DASAR-DASAR RELAY PROTEKSI

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DASAR-DASAR RELAY PROTEKSI

Tiga aspek yang menjadi dasar dari sistem proteksi

A. Operasi Normal
B. Pencegahan dari kerusakan listrik.
C. Mengurangi akibat masalah-masalah kelistrikan

Yang dimaksud dengan keadaan operasi normal adalah tidak ada kerusakan peralatan, tidak ada kesalahan manusia dan tidak ada. Juga memenuhi dari persyaratan minimum untuk supply beban dan juga mengantisipasi perkembangan

A. Choice between hydro, steam, or other sources of power.

B. Location of generating stations.

C. Transmission of power to the load.

D. Study of the load characteristics and planning for its future growth.

E. Metering

F. Voltage and frequency regulation.

G. System operation.

E. Normal maintenance

THE FUNCTION OF PROTECTIVE RELAYING

Fungsi utama dari relay proteksi adalah memutuskan hubungan listrik dari sistem ketika ada kemungkinan atau terjadi short circuit atau ketika memulai operasi dalam keadaan abnormal yang memungkinkan merusak atau mengganggu sitem yang sedang berjalan. Relay merupakan peralatan yang ditambahkan untuk membantu CB dalam memutuskan sistem yang mengalami gangguan.

THE FUNCTION OF PROTECTIVE RELAYING

Fungsi kedua dari relay proteksi adalah memberikan indikasi dari lokasi dan type dari gangguan . Masing-masing data tidak hanya untuk membantu uuntuk memperbaiki tetapi untuk membandingkan dengan hasil observasi manusia dan data oscilograph otomatis . Semuanya dapat digunakan untuk menganalisis secara effective dari pencegahan gangguan

PRISNSIF DASAR RELAY PROTEKSI

SEE PICTURE

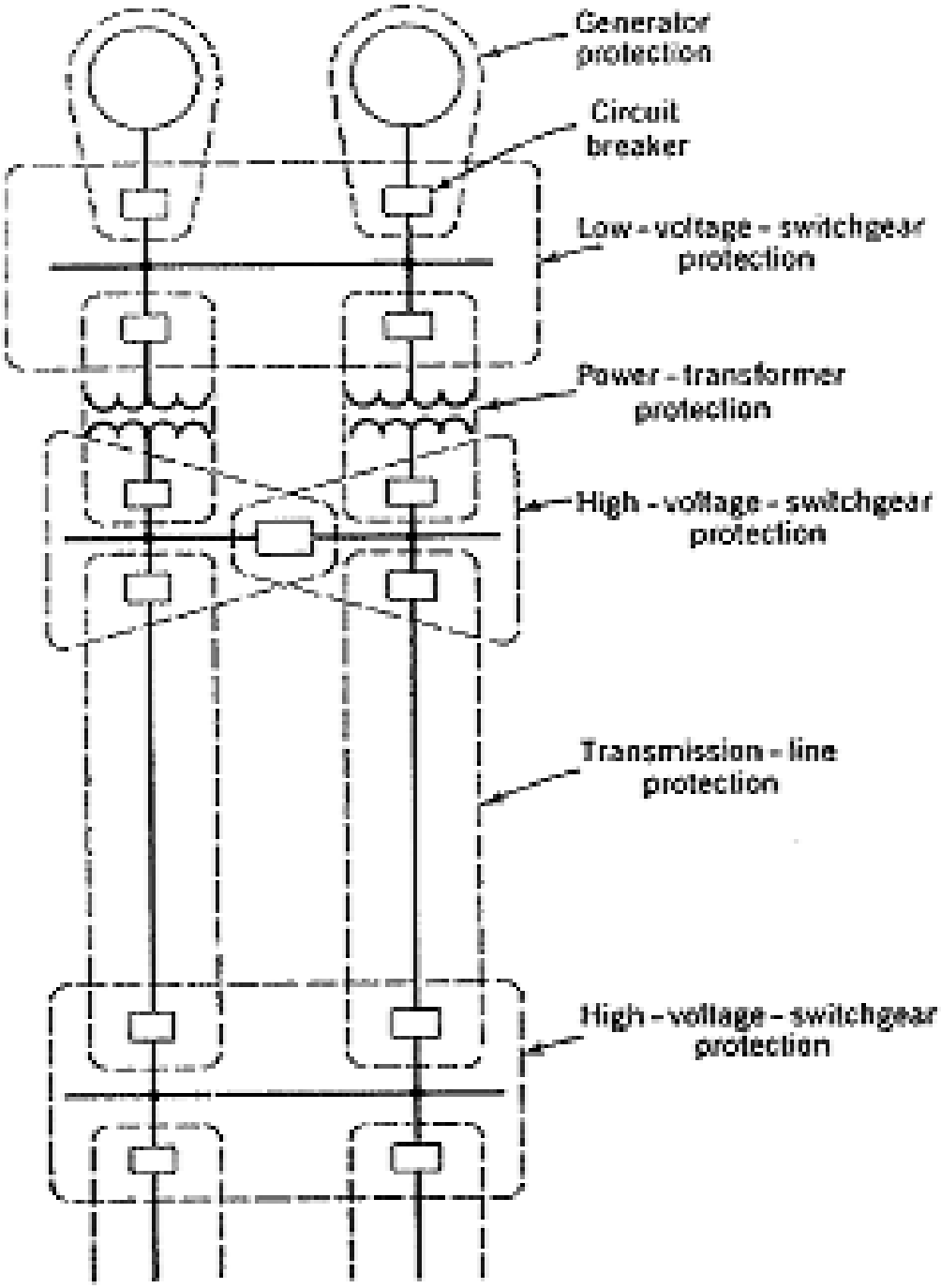

Fig. 1. One-line diagram of a portion of an electric power system illustrating primary relaying.

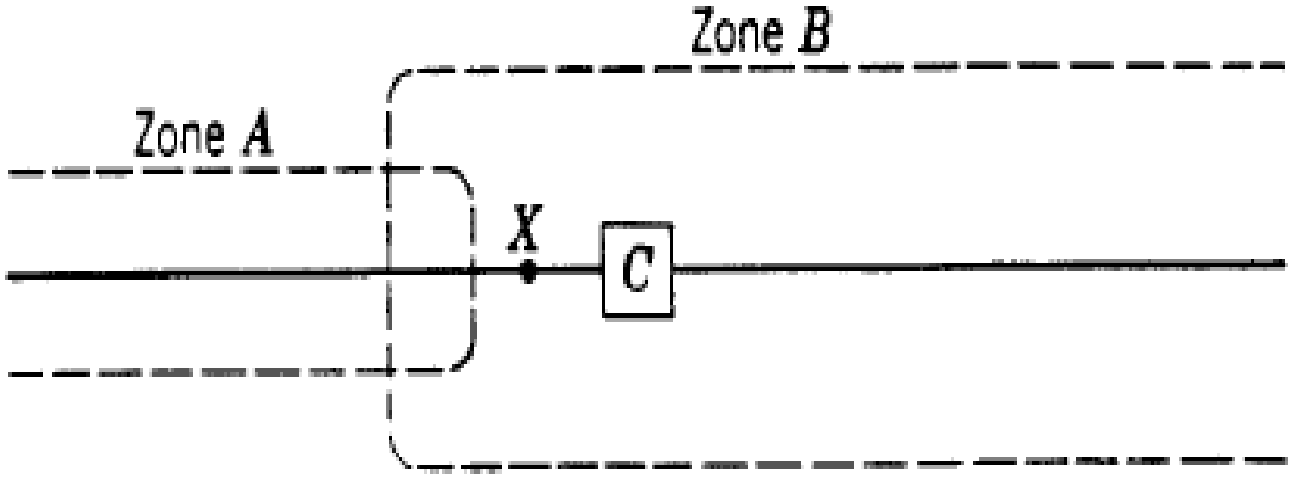

Fig. 2. Overlapping adjacent protective zones on one side of a circuit breaker.

BACK-UP RELAYING

Relay back up ditempatkan hanya untuk proteksi short circuit sebab short circuit adalah gangguan yang terbesar . “Penempatan yang lain kurang ekonomis”

Ketika kita katakan bahwa primary relaying ada gangguan, Kita maksudkan bahwa beberapa hal mungkin terjadi untuk mencegah primary relaying dari penyebab terputusnya gangguan tenaga

Primary relaying may fail because of failure in any of the following:

A. Current or voltage supply to the relays.

B. D-c tripping-voltage supply.

C. Protective relays.

D. Tripping circuit or breaker mechanism.

E. Circuit breaker.

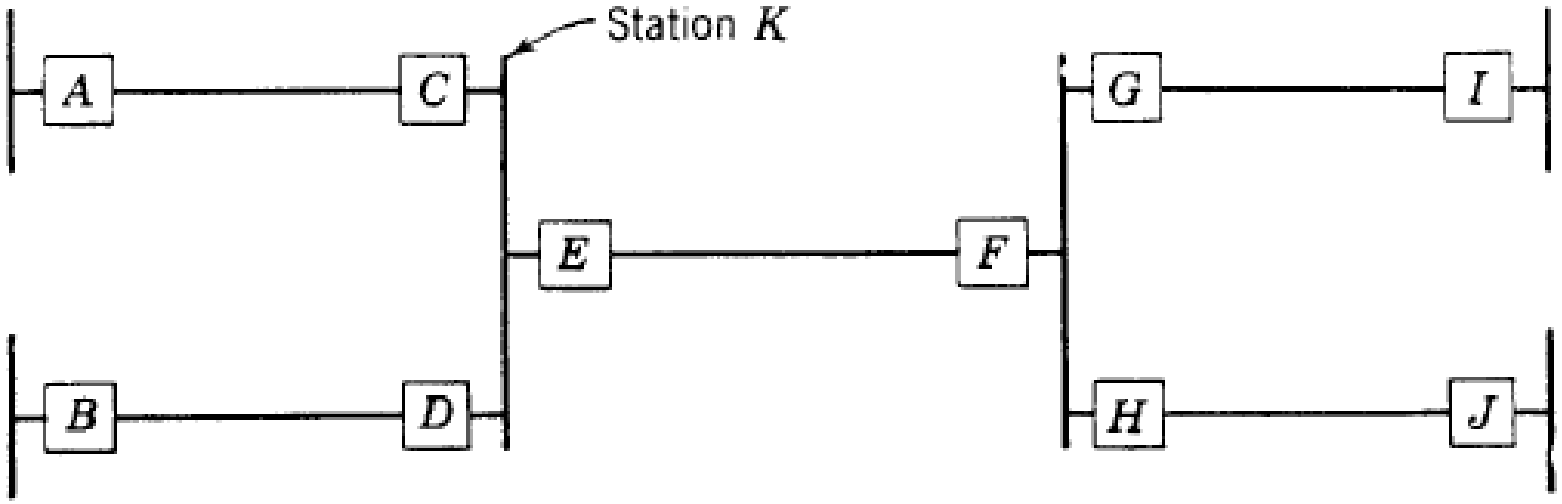

Fig. 3. Illustration for back-up protection of transmission line section *EF*.

FUNCTIONAL CHARACTERISTICS OF PROTECTIVE RELAYING

SENSITIVITY, SELECTIVITY, AND SPEED

Sensitivity, selectivity dan speed merupakan karakteristik yang digunakan dalam peralatan relay proteksi. Setiap peralatan proteksi harus cukup sensitiv sehingga bisa menjadi realible ketika diperlukan juga harus bisa menseleksi antara operasi yang diperlukan atau kondisi tidak beroperasi atau dengan operasi time

THE EVALUATION OF PROTECTIVE RELAYING

Seperti pada semua bagian dari sistem tenaga , relay proteksi harus dievaluasi kontribusinya dalam memberikan service secara ekonomis untuk customer. Kontribusi relay proteksi adalah membantu fungsi dari sistem tenaga untuk beroperasi secara efficient dan effectivehe

Dengan mengurangi kerusakan akibat gangguan , relay proteksi mengurangi :

A. Biaya perbaikan dari kerusakan.

B. Kerusakan pada peralatan lain.

C. Waktu perbaikan.

D. Kehilangan kepercayaan

HOW DO PROTECTIVE RELAYS OPERATE?

Semua relay digunakan untuk proteksi short circuit,All relays used for short-circuit protection, and many other types also, operate by virtue of

the current and/or voltage supplied to them by current and voltage transformers connected in various combinations to the system element that is to be protected. Through individual or relative changes in these two quantities, failures signal their presence, type, and location to the protective relays. For every type and location of failure, there is some distinctive difference in these quantities, and there are various types of protective-relaying equipments available, each of which is designed to recognize a particular difference and to operate in response to it

FUNDAMENTAL RELAY-OPERATING PRINCIPLES AND CHARACTERISTICS

There are really only two fundamentally different operating principles: (1) electromagnetic attraction, and (2) electromagnetic induction. Electromagnetic attraction relays operate by virtue of a plunger being drawn into a solenoid, or an armature being attracted to the poles of an electromagnet. Such relays may be actuated by d-c or by a-c quantities. Electromagnetic-induction relays use the principle of the induction motor whereby torque is developed by induction in a rotor; this operating principle applies only to relays actuated by alternating current, and in dealing with those relays we shall call them simply "induction-type" relays.

DEFINITIONS OF OPERATION

Mechanical movement of the operating mechanism is imparted to a contact structure to close or to open contacts. When we say that a relay "operates," we mean that it either closes or opens its contacts-whichever is the required action under the circumstances. Most relays have a "control spring," or are restrained by gravity, so that they assume a given position when completely de-energized; a contact that is closed under this condition is called a "closed" contact, and one that is open is called and "open" contact

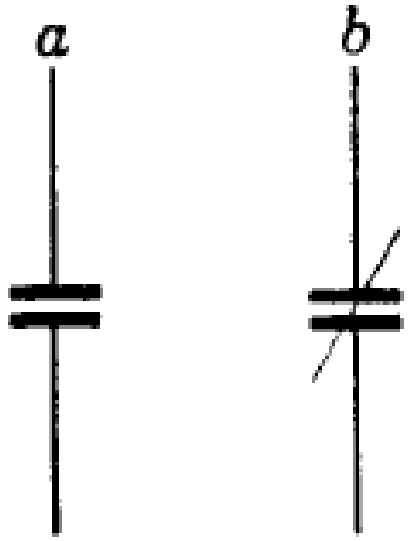

Fig. 1. Contact symbols and designations

Fig. 2. Electrically operated targets are generally preferred because they give definite assurance that there was a current flow in the contact circuit. Mechanically operated targets may be used when the closing of a relay contact always completes the trip circuit where tripping is not dependent on the closing of some other series contact. A mechanical target may be used with a series circuit comprising contacts of other relays when it is desired to have indication that a particular relay has operated, even though the circuit may not have been completed through the

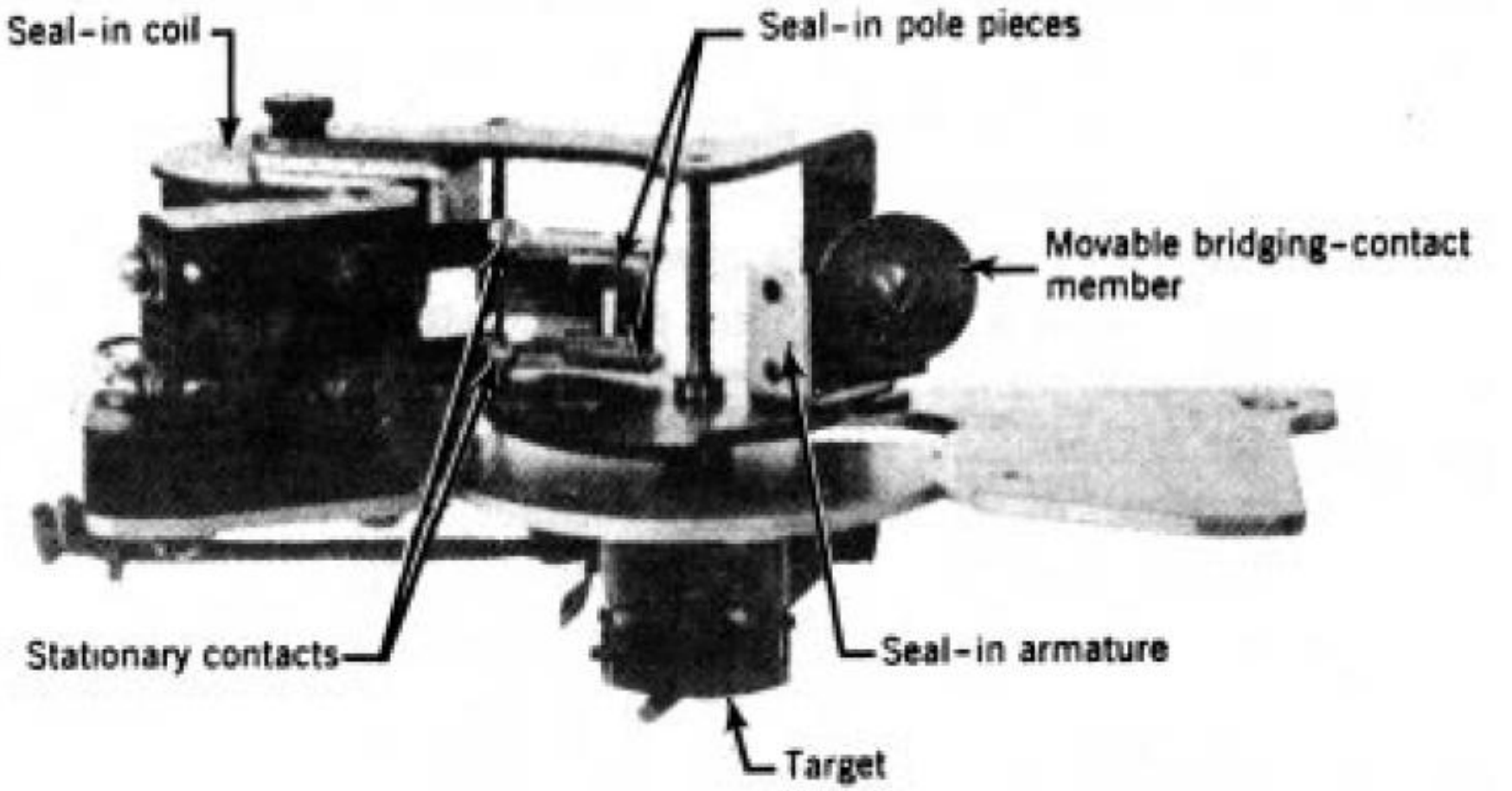

Fig. 2. One type of contact mechanism showing target and seal-in elements.

Figure 3 also shows the preferred polarity to which the circuit-breaker trip coil (or any other coil) should be connected to avoid corrosion because of electrolytic action. No coil should be connected only to positive polarity for long periods of time; and, since here the circuit breaker and its auxiliary switch will be closed normally while the protective-relay contacts will be open, the trip-coil end of the circuit should be at negative polarity.

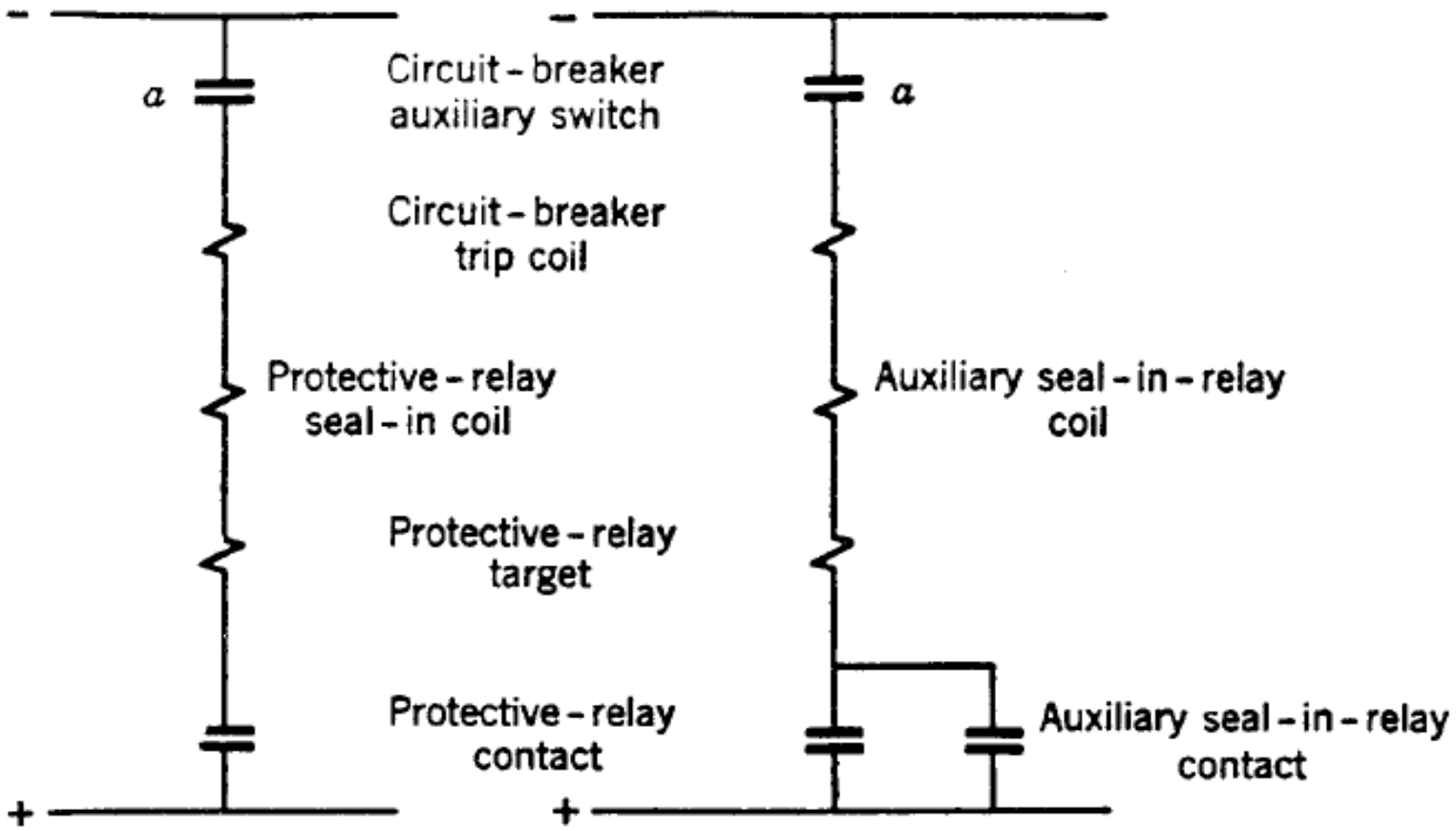

Fig. 3. Alternative contact seal-in methods.

OPERATING PRINCIPLE

Figure 6 illustrates schematically the operating principle of this type of relay. A movable armature is shown magnetized by current flowing in an actuating coil encircling the armature, and with such polarity as to close the contacts.

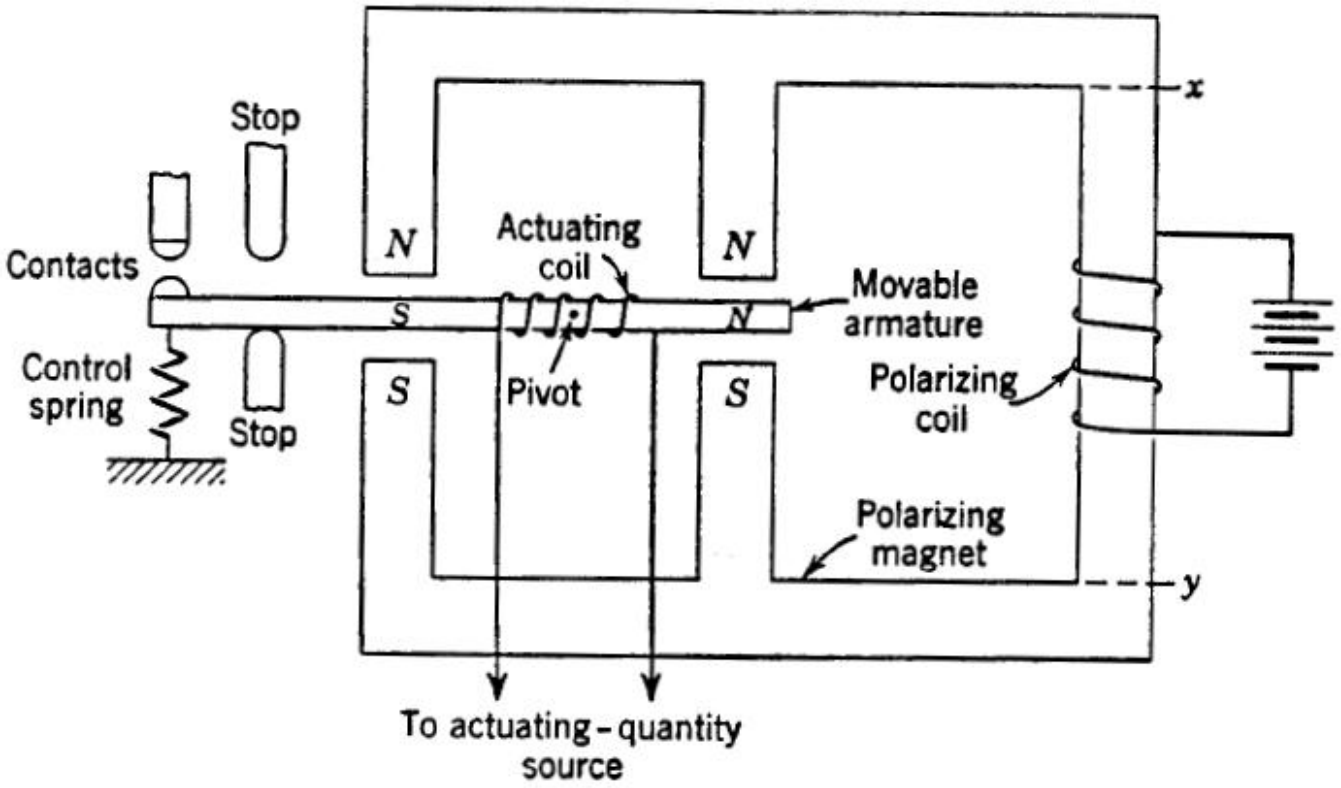

Fig. 6. Directional relay of the electromagnetic-attraction type.

A reversal of the polarity of the actuating quantity will reverse the magnetic polarities of the ends of the armature and cause the contacts to stay open. Although a "polarizing," or "field," coil is shown for magnetizing the polarizing magnet, this coil may be replaced by a permanent magnet in the section between x and y. There are many physical variations possible in carrying out this principle, one of them being a construction similar to that of a d-c motor

The force tending to move the armature may be expressed as follows, if we neglect saturation:

$$F = K_1 I_p I_a - K_2,$$

F = net force

where K1 = a force-conversion constant.
I_p = the magnitude of the current in the polarizing coil.
I_a = the magnitude of the current in the armature coil.
K_2 = the restraining force (including friction).

At the balance point when F = 0, the relay is on the verge of operating, and the operating characteristic is:

$$I_p I_a = \frac{K_2}{K_1} = \text{constant}$$

I_p and I_a, are assumed to flow through the coils in such directions that a pickup force is produced, as in Fig. 6. It will be evident that, if the direction of either I_p or I_a (but not of both) is reversed, the direction of the force will be reversed. Therefore, this relay gets its name from its ability to distinguish between opposite directions of actuating-coil current flow, or opposite polarities. If the relative directions are correct for operation, the relay will pick up at a constant magnitude of the product of the two currents