ELECTRO-MOTIVE

MAINTENANCE INSTRUCTION

M.I. 5355
*Rev. B

AUXILIARY RELAYS

DESCRIPTION

The relays covered by this Maintenance Instruction, and tabulated in the Service Data Section, are all of the same basic construction and are used in a wide variety of applications.

They differ only in physical size, the number, rating and arrangement of contacts, and in operating values. Figures 1 and 2 illustrate the two size groups into which these relays fall. The smaller size relays, Fig. 1, have a 10 ampere capacity rating while the larger size relays, Fig. 2, have a 20 ampere rating, in most cases. Exceptions include relay 8210254 with a 35 ampere capacity and 9080888 which has a 60 ampere capacity.

The relays all consist of a base, a coil assembly and a contact assembly. The coil of the relay is top mounted and is held in place inside the magnet yoke, Fig. 3, by a hollow center core assembly. The contact assembly consists of upper and lower stationary contact assemblies, a movable contact assembly, a back cover and a front cover.

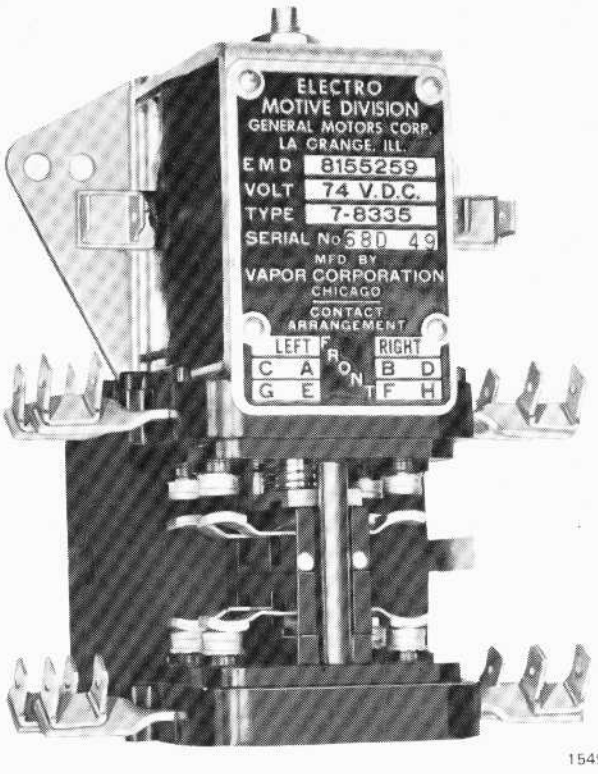

Fig.1 – Typical Ten Ampere capacity Relay

Fig.2 – Typical Twenty Ampere Capacity Relay

*This bulletin is revised and supersedes previous issues of this number.

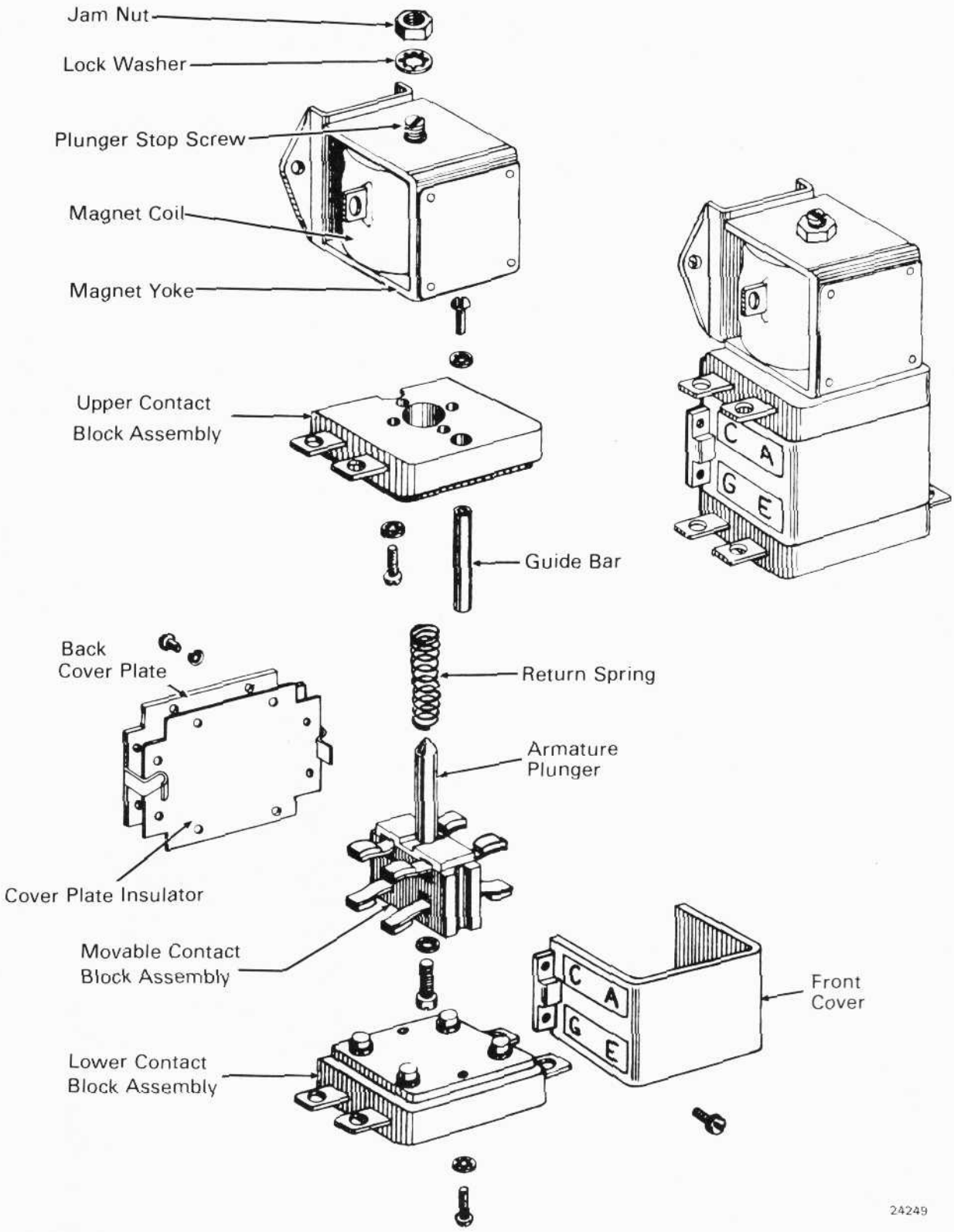

Fig.3 - Exploded View - All Relays

The upper stationary contact assembly consists of a phenolic block with stationary contacts and external connectors molded into the block. In some cases, tapped inserts are molded into the phenolic block for the contacts to thread into. The upper block is attached to the magnet yoke with machine screws.

The lower stationary contact assembly also consists of external connectors and stationary contacts, or tapped inserts, molded into a phenolic block. The lower block is connected to the upper stationary contact assembly by two guide bars.

The movable contact assembly consists of an armature plunger, a return spring, movable contact bars and phenolic spacers. The armature plunger moves inside the hollow center core which holds the magnet coil in the yoke. The phenolic spacers are fastened to the armature plunger by a machine screw. The movable contact bars are connected to the phenolic spacers by small springs held in place by metal studs and retainer rings. The springs provide the necessary overtravel and contact pressure. The return spring, which is around the armature plunger, acts to return the contacts to their normal position when the relay coil is de-energized. The two guide bars position the spacer blocks to align the movable contacts with the stationary contacts.

The coils of these auxiliary relays are operated by 74 volt DC control circuits, in most cases. The contact arrangements are designed to set up a variety of control circuits for equipment operation. The individual system wiring diagrams will indicate relay function.

OPERATION

When the top mounted coil of these relays is energized, the armature plunger is attracted upward, overcoming the tension of the return spring. All of the contacts change position when this occurs. The movable contact bars and phenolic spacers of the different relays are arranged to produce the desired sequence of operation, such as normally open N.O. contacts close before normally closed N.C. contacts open or vice versa.

When the relay coil is de-energized, the movable contact assembly is forced downward by the return spring, returning the contacts to their normal position. The arc created at de-energization is not sufficient to require any form of arc suppression.

MAINTENANCE

Due to simplicity of construction employing a minimum of moving parts together with silver alloy contacts and dust-tight enclosure, these auxiliary relays should provide satisfactory service over a long period of time. Maintenance requirements are confined to occasional inspections to qualify the relays for continued service.

INSPECTION

1. Check the cover for cracks, discoloration or poor fit. Clean any accumulation of dirt or dust from the relay with a soft brush or dry compressed air.

2. Inspect the electrical connections for tightness and electrical contact.

3. Inspect the operating coil for burns or discoloration. Check resistance of the coil according to values given in the Service Data Section, Table 1.

4. Inspect the alloy contacts for contact gap, wipe action and surface condition.

   The contact gap and overtravel for each relay is listed in the Service Data Section, Table 1.

   NOTE

   Alloy contacts will operate satisfactory even though blackened, pitted or eroded. Do NOT clean, dress, or file contacts as abrasive particles may become imbedded in contact surfaces causing poor electrical contact and decreased contact life. Replace contacts when any part of the alloy is worn away to the base metal. Both stationary and movable contacts should be replaced if either alloy tip is worn to the base metal.

5. Check the movable mechanical parts of the relay for proper function. Do NOT apply lubrication of any type to these relays.

6. Electrically inspect the relay for pickup and dropout against the values tabulated in the Service Data Section, Table 1, and adjust as described below.

ADJUSTMENT OF PICKUP AND DROPOUT

There is only a single adjustment for pickup and dropout on these relays. The settings can be made while the relay is installed on the equipment or on a work bench. The relay must be in a vertical position in either case.

1. Connect a variable source of DC power (such as a motor-generator set) to the relay coil. Use a voltmeter connected across the line to read the voltage.

2. To adjust, loosen the jam nut on the top of the magnet yoke assembly and turn the plunger stop screw with a screwdriver.

3. Set the pickup of the relay according to the values listed in the Service Data Section, Table 1.

4. Tighten the jam nut and proceed to check the dropout of the relay. It should also agree with the values given in the Service Data for the particular relay being adjusted. If the dropout value is not satisfactory, check for binding of the armature plunger or a broken or fatigued return spring.

ADJUSTMENT OF CONTACT AIR GAP AND OVERTRAVEL

The contact air gap and contact wipe of the relay should be correct after the pickup and dropout has been adjusted, as outlined above. If the values do not agree with those given in the Service Data, Table 1, the contact bar assemblies may be bent slightly. If this appears to be the case, attempt should be made to bend them back into alignment.

REPLACEMENT OF OPERATING COIL

1. To replace the operating coil of the relay, first remove the jam nut and lockwasher from the plunger stop screw, see Fig. 3.

2. Remove the hollow center core assembly by unthreading from the magnet yoke.

3. Push the magnet coil, together with the spring washer (beneath the coil), from the magnet yoke – pushing to the right.

NOTE

The spring washer replaces fish paper spacer washers used on earlier models of these relays.

Some older models may use two set screws and jam nuts to hold the operating coil in place.

4. Apply the new operating coil by reversing the procedure outlined above. Set the pickup and dropout of the new coil by adjusting the stop plunger screw outlined previously.

REPLACEMENT OF CONTACTS

Except for a few early models, stationary contacts are molded into the upper and lower contact base assemblies. The stationary contacts on the early models may be replaced by merely unscrewing the contacts from their tapped inserts and installing the new contacts. When the stationary contacts need replacing on newer models, the entire upper or lower contact block assembly must be replaced. Proceed as follows:

1. Remove the front cover by releasing the cover clips, Fig. 3. (Some older models had the cover attached with screws and nuts.)

2. Remove the back cover plate and cover plate insulator by removing the four screws holding them in place, Fig. 3.

3. Remove the lower contact block assembly by removing the two screws holding it to the guide bars which are attached in the same manner to the upper contact block assembly.

   When the lower contact block is removed, the plunger and movable contact block assembly will then slide off the guide bars.

CAUTION

Use care in removing lower block as return spring tension will cause movable block assembly to spring free. If dropped, the phenolic block may be broken.

4. To remove the upper contact block assembly, remove the screws holding it to the magnet yoke assembly.

The movable contact bars may be removed from the movable contact assembly by merely removing the screw which holds the plunger and contact block assembly together, see Fig. 3. The contact bars will then slide out of the contact assembly.

SERVICE DATA

TABLE 1

Part No.	Contacts: Arrangement	Contacts: Rating	Operating Coil Resistance @ 20° C (68° F) Ohms	Operating Voltage: Working	Operating Voltage: Max. Pickup	Operating Voltage: Dropout	Contact (Minimum): Gap	Contact (Minimum): Lift
8138583	2 NO-1 NC	50 Amps.	495 Ohms ±5%	74 VDC	48 VDC	5-28 VDC	3/32"	1/32"
8155259	2 NO-2 NC	10 Amps.	1100 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	1/16"	1/32"
8157086	3 NO-3 NC	20 Amps.	400 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	1/32"
8174804	3 NO-1 NC	10 Amps.	1100 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	1/16"	1/32"
8174805	2 NO-2 NC	10 Amps.	50 Ohms ±10%	64 VDC w/ 100 Ohm in series	11 VDC	6 VDC	1/16"	1/32"
8182398	2 NO-2 NC	10 Amps.	50 Ohms ±10%	18 VDC	10-13.6 VDC	2.6-3.3 VDC	1/16"	1/32"
8187245	4 NO-2 NC	10 Amps.	590 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	1/16"	1/32"
8188947	4 NO-2 NC	20 Amps.	495 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	1/32"
8190872	3 NO-3 NC	10 Amps.	590 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	1/16"	1/32"
8210254	2 NO	35 Amps.	495 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	5/64"
8253133	4 NO-2 NC	20 Amps.	495 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	1/32"
8272598	5 NO-1 NC	10 Amps.	590 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	.010"	.010"
8319025	4 NO	10 Amps.	745 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	5/64"
8341764	2 NO-4 NC	10 Amps.	590 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	1/16"	1/32"
9080888	4 NO	60 Amps.	495 Ohms ±10%	74 VDC	48 VDC	5-28 VDC	3/32"	1/32"

NOTE

All relays have a 74 Volt DC working voltage except:

8174805 - 64 Volts circuit with 100 ohms in series
8182398 - 18 Volts DC

Hi-Pot Test (Relays 8138583, 8157086, 8174805, 8182398, 8210254)

Coil To Ground	600 Volts RMS	-	60 Hz	-	1 Minute
Coil To Contacts	600 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Ground	600 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Contacts	600 Volts RMS	-	60 Hz	-	1 Minute

Hi-Pot Test (Relay 8157398)

Coil To Frame	1200 Volts RMS	-	60 Hz	-	1 Minute
Coil To Contacts	1200 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Contacts	1200 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Frame	1200 Volts RMS	-	60 Hz	-	1 Minute

Hi-Pot Test (Relays 8155259, 8174804, 8187245, 8190872, 8253133, 8272598, 8188947, 8319025, 8341764, 9080888)

Coil To Ground	600 Volts RMS	-	60 Hz	-	1 Minute
Coil To Contacts	2400 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Ground	2400 Volts RMS	-	60 Hz	-	1 Minute
Contacts To Contacts	2400 Volts RMS	-	60 Hz	-	1 Minute