



MAINTENANCE INSTRUCTION

MOTOR OPERATED TRANSFER SWITCH MOTOR MODULE

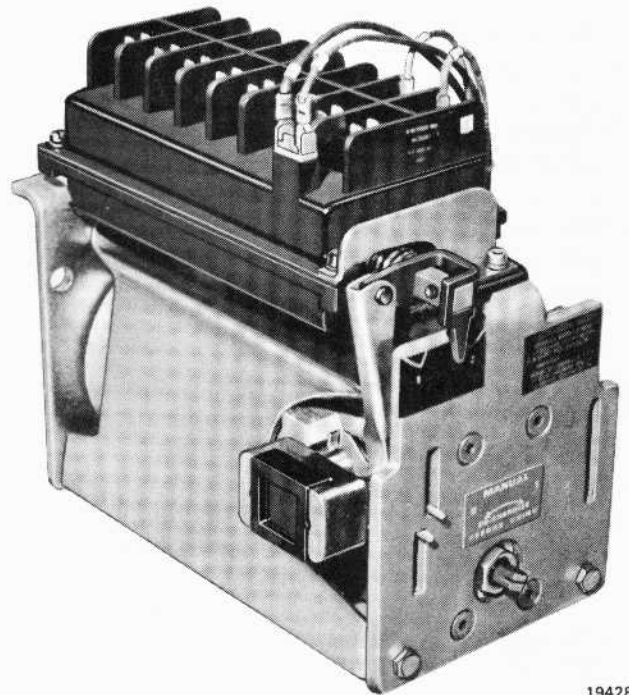
INTRODUCTION

This publication provides maintenance data for the motor module portion of the transfer switch assembly. Refer to Maintenance Instruction M.I. 5421-1 for data on the switch modules.

The motor operated transfer switch assembly is made up of from two to six power switches mounted on a common support of length to suit the total number of switches used. The switches are driven by a single motor through a segmented shaft, and a positive feed to the motor is required to move the switch contacts. When the motor operates to drive the switches, all poles operate together, and once the switches are positioned, they will not drop out.

DESCRIPTION

The motor module, Fig. 1, contains a reversible 74 V DC motor that drives a horizontal output shaft through gear reductions. Rotation of the output shaft is limited in both directions by mechanical stops. Interlock contacts de-energize the motor before travel reaches the mechanical stops. A clutch in the gear housing limits torque on the gears if the motor drives the output shaft to its mechanical travel stops. A slotted square shaft protruding from the front of the motor module permits manual rotation of the output shaft to the neutral position to facilitate removal or insertion of the motor module or any one of the switch modules from the composite assembly.



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Fig.1 - Motor Module 8453176

The motor module limit switches and a group of auxiliary interlocks are enclosed in a dust-tight housing above the motor. The interlock camshaft is link operated from the output shaft, and its operating position is shown by an indicator on the front of the motor module. Two lips on the back mounting plate help support and position the motor module while it is secured with two mounting screws accessible from the front.

*This bulletin is revised and supersedes previous issues of M.I. 5421 and M.I. 5421-2. It is to be used in conjunction with M.I. 5421-1.

This Maintenance Instruction applies to the following motor modules:

Description	Usage	Part No.
55°	Off-Highway Vehicle	8449939
55°	Locomotive	8422928
220°	Locomotive	8453176

These instructions apply to all the motor modules unless specifically identified.

SAFETY PRECAUTIONS

WARNING

The motor module was designed for specific application to drive switch modules of a motor operated switch where circuits and devices are enclosed in suitably protective cabinets. Care has been taken in the design of the equipment to provide adequately for the safety of operating and service personnel, provided reasonable care and caution are exercised in the performance of operating and service functions.

The following safety considerations should always be carefully observed in the application, operation, or servicing of the equipment.

1. ELECTRICAL RATINGS of the equipment are values that should be considered to be **EXTREMELY DANGEROUS** to personnel.
2. EQUIPMENT SHOULD ALWAYS BE COMPLETELY DE-ENERGIZED BEFORE HANDLING OR PERFORMING ANY SERVICE OPERATIONS. Moving the switch contacts to the neutral position is not sufficient to render the equipment safe; the power lines must be disconnected or otherwise de-energized. If power lines are not de-energized, all parts of the device should be considered to be at maximum system voltage.
3. IF INSPECTION OF ENERGIZED EQUIPMENT IS NECESSARY, DO NOT TOUCH OR HANDLE ANY PARTS, OR INSPECT AT CLOSE RANGE. The discharge of hot gases and particles is always possible when the device is operated in an energized circuit.
4. Operating temperatures for the switch are high. Some parts of these devices may reach temperatures in excess of 93° C (200° F).

SERIOUS BURNS CAN RESULT FROM HANDLING THE EQUIPMENT AFTER IT HAS BEEN IN SERVICE AND BEFORE IT HAS BEEN ALLOWED TO COOL.

MOTOR MODULE DISASSEMBLY

Motor module maintenance parts have been grouped into four kits for motor module 8453176 and five kits for motor modules 8422928 and 8449939. Refer to Service Data at end of this Maintenance Instruction for kit contents and part numbers.

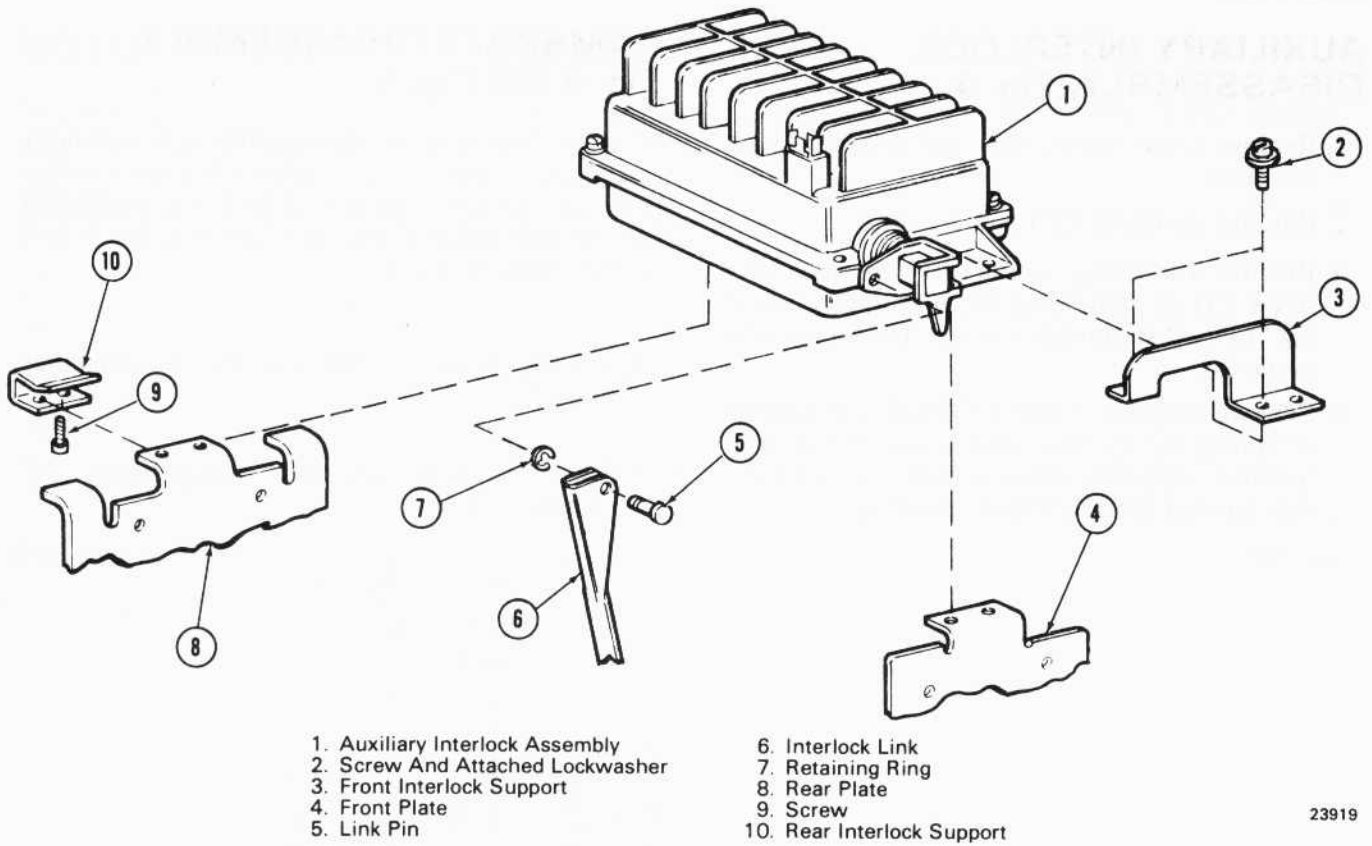
Only skilled personnel familiar with electrical equipment and the hazards involved should be permitted to service the motor module. All safety precautions must be observed.

MOTOR MODULE 8453176, REMOVAL OF AUXILIARY INTERLOCK ASSEMBLY, Fig. 2

1. Disconnect all wires from auxiliary interlock (1) terminals.
2. Remove retaining ring (7) and link pin (5) from interlock link (6).
3. Remove three screws and lockwashers (2) to remove front interlock support (3).
4. Separate interlock from gear motor assembly by loosening two screws (9) and lifting front end of interlock to slide forward out of rear interlock support (10).

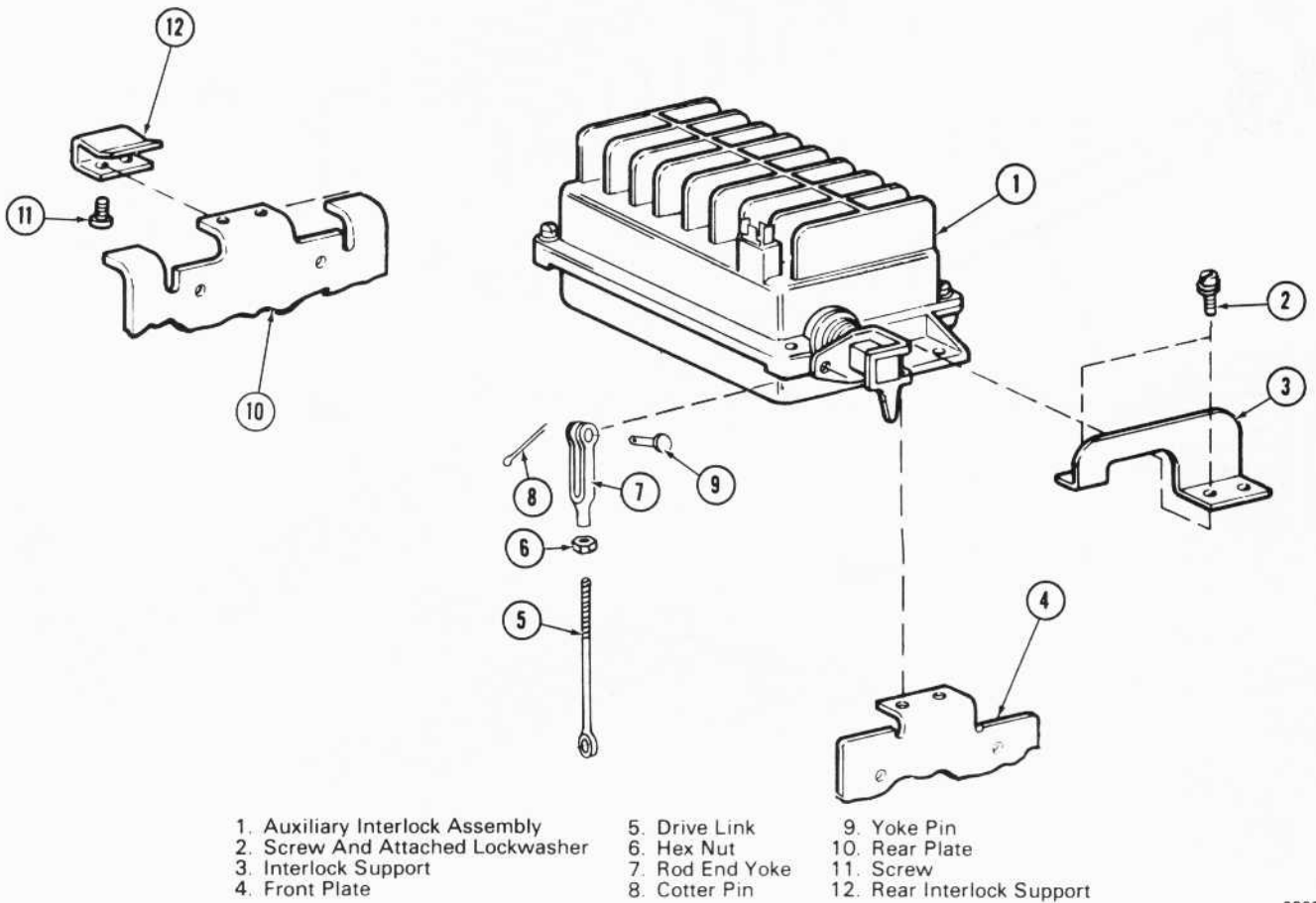
MOTOR MODULES 8422928 AND 8449939, REMOVAL OF AUXILIARY INTERLOCK ASSEMBLY, Fig. 3

1. Disconnect all wires from auxiliary interlock (1) terminals.
2. Remove cotter pin (8) and yoke pin (9) from rod end yoke (7).
3. Remove three screws and lockwashers (2) to remove front interlock support (3).
4. Separate auxiliary interlock from gear motor assembly by loosening two screws (11) and lifting front end of auxiliary interlock to slide forward out of rear interlock support (12).



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Fig.2 - Motor Module 8453176 Auxiliary Interlock Assembly



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Fig.3 - Motor Modules 8422928 And 8449939 Auxiliary Interlock Assembly

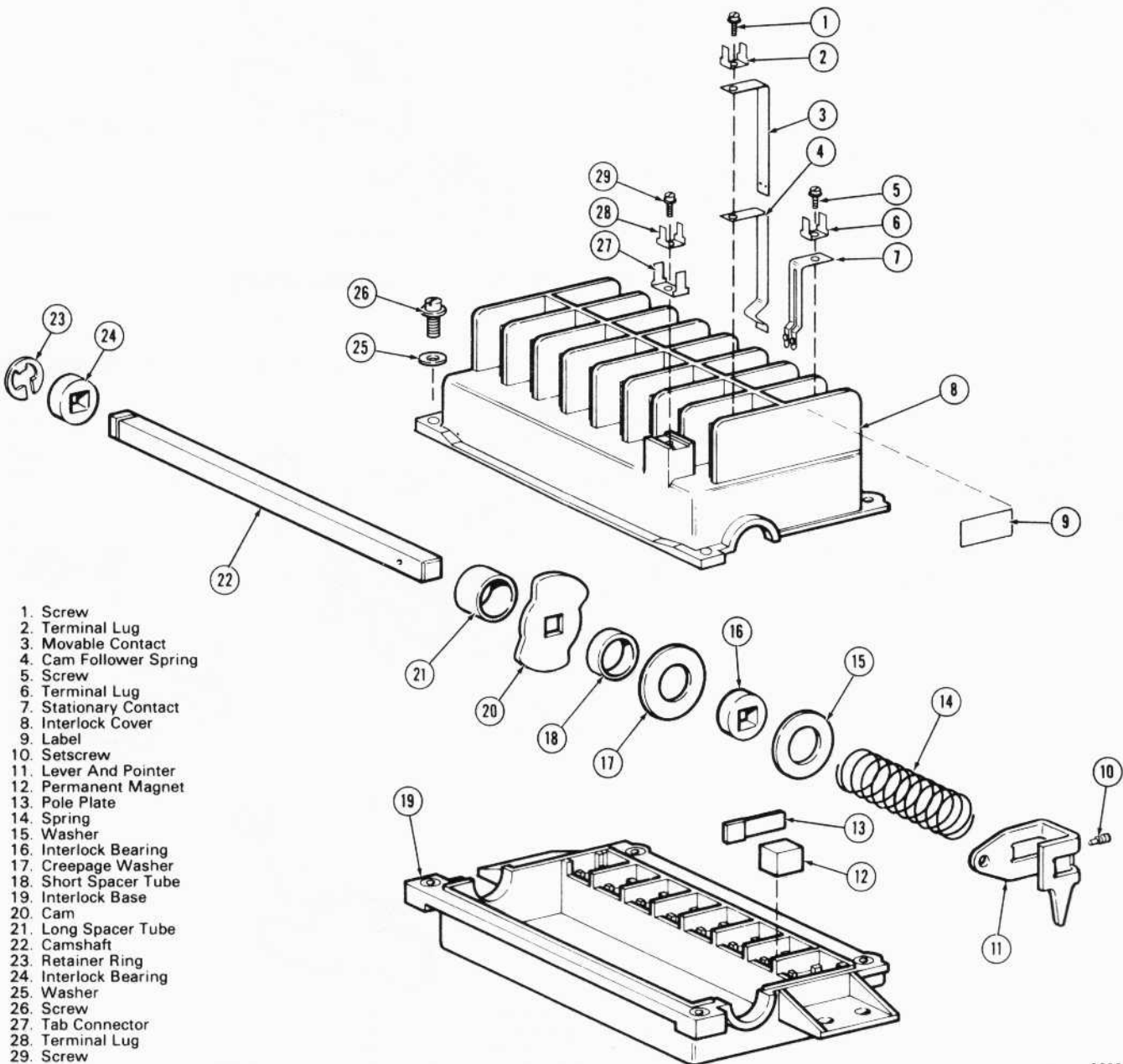
AUXILIARY INTERLOCK DISASSEMBLY, Fig. 4

1. Remove three screws (26) and open interlock assembly.
2. Remove camshaft (22) and assembly.
3. Remove stationary contact (7) by removing screw (5) at that terminal, releasing terminal lug (6) and stationary contact from interlock cover (8).
4. Remove movable contact (3) and cam follower spring (4) by removing screw (1) at that terminal, releasing terminal lug (2) and movable contact from interlock cover (8).

CAMSHAFT DISASSEMBLY, Fig. 4 OR Fig. 5

If it is required to disassemble the camshaft assembly, observe the number stamped on the lever and pointer assembly (11). If the number is 506 or 507, refer to Fig. 4. If the number is 508 or 509, refer to Fig. 5.

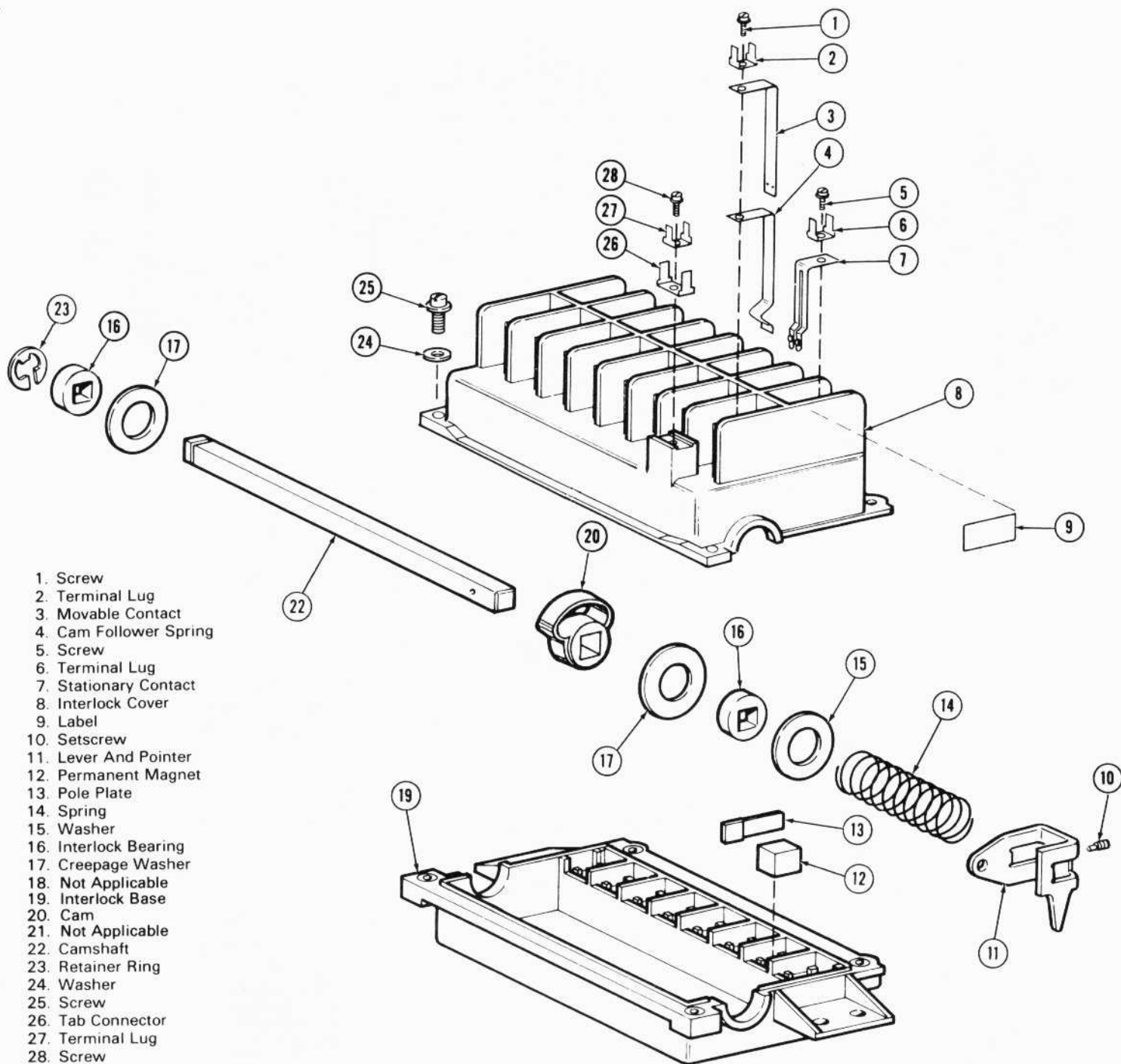
1. Release setscrew (10) and remove retaining ring (23).
2. Slide camshaft assembly components off camshaft (22).



1. Screw
2. Terminal Lug
3. Movable Contact
4. Cam Follower Spring
5. Screw
6. Terminal Lug
7. Stationary Contact
8. Interlock Cover
9. Label
10. Setscrew
11. Lever And Pointer
12. Permanent Magnet
13. Pole Plate
14. Spring
15. Washer
16. Interlock Bearing
17. Creepage Washer
18. Short Spacer Tube
19. Interlock Base
20. Cam
21. Long Spacer Tube
22. Camshaft
23. Retainer Ring
24. Interlock Bearing
25. Washer
26. Screw
27. Tab Connector
28. Terminal Lug
29. Screw

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Fig.4 - Auxiliary Interlock Assembly (Camshaft Assembly 506 Or 507), Exploded View



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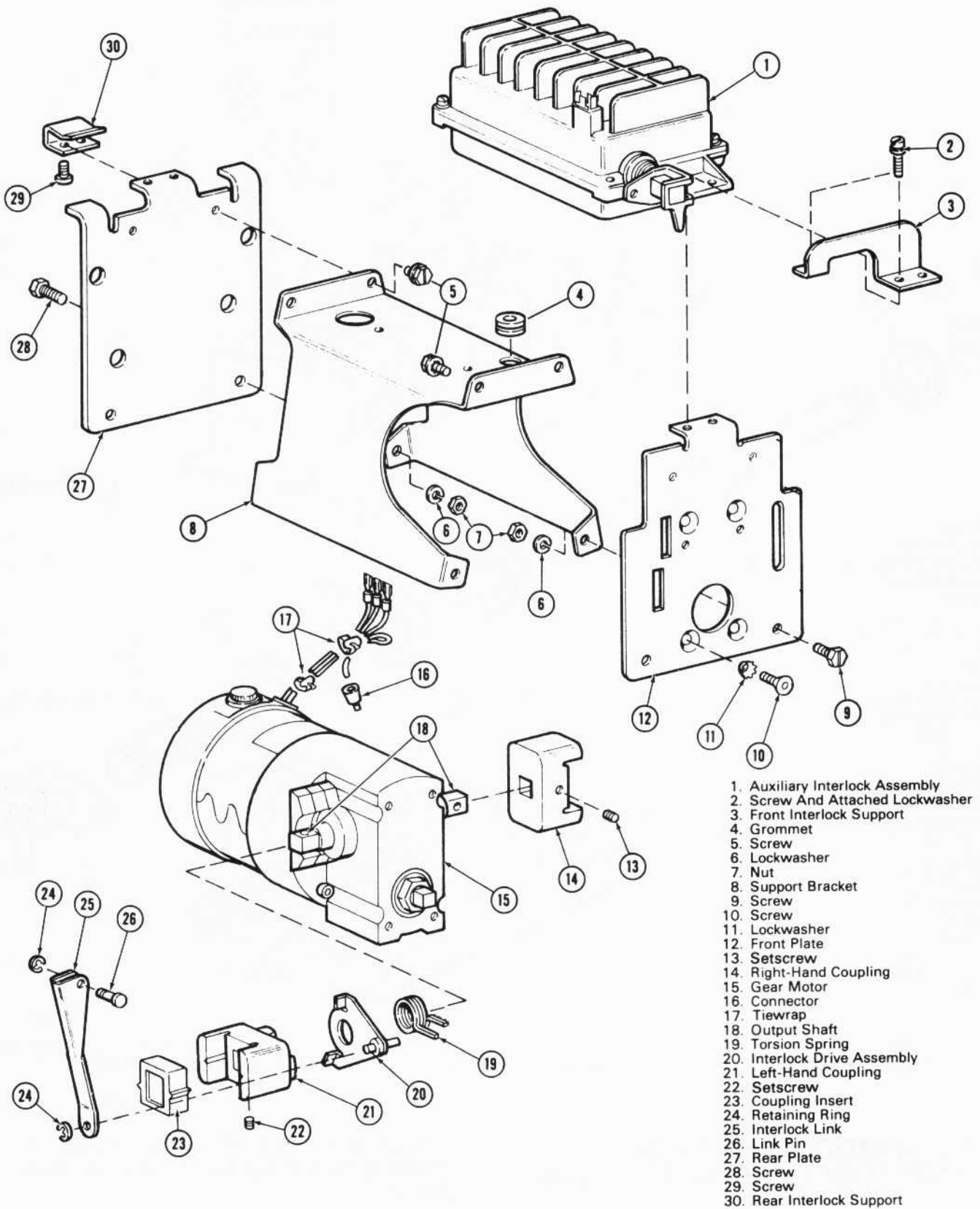
Fig.5 - Auxiliary Interlock Assembly (Camshaft Assembly 508 Or 509), Exploded View

MOTOR MODULE 8453176, REMOVAL OF GEAR MOTOR, Fig. 6

NOTE

The auxiliary interlock assembly must be removed before attempting to remove the gear motor.

1. Remove two screws (5) and two screws (9) separating support bracket (8) from the front plate (12).
2. Carefully remove the four motor leads from hole in grommet (4) one at a time.
3. Remove front plate (12) by removing four screws (10).



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Fig.6 - Motor Module 8453176, Partial Exploded View

4. Remove interlock link (25) by removing retaining ring (24).
5. Remove left-hand coupling (21) by releasing setscrew (22). Remove interlock drive (20) and torsion spring (19).
6. Remove right-hand coupling (14) by releasing setscrew (13).

MOTOR MODULES 8422928 AND 8449939, REMOVAL OF GEAR MOTOR, Fig. 7

NOTE

The auxiliary interlock assembly must be removed before attempting to remove gear motor.

1. Remove yellow motor lead (marked "U") from resistor (4).
2. Remove two screws (6) and two screws (11) separating support bracket (10) from the front plate (14).
3. Carefully remove the four motor leads from hole in grommet (7) one at a time.
4. Remove front plate (14) by removing four screws (12).
5. Remove drive link (25) by removing nut (21) and shoulder screw (24).
6. Remove left-hand coupling (23) by releasing setscrew (22).
7. Remove right-hand coupling (17) by releasing setscrew (15).
4. Remove spirol pins (6) from output shaft (21) with a drift punch inserted through the plug holes in the gear housing (12).
5. Press the output shaft (21) out of gear housing (12), releasing worm gear (5) and spacer washers (2, 3, 4).
6. Remove hex nut (15) and press worm shaft (33) out of gear housing (12).
7. Remove manual shaft ball bearing (16), sleeve bearings (1, 9), and worm and output shaft oil seals (8, 17, 20) from gear housing (12).
8. Remove grease from gear housing (12) and all parts that will be reused. Clean parts with a solvent.
9. Remove brush holder caps (32) and brush and spring assemblies (31) from end bell and brush holder assembly (30).
10. Remove screws (27), end bell (22) from gear end, and armature assembly (26) from the motor assembly.
11. Loosen end bell and brush holder assembly (30) from motor field assembly (23). Disconnect leads from brush holders, pull leads through grommet in the end bell. Remove end bell and brush holder assembly (30).
12. Remove commutator end and gear end ball bearings (28, 25), armature end play takeup spring (29), and motor shaft oil seal (24).

GEARMASTER GEAR MOTOR (Siemens-Allis No. 14-327-293-003) DISASSEMBLY, Fig. 8

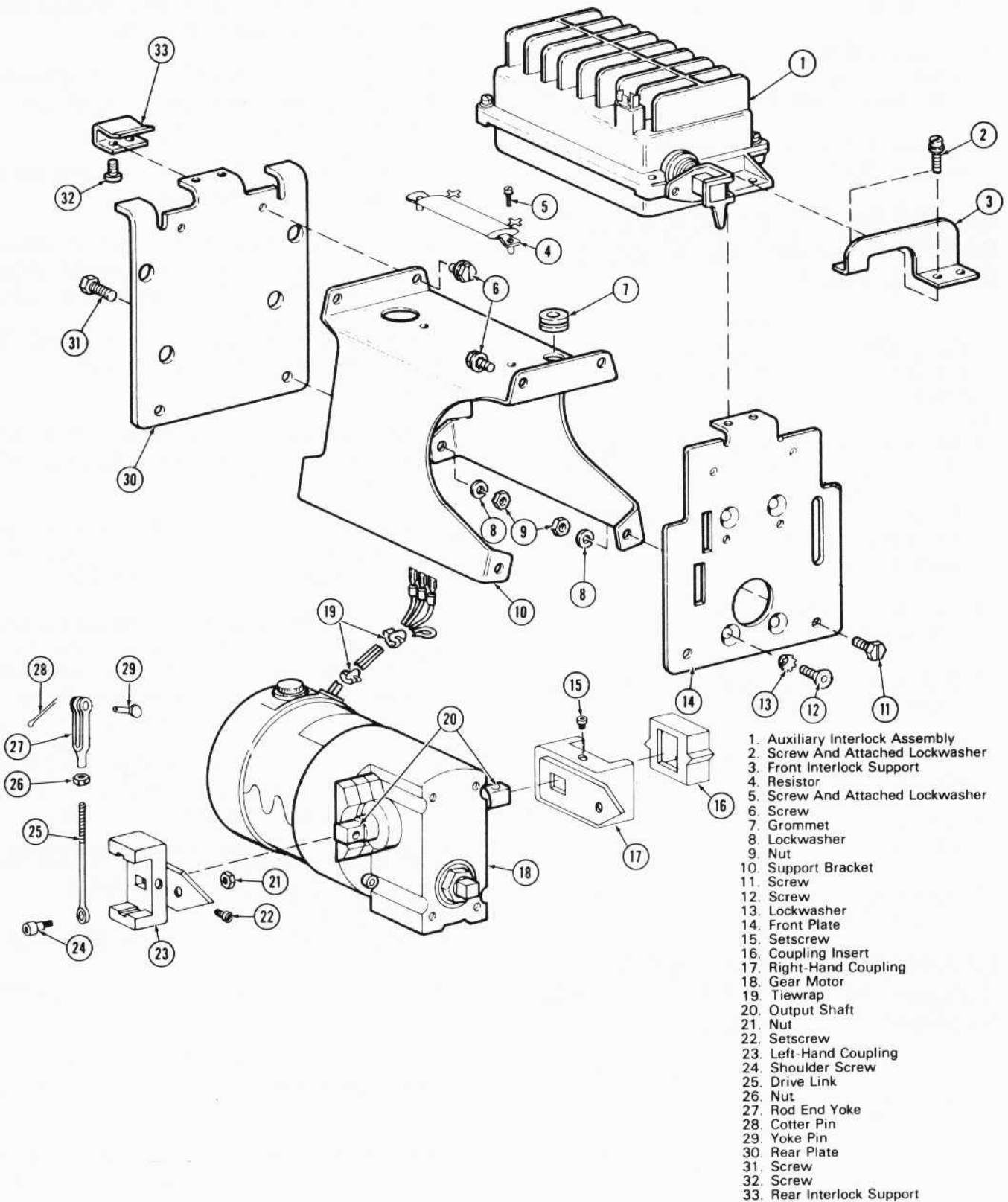
1. Remove screw (14) and screw (18). Separate gear housing (12) from end bell (22). Remove vent plug (10) and pipe plug (11).
2. Remove screw (41), roller bearing race (39), roller bearing (40), rear clutch plate (38), clutch gear (37), front clutch plate (36), square key (34), and four Belleville washers (35) from worm shaft (33).
3. Remove locking wires (7) from spirol pins (6).

SIEMENS GEAR MOTOR, 8453176 AND 8449939 (Siemens-Allis No. 14-327-293-005) DISASSEMBLY, Fig. 9 OR Fig. 10

1. Mark a line across junction of gear housing (22) and motor housing (51).
2. Remove brush holder caps (55) and brush spring assemblies (53) from motor housing (51).
3. Remove two screws (50) and separate gear housing (22) from motor housing (51). Remove vent plug (23).

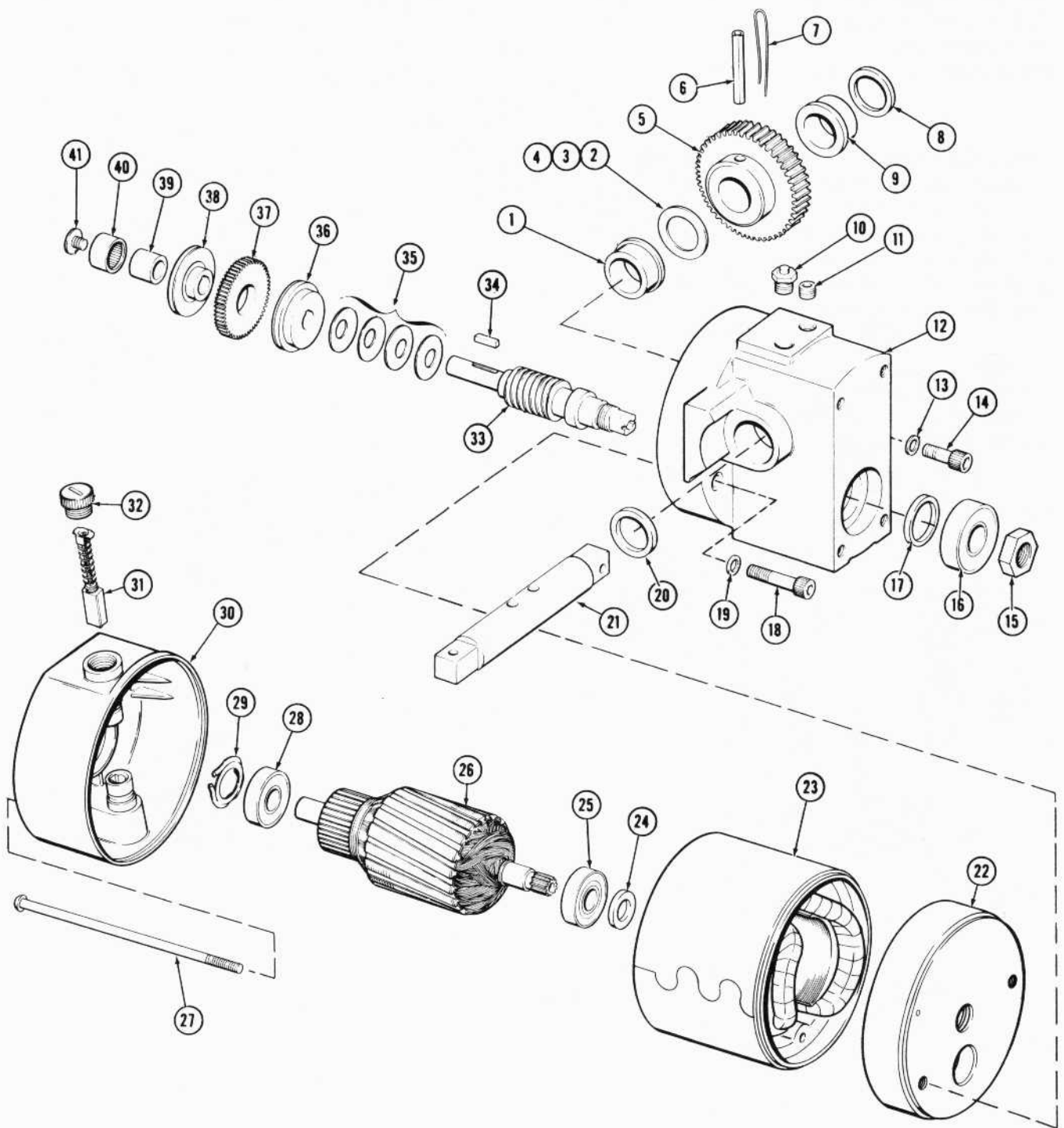
NOTE

Depending upon the model of gear motor, the gear housing end bell (38) is secured to the gear housing (22) with either two screws (39) or four screws (39).



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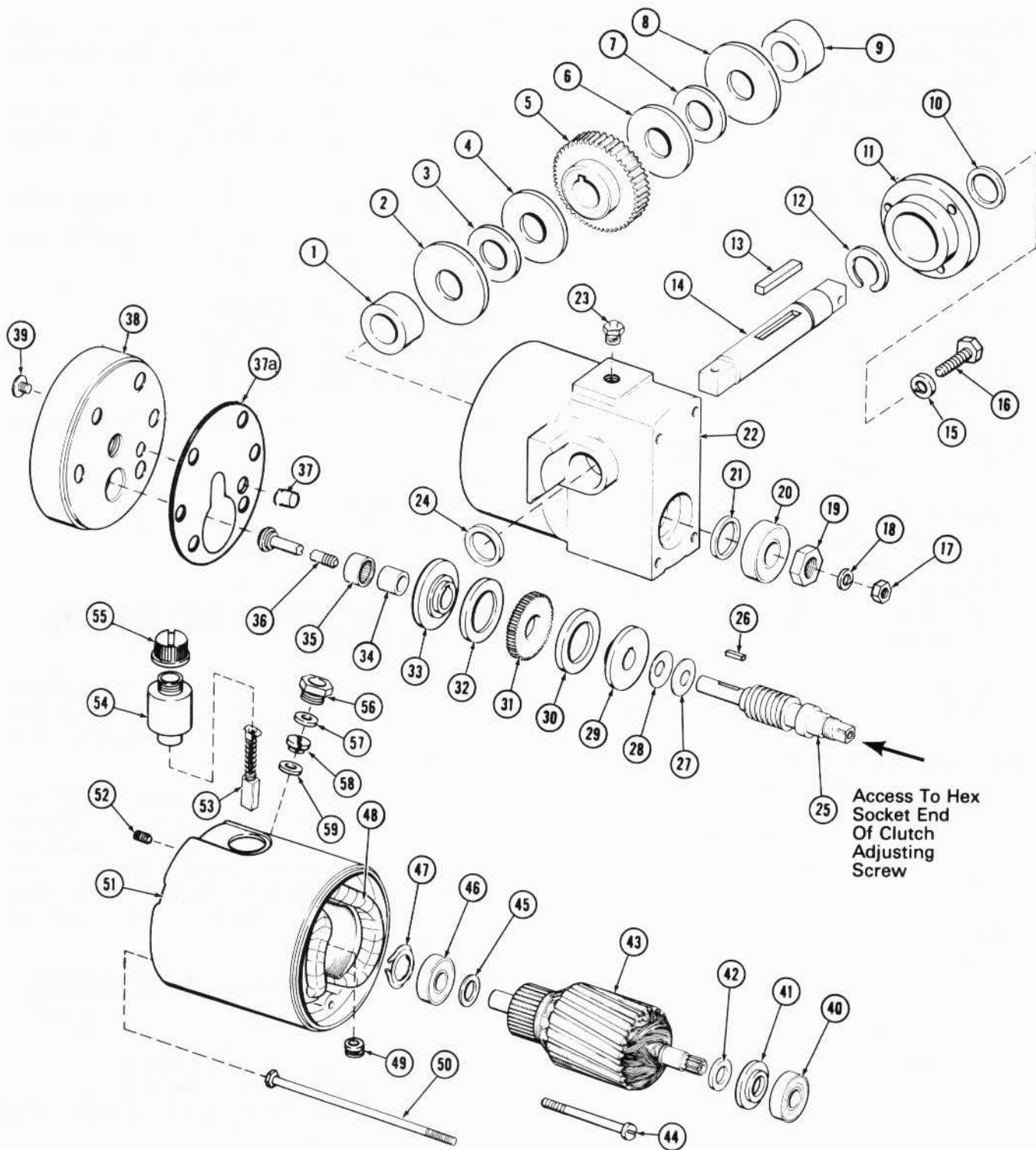
Fig.7 - Motor Modules 8422928 And 8449939, Partial Exploded View



- | | | | |
|----------------------------------|------------------|--------------------------------------|----------------------------|
| 1. Sleeve Bearing | 12. Gear Housing | 22. End Bell | 32. Brush Holder Cap |
| 2. 0.13 mm (.005") Spacer Washer | 13. Washer | 23. Motor Field Assembly | 33. Worm Shaft |
| 3. 0.25 mm (.010") Spacer Washer | 14. Screw | 24. Oil Seal | 34. Square Key |
| 4. 0.64 mm (.025") Spacer Washer | 15. Hex Nut | 25. Ball Bearing | 35. Belleville Washer |
| 5. Worm Gear | 16. Ball Bearing | 26. Armature Assembly | 36. Front Clutch Plate |
| 6. Spirol Pin | 17. Oil Seal | 27. Screw | 37. Clutch Gear |
| 7. Locking Wire | 18. Screw | 28. Ball Bearing | 38. Rear Clutch Plate |
| 8. Oil Seal | 19. Washer | 29. Armature End Play Takeup Spring | 39. Roller Bearing Race |
| 9. Sleeve Bearing | 20. Oil Seal | 30. End Bell & Brush Holder Assembly | 40. Roller Bearing |
| 10. Vent Plug | 21. Output Shaft | 31. Brush & Spring Assembly | 41. Clutch Adjusting Screw |
| 11. Pipe Plug | | | |

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Fig.8 - Gearmaster Gear Motor, Exploded View



- | | | | |
|--------------------|-----------------------|----------------------------|-------------------------------------|
| 1. Roller Bearing | 17. Nut | 32. Friction Washer | 46. Ball Bearing |
| 2. Thrust Washer | 18. Lockwasher | 33. Clutch Plate | 47. Armature End Play Takeup Spring |
| 3. Thrust Washer | 19. Nut | 34. Roller Bearing Race | 48. Field Assembly |
| 4. Thrust Washer | 20. Ball Bearing | 35. Roller Bearing | 49. Wire Grommet |
| 5. Worm Gear | 21. Oil Seal | 36. Clutch Adjusting Screw | 50. Screw |
| 6. Thrust Washer | 22. Gear Housing | 37. Locating Pin | 51. Motor Housing |
| 7. Thrust Washer | 23. Vent Plug | 37a. Gasket | 52. Setscrew |
| 8. Thrust Washer | 24. Oil Seal | 38. End Bell | 53. Brush And Spring Assembly |
| 9. Roller Bearing | 25. Worm Shaft | 39. Screw | 54. Brush Holder |
| 10. Oil Seal | 26. Square Key | 40. Ball Bearing | 55. Brush Holder Cap |
| 11. Bearing Cover | 27. Belleville Washer | 41. Washer | 56. Bushing |
| 12. Retaining Ring | 28. Belleville Washer | 42. Washer | 57. Washer |
| 13. Key | 29. Clutch Plate | 43. Armature Assembly | 58. Wire Holder |
| 14. Output Shaft | 30. Friction Washer | 44. Screw | 59. Washer |
| 15. Lockwasher | 31. Clutch Gear | 45. Washer | |
| 16. Screw | | | |

Fig.10 - Current Model Siemens Gear Motor, Exploded View

4. Remove screws (39, Figs. 9 or 10) and remove gear housing end bell (38). If there are four screws (39) in gear housing end bell (38), visually inspect end bell (38) to determine if a gasket is cemented to the gear housing (22) side. If there is a gasket, remove gasket and any spacing washers around the screw holes. Discard the gasket and any spacing washers. Clean cement from gear housing end bell by washing with a solvent.

NOTE

Before reassembling a motor which previously had a cemented gasket and spacing washers between the end bell and the gear housing, a new gasket from oil seal kit 9511397 must be procured.

5. Remove washers (41, 42) and ball bearing (40) from end bell (38).
6. Remove nut (17), screw (36), roller bearing race (34), clutch plates (29, 33), gear (31), friction washers (30, 32), key (26), and ten Belleville washers (27, 28) from worm shaft (25). Roller bearing (35) should remain pressed into end bell (38).
7. Remove screws (16), bearing cover (11), one roller bearing (9), and one oil seal (10).
8. Push output shaft (14) out through bearing cover (11) side of gear housing (22).
9. Remove three thrust washers (8, 7, 6), retaining ring (12), and key (13) from output shaft (14).
10. Remove worm gear (5), remaining thrust washers (4, 3, 2), roller bearing (1), and oil seal (24) from gear housing (22).
11. Remove nut (19) and press worm shaft (25) out of gear housing (22).
12. Remove ball bearing (20) and oil seal (21) from gear housing (22).
13. Remove grease from gear housing (22) and all parts that will be reused. Clean parts with a solvent.
14. Remove armature assembly (43) from motor housing (51).
15. Remove bushing (56), washers (57), and wire holder (58) from motor housing (51).
16. Remove brush and spring assemblies (53) from brush holders (54). Remove grommet (49) from motor housing (51).
17. Mark a line across junction of motor field assembly (48) and motor housing (51) for alignment when reassembling.
18. Remove screws (44) and motor field assembly (48), pulling leads through hole in motor housing.
19. Remove screws (52) and brush holders (54).
20. Remove washers (45), ball bearing (46), and armature end play takeup spring (47).

ASSEMBLY AND ADJUSTMENT OF MOTOR MODULE

The motor module is made up of the following subassemblies:

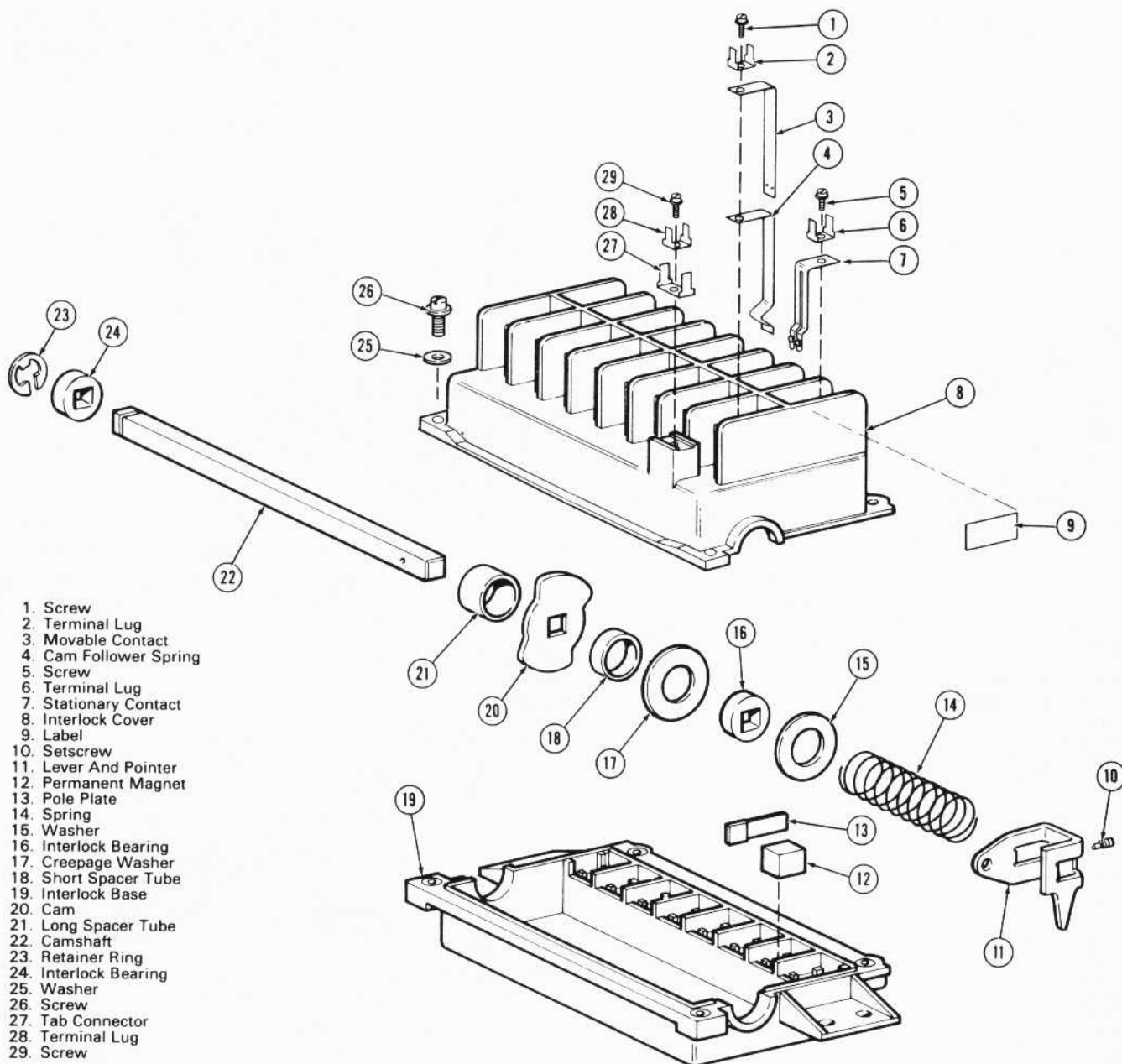
- Base Assembly
- Cover Assembly
- Camshaft Assembly
- Auxiliary Interlock Assembly
- Gear Motor Assembly

INTERLOCK BASE ASSEMBLY, Fig. 11 OR Fig. 12

1. Observe the number stamped on the lever and pointer assembly (11). If the number is 506 or 507, refer to Fig. 11. If the number is 508 or 509, refer to Fig. 12.
2. Cement the two permanent magnets (12) and the four pole plates (13) into two pockets in base (19), below the V and W terminals on cover, with RTV adhesive. Ensure both arrows on magnets are pointed in the same direction, away from adjacent mounting ear of molding.

INTERLOCK COVER ASSEMBLY, Fig. 11 OR Fig. 12

1. Observe the number stamped on the lever and pointer assembly (11). If the number is 506 or 507, refer to Fig. 11. If the number is 508 or 509, refer to Fig. 12.
2. Pass the contact end of stationary contact (7) through its locating slot (any of R to V locations). Place terminal lug (6) over mounting hole in stationary contact and secure with screw (5).
3. Pass the mounting hole end of a cam follower spring (4) and a movable contact finger (3) through the slot of the opposing terminal (Q to Y). Place terminal lug (2) over mounting holes in cam follower spring (4) and movable contact finger (3) and secure with screw (29).



1. Screw
2. Terminal Lug
3. Movable Contact
4. Cam Follower Spring
5. Screw
6. Terminal Lug
7. Stationary Contact
8. Interlock Cover
9. Label
10. Setscrew
11. Lever And Pointer
12. Permanent Magnet
13. Pole Plate
14. Spring
15. Washer
16. Interlock Bearing
17. Creepage Washer
18. Short Spacer Tube
19. Interlock Base
20. Cam
21. Long Spacer Tube
22. Camshaft
23. Retainer Ring
24. Interlock Bearing
25. Washer
26. Screw
27. Tab Connector
28. Terminal Lug
29. Screw

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Fig.11 – Auxiliary Interlock Assembly, Exploded View (Camshaft Assembly 506 Or 507)

4. Place tab connector (27) into slot on Z terminal. Place terminal lug (28) crosswise on tab connector (27) and secure with screw (29).

NOTE

Contacts are adjusted after interlock assembly is completed.

CAMSHAFT ASSEMBLY, Figs. 13, 14, 15, OR 16

To rebuild the camshaft assembly, observe the number stamped on the lever and pointer assembly. Refer to one of the following Figures for

proper sequence of parts and orientation of the cams.

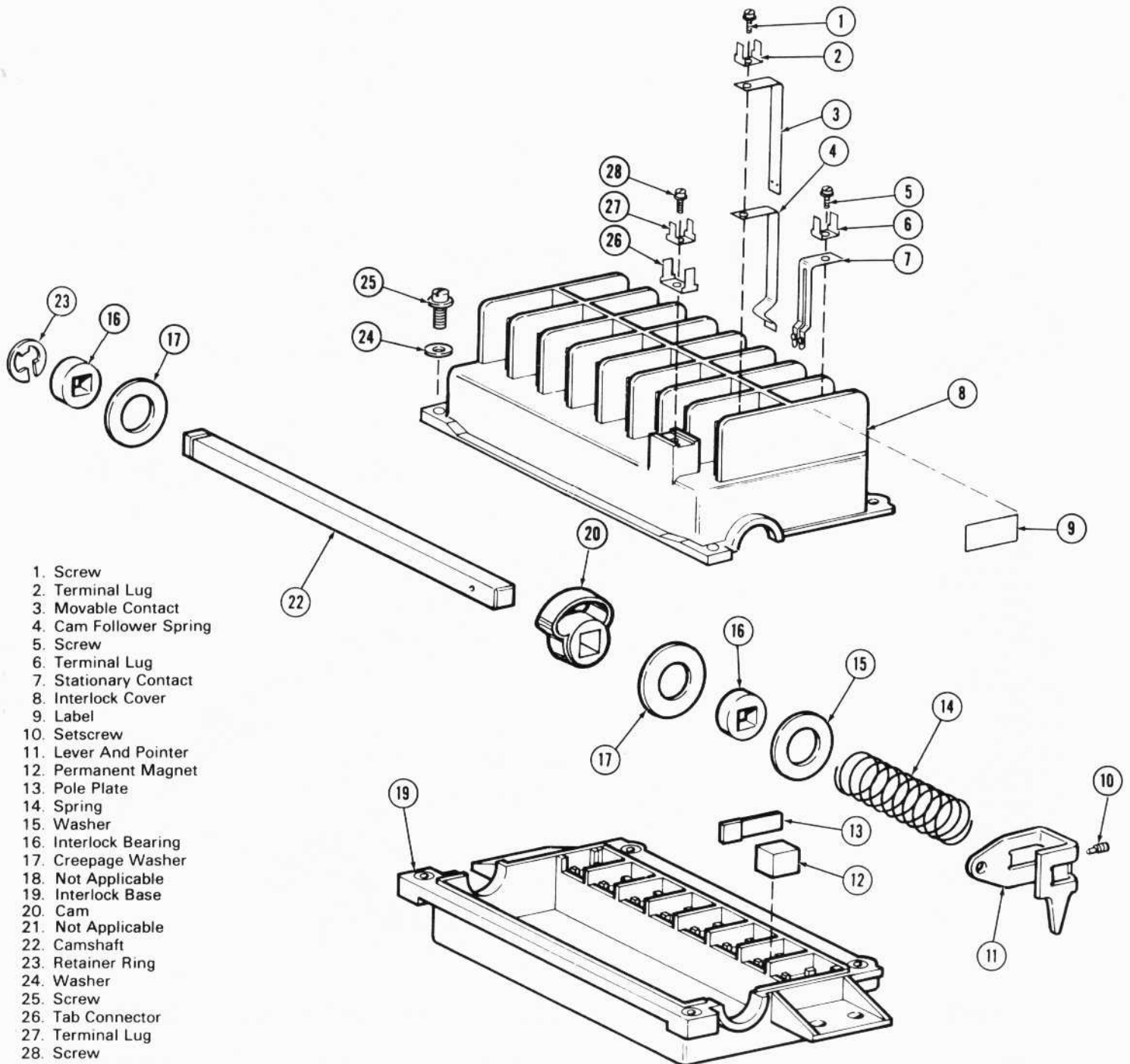
If the number is 506, refer to Fig. 13.

If the number is 507, refer to Fig. 14.

If the number is 508, refer to Fig. 15.

If the number is 509, refer to Fig. 16.

Complete replacement parts are no longer available for the 506 and 507 camshaft assemblies. If necessary, the complete camshaft assembly may be replaced with the current model camshaft



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Fig.12 - Auxiliary Interlock Assembly, Exploded View (Camshaft Assembly 508 or 509)

assembly. Replace 506 camshaft assembly with Siemens-Allis Part Number 14-190-858-508 camshaft assembly. Replace 507 camshaft assembly with Siemens-Allis Part Number 14-190-858-509 camshaft assembly.

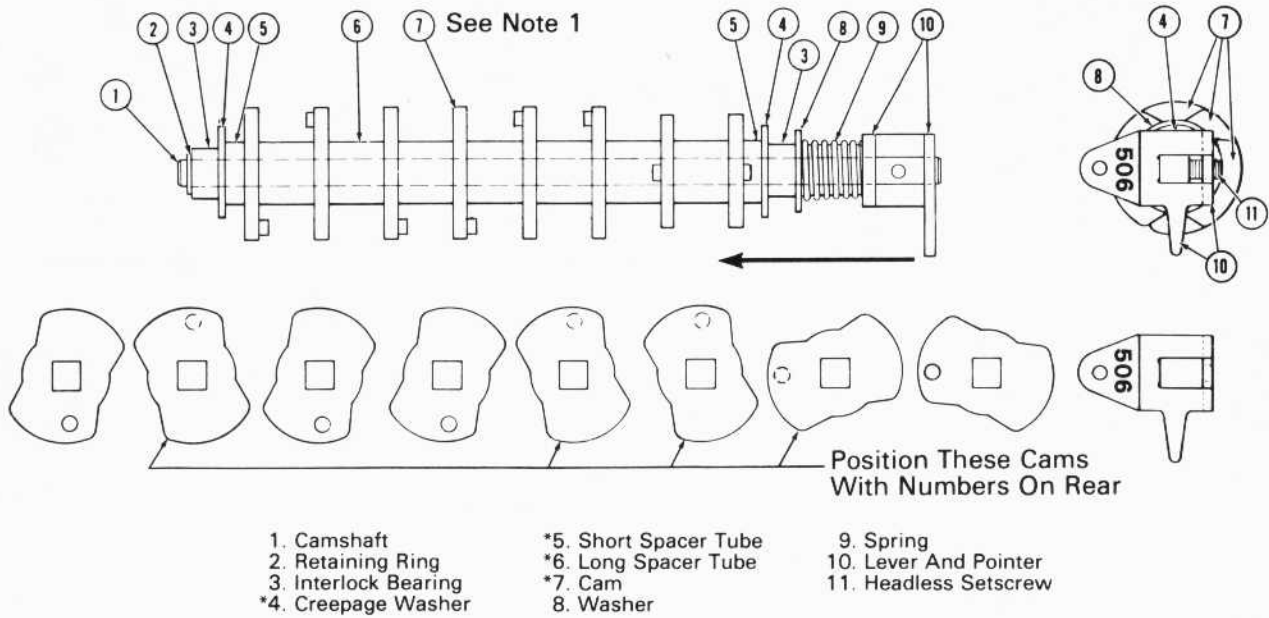
NOTE

Camshaft assembly 506 is used on previous model 55° motor module auxiliary interlock assembly.

Camshaft assembly 507 is used on previous model 220° motor module auxiliary interlock assembly.

Camshaft assembly 508 is used on current model 55° motor module auxiliary interlock assembly.

Camshaft assembly 509 is used on current model 220° motor module auxiliary interlock assembly.



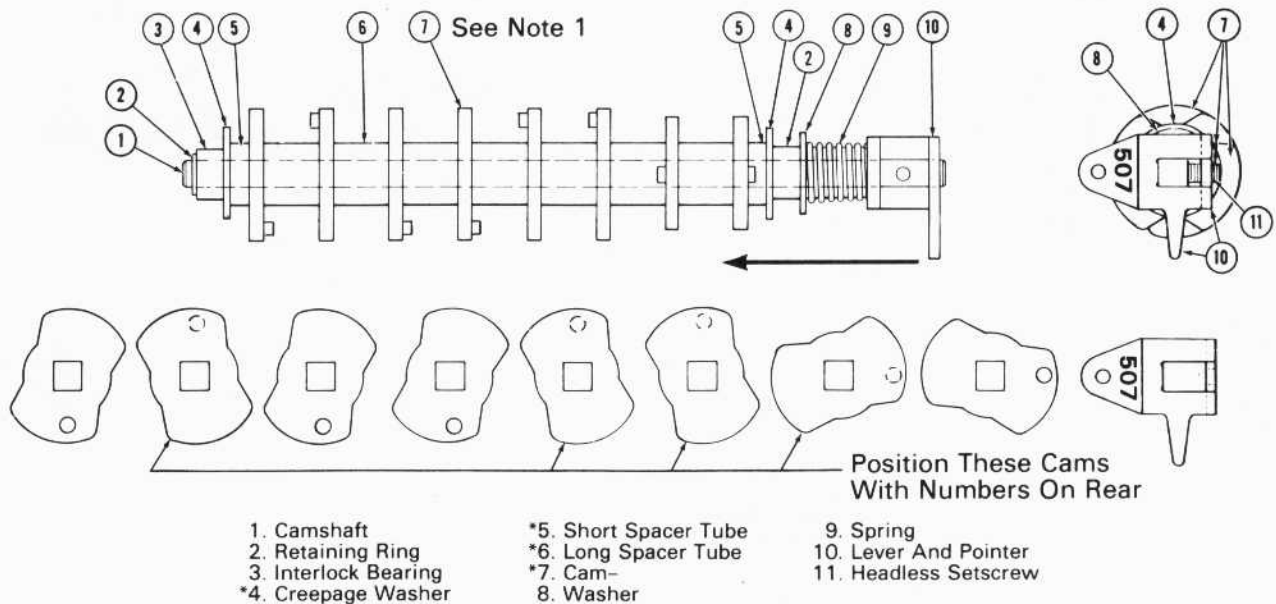
*These items no longer available. If necessary, complete camshaft assembly may be replaced with Siemens-Allis Part Number 14-190-858-508 camshaft assembly.

NOTES

1. When assembling cams, use identifying buttons to position as shown.
2. Cams are shown as viewed in direction of arrow.

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Fig.13 - Previous Model 55° Motor Module Camshaft Assembly



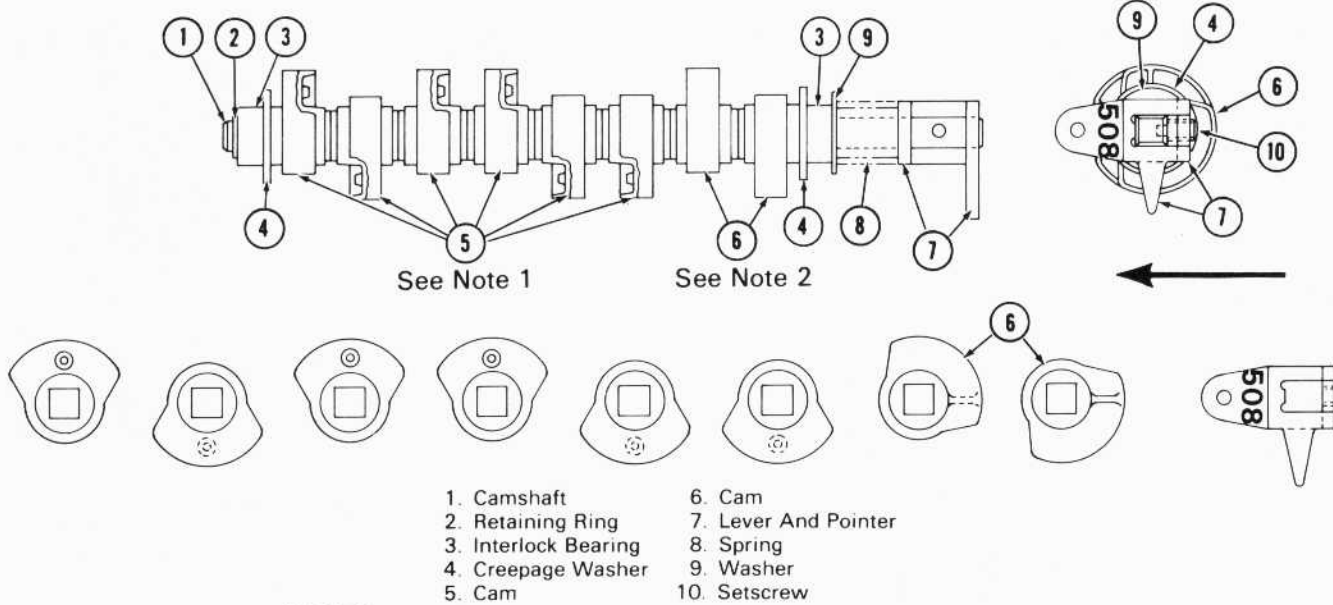
*These items no longer available. If necessary, complete camshaft assembly may be replaced with Siemens-Allis Part Number 14-190-858-509 camshaft assembly.

NOTES

1. When assembling cams, use identifying buttons to position as shown.
2. Cams are shown as viewed in direction of arrow.

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Fig.14 - Previous Model 220° Motor Module Camshaft Assembly

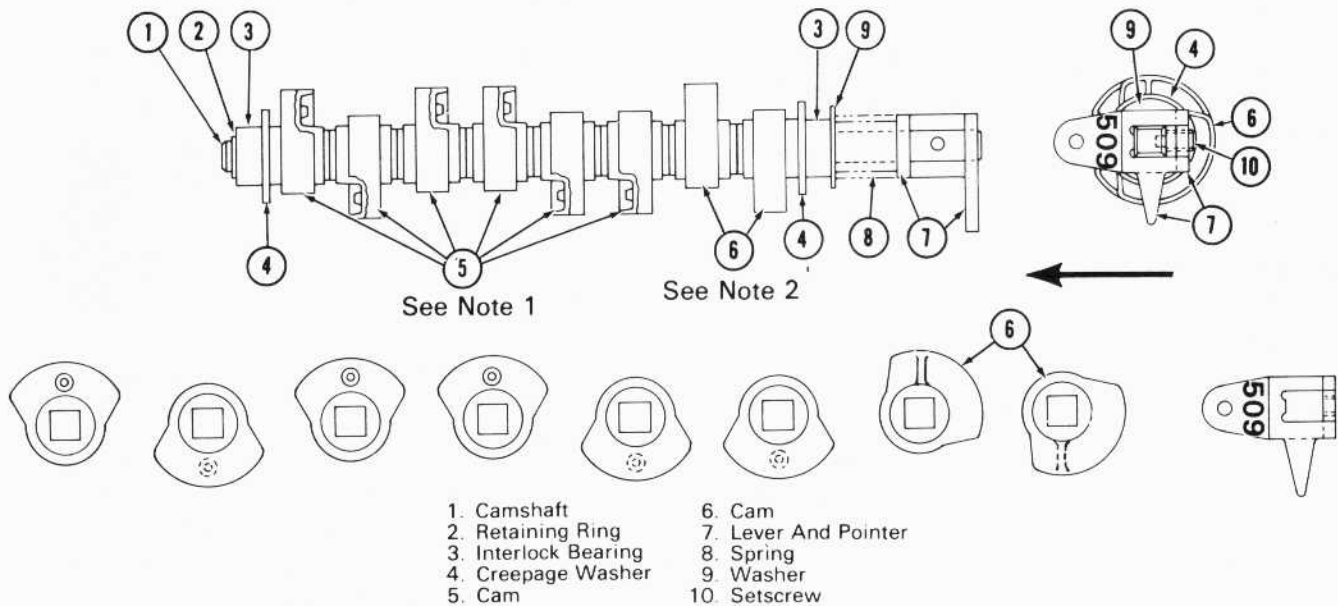


NOTES

1. When assembling cams, use identifying buttons to position as shown.
2. When assembling cams, use identifying ribs to position as shown.
3. Cams are shown viewed in direction of the arrow.

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Fig.15 – Current Model 55° Motor Module Camshaft Assembly



NOTES

1. When assembling cams, use identifying buttons to position as shown.
2. When assembling cams, use identifying ribs to position as shown.
3. Cams are shown viewed in direction of arrow.

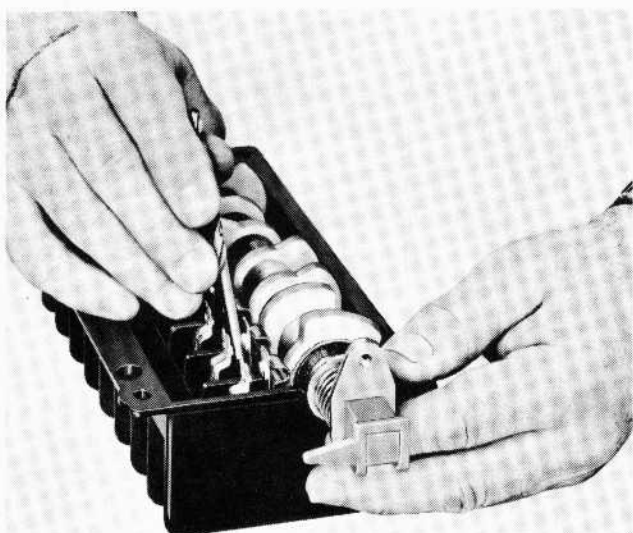
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Fig.16 – Current Model 220° Motor Module Camshaft Assembly

1. Insert retaining ring into slot of square camshaft.
2. Add bearings, washers, cams, spring, and lever and pointer in the sequence shown in Fig. 13, 14, 15, or 16, as applicable. Orient the cams as shown in lower portion of figure. Cams are shown as viewed in the direction of the arrow.
3. Secure by applying Loctite to threads of the setscrew in the lever and pointer assembly with the dog point in the hole of the square camshaft.
3. Rotate camshaft clockwise until drilled lever points to the right. Contact gaps on the six rear circuits must be between 4.37 mm and 4.75 mm (.172" and .187"). If required, adjust by bending as described in Step 2.
4. Place interlock base assembly (19, Fig. 11 or Fig. 12) over cover and cam assembly. Invert and secure with three screws (26) and washers (25).

GEARMASTER GEAR MOTOR (Siemens-Allis No. 14-327-293-003), Fig. 19

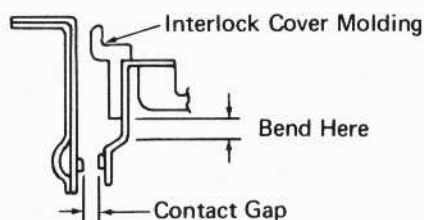
INTERLOCK ASSEMBLY, Fig. 17



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Fig.17 - Interlock Contact Gap Check

1. Place interlock cover in the inverted position. Place camshaft into bearing sockets of the cover.
2. With drilled lever pointing up, check contact gaps on the front two circuits, V-Y and X-W, as shown in Fig. 11. Gaps must be between 4.37 mm and 4.75 mm (.172" and .187"). If required, adjust by bending stationary contact finger between the second bend and point of contact with cover molding, Fig. 18.



17905

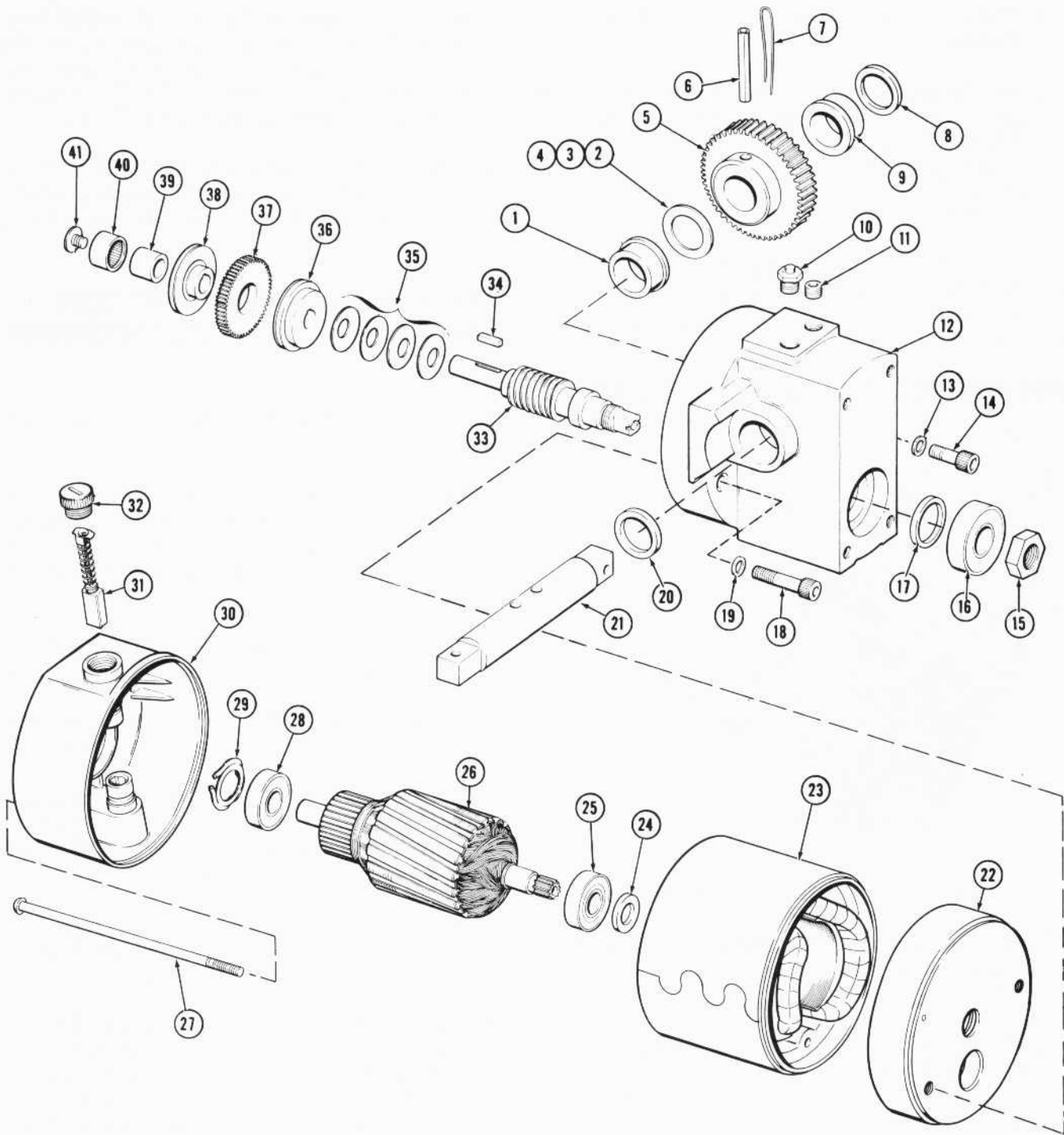
Fig.18 - Interlock Contact Adjustment

1. Assemble spring (29) and ball bearing (28) into end bell (30).
2. Thread leads from motor field assembly (23) through grommet in end bell (30). Connect brush leads to brush holders in end bell (30). Position end bell (30) on motor field assembly (23).
3. Press armature (26) into commutator end ball bearing (28).
4. Assemble motor-shaft oil seal (24) and gear-end ball bearing (25) into end bell (22).
5. Position end bell (22) on motor field assembly (23). Rotate end bells to line up marks on end bells with the marks on motor field assembly and secure with two screws (27).
6. Assemble oil seal (17) and ball bearing (16) into gear housing (12). Assemble sleeve bearings (1 and 9) into gear housing.
7. Assemble ball bearing (16) to gear housing (12) to prevent damage to oil seal (17). Carefully insert worm shaft (33) through oil seal (17) to prevent damage to oil seal and press worm shaft into ball bearing (16). Secure worm shaft to bearing with hex nut (15).

NOTE

If output shaft (21) and worm gear (5) are not being replaced, proceed to Step 11. If output shaft and worm gear are being replaced, continue with Step 8.

8. Position worm gear (5) on output shaft (21) and insert one spirol pin (6) in existing holes in worm gear and output shaft.

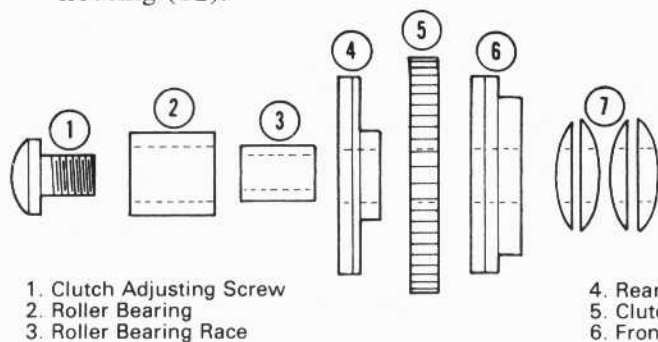


- | | | | |
|----------------------------------|------------------|--------------------------------------|----------------------------|
| 1. Sleeve Bearing | 12. Gear Housing | 22. End Bell | 32. Brush Holder Cap |
| 2. 0.13 mm (.005") Spacer Washer | 13. Washer | 23. Motor Field Assembly | 33. Worm Shaft |
| 3. 0.25 mm (.010") Spacer Washer | 14. Screw | 24. Oil Seal | 34. Square Key |
| 4. 0.64 mm (.025") Spacer Washer | 15. Hex Nut | 25. Ball Bearing | 35. Belleville Washer |
| 5. Worm Gear | 16. Ball Bearing | 26. Armature Assembly | 36. Front Clutch Plate |
| 6. Spirol Pin | 17. Oil Seal | 27. Screw | 37. Clutch Gear |
| 7. Locking Wire | 18. Screw | 28. Ball Bearing | 38. Rear Clutch Plate |
| 8. Oil Seal | 19. Washer | 29. Armature End Play Takeup Spring | 39. Roller Bearing Race |
| 9. Sleeve Bearing | 20. Oil Seal | 30. End Bell & Brush Holder Assembly | 40. Roller Bearing |
| 10. Vent Plug | 21. Output Shaft | 31. Brush & Spring Assembly | 41. Clutch Adjusting Screw |
| 11. Pipe Plug | | | |

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Fig.19 - Gearmaster Gear Motor, Exploded View

9. Starting at partially drilled hole in hub of worm gear, drill a 6.38/6.43 mm (.251/.253") diameter hole in the output shaft and worm gear for second spirol pin. Clean chips from parts, but do not insert second spirol pin at this time.
10. Mark one flat surface on the end of the square portion of the output shaft and in the same quadrant, mark the side of the worm gear which faces this mark. The marks are to be used for a reassembly reference. Remove spirol pin.
11. Select spacer washers (2, 3, 4) to center worm gear (5) on worm shaft (33) with a total worm gear end clearance of between 0.05 mm and 0.25 mm (.002" and .010").
12. Assemble spacer washers on output shaft with worm gear and insert two spirol pins (6).
13. Insert locking wires (7) through spirol pins (6) and form over worm gear hubs.
14. Place Belleville washers (7, Fig. 20) on worm shaft (9) as shown.
15. Put a small amount of Alemite No. 8324 gear shield lubricant on clutch faceplates (4, 6). Insert key (8) in worm shaft slot and position front clutch plate (6) on key. Place clutch gear (5) on rear clutch plate (4) hub and position on key.
16. Apply Loctite to screw threads (1) and inside surface of roller bearing race (3). Put roller bearing (2) over race (3) and place on worm shaft (9). Turn screw (1) into worm shaft (9) until it just tightens against the bearing race, then tighten one full turn to approximately set the clutch slip torque.
17. Place oil seals (8 and 20, Fig. 19) over the ends of output shaft (21) and press into gear housing (12).



1. Clutch Adjusting Screw
2. Roller Bearing
3. Roller Bearing Race

4. Rear Clutch Plate
5. Clutch Gear
6. Front Clutch Plate

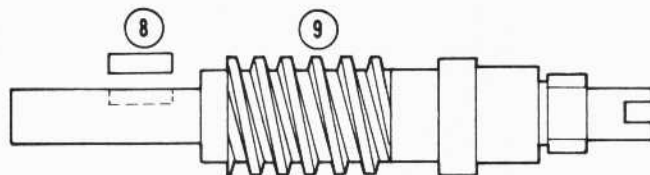
7. Bellville Washers
8. Key
9. Worm Shaft

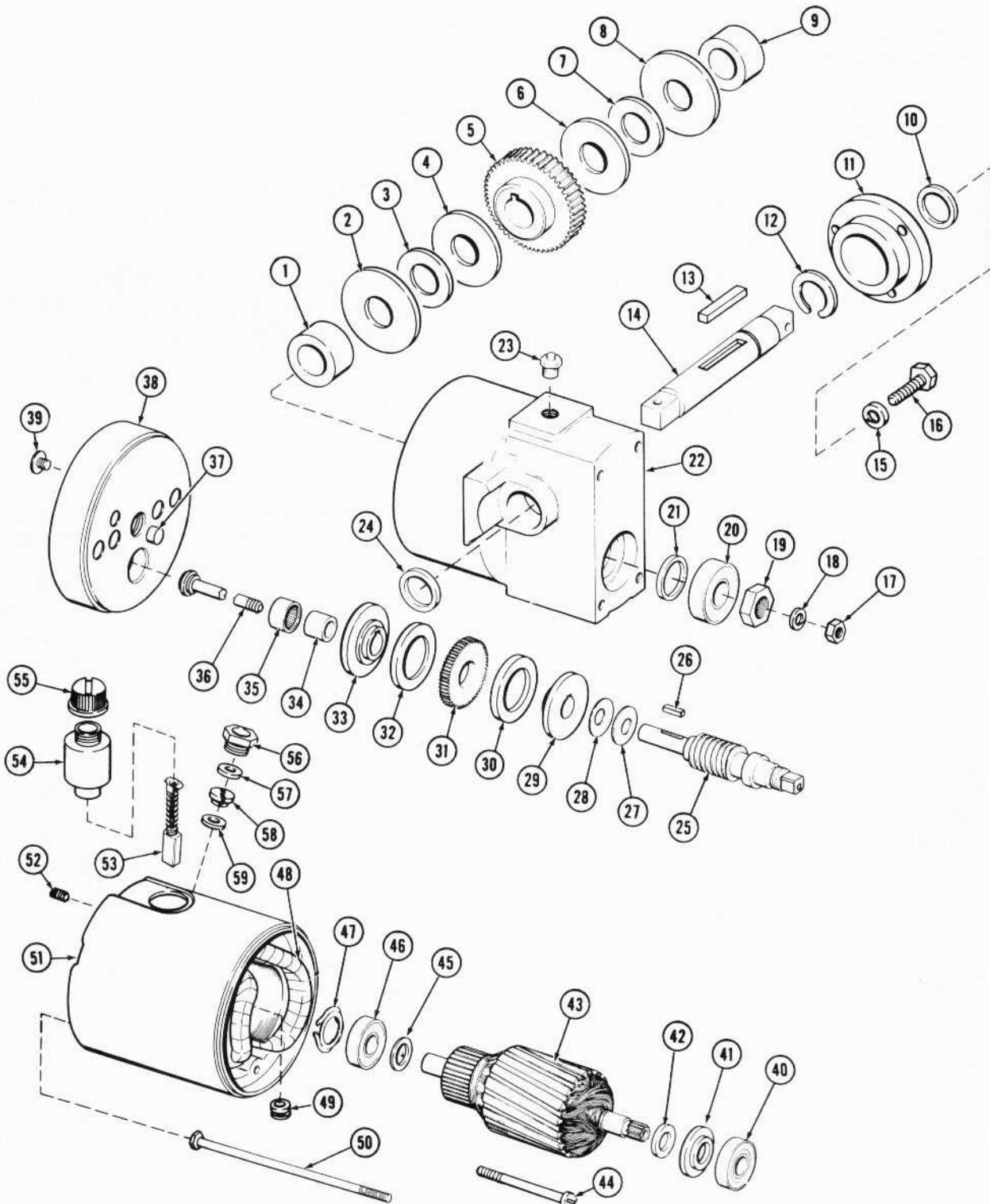
Fig.20 - Worm Shaft Assembly

18. Insert vent plug (10) and pipe plug (11) into gear housing (12).
19. Lubricate inside of gear housing with 71 to 85 g (2-1/2 to 3 oz) of Alemite No. 8324 lubricant.
20. Position gear housing (12) on end bell (22) and secure with screw (14), screw (18), and washers (19 and 13).

SIEMENS GEAR MOTOR (Siemens-Allis No. 14-327-293-005), Fig. 21 OR Fig. 22

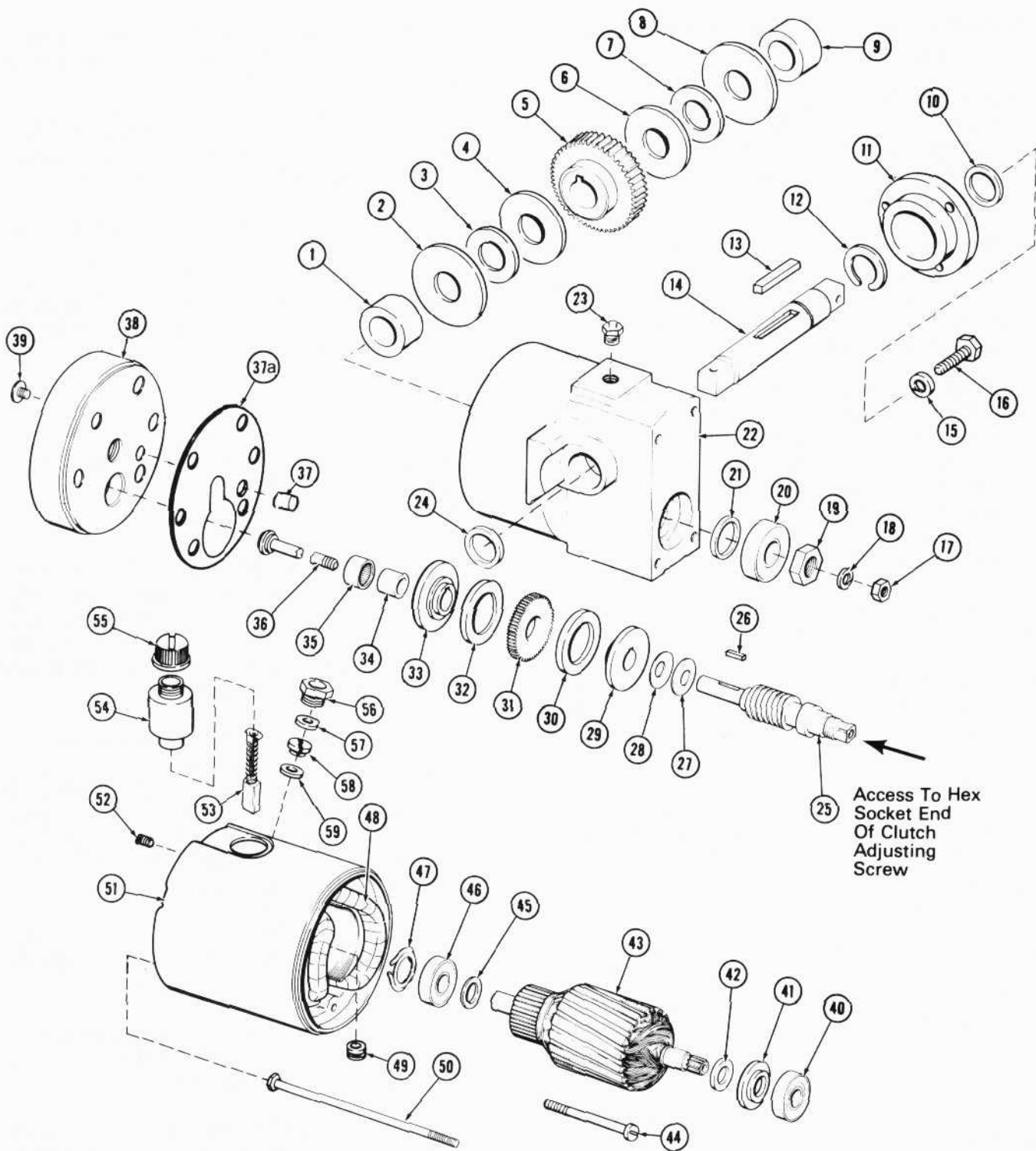
1. Assemble brush holders (54) in motor housing (51). Apply Loctite to set screws (52) and secure brush holders.
2. Assemble black lead to brush holder (54) adjacent to hole for bushing (56). Bring lead through bushing hole in motor housing (51).
3. Connect yellow lead assembly to other brush holder (54). Push grommet (49) on yellow lead assembly into slot in motor housing (51). Bring yellow lead through bushing hole in motor housing (51).
4. Assemble motor field assembly (48) into motor housing (51), threading red and green field leads through bushing hole in motor housing (51).
5. Line up mark on field assembly (48) with mark on motor housing (51) and secure with screws (44).
6. Insert washer (59), wire holder (58), and washer (57) on motor leads into hole in motor housing (51) and secure with bushing (56).
7. Lay yellow lead assembly between field assembly (48) and motor housing (51). Push wire holder (58) into space between field assembly and motor housing.





- | | | | |
|--------------------|-----------------------|----------------------------|-------------------------------------|
| 1. Roller Bearing | 16. Screw | 31. Clutch Gear | 46. Ball Bearing |
| 2. Thrust Washer | 17. Nut | 32. Friction Washer | 47. Armature End Play Takeup Spring |
| 3. Thrust Washer | 18. Lockwasher | 33. Clutch Plate | 48. Field Assembly |
| 4. Thrust Washer | 19. Nut | 34. Roller Bearing Race | 49. Wire Grommet |
| 5. Worm Gear | 20. Ball Bearing | 35. Roller Bearing | 50. Screw |
| 6. Thrust Washer | 21. Oil Seal | 36. Clutch Adjusting Screw | 51. Motor Housing |
| 7. Thrust Washer | 22. Gear Housing | 37. Locating Pin | 52. Setscrew |
| 8. Thrust Washer | 23. Vent Plug | 38. End Bell | 53. Brush And Spring Assembly |
| 9. Roller Bearing | 24. Oil Seal | 39. Screw | 54. Brush Holder |
| 10. Oil Seal | 25. Worm Shaft | 40. Ball Bearing | 55. Brush Holder Cap |
| 11. Bearing Cover | 26. Square Key | 41. Washer | 56. Bushing |
| 12. Retaining Ring | 27. Belleville Washer | 42. Washer | 57. Washer |
| 13. Key | 28. Belleville Washer | 43. Armature Assembly | 58. Wire Holder |
| 14. Output Shaft | 29. Clutch Plate | 44. Screw | 59. Washer |
| 15. Lockwasher | 30. Friction Washer | 45. Washer | |

Fig.21 – Previous Model Siemens Gear Motor, Exploded View



- | | | | |
|--------------------|-----------------------|----------------------------|-------------------------------------|
| 1. Roller Bearing | 17. Nut | 32. Friction Washer | 46. Ball Bearing |
| 2. Thrust Washer | 18. Lockwasher | 33. Clutch Plate | 47. Armature End Play Takeup Spring |
| 3. Thrust Washer | 19. Nut | 34. Roller Bearing Race | 48. Field Assembly |
| 4. Thrust Washer | 20. Ball Bearing | 35. Roller Bearing | 49. Wire Grommet |
| 5. Worm Gear | 21. Oil Seal | 36. Clutch Adjusting Screw | 50. Screw |
| 6. Thrust Washer | 22. Gear Housing | 37. Locating Pin | 51. Motor Housing |
| 7. Thrust Washer | 23. Vent Plug | 37a. Gasket | 52. Setscrew |
| 8. Thrust Washer | 24. Oil Seal | 38. End Bell | 53. Brush And Spring Assembly |
| 9. Roller Bearing | 25. Worm Shaft | 39. Screw | 54. Brush Holder |
| 10. Oil Seal | 26. Square Key | 40. Ball Bearing | 55. Brush Holder Cap |
| 11. Bearing Cover | 27. Belleville Washer | 41. Washer | 56. Bushing |
| 12. Retaining Ring | 28. Belleville Washer | 42. Washer | 57. Washer |
| 13. Key | 29. Clutch Plate | 43. Armature Assembly | 58. Wire Holder |
| 14. Output Shaft | 30. Friction Washer | 44. Screw | 59. Washer |
| 15. Lockwasher | 31. Clutch Gear | 45. Washer | |
| 16. Screw | | | |

Fig.22 - Current Model Siemens Gear Motor, Exploded View

8. Position spring (47) into bearing socket in end of motor housing (51).
9. Apply a good grade of bearing grease to ball bearing (46). Assemble washer (45) and bearing (46) on commutator end of armature (43). Assemble armature assembly (43) into motor housing (51).
10. Assemble washers (42, 41) and ball bearing (40) on pinion end of armature (43).
11. Insert roller bearing (1) in bearing socket in gear housing (22).
12. Assemble retaining ring (12) on output shaft (14). Place key (13) in keyway on output shaft (14). Hold end of output shaft extending through hole in gear housing (22) for bearing cover (11). Assemble worm gear (5) and washers (2, 3, 4) on output shaft (14) from inside of gear housing (22). Insert output shaft into ball bearing (1) in gear housing.
13. Assemble washers (6, 7, 8) and roller bearing (9) on output shaft (14).
14. Apply RTV compound to flange of bearing cover (11). Position on gear housing (22) and secure with four screws (16) and lockwashers (15).
15. Place oil seals (10, 24) over ends of output shaft (14) and press into gear housing (22).
16. Insert oil seal (21) and ball bearing (20) into gear housing (22).
17. Insert worm shaft (25) through oil seal (21) and ball bearing (20). Apply Loctite to nut (19) and secure ball bearing (20) to worm shaft (25) with nut (19).
18. Place ten Belleville washers (27, 28) on worm shaft (25) as shown in Fig. 23.
19. Place key (26, Fig. 21) in worm shaft (25) keyway. Assemble clutch plate (29), friction

washer (30), clutch gear (31), friction washer (32), clutch plate (33), and roller bearing race (34) to worm shaft (25).

20. Assemble roller bearing (35) on race (34). Turn screw (36) into worm shaft (25) to partially compress Belleville washers (27 and 28).
21. Assemble vent plug (23) into gear housing (22).
22. Lubricate inside of gear housing (22) with 71 to 85 g (2-1/2 to 3 oz) of Aero Lubriplate gear shield lubricant.

NOTE

Depending upon the model of gear motor, the gear housing end bell (38) is secured to the gear housing (22) with either two screws (39) or four screws (39).

23. If the gear housing end bell (38) is secured to gear housing (22) with two screws (39), apply RTV compound to gear housing end bell (38). Position gear housing end bell (38) on gear housing (22) with locating pin (37) and secure with two screws (39).
24. If the gear housing end bell (38) is secured to gear housing (22) with four screws (39), apply gasket (37A) from oil seal kit 9511397 between gear housing end bell (38) and gear housing (22). Position gear housing end bell (38) on gear housing (22) with locating pin (37) and secure with four screws (39).
25. Position motor housing (51) on gear housing (22) so that the marks at the junction are in line. Secure with two screws (50).
26. Apply a small amount of RTV compound to threads of brush holder (54) and screw brush caps (55) to brush holder (54).
27. Place nut (17) and lockwasher (18) on end of screw (36) protruding from end of worm shaft (25).

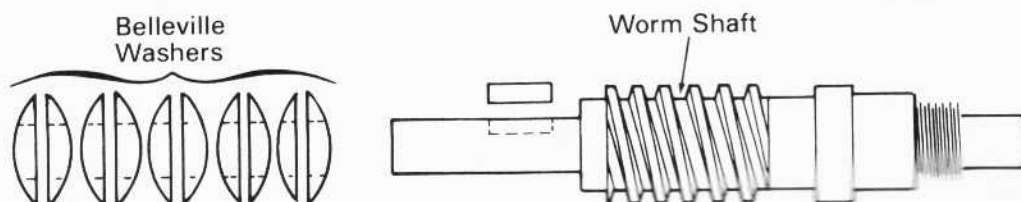


Fig.23 - Worm Shaft Belleville Washer Assembly

MOTOR MODULE 8453176 - GEAR MOTOR ASSEMBLY, Fig. 24

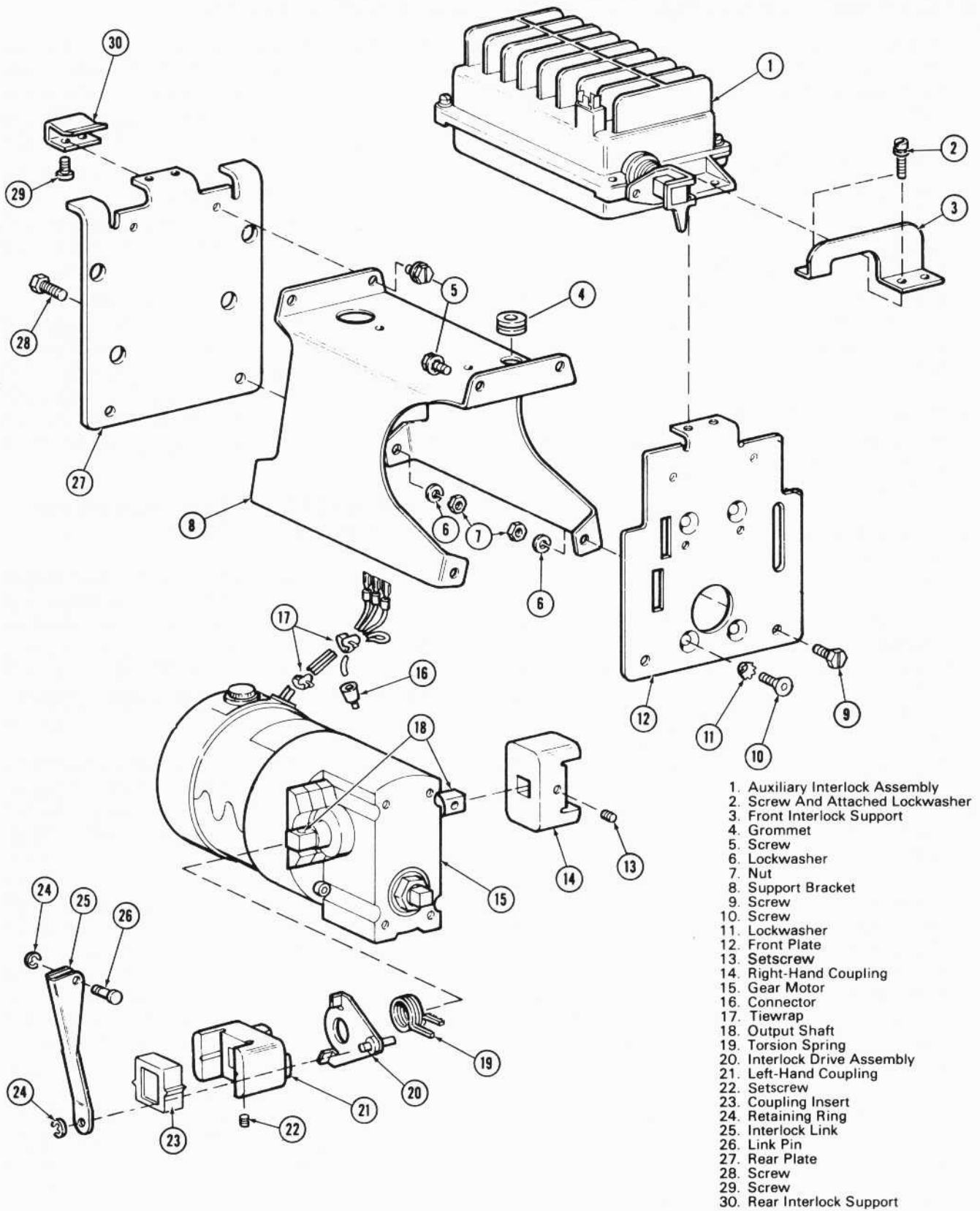
1. Rotate the square shaft on the front of the gear motor (15) until the hole in the left-hand square shaft extension is in the vertical plane.
2. Position the right-hand coupling (14) over the right-hand shaft extension with setscrew hole toward front. Secure with setscrew (13).
3. Assemble torsion spring (19) on sleeve of interlock drive assembly (20) with ends of spring crossed over around stop pin. Place assembly on left-hand shaft extension with the torsion spring on the inside toward the gear motor.
4. Position the left-hand coupling (21) over the left-hand shaft extension with setscrew hole toward the bottom. Secure with setscrew (22).
5. Place drive link (25) on stop pin of interlock drive assembly (20) and secure with retaining ring (24).
6. Position the drive link assembly to point upward and place the front plate (12) on the front face of gear case so that the ends of torsion spring (19) extend into the two slots on the left side of the front plate. The bent tab on the front plate must be at the top and pointing rearward. Secure with four screws (10) and lockwashers (11).
7. Insert rubber grommet (4) into hole in central section of support bracket (8).
8. Position the support bracket (8) behind the front plate (12) as shown in Fig. 24. Thread the motor leads through the grommet, one at a time. Secure the support bracket to the front plate with two screws (5) at the top and with two screws (9), lockwashers (8) and nuts (7), at the bottom. The two nuts must be inside the support bracket.
9. Position the rear plate (27) to the back end of the support bracket (8) with the bent tabs at the top and pointing towards the rear. Secure with two screws (5) at the top and with two screws (28), lockwashers (6), and nuts (7) at the bottom. The two nuts must be inside the support bracket.
10. Fasten rear interlock support (30) to rear plate (27) with two screws (29).

MOTOR MODULE 8453176 ASSEMBLY, Fig. 24

1. Slide the interlock assembly (1) into the rear interlock support (30) over the gear motor assembly, with camshaft pointer at the front. Position the front interlock support (3) and secure with three screws and lockwashers (2).
2. Align the holes in the formed end of the interlock link (25) with the hole in the lever and pointer assembly and insert link pin (26) from the front. Secure with retaining ring (24).
3. Connect the V, W, Z leads of the motor to the respective terminals on the interlock assembly. Cut terminal off yellow motor lead. Strip end of wire and crimp connector (16) on. Bend wire back and secure to four leads at the lead midpoint with tie-wrap (17). Also secure the four leads next to the grommet with tie-wrap (17).

MOTOR ROTATION CHECK AND SLIP CLUTCH SETTING, Fig. 24

1. Connect the negative lead of a power supply capable of from 0 to 100 V DC to terminal Z of the auxiliary interlock assembly. Connect the positive lead of power supply to terminal Y. Apply 20 to 45 volts DC. Motor should operate and interlock pointer should indicate No. 1 position.
2. Connect the positive lead of power supply to terminal X of the auxiliary interlock assembly. Apply 20 to 45 volts DC. Motor should operate and interlock pointer should indicate No. 2 position.
3. With the positive lead of power supply still connected to terminal X, secure a 0 to 68 N·m (0 to 600 in.-lbs) torque wrench to either end of the output shaft (18). Raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft in a direction opposite to that which produced the torque. Allow the clutch to cool for 1 minute.
4. Connect the positive lead of power supply to terminal Y. With torque wrench connected to either end of output shaft (18), raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and



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Fig.24 - Motor Module 8453176, Partial Exploded View

allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft. Allow the clutch to cool for 1 minute.

5. Connect the positive lead of power supply to terminal X. With torque wrench connected to either end of output shaft (18), raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft.
6. Connect the positive lead of power supply to terminal Y. With torque wrench connected to either end of output shaft (18), raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench.
7. Disregard torque indication recorded in Step 4. The torque indications of Step 5 and Step 6 must be within 34 to 68 N·m (300 to 600 in.-lbs). If indications are not within this range, perform either "Motor Module 8453176 With Siemens Gear Motor Clutch Adjustment" procedure or "Motor Module 8453176 With Gearmaster Gear Motor Clutch Adjustment" procedure as applicable.

MOTOR MODULE 8453176 WITH GEARMASTER GEAR MOTOR, CLUTCH ADJUSTMENT, Fig. 19

Adjust clutch slip torque as follows:

1. Remove auxiliary interlock assembly per instructions of "Motor Module 8453176, Removal Of Auxiliary Interlock Assembly" procedure.
2. Remove gear motor per instructions of "Motor Module 8453176, Removal Of Gear Motor" procedure.
3. Remove screw (14, Fig. 19) and screw (18). Separate gear housing (12) from end bell (22).

4. Rotate screw (41) into worm shaft (33). Clockwise rotation will increase torque. Counterclockwise rotation will decrease torque.

NOTE

If Loctite applied to threads of screw (41) and inside surface of roller bearing race (39) has already hardened, the screw and bearing race must be removed from worm shaft (33) and fresh Loctite must be applied.

5. Reassemble the gear housing (12) to the end bell (22) with screws (14 and 18). Reassemble the motor module and install auxiliary interlock assembly.
6. Repeat Steps 3 through 7 of "Motor Rotation Check And Slip Clutch Setting" and Steps 1 through 5 of this procedure until clutch slip torque is within specified limits.

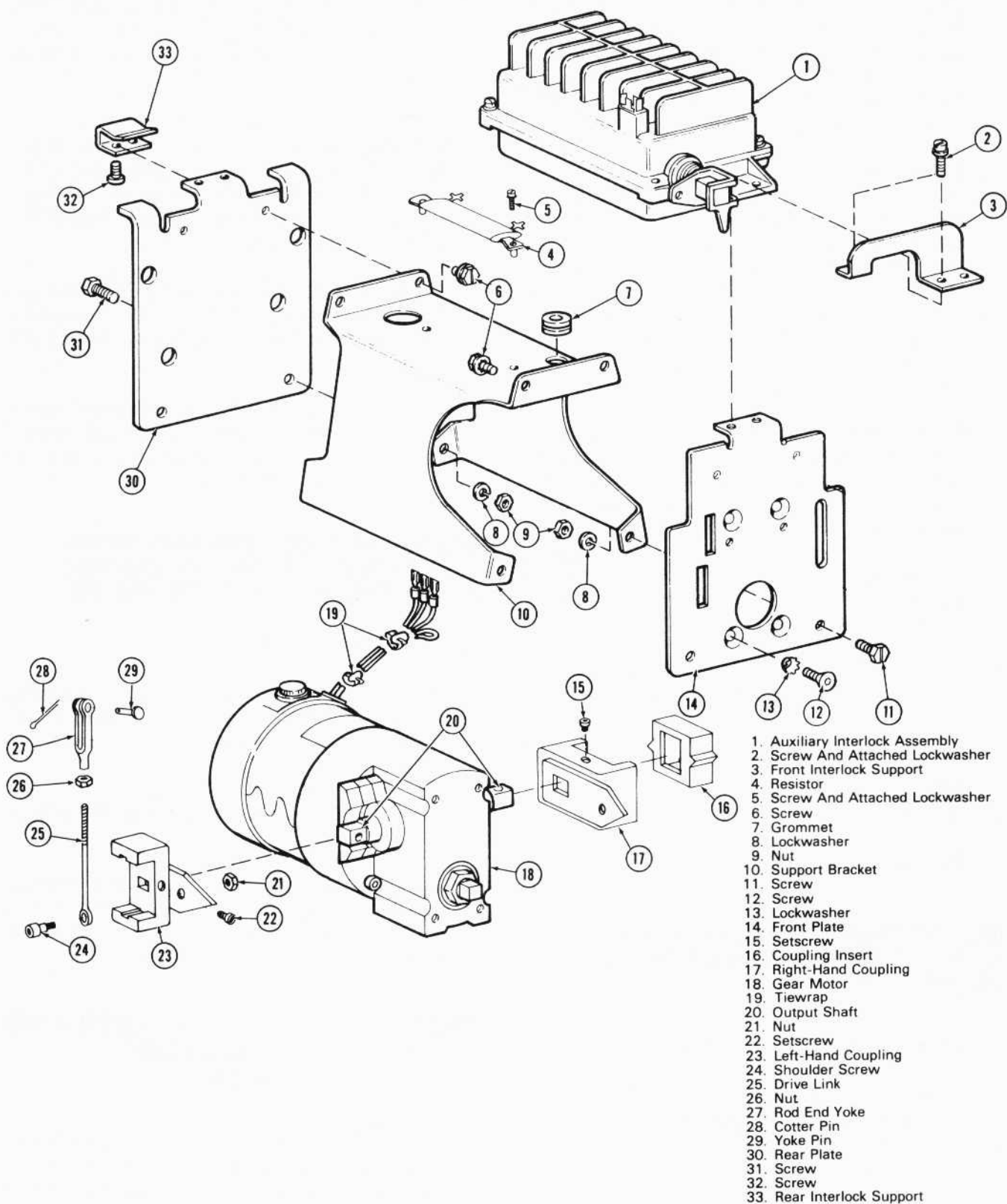
MOTOR MODULE 8453176 WITH SIEMENS GEAR MOTOR, CLUTCH ADJUSTMENT, Fig. 21 OR Fig. 22

Adjust clutch slip torque as follows:

1. Rotate hex socket end of clutch adjusting screw (36). Clockwise rotation will reduce torque. Counterclockwise rotation will increase torque.
2. Secure clutch adjusting screw (36) by tightening nut (17).
3. Repeat Steps 3 through 7 of "Motor Rotation Check And Slip Clutch Setting" and Steps 1 and 2 of this procedure until clutch slip torque is within specified limits.

MOTOR MODULES 8422928 AND 8449939 GEAR MOTOR ASSEMBLY, Fig. 25

1. Rotate the square shaft on the front of the gear case of the gear motor (18) until the hole in the right-hand square shaft extension is in the vertical plane.
2. Position the right-hand coupling (17) over the right-hand shaft extension with the setscrew hole at the top and the interlock lever (pointer) facing forward. Secure with setscrew (15).



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Fig.25 - Motor Modules 8422928 And 8449939,
 Partial Exploded View

3. Position the left-hand coupling (23) over the left-hand shaft extension with the interlock lever pointing forward. Secure with setscrew (22).
4. Position nut (26) on threaded portion of drive link (25) at about 25 mm (1") from the end. Rotate rod end yoke (27) onto drive link (25) until drive link touches nut (26). Do not tighten.
5. Place shoulder screw (24) through loop end of drive link (25) and turn into tapped hole in the lever of the left-hand coupling (23). Tighten and lock with nut (21).
6. Position drive link assembly (24 through 29) to point upward and place front plate (14) on the front face of gear case so that the two slots fit over the levers of the couplings. The bent tab on the front plate must be at the top and pointing rearward. Secure with four screws (12) and lockwashers (13).
7. Insert rubber grommet (7) into hole in central section of the support bracket (10).
8. Position the support bracket (10) behind the front plate (14) as shown and thread the four motor leads through the grommet one at a time.
9. Secure the support bracket (10) to the front plate (14) with two screws (6) at the top, and with two screws (11), lockwashers (8), and nuts (9) at the bottom. The two nuts are to be inside the support bracket.
10. Position the rear plate (30) to the back end of the support bracket (10) with the bent tabs at the top pointing to the rear. Secure with two screws (6) at the top, and with two screws (31), lockwashers (8) and nuts (9) at the bottom. The two nuts are to be inside the support bracket.
11. Position resistor (4) over tapped holes on top of support bracket (10) with the connecting tabs pointing to the right. Secure with two sems screws (5).
2. Align the holes in the open end of the rod end yoke (27) with the hole in the camshaft lever and pointer assembly and insert yoke pin (29) from the front. Do not insert cotter pin (28) at this time.
3. Connect the V, W, and Z leads of the motor to the respective terminals on the auxiliary interlock. Connect the U lead to the rear terminal of the resistor (4). Use a flexible lead to interconnect the front terminal of the resistor and the Z terminal of the auxiliary interlock. Secure the four leads at midpoint with tiewrap (19).
4. Travel adjustment of the motor limit contacts V-Y and X-W is vital to proper performance of the motor drive. Perform the following procedure.
 - a. Connect terminals X and Y to a low voltage continuity indicator.
 - b. Rotate the square shaft on the front of the gear case in the REV (reverse) direction with a socket and speeder handle. Rotate until the circuit is just interrupted. Note the orientation of the slot. Continue to rotate shaft and note the angular overtravel required to strike the mechanical limit.
 - c. Rotate the shaft about six turns in the FOR (forward) direction until the circuit is again just interrupted. Continue to rotate the shaft and note the angular overtravel required to strike the mechanical limit.
 - d. The overtravel in each direction should be made as nearly equal as possible. Adjust the travel by lengthening or shortening the drive link assembly. To reduce the overtravel at the REV end, shorten the link assembly by turning the rod end yoke (27).
 - e. Repeat Steps b, c, and d until overtravels are equal within the limits set by the thread pitch on the drive link (25).
 - f. Insert cotter pin (28) into hole in yoke pin (29) and spread cotter pin tangs to retain pin.
 - g. Tighten the locking nut (26) at the base of the rod end yoke (27). Remove continuity indicator.

MOTOR MODULES 8422928 AND 8449939 - ASSEMBLY, Fig. 25

1. Slide the interlock assembly (1) into the rear interlock support (33), over the gear motor assembly, with camshaft pointer at the front. Position the front interlock support (3) and secure with three screws and lockwashers (2).

MOTOR ROTATION CHECK AND SLIP CLUTCH SETTING, Fig. 25

1. Connect the negative lead of a power supply capable of from 0 to 100 V DC to terminal Z of the auxiliary interlock assembly. Connect the positive lead of power supply to terminal Y. Apply 20 to 45 volts DC. Motor should operate and interlock pointer should indicate No. 1 position.
2. Connect the positive lead of power supply to terminal X of the auxiliary interlock assembly. Apply 20 to 45 volts DC. Motor should operate and interlock pointer should indicate No. 2 position.
3. With the positive lead of power supply still connected to terminal X, secure a 0 to 68 N·m (0 to 600 in.-lbs) torque wrench to either end of the output shaft (20). Raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft in a direction opposite to that which produced the torque. Allow the clutch to cool for 1 minute.
4. Connect the positive lead of power supply to terminal Y. With torque wrench connected to either end of output shaft (20), raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft. Allow the clutch to cool for 1 minute.
5. Connect the positive lead of power supply to terminal X. With torque wrench connected to either end of output shaft (20), raise the voltage from zero until the clutch slips. Continue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench. Return the indication to zero by rotating the worm shaft.
6. Connect the positive lead of power supply to terminal Y. With torque wrench connected to either end of output shaft (20), raise the voltage from zero until the clutch slips. Con-

tinue raising the voltage to 60 volts DC and allow the clutch to slip for 10 seconds. Return the voltage to zero and observe and record the retained indication of torque wrench.

7. Disregard the torque indications recorded in Step 4.

For motor module 8449939, the torque indications of Steps 5 and 6 must be within 34 to 68 N·m (300 to 600 in.-lbs). If indications are not within this range, perform either "Motor Module 8449939 With Siemens Gear Motor Clutch Adjustment" procedure or "Motor Module 8449939 With Gearmaster Gear Motor Clutch Adjustment" procedure as applicable.

For motor module 8422928, the torque indications of Steps 5 and 6 must be within 62 to 119 N·m (550 to 1050 in.-lbs). If indications are not within this range, perform "Motor Module 8422928 With Gearmaster Gear Motor Clutch Adjustment" procedure.

NOTE

Motor module 8422928 is manufactured with a Gearmaster Gear Motor only.

MOTOR MODULES 8449939 AND 8422928 WITH GEARMASTER GEAR MOTOR, CLUTCH ADJUSTMENT, Fig. 19

Adjust clutch slip torque as follows:

1. Remove auxiliary interlock assembly per instructions of "Motor Module 8422928 And 8449939, Removal Of Auxiliary Interlock Assembly" procedure.
2. Remove gear motor per instructions of "Motor Module 8422928 and 8449939, Removal Of Gear Motor" procedure.
3. Remove screw (14) and screw (18). Separate gear housing (12) from end bell (22).
4. Rotate screw (41) into worm shaft (33). Clockwise rotation will increase torque. Counterclockwise rotation will decrease torque.

NOTE

If Loctite applied to threads of screw (41) and inside surface of roller bearing race (39) has already hardened, the screw and bearing race must be removed from worm shaft (33) and fresh Loctite must be applied.

5. Reassemble the gear housing (12) to the end bell (22) with screws (14 and 18). Reassemble the motor module and install auxiliary interlock assembly.
6. Repeat Steps 3 through 7 of "Motor Rotation Check And Slip Clutch Setting" and Steps 1 through 5 of this procedure until clutch slip torque is within specified limits.

1. Rotate hex socket end of clutch adjusting screw (36). Clockwise rotation will reduce torque. Counterclockwise rotation will increase torque.
2. Secure clutch adjusting screw (36) by tightening nut (17).
3. Repeat Steps 3 through 7 of "Motor Rotation Check And Slip Clutch Setting" and Steps 1 and 2 of this procedure until clutch slip torque is within specified limits.

MOTOR MODULE 8449939 WITH SIEMENS GEAR MOTOR, CLUTCH ADJUSTMENT, Fig. 21 OR Fig. 22

Adjust clutch slip torque as follows:

SERVICE DATA

SPECIFICATIONS

GEAR MOTOR RATING

74 V DC intermittent
 120 operations per hour maximum
 5 operations per minute maximum

OPERATING SPEED (74 V DC, 25° C Ambient)

Motor must run at no load from one extreme position to the other in 2 seconds

SLIP CLUTCH SETTING

Motor Modules 8453176 And 8449939
 34 to 68 N·m (300 to 600 in.-lbs)
 Motor Modules 8422928
 62 to 119 N·m (550 to 1050 in.-lbs)

AUXILIARY INTERLOCK SWITCH INTERRUPTION RATING

1.5 amperes, 74 V DC inductive
 5.0 amperes, 74 V DC resistive

VOLTAGE RATING

1500 V DC between adjacent contacts and across open contacts on circuits A through R

GEAR MOTOR RESISTANCE

MOTOR MODULE 8453176, Fig. 26

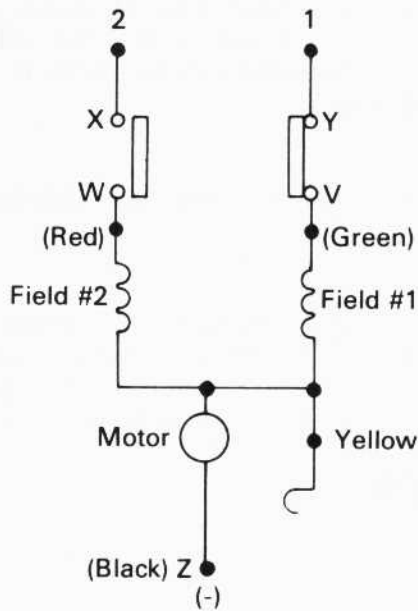
Field No. 1 to Field No. 2 (green to red lead)	4.76 ohms ±10%
Field No. 1 to Armature and Brushes (green to black lead)	8.91 ohms ±15%
Field No. 2 to Armature and Brushes (red to black lead)	8.91 ohms ±15%

MOTOR MODULES 8422928 AND 8449939, Fig. 27

NOTE

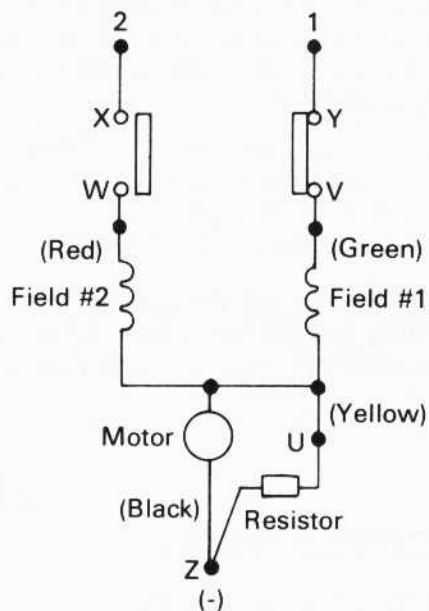
Measure with connection to armature shunting resistor open.

Field No. 2 (yellow to red lead)	2.38 ohms ±10%
Field No. 1 (yellow to green lead)	2.38 ohms ±10%
Armature Plus Brushes (yellow to black lead)	6.55 ohms ±15%



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Fig.26 - Motor Module 8453176, Control Motor Wiring Diagram



23935

Fig.27 - Motor Modules 8422928 And 8449939, Control Motor Wiring Diagram

MAINTENANCE PARTS

MOTOR MODULE 8453176

Motor module maintenance parts have been grouped into four kits. For kit and component part numbers refer to Parts List 5421, Parts Catalog 190.

MOTOR KIT (Section 2, Fig. 28) 8492386

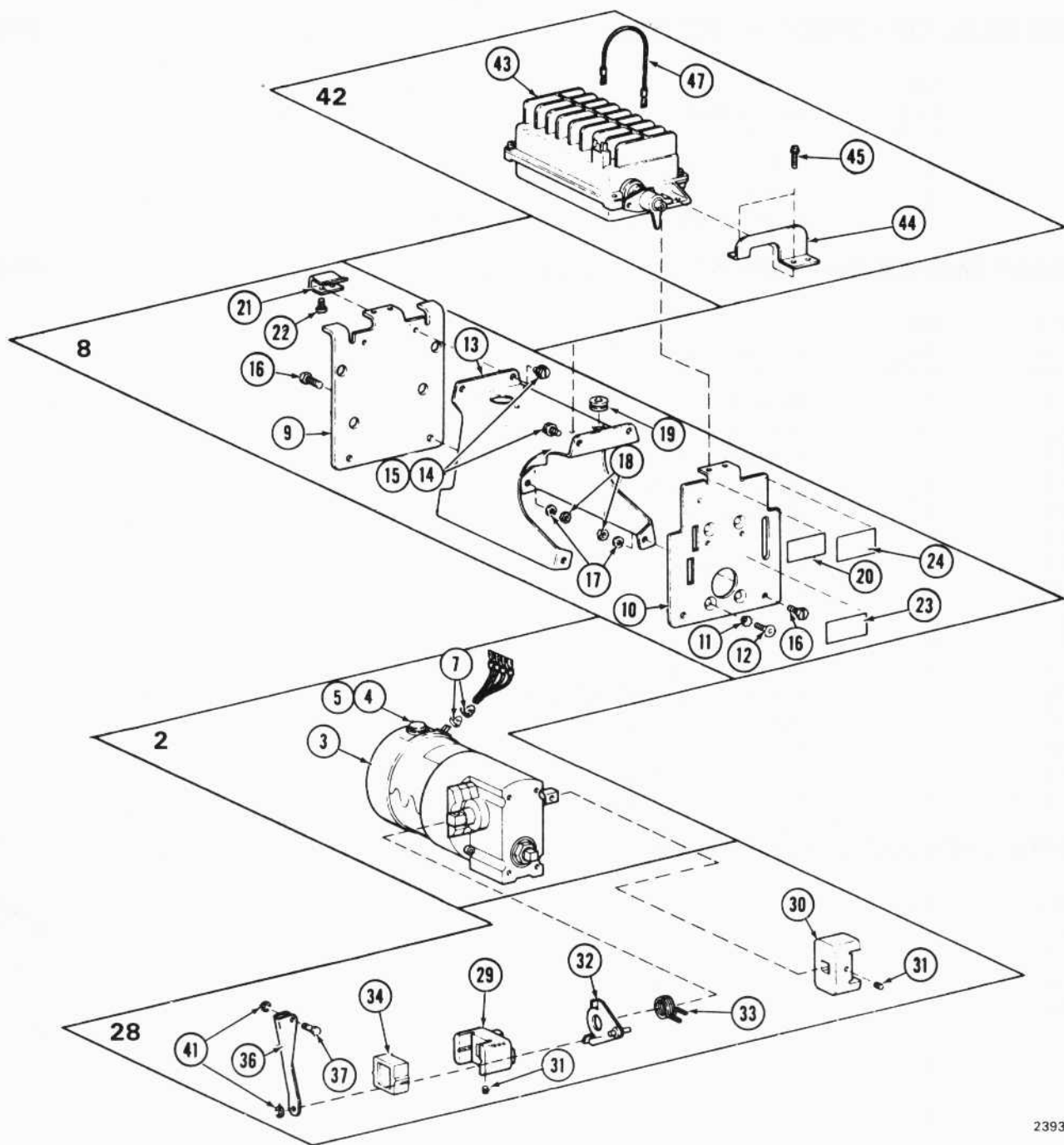
Ref. No.	No. Req.	Description	
3	1	Gear motor (Gearmaster or Siemens type)	} Gearmaster Motor Only
4	2	Brush (includes spring)	
5	2	Brush Holder Cap	
	1	Seal Kit (output and motor shaft)	
7	2	Tiewrap	

BRUSH KIT - GEARMASTER MOTOR 9084446

No. Req.	Description
2	Brush (includes spring)
2	Brush Holder Cap

BRUSH KIT - SIEMENS MOTOR 9505761

No. Req.	Description
2	Brush (includes spring)
2	Brush Holder Cap



23936

Fig.28 - Motor Module 8453176 Parts Kits

ARMATURE ASSEMBLY - GEARMASTER MOTOR	8483897
ARMATURE ASSEMBLY - SIEMENS MOTOR	9511398
OIL SEAL KIT - GEARMASTER MOTOR	9505762

<u>No.</u> <u>Req.</u>	<u>Description</u>
2	Output Shaft Seal
1	Worm Shaft Seal
1	Motor Shaft Seal

OIL SEAL KIT - SIEMENS MOTOR 9511397

<u>No.</u>	<u>Req.</u>	<u>Description</u>
2		Output Shaft Seal
1		Worm Shaft Seal
1		Gasket (current production motors)

GEAR MOTOR SUPPORT KIT (Section 8, Fig. 28) 8492386

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
9	1	Rear Plate
10	1	Front Plate
11	4	Lockwasher
12	4	Machine Screw
13	1	Support Bracket
14	4	Bolt
15	4	Lockwasher
16	4	Bolt
17	4	Lockwasher
18	4	Nut
19	1	Rubber Grommet
20	1	Label (REV, BRK, O, FOR, MOT)
21	1	Rear Interlock Support
22	2	Screw
23	1	Label (instruction)
24	1	Label (identification)

COUPLING KIT (Section 28, Fig. 28) 8492388

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
29	1	Coupling, Left-Hand
30	1	Coupling, Right-Hand
31	2	Setscrew
32	1	Coupling Drive Assembly
33	1	Spring, Torsion
34	1	Coupling Insert
36	1	Drive Link
37	1	Link Pin
41	2	Retaining Ring

INTERLOCK KIT (Section 42, Fig. 28) 8492389

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
43	1	Interlock Assembly
44	1	Front Interlock Support
45	3	Cap Screw (with attached lockwasher)
47	1	Flexible Lead Assembly

MOTOR MODULES 8422928 AND 8449939

Motor module maintenance parts have been grouped into five kits. For kit and component part numbers refer to Parts List 5421, Parts Catalog 190 or 382.

MOTOR KIT, (Section 2, Fig. 29) 9339329

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>	
3	1	Gear Motor (Gearmaster or Siemens type)	} (Gearmaster motor Only)
4	2	Brush (includes spring)	
5	2	Brush Holder Cap	
	1	Seal Kit (output and motor shaft)	
7	2	Tiewrap	

BRUSH KIT - GEARMASTER MOTOR 9084446

<u>No. Req.</u>	<u>Description</u>
2	Brush (includes spring)
2	Brush Holder Cap

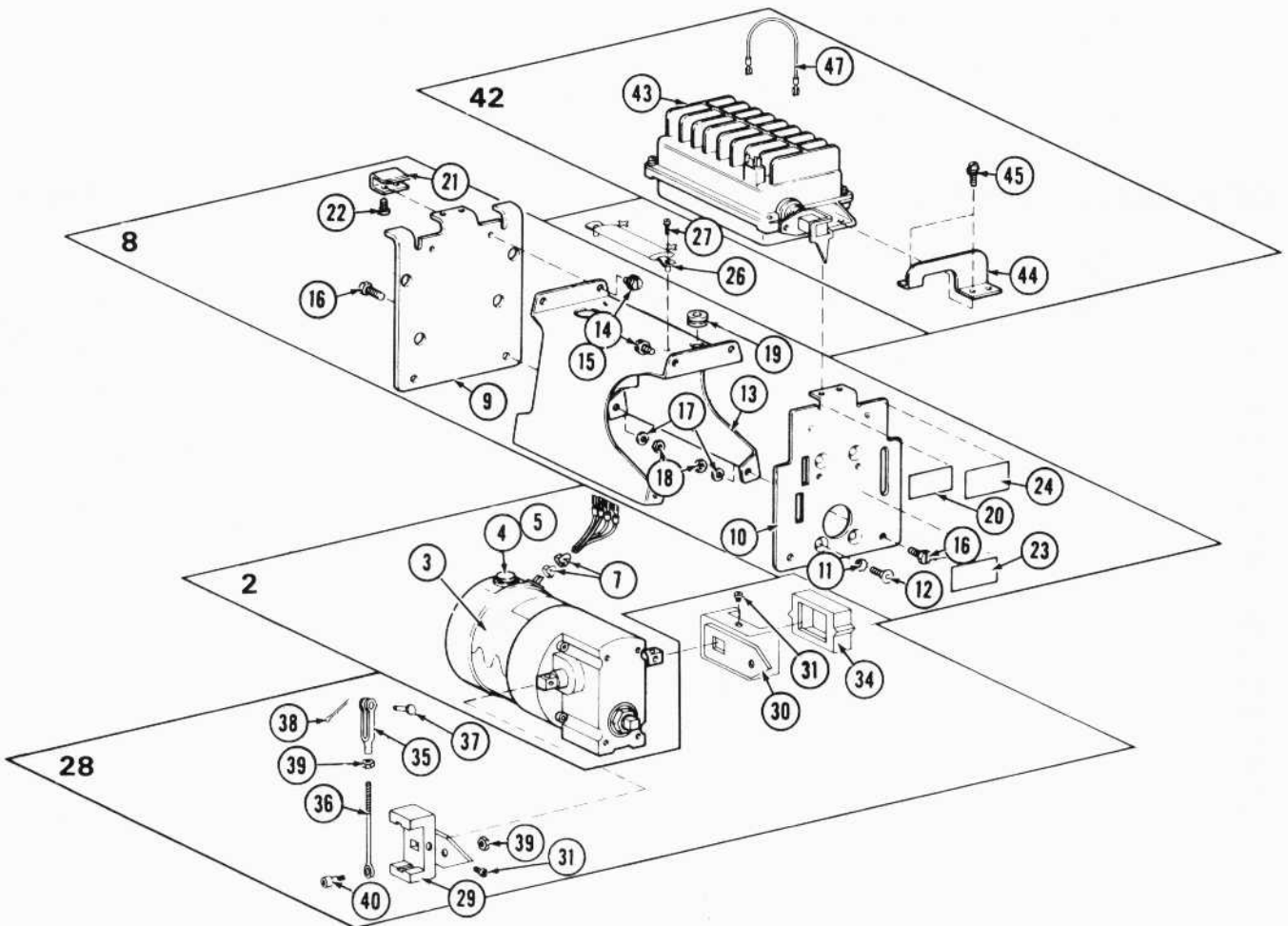


Fig.29 - Motor Modules 8422928 And 8449939 Parts Kits

BRUSH KIT - SIEMENS MOTOR 9505761

<u>No.</u>	<u>Req.</u>	<u>Description</u>
2		Brush (includes spring)
2		Brush Holder Cap

ARMATURE ASSEMBLY - GEARMASTER MOTOR 8483897

ARMATURE ASSEMBLY - SIEMENS MOTOR 9511398

OIL SEAL KIT - GEARMASTER MOTOR 9505762

<u>No.</u>	<u>Req.</u>	<u>Description</u>
2		Output Shaft Seal
1		Worm Shaft Seal
1		Motor Shaft Seal

OIL SEAL KIT - SIEMENS MOTOR 9511397

<u>No.</u>	<u>Req.</u>	<u>Description</u>
2		Output Shaft Seal
1		Worm Shaft Seal
1		Gasket (current production motors)

GEAR MOTOR SUPPORT KIT (Section 8, Fig. 29) 9084417

<u>Ref.</u>	<u>No.</u>	<u>Description</u>
<u>No.</u>	<u>Req.</u>	
9	1	Rear Plate
10	1	Front Plate
11	4	Lockwasher
12	4	Machine Screw
13	1	Support Bracket
14	4	Bolt
15	4	Lockwasher
16	4	Bolt
17	4	Lockwasher
18	4	Nut
19	1	Rubber Grommet
20	1	Label (REV, BRK, O, FOR, MOT)
21	1	Rear Interlock Support
22	2	Screw
23	1	Label (instruction)
24	1	Label (identification)

RESISTOR KIT, (Section 25, Fig. 29) 8492387

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
26	1	Resistor, 40 ohm, 55 Watt
27	2	Screw (includes washer)

COUPLING KIT (Section 28, Fig. 29) 9339330

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
29	1	Coupling, Left-Hand (includes pointer)
30	1	Coupling, Right-Hand (includes pointer)
31	2	Setscrew
34	1	Coupling Insert
35	1	Rod End Yoke
36	1	Drive Link
37	1	Yoke Pin
38	1	Cotter Pin
39	2	Nut
40	1	Shoulder Screw

INTERLOCK KIT (Section 42, Fig. 29) 9084419

<u>Ref. No.</u>	<u>No. Req.</u>	<u>Description</u>
43	1	Interlock Assembly
44	1	Front Interlock Support
45	3	Cap Screw (with attached lockwasher)
47	1	Flexible Lead Assembly

MATERIAL LIST

	<u>Part No.</u>
Silicone (RTV) Compound - 12 oz cartridge	8366747
Silicone (RTV) Compound - 5 oz tube	8453256
Loctite Retaining Compound - 10 cc tube	8471182
Gear Shield Lubricant (Gearmaster Gear Motor)	Alemite (Div. of Stewart Warner) 8324
Gear Shield Lubricant (Siemens Gear Motor) - 1 lb can	Aero Lubriplate 8196886

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