



2400 Series Bossmatic Control Valve Installation, Operating and Maintenance Instructions.

INSTRUCTIONS

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil or grease, and other foreign material.
2. Install the valve so the controlled fluid will flow through the valve body in the direction indicated by the arrow cast on the valve body.
3. A three-valve bypass would permit removal of the control valve from the line without shutting down the system.

CAUTION!

Before attempting to do any work on a valve while the system is in operation, the valve must be isolated 100% from the active system and the isolated line voided of pressure and/or hazardous fluids.

4. In case of a heat-insulated installation, insulate the valve body only, not the bonnet.

AIR PIPING

1. For an air-to-extend actuator (air-to-close action), connect the actuating air pressure line to the ¼ NPT opening in the upper diaphragm case. For an air-to-retract actuator (air-to-open action) connect the actuating air pressure line to the ¼ NPT opening in the lower diaphragm case.
2. Use ¼" (6mm) O.D. tubing or equivalent for all air lines. If airline exceeds 25 ft (8m) in length, 3/8" (10mm) tubing is preferred. Airlines must not leak. Air pressure should not exceed 35 psig (2.5 BarG).

CAUTION!

When assembling or disassembling the valve, do not turn the valve stem while the plug is touching the valve seat. This will damage the valve's seating surfaces.

CAUTION!

When adjusting the valve stem do not grip the stem directly with pliers or a wrench. This will damage the surface of the stem, and cause damage to the packing in the valve. Instead, counter-tighten the two locknuts (27) on the stem (5). This will allow you to turn the stem by turning the locknuts (27) with a wrench.

When placing valve in a vice, clamp the flat end faces of the valve. Do not clamp the rounded sides of the valve. This will distort the shape of the casting, and will ruin the valve.

BODY DISASSEMBLY

1. Mount the valve in a vice by clamping the flat end faces of the valve (Fig 1). Caution must be taken not to damage the serrated flange faces.
2. Remove actuator, stem locknuts (27), travel indicator (58) and yoke drive nut (9).
3. Turn the bonnet (8) in a counter-clockwise direction from the valve body (1). Remove o-ring (12) and remove and discard the body gasket (49). A new gasket should be installed each time the valve is disassembled.
4. Pull the plug and stem assembly (4 & 5) out through the bottom of the bonnet. Rotate the assembly to prevent damage to the packing. Handle the parts carefully to avoid damaging the seating and guiding surfaces. Wipe the parts with a clean soft cloth and examine for signs of wear.
5. To remove the seat ring (2), fabricate a special wrench to engage the lugs on the ring. Clean thoroughly and examine for signs of wear.

LAPPING THE METAL SEAT

If valve leakage becomes excessive, it may be necessary to lap the valve seat.

1. Remove the plug and stem as directed in body disassembly on page 1.
2. Apply fine lapping compound (e.g. United States Products Co. Grade 600 Crystolon) at several spots around the seating surface. Replace the plug in the bonnet.
3. Screw the bonnet loosely into the body to serve as a guide during the lapping operation.
4. Excessive lapping will shoulder the seat ring, and will not improve the seating.

5. Clean the valve seat and plug thoroughly when lapping is complete, removing all traces of lapping compound.

REPLACING THE PACKING

Refer to Figure 1 and the standard and optional packing constructions illustrated on page 6 to determine the packing that has been pre-installed in your valve.

1. Disassemble the valve as directed. Remove the locknuts (27) and indicator disk (58), and turn the plug stem out through the packing box. Remove the packing follower (10) and push out the old packing by working from the underside of the bonnet.

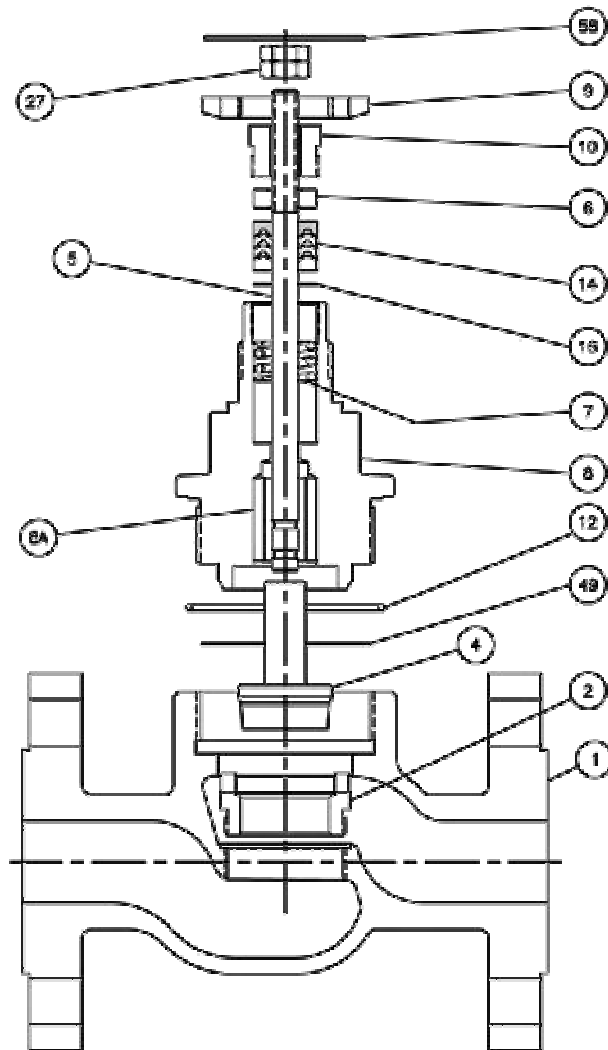


Figure 1. Valve Body Assembly
Shown with Standard PTFE Spring Loaded Packing

2. **For Standard Spring Loaded PTFE V-Ring Packing (see Fig 1 & 2):** Carefully insert each piece in exact order shown in the illustration. Turn the packing follower (10) until it shoulders on the bonnet (8). This will compress the packing spring (7) to ensure constant stem sealing throughout packing life.
3. **For Molded Graphite Ribbon Packing (see Fig. 3):** Carefully insert each piece in exact order shown in the illustration on page 6. Hand tighten packing follower (10). Use a wrench to increase tightness by turning the follower an additional 60 degrees.
4. **For ENVIRO-SEAL^(R) Packing (see Fig 4).** Carefully insert each piece in exact order as shown in Figure 4 on page 6. Tighten the packing follower (10) until the Belleville springs are compressed. This will be signaled by a significant increase in resistance. Back off the follower 1/8 to 1/4 turn. A gap of approximately 1/16" between the packing follower and the bonnet will assure packing is seated properly.

REASSEMBLY

Insert a new body gasket (49) and reassemble bonnet (8) with plug and stem assembly in valve. The O-ring (12) must be reinstalled by gently stretching over the bonnet and snapping into the gap between the top of the body (1) and the bonnet (8). This O-ring acts as a dust/moisture seal.

Place the actuator yoke over the stem (5). While tilting actuator back, drop yoke drive nut (9) over stem (5). Run locknuts (27), and travel indicator (58), down as far as possible and counter tighten locknuts (27) to lock.

See appropriate actuator instructions.

CAUTION!

To avoid damage to seating surface, do not turn stem while plug is in contact with seat.

Table 1. Common Parts

| KEY NO. | DESCRIPTION | VALVE SIZES | | | | |
|---------|---|--------------|--------------|----------------|----------------|------------|
| | | 1/2" / DN 15 | 3/4" / DN 20 | 1" / DN 25 | 1 1/2" / DN 40 | 2" / DN 50 |
| 1 | Body, Ductile Iron, DIN PN 10-40 | 24000-111 | 24000-211 | 24000-311 | 24000-511 | 24000-611 |
| | Body, Ductile Iron, ANSI Class 150 RF | 24000-113 | 24000-213 | 24000-313 | 24000-513 | 24000-613 |
| | Body, Carbon Steel, DIN PN 10-40 | 24000-111W | 24000-211W | 24000-311W | 24000-511W | 24000-611W |
| | Body, Carbon Steel, ANSI CL 150 RF | 24000-113W | 24000-213W | 24000-313W | 24000-513W | 24000-613W |
| 5 * | Stem ** | 24058-100 | 24058-100 | 24058-101 | 24058-102 | 24058-102 |
| 6 | Stem Guide | | | 24494-1 | | |
| 7 * | Packing Spring | | | 24467 | | |
| 8 | Bonnet | 24000-121 | 24000-121 | 24000-321 | 24000-521 | 24000-621 |
| 8A | Bonnet Bushing | | | 24000-125 | | |
| 9 | Drive Nut (Yoke) | | | 011757-003-153 | | |
| 10 * | Packing Follower | | | 24490-1 | | |
| 12 | O-Ring | 24000-151 | 24000-151 | 24000-351 | 24000-551 | 24000-651 |
| 14 * | Packing Kit, Spring Loaded PTFE V-Ring, standard | | | 24494T001 | | |
| | Packing Kit, Molded Graphite Ribbon, optional | | | 24492T001 | | |
| | Packing Kit, ENVIRO-SEAL, optional | | | 24490T001 | | |
| 16 | Washer | | | 24910 | | |
| 27 | Locknuts (2) | | | 971514-002-250 | | |
| 49 * | Body Gasket, Copper (Standard) | 24000-131 | 24000-131 | 24000-331 | 24000-531 | 24000-631 |
| | Body Gasket, 316 Stainless Steel reinforced Graphite (optional) | 24000-132 | 24000-132 | 24000-332 | 24000-532 | 24000-632 |
| 58 | Travel Indicator | | | 24299 | | |

* Recommended Spare Parts.

** Stem (5) is assembled to plug (4) at factory. See pages 4 & 5.

Table 2. Plug, Seat Ring, and Stem for 1/2", 3/4", and 1" Valves

| VALVE SIZE | | | | | | 1/2" / DN 15 | 3/4" / DN 20 | 1" / DN 25 |
|---------------------------|------------------|-------------------------|-----------------------|-------------------------|------------------|--------------|--------------|----------------|
| KEY NO. | DESCRIPTION | PLUG TYPE | PLUG NO. | ORIFICE DIAMETER (inch) | C _v | PART NUMBER | | |
| 4 (Note A) | Plug (Note B) | Micro Trim | 102 | 0.25 | 0.2 ^c | 24229 | 24229 | 24229 |
| | | PTFE Seat (Equal %) | 577 | 0.375 | 1.0 | 24893 | 24893 | 24893 |
| | | | | | 1.5 | 24796 | 24796 | 24796 |
| | | | | | 2.5 | 24609 | 24609 | 24609 |
| | | | | 0.8125 | 4 | 24010-2 | 24010-2 | 24010-2 |
| | | | | | 6 | 24010 | --- | --- |
| | | | | | 7.5 | --- | 24010 | --- |
| | | | | | 8.5 | --- | --- | 24010 |
| | | 1.0625 | 13 | --- | --- | 24011 | | |
| | | Metal Seat (Equal %) | 588 | 0.25 | 0.2 ^c | 24758 | 24758 | 24758 |
| | | | | | 0.5 ^c | 24786 | 24786 | 24786 |
| | | | | | 1.0 | 24127 | 24127 | 24127 |
| | | | | 0.375 | 1.5 | 24634 | 24634 | 24634 |
| | | | | | 2.5 | 24171 | 24171 | 24171 |
| | | | | 0.8125 | 4 | 24185 | 24185 | 24185 |
| | | | | | 7.7 | 24061 | --- | --- |
| | | 1.0625 | 13.6 | --- | --- | 24062 | | |
| | | PTFE Seat (Linear) | 677 | 0.375 | 0.1 | 24660 | 24660 | 24660 |
| | | | | | 0.2 | 24625 | 24625 | 24625 |
| | | | | | 0.5 | 24617 | 24617 | 24617 |
| | | | | | 1.0 | 24631 | 24631 | 24631 |
| | | | | | 2.5 | 24656 | 24656 | 24656 |
| | | | | 0.8125 | 5 | 24010-1 | 24010-1 | 24010-1 |
| | | | | Metal Seat (Linear) | 688 | 0.25 | 0.5 | 24898 |
| | | 1.0 | 24145 | | | | 24145 | 24145 |
| | | 0.375 | 1.5 | | | 24669 | 24669 | 24669 |
| | | | 2.5 | | | 24671 | 24671 | 24671 |
| | | 0.8125 | 4 | | | 24757 | 24757 | 24757 |
| | | | 6 | | | 24717 | --- | --- |
| | | | 8 | | | --- | 24717 | --- |
| | | 1.0625 | 13 | --- | --- | 24791 | | |
| | | 2 (Note A) | Seat Ring (Note B) | 0.25 inch Port Diameter | | | | 007635-001-163 |
| 0.375 inch Port Diameter | | | | 007635-002-163 | 007635-002-163 | 24000-342 | | |
| 0.8125 inch Port Diameter | | | | 007635-005-163 | 007635-005-163 | 24000-343 | | |
| 1.0625 inch Port Diameter | | | | --- | --- | 24000-344 | | |

A. Recommended Spare Parts.

B. Replacement plug (item 4) orders must include stem (item 5) and will be furnished factory assembled.

C. Matching seat rings must be furnished with replacement plug orders for micro trim plug number 102 and plug number 588, C_v = 0.2 and 0.5.

Table 3. Plug, Seat Ring, and Stem for 1½" and 2" Valves

| VALVE SIZE | | | | | | 1½" / DN 40 | 2" / DN 50 |
|----------------------|-------------------------|-------------------------|-----------------------|-------------------------|----------------|-------------|------------|
| KEY N ^o . | DESCRIPTION | PLUG TYPE | PLUG N ^o . | ORIFICE DIAMETER (inch) | C _v | PART NUMBER | |
| 4 (Note A) | Plug (Note B) | PTFE Seat (Equal %) | 577 | 1.25 | 20 | 24411 | --- |
| | | | | 1.50 | 10 | 24884 | 24884 |
| | | | | | 17 | 24774 | 24774 |
| | | | | | 28 | 24254 | 24254 |
| | | 2.0 | 30 | --- | 24882 | | |
| | | Metal Seat (Equal %) | 588 | 1.25 | 10 | 24421 | --- |
| | | | | | 20 | 24401 | --- |
| | | | | 1.50 | 10 | 24635 | 24635 |
| | | | | | 17 | 24710 | 24710 |
| | | | | | 32.9 | 24038 | 24038 |
| | | | | 2.0 | 30 | --- | 24905 |
| | | 52.9 | --- | | 24039 | | |
| | | PTFE Seat (Linear) | 677 | 1.25 | 20 | 24436 | 24436 |
| | | | | | 1.50 | 10 | 24799 |
| | | | | 2.0 | | 17 | 24798 |
| | | | | | 30 | --- | 24891 |
| | | Metal Seat (Linear) | 688 | 1.25 | 10 | 24425 | --- |
| | | | | | 20 | 24424 | --- |
| | | | | 1.50 | 10 | 24761 | 24761 |
| | | | | | 17 | 24899 | 24899 |
| 28 | 24760 | | | | 24760 | | |
| 2.0 | 30 | | | --- | 24887 | | |
| | 50 | | | --- | 24762 | | |
| | 1.25 inch Port Diameter | | | | 24000-542 | --- | |
| 2 (Note A) | Seat Ring (Note B) | 1.5 inch Port Diameter | | | | 24000-541 | 24000-642 |
| | | 2.0 inch Port Diameter | | | | --- | 24000-641 |

A. Recommended Spare Parts.

B. Replacement plug (item 4) orders must include stem (item 5) and will be furnished factory assembled.

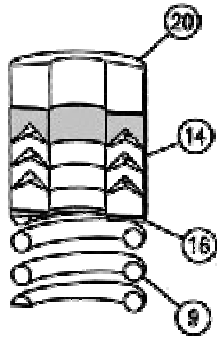


Figure 2. Spring Loaded PTFE V-Ring Packing Kit P/N 24494T001 (Standard)

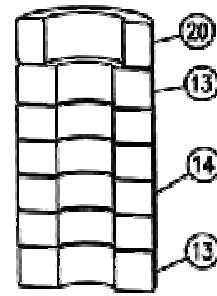


Figure 3. Molded Graphite Ribbon Packing Kit P/N 24492T001

Table 4. Spring Loaded PTFE V-Ring Packing Kit

| KEY NO. | DESCRIPTION | MATERIAL |
|---------|-------------|---------------------------------|
| 9 | Spring | ASTM A313 S30200 |
| 14 | Packing Set | PTFE / carbon filled PTFE |
| 16 | Washer | ASTM A240 S31600 |
| 20 | Stem Guide | JLON 2000 (proprietary plastic) |

Table 5. Molded Graphite (Grafoil) Packing Kit

| KEY NO. | DESCRIPTION | MATERIAL |
|---------|-------------------|------------------|
| 13 | Bushing | Carbon-Graphite |
| 14 | Packing Rings (4) | Graphite |
| 20 | Stem Guide | ASTM A582 S30300 |

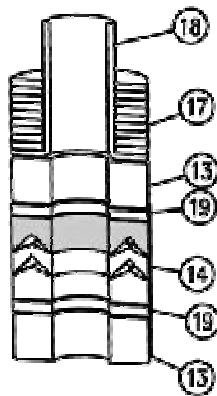


Figure 4. ENVIRO-SEAL® Packing Kit P/N 24490T001

Table 6. ENVIRO-SEAL® Packing Kit

| KEY NO. | DESCRIPTION | MATERIAL |
|---------|--------------------|---------------------------|
| 13 | Bushings | Carbon Graphite |
| 14 | Packing Set | PTFE / carbon filled PTFE |
| 17 | Belleville Springs | ASTM B637 N07718 |
| 18 | Bushing | PEEK |
| 19 | Washers | PTFE, Filled Gylon |

Table 8. Valve Assembly Weights

| VALVE SIZE | | WEIGHTS | |
|------------|----|---------|-----|
| in | DN | lbs | kg |
| 1/2 | 15 | 9 | 4.1 |
| 3/4 | 20 | 11 | 5.0 |
| 1 | 25 | 14 | 6.4 |
| 1-1/2 | 40 | 22 | 10 |
| 2 | 50 | 33 | 15 |

Table 9. Actuator Weights

| ACTUATOR TYPE | WEIGHTS | |
|--|---------|------|
| | lbs | kg |
| 32 | 10 | 4.5 |
| 54 | 25 | 11.3 |
| 70 | 34 | 15.4 |
| NV24-MFT (non spring return) | 3.3 | 1.5 |
| NVF24-MFT or NVF24-MFT-E (spring return) | 4 | 1.8 |

Figure 5. Dimensional Drawings: inches [millimeters]

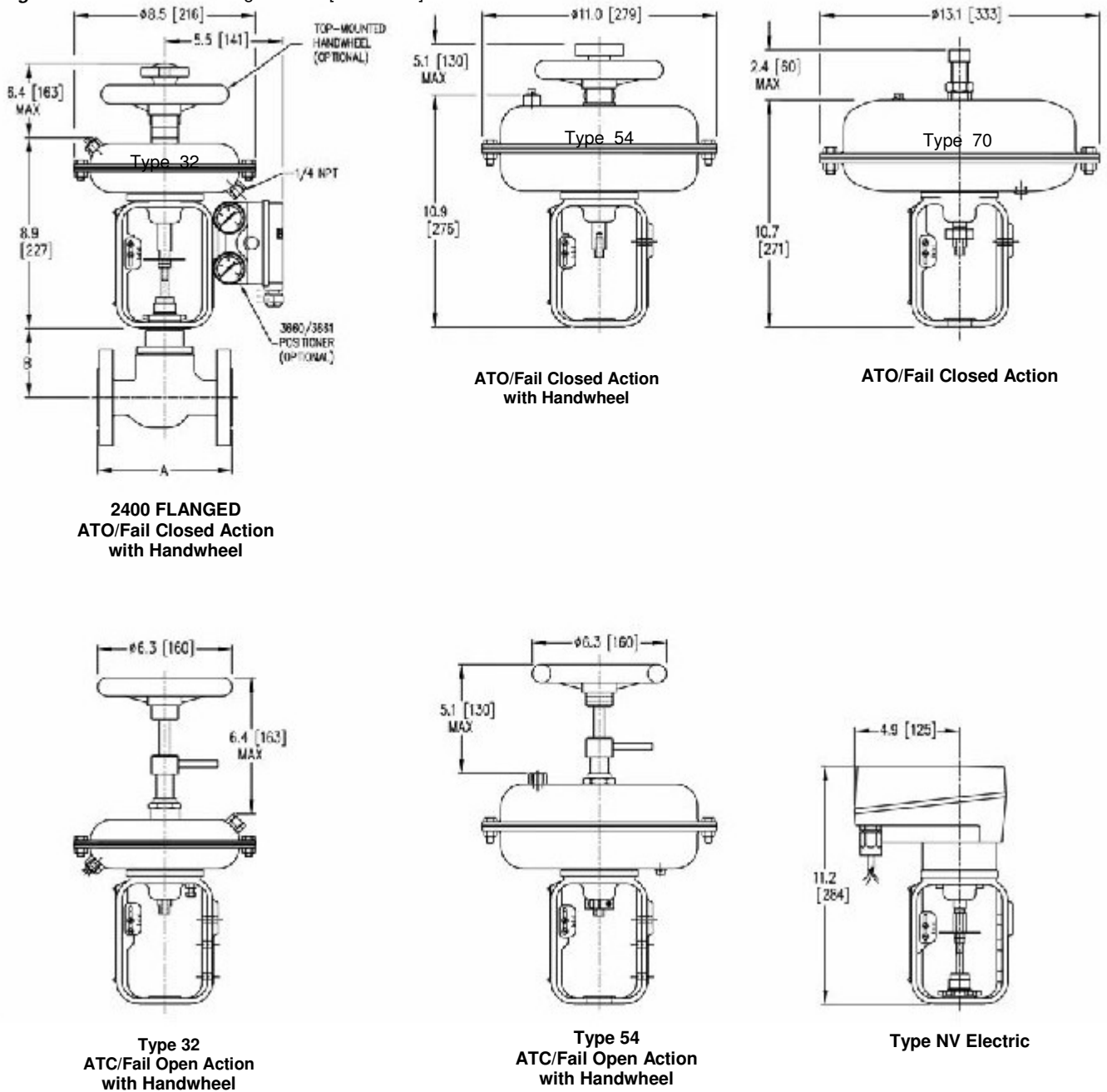


Table 7. Valve Dimensions

| VALVE SIZE | | "A" 150 RF | | "A" PN10-40 | | "B" | |
|------------|----|------------|-----|-------------|-----|------|-----|
| in | DN | in | mm | in | mm | in | mm |
| 1/2 | 15 | 7.25 | 184 | 5.12 | 130 | 3.15 | 80 |
| 3/4 | 20 | 7.25 | 184 | 5.91 | 150 | 3.15 | 80 |
| 1 | 25 | 7.25 | 184 | 6.30 | 160 | 3.27 | 83 |
| 1-1/2 | 40 | 8.75 | 222 | 7.87 | 200 | 3.90 | 99 |
| 2 | 50 | 10.00 | 254 | 9.06 | 230 | 4.22 | 107 |

NOTE: Actuator removal requires 4-1/2 in(115mm) vertical clearance.