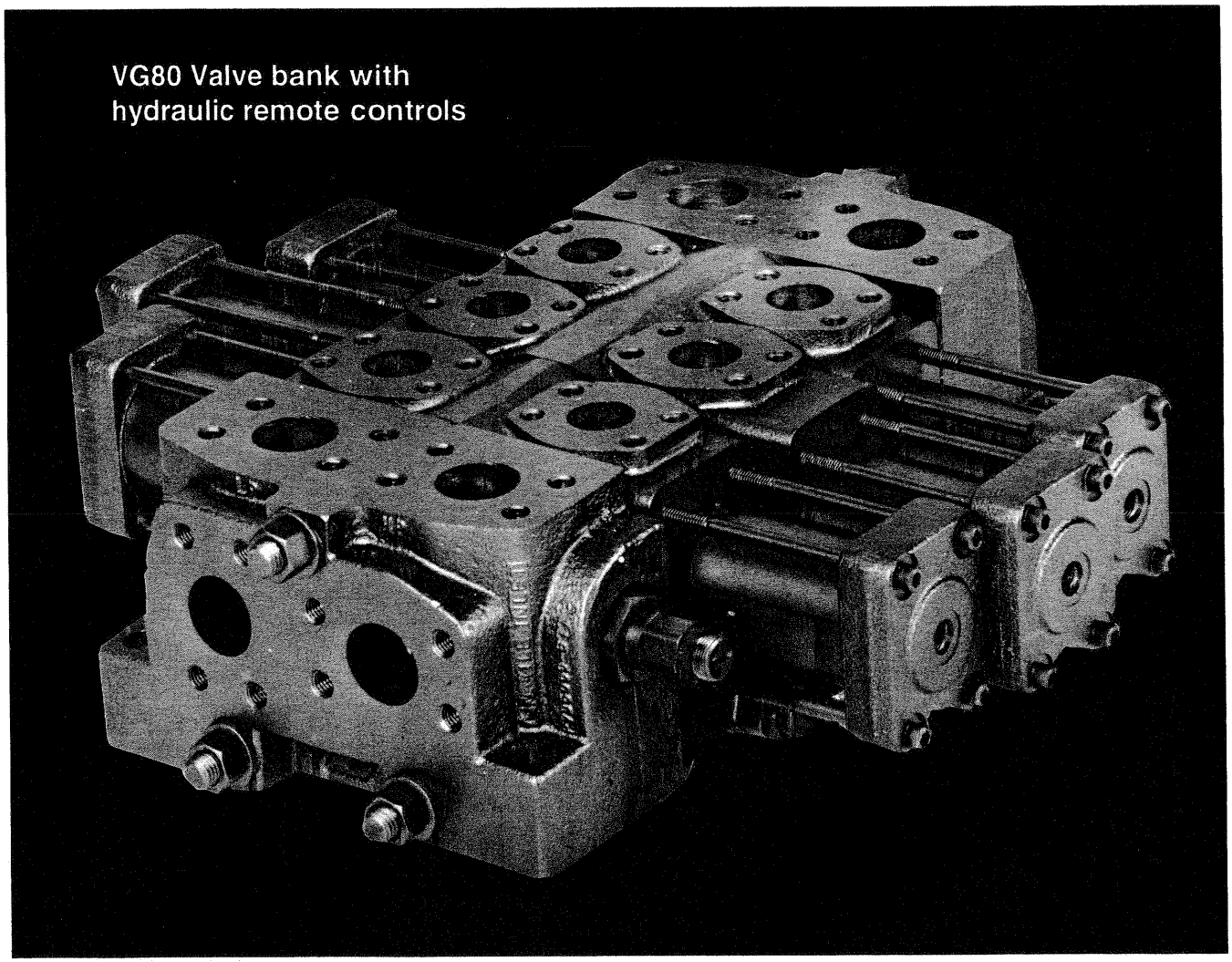
# VG 80

## Directional Control Valves
## Service Instructions HS 36

Commercial Intertech



VG80 Valve bank with
hydraulic remote controls

80-492

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## Introduction

This manual has been prepared to assist you in the proper maintenance of Commercial Intertech's VG80 directional control valves. To facilitate repairs, and before any work is done, we suggest that you read the assembly and disassembly instructions completely.

Also remember that the first rule of good maintenance is cleanliness, including the work environment. MAKE SURE YOU DISASSEMBLE AND ASSEMBLE YOUR HYDRAULIC EQUIPMENT IN A CLEAN AREA. Dirt is the natural enemy of any hydraulic system.

## Genuine Parts

The illustrations in this manual and the instructions which refer to them, apply only to Commercial Intertech assemblies, sub-assemblies and components. All valve components except for spools and housings are available as replacement parts or sub-assemblies. Spools are hone-fitted to their individual housings. Therefore, damage to either of these components means the entire section must be replaced.

We recommend that you use only original Commercial Intertech replacement parts in your service program. Manufactured on the same production lines to the same exacting tolerances and quality controls as the original equipment, genuine Commercial Intertech replacement parts are your best hedge against premature component failure and costly downtime. Service parts and assemblies are available through your original equipment dealer or any authorized Commercial Intertech distributor.

## General Information

Commercial's VG model valves are cast from compacted graphite, a high strength iron alloy which allows the valve to be rated for 3500 psi service.
These open-center directional control valves are designed for parallel circuitry. They are of sectional or stack type construction which permits additional work sections to be added to the valve bank. This design also makes possible the combination of sections for a variety of controls in a single bank.

All sections have optional features such as port relief valves and anti-cavitation checks.

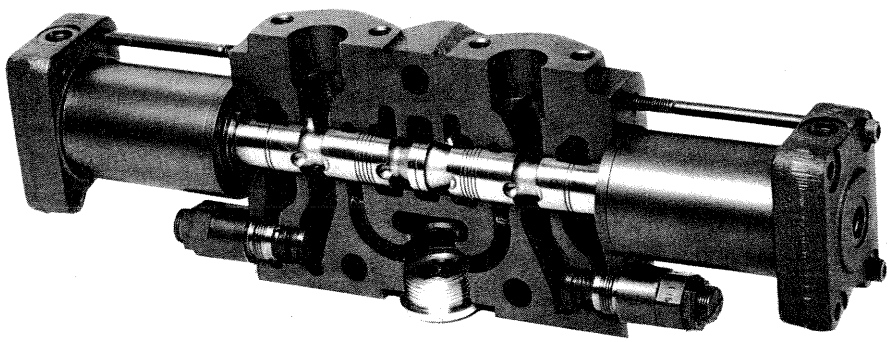
**Always refer to the machine's owners manual for the proper procedure to remove the valve from the machine.**

## Overhaul

Valves are often used in hazardous environments. Therefore, care should be taken to inspect it frequently for damage due to improper use, corrosion or normal wear. Repairs should be made immediately if needed.

Remove the valve bank from the equipment and disconnect all hoses, fittings, control handles and linkage connectors that might be attached to the valve. Plug all ports and thoroughly clean the valve bank's exterior, after which the port plugs can be removed.

**ALL WORK MUST BE PERFORMED IN A CLEAN AREA.**



**Typical VG80 work section with remote operators**

® Commercial Intertech

# Valve Bank Disassembly

## Step 1 - Mark the Valve Bank

This step is the most critical step in the disassembly procedure. It should be followed very closely to ensure that the valve bank is properly reassembled after repairs have been made. See figure 1.

A. Take a waterproof, quick-drying marker and mark each casting with a sequential number. Start by marking the inlet casting as #1 and finish by marking the outlet with the highest number.

B. Mark the port boss closest to the back cap on each work section with a "B" (for back cap end).

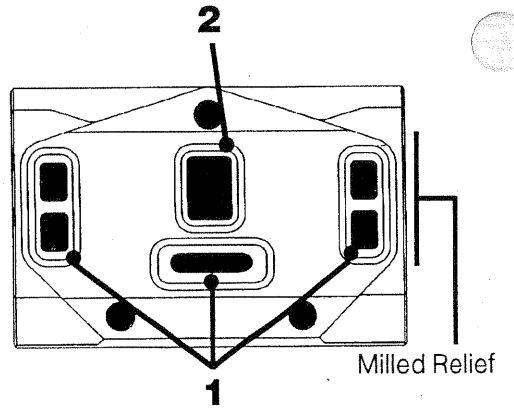
C. Next mark the port boss closest to the spool clevis on each work section with a "C" (for clevis end).

D. Lastly, if relief valves must be removed from the valve bank they should be marked with the number of the casting and port to which they belong. Inlet and mid-inlet relief valves are marked with their casting number only.

## Step 2 - Tie Bolts

Remove the three (3) tie bolts which hold the bank together and separate the sections.

**Figure 2**




Parallel Section

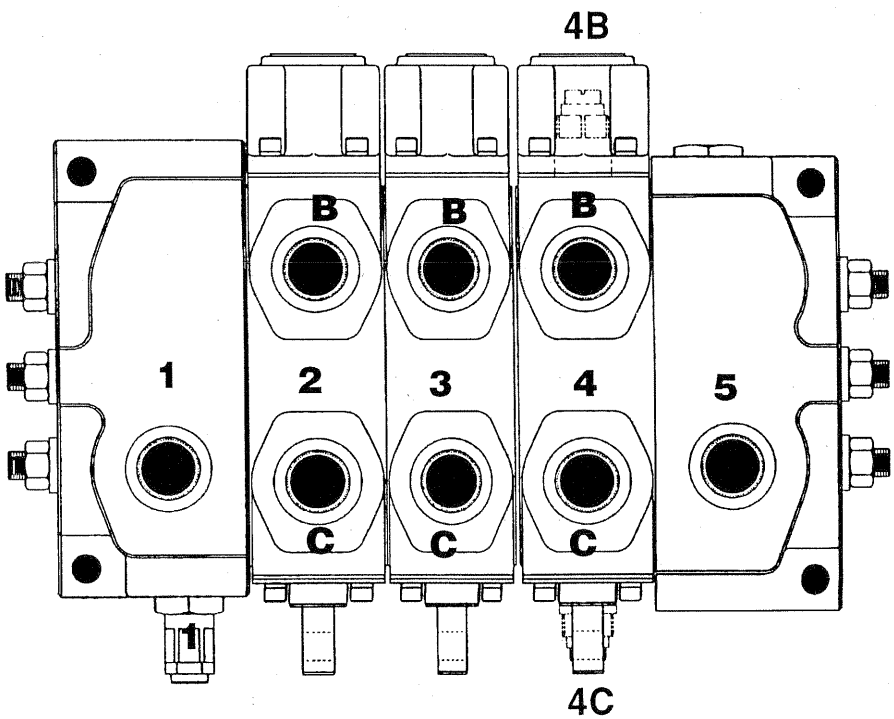
## Step 3 - Section Seals

The inlet, mid-inlet and each parallel work section have four (4) section seals (Items 1 & 2, Figure 2) on the downstream mating face. These section seals should be removed and discarded.

## Step 4 - Valve Back Cap

Remove the four (4) cap screws (Item 4) and lock washers (Item 4A) which fasten the back cap to the work section and then remove the back cap (Item 5).See Figure 3.

**Figure 1**



## Step 5 - Control Spool and Seals

Grasp the spring end of the spool with a clean rag and pull the spool with a twisting motion. Generally, the rear retainer plate (Item 6) backup ring (Item 7) and spool seal (Item 8) will come out with the spool.

**CAUTION: For detented spool models, be careful not to remove the detent poppet sleeve (Item 17, Figure 4) unless it is to be serviced.**

Next remove the four retainer screws (Item 9) and lock washers (Item 4A) from the spool clevis end of the work section. Then remove the two retainer plates (Item 6), the backup ring (Item 7) and the spool seal (Item 8). Tag or mark the spool with its work section's identification number (from Step 1). Discard spool seals (Item 8) and backup rings (Item 7).

## Step 6 - Transition Check

The transition check is located in the bottom center of the work section housing. Remove the check valve cap (Item 10) and its "O" ring seal (Item 11) then remove the check spring (Item 12) and the check valve poppet (Item 13).

NOTE: Only cylinder work sections that have ports blocked in neutral have a transition check.

## Spool - Disassembly

## Step 7 - Spring Centered Spool

These parts should not be removed from the spool unless they are being replaced. Once the spool is free of the work section housing, it must be handled carefully to avoid damage. Place the spool in a soft jawed vise and remove the stripper bolt (Item 14) with a wrench. Cautious application of heat may be required to free the stripper bolt because an anaerobic thread adhesive is used in its assembly.

**CAUTION: Too much heat may distort the spool.**

As the stripper bolt threads disengage the spring (Item 15) and spring guides (Item 16) will pop free of the spool.

## Step 8 - Detented Spool

Again these parts should not be removed from the spool unless they need to be replaced. Wrap the detent sleeve (Item 17) with a clean rag. Grip the rag covered sleeve and pull firmly. As the sleeve moves backwards, the detent balls (Item 18) and the detent spring (Item 19) will pop free. The rag should capture these parts and prevent their loss. Then remove the spacer (Item 21). Next clamp the spool in a soft jawed vise and remove the detent poppet retainer (Item 20) use an undersized bar through the detent ball bore as a wrench. Cautious application of heat may be required because an anaerobic adhesive is used in the retainer's assembly.

**CAUTION: Too much heat may distort the spool.**

## Cleaning, Inspection and Repair

1. Inspect the spool bores, check seats and spools for deep scratches, gouges or excessive wear. If any of these conditions exist, replace the section. Minor surface damage on the control spool and check poppet may be polished away carefully with very fine crocus cloth.
2. Examine the machined surfaces of the valve housing for nicks and burrs that could cause leakage between sections. Lightly stone these surfaces to remove any rough spots.

**CAUTION: A shallow milled relief area (noted in Figure 2) extends across the "O" ring face of the valve housing. It should not be stoned or ground off.**

3. Wash all parts thoroughly in a clean solvent and blow dry before beginning reassembly. Pay special attention to the number and letters marked on the parts in Step 1. If any marks are washed off during cleaning, remark immediately.

# Typical Valve Section

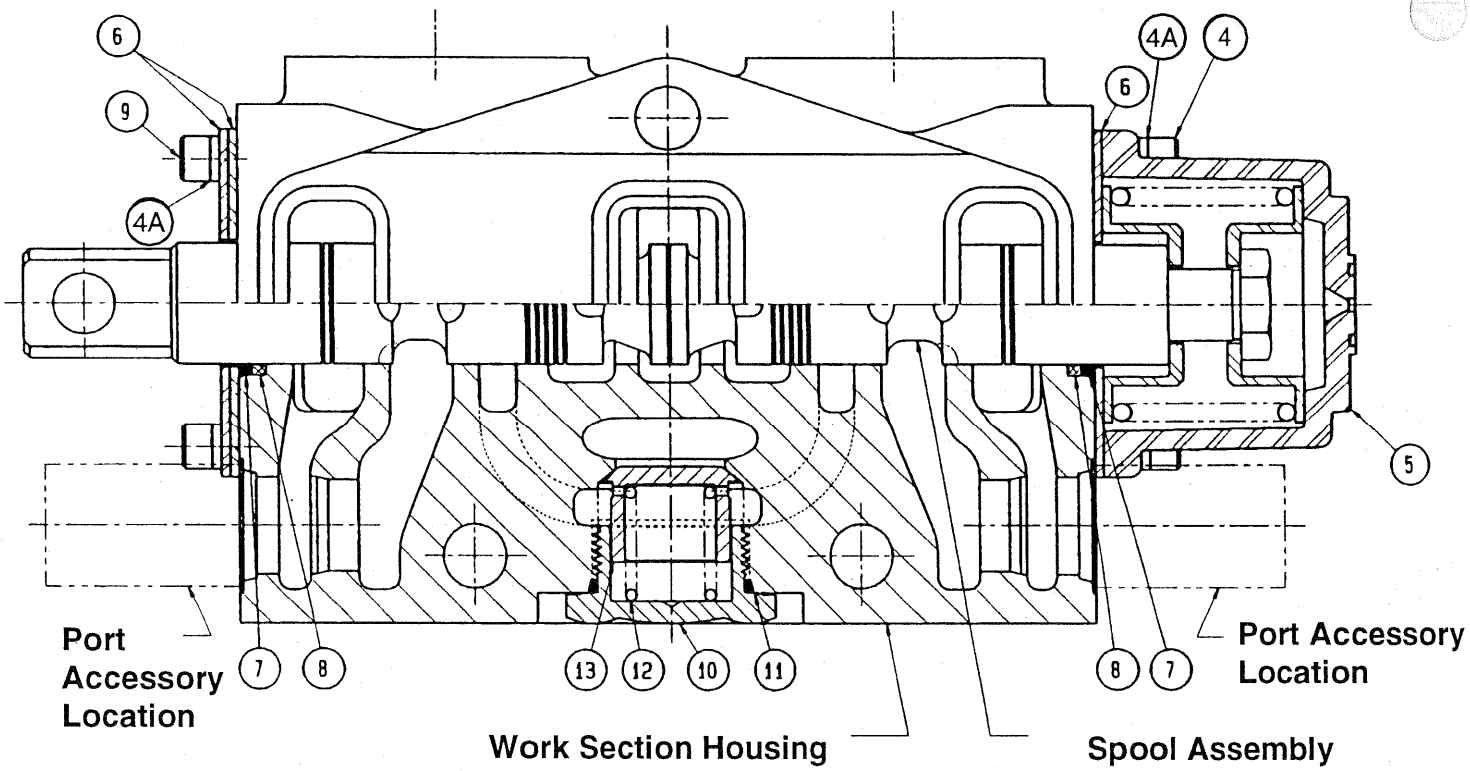



**Figure 3**

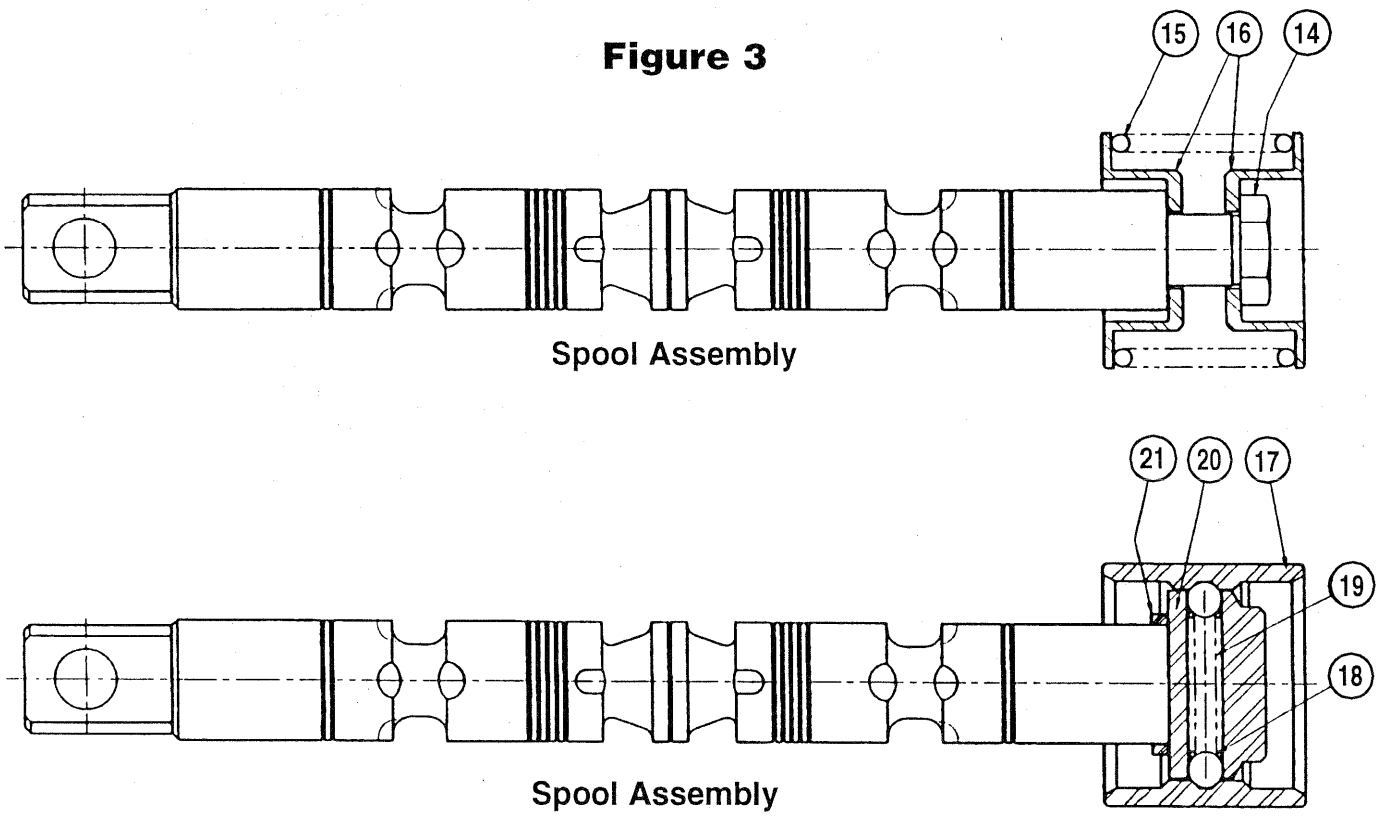



**Figure 4**

# PARTS LIST

| Item | Description | Qty. |
|---|---|---|
| **Parallel Section Seals* See figure 2** | | |
| 1. | Square Seal | 3 |
| 2. | Square Seal | 1 |
| Parallel Section Component Parts. See Figure 4 | | |
| 4. | Back Cap Screw | 4 |
| 4A. | Lock Washer | 8 |
| 5. | Back Cap | 1 |
| 6. | Retainer Plate | 3 |
| 7. | Backup Ring | 2 |
| 8. | Spool Seal | 2 |
| 9. | Retainer Plate Screw | 4 |
| 10. | Check Valve Cap | 1 |
| 11. | "O" Ring Seal | 1 |
| 12. | ** Check Spring | 1 |
| 13. | ** Check Valve Poppet | 1 |
| 14. | Stripper Bolt | 1 |
| 15. | Centering Spring | 1 |
| 16. | Spring Guide | 2 |
| 17. | Detent Sleeve | 1 |
| 18. | Detent Ball | 2 |
| 19. | Detent Spring | 1 |
| 20. | Detent Poppet Retainer | 1 |
| 21. | Detent Spacer | 1 |

*Parallel Sealing Face includes inlets and mid-inlets.

** Not required in Float-in-neutral Sections.

# Assembly

Reverse the procedures outlined in Steps 1 through 8. Also, follow the additional instructions listed below:

## Spool Assembly (Spring Centered)

Clamp the control spool in a soft jawed vise. Apply a small amount of Loctite™262 or equivalent anaerobic adhesive to the stripper bolt (Item 14) before assembly.

**CAUTION: Follow the adhesive manufacturer's instructions for proper cleaning and curing. Failure to clean and prepare parts properly may result in assembly failure.**

Assemble the spring (Item 15), spring guides (Item 16) and stripper bolt (Item 14) onto the spool (Reverse of Step 7). Lightly coat the spring assembly with high temperature grease to prevent it from rusting.

## (Detented)

Clamp the control spool in a soft jawed vise. Apply a small amount of Loctite™262 or equivalent anaerobic adhesive to the detent poppet retainer (Item 20) and thread it into the control spool.

**CAUTION: Follow the adhesive manufacturer's instruction for proper cleaning and curing. Failure to clean and prepare parts properly may result in assembly failure.**

Then lightly coat the detent balls (Item 18), detent spring (Item 19) and detent sleeve (Item 17) with high temperature grease. Next place the detent balls and spring into the detent poppet retainer as indicated in Step 8 and partially compress them with a small clamp. Now slide the detent sleeve into position, pushing the clamp out of the way at the same time.

## Valve Section Assembly

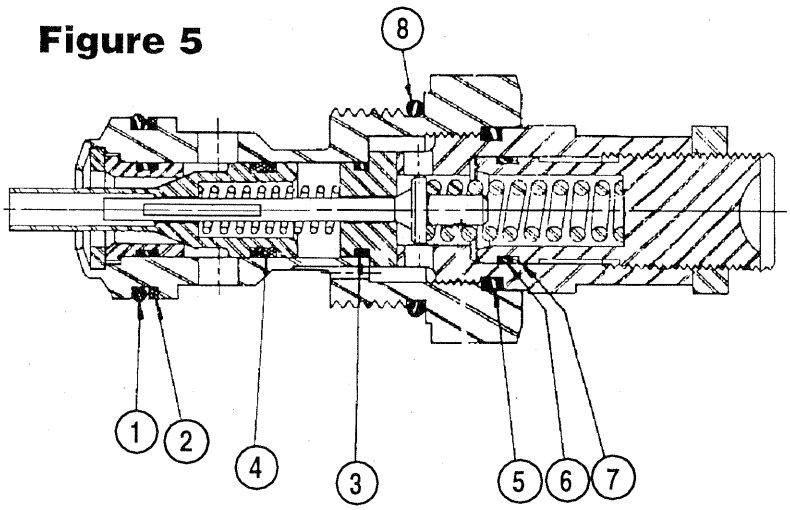
Apply a light coating of clean hydraulic oil to the valve spool. Place the retaining plates (Item 6), new backup rings (Item 7) and new spool seals (Item 8) in position as shown in Figure 3. Carefully insert the spool into the housing. Make sure that the spool and housing are in the proper orientation (see Step 1). Place Loctite™262 or its equivalent on the backcap screws (Item 4) and front retainer screws (Item 9). Install lockwashers (Item 4A) and thread screws into the valve housing. When installing the transition check refer to Step 6. Torque cap screws to 143 - 145ft. lbs.

## Valve Bank Assembly

Return all relief valves to their proper positions (see Step 1). Coat the section seals (Items 1 & 2 or Items 1 & 3) with grease and place them in their grooves (Figure 2). Install the valve sections on the tie bolts in their proper sequence (see Step 1). Torque the tie bolts in a cross pattern to 150 ft. lbs.

## System Overload Relief Valve

**Figure 5**




| Item | Description | Qty |
|---|---|---|
| 1. | "O" Ring | 1 |
| 2. | Backup Ring | 1 |
| 3. | "O" Ring | 1 |
| 4. | Seal | 1 |
| 5. | "O" Ring | 1 |
| 6. | "O" Ring | 1 |
| 7. | Backup Ring | 1 |
| 8. | "O" Ring | 1 |

The main relief valve protects the hydraulic system against overload pressures. It is located in the inlet housing and it also can be found in mid-inlet sections used in the valve bank. Figure 5 illustrates the arrangement of the parts and serviceable seals. This is a cartridge type relief valve and is removed from the control valve as an assembly for replacement or service.

# Work Port Relief Valve Options

## • Pilot Operated Relief Valve With Anti-cavitation Function Screw Adjustable

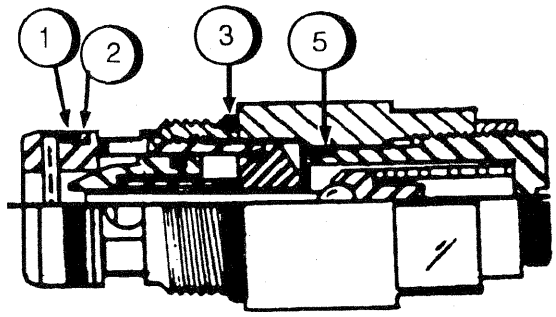



**Figure 6**

The full-flow work port relief valve normally functions when the valve spool is in the neutral position. Fluid is discharged from the work port passage to the tank return passage of the valve section. The pressure setting is normally higher than that of the main relief valve. Either of the two work port relief valves can be used in any VG80 section if the section has the appropriate machining.

| Item | Description | Qty |
|---|---|---|
| 1. | "O" Ring | 1 |
| 2. | Backup Ring | 1 |
| 3. | "O" Ring | 1 |
| 4. | "O" Ring | 1 |
| 5. | "O" Ring | 1 |

**NOTE: When installing relief valves, torque them to 80 - 90 ft. lbs.**

## • Differential Area Relief Valve Shim Adjustable

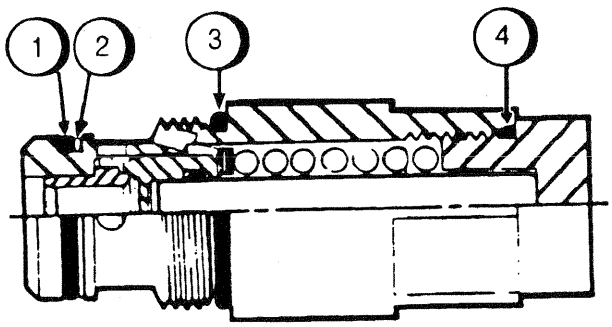



**Figure 7**

# Service Instructions
# Remote Control Operators

**Read these instructions carefully. Failure to follow these procedures can result in poor performance and/or product failure. Make sure all work is done in a clean area.**

**VG80 Seal Parts List**

**Item 1 2-Pieces**
**Item 10 4-Pieces**

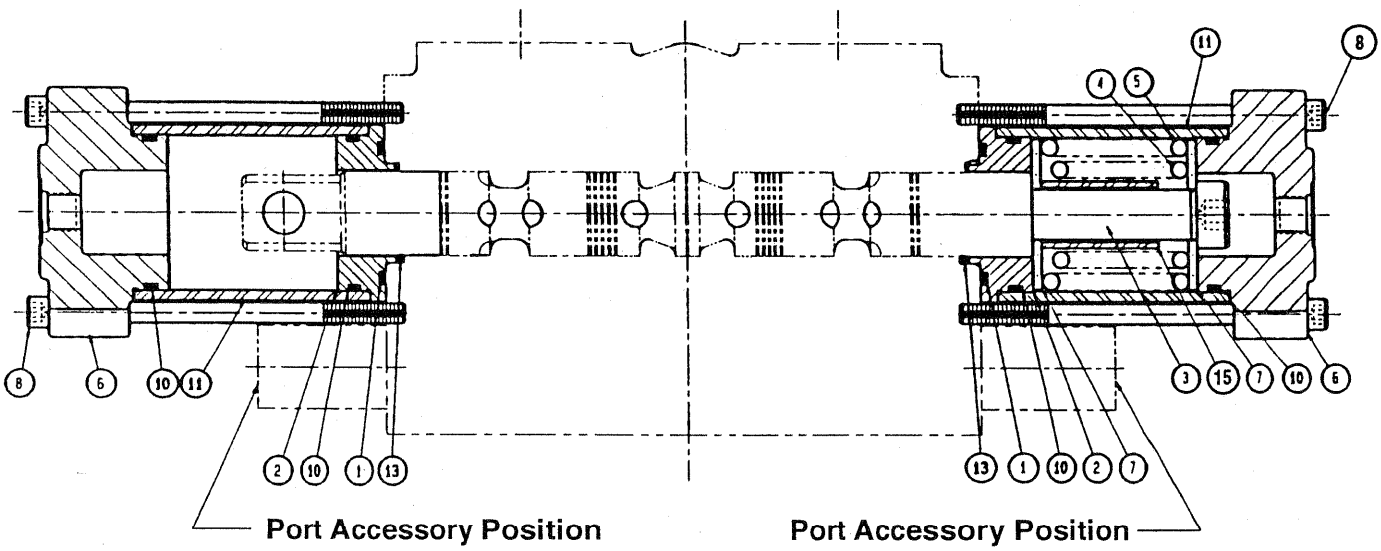



**Figure 8**

### Section Disassembly

1. Remove cap screws (8) from both ends of the valve section.

2. Remove end caps (6) , seals (10) and end cap tubes (11) from each end of casting.

3. Remove the seal retainer (2), seals (1 & 10) and backup ring (13) from the clevis end of the spool assembly.

4. Remove spool and spring package assembly from valve section. Remove the seal retainer (2), seals (1 & 10) and backup ring (13) to replace seals.

5. If stripper bolt (3) must be removed from the spool to replace parts, it may be necessary to heat the stripper bolt to loosen adhesive on the threads.

**Use heat carefully to avoid warping the spool.**

### Preparation of Parts

1. Clean adhesive from threads of spool, stripper bolt, housing, cap screw holes and hex nut with Loctite™ Chisel Gasket Remover.

2. Wash all parts in solvent to remove grease and oil. Blow dry.

# Section Assembly

**CAUTION Failure to follow these recommended assembly instructions can result in poor performance and / or failure of the product. Product should be thoroughly tested to ensure proper operation before the valve is put into service.**

## Start assembly with the spring end or B end of the spool.

NOTE: If stripper bolt (3) was not removed from spool, proceed to step 6.

1. Place spool in a soft-jawed vise, threaded end up.

2. Spray the threads of the new stripper bolt (3) with LOCQUIC Primer Grade NF™ and let dry. Apply Loctite 262 Red™ to threads.

3. Slide one spring retainer (7) onto the end of the stripper bolt (3).

4. Slide the springs (4 & 5 ) and spacer (15) over the stripper bolt. Install the other spring retainer (7) and compress the springs so that the stripper bolt (3) can be screwed into the valve spool.

**Be sure the spring retainer slides freely.**

5. Torque the stripper bolt (3) to 28 ft. lbs. ( ± 1 ft. lb. ) and set the spool assembly aside to cure for a minimum of 8-hours. After curing, test the stripper bolt to be sure it withstands 22 ft. lbs. of breakaway torque.

6. Apply light grease to seals. Assemble "O" ring (10) on OD of seal retainer (2) and "O" ring (1) in the end of the seal retainer.

**CAUTION: Seals are similar in size. Be sure to insert seals (1 & 10) in their proper position. They are not interchangable.**

7. Install one seal retainer with "O" rings onto spool. Install backup ring (13) and slide the spool into the valve housing.

8. Lightly grease "O" ring (10) and install it on the valve cap (6).

9. Install end cap tube (11) on seal retainer (2) . Then slip end cap (6) into the end cap tube (11).

10. Spray threads of the cap screws (8) and the threads in the housing with LOCQUIC Primer Grade NF™ and let dry.

11. Apply Loctite 262 Red™ to threads of the four cap screws (8). Insert them through valve cap (6) and screw them into the valve housing. Tighten the cap screws evenly and torque to 175 in. lbs. ( ±17 in. lbs.)

Assembling the clevis end or C end.

12.Install seal backup ring (13) and seal retainer (2) with seals on clevis end of spool. Install end cap tube (11) and valve cap (6) as in figure 8.

13. Install four cap screws (8), tighten evenly and torque to 175 in. lbs. ( ± 17 in. lbs.) to complete assembly.

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## TROUBLESHOOTING

| TROUBLE | PROBABLE CAUSE | REMEDY |
|---|---|---|
| Oil leaks between sections | Pinched or blown section seal | Replace seal |
| | Stud fasteners not correctly torqued | Replace seals and torque fasteners to specifications |
| | Mounting plate not level | Loosen mounting bolts and shim as required |
| Oil leaks at either end of spool | Over pressurized tank core | Correct high back-pressure condition |
| | Worn or damaged spool seals | Replace the seals |
| Spring - centered spools do not return to neutral | Broken centering spring | Replace spring |
| | Misalignment of operating linkage | Check linkage for mechanical binding |
| | Foreign particles in system | Clean valve & system |
| Load will not hold | Cylinder leaking or worn | Check cylinder - repair |
| | Port relief valve not functioning | Remove & clean or replace |
| | Spool or housing scored or worn excessively | Replace valve section |
| Load drops when spool moved from neutral | Dirt or foreign particles lodged between check valve poppet and seat | Disassemble, clean & reassemble |
| | Scored or sticking check valve poppet | Replace poppet |
| No motion, slow or erratic system operation | Worn pump | Rebuild or replace pump |
| | Defective cylinder or motor | Repair or replace |
| | Low oil level in reservoir | Add oil to recommended level |
| | Clogged suction strainer | Clean or replace strainer |
| | Suction line restricted | Check lines for kinks or obstructions |
| | Relief valve not properly set | Be sure R/V is set to specs |
| | Relief valve poppet or seat scored & sticking | Replace relief valve |
| | Valve spool not shifted to full stroke | Check spool linkage travel |

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