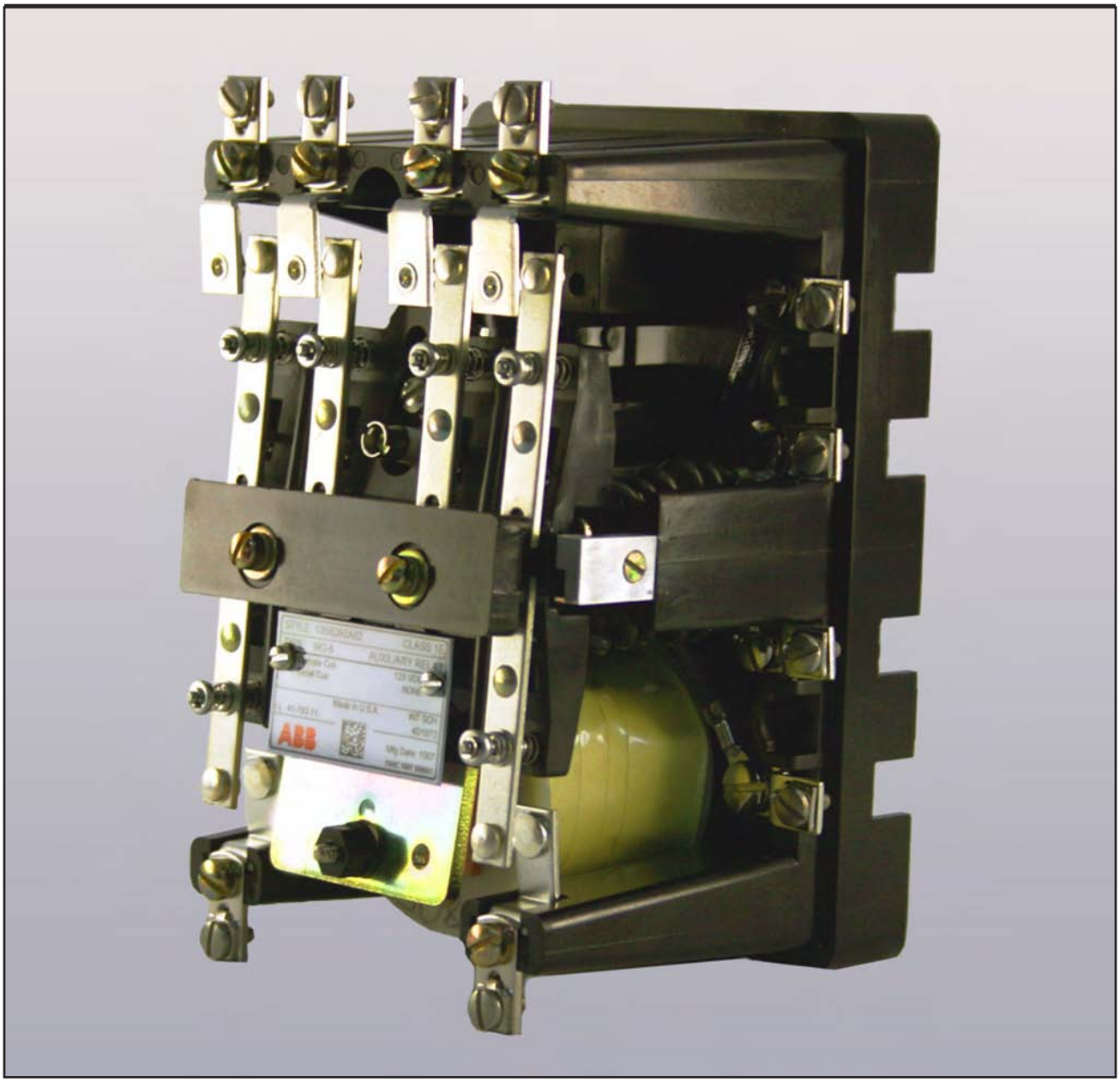
# Type MG-6
# Multi-Contact Auxiliary Relay

## Class 1E Application

Instruction Leaflet: 41-753.11
Effective: January 2008

New Release

Device Number: **94X, Y, Z**



**CAUTION**

**Before putting relays into service, remove all blocking materials which may have been inserted for the purpose of securing the parts during shipment. Make sure all moving parts operate freely. Inspect contacts to see they are clean and close properly. Operate the relay to check the settings and electrical connections.**

## 1.0 APPLICATION

MG-6 Relays have been specially designed and tested to establish their suitability for Class 1E application in accordance with the ABB program for Class 1E Qualification Testing as detailed in the ABB bulletin STR-1.

"Class 1E" is the safety classification of electric equipment and systems in nuclear power generating stations that are essential to emergency shutdown of the reactor. An emergency reactor shutdown involves containment isolation, reactor core cooling, and reactor core heat removal, which are necessary in preventing significant release of radioactive material into the environment.

The type MG-6 relay is designed for applications where several independent circuits may be energized or de-energized upon operation of a single primary relay contact or where the capacity of the primary relay contact is inadequate for the energy required. In certain applications these relays may be used directly as primary relays. The stationary contacts can be reversed so that either circuit opening or circuit closing service is readily attained. Although recommended, it is not necessary to predetermine the relay's contact arrangement. If the relay has a dc operating coil, a small increase in spring tension may be required. This will be covered under section 6.0 ADJUSTMENTS & MAINTENANCE.

In the usual application of the relay, the armature resets when the operating coil is de-energized. However, the relays can be supplied with a latching mechanism that holds the armature in the operate position until the latch is tripped, either by hand or electrically.

## 2.0 CONSTRUCTION & OPERATION

MG-6 relays are available in several different case and cover configurations, providing users a variety of mounting options as well as a choice of front or rear terminal connections. All bases and covers are made of a molded thermo-plastic material, which provides a tough, insulated enclosure for the relay. MG-6 are available as follows:

- Molded Case, semi-flush mount, rear connected. Smart Style No's **MGA**...
- Molded Case, projection mount, rear connected. Smart Style No's **MGB**...
- Molded Case, surface mount, front connected without cover. Smart Style No's **MGC**...
- Molded Case, surface mount, front connected with cover. Smart Style No's **MGF**...
- Flexitest Type FT-22 Case, semi-flush mount, rear connected. Smart Style No's **MGD**...

The MG-6 relay is an electromagnetic type solenoid device with six independent contacts. When the coil is energized, the armature is attracted to the lamination stack thereby operating the moving contacts. Operation is single mode with a make or break function that can be supplied with either a self or a latching reset. The duty cycle may be from extremely intermittent to continuous energization.

Class 1E MG-6 relays consist of four major assemblies:

1. Operating electromagnet.
2. Armature and moving contacts.
3. Base and stationary contacts.
4. Latch (optional).

### 2.1 Operating Electromagnet

The operating electromagnet located at the lower end of the relay (as shown in Figure 1) is comprised of the operate coil (Figure 1, Item 8) and a U-shaped lamination stack. The coil utilizes one leg of the stack as its core. This leg is slotted at the outer end to receive the copper lag loops used to obtain quiet ac

*All possible contingencies which may arise during installation, operation, or maintenance; and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding their particular installation or operation and maintenance of the equipment, the local ABB representative should be contacted.*

operation. For a dc operated coil, an iron plate, rather than lag loops, is used to improve performance. The inner end of the other leg of the stack is shaped so the armature restraining spring can be attached.

### 2.2 Armature and Moving Contacts

The steel armature has projecting sections at the sides near the center, which act as knife-edge bearings and rest on supports that are a part of the molded base. A stud attached to the core leg of the lamination stack extends through a hole in the lower end of the armature. A self-locking stop-nut on the outer end of the stud is used to limit and adjust the travel of the armature in the de-energized direction.

The upper end of the armature has an adjustment screw (Figure 1, Item 6) to which one end of the armature restraining spring is attached. In both the hand and electric reset versions of the relay, a latch screw (Figure 1, Item 5) is mounted at the extreme top end of the armature. For the self-reset relays, the latch screw is replaced by a set screw which serves to slightly separate the locking plate from the armature. Located between the spring adjustment screw and the latch (set) screw is a third screw, which when tightened, applies pressure to the former screws and effectively locks them in place.

The ac rated MG-6 relay can be used with any combination of contacts, but the dc relay can have up to four circuit opening contacts with the normal operating spring adjustment. With more than four “break” contacts, the operating spring should be adjusted to give the correct back contact follow (see Section 6.4 CONTACTS).

The moving contact fingers are mounted on a molded insulation plate attached to the armature. Silver contact buttons are on both sides of the fingers so that they may be used as either circuit-opening or circuit-closing contacts. The fingers are assembled on guide pins between two springs so that a definite spring compression and contact wipe is assured for either the contact-closing or the contact-opening conditions. Flexible leads are connected to the contact fingers.

The armature assembly has the contact fingers located above and below the bearing points so the weight is partially balanced about the bearings.

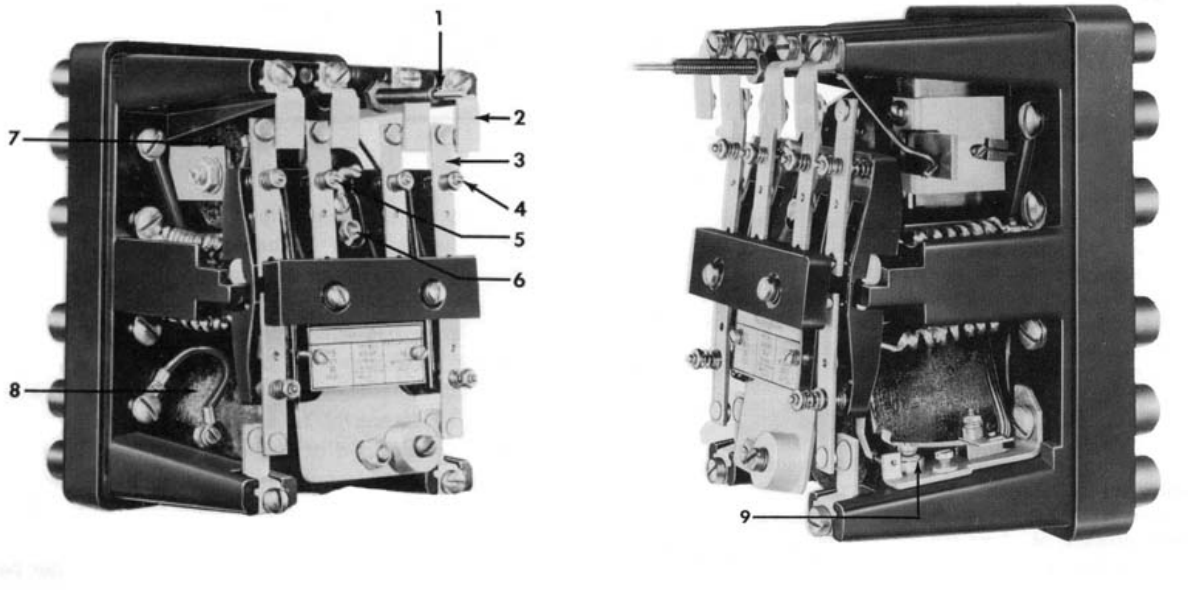
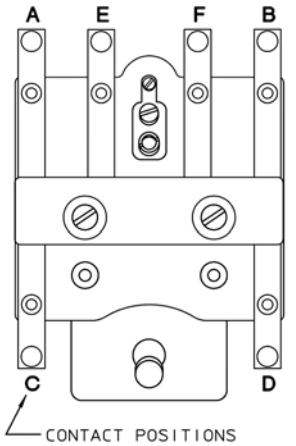



*Figure 1 - For Reference Only - Front and Side Views of MG-6 Commercial Relay with Electric & Hand Reset (Cover Removed).*

*1 = Reset push rod*
*2 = Stationary contact*
*3 = Moving contact*
*4 = Moving contact spring assembly*
*5 = Latch adjustment screw for armature*
*6 = Adjusting screw for armature spring tension*
*7 = Reset coil*
*8 = Operate coil*
*9 = Optional operating coil cutoff contact **
* *Not available on Class 1E Mg-6 Relays.*

Retainer blocks are attached to both sides of the base, further stabalizing the armature assembly, even under severe stress. The corresponding stationary, large silver button contacts can be installed to mate with the moving contacts when the armature is in either the energized or de-energized position.

**Designated Position of MG-6 Contacts**




### 2.3 Base and Stationary Contacts

The stationary contacts (Figure 1, Item 2) are on six legs located at the top and bottom of the base. The stationary contact brackets are connected directly to the terminal inserts by means of long screws passing through brass tubes. This method allows a tight connection without compressing the base material. The contact bracket is held against its seat by means of a spring ring which is compressed between shoulders in the base and on the hexagonal terminal insert.

### 2.4 Latch

The self-reset assembly is the standard build of the relay. The electrical reset assembly (as shown in. Figure 2) is optional and can be supplied in any case configuration. The upper half of the figure shows the reset assembly viewed from the front of the relay. The lower half of the figure (looking in from the bottom of the relay) shows a sectional view of the reset assembly with the latch screw (of the main armature) in a de-energized position. The reset armature is free to be moved to the right by the reset armature tension spring until the hardened latch plate on the reset armature almost rests against the latch screw. When the operating coil is energized the latch screw will move slightly so that its shoulder comes to rest on the edge of the latch plate. When the reset coil is energized, its armature moves to the left thus permitting the main armature to return to its open position. Pressing the reset push rod which extends through the cover stud will also release the latch by way of the reset lever, as shown in Figure 2.

## 3.0 CHARACTERISTICS

**Normal Operating Time:**

ac = approximately 0.033 seconds

dc = approximately 0.083 seconds

If faster operation is desired and if the application requires only intermittent energization of the relay, the operating coils may be energized at higher than rated voltage.

- Twice rated voltage will give an operating time of approximately 0.017 seconds on ac relays and the coil will withstand this voltage safely for over 2 minutes if 60 Hz or 4 minutes if 25 Hz.
- The time of the dc relay can be reduced to slightly over 0.017 seconds if the coil is energized at 5 times rated voltage. The coil will withstand this voltage for 1 minute.

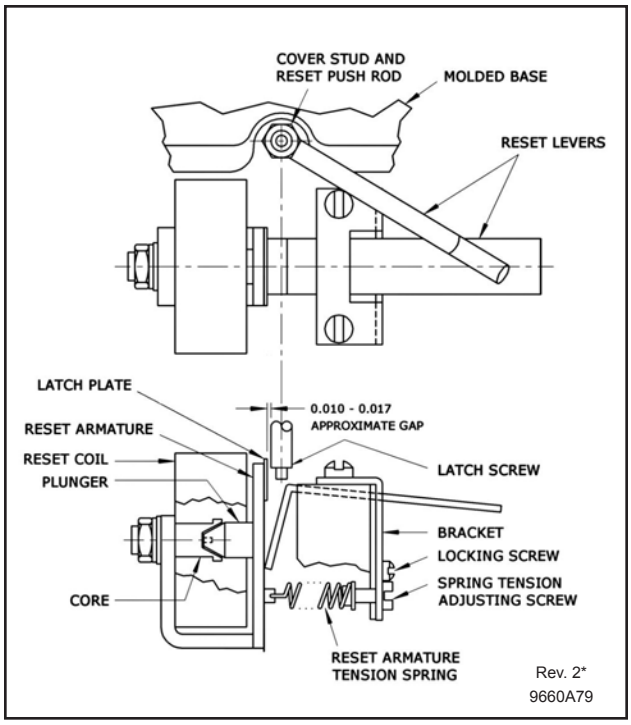



*Figure 2*
*Detail View of Latch and Electric Reset of MG-6 Relay*

If faster time is desired on a dc relay which must be energized continuously, the use of a low voltage coil with a series resistor will reduce the time. With 10% of the line voltage across the relay coil and the balance across a series resistor, the reduced inductance of the circuit results in an operating time of approximately 0.033 seconds.

## 4.0 RELAY SETTINGS

The relays are shipped from the factory adjusted for the correct armature travel, contact follow and pressure. No adjustments should be necessary. All contacts are assembled for circuit closing (making) operation unless other contact arrangements have been ordered. To convert to circuit opening (breaking) operation, loosen the screw for the stationary contact bracket, turn the bracket over and tighten the screw. Check the contact follow. It may be necessary to slightly bend the bracket(s). Refer to section 6.4.1 Contact Follow, for details. On dc relays it is recommended that no more than four contacts be reversed. This is to assure that correct pressure and travel are maintained, see Section 6.4 CONTACTS.

## 5.0 INSTALLATION

MG-6 relays should be mounted on switchboard panels or their equivalent in locations free from dirt, dust, moisture, excessive vibration and heat. Relays should be mounted vertically by means of their respective mounting hardware, as shown in Figures 7 to 11.

The electrical connections may be made directly to the relay terminals by means of screws provided. Relay grounding can be accomplished by using a mounting screw, or in the case of the front connected with cover (Figure 10), a lug is provided adjacent to the upper mounting hole for device grounding.

## 6.0 ADJUSTMENTS & MAINTENANCE

The proper adjustments to insure correct operation of the relay have been made at the factory and the relay should not require adjustment after receipt by the customer. If any of the adjustments or the contact configuration has been changed or the relay is disassembled, the instructions below should be followed.

| RATINGS | |
|---|---|
| **Standards**<br>Meets or exceeds all the following, as applicable | ANSI C37.90<br>IEC 255<br>UL STD-508<br>IEEE C37.98<br>IEEE C37.105 |
| **Frequency** | dc, 50 Hz, or 60 Hz<br>(specify when ordering) |
| **Dialectric Withstand** | 1000 Volts plus twice the operational voltage for one minute. |
| **Relay Pickup** | 80% of rated voltage<br>(60% for dc relay without interrupting contact rating) |
| **Relay Latch Reset** | 70% of rating momentarily applied |
| **Contact Rating (MAKE)** | 30 Amps @ 575 Volts ac for one minute,<br>12 Amps continuous |
| **Contact Rating (BREAK)**<br><br>Non-inductive loads only: | 30 Amps @ 115 Volts ac<br>20 Amps @ 230 Volts ac<br>15 Amps @ 460 Volts ac<br>10 Amps @ 575 Volts ac<br>30 Amps @ 12 Volts dc<br>15 Amps @ 24 Volts dc<br>10 Amps @ 32 Volts dc<br>8 Amps @ 48 Volts dc<br>3 Amps @ 125 Volts dc<br>1 Amps @ 250 Volts dc |
| **Temperature Range** | -20 to +55º C (operating)<br>-40 to +70º C (storage) |

| **Burden: Operating Coil at Rated Voltage** | | | | |
|---|---|---|---|---|
| **Frequency (Hz)** | **Closed Gap** | | **Open Gap** | |
| | **Watts** | **Volt Amps** | **Watts** | **Volt Amps** |
| 25 | 6.8 | 23 | 19.6 | 53 |
| 50 | 9.8 | 31 | 17.4 | 78 |
| 60 | 12 | 37 | 17.6 | 92 |
| dc | 7.8 COLD | — | 7.8 COLD | — |
| dc | 6.5 HOT | — | 6.5 HOT | — |
| **Burden: Reset Coil at Rated Voltage*** | | | | |
| **Frequency (Hz)** | **Closed Gap** | | **Open Gap** | |
| | **Watts** | **Volt Amps** | **Watts** | **Volt Amps** |
| 25 | 48 | 51.6 | 52 | 54 |
| 50 | 46 | 58.2 | 57 | 63.8 |
| 60 | 84 | 104.5 | 96 | 112.8 |
| dc | 66 COLD | — | 68 COLD | — |

* = *Reset coils are for intermittent duty only and should not be energized longer than 30 seconds.*

The relay should be mounted in a normal vertical operating position for all of these checks. Refer to Figures 1 & 2, and Section 2.0 CONSTRUCTION & OPERATION, for part identification and contact information.

### 6.1 ACCEPTANCE CHECK

The following checks are recommended to ensure that the relay is in proper working order.

Pickup – 80% of rating
Make contacts – Operate simultaneously
Break contacts – Operate simultaneously

### 6.2 ARMATURE

#### 6.2.1 Armature Stop Adjustment Nut

The armature stop adjustment nut should be set to 3/8" with the armature held against the electromagnet. The flat on the nut should be parallel with the armature. The hole in the armature must not touch the stop nut stud for either the extreme right or the extreme left position of the armature in its bearings. Adjust the position of the coil should the stud be touching either side.

#### 6.2.2 Armature Spring - Preliminary Adjustment

When adjusting the armature spring tension, the locking screw for the spring adjusting screw is loosened and this adjusting screw is turned (inward to reduce spring tension) until the spring barely holds the armature against the stop nut. The relay must be in its normal vertical position when this adjustment is made with all contacts assembled as circuit closing. The armature spring should then be tightened by turning the adjusting screw 4 turns counterclockwise for ac relays or 2 turns for dc relays, and the locking screws should be tightened.

#### 6.2.3 Armature Spring - Final Adjustment

If the relay is ac operated and has less than 6 break contacts, turn the spring adjuster counterclockwise 4 turns. If the relay is dc operated and has less than 4 break contacts, turn the spring adjuster counterclockwise 2 turns. For dc relays with 4 or more break contacts or ac relays with 6 break contacts, turn the spring adjuster counterclockwise only enough for the armature to hit the stop nut. Tighten locking screw on non-latching relays. See section 6.5 LATCH ASSEMBLIES, for information on latching relays.

**Operating Data for Continuously Rated Auxiliary Relays**

| Rating | Operating Coil | | Reset Coil** |
|---|---|---|---|
| | dc Resistance (Ohms) ±10% @ 25° C | Must Pickup (Volts) 80% of Rating | dc Resistance (Ohms) ±10% @ 25° C |
| 1 Amp dc | 4.8 | — | — |
| 2 Amps dc | 1.0 | | |
| 3 Amps dc | 0.4 | | |
| 4 Amps dc | 0.24 | | |
| 5 Amps dc | 0.15 | | |
| 6 Volts dc | 4.8 | 4.8 | 0.53 |
| 12 Volts dc | 19 | 9.6 | 2.12 |
| 24 Volts dc | 75 | 19.2 | 8.5 |
| 32 Volts dc | 132 | 25.6 | 13.9 |
| 48 Volts dc | 310 | 38 | 34 |
| 62.5 Volts dc | 530 | 50 | 56 |
| 125 Volts dc | 2000 | 100 | 222 |
| 250 Volts dc | 8200 | 200 | 890 |
| 115V - 60Hz | 19 | 92 | 91 |
| 208V - 60Hz | 67 | 166 | 322 |
| 230V - 60Hz | 75 | 184 | 364 |
| 460V - 60Hz | 305 | 368 | 1445 |
| 575V - 60Hz | 495 | 460 | 2208 |
| 115V - 50Hz | 26 | 92 | 138 |
| 230V - 50Hz | 105 | 184 | 550 |
| 460V - 50Hz | 465 | 368 | 2200 |
| 575V - 50Hz | 660 | 460 | 3500 |

** = *Reset coil intermittent rating is 100% for 60 seconds.*

### 6.3 MOVING CONTACT FINGERS

When a moving contact finger has been removed from its guide pin and is to be reassembled, the coil springs on either side of the finger must be replaced correctly. Select the stronger spring and place it on the closing side of the contact finger. The stronger spring can be determined by placing the two springs on a flat surface and compressing them. Pick the stronger of the two.

## 6.4 CONTACTS

### 6.4.1 Contact Follow

The follow of the moving contact fingers should be 3/32" for the make contacts and 1/16" for the break contacts, measured at the contacts. This can be checked more conveniently by measuring the travel of the lower edge of the armature after the contacts touch. This should be approximately 1/8" for the make contacts and 3/32" for the break contacts. In case moving contact fingers have been removed from their guide pins, it is important that the coil springs on the two sides of the fingers be replaced correctly. The springs which are compressed by circuit-closing contacts are approximately three times as strong as the ones compressed by circuit-opening contacts and thus they can be readily distinguished. The positions of the two springs are reversed at the two ends of the relay.

### 6.4.2 Contact Cleaning

All contacts should be periodically cleaned. A contact burnishing tool, Style # 182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended because of the danger of embedding small particles in the face of the soft silver and therefore impairing the contact.

## 6.5 LATCH ASSEMBLIES

On latching type relays the latch screw is adjusted so that with the armature closed and the operating coil de-energized there will be a gap of 0.020 ±0.005 inches between the electromagnet pole face and the raised section of the armature striking the pole face. Following this adjustment, tighten the locking screw securely.

There is a small amount of clearance between the armature and its supporting posts and in order to insure proper operation, allowance must be made for this in the following manner. With the armature held against its left hand support and nearly closed, the latch spring or reset armature should be moved to the left as far as it will go by means of the hand reset.

To assure that the latch will always release the armature, the resulting space between the latch and the latch screw should be at least 0.010 inch, and should not be more than 1/64 inch. This should also be checked electrically if electrical reset is provided. Some change of this gap can be made by loosening the mounting screws in the relay base and moving the latch support in the desired direction. The gap can also be changed by loosening the two screws which hold the moving contact insulation block to the armature and shifting the armature in the desired direction.

On electrical reset relays, the tension of the spring which draws the reset armature toward the latch screw must be adjusted if these parts are being reassembled. The locking screw (Figure 2) is screwed out until its head clears the head of the adjusting screw. The main armature is then held completely closed and against its right hand support and the latch spring tension adjusting screw is turned until the latch barely touches the stop projecting from the center of the latch screw. Then, the latch spring tension should be increased by turning the screw clockwise until it just stops (approximately 9 turns). Finally, the locking screw should be tightened.

Note: Care must be taken not to overtighten the spring tension adjusting screw or the tension spring will be damaged.

If either the core nut of the electrical reset assembly or the screws which mount its armature have been loosened, the relative positions of the core and the plunger may shift sufficiently to cause the plunger to strike on the side of the conical core opening. To assure correct alignment of these parts, 0.042 inch diameter holes are provided through the center of the core and about 1/16 inch deep in the center of the plunger. After tightening the core nut a close fitting pin should be inserted through the core and into the plunger. With the pin in place and the plunger pressed firmly against the core and the mounting end of the armature centrally located with respect to the electromagnet, the two armature mounting screws should be tightened. The pin should then be removed.

A small amount of silicone oil is applied at the factory to the polished and hardened surfaces of the latch screw and the latch plate in order to minimize wear and protect against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts, and it's also recommended to renew oil application at regular maintenance periods.

## 6.6 SPECIAL DROPOUT COILS

If an ac relay is to be dropped out by shorting the coil, a high wattage resistor must be placed in series with the coil to handle the current during the time the

coil is shorted. An alternate method is to reduce the armature spring tension to approximately 1-1/2 turns and reduce the follow of the stationary make contact to 1/16". This can be accomplished by bending the stationary contact. With this reduced tension, the number of break contacts is limited to two. Because of the low relay impedance with the armature open as compared to the impedance with the armature closed, it is not advantageous to use a resistor in series with a coil rated less than line voltage, as in the case of dc applications. If the coil is only to be shorted momentarily, or if a higher wattage consumption is not objectionable, it may not be necessary to reduce the spring tension or contact follow. The contact and spring adjustments example specified above is for a 60 Hz MG-6 relay with a voltage rating equal to line voltage and can be used with a series resistor that handles 90 watts when placed directly across the line.

## 7.0 CALIBRATION

Calibrating the relay is only necessary if the relay has been taken apart for repairs or the adjustments disturbed. This procedure should not be used until it is apparent that the relay is not in proper working order. To calibrate the relay, see Section 6.1 ACCEPTANCE CHECK.

### 7.1 ROUTINE MAINTENANCE

All relays should be inspected periodically and the time of operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

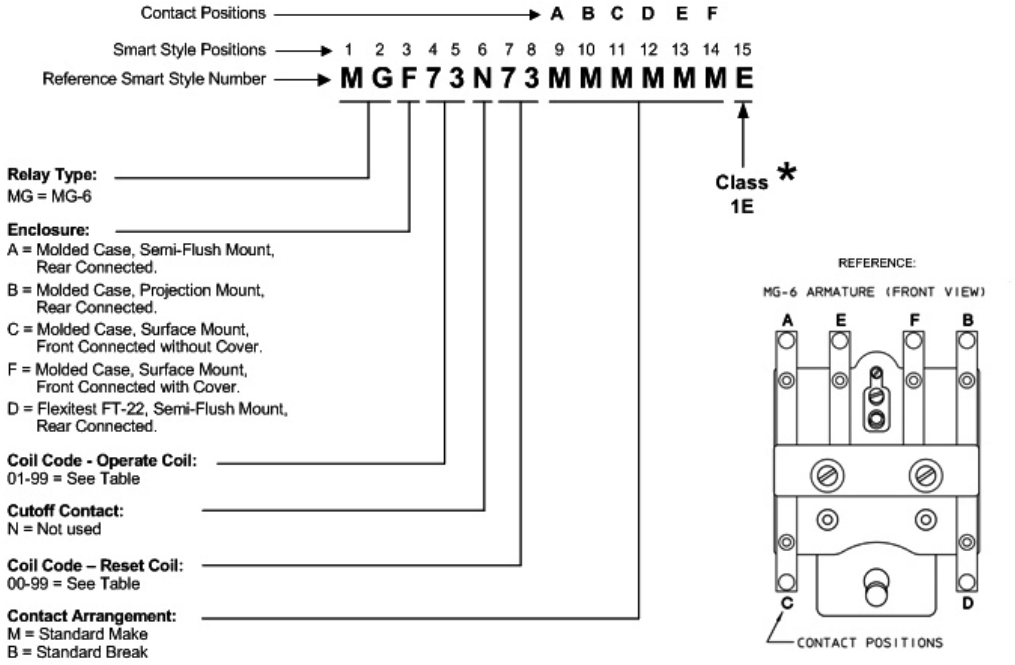
All contacts should be cleaned periodically. A contact burnishing tool, Style # 182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

For relays with latching assemblies, a small amount of silicone oil is applied at the factory to the polished and hardened surfaces of the latch screw and the latch plate in order to minimize wear and protect against corrosion. Oil should be reapplied after any cleaning and reassembling of these parts and it's also recommended to renew oil application at regular maintenance periods

## 8.0 RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to customers who are equipped for doing repair work. When ordering parts, always give the complete information found on the Relay Nameplate.

## Ordering Information - MG-6 Class 1E Relay




*** = Class 1E Style Number:**

- **Use this page as a reference tool to configure MG-6 Class 1E Relay, as needed.**
- **Factory will assign official Part Number based on Smart Style.**

| Rating | | Coil Code |
|---|---|---|
| NONE | | 00 ** |
| **AC Coils** | | |
| 12 Volts | 25 Hz | 18 |
| 12 Volts | 50 Hz | 02 |
| 12 Volts | 60 Hz | 01 |
| 24 Volts | 25 Hz | 19 |
| 24 Volts | 50 Hz | 04 |
| 24 Volts | 60 Hz | 03 |
| 48 Volts | 25 Hz | 07 |
| 48 Volts | 50 Hz | 06 |
| 48 Volts | 60 Hz | 05 |
| 60 Volts | 50 Hz | 29 |
| 60 Volts | 60 Hz | 23 |
| 92 Volts | 60 Hz | 27 * |
| 115 Volts | 25 Hz | 20 |
| 115 Volts | 50 Hz | 09 |
| 115 Volts | 60 Hz | 08 |
| 120 Volts | 60 Hz | 24 |

| Rating | | Coil Code |
|---|---|---|
| 208 Volts | 50 Hz | 26 |
| 208 Volts | 60 Hz | 10 |
| 220 Volts | 50 Hz | 25 ** |
| 230 Volts | 25 Hz | 21 |
| 230 Volts | 50 Hz | 12 * |
| 230 Volts | 60 Hz | 11 |
| 460 Volts | 25 Hz | 16 |
| 460 Volts | 50 Hz | 22 |
| 460 Volts | 60 Hz | 13 |
| 575 Volts | 25 Hz | 17 * |
| 575 Volts | 50 Hz | 15 |
| 575 Volts | 60 Hz | 14 |
| 5 Amps | 60 Hz | 28 * |
| **DC Coils** | | |
| 6 Volts dc | | 77 |
| 12 Volts dc | | 64 |
| 24 Volts dc | | 65 |
| 28 Volts dc | | 66 * |

| Rating | Coil Code |
|---|---|
| 32 Volts dc | 67 |
| 36 Volts dc | 68 * |
| 38 Volts dc | 69 * |
| 40 Volts dc | 78 * |
| 48 Volts dc | 70 |
| 62 Volts dc | 71 |
| 79 Volts dc | 72 * |
| 125 Volts dc | 73 |
| 200 Volts dc | 74 |
| 220 Volts dc | 75 * |
| 250 Volts dc | 76 |
| 500 Volts dc | 80 |
| 0.1 Amp dc | 79 * |
| 1 Amp dc | 63 * |
| 2 Amps dc | 62 * |
| 3 Amps dc | 61 * |
| 4 Amps dc | 60 * |
| 5 Amps dc | 59 * |

* = Not available for Reset Coil.
** = Not available for Operate Coil.

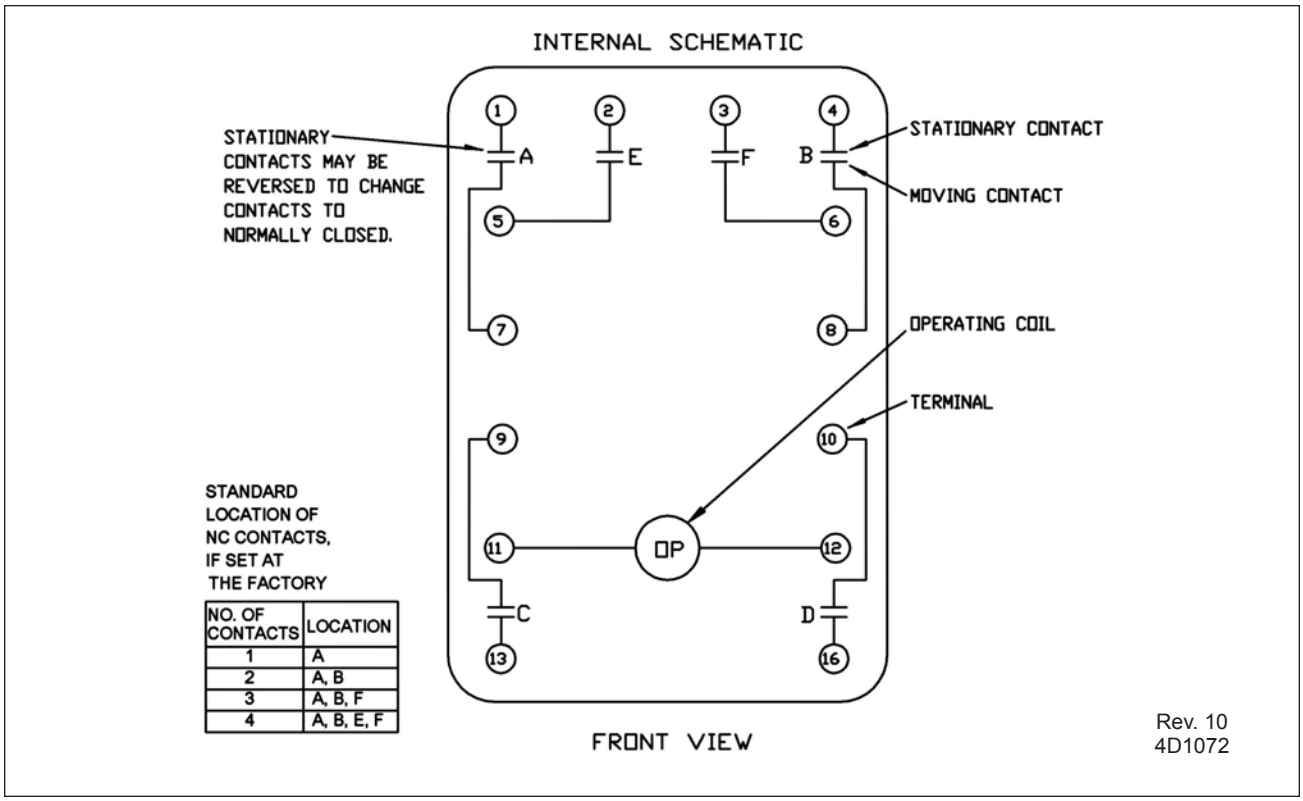



*Figure 3 - Internal Schematic for the Type MG-6 Relay, Self Reset, in Molded Case*

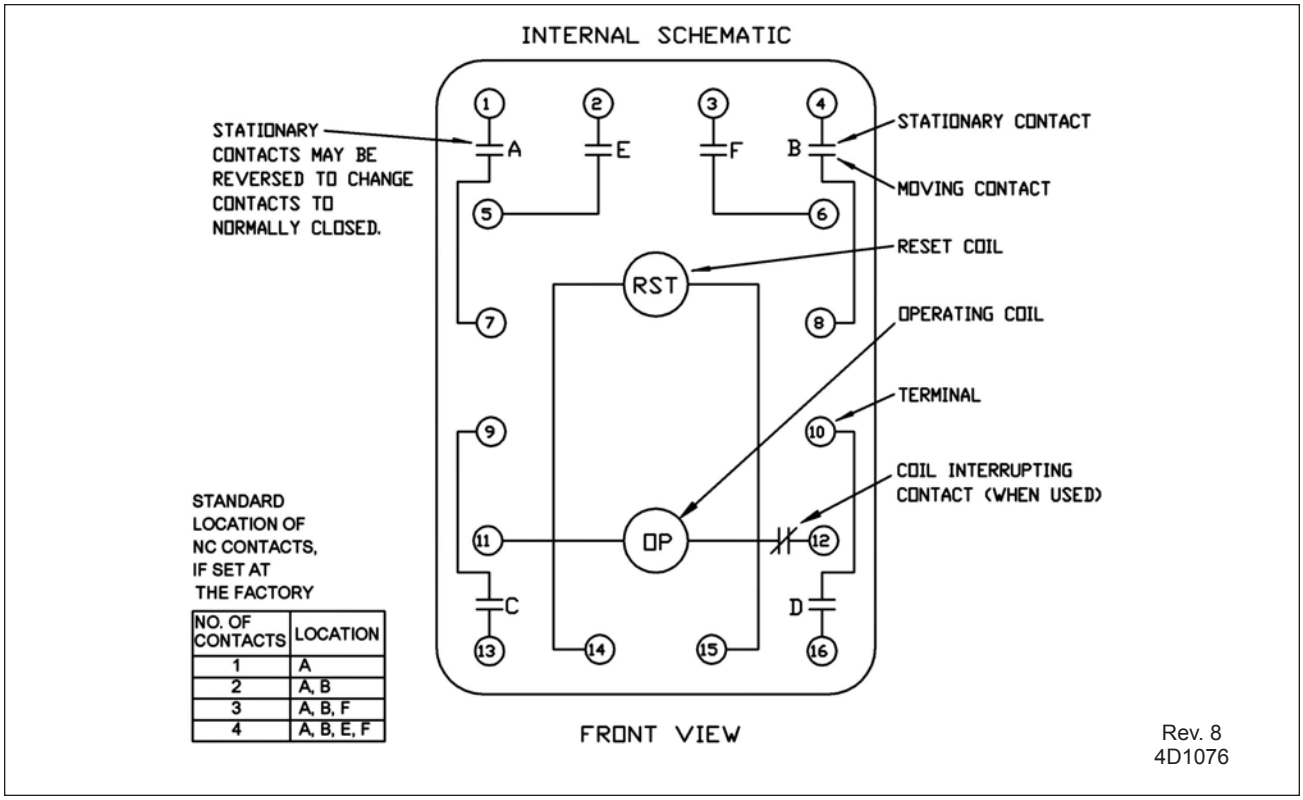



*Figure 4 - Internal Schematic for the Type MG-6 Relay, Electric Reset, in Molded Case*

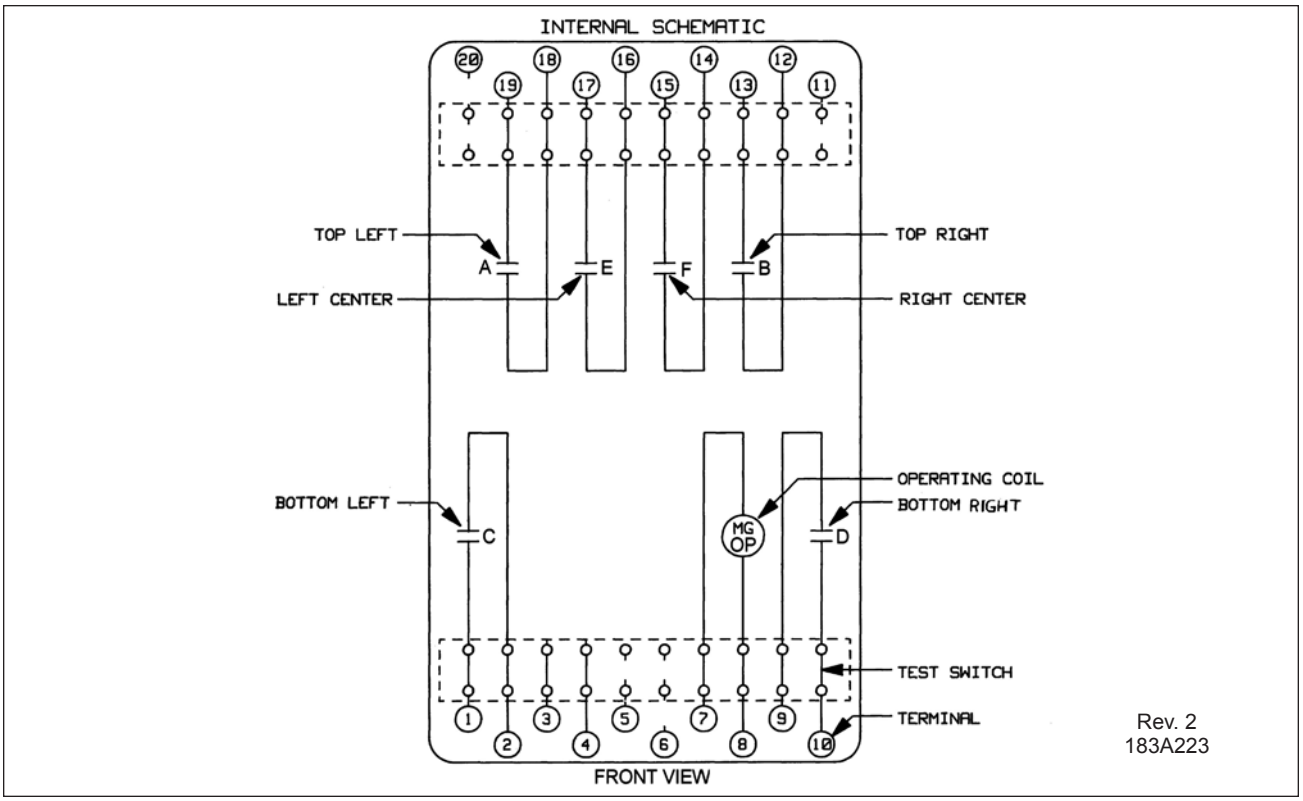



*Figure 5 - Internal Schematic for the Type MG-6 Relay, Self Reset, in FT-22 Case*

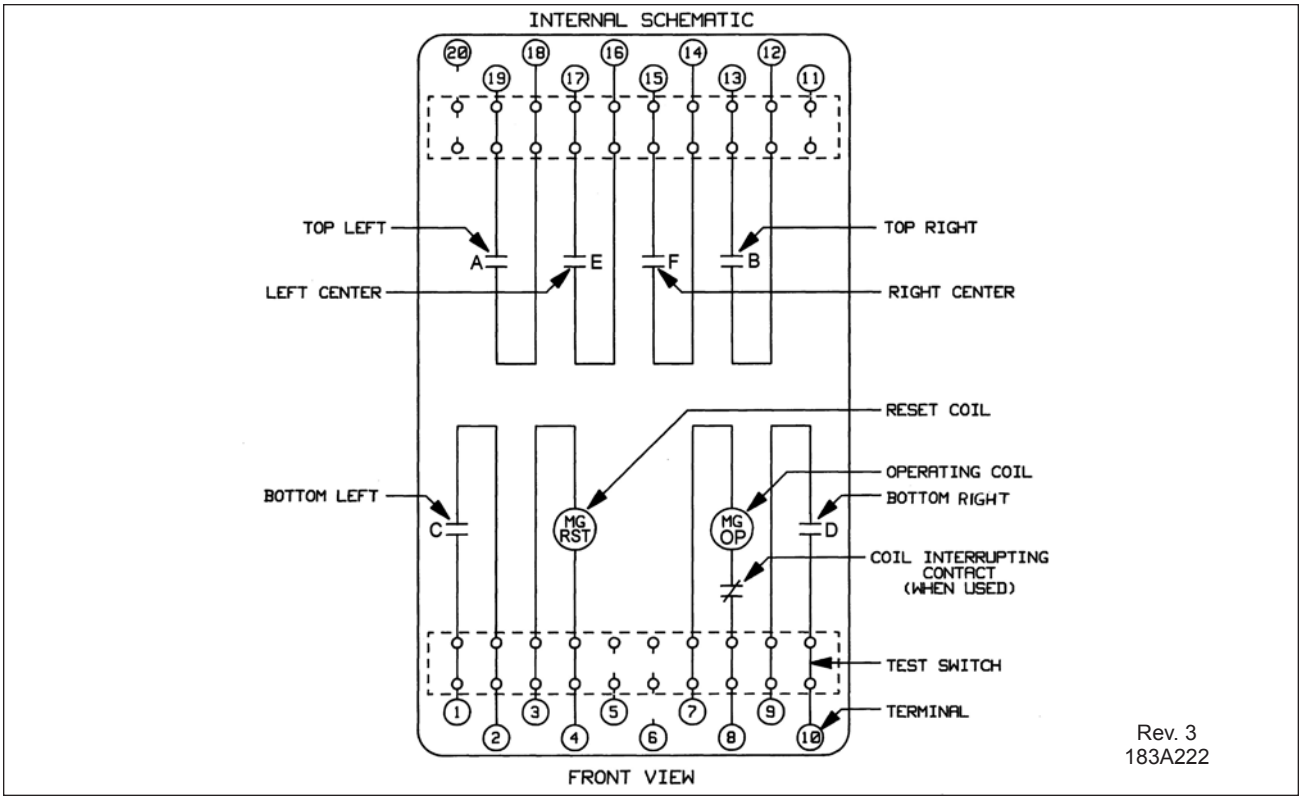



*Figure 6 - Internal Schematic for the Type MG-6 Relay, Electric Reset, in FT-22 Case*

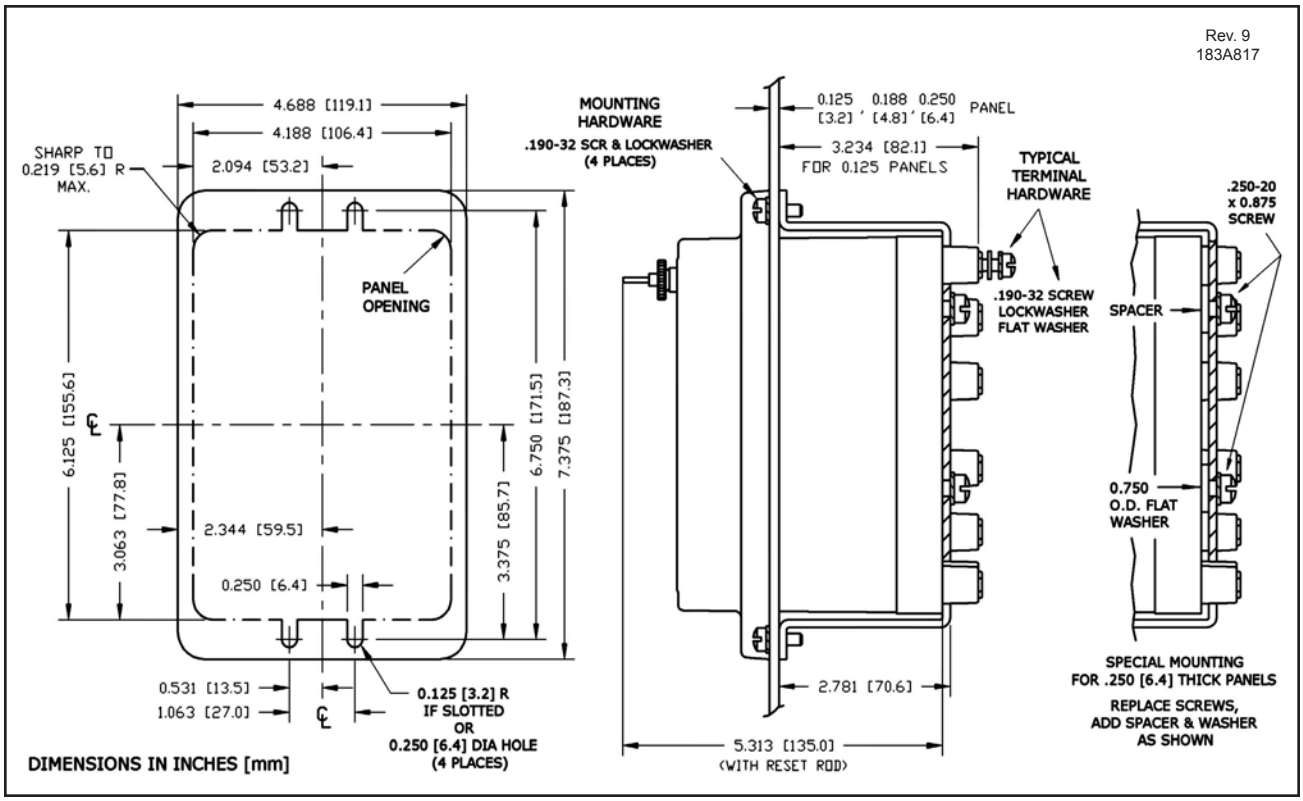



*Figure 7 - Outline and Drilling Plan for MG-6 Class 1E Relay in Molded Semi-Flush Mount Case*

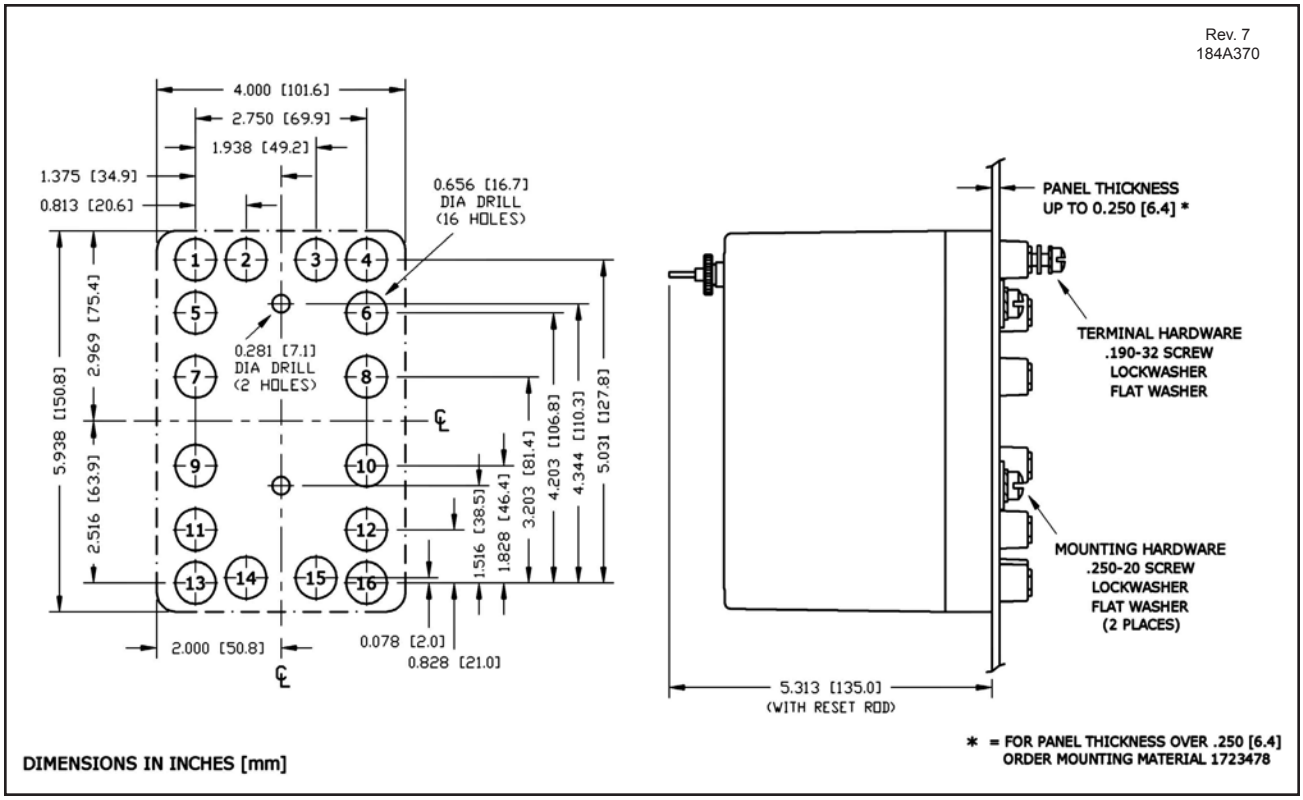



*Figure 8 - Outline and Drilling Plan for MG-6 Class 1E Relay in Molded Projection Mount Case*

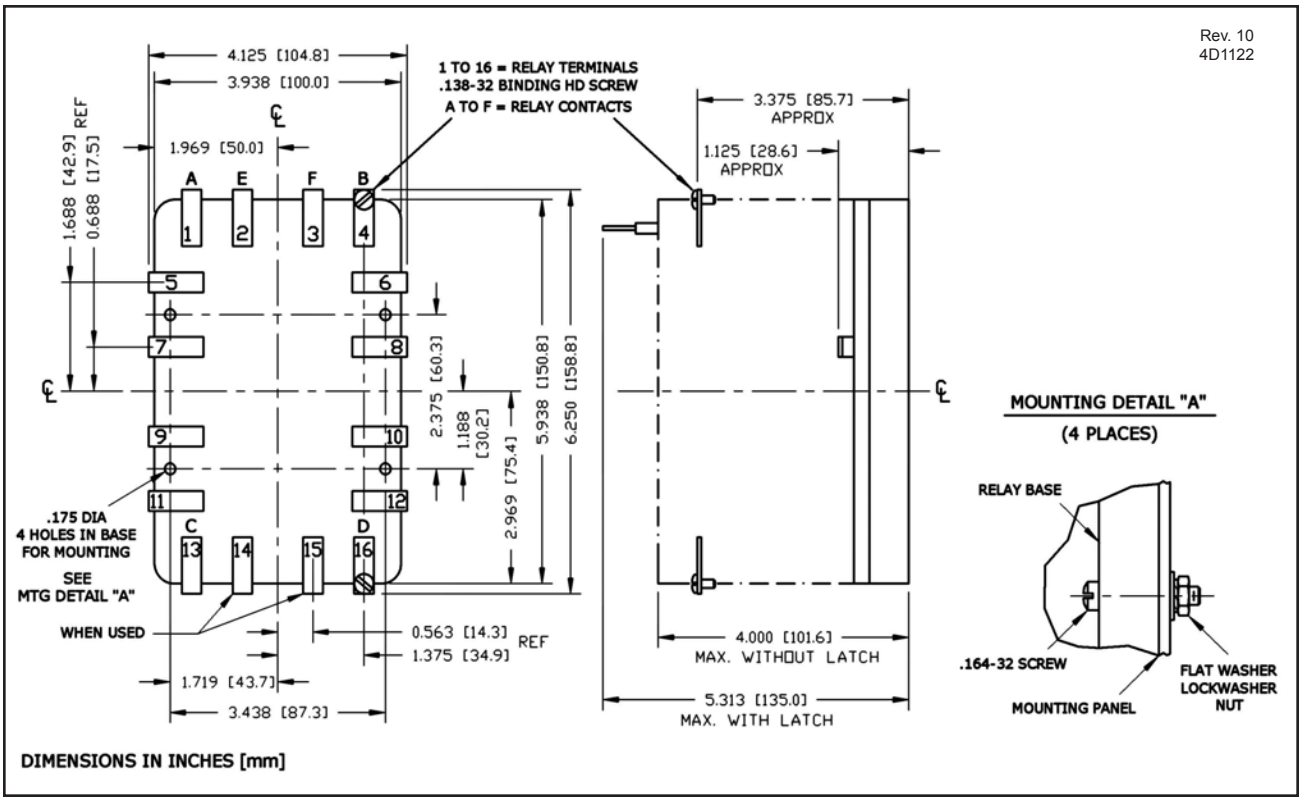



*Figure 9 - Outline and Drilling Plan for MG-6 Class 1E Relay in Molded Case, Surface Mount, Front Connected without Cover*

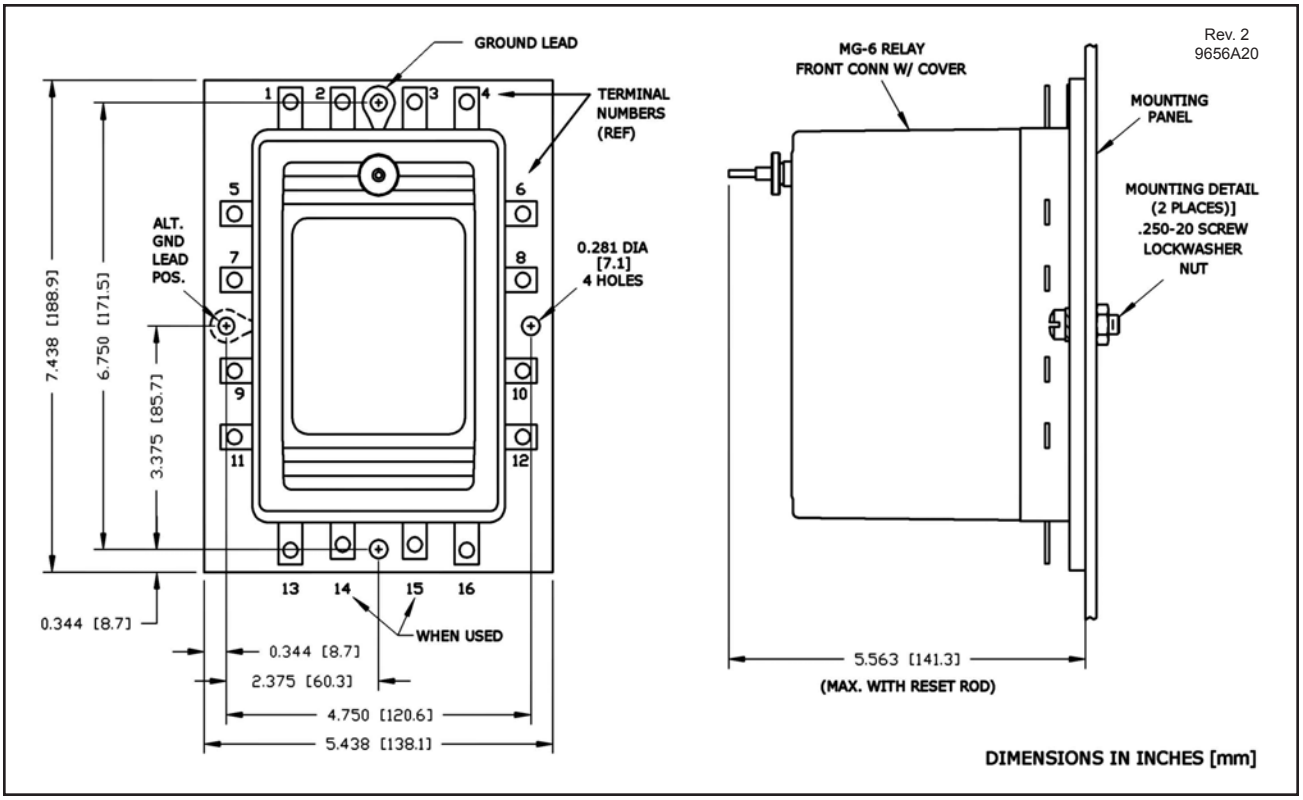



*Figure 10 - Outline and Drilling Plan for MG-6 Class 1E Relay in Molded Case, Surface Mount, Front Connected with Cover*

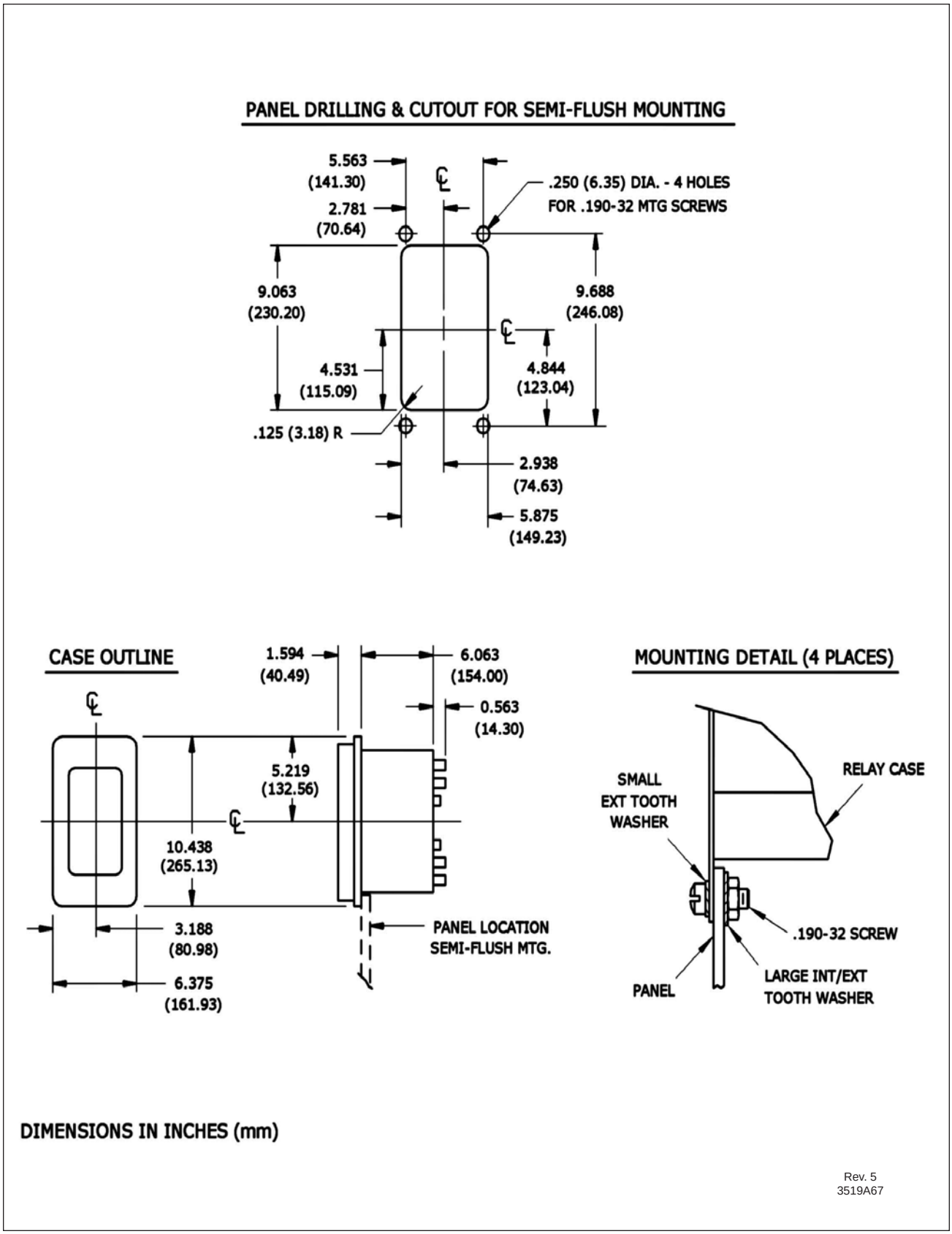



*Figure 11 - Outline and Drilling Plan for MG-6 Class 1E Relay in Flexitest FT-22 Case*

**This Page Reserved for NOTES**

IL 41-753.11 - New Release

ABB Inc.

4300 Coral Ridge Drive
Coral Springs, Florida 33065

Telephone: +1 954-752-6700
Fax: +1 954-345-5329

www.abb.com/substation automation