DESCRIPTION • INSTALLATION • MAINTENANCE

INSTRUCTIONS

MAGNETIC CONTACTORS, TYPE M

Frames M-810, M-810-R and M-910

Single Pole **Direct Current** **Magnet Closed**

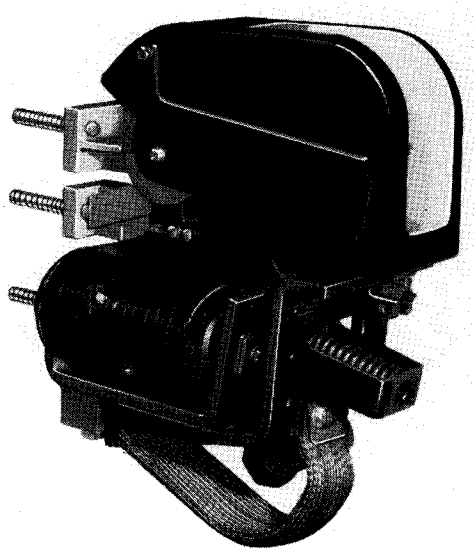

FIG. 1. Type M-810 Rear-Connected Contactor

TYPE M-810 AND M-910 CONTACTORS are heavy-duty magnetic contactors designed primarily for steel mill and general purpose applications. The Type M-810-R contactor is designed for automatic substation applications requiring higher interrupting capacity contactors.

Type M contactors are insulated for 600 volts maximum. The operating coils of the M-810 and M-910 contactors are rated for continuous duty and will operate the contactors at 80 to 110 percent of their rated voltage. Double-rated voltage is applied to the coils of the M-810-R contactor; thus, these coils are rated for intermittent duty unless a suitable resistor is inserted in series with the coils after the contactor has closed.

Table No. 1. RATINGS

CONTACTOR TYPE	M-810	M-810-R	M-910
Voltage Rating	600	600	600
8-Hour Ampere Rating	1350	1350	2500
1-Hour Ampere Rating	1800	1800	3333
Interrupting Capacity Amperes	13,500	25,000	25,000

DESCRIPTION

These contactors resemble, in general appearance, the smaller Type M contactors with the exception that they are not of unit assembly. The armature hinges on a knife-edge bearing which has an extremely long life and requires little maintenance.

Kickout springs hold the contacts open even when the contactor is tilted at an angle of 30 degrees with the vertical.

The arc shield, which is supported by the blowout pole pieces, is capable of being swung upward for inspection of the contacts. It may be removed altogether by simply withdrawing the bolt at the top rear of the arc box.

An arc horn in the arc shield relieves the moving contact of excessive burning. The arc which is drawn between the contacts when the contactor opens, moves outward under the influence of the magnetic blowout field and transfers from the moving contact to the arc horn.

The latter is maintained at the potential of the moving contact by connection to the stop bracket through a blade which projects from the bottom of the arc shield. On the M-810 contactor, electrical contact to the blade is maintained when the arc shield occupies its lowered operating position, by a pair of silver alloy faced jaws. This is a bolted connection on the M-810-R and M-910 contactors.

The moving contact support is hinged on the armature in a hardened steel knife-edged bearing so that the moving contact slides as the armature closes. The amount of slide is sufficient to keep the contacts free of oxides and scale, a provision essential to maintaining good contact with copper surfaces.

A pad of non-magnetic steel is brazed to the stop bracket to serve as a wearing pad and as an air gap to prevent magnetic "lockout" of the armature.

The contactors are held to the panel by four mounting studs, two of which make provision for electrical connections.

The contactors are suitable for mounting only on insulating panels, up to three inches thick. As the frame is of the same potential as the moving contact, special insulating precautions must be taken if a contactor is to be mounted on a conducting surface.

Electrical Interlocks. The contactors will accommodate a total of four Type L-61 electrical interlocks, any of which may be selected to have the following:

a. One normally-open contact.

b. One normally-closed contact.

c. One normally-open and one normally-closed (independent) contact.

d. Two normally-open independent contacts.

e. Two normally-closed independent contacts.

A maximum of eight interlock circuits may be obtained.

For more complete information, refer to instruction leaflet I.L. 15-829-1.

Mechanical Interlock. A Type M-27 mechanical interlock (see Fig. 2) may be employed to safeguard a pair of contactors against the closing of one if the other is already closed. Another verison can be used to interlock three contactors against the closing of either or both of two contactors if one is already closed.

Interlocks must be selected in accordance with the frame size of the contactor as tabulated in Table No. 2.

The mechanical interlock is mounted on the stop bracket of the contactor and requires no additional panel drilling. Adjustment is obtained by moving the interlock mounting bracket. With one contactor energized and the other de-energized, the operating arm should have $\frac{1}{32}$ to $\frac{1}{16}$-inch vertical play.

INSTALLATION AND MAINTENANCE

Arc Shield. The arc shield and its arc horn are essential to the performance of the contactor and these parts should always be in place. On the M-810 contactor, the arc shield should always be pushed down so that it rests on the stop bracket. This insures proper engaging of the knife blade with the connector switch jaws. This is a bolted connection on the M-810-R and M-910 contactors.

The arc shield may be removed by first removing the arc shield retaining bolt, which is located at

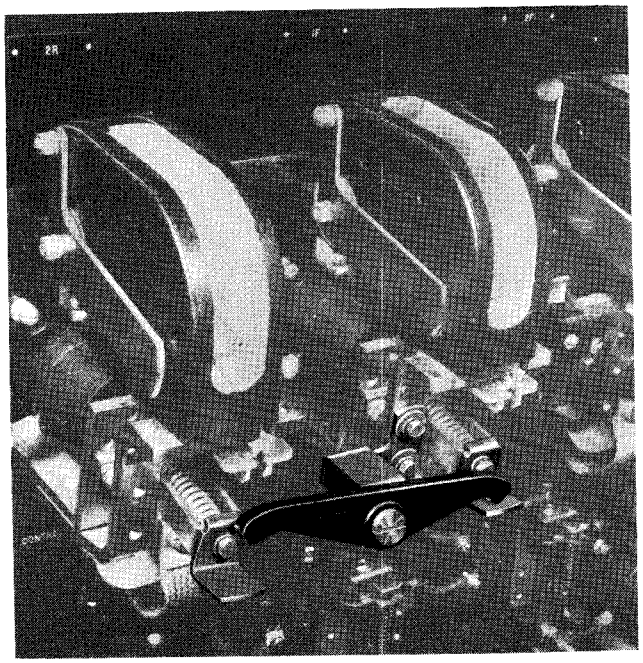

FIG. 2. Type M-27 Mechanical Interlock Assembled on Two Type M-810 Contactors.

Table No. 2. TYPE M-27 MECHANICAL INTERLOCK DATA

FRAME	FOR TWO CONTACTORS		FOR THREE CONTACTORS	
	STYLE NUMBER	C TO C CONTACTOR SPACING	STYLE NUMBER	C TO C CONTACTOR SPRING
M-810 M-810-R M-910	1490 249 1747 773 1490 249	11 inches	1490 250 1747 774 1490 250	11 inches

the top of the L-shaped side plates, then raising the arc shield until the knife blade clears the stop bracket. Pull the arc shield forward, clear of the contactor.

In replacing the arc shield, care must be taken that the pole piece plugs are aligned with the recesses in the arc shield walls to permit proper reassembly. The arc box retaining bolt is made of non-magnetic material. A steel bolt used in this location will short-circuit the magnetic blowout field and impair interruption of the arc.

Armature and Bearing. The knife-edge bearing requires no maintenance. A shelf is provided on the armature plate to prevent falling dust and dirt from collecting between the armature and frame. Oil should not be used at any point on this contactor.

Operating Coil. When a new operating coil is installed, the identification label should be examined to make certain that the voltage rating and coil style number are correct for the application. The more commonly used coils are listed in Table No. 3.

All of these contactors have class H coils which operate at a temperature rise of approximately 150 degrees C. The surface temperature of the latter coils will be higher than that of the class A coils.

Steps to follow in removing operating coil are:

1. Raise arc shield.

2. Remove the two bolts securing the stop bracket to the underside of the contactor frame and allow the assembly to hang by the shunt.

3. Remove the bolt holding the pole face to the core of the magnet.

4. Disconnect the coil leads and slide the coil forward until it is clear of the contactor.

Contacts. Oil or other lubricants should not be used on the copper contacts. Filing and dressing the contacts is unnecessary and harmful.

When the contacts are new and the armature is closed either electrically or mechanically, the gap between the contact support bracket and the top of the armature plate, Dimension "A", Fig. 3, should be as shown in Table No. 4. Change contacts when this dimension is reduced to 1/32 inch.

The moving and stationary contacts may be removed by removing the bolts holding the contacts to their respective supports. The bolt heads are slotted to permit use of a screwdriver.

Table No. 4 shows the proper contact gap, contact overtravel, and contact forces with new contacts.

To measure the final contact force, close the contactor and by means of a spring scale hooked to a loop of wire measure the force necessary to separate the contacts. Consideration must be given the thickness of the wire used in comparing values read with the tabulated values in this leaflet.

If after new contacts are installed, the forces are not correct, it may be necessary to replace the contact spring, or adjust the number of spring shims in the spring seat.

Failure of the magnet to close the contactor may result from an open-circuited operating coil, from a circuit condition in which the voltage is excessively low, from excessive contact spring forces, or from friction between parts. Failure of the contactor to open may be caused by friction or by defective kickout springs.

Table No. 3. OPERATING COILS

COIL VOLTS	M-810	M-810-R	M-910
	COIL STYLE NO.	COIL STYLE NO.	COIL STYLE NO.
115	1419 567	1659 429	1626 209
230	Use two 115-volt coils wired in series.	1419 567	Use two 115-volt coils wired in series.
550	1419 569	Use two 230-volt coils wired in series.	1626 210

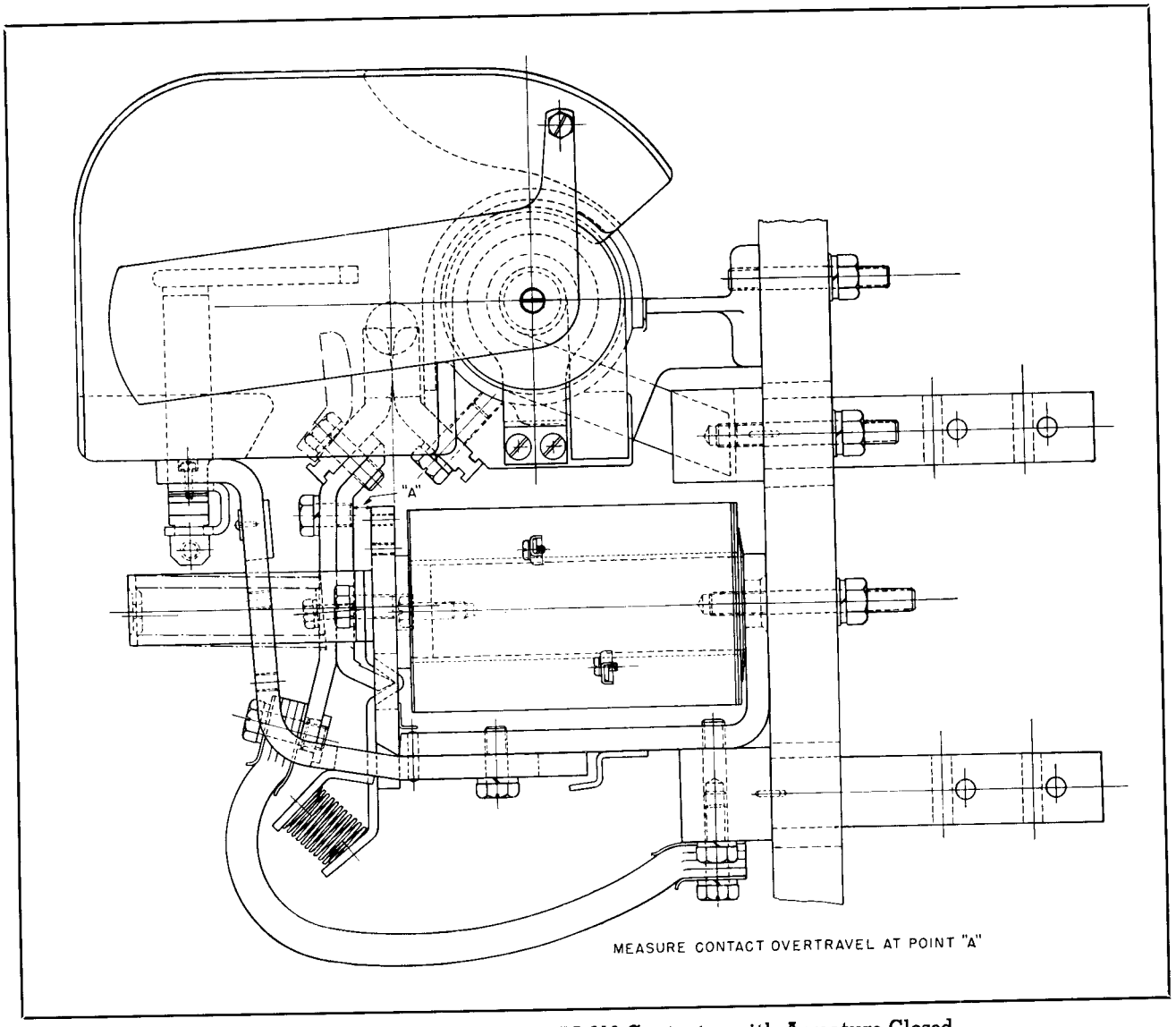

FIG. 3. Sectional View of Type M-810 Contactor with Armature Closed

Table No. 4. CONTACT FORCE, GAP AND OVERTRAVEL DATA

CONTACTOR TYPE	CONTACT FORCE IN POUNDS		*CONTACT OVERTRAVEL (Inches)	CONTACT GAP (Inches)
	INITIAL	FINAL		
M-810	12 to 14	38 to 44	13/32	7/8 ± 1/16
M-810-R	27 to 33	72 to 88	13/32	7/8 ± 1/16
M-910	18 to 22	54 to 66	13/32	7/8 ± 1/16

* Dimension "A" of Fig. 3.

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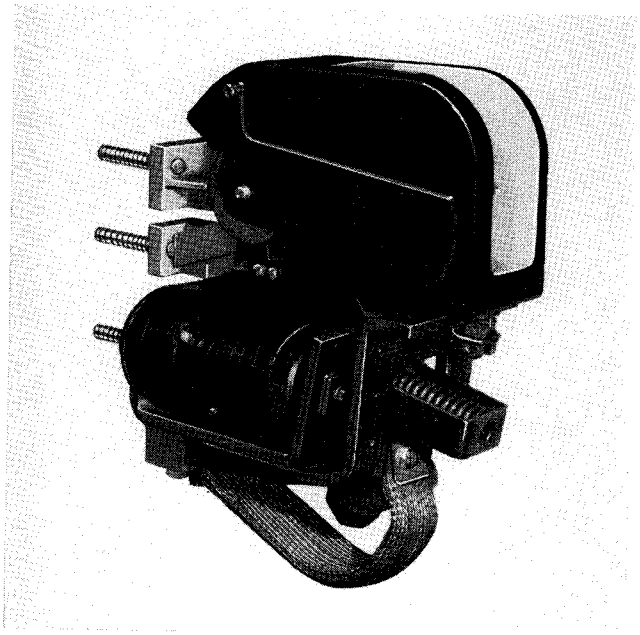

FIG. 1. Type M-810 Rear-Connected Contactor

TYPES M-810 AND M-910 CONTACTORS are heavy-duty magnetic contactors designed primarily for steel mill and general purpose applications. The Type M-810-R contactor is designed for automatic substation applications requiring higher interrupting capacity contactors.

Type M contactors are insulated for 600 volts maximum. The operating coils of the M-810 and M-910 contactors are rated for continuous duty and will operate the contactors at 80 to 110 percent of their rated voltage. Double-rated voltage is applied to the coils of the M-810-R contactor; thus, these coils are rated for intermittent duty unless a suitable resistor is inserted in series with the coils after the contactor has closed.

Table No. 1. RATINGS

CONTACTOR TYPE	M-810	M-810-R	M-910
Voltage Rating	600	600	600
8-Hour Ampere Rating	1350	1350	2500
1-Hour Ampere Rating	1800	1800	3333
Interrupting Capacity Amperes	13,500	25,000	25,000

DESCRIPTION

These contactors resemble, in general appearance, the smaller Type M contactors with the exception that they are not of unit assembly. The armature hinges on a knife-edge bearing which has an extremely long life and requires little maintenance.

Kickout springs hold the contacts open even when the contactor is tilted at an angle of 30 degrees with the vertical.

The arc shield, which is supported by the blowout pole pieces, is capable of being swung upward for inspection of the contacts. It may be removed altogether by simply withdrawing the bolt at the top rear of the arc box.

An arc horn in the arc shield relieves the moving contact of excessive burning. The arc which is drawn between the contacts when the contactor opens, moves outward under the influence of the magnetic blowout field and transfers from the moving contact to the arc horn.

The latter is maintained at the potential of the moving contact by connection to the stop bracket through a blade which projects from the bottom of the arc shield. On the M-810 contactor, electrical contact to the blade is maintained when the arc shield occupies its lowered operating position, by a pair of silver alloy faced jaws. This is a bolted connection on the M-810-R and M-910 contactors.

The moving contact support is hinged on the armature in a hardened steel knife-edged bearing so that the moving contact slides as the armature closes. The amount of slide is sufficient to keep the contacts free of oxides and scale, a provision essential to maintaining good contact with copper surfaces.

A pad of non-magnetic steel is brazed to the stop bracket to serve as a wearing pad and as an air gap to prevent magnetic "lockout" of the armature.

The contactors are held to the panel by four mounting studs, two of which make provision for electrical connections.

The contactors are suitable for mounting only on insulating panels, up to three inches thick. As the frame is of the same potential as the moving contact, special insulating precautions must be taken if a contactor is to be mounted on a conducting surface.

Electrical Interlocks. The contactors will accommodate a total of four Type L-61 electrical interlocks, any of which may be selected to have the following:

a. One normally-open contact.

b. One normally-closed contact.

c. One normally-open and one normally-closed (independent) contact.

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A maximum of eight interlock circuits may be obtained.

For more complete information, refer to instruction leaflet I.L. 15-829-1.

Mechanical Interlock. A Type M-27 mechanical interlock (see Fig. 2) may be employed to safeguard a pair of contactors against the closing of one if the other is already closed. Another version can be used to interlock three contactors against the closing of either or both of two contactors if one is already closed.

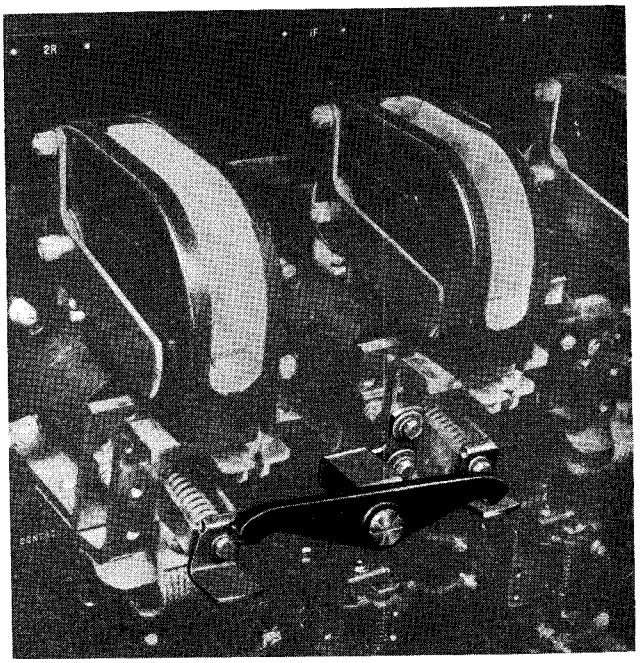
Interlocks must be selected in accordance with the frame size of the contactor as tabulated in Table No. 2.

The mechanical interlock is mounted on the stop bracket of the contactor and requires no additional panel drilling. Adjustment is obtained by moving the interlock mounting bracket. With one contactor energized and the other de-energized, all vertical play of the operating arm should be removed. Check the interlocking action to make sure that no binding occurs.

INSTALLATION AND MAINTENANCE

Arc Shield. The arc shield and its arc horn are essential to the performance of the contactor and these parts should always be in place. On the M-810 contactor, the arc shield should always be pushed down so that it rests on the stop bracket. This insures proper engaging of the knife blade with the connector switch jaws. This is a bolted connection on the M-810-R and M-910 contactors.

The arc shield may be removed by first removing the arc shield retaining bolt, which is located at



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M-810 M-810-R M-910	1490 249 1747 773 1490 249	11 inches	1490 250 1747 774 1490 250	11 inches

the top of the L-shaped side plates, then raising the arc shield until the knife blade clears the stop bracket. Pull the arc shield forward, clear of the contactor.

In replacing the arc shield, care must be taken that the pole piece plugs are aligned with the recesses in the arc shield walls to permit proper reassembly. The arc box retaining bolt is made of non-magnetic material. A steel bolt used in this location will short-circuit the magnetic blowout field and impair interruption of the arc.

Armature and Bearing. The knife-edge bearing requires no maintenance. A shelf is provided on the armature plate to prevent falling dust and dirt from collecting between the armature and frame. Oil should not be used at any point on this contactor.

Operating Coil. When a new operating coil is installed, the identification label should be examined to make certain that the voltage rating and coil style number are correct for the application. The more commonly used coils are listed in Table No. 3.

All of these contactors have class H coils which operate at a temperature rise of approximately 150 degrees C. The surface temperature of the latter coils will be higher than that of the class A coils.

Steps to follow in removing operating coil are:

1. Raise arc shield.

2. Remove the two bolts securing the stop bracket to the underside of the contactor frame and allow the assembly to hang by the shunt.

3. Remove the bolt holding the pole face to the core of the magnet.

4. Disconnect the coil leads and slide the coil forward until it is clear of the contactor.

Contacts. Oil or other lubricants should not be used on the copper contacts. Filing and dressing the contacts is unnecessary and harmful.

When the contacts are new and the armature is closed either electrically or mechanically, the gap between the contact support bracket and the top of the armature plate, Dimension "A", Fig. 3, should be as shown in Table No. 4. Change contacts when this dimension is reduced to $\frac{1}{32}$ inch.

The moving and stationary contacts may be removed by removing the bolts holding the contacts to their respective supports. The bolt heads are slotted to permit use of a screwdriver.

Table No. 4 shows the proper contact gap, contact overtravel, and contact forces with new contacts.

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Failure of the magnet to close the contactor may result from an open-circuited operating coil, from a circuit condition in which the voltage is excessively low, from excessive contact spring forces, or from friction between parts. Failure of the contactor to open may be caused by friction or by defective kickout springs.

Table No. 3. OPERATING COILS

LINE VOLTS	M-810	*M-810-R	M-910
	COIL STYLE NO.	COIL STYLE NO.	COIL STYLE NO.
115	2 Coils S# 1419 567 Connected in parallel	2 Coils 33-P-902H01 Connected in parallel	2 Coils S# 1626 209 Connected in parallel
230	2 Coils S# 1419 567 Connected in series	2 Coils S# 1419 567 Connected in parallel	2 Coils S# 1626 209 Connected in series
550	2 Coils S# 1419 569 Connected in parallel	2 Coils S# 1419 567 Connected in series	2 Coils S# 1626 210 Connected in parallel

* These coils are intermittently rated when used as indicated. In normal practice a series resistance is inserted in the coil circuit after the contactor is closed.

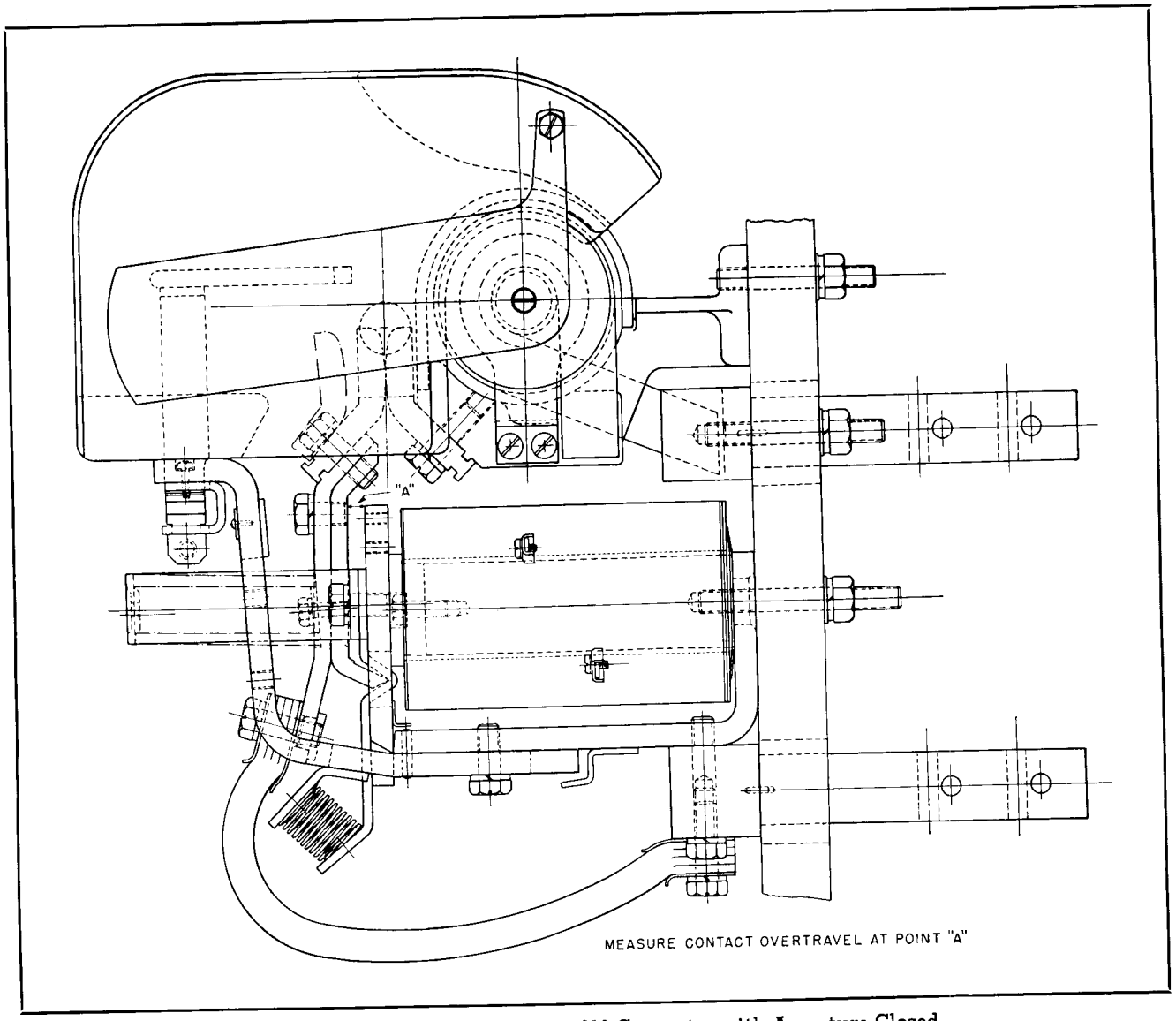

FIG. 3. Sectional View of Type M-810 Contactor with Armature Closed

Table No. 4. CONTACT FORCE, GAP AND OVERTRAVEL DATA

CONTACTOR TYPE	CONTACT FORCE IN POUNDS		*CONTACT OVERTRAVEL (Inches)	CONTACT GAP (Inches)
	INITIAL	FINAL		
M-810	12 to 14	38 to 44	13/32	7/8 ± 1/16
M-810-R	27 to 33	72 to 88	13/32	7/8 ± 1/16
M-910	18 to 22	54 to 66	13/32	7/8 ± 1/16

* Dimension "A" of Fig. 3.

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