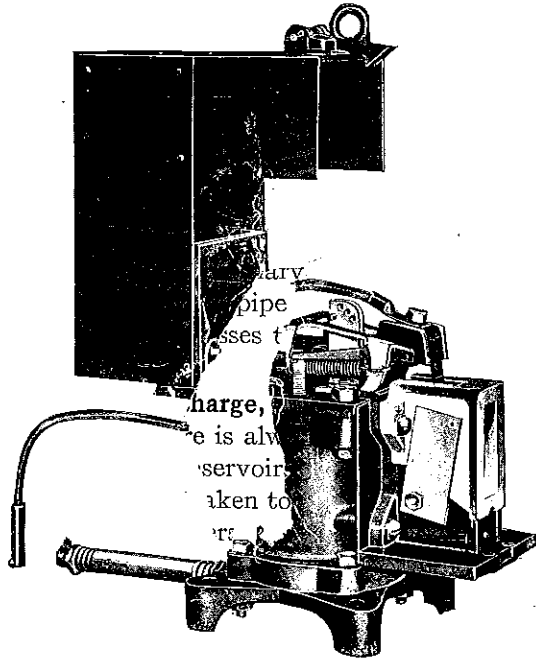
The oiling system is positive in action and continuously delivers oil to the bearings which flows back into the well after doing its work. So long as oil remains in the well, all parts of the compressor are perfectly lubricated.

These compressors, which are of the latest design, have been developed after long experience in the building of air compressors for railway work. They are generally considered

IGE-44565A-4 Automatic Variable Release Air Brake Equipment

as surpassing all competing makes in accessibility, simplicity and general balanced design.

Compressors of this type are manufactured in several sizes to meet the requirements of all classes of railway service. Although



AIR COMPRESSOR GOVERNOR

primarily designed for installation on electrically operated cars, these compressors are perfectly adapted for any class of work requiring the use of compressed air.

Intake Strainer

The supply of air is drawn into the cylinders through an intake pipe which has a strainer containing curled hair on the end farthest from the air compressor. This strainer when practicable should be placed inside the car.

AIR COMPRESSOR GOVERNOR

The governor is essentially a single-pole switch of the contactor type, operated by means of a rubber diaphragm, a piston, and a set of levers. The operating mechanism is simple, compact, and reliable. The construction of this governor is such that air does not pass through, or come in contact with the operating mechanism, but is restricted to a

chamber below the diaphragm, hence troubles resulting from condensation are eliminated.

The essential points of advantage in this type of governor are:

Interrupting switch provided with an arc chute of highly refractory material, an effective magnetic blowout, and easily renewable contacts. The arc chute can be quickly removed for inspection or repairs without disturbing any other part or any electrical connections. The operating mechanism is arranged so as to maintain constant pressure on the contact tips until the point of tripping is reached, insuring a quick break of the contacts when opening the circuit.

A wiping action takes place between the contact tips when the compressor circuit is opened or closed. This action prevents pitting and materially increases the life of the tips.

All principal bearings are provided with hardened knife edges to reduce friction and to insure a quick snap action.

Provision is made for quickly changing the range or difference between opening and closing pressures.

FEED VALVE

The feed valve maintains a constant pressure in the control pipe that supplies the air required for braking purposes. This valve is attached to a bracket to which pipe connections are made, thus making it unnecessary to break any pipe joints when it is desired to remove the valve for cleaning.

This feed valve is of the well known slide valve type and is interchangeable with feed valves of other manufacture.

It responds quickly to small reductions of pressure, and maintains a constant pressure in the control pipe.

The adjustment of the valve can be readily changed by means of an adjusting screw provided for that purpose.

SAFETY VALVE

The safety valve is similar in construction to the pop safety valve used in steam practice and can be readily adjusted by removing the

Automatic Variable Release Air Brake Equipment IGE-44565A-5

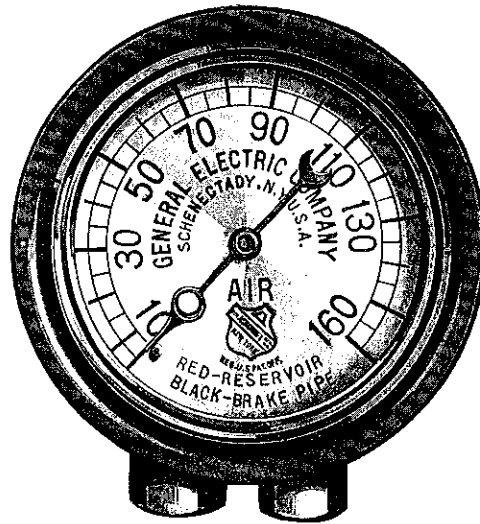
cap on the upper part of the valve and turning the adjusting screw. This valve is adjusted to open at 110 lb. pressure per square inch.

MOTORMAN'S VALVE

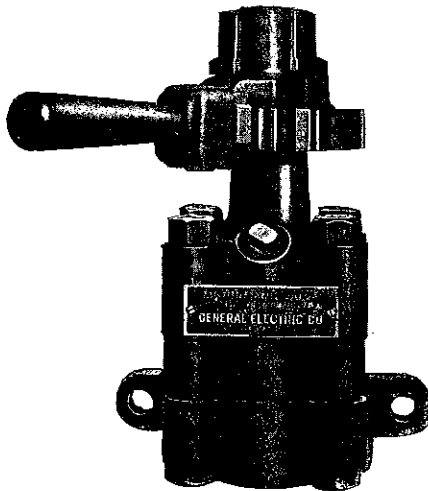
The motorman's valve is of the rotary type and is designed so as to require little space in the motorman's cab. The valve seat is provided with machined ports which register with the ports in the rotary valve when the handle is in its several positions. The valve seat is provided on the upper surface with a recess for receiving a gasket which makes a tight joint with the valve bonnet. The lower surface of the valve seat is machined and makes a tight joint against a gasket which is located in the upper surface of the valve body. This construction allows the bonnet, rotary valve and valve seat to be removed for repairs without disturbing the pipe connections which are made to the valve body.

The valve stem is steel, case hardened at the handle fit and is provided at the base with

voir and the control pipe pressure when the valve is in the release and running positions will be the same as the brake pipe pressure. Hence what were formerly known as full release and running positions of the motor-



PRESSURE GAUGE



MOTORMAN'S VALVE

a ball seat which prevents leakage between the stem and bonnets. The bonnet is provided with a bearing for the stem and can be renewed when worn.

The motorman's valve is designed to be left in the release position while running, as the excess pressure is confined to the main reser-

man's valve have been combined into one which is called the release position.

The positions of the valve handle are therefore: Release, Retain, Lap, Service 1 car, Service 2 or more cars, and Emergency.

PRESSURE GAUGES

Duplex pressure gauges are furnished with this type of equipment. These gauges are especially adapted for this class of service, and are constructed in such a manner that they will retain their calibration indefinitely, and are not affected by temperature changes. When desired an attachment for illuminating the dial can be provided.

COMBINED SWITCH AND FUSE

The combined switch and fuse is of fire-proof construction and is so designed that it is capable of positively opening the circuit under all conditions.

All the current carrying parts are enclosed in moulded insulation, and a powerful mag-

IGE-44565A-6 Automatic Variable Release Air Brake Equipment

netic blowout is provided for extinguishing the arc. The fuse being of the well known enclosed type is placed in a separate compartment which is isolated from the switch by barriers of insulation. Both the switch and fuse are readily accessible by opening the cover, which is held closed by a simple latch.

BRAKE CYLINDER

The brake cylinders furnished with these equipments are designed with a view of incorporating such features as have been found to be most satisfactory in the past, and which therefore have become almost universally standard. The packing leathers are treated by a special process which renders them air tight. The pressure head of the cylinder is provided with a boss to which malleable iron brackets are attached for receiving the dead cylinder lever. When desired a slack adjuster of approved type can be furnished with these cylinders and can be attached to the boss in place of the brackets.

Cylinders are fitted with a tubular piston rod which surrounds the push rod attached to the live cylinder lever. This construction permits of the brakes being applied by hand without moving the brake cylinder piston.

TRIPLE VALVE

The triple valve is of the pipeless type and is bolted to a bracket or the pressure head of the brake cylinder. It can, therefore, be removed for cleaning without breaking any pipe connections.

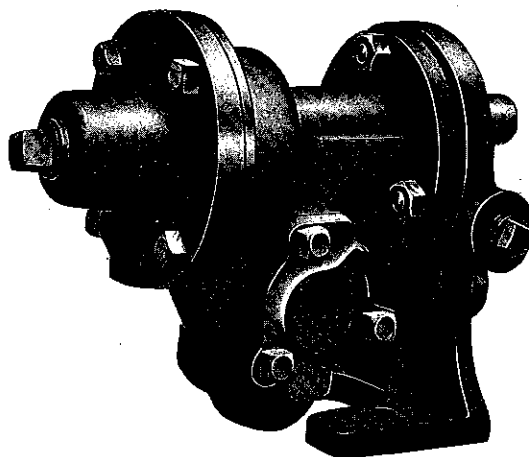
This triple valve has the following advantageous features:

1. Quick recharge of auxiliary reservoir from two sources, namely, the brake pipe and control pipe whereby a maximum braking pressure is always available after a number of successive brake applications.

2. Quick service whereby serial operation of the brakes is obtained. This is accomplished by venting a small amount of brake pipe air to the brake cylinder in service application.

3. Graduated release which permits of a full or partial release of the brakes as desired.

4. High brake cylinder pressure in emergency. This is obtained by venting through a large port some of the air contained in the brake pipe. Brake cylinder pressure is thereby increased above the maximum that can be obtained in service application.



TRIPLE VALVE AND BRACKET

CONDUCTOR'S VALVE

The conductor's valve is of the lift type and is provided with a rubber seat. This valve is operated by means of a lever to which is attached a cord extending throughout the car.

It is of the non-self-closing type, and when opened must be closed by hand.

CENTRIFUGAL DIRT COLLECTOR AND STRAINERS

A centrifugal dirt collector, branch pipe strainer and control pipe strainer are furnished for preventing the entrance of dirt and pipe scale into the triple valve.

These parts are of standard design and are interchangeable with those manufactured by other companies.

COMBINED STRAINER AND CHECK VALVE

A combined strainer and check valve is furnished and is located in the control pipe near the triple valve.

This combined strainer and check valve prevents the loss of auxiliary reservoir pressure and consequently loss of braking power in case of damage to the control pipe or connections.

Automatic Variable Release Air Brake Equipment IGE-44565A-7

HOSE AND COUPLINGS

The hose and couplings for connecting the control pipe and brake pipe between the cars are of standard design, and are interchangeable with those used by other manufacturers.

CUTOUT COCKS

All cutout cocks are of strong and substantial design. The key is held on its seat by a compression spring in the valve cap. Malleable iron handles are attached to the square end of the key by a pin, and can be easily removed when regrinding is necessary.

RESERVOIRS

Reservoirs are made of a special grade of steel to give maximum strength with minimum weight. A 1/2-in. drain cock of substantial construction with a large opening is furnished with each reservoir. Reservoirs are tapped at the ends for the pipe connections to the parts of the air brake equipment. Provision is made in the main reservoir for a separate connection to the air compressor governor. Reservoir hangers are supplied for attaching to the car body.

WHISTLES

The whistles furnished with these equipments are the General Electric Company's

deep tone organ type, possessing agreeable tone and great carrying power.

The whistles are operated by means of a whistle valve placed in the motorman's cab. The stem of the valve is provided with a stuffing box which prevents leakage of air around the stem when the valve is in the open position.

Cutout cocks are provided for disconnecting any whistle when required.

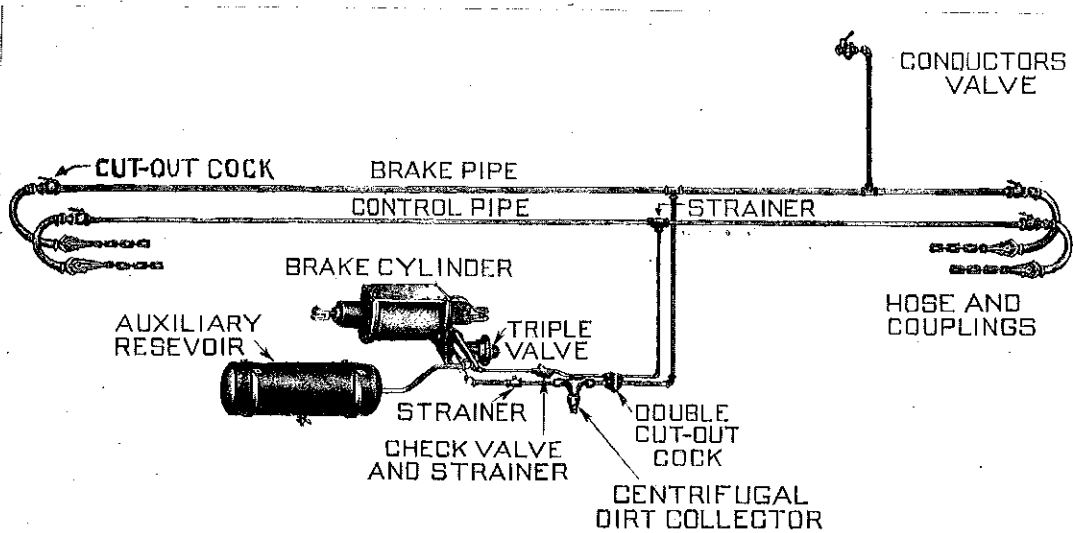
MATERIAL AND WORKMANSHIP

Special attention is given to the character of workmanship and material entering into the construction of all air brake equipment parts. Each piece of apparatus is subjected to rigid inspection and test during the process of manufacture and after it is completed.

The wide experience in the manufacture of high class electric railway apparatus is a guarantee that the air brake equipments placed on the market by the General Electric Company embody all the best features of design, thus insuring safety, reliability and efficiency.



AIR WHISTLE



PIPING DIAGRAM OF AIR BRAKE EQUIPMENT FOR TRAIL CAR

INTERNATIONAL GENERAL ELECTRIC COMPANY, INC.

GENERAL OFFICES

120 Broadway, New York

U. S. A.

Schenectady, N. Y.

OFFICES AND ASSOCIATED COMPANIES

ARGENTINA

General Electric, S. A., Pasaje Roverano, Av. de Mayo 560, Calle Victoria 557, Buenos Aires

AUSTRALIA

Australian General Electric Co., Ltd., Mazda House, Cor. Wentworth Ave. & Goulburn St., Sydney, New South Wales, G. P. O. Box 2517
Australian General Electric Co., Ltd., Cor. Queen & Little Collins Sts., Melbourne, P.O. Box 538

AUSTRIA

Joh. Kremenczky Fabrik Für Electricische, Glühlampen, Vienna
Elektrische-Glühlampenfabrik "Watt" A. G., Vienna

BELGIUM AND COLONIES

Societe d'Electricite et de Mecanique (Procedes Thomson-Houston & Carels), Societe Anonyme 54 Chaussee de Charleroi, Brussels; Saint Gilles

BRAZIL

General Electric, S. A., Avenida Rio Branco, N. 60, Rio de Janeiro, Caixa do Postal, 109
General Electric, S. A., Rua Anchieta, N. 5, Sao Paulo, Caixa do Postal, 547

CANADA

Canadian General Electric Co., Ltd., King & Simcoe Sts., Toronto, Ontario

CHILE

International Machinery Co., Santiago, Casilla 107-D; Antofagasta, Casilla 912; Valparaiso, Casilla 905

CHINA

Andersen, Meyer & Co., Ltd., 4 Yuen Ming Yuen Road, Shanghai, P.O. Box 752
International General Electric Co., Inc. (General Office for the Far East excluding Japan and China), 15 Robison Road, Shanghai, P.O. Box 624

COLOMBIA

Wesselhoeft & Poor, 18 Calle Real, Barranquilla, Apartado 11
Wesselhoeft & Poor, Bogota, Apartado 1055
Wesselhoeft & Poor, Medellin, Apartado 11
Wesselhoeft & Poor, Bucaramanga, Apartado 51

CUBA

General Electric Company of Cuba, 79 Obispo St., Havana, Apartado 1689
General Electric Company of Cuba, Santiago, Apartado 477

DUTCH EAST INDIES

International General Electric Co., Inc., Balistraat 21, Soerabaia, Java

ECUADOR

Carlos Cordovez, Guayaquil, Apartado 186

EGYPT

British Thomson-Houston Co., Ltd., Sharia Madabegh, No. 15, A., Cairo, P.O. Box 901

FRANCE AND COLONIES

Compagnie Francaise Thomson-Houston, 10 Rue de Londres, Paris
Compagnie de Lampes, 41 Rue la Boetie, Paris
International General Electric Co., Inc., 4 Rue d'Aguesseau (VIII Arrondt), Paris

GREAT BRITAIN AND IRELAND

British Thomson-Houston Co., Ltd., Rugby, England
International General Electric Co., Inc., Crown House, Aldwych, London, E. C., 4

GREECE AND COLONIES

Compagnie Francaise Thomson-Houston, 10 Rue de Londres, Paris, France

HOLLAND

Philips Gloeilampen Fabrieken, Eindhoven

HUNGARY

United Incandescent Lamp & Electrical Co., Ltd., Ujpest near Budapest
Ungarische Wolframlampen Fabrik—Joh. Kremenczky A. G., Ujpest

INDIA

British Thomson-Houston Co., Ltd., A-3 Clive Building, Calcutta, P.O. Box 271
International General Electric Co., Inc., A-3 Clive Building, Calcutta, P.O. Box 271
British Thomson-Houston Co., Ltd., Ready money Building, Apollo Bunder, Bombay, P.O. Box 484
International General Electric Co., Inc., Ready money Building, Apollo Bunder, Bombay, P.O. Box 484

ITALY AND COLONIES

Compagnia Generale Di Elettricitá, Via Borgognone, No. 40, Milan (24)
Fabbrica Lampade Italia, Milan
Societa Edison per la Fabbricazione delle Lampade, Ing. C. Clerici & Co., Milan

JAPAN

International General Electric Co., Inc., 23 Waters St., Yokohama, P.O. Box 174
Shibaura Engineering Works, 1 Shinhamacho Shibaku, Tokyo
Tokyo Electric Co., Ltd., Kawasaki, Kanagawa-Ken

MEXICO

Mexican General Electric Co., San Juan de Letran, No. 5, City of Mexico, Apartado 403
Mexican General Electric Co., Sector Juarez, Calle 16-168, Guadalajara, Jal., Apartado 318
Mexican General Electric Co., Edificio Elizondo, Monterey, N. L., Apartado 139

NEW ZEALAND

National Electrical & Engineering Co., Ltd., Auckland, Dunedin, Christchurch, Wellington

PARAGUAY

General Electric, S. A., Pasaje Roverano, Av. de Mayo 560, Calle Victoria 557, Buenos Aires, Argentina

PERU

W. R. Grace & Co., Lima

PHILIPPINE ISLANDS

Pacific Commercial Co., Manila

PORTO RICO

International General Electric Co., Inc., San Juan, P.O. Box 120

PORTUGAL AND COLONIES

Sociedad Iberica de Construcciones Electricas, Praca dos Restauradores, 78-1º, Lisbon

RUSSIA

Wscobshtchaia Electrichekskaia Kompania, Petrograd and Vladivostok

SOUTH AFRICA

South African General Electric Co., Ltd., G-E Building, Marshall & Simmonds Sts., Johannesburg, Transvaal, P.O. Box 1905
South African General Electric Co., Ltd., Tyne Building, Cor. Long & Dorp Sts., Capetown, P.O. Box 1482

SPAIN AND COLONIES

Sociedad Iberica de Construcciones Electricas, Plaza de Canovas 4, Apartado 990, Madrid
Sociedad Iberica de Construcciones Electricas, Rambla de Cataluna 13, Barcelona

URUGUAY

General Electric, S. A., Calle Uruguay 752, Montevideo, Casilla Correos 360

VENEZUELA

Wesselhoeft & Poor, Caracas, Apartado 289