



SERVICE MA

MVAJ

Tripping and Control Relays

Types	MVAJ11	
	MVAJ13	
	MVAJ14	low burden
	MVAJ15	
	MVAJ17	
	MVAJ21	
	23	
	24	
	25	high burden
	26	
	27	
	28	
	29	
	MVAJ34	control

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1. INSTALLATION

- 1.1 Protective relays, although generally of robust construction, require careful treatment prior to installation and a wise selection of site. By observing a few simple rules the possibility of premature failure is eliminated and a high degree of performance can be expected.

- 1.2 The relays are either despatched individually or as part of a panel/rack mounted assembly in cartons specifically designed to protect them from damage.

Relays should be examined immediately they are received to ensure that no damage has been sustained in transit. If damage due to rough handling is evident, a claim should be made to the Transport Company concerned immediately, and the nearest GEC Measurements Branch Office should be promptly notified. Relays which are supplied unmounted and not intended for immediate installation should be returned to their protective polythene bags.

- 1.3 Care must be taken when unpacking and installing the relays so that none of the parts are damaged or their settings altered, and must at all times be handled by skilled persons only.

Relays should be examined for any wedges, clamps, or rubber bands necessary to secure moving parts to prevent damage during transit and these should be removed after installation and before commissioning.

Relays which have been removed from their cases should not be left in situations where they are exposed to dust or damp. This particularly applies to installations which are being carried out at the same time as constructional work.

- 1.4 If relays are not installed immediately upon receipt they should be stored in a place free from dust and moisture in their original cartons and where de-humidifier bags have been included in the packing they should be retained. The action of the de-humidifier crystals will be impaired if the bag has been exposed to ambient conditions and may be restored by gently heating the bag for about an hour, prior to replacing it in the carton.

Dust which collects on a carton may, on subsequent unpacking, find its way into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifying agent will lose its efficiency.

The storage temperature range is - 25°C to +70°C.

- 1.5 The installation should be clean, dry and reasonably free from dust and excessive vibration. The site should preferably be well illuminated to facilitate inspection.

An outline diagram is normally supplied showing panel cut-outs and hole centres. For individually mounted relays these dimensions will also be found in publication R-6015.

Publication R-7012 is a Parts Catalogue and Assembly Instructions. This document will be useful when individual relays are to be assembled as a composite rack or panel mounted assembly.

Publication R-6001 is a leaflet on the modular integrated drawout system of protective relay.

Publication R-6014 is a list of recommended suppliers for the pre-insulated connectors.

2. COMMISSIONING

2.1 Check that ratings of relay agree with the supplies to which it is to be connected.

2.2 Check all wiring connections to the relay, including the case earthing connection above the terminal block. It is especially important that d.c. supplies and magnetic blowout contacts are wired with the correct polarity. The relay diagram number appears inside the case.

2.3 Before leaving the factory all relays are accurately adjusted, tested and carefully packed. Hence there should be no need for any re-adjustment on commissioning.

Moving parts are held in position during transit by rubber bands and packing. These should be removed carefully.

2.3.1 To gain access to the relay first loosen the captive cover screws. Then carefully remove the cover from the case.

The module can then be removed from the case by grasping the handles at the top and bottom of the front plate and pulling forwards.

Care must be taken to ensure that mechanical settings of the element are not disturbed.

2.3.2 Carefully remove the rubber band securing the flag mechanism.

2.3.3 Check that the bottom end of the contact operating card has not been dislodged from the slot in the armature extension.

2.3.4 Carefully actuate the armature of each unit in turn with a small screwdriver/probe. Note immediately after the point where any make contacts just close there is a further small movement of the armature. This ensures that contact follow through and wiping action is present. Repeat similarly with break contacts on armature release.

On units fitted with hand reset flag indicators, check that the flag is free to fall before, or just as, any make contacts close.

2.3.5 Replace the module in the case and refit the cover. Make sure that the reset mechanism in the cover is correctly located with respect to the relay element, and that the flag (or mechanism) can be reset.

2.4 INSULATION

The relay, and its associated wiring, may be insulation tested between:

- a) all electrically isolated circuits
- b) all circuits and earth

An electronic or brushless insulation tester should be used, having a D.C. voltage not exceeding 1000V. Accessible terminals of the same circuit should first be strapped together. Deliberate circuit earthing links, removed for the tests, subsequently must be replaced.

- 2.5 Check operation or electrical reset by energising the relay with 60% of the rated supply voltage, except MVAJ34 which should be checked at 80% of the rated supply voltage. The appropriate terminals should be identified from the internal wiring diagram normally supplied.

Disconnect external wiring from these terminals to allow application of the test supply.

The relays should switch cleanly with one movement.

The rated voltages are marked on either the lower hand strip or front plate.

- 2.6 Restore any external wiring connections that may have been disturbed during the above tests.

3. MAINTENANCE

Periodic maintenance is not necessary. However, periodic inspection and test is recommended. This should be carried out every 12 months or more often if the relay is operated frequently or is mounted in poor environmental conditions.

- 3.1 Repeat check 2.3 with emphasis on contact wear and condition. Mechanical settings may be checked against those shown in section 4.

- 3.1 Tests 2.4 and 2.5 should be carried out to prove operation.

4. MECHANICAL SETTINGS

4.1 General

Armature gap measurements should be made with the top of the feeler gauge level with the centre line of the core.

Contact pressures are measured with a gramme gauge at the contact tips.

In general contact gaps and follow through are defined by quoting an armature gap at which the tips should be just closed or just open. Some mechanically operated contact gap must be measured directly with feeler gauges at the contact tips.

The relay contact state is always defined with the relay in the unenergised position, unless otherwise specified on the appropriate circuit diagram.

Contact Type	Symbol used on diagrams	
	Normal Duty	Heavy Duty
Make (Normally open)	M	Z
Break (Normally closed)	B	Y
Break before make (Changeover)	BBM	-

4.1.1 With the armature closed the clearance between the back of the armature and the back stop should be 0.005"/0.008".

4.1.2 Nominal armature gap open 0.050"/0.060" for all types.

4.2 Contact Settings

4.2.1 Contact settings for:-

MVAJ11, 17, 21 and 26 (main element with output contacts)

Normal/heavy duty make and break contacts.

With the armature closed onto a 0.012" feeler gauge the make contacts should be closed, but should be open using a 0.015" feeler gauge.

With the relay in the operated position the break contacts should have a contact gap of 0.06"/0.070".

Force to just close the make contacts 27/30 grams.

Force to just open the break contacts 27/30 grams.

4.2.2 Contact settings for:-

MVAJ13, 14, 15, 23, 24, 25, 26, 27, 28 and 29 (main element with output contacts).

Normal/heavy duty make and break contacts.

With the armature closed onto a 0.018" feeler gauge the make contact should be closed, but should be open using a 0.022" feeler gauge.

With the relay in the operated position the break contacts should have a contact gap of 0.060"/0.070".

Force to just close the make contacts - 27/30 grams.

The force to just open the break contacts - 27/30 grams.

4.2.3 Contact setting for:-

MVAJ13, 14, 15, 23, 24, 25, 27, 28 and 29

Cut off contact - lower left hand contact.

First set the lower lug on the armature extension so that the top of the roller is level with the top of the plastic catch when the relay is in the operated position.

Remove the operating wire from the plastic block on the moving contact.

Set the contact gap to 0.045"/0.055".

Force to just close the make contact 12/15 grams.

Reposition the operating wire which should locate freely in the hole in the plastic block on the moving contact blade. If necessary bend the wire to suit.

4.2.4 Contact settings for:-

MVAJ34

Normal/Heavy duty make and break contacts.

With the armature closed onto a 0.017" feeler gauge the make contacts should be closed, but should be open using a 0.020" feeler gauge.

With the relay in the operated position the break contacts should have a contact gap of 0.060"/0.070".

Force to just close the make contacts 20/23 grams

Force to just open the break contacts 18/23 grams

4.2.5 Contact settings for:-

Auxiliary units in MVAJ11, 17, 21, 26, 27, 28 and 29

Normal/heavy duty make and break contacts.

With the armature closed onto a 0.011" feeler gauge the make contacts should be closed, but should be open using a 0.013" feeler gauge.

With the armature closed onto a 0.027" feeler gauge the break contact should be open, but should be closed using a 0.029" feeler gauge.

Force to just close the make contacts 20/25 grams.

Force to just open the break contacts 18/23 grams.

4.3 Mechanical settings related to the latch for:-

MVAJ13, 14, 15, 23, 24, 25, 27, 28, 29 and 34

The upper limiting lug should be clear of the cross roller and armature backstop in all positions.

Care should be taken to ensure that the upper lug still prevents the cross roller from riding up and over the armature extension.

With the armature closed the force to lift the cross roller above the latch should be 40/50 grams.

With the armature closed onto a 0.003" feeler gauge the cross roller should pass clear of the plastic catch, but with a 0.006" feeler gauge the roller should not clear the catch. To achieve this the armature extension should be bent. The upper face of the plastic catch should remain tangential to a circle centred on the armature hing. The armature should return freely to the fully open position when partly closed and released and the reset arm should fall freely to the fully operated position when partly reset and released.

4.4 Electrical reset mechanism for:-

MVAJ14, 15, 24, 25, 28, 29 and 34

With the unit de-energised the lever arm should rest on the frame with the control spring just touching.

When the reset armature is closed onto a 0.01" feeler gauge it should reset the main element, but not reset with a 0.02" feeler gauge.

If the reset mechanism has been moved or changed, it may be necessary to adjust the position of the reset electromagnet by means of the mounting screws which are located in slotted holes.

4.5 Mechanical flag settings

4.5.1 Settings for self reset units

MVAJ 11, 17, 21 and 26

With the armature closed onto a 0.015" feeler gauge the flag should be free to fall, but should not fall using a 0.020" feeler gauge. Adjustment is made to the catch spring on the flag.

4.5.2 Settings for hand reset and electrically reset units

MVAJ 13, 14, 15, 23, 24, 25, 27, 28 and 29

With the armature closed onto a 0.022" feeler gauge the flag shall be free to fall, but should remain unoperated with a 0.027" feeler gauge. Adjustment is made to the flag catch spring on the flag.

4.5.3 Setting for self reset flag

MVAJ 34

Adjust the flag operating lever such that the flag side arm is parallel to the frame, when viewed from the side and the flag covers the flag label.

4.6 Settings for reset levers on hand reset and hand/electrically reset units

MVAA 13, 15, 23, 25, 27 and 29

The distance between the reset lever and the top of the reset arm should be 0.250". This is measured above the roller pivot and is adjusted by bending the reset lever.

5. PROBLEM ANALYSIS

5.1 Failure to Operate/Reset

Check diagram for correct input connections.

Check rated voltage, this is marked on the front of the module.

Ensure the power supply is capable of supplying the necessary power.

With MVAJ13, 14, 15, 23, 24, 25, 27, 28, 29 and 34, check that the relays are not latched in the operated position.

Some relays may be fitted with cut-off contacts - refer to diagram.

Flag spring may have been distorted and is holding the armature open or closed.

Check internal wiring.

Check continuity - result open circuit.

Coil open circuit.

Cut-off contact in series with coil open circuit.

Internal wiring damaged.

Diode bridge damaged, MVAJ 11, 13, 14, 15 and 21.

Series resistor open circuit.

Parallel resistor (when fitted) short circuit

Check continuity - result short circuit.

Parallel resistor (when fitted) short circuit

Diode bridge damaged - relay takes excessive current.

5.2 Excessive current taken by relay.

Diode bridge damaged.

Incorrect voltage applied.

Internal resistors short circuit.

5.3 Output contacts not changing state.

Operating card not in position.

Check output terminals with reference to diagram.

Internal wiring damaged.

Contamination of contacts.

Contacts should be cleaned with the burnishing tool, supplied in relay tool kits.

On no account should knives, files or abrasive materials be used.

Check mechanical settings as per section 4.

5.4 Relays fail to economise MVAJ 11, 17, 21 and 26 check economy relay, contact settings and wiring.

5.5 Relays fail to cut off MVAJ 13, 14, 15, 23, 24, 25, 27, 28 and 29 check mechanical operation of wire operated contact (lower left hand contact viewed from front) by manually operating the relay.

Check mechanical settings.

5.6 Operating times too long.

Check power supply is capable of supplying current and does not current limit during operation.

The operating time is measured to the first closure of the contacts and the timer must not add any subsequent contact bounce.

6. SPARES

When ordering spares, quote the full relay model number and any component references numbers, or briefly describe the parts required.