# INSTRUCTIONS–PARTS LIST

307–866
Rev. B
Supersedes A

**This manual contains IMPORTANT WARNINGS AND INSTRUCTIONS**
READ AND RETAIN FOR REFERENCE

# CONVERSION/REPAIR KIT 221–181

**To repair Quiet Viscount I Hydraulic Motor, Model 221–168**

**To convert a Standard Viscount motor, Models 210–107, 217–022 and 217–338 to a Quiet–style motor.**

U.S. Patent No. 4,792,291
U.K. Patent No. 2,226,089
French Patent No. 88 16726
Other Foreign Patents Pending

**WARNING**

**Pressure Relief Procedure**
To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or skin, or injury from moving parts, always follow this procedure when shutting off the pump, checking or servicing any part of the system, installing or changing spray tips and whenever you stop spraying.

1. Engage the gun/dispensing valve safety latch.
2. Turn off the hydraulic power supply.
3. Disengage the gun/valve safety latch.
4. Hold a metal part of gun/valve firmly to a grounded metal pail. Trigger to relieve pressure.
5. Engage the safety latch again.
6. Open the pump drain valve (required in system), having a container ready to catch the drainage.
7. Leave the drain valve open until you are ready to spray again.

*If you suspect the spray tip or hose is completely clogged or pressure is not fully relieved after following these steps,* VERY SLOWLY loosen hose end coupling and relieve pressure gradually, then loosen completely. Now clear the tip or hose obstruction.

**CAUTION**

Cleanliness is essential when repairing hydraulic motors. Avoid getting dust or dirt into the motor.

**NOTE:** Complete warnings and instructions are in manuals 307–158 and 307–865.

**NOTE:** Always replace retaining plugs and springs when replacing spool. Kit parts are marked in the text with two asterisks, for example (37**).

## Disassembly

1. Follow the **Pressure Relief Procedure Warning.** Disconnect all lines from motor. Remove pump from mounting. Disconnect motor from pump.

**CAUTION**

Plug the hydraulic lines immediately to prevent contamination of the hydraulic system.

2. Place the hydraulic motor in a bench vise.
3. ***For Models 221–168 and 210–107 only:*** Remove the drip pan screws (4) and drip pan (50) from base (42). Unscrew the retainer screw (6). Remove the drip cover (31) from the piston (49). Refer to the Parts Drawing on page 3.
4. Unscrew both hydraulic tube (48) compression nuts. Remove the tube. Drain the oil into a pan. Remove the screws (8) holding the end cap (44).
5. Push the piston (49) up as far as possible.

**CAUTION**

To prevent damage to the spool (37) and upper housing (40), **be sure** the detent assemblies are removed before removing the end cap (44) and bearing and guide (51). See Step 6.

6. Remove one detent assembly – *plug (28), gasket (25), spring (29), guide (27), ball (7)*. If parts stick in the upper housing (40), turn the motor over and tap lightly. **Do not allow the parts to fall into the motor**. Repeat for the other detent assembly.
7. *Loosen* the four tie rod locknuts (3).
8. Remove the motor and lay on its side in a pan.
9. Remove the four tie rod locknuts (3), the four tie rods (35) and washers (1). It is not necessary to remove the crown nuts (22) from the rod.

**CAUTION**

With the tie rods removed, the assembly may separate at the joints between the cylinder (39) and the upper and lower housings (40 & 41).

10. Remove the capscrews (8) and end cap (44).

11. Remove the stop plug (43) from the upper housing (40). Pull the upper housing 2 to 3 inches off the cylinder (39). Rock the housing to work it free. Do not remove the cylinder from the lower housing (41).

12. Hold the trip rod (36) steady with an adjustable wrench on the flats of the rod, and remove the top hex nut (20) from the trip rod.

13. Lift the upper housing assembly (40) with the spool guides (34) and springs (38) still inside.

**NOTE:** If you are not using the repair kit, inspect the trip rod above the shoulder for scoring or damage. There must be no reduction in rod diameter. If there is, replace the rod.

14. Pull the trip rod (36) and piston (49) from the lower housing (41) and cylinder (39). Place the flats of the piston in a vise. Use a hammer and punch to remove the retainer (32). Remove the trip rod from the piston.

15. Remove the trip rod locknut (9) and piston stop (33). If the piston is being replaced, remove and save the compression spring (55) and the o–ring (26). New compression rings (19) are supplied with the kit.

**CAUTION**

Use care when removing the piston from the cylinder to avoid scratching the cylinder wall or the piston.

16. Remove the cylinder (39) and lower housing (41). Remove the seals (23) from the bottom of the lower housing.

## Reassembly

1. Lubricate the seals (23**) with light oil. Install in the lower housing (41) ***with lips facing top of motor***. Install the o–ring (12**) on the lower housing. Install the lower housing, making sure it seats properly. Install the o–rings (13**) on the cylinder (39), and install the cylinder on the lower housing.

2. Install the compression spring (55) inside the piston (49). The compression rings (19**) should be positioned with the joints 180° opposed.

3. Install the piston stop (33**) and locknut (9) on the trip rod (36**). Slide the trip rod into the piston (49) and spring (55). Apply low strength sealant such as Loctite® TL–222 to the retainer threads (32). With the piston flats in a vise, screw the retainer all the way into the piston.

**CAUTION**

Screwing the retainer (32) ***all the way*** into the piston (49) is essential to prevent the retainer from backing out during operation and damaging the motor.

4. Using a hose clamp to compress the piston rings (19**), install the trip rod and piston in the cylinder (39) and lower housing (41) until the tops of the piston and cylinder are flush.

5. Clamp the trip rod flats with a wrench, and then install the upper housing (40), so the tube fittings align with those on the lower housing. The trip rod will protrude.

6. Slide the lower trip rod guide (34**) and spring (38**) onto the trip rod. Install the spool (37**) with the detent at the top. Install the top spring (38**) and guide (34**) on the trip rod. Hold the flats of the trip rod with an adjustable wrench and install the top hex nut (20). Slide assembly into upper housing (40).

7. Place the o–ring (11**) on the stop plug (43**), then place the plug on the spool (37**). Install the end cap (44), using low strength sealant on the screws (8). Install the tie rods (35) and washers (1).

**CAUTION**

To prevent damage to the spool (37) and upper housing (40), **be sure** the end cap (44) and bearing and guide (51) are installed before installing the detent assemblies. See Step 8.

8. With the motor on its side, install the detent assemblies: ball (7), guide (27 – *with concave surface toward ball*), spring (29**), gasket (25**) and retaining plug (28**). Repeat for the other detent assembly.

9. Install the hydraulic tube (48) and tighten the compression nuts to 40–60 ft–lb (54–82 N.m).

10. Torque the crown nuts (22) and tie rods (35) to 70–80 ft–lb (95–108 N.m).

11. Apply low strength sealant to the lower threads of the tie rods (35) and torque the four tie rods locknuts (3) to 20–30 ft–lb (27–41 N.m).

12. Be sure the o–ring (26) is in place in the groove on the bottom half of the piston (49). Install the drip cover (31) and screw (6) on the bottom of the piston (49). Install the drip pan (5) and screws (4), making sure the drain adapter aligns with the drain port in the base (42).

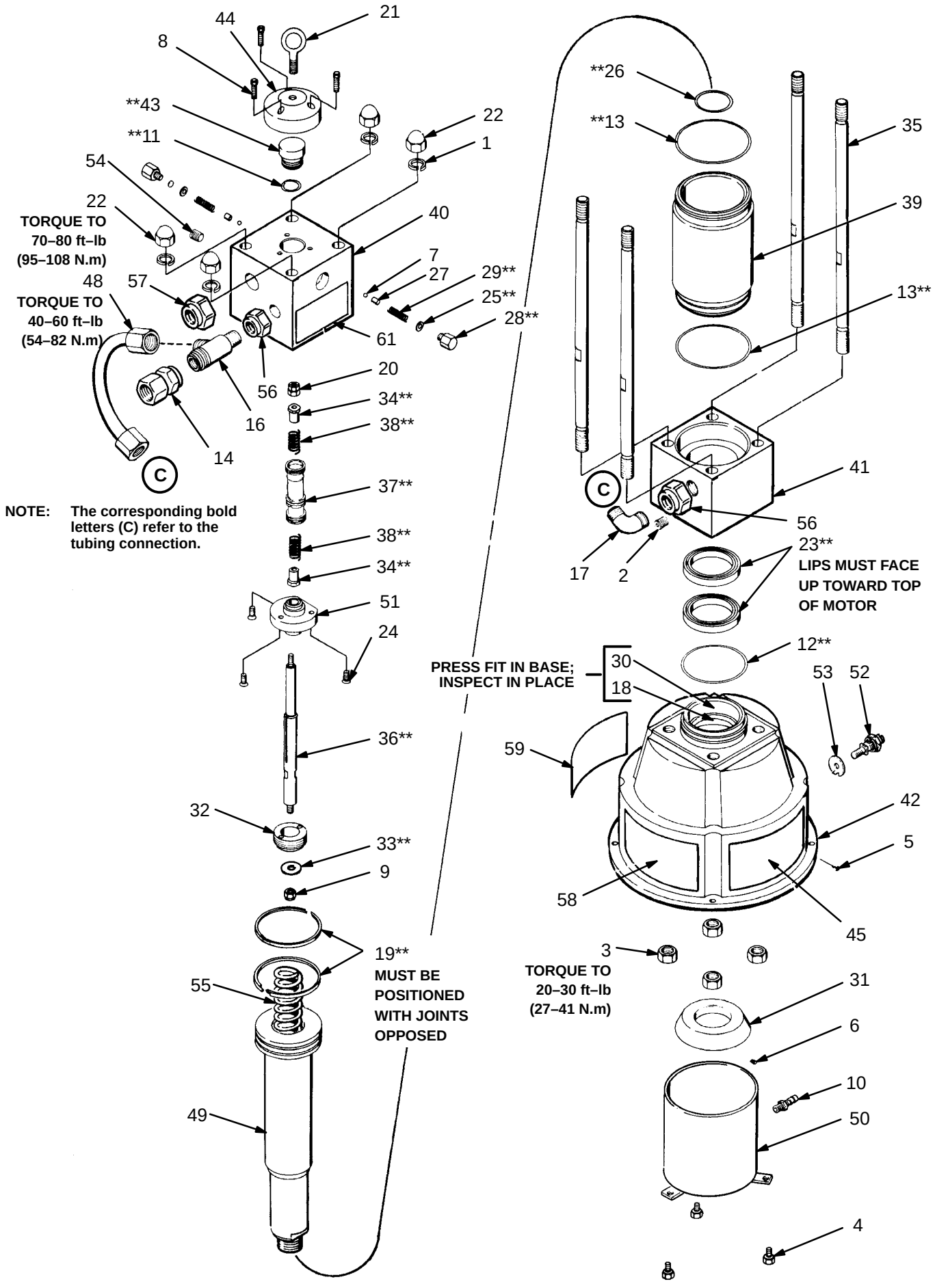
13. Connect the pump and motor, and all fluid lines. Install in your system. Reconnect the ground wire.

## PARTS LIST

**Repair Kit 221–181**
**Includes items listed below**

| Ref No. | Part No. | Description | Qty |
|---|---|---|---|
| 11 | 104–093 | O–ring | 1 |
| 12 | 104–280 | O–ring | 1 |
| 13 | 104–095 | O–ring | 2 |
| 19 | 104–103 | Ring, piston, compression | 2 |
| 23 | 104–203 | Seal, v–block | 2 |
| 25 | 150–111 | Gasket | 2 |
| 28 | 167–431 | Plug | 2 |
| 29 | 108–522 | Spring | 2 |
| 33 | 181–243 | Stop | 1 |
| 34 | 183–659 | Guide | 2 |
| 36 | 171–407 | Rod | 1 |
| 37 | 183–658 | Spool | 1 |
| 38 | 171–411 | Spring | 2 |
| 43 | 171–416 | Plug | 1 |

# PARTS DRAWING



# THE GRACO WARRANTY AND DISCLAIMERS

**WARRANTY**

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non–Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

**DISCLAIMERS AND LIMITATIONS**

THE TERMS OF THIS WARRANTY CONSTITUTE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND ARE IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED), INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY NON–CONTRACTUAL LIABILITIES, INCLUDING PRODUCT LIABILITIES, BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL GRACO'S LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. ANY ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN TWO (2) YEARS OF THE DATE OF SALE.

**EQUIPMENT NOT COVERED BY GRACO WARRANTY**

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS, OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

# IMPORTANT PHONE NUMBERS

**TO PLACE AN ORDER**, contact your Graco distributor, or call this number to identify the distributor closest to you: **1–800–328–0211 Toll Free**

**FOR TECHNICAL ASSISTANCE,** service repair information or assistance regarding the application of Graco equipment: **1–800–543–0339 Toll Free**

**Factory Branches:** Atlanta, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)
**Subsidiary and Affiliate Companies:** Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

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