ELECTRO-MOTIVE

MAINTENANCE INSTRUCTION

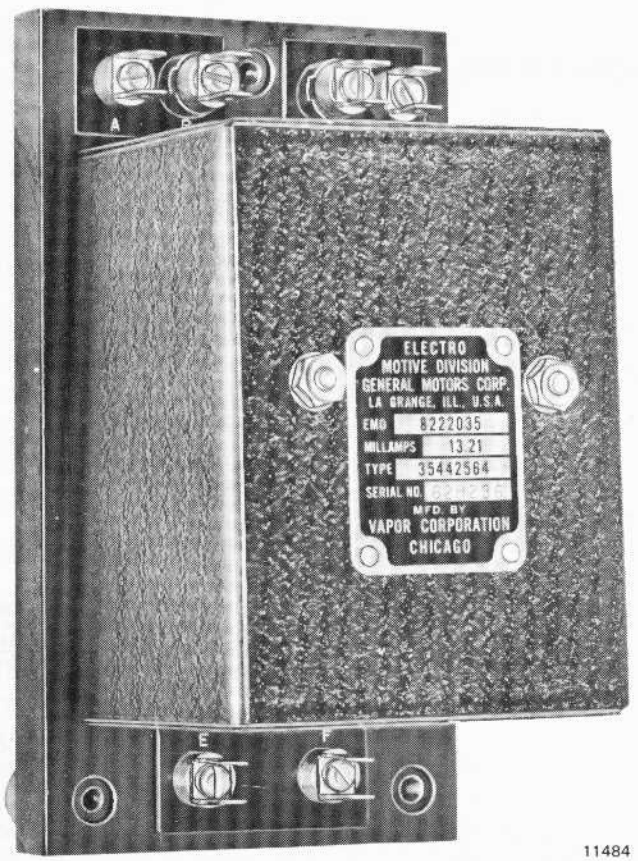
M.I. 5394
*Rev. B

WHEEL OR SPROCKET SLIP RELAYS

DESCRIPTION

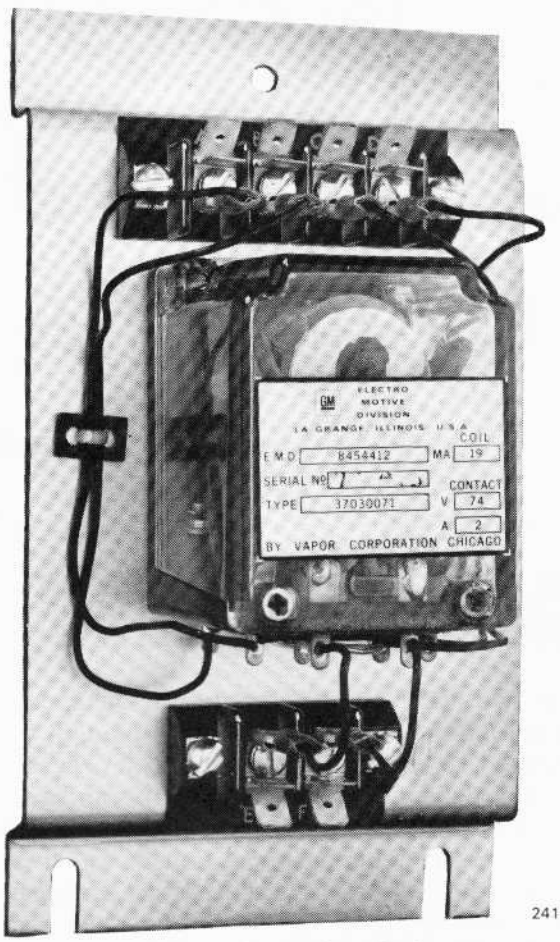
The relays, Figs. 1 and 2, covered by this Maintenance Instruction are designed for use in wheel or sprocket slip bridge circuits, Fig. 3, between motors and fixed resistors. This type relay is energized when a variation in electrical potential, caused by differences in motor rotational speeds, produces an unbalanced condition in the bridge circuit which allows current to flow through the operating coil of the relay. When operating coil is energized, its contacts establish circuits to bring about full or partial unloading of the power plant, and automatic sanding at driving wheels on locomotive applications.

All the slip relays included in this instruction are of the panel mounting type with front connections. The two models referred to as "Old Style Slip Relays" can be maintained with replacement components and adjustments while the models designated as "New Style Slip Relays" are of a module design. Should inspection and test of these newer type relays indicate a need for maintenance, the entire relay module (less mounting bracket) should be replaced.



11484

Fig.1 – Old Style Slip Relay

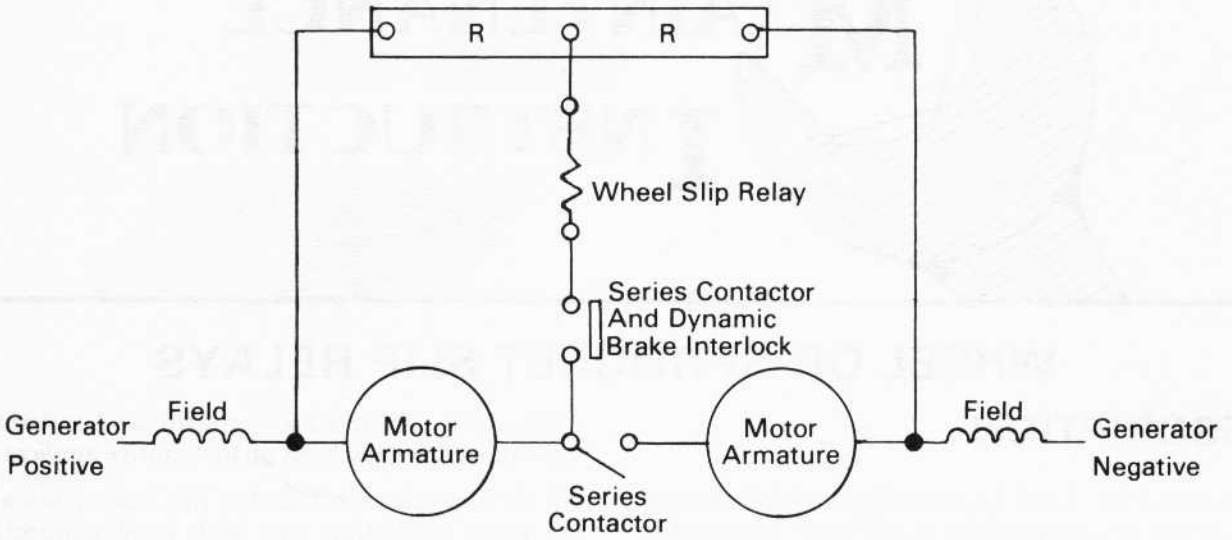


24182

Fig.2 – New Style Slip Relay

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

TYPICAL LOCOMOTIVE APPLICATION



TYPICAL DRILLING APPLICATION

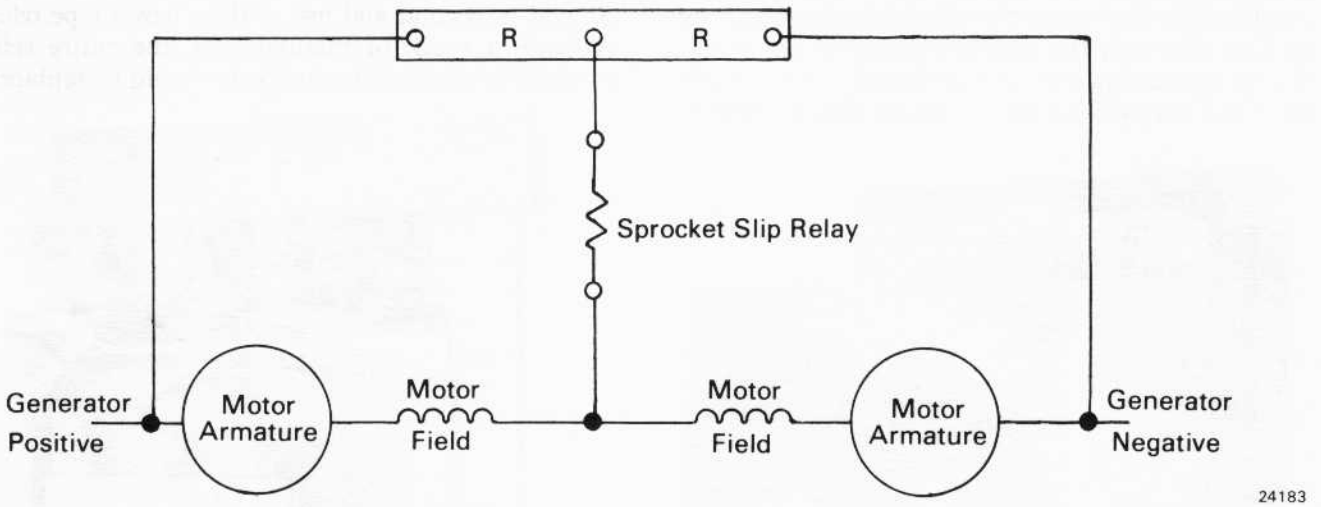


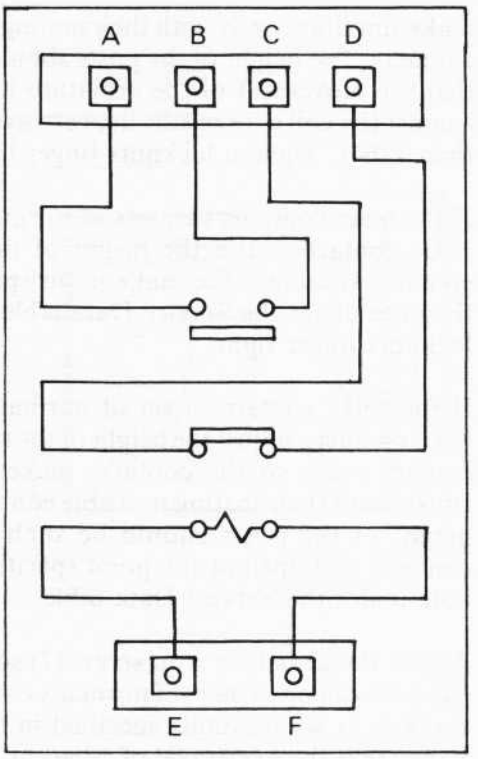
Fig.3 – Slip Relay Bridge Circuit Applications

OLD STYLE SLIP RELAYS (8222035, 8284597)

The two "Old Style" relays are of the same basic construction, but differ in the amount of current required to energize the magnet coil. These relays consist of a panel base, a coil assembly and a contact assembly. The internal components are bottom-wired on the panel base and housed under a dust-tight protective steel cover. Contact arrangements are shown in Fig. 4, and operating values are listed in the Service Data table at the back of this instruction.

OPERATION

The magnet coil, item (14, Fig. 5,) is mounted on the base (1) of the relay assembly and is held in place by a screw through the base. The armature assembly (8) supports the movable contacts (3) and is held in place by a tension spring (10). It is also supported by the knife edge of the magnet frame (12) which acts as a pivot. The inward movement of the armature, when the relay is energized, is limited by the armature stop screw (7). The released movement of the armature is limited by an adjusting screw (6) on the armature limiting bar. The tension spring (10) is



8222035
8284597
Coil De-Energized

24184

Fig.4 – Contact Arrangement
(Old Style Relays)

adjusted to control movement of the armature by turning the tension adjusting nut (9). Current to energize the magnet coil is supplied through tabs (11) and leads (13). External connection for movable contacts (3) and stationary contacts (15) is supplied at tabs (2).

MAINTENANCE

Due to the design of these relays, little maintenance is required. The cover should be removed periodically for examination of electrical connections for good tight contacts and inspection of the magnet coil for burns or discoloration from high temperature operation.

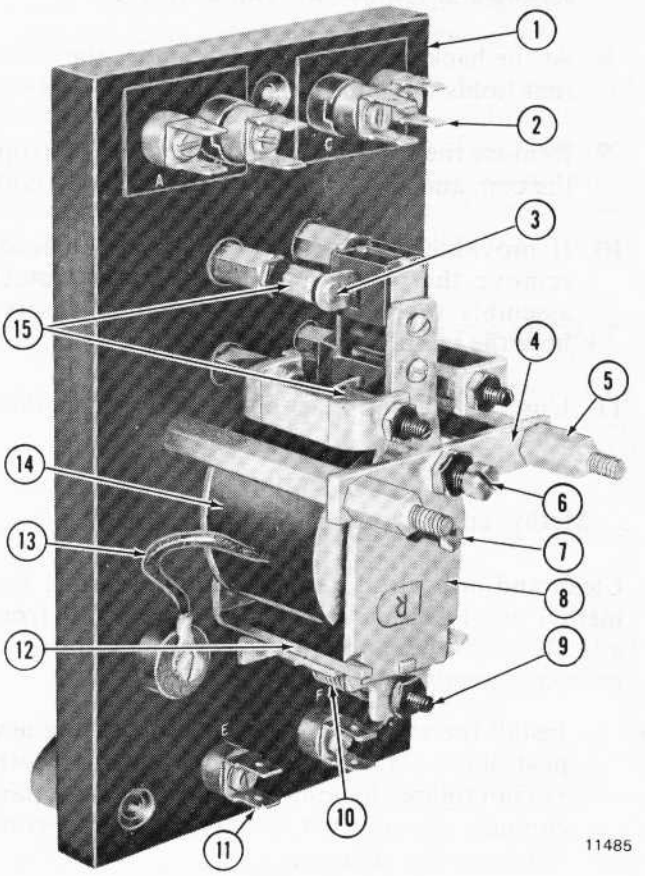
INSPECTION

Check the contact points; replace the contacts when they are worn to a point where limits can not be maintained, as listed in the Service Data table. Do not use lubricant on any part of the relay. A soft brush or low air pressure may be used to remove any dust.

If the relay is being inspected because of a definite malfunction, first determine that no loose metal such as a nut or screw has dropped behind the relay base shorting out the soldered connections.

COIL/CONTACTS REPLACEMENT

If at the time of inspection it is found that either the magnet coil or the contacts must be replaced, they may be removed and replaced in the following manner. Refer to Fig. 5.



11485

1. Base Assembly
2. Contact Connection Tab
3. Movable Contacts
4. Armature Limit Bar
5. Cover Adapter Stud
6. Armature Limit Adjusting Screw
7. Armature Stop Screw
8. Armature
9. Tension Adjusting Nut
10. Tension Spring
11. Coil Connection Tabs
12. Magnet Frame
13. Coil Leads
14. Magnet Coil
15. Stationary Contact Post

Fig.5 – Identification Of Parts
(Old Style Relays)

1. Disconnect all leads from the relay.
2. Remove relay from panel.
3. Break the safety wire and remove the two nuts and washers holding the cover in place. Take the cover off and remove the metal and rubber washers from the studs (5, Fig. 5) to avoid loss.
4. Loosen the tension adjusting nut (9), and release the tension spring from the lug on the spring retaining bracket.

5. Unscrew the cover adapter studs (5) so that the armature limit bar (4) can be removed.

6. Lift the armature assembly (8) free of the relay.

7. If the coil is to be removed, loosen the two screws and remove the coil leads (13).

8. At the back of the relay base, remove the screw that holds the coil in place.

9. Remove the coil core and retaining washer from the coil, and save for application with new coil.

10. If movable contacts (3) are to be replaced, remove the two screws holding the contact assembly to the armature. Carefully observe how the contact assembly is put together.

11. Unscrew the stationary contact posts from their studs.

WARNING

Methyl ethyl ketone is highly flammable.

Clean and inspect all parts before reassembly. Use methyl ethyl ketone to remove old cement from adjusting screws and nuts. Using new parts as needed, assemble as follows:

1. Install the stationary contact posts, using new posts if the old ones are pitted, burned, or worn. Do not tighten locking nuts until the stationary contacts are adjusted. See adjustments section following for settings.

2. Check resistance of coil. Reassembly coil core and retainer washer to coil and attach coil to base.

3. Assemble and apply the movable contacts to the armature, replacing any worn or burned contacts with new ones, and secure the assembly with the two screws removed during dismantling.

4. Place the armature assembly in position, engaging the knife edge of the frame.

5. Apply the armature limit bar and hold in place with the stud cover adapters.

6. Assemble the tension spring and adjust as described in section following.

ADJUSTMENTS

1. Back out armature stop screw (7, Fig. 5), and armature limit adjustment screw (6).

2. Adjust the height of the stationary posts for normally open N.O. contacts so the contacts make simultaneously with their mating movable contacts. The height of the posts should be such that the movement of the armature to bottom against the coil core results in overtravel greater than 1/64". Tighten locknuts finger tight.

3. If the relay contains two sets of normally open N.O. contacts, raise the height of one set of contacts to obtain the make point specified in the note under the Service Data table. Tighten locknuts finger tight.

4. If the relay contains a set of normally closed N.C. contacts, adjust the height of the stationary contact posts so the contacts make simultaneously with their mating movable contacts. The height of the posts should be such that the contacts will open at the point specified in the note under the Service Data table.

5. Adjust the armature stop screw (7) so that the gap between open pairs of normally closed N.C. contacts is within limits specified in the table. Verify that the overtravel of adjacent normally open N.O. contacts is greater than the minimum specified. Tighten stop screw locknut finger tight.

6. Position the armature adjusting screw (6) so that the overtravel of normally closed N.C. contacts is within limits specified. Verify that the gap of adjacent normally open N.O. contacts is greater than the specified minimum. Tighten locknut finger tight.

7. Adjust tension spring (10) by turning adjusting nut (9) to obtain proper pickup and dropout values, as listed in Service Data table.

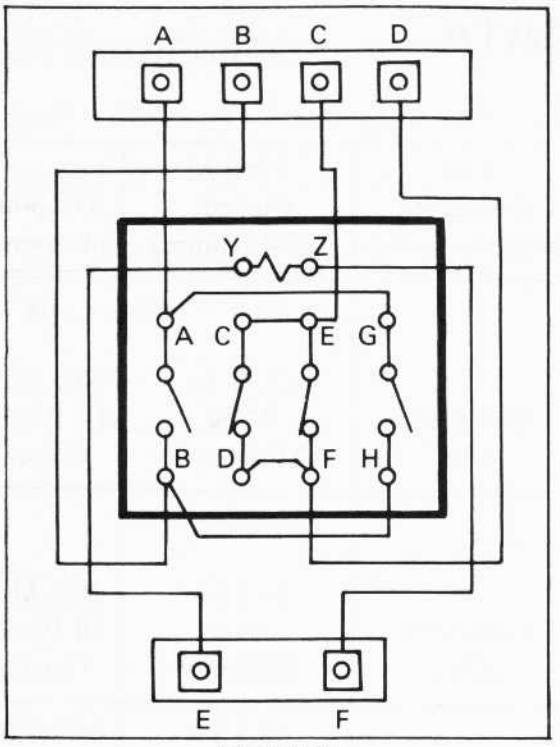
8. Check all air gap and overtravel dimensions. If correct, tighten all locknuts and seal with cement. (Duco household cement 110-CH-25).

NOTE

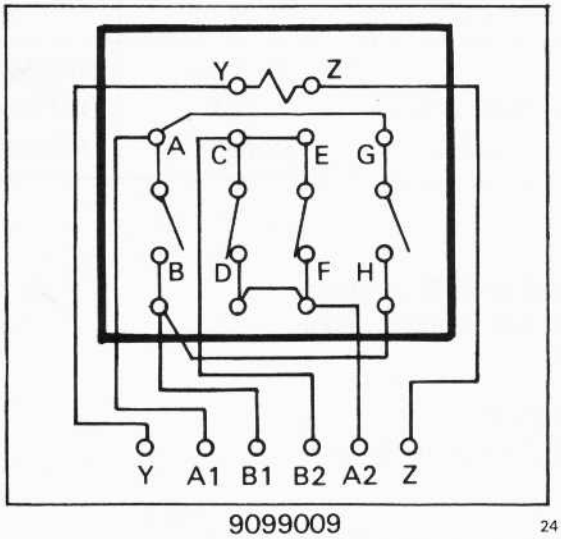
Duco cement may be removed with lacquer thinner, but methyl ethyl ketone is required to remove red insulating paint such as Glyptol.

NEW STYLE SLIP RELAYS (8454412, 9099009)

The two "New Style" relay assemblies each incorporate the same module-type relay with high pressure paralleled contacts, but differ in type of mounting brackets and external connections. Contact arrangements are shown in Fig. 6, and pickup values are listed in the Service Data table at the back of this instruction.



8454412



9099009 24185

Fig.6 – Contact Arrangements (New Style Relays)

MAINTENANCE

Due to the construction simplicity of these relays, employing a minimum of moving parts and transparent dust tight enclosure, they should provide satisfactory performance over a long service life. The modular design confines maintenance to an occasional inspection and test to qualify the units for continued service.

INSPECTION

At time of routine inspection, relay contacts should be checked visually for pitting or burning. In the event that badly burned or pitted contacts are apparent, relay module should be replaced. Do not attempt to disassemble relay to dress or file contacts.

NOTE

Relay contacts will turn black (tarnish) in time with normal operation. This will not impair operation or indicate need for replacement.

Inspect electrical connections for tightness and electrical contact. Check operating coil for burns or discoloration due to excessive heat. Test resistance of the coil, and pickup/dropout against values tabulated in the Service Data table. During testing, check all movable parts of relay for proper functioning.

RELAY MODULE REPLACEMENT

1. To remove relay module from mounting bracket, first mark or note location of all terminal leads, then unsolder leads using a 100 watt soldering iron.
2. Remove hex nuts from mounting lugs on back side of bracket and lift relay free.
3. To assemble new relay module to bracket, reverse procedure of disassembly. Make certain all contact tabs and wires are clean and correctly located before resoldering.

NOTE

Replace fish paper insulation strip between relay and bracket, if used.

4. Hook wires through eyelets in contact tabs and solder in place using resin core solder. Use no more solder than is necessary to make good electrical connections.

TEST PROCEDURE

In order to perform the recommended tests, test equipment listed in the Service Data section must be available.

1. If relay has been removed from mounting panel, secure assembly in a vertical position before beginning tests.
2. Measure coil resistance and compare with values listed in Service Data.
3. Test pickup and dropout of relay by slowly increasing and decreasing the current to the relay coil. The action of the relay should be positive and without hesitation on either stroke.
4. Connect test lamps across each set of contact terminals and cycle relay 25 to 50 times. Positive contact should be noted on each cycle or relay should be replaced.

SERVICE DATA

TABLE I

EMD Part No.	Interlock Gap		Interlock Overtravel		Coil Resistance @ 20° C (68° F)	Pickup Current (In Milliamps)	Dropout Current
	AB	CD	AB	CD			
8222035	1.14 mm (.045") Min.	0.38 mm (.015") To 0.76 mm (.030")	0.4 mm (1/64") Min.	0.13 mm (.005") To 0.38 mm (.015")	1060 Ohms ±10%	12.72 To 13.69 Milliamps	60% Min. Of Pickup Current
8284597	1.14 mm (.045") Min.	0.38 mm (.015") To 0.76 mm (.030")	0.4 mm (1/64") Min.	0.13 mm (.005") To 0.38 mm (.015")	1060 Ohms ±10%	18.3 To 19.7 Milliamps	60% Min. Of Pickup Current
8454412	—	—	—	—	1050 Ohms ±10%	18.3 To 19.5 Milliamps	60% Min. Of Pickup Current
9099009	—	—	—	—	1050 Ohms ±10%	18.3 To 19.5 Milliamps	60% Min. Of Pickup Current

NOTE

1. Relays 8222035 and 8284597 C-D contacts must be open .005" before A-B contacts make. There must be no overlap.

2. Relays 8454412 and 9099009 normally closed N.C. contacts must open before normally open N.O. contacts close.

3. All relays have a 74 Volt DC working voltage.

Hi-Pot Test (Relays 8222035 and 8284597) - 1 Minute Duration

Coil To Contacts	2400 V RMS - 60 Hz.
Coil to Frame	2400 V RMS - 60 Hz.
Contacts To Contacts	600 V RMS - 60 Hz.
Contacts To Frame	600 V RMS - 60 Hz.

Hi-Pot Test (Relays 8454412 and 9099009) - 1 Minute Duration

Coil To Contacts	2800 V RMS - 60 Hz.
Coil To Frame	2800 V RMS - 60 Hz.
Contacts To Contacts	1200 V RMS - 60 Hz.
Contacts To Frame	1200 V RMS - 60 Hz.

TEST EQUIPMENT

1. Hi-Pot Tester — Variable DC Voltage Supply (3200 V RMS)
2. Ohmmeter — W/Accuracy Of 0.2%
3. DC Ammeter — 0.0 To 0.0299 Amperes, W/0.0002 graduations and accuracy of 0.5%
4. Test Lamps Or Light Box

• • • • **A Service Department Publication** • • • •

Electro-Motive Division Of General Motors La Grange, Illinois 60525

Litho In U.S.A.