WA-005 Guided float flag for a shallow service-water pan

Display two checked low/high water references above an opaque, shallow nonpotable service pan using a buoyant mechanical follower.

Original attended, open-pan level indicator. No fill valve, pressure vessel, potable treatment, certified depth accuracy or automatic overflow protection is built. Actual receiver fit, complete wet mass, low guide drag and water-reference comparisons are required. The apparatus is unbuilt and untested.

US inches/feet control; metric figures are references. No physical construction, force/reference qualification or structural certification has been performed.

Before cutting

Read the full machining, assembly, qualification and service sequence before buying materials. Arrange a suitable low-force balance or gauge for the receiving tests; it is a separate tool, not a component included with this construction.

Receive the actual Rubbermaid FG334900GRAY pan before drilling the mast. The manufacturer publishes outer dimensions only. The interior corridor, floor, rim and service-path dimensions below are original receiving requirements, not manufacturer specifications.

This build requires actual .001-.002 in machining, alignment and measuring capability, including precision depth/straightness checks. It is not an ordinary rough-lumber cutting project, and the drawings do not imply those tolerances are achieved automatically. Arrange suitable equipment or accurate fabrication before buying the materials.

Use clamped work, backed drilling and suitable tool protection. Machine actual finished gauges from oversize stock. Keep guide walls smooth and unpainted; keep both matched guide caps removable. Do not substitute wider pan/button heads for the four specified cylindrical socket-cap mounts.

Materials and actual cuts

Part	Qty	Actual size	Material and special cut
A Fully supported base board	1	24 x 20 x 3/4 in 609.60 x 508.00 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Global X 0..24, Y 0..20, Z 0...75. Keep the entire underside supported on a level bench or floor. WB1 axes: X 11, 11.75, 12.5, 13 at Y 18.375. WB3 axes: X 10.8125/13.1875, Y 19.125. Countersink underside heads fully flush.
B Rear mast	1	18 x 3 1/2 x 3/4 in 457.20 x 88.90 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Install X 10.25..13.75, Y 18..18.75, Z .75..18.75, with grain along its 18 in height. Transfer every F-dependent arm/wedge row from the actual received pan floor. Do not assume the illustrative F = 1 in is the pan interior.
C Rear mast-foot gusset	2	4 x 1 1/4 x 3/4 in 101.60 x 31.75 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Retain one right triangle in YZ: (18.75,.75), (20,.75), (18.75,4.75). X intervals 10.25..11 and 13..13.75. The finished part is triangular, not the full rectangular blank.
D Lower split-guide arm	1	8 1/4 x 1 1/2 x 3/4 in 209.55 x 38.10 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Install X 11.25..12.75, Y 9.75..18, Z F+6.5..F+7.25. At the front face remove the guide half-notch: X 12 +/- .140625, Y 9.75..9.890625, through Z. WB4 rear axes X 11.75/12.25, Z F+6.875.

Part	Qty	Actual size	Material and special cut
E Upper guide and scale arm	1	8 1/4 x 3 1/2 x 3/4 in 209.55 x 88.90 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Install X 11.25..14.75, Y 9.75..18, Z F+9.5..F+10.25. Same guide half-notch as D. WB4 axes X 11.75/12.25, Z F+9.875. Fixed scale clamp SF1 axes: X 14, Y 10.25/10.75.
F Removable front guide cap	2	1 1/2 x 3/4 x 3/4 in 38.10 x 19.05 x 19.05 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Two matched caps, X 11.25..12.75, Y 9..9.75, at Z F+6.5 and F+9.5. The rear half-notch is X 12 +/- .140625, Y 9.609375..9.75, through Z. Together with the arm it forms a true 9/32 in square guide. WB7 axes X 11.5/12.5 at guide bottom + .375, directed along +Y.
G Arm underside support wedge	2	3 x 2 x 1 1/2 in 76.20 x 50.80 x 38.10 mm	Sound flat exterior-bond plywood or straight-grain hardwood, finished to the listed actual size. No voids, splits or loose fibers. The base remains fully supported; no elevated tank or bench load rating is claimed. Lower YZ triangle: (15,F+6.5), (18,F+6.5), (18,F+4.5); upper triangle 3 in higher. Both occupy X 11.25..12.75. Vertical WB6 axes X 11.5/12.5, Y 17.25. Horizontal WB5 axes X 11.75/12.25, Z F+5.875 or F+8.875. Different X rows prevent hidden screw crossings.
H Float capture plate	2	3 x 3 x 1/8 in 76.20 x 76.20 x 3.17 mm	Solid unfilled HDPE, such as King StarBoard standard material machined from oversize stock to the actual gauge. No foamed core, adhesive joint or transferred food-contact certification. Both 3 in square, actual thickness .124..126 in, centered X 12, Y 9.75 in the reference pose. Four received .125..126 in bores at local X/Y .375 or 2.625. Do not countersink: rounded MF1 heads seat below the lower plate. Upper H also has two mount bores at local X 1.5, Y 1.25/1.75.
I Closed-cell buoyancy core	1	3 x 3 x 2 in 76.20 x 76.20 x 50.80 mm	One monolithic closed-cell crosslinked PE foam block, Plastazote LD45 candidate. Published data are typical only; actual finished dimensions and complete wet moving mass govern. Receive one monolithic closed-cell block, plan 2.995..3.005 in square and thickness 1.995..2.005. Four 9/32 in square through-passages on the H corner pattern. TOP ONLY: two 7/16 in diameter reliefs .500 +/- .001 in deep, at local (1.5,1.25)/(1.5,1.75). The lower foam section remains intact. Actual core height must not exceed the shortest J spacer; trim before assembly. No laminated or open-cell substitution.
J Compression-limiting square spacer	4	2 x 1/4 x 1/4 in 50.80 x 6.35 x 6.35 mm	Solid unfilled HDPE, such as King StarBoard standard material machined from oversize stock to the actual gauge. No foamed core, adhesive joint or transferred food-contact certification. Finish four equal 2.000 +/- .001 in lengths, each .25 in square. Make a straight .125..126 in axial bore. They fit the larger foam passages and span the two H inside faces, so screw tightening stops on solid spacer ends rather than compressing the foam.
K Slotted root/scale capture block	2	1 1/2 x 3/4 x 1/2 in 38.10 x 19.05 x 12.70 mm	Solid unfilled HDPE, such as King StarBoard standard material machined from oversize stock to the actual gauge. No foamed core, adhesive joint or transferred food-contact certification. Two blocks, each 1.5 X by .75 Y by .5 Z. Centered top pocket: target 1.253 X by .253 Y, depth .375; received length 1.252..1.254, width .252...254, depth .374...376. Nominal pocket X .1235..1.3765, Y .2485...5015; leave the .125 nominal floor. Square the corners. Side-pin bores .125...126 along Y at local X .375/1.125, Z .3125. Vertical mount bores .125...126 at local X .75, Y .125/.625. Mounts and side pins use separate axes.

Part	Qty	Actual size	Material and special cut
L One-piece follower stem and flag	1	11 1/2 x 1 1/2 x 1/4 in 292.10 x 38.10 x 6.35 mm	Solid unfilled HDPE, such as King StarBoard standard material machined from oversize stock to the actual gauge. No foamed core, adhesive joint or transferred food-contact certification. One retained XZ profile, all .249...251 in thick in Y. Relative to stem axis X 0 and root bottom Z 0, vertices: (-.625,0),(.625,0),(.625,.5),(.125,.5),(.125,8.25),(.875,8.25),(.875,8.5),(.125,8.5),(.125,11.5),(-.125,11.5),(-.125,.5),(-.625,.5). Straight stem width .249...251; root width 1.249..1.251. Root pin holes .125...126 along Y at X +/- .375, Z .1875. Temporary test-loop hole 3/32 in along Y at X 0, Z 11.25. The LOWER flag edge is the only reading edge. Root bottom square to the stem within .002 in over a 1 in reference.
M Blank fixed reference blade	1	7 x 1 1/4 x 1/4 in 177.80 x 31.75 x 6.35 mm	Solid unfilled HDPE, such as King StarBoard standard material machined from oversize stock to the actual gauge. No foamed core, adhesive joint or transferred food-contact certification. Bottom square to blade axis within .002 in over 1 in; whole straightness within .002 in. Actual blade 7 Z by 1.25 X by .25 Y; receive width 1.249..1.251, thickness .249...251. Install X 13.375..14.625, Y 10.375..10.625, Z F+10.375..F+17.375. Two .125...126 in side-pin bores at local X .25/1.0, Z .1875. Lower .375 in enters K. Mark actual LOW/HIGH bands after qualification; no pre-calibrated ruler is supplied.

Hardware and tools

4 x #10 x 2 1/2 in 18-8 flat-head wood screw. WB1: A to B. Four axes X 11/11.75/12.5/13, Y 18.375. Flat outer head at Z 0, tip Z 2.5. Head OD <= .375, shaft <= .190. Drill 13/64 clearance through A and a measured-stock 7/64 pilot 1.75 in into B; prove the pilot on an offcut. Countersink fully flush.

4 x #8 x 1 1/4 in 18-8 flat-head wood screw. WB2: through mast front Y 18 to rear gusset tip Y 19.25. X 10.4375/13.5625 crossed with Z 1.375/2.375. Drill 3/16 clearance through B and a measured-stock 7/64 pilot .5 in into C. All #8 wood screws have head OD <= .3125, shaft <= .164.

2 x #8 x 1 1/2 in 18-8 flat-head wood screw. WB3: A to rear feet C. Axes X 10.8125/13.1875, Y 19.125; head Z 0, tip Z 1.5. Drill 3/16 clearance through A, then a 7/64 pilot .75 in into C. X offset from WB2 prevents crossing shafts.

4 x #8 x 2 1/2 in 18-8 flat-head wood screw. WB4: through mast back Y 18.75, tips Y 16.25, at X 11.75/12.25 and Z F+6.875/F+9.875. Drill 3/16 clearance through mast and 7/64 pilot 1.75 in into each arm end. The completed arm ALSO has wedge G; these end-grain screws are not used alone.

4 x #8 x 2 1/2 in 18-8 flat-head wood screw. WB5: mast back Y 18.75 to wedge tips Y 16.25. X 11.75/12.25, Z F+5.875/F+8.875. Drill 3/16 mast clearance and 7/64 pilot 1.75 in into G. Their X axes are .25 in away from vertical WB6.

4 x #8 x 1 1/2 in 18-8 flat-head wood screw. WB6: vertically through arm top F+7.25/F+10.25 to tips F+5.75/F+8.75. X 11.5/12.5, Y 17.25. Drill 3/16 through arm and 7/64 pilot .75 in into G. Countersink flush; avoid the offset WB4/WB5 axes.

4 x #8 x 2 1/4 in 18-8 flat-head wood screw. WB7: matched guide caps. Heads at Y 9, tips Y 11.25; X 11.5/12.5, Z F+6.875/F+9.875. Drill 3/16 through the .75 in cap and 7/64 pilot 1.5 in into the main arm. Keep each cap paired with its original arm.

4 x #4-40 x 2 3/4 in 18-8 pan-head machine screw. MF1: identified candidate Grainger 856YN8, model 1-ppm-4c-275. Under-head length 2.75 in; head OD <= 7/32, height <= 5/64. Published minimum tip-thread length 1.5 in. Receive shaft diameter .104...112. Under-head seats on lower H underside b; tip b+2.75. Four J spacers and two H plates give a nominal 2.25 in solid stack. Rounded heads remain BELOW H; do not countersink them.

2 x #4-40 x 1 in 316 stainless cylindrical socket-head cap screw. MF2: moving K mounts. JC dimensional candidate B6uA0144025 (nonpreferred/limited availability, not a stock promise). Axes local float X 0, Y +/- .25; under-head at b+2.75, tips b+1.75. Head OD <= .185, height <= .115, shaft .104...112, and at least .5 in full thread from the tip. Two under-plate washers/nuts/tips enter the 7/16 in foam reliefs. Wider pan/button heads are prohibited here.

2 x #4-40 x 1 in 18-8 pan-head machine screw. MF3: moving root pins along +Y, local X +/- .375, Z b+2.5625. Under-head at Y -.375, tip +.625 relative to float center. Washer/nut bears on K back Y +.375. Head OD <= .225, height <= .087, shaft .104...112; received bores .125...126. Receive at least .5 in of full tip thread. Root/slot clearances remain bounded, even when the foot is not assumed perfectly fixed.

2 x #4-40 x 1 3/4 in 316 stainless cylindrical socket-head cap screw. SF1: fixed K mounts, JC dimensional candidate B6uA0144044 (nonpreferred/limited availability, not a stock promise). X 14, Y 10.25/10.75. Under-head Z F+10.75, tips F+9.0; washers/nuts under E at F+9.5. Head OD <= .185, height <= .115, shaft .104...112, at least .5 in full thread from tip. No wider pan/button-head substitution.

2 x #4-40 x 1 in 18-8 pan-head machine screw. SF2: fixed blade pins. X 13.625/14.375, Z F+10.5625; under-head Y 10.125, tip Y 11.125. Washer/nut behind K back Y 10.875. Head OD <= .225, height <= .087; shaft .104...112 and bores .125...126. Receive at least .5 in of full tip thread.

12 x #4-40 low-profile nylon-insert stainless locknut. One per machine screw. Albany 1062 family candidate: nominal .251 across flats and .125 high. Receive actual height .120...130, corner OD <= .300 and complete seated radial envelope <= .166 from screw axis. Eight move with the float; four are fixed. Retain at least two complete 40-TPI threads (.050 in) beyond each insert. No tall cap nuts or independently rocking joints. All seated head/nut/washer faces must remain flat and normal to their host faces; verify the COMPLETE extents through the allowed bore play, not only their nominal centerlines.

12 x #4 Type B narrow 18-8 flat washer. One under each locknut. PENCOM family nominal .032 thick, .125 ID, .250 OD. Receive thickness .028...036, ID .120...125, OD .245...250; actual radial envelope from screw axis <= .138 including hole eccentricity. Eight move, four remain fixed. Use plain flat washers, not spring/conical washers.

1 x Rubbermaid Commercial FG334900GRAY open bus/utility box. One unmodified bought HDPE pan. Manufacturer outer dimensions: 20 x 15 x 5 in, 4.6 gal nominal capacity. Accept the ACTUAL outer envelope, corridor, highest floor and rim conditions in the method. It stands directly on fully supported A. Neither the pan nor bench receives a load certification from this build.

1 x PESOLA 40300 Medio Line 300 g / 2 g spring balance, or an appropriate calibrated equivalent. Temporary qualification tool, not built into the indicator. Manufacturer gives 300 g capacity, 2 g divisions and +/- .3% precision, and prohibits user calibration. Follow its zero/tare procedure. Allow +/- 3 g per careful reading, including half-division reading, zero and full-scale maker allowance; a two-reading difference gets +/- 6 g. Observed drag difference <= 4 g therefore bounds equivalent drag <= 10 gF. No such measurement has been performed by us.

1 x Water-resistant marking crayon, independent depth rule and temporary fine test-loop cord. For all machine screws receive the listed under-head length within +/- .010 in; heads, plain washers and nuts must seat flat and normal to the matching host faces without independent rocking. Mark only the two water-reference bands after actual rising/falling trials; temporary service-position marks are separate. Keep marks out of the guide contact surfaces. Remove the loop before use. Read at the same eye level and viewing direction as the calibration. No preset depth scale is supplied.

US rule with 1/64 in divisions; calipers and depth gauge readable to .001 in; square and straightedge; .001 in feeler; straight 1/4 in square setup bar; clamped wood saw/drill; router or mill and square files for the HDPE pockets; 3/32, 1/8, 7/64, 3/16 and 13/64 in bits; countersink; small wrenches and 3/32 in hex key; suitable force balance and known reference; plain water, independent depth rule and water-resistant marking crayon. Complete receiving dimensions and repeated water trials govern.

Measured assembly reference

Coordinates refer to the illustrated F = 1 in, b = .75 in pose: x left/right, y front/rear, z up. Positions are global inches from the front-left A underside datum. Every floating b+... height in the methods is above actual F, therefore global Z = F+b+.... A negative position projects beyond that datum. The size vector gives the part orientation before any stated rotation; it is not a substitute for its cut profile.

Part / instance	Origin x, y, z	Size dx, dy, dz / rotation
A / 1	0, 0, 0 in 0.00, 0.00, 0.00 mm	24 x 20 x 3/4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
B / 1	10 1/4, 18, 3/4 in 260.35, 457.20, 19.05 mm	3 1/2 x 3/4 x 18 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg

Part / instance	Origin x, y, z	Size dx, dy, dz / rotation
C / 1	10 1/4, 18 3/4, 3/4 in 260.35, 476.25, 19.05 mm	3/4 x 1 1/4 x 4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
C / 2	13, 18 3/4, 3/4 in 330.20, 476.25, 19.05 mm	3/4 x 1 1/4 x 4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
D / 1	11 1/4, 9 3/4, 7 1/2 in 285.75, 247.65, 190.50 mm	1 1/2 x 8 1/4 x 3/4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
E / 1	11 1/4, 9 3/4, 10 1/2 in 285.75, 247.65, 266.70 mm	3 1/2 x 8 1/4 x 3/4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
F / 1	11 1/4, 9, 7 1/2 in 285.75, 228.60, 190.50 mm	1 1/2 x 3/4 x 3/4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
G / 1	11 1/4, 15, 5 1/2 in 285.75, 381.00, 139.70 mm	1 1/2 x 3 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
F / 2	11 1/4, 9, 10 1/2 in 285.75, 228.60, 266.70 mm	1 1/2 x 3/4 x 3/4 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
G / 2	11 1/4, 15, 8 1/2 in 285.75, 381.00, 215.90 mm	1 1/2 x 3 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
H / 1	10 1/2, 8 1/4, 1 3/4 in 266.70, 209.55, 44.45 mm	3 x 3 x 1/8 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
H / 2	10 1/2, 8 1/4, 3 7/8 in 266.70, 209.55, 98.42 mm	3 x 3 x 1/8 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
I / 1	10 1/2, 8 1/4, 1 7/8 in 266.70, 209.55, 47.62 mm	3 x 3 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
J / 1	10 3/4, 8 1/2, 1 7/8 in 273.05, 215.90, 47.62 mm	1/4 x 1/4 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
J / 2	10 3/4, 10 3/4, 1 7/8 in 273.05, 273.05, 47.62 mm	1/4 x 1/4 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
J / 3	13, 8 1/2, 1 7/8 in 330.20, 215.90, 47.62 mm	1/4 x 1/4 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
J / 4	13, 10 3/4, 1 7/8 in 330.20, 273.05, 47.62 mm	1/4 x 1/4 x 2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
K / 1	11 1/4, 9 3/8, 4 in 285.75, 238.12, 101.60 mm	1 1/2 x 3/4 x 1/2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
K / 2	13 1/4, 10 1/8, 11 1/4 in 336.55, 257.18, 285.75 mm	1 1/2 x 3/4 x 1/2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
L / 1	11 3/8, 9 5/8, 4 1/8 in 288.93, 244.47, 104.77 mm	1 1/2 x 1/4 x 11 1/2 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg
M / 1	13 3/8, 10 3/8, 11 3/8 in 339.72, 263.52, 288.93 mm	1 1/4 x 1/4 x 7 in Rotation x/y/z: 0.0000, 0.0000, 0.0000 deg

Numbered assembly

01. Choose a level, fully supported 24 x 20 in work area with at least 32 in of clear height for the mast and temporary force-balance suspension. This apparatus shows two water references above an opaque service pan. It does not stop filling or detect an overflow automatically. Read the complete receiving, machining, force-check, calibration and service sequence. No physical build or qualification test has been performed by the author.

02. Receive the real FG334900GRAY before positioning the arms. Center its outer footprint at X 12, Y 9.5 on A. Require outer length <= 20.0625, width <= 15.0625 and height <= 5.0625 in; no handle or rib may extend behind Y 17.03125. Verify a continuous interior service corridor X 9.25..14.75, Y 4.5..12.5, from its highest floor through

5.125 in above that floor. This is 5 1/2 in wide by 8 in long. It includes the operating float and its forward service translation. Outer dimensions do not prove the interior. Reject an incompatible pan; do not heat, cut or guess its shape.

03. With the empty pan in that position, measure F: the highest floor point anywhere in the service corridor, from A underside Z 0. Use a straight rim bridge and depth gauge if needed; subtract the measured interior depth from its measured absolute reference height. F must be .875..1.125 in. The lowest rim must be at least 4.25 in above F. Transfer this ACTUAL datum to the mast. Illustrations use F = 1 in only. Never use the lip as zero or infer F from the published 5 in outer height. ALL floating b+... heights below are above F, so global Z = F+b+.... Drawing 04 uses local z = 0 at bottom H underside.

04. Finish A and B to the actual cuts; put B grain along its 18 in height. Retain the two C right triangles, not their rectangular blanks. Keep finished wood gauges within .001 in of the listed values and mating faces flat. Prove each wood-screw pilot on an offcut of the actual stock. The stated 7/64 in pilot is a starting size for received stock; change the pilot if an offcut splits or fails to seat, without changing the screw axes or lengths.

05. Clamp B at X 10.25..13.75, Y 18..18.75 with its bottom at Z .75. Install four WB1 from the underside of A at X 11/11.75/12.5/13, Y 18.375. Heads finish flush at Z 0, tips Z 2.5. Confirm both mast planes are square and its top is Z 18.75. A must remain fully supported across its underside; it is not a platform spanning supports.

06. Fit C behind B at Y 18.75..20. Install WB2 from mast front Y 18, at X 10.4375/13.5625 and Z 1.375/2.375, to tips Y 19.25. Install WB3 vertically from A underside at X 10.8125/13.1875, Y 19.125, to tips Z 1.5. These different X rows prevent the vertical and horizontal screws crossing inside the gussets. Check tips against the actual triangular profile before driving.

07. Cut D, E and their two matched caps F. Clamp each cap to its own arm at the Y 9.75 split. Make a true 9/32 in square vertical guide centered X 12, Y 9.75: each half is 9/64 in deep in its mating Y face. Square-file the corners. Receive actual guide sides .28125...28325 in. Do not use a round hole for a square stem. Mark LOWER and UPPER pairs and keep guide walls smooth and unpainted.

08. Transfer measured F to the arm underside heights F+6.5 and F+9.5. Both rear arm ends butt mast front Y 18. Install WB4 from mast back Y 18.75, at X 11.75/12.25 and Z F+6.875/F+9.875, to tips Y 16.25. Those X axes are deliberately offset from vertical WB6. Keep arms level and guides aligned; these end-grain screws alone are not the finished arm support.

09. Cut both G wedges to the actual 3 Y by 2 Z triangles. They occupy X 11.25..12.75, Y 15..18 below the arms. Install WB5 at X 11.75/12.25, Z F+5.875/F+8.875, from mast back Y 18.75 to tips Y 16.25. Install vertical WB6 at X 11.5/12.5, Y 17.25, from arm top to tips F+5.75/F+8.75. Verify the full wedge and every received pan rim/handle remain at least 1/8 in apart.

10. Replace each matched F with WB7 from Y 9 to Y 11.25 at X 11.5/12.5 and the guide midheight. Pass a straight, actual 1/4 in square setup bar through both guides without bending it or spreading a cap. Locate both guide centers within .002 in of X 12, Y 9.75; their relative X/Y difference must also be <= .002 in per axis. Caps must come off forward with screwdriver access clear of the pan. Correct misalignment rather than enlarging a guide beyond .28325 in.

11. Machine both K blocks. Their centered rectangular pockets target 1.253 x .253 x .375 in deep; receive length 1.252..1.254, width .252...254 and depth .374...376. Square the internal corners and retain the nominal .125 in floor. Make the two side-pin bores at local X .375/1.125, Z .3125, along Y; make the separate vertical mount bores at local X .75, Y .125/.625. Receive these bores .125...126. The close pocket fit limits rocking; the two side pins alone are not treated as a perfectly rigid joint.

12. Put fixed K on E at X 13.25..14.75, Y 10.125..10.875, Z F+10.25..F+10.75. Install cylindrical socket-cap SF1 at X 14, Y 10.25/10.75; under-head at F+10.75 and tips F+9.0. Put their washers/nuts beneath E. Both washers need full support on E. Seat M on the pocket floor, giving its lower edge F+10.375. Fit SF2 at X 13.625/14.375, Z F+10.5625, from Y 10.125 to tips 11.125. Retain at least .050 in of complete thread beyond every insert.

13. Cut L as one piece from .249...251 in thick HDPE using its full XZ contour. Do not glue on a pointer or root. The lower flag edge, local Z 8.25, is the reading edge. Receive root width 1.249..1.251 and stem width .249...251. The stem must remain within .002 in of a common straight line over its length; check with a straightedge and feeler. Root bottom must be square to the stem within .002 in over a 1 in reference. Make the two .125...126 root holes and the 3/32 in temporary loop hole at their listed centers.

14. Cut both H plates to actual .124...126 in thickness. Match four .125...126 corner bores on a 2.25 in square pattern, each .375 in from adjacent edges. The lower plate is NOT countersunk: MF1 rounded heads sit below it.

Add upper H mount bores at local X 1.5, Y 1.25/1.75. Keep hole-center errors within .001 in per axis. Distinguish this small center mount pattern from the corner ties.

15. Finish the monolithic I core within its plan and thickness ranges. Make four 9/32 in square clearance passages on the corner tie axes. From TOP ONLY make two 7/16 in diameter reliefs .500 +/- .001 in deep at local (1.5,1.25)/(1.5,1.75). They clear complete mount nuts, washers and tips, not just a bolt centerline. The lower foam zone stays intact except for the four passages. Receive or trim I so its actual height is no greater than the shortest J spacer; do not obtain the hard-stop gap by compressing an oversized core. Do not laminate scraps or use open-cell foam.

16. Finish all four J spacers to 2.000 +/- .001 in with square, parallel ends; bore them .125...126 along their lengths. Confirm the received .104...112 in screw shafts pass freely. The .25 in square spacers slip through their larger foam passages. Four equal solid lengths, not tightening torque or an assumed foam compression, set the separation between H inside faces.

17. Before fitting I, install moving K on upper H, centered on float X 12, Y 9.75. Use MF2 at local X 0, Y +/- .25, under-head b+2.75 to tips b+1.75. Only cylindrical heads <= .185 in OD and <= .115 in high are accepted here; wider pan/button heads can touch the root. Washers/nuts beneath H enter the foam reliefs with the screw tips. Tighten to full flat seating without bowing H; a .001 in feeler must not enter the K/H bearing joint. Check the assembly after wet qualification as well.

18. Stack lower H, the four J spacers and I, then the prepared upper H. Insert MF1 upward with rounded heads against lower H underside b; tips are b+2.75. Add one received washer and locknut per corner. The nominal solid stack is .125+2+.125 = 2.25 in. Nip diagonally only until all four spacer ends contact both plates. Do not compress foam to hide unequal spacers. No sharp thread projects below H; head height is <= 5/64 in. Before tightening, align the moving K center to the H center within .020 in per X/Y axis. The complete plate-center offset from the stem reference must remain <= .025 in per X/Y axis throughout the captured root play.

19. Seat L root initially on the moving K floor, nominally b+2.375. Fit both MF3 side pins at local X +/- .375, Z b+2.5625, from Y -.375 to +.625 relative to float center. Seat washers/nuts flat without bending the stem or crushing the fork. Before and after assembly, pocket maximum length/width must remain 1.254/.254; the root must move by no more than .025 in vertically within the pins. Reduced clearance from gentle seating is acceptable. Before tilt, the complete root hardware stays below F+b+2.93 in GLOBAL Z. Apply the full tilted envelope before checking the lower arm. Its permitted small lift and rocking are included in the envelope calculations; do not assume a zero-play joint.

20. Weigh the COMPLETE moving unit H/I/J, moving K, L, all eight screws, eight nuts and eight washers, including any absorbed water. Temporarily suspend it from a fine loop through the L tip hole. Actual mass must be 60..110 g. For the specified 300 g/2 g balance, accept free-hanging readings 64..106 g with the stated conservative +/-3 g reading allowance. Check zero/tare and a suitable known reference using the maker procedure; do not recalibrate the spring yourself. Correct wrong stock or hardware instead of deleting retainers to meet the mass limit.

21. Remove both guide caps with the empty pan on A. Hold the complete float over the received service corridor. Bring the stem sideways into both open main half-notches from the FRONT; replace both matched caps and all four WB7. The broad root and side flag cannot pass through closed square guides. Keep the stem straight and verify the fixed scale is clear. Do not force, cut off or bend a retained contour to obtain assembly access.

22. With no water, suspend the unit by the temporary balance loop and record free-hanging reading R. Slowly raise/lower through b = .25..3.25 in without pan contact, acceleration or side-pull. Pause at least every 1/4 in and observe breakaway and running readings continuously between pauses. Upward readings must be <= R+4 g; downward readings >= R-4 g. Allowing +/-6 g on each difference bounds equivalent drag by 10 gF. Repeat dry and water-wiped. Correct burrs/alignment rather than forcing movement, adding lubricant or opening guides beyond their received size. These are required builder checks, not tests performed by the author.

23. Remove the loop and balance. Check the whole attached assembly over its full operating stroke and every permitted guide, pocket and pin play. At LOW, all lower rounded heads must clear the highest floor by >=1/8 in. At HIGH, complete root/nuts/tips must clear the lower arm by >=1/8. Keep the flag >=1/4 above the upper arm and >=1/8 from fixed blade/clamp. Include the actual one-piece contours, close-pocket joint rocking, heads, washers and tips; a foam-only radius check is insufficient.

24. For initial wet qualification use plain fresh nonpotable water at 40..95 F, without detergents, oil, brine or ingredients. Add by hand around the float. Attend a one-hour exposure at the highest intended depth, 3.5 in

above F, then remove through the service path, drain surface droplets and repeat complete mass, wet-stem drag and full-envelope gates. This test has not been performed by the author. The user must qualify the received assembly; stop for swelling, changed mass or drag. Later sessions are attended and limited to 30 minutes, followed by draining and drying.

25. Use an independent vertical rule to set still water 1.5 in above the actual F datum. Approach from below and from above three times each, without touching the float. Mark all LOWER flag-edge positions on M. The observed spread must be <=3/16 in. Mark LOW at the midpoint of that spread and draw a 3/8 in high band centered there. Do not infer this offset from the foam density or change marks to hide sticking.

26. Repeat all six rising/falling comparisons at actual 3.5 in above F and mark HIGH. Midpoint spacing must be 2 +/- .1875 in, with both bands entirely on M. Verify >=.75 in freeboard to the actual lowest rim. Repeat the motion and clearances at both extremes. Use the same pan orientation, datum, mass and viewing direction; repeat qualification after a material/hardware change or a significant temperature change. No intermediate-depth accuracy is promised.

27. Read the LOWER flag edge from straight in front of M at the same eye height used for calibration. LOW and HIGH are the two observed service references, not automatic commands. Inspect the water itself before drawing or adding it, and stop filling at the upper reference. Never connect an unattended mains hose or rely on this flag for overflow protection. Stop for unclear marks, sticking, a changed datum or water outside the intended range.

28. For service, stop adding water and drain while supporting the whole moving unit by its body, never the flag. Remove both guide caps completely and place them outside the corridor. Initially keep exactly the same square-stem yaw as in the matched closed guides, without twisting in the half-notches, while sliding at least .25 in forward to clear both open half-notches. Hold bottom H at b = .375..3.25 in, plates level within 1/8 in across 3 in, and stem within 1 degree of vertical. Do not twist it from its marked FRONT orientation. Continue until the actual H plate center is at Y 7.125..7.25: a 2.5..2.625 in whole-unit forward translation from Y 9.75. Keep its X center within 1/16 in of X 12. Mark/check this service position on the empty received pan before use. Only then lift the whole unit vertically, clear of both arms, until it is above the pan rim and can move to a separate tray. A 1/4 in stem-only shift frees the notches but does NOT clear the broad float from the arms. Remove the empty pan afterward.

29. On the tray remove root pins and corner nuts together, keeping matched spacers, cap pairs and plate orientation. Expose all reliefs and foam for inspection and maker-compatible cleaning. Dry everything fully before storage. Replace damaged foam, bent stem, warped plates, loose guides or stripped hardware rather than coating over defects. Reassemble every retainer and repeat actual mass, drag, full motion and both water-reference bands after any rebuild or relocation. No physical performance, life, strength or potable-water certification is claimed.

Acceptance and intermediate checks

Dry fit all 21 stock pieces and all 62 fastener pieces. Verify actual materials/gauges and the full triangular, pocketed, notched and one-piece retained profiles. No bounding box substitutes for a cut profile.

Receive actual F = .875..1.125 from A underside, the continuous 5.5 x 8 in service corridor and rim/outer-envelope limits. Transfer actual F to both arms and fixed scale; these are original interface requirements, not published pan interior dimensions.

Complete wet moving mass 60..110 g; qualified guide drag <=10 gF; all 12 machine screws retain >=.050 in of complete thread beyond inserts. Both dry and water-wiped force comparisons are required; none has been performed by the author.

Guides .28125...28325 square, stem .249...251 square, close K pockets no greater than 1.254 x .254, root vertical lift <=.025 in. Check all complete head/nut/washer/tip extents, joint rocking, guide tilt and stem straightness.

LOW: lower rounded heads >=1/8 above the highest floor. HIGH: complete root >=1/8 below lower arm. Flag >=1/4 above upper arm and >=1/8 from fixed blade/clamp. Verify freeboard >=.75 at HIGH.

Six real reference passes at each 1.5/3.5 in depth: spread <=3/16; midpoint spacing 2 +/-3/16. Mark actual 3/8 in high bands only after those results. No preset scale or certified accuracy is supplied.

Service requires both caps removed, whole unit supported, 2.5 in forward translation and THEN vertical lifting. Broad float/root/flag must never pass closed guides or lift through an arm. Recheck gates after each rebuild.

Use and maintenance

Plain fresh nonpotable water, 40..95 F, in the received unmodified pan only. No drinking, food contact, detergents, fuels, brine, freezing or hot water.

Only the qualified LOW 1.5 in and HIGH 3.5 in bands are intended. Always check the water itself. No automatic filling, shutoff, overflow alarm or precise intermediate reading is claimed.

Keep A fully supported and pan/frame level. Attend filling and drawing; later qualified sessions last no more than 30 minutes, then drain and dry.

Do not carry a charged pan or frame with the float inside. Use the supported 2.5 in forward side-exit path before vertical removal. The flag is not a lifting handle.

Before use inspect the core, complete hardware, guide walls and marks. Stop for swelling, binding, changed wet mass, rubbing, unclear bands, loose caps or a changed pan/floor reference.

Drain and remove the whole group through the stated cap/translation/lift sequence before lifting the pan or opening the float. Do not pry the T root or flag through a closed guide.

Expose and clean every relief/spacer with the actual material maker instructions; do not rinse a closed charged assembly or use an unknown coating. Dry fully before storage. Replace failed materials instead of hiding damage.

Repeat complete wet mass, drag, motion and both real water-reference bands after changing any material, fastener, cleaning process or pan position. Calculations are conditional geometry and force budgets, not measured reliability, structural rating or physical test results.

Measured interface notes

F is the actual highest floor anywhere in the full service corridor, measured from A underside. Its accepted range is .875..1.125 in. Reference drawings use F = 1 and b = .75 only. b is the actual bottom H center underside above F, not water depth. Every floating b+... height is ABOVE actual F: its global Z from A underside is F+b+.... Drawing 04 local z is measured from bottom H underside. The published pan outer height is never used as its interior floor datum.

The actual 60..110 g moving-mass gate includes both plates, foam, four compression spacers, moving K, L, all eight moving screws/nuts/washers and water pickup. The 10 gF drag allowance includes the conservative instrument-difference budget. Typical foam and HDPE data are material-selection context, not an achieved mass result.

For received geometry, the lower foam waterplane is at least 8.5 in2; 9.1 in2 is a conservative upper bound including the permitted small tilt. Plain 40..95 F water is modeled at 16..16.5 g/in3. Up to .25 g equivalent buoyancy from the four below-plate heads is included in the shallowest-draft bound. Thus draft from bottom H is conditionally between (60-10-.25)/(9.1*16.5) = .33134 and (110+10)/(8.5*16) = .88236 in. These are not observed float depths.

The top-only foam reliefs start 1.5 in above the foam underside; the maximum modeled waterline remains lower. Hard J spacers set the plate separation. No hidden gasket, sealed air box, glued foam or specified leak-tight joint is assumed.

K pockets are close-fitting .252...254 by 1.252..1.254 in. Root-center lift is <=.025 in, and rocking is included. From the seated posture, continuous movement remains on the small-angle contact branch; the root cannot pass 10 degrees while engaged. Even at that provisional angle, .374-.025-hypot(1.251,.251)/2*sin(10 deg) > .23 in of full root section remains below the rim. With that conservative common section, solve w*cos(beta)+.23*sin(beta) <= pocket for each orthogonal projection, not a small-angle tangent approximation. The complete K/H and K/E bearing joints must stay flat within a .001 in feeler check, and root/blade bases must be square to their long axes within .002 over 1 in. Full receiving gates and hardware envelopes are checked separately; no perfectly fixed root is assumed.

The force/lift component of hysteresis is 2*10/(8.5*16) + .025 = .17206 in. This is NOT a bound on total flag-reading spread: guide tilt changes the height of the lateral flag and the long stem, and joint play may change during motion. The actual six-pass spread <=3/16 in at BOTH references is the decisive receiving gate. No wear, temperature, life or intermediate-depth accuracy is certified.

After both guide caps are removed, the whole unit translates 2.5..2.625 in forward before lifting, until the actual H plate center is at Y 7.125..7.25. Initial notch exit preserves the SAME yaw as in its matched closed guides; do

not twist the square stem in the half-notches. Later handling holds stem within 1 degree of vertical, plates level within 1/8 over 3 in, and the original FRONT orientation without yawing. This clears the broad float from the main-arm fronts; freeing only the quarter-inch stem does not. The original 5.5 x 8 in received corridor includes that translation and the full float/hardware yaw/tilt envelope.

The original drawings, complete-body envelope audit, export retention and native-page review are documented separately. They establish editorial consistency within explicit receiving limits; they are not a physical prototype, strength, friction, buoyancy or calibration trial.

Primary context references

V1: Rubbermaid Commercial Products, FG334900GRAY bus/utility box. Published outer 20 x 15 x 5 in, HDPE and 4.6 gal nominal capacity only. The full interior corridor, floor F, rim and operating fit are original actual receiving gates, not maker-provided internal dimensions. https://www.rubbermaidcommercial.com/foodservice/table-service/busutility-boxes/?sku=FG334900GRAY

V2: Zotefoams, Plastazote LD45 PIS A013, Issue 1 Revision 1, June 2026. Closed-cell crosslinked PE context and typical density 45 kg/m3 only. Typical material data do not prove complete wet moving mass, life or actual buoyancy. https://www.zotefoams.com/wp-content/uploads/2025/03/PIS-A013-Plastazote-LD45.pdf

V3: King Plastic, King StarBoard standard material sheet. Standard HDPE material context and typical density .955 g/cc. Nominal sheet gauges do not satisfy the original precision machining/receiving limits automatically. https://www.kingplastic.com/wp-content/uploads/2014/05/King-StarBoard-Literature.pdf

V4: USGS Water Science School, Water density. Plain-water density context supports the conservative 16..16.5 g/in3 budget over 40..95 F. This is not evidence of an actual water trial. https://www.usgs.gov/water-science-school/science/water-density

V5: W. W. Grainger, 856YN8 / 1-ppm-4c-275 #4-40 x 2.75 in pan-head screw. Published 2.75 in under-head length, 7/32 in maximum pan-head diameter, 5/64 in maximum height and minimum 1.5 in threaded tail. Actual receiving remains required. https://www.grainger.com/product/Machine-Screw-4-40-Thread-856YN8

V6: PESOLA, 40300 Medio Line 300 g / 2 g spring balance. 300 g range, 2 g divisions, +/- .3% precision and no user calibration. The larger original per-reading/difference budgets include reading and zero allowances. https://www.pesola.com/data/media/images/cms/Produktdatenblatt-Federwaage-Medio-Line-40300.pdf

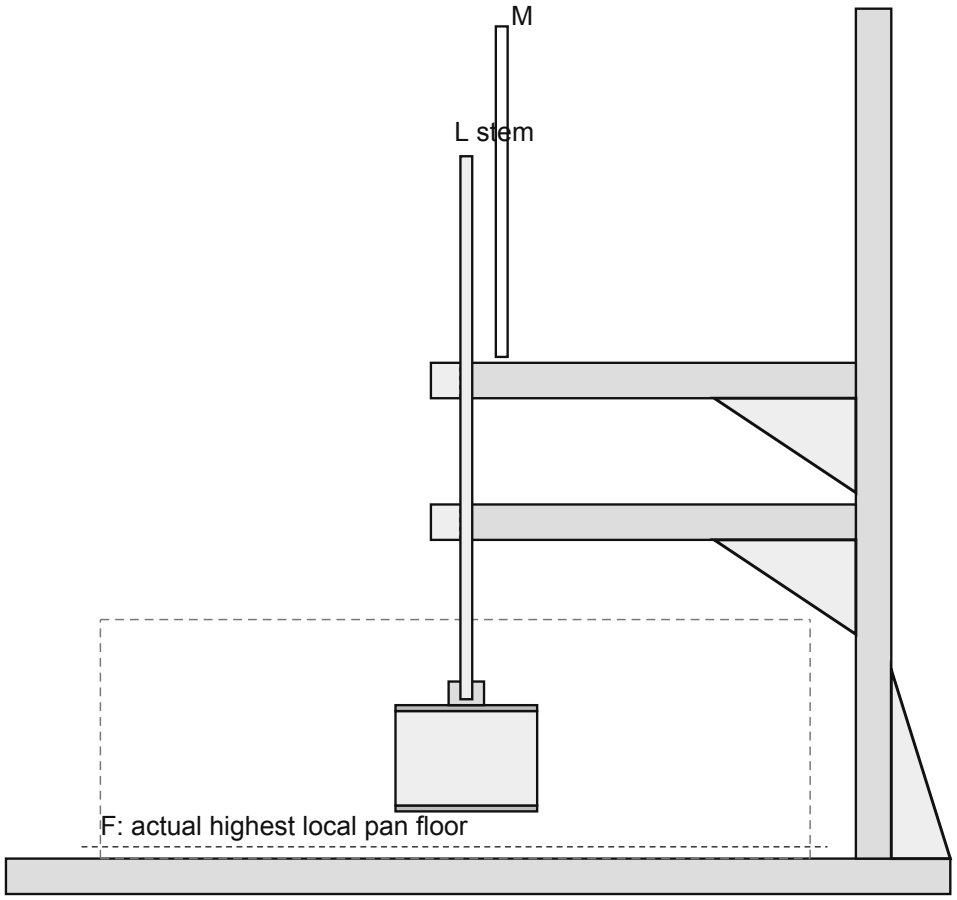
V7: PENCOM, Type B narrow washer catalog, printed page 102. Nominal #4 Type B narrow washer dimensions are .032 in thick, .125 ID and .250 OD. Complete eccentric envelope limits in this construction are original receiving gates. https://www.pencomsf.com/public/product-catalogs/washers/washers-catalog.pdf

V8: Albany County Fasteners, #4-40 low-profile nylon-insert 316 stainless hex nut. Nominal .251 in across flats and .125 in height. Actual corner envelope, height and complete thread projection must be received; no substituted tall nut is covered. https://www.albanycountyfasteners.com/nylon-hex-jam-nut-316-ss-4-40-251-flats-x-125-thick-1062-100000-0002/

V9: JC Fasteners, ASME B18.3-1 SS316 socket-head cap screw table. Primary SS316 socket-cap table: #4-40 head maximum .183 D/.112 H and named 1 in / 1.75 in length candidates. The length codes are marked nonpreferred/limited availability; no current stock is promised. Original received maximum .185 D/.115 H and minimum .5 in full tip thread apply as actual receiving gates, not a catalog thread-length promise. No rated property is transferred. https://www.jcfasteners.com/wp-content/uploads/ASME-B18.3-1-Allen-Cap-B6uA01-SS316.pdf

WA-005 | RECEIVED PAN, GUIDED FLOAT AND FIXED SCALE

Side view along X. F = measured floor; b = bottom-plate underside above F. Neither symbol is water depth.



A: 24 X x 20 Y x 3/4 Z, fully supported.

B: 18 high x 3 1/2 X x 3/4 Y.

D/E rear ends at Y 18; front guide split at Y 9 3/4.

Guide bottoms: F + 6 1/2 and F + 9 1/2; each guide 3/4 high.

Float axis X 12, Y 9 3/4. The bought pan is centred X 12, Y 9 1/2.

Illustrative pose ONLY: F = 1, b = 3/4. Transfer the actual F; no water level is inferred from this pose.

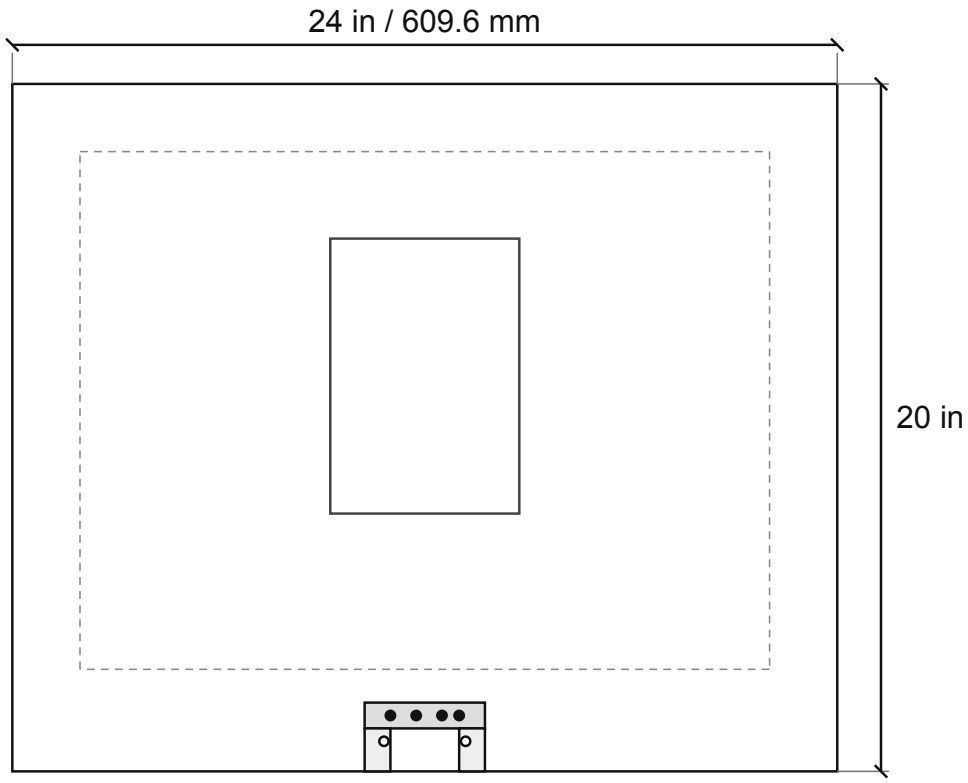
Dashed pan rectangle is the received bounding envelope, not a cut pattern or a published molded profile.

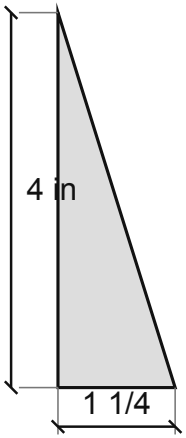
Fixed blade is offset across X; side view shows only its Y thickness. Read the separate profile and service plates.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | BASE LAYOUT AND RETAINED SUPPORT PROFILES

US inches control. Rear-foot fasteners and arm-wedge fasteners use different X rows.





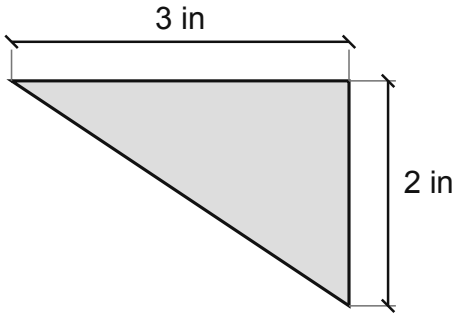
C x 2: 3/4 X thickness.

Actual right triangle.

At Y 18 3/4...20, Z 3/4...4 3/4.

G x 2: 1 1/2 X thickness. Full triangle supports each arm.

Top edge Y 15...18. Lower point at Y 18, two inches below arm underside.



Solid dots: WB1, X 11 / 11 3/4 / 12 1/2 / 13, Y 18 3/8.

Open dots: WB3, X 10 13/16 / 13 3/16, Y 19 1/8.

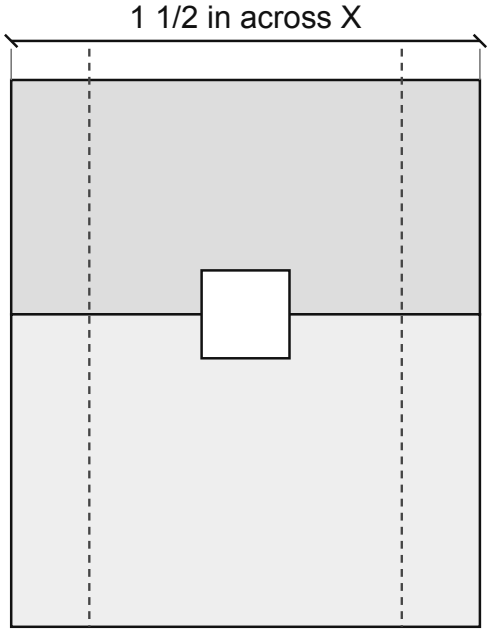
Box: received 5 1/2 x 8 in service corridor, X 9 1/4...14 3/4, Y 4 1/2...12 1/2.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | TWO REMOVABLE SPLIT SQUARE GUIDES

Each square guide is opened from the FRONT for installing/removing the one-piece follower.

FRONT, Y 9



Split Y 9 3/4

Arm continues to Y 18

Stem actual section .249...251 square. Guide .28125...28325 square.

Lower guide Z: F + 6 1/2...7 1/4. Upper: F + 9 1/2...10 1/4.

Match each cap to its own arm. Centres aligned within .002 per X/Y axis.

Keep walls smooth and unpainted. Full drag and wet-motion tests are still required.

For service: support the entire float; remove both caps forward; move the WHOLE float 2 1/2 in FRONT, then lift. A stem-only 1/4 in shift is insufficient.

Never force the wider root or side flag through a closed square guide.

Guide centre X 12, Y 9 3/4. Each half depth 9/64; full actual square 9/32.

F cap: 1 1/2 X x 3/4 Y x 3/4 Z. D arm width 1 1/2; E width 3 1/2.

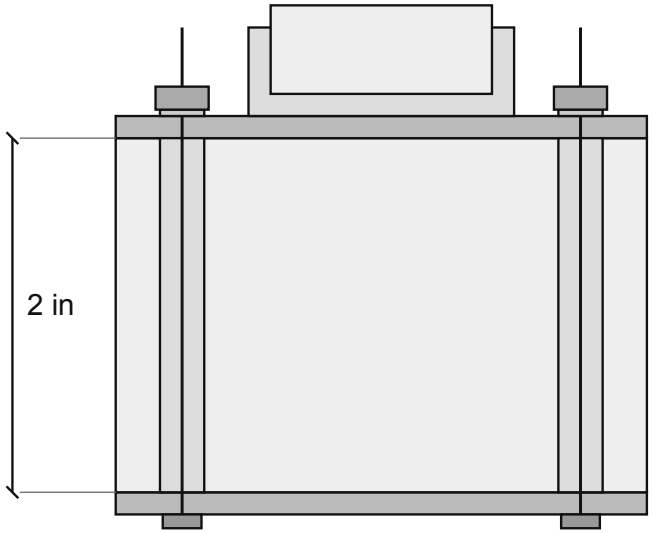
WB7 axes X 11 1/2 and 12 1/2; head Y 9, tip Y 11 1/4.

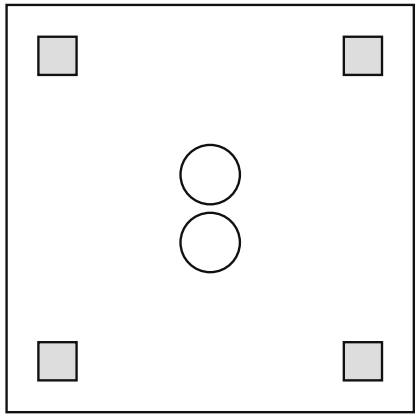
Rear arm screws WB4 are X 11 3/4 and 12 1/4, offset from vertical WB6.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | COMPRESSION-LIMITED FLOAT STACK

Local z = 0 at bottom H underside b. No water-tight chamber, adhesive seal or compressed-foam dimension.





Four 9/32 square passages: 2 1/4 square pattern, 3/8 from each edge.

Two TOP reliefs: 7/16 D x 1/2 deep; centres (1 1/2,1 1/4) and (1 1/2,1 3/4).

Solid lower foam zone remains below reliefs.

H x 2: 3 x 3 x 1/8. I: 3 x 3 x 2. J x 4: 1/4 square x 2 with 1/8 bore.

MF1 heads below H: <=5/64 high, <=7/32 OD. Underhead z 0, tip z 2 3/4.

Washer <=.036 + nut <=.130; two full threads remain. No sharp tip below float.

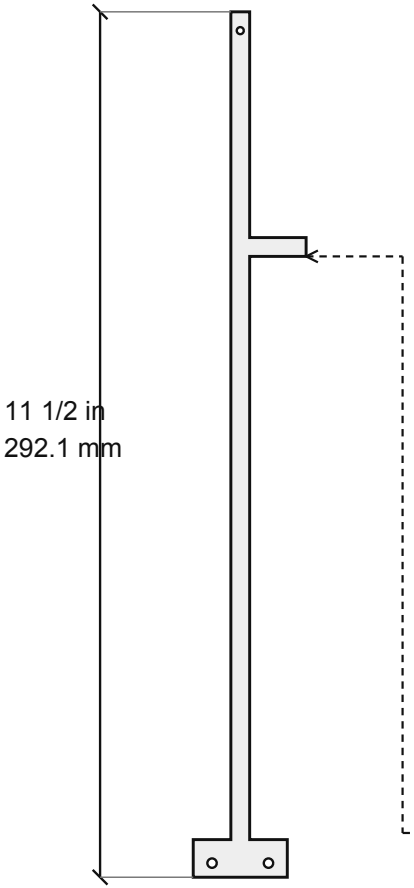
Install moving K mounts BEFORE core; nuts and downward tips enter the top reliefs.

Root local z 2 3/8...2 7/8; untilted root/hardware <=2.93. Add tilt for arm clearance.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | ONE-PIECE FOLLOWER AND FIXED REFERENCE BLADE

L is machined from one solid 1/4 in sheet. The lower flag edge, not its top, is the water-reference pointer.



L root: 1 1/4 wide x 1/2 high. Thickness .249...251.

Narrow stem: .249...251 square. Flag reaches X +7/8.

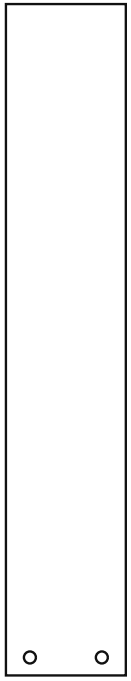
Flag Z 8 1/4...8 1/2 from root bottom.

Root pin bores: X +/-3/8, Z 3/16, 1/8 diameter along Y.

Tip test loop: 3/32 diameter along Y, Z 11 1/4. Remove the loop before operation.

Root floor in moving K: b + 2 3/8 above F.

All contour stations are in the cut list; no added pointer tab or glued root.



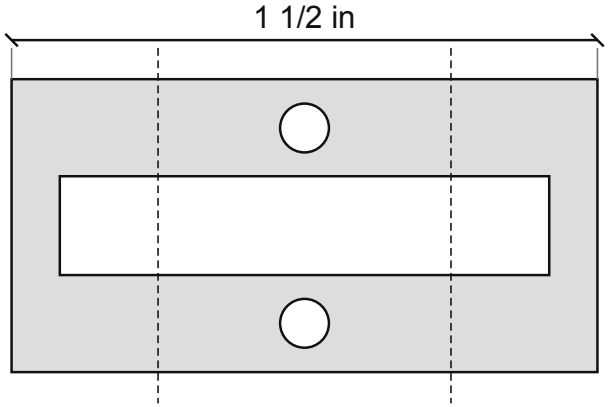
M: 7 x 1 1/4 x 1/4. Bottom seats 3/8 into K.

LOW/HIGH bands made only after actual water trials; no preset calibration engraved.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | TWO CAPTURE BLOCKS: POCKETS AND FULL PIN/MOUNT PATHS

One moving block and one stationary block share the same machined profile. They are components of this one apparatus.



Top pocket: 1.252...1.254 long, .252...254 wide, 3/8 deep.

Floor remains 1/8. Vertical mount axes local X 3/4, Y 1/8 and 5/8.

Dashed side-pin axes local X 3/8 and 1 1/8, Z 5/16, directed along Y.

K is 1/2 high. Pocket accepts actual .249...251 material; root/blade sits on the flat floor.

MOVING K: X 11 1/4...12 3/4, Y 9 3/8...10 1/8. Bottom z = b + 2 1/4 above F.

MF2 mount screws run DOWN from local z 2 3/4 to 1 3/4; heads miss the narrow root, nuts fit foam reliefs.

MF3 root pins run from local Y-3/8 to+5/8, at X+/-3/8, z 2 9/16.

STATIONARY K: X 13 1/4...14 3/4, Y 10 1/8...10 7/8, bottom F+10 1/4.

SF1 down at X 14: heads F+10 3/4, tips F+9. SF2 X 13 5/8 /14 3/8, head Y 10 1/8, tip 11 1/8.

MF2 and SF1 ONLY: cylindrical socket heads <=.185 D, <=.115 H. No pan/button heads.

All 12 machine screws: actual 2+ full 40 TPI threads beyond locknut. Actual washer T <= .036, nut H <= .130.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | MASS, LOW-FORCE RECEIVING AND REAL WATER REFERENCES

Conditional calculations explain the required receiving tests. None has been physically performed by the author.

WEIGH THE WHOLE MOVING UNIT

H plates, I core, all 4 J spacers, moving K, one-piece L, all 8 screws, 8 nuts and 8 washers and absorbed water.

Actual mass 60...110 g. With the stated 2 g division scale and conservative 3 g reading budget, accept a free hanging display 64...106 g.

Temporary PESOLA 40300 tool:300 g range,2 g division. Follow maker zero/tare instructions; no user recalibration. The balance is not built into the apparatus.

CONDITIONAL DRAFT BOUNDS

Minimum waterplane 8.5in 2; maximum 9.1. Plain 40...95 F water density 16...16.5 g/in 3.

Draft from bottom H = (mass +/- drag)/(area x density). Include <=.25 gF buoyancy of bottom heads. Conditional draft .33134...88236 in.

Bottom panhead adds <=.078125in below H. Complete tilted envelope and panfloor clearance still govern.

DRAG TEST, NO SIDE-PULL OR ACCELERATION

Free-hanging reading R. Guided upward <=R + 4 g; downward >=R - 4 g. Allow 6 g per difference: actual guide drag <=10 gF.

Traverse b=.25...3.25 slowly in both directions; pause every 1/4 in. Repeat dry and water-wiped; no force-through or lubricant.

These are receiving criteria and instrument budgets, not measured results.

ACTUAL TWO-WAY REFERENCE TEST

At 1 1/2 in and 3 1/2in above measured F, compare lower flag edge on 3 rising and 3 falling trials EACH.

Root lift <=.025 in is included. Observed spread <=3/16. Mark LOW/HIGH bands 3/8 high around actual midpoints. Midpoint spacing 2 +/-3/16.

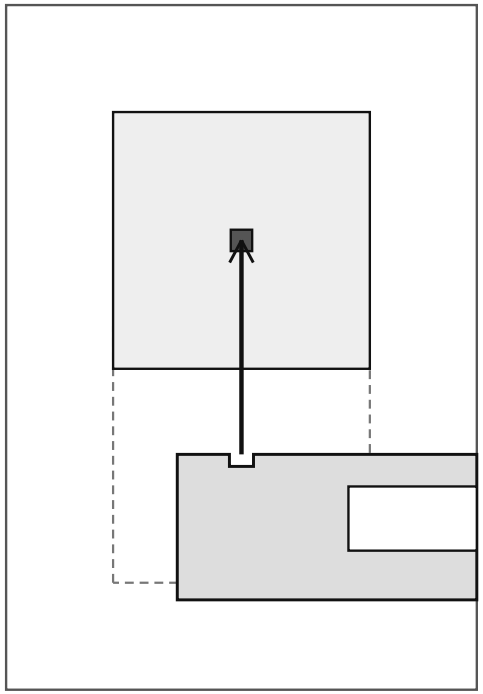
Minimum HIGH freeboard 3/4 in. No preset intermediate-depth accuracy, shutoff or unattended alarm.

Original B/W measured drawing - not a full-scale template - unbuilt / untested

WA-005 | WHOLE-FLOAT FORWARD EXIT BEFORE LIFTING

Top view: broad float cannot lift through an arm. Remove both caps, translate 2 1/2 in forward, THEN lift.

CLEAR CORRIDOR: 5 1/2 x 8 in



FRONT = decreasing Y

1. Drain with the whole unit supported by its body.

2. Remove BOTH matched caps and put them outside the corridor.

3. Hold bottom H at b = 3/8...3 1/4 above F; keep plates level within 1/8 over 3 in and stem within 1 degree of vertical.

4. Preserve guided yaw through first 1/4 in; no twist. Then move WHOLE unit 2 1/2...2 5/8 in FRONT: H centre Y 7 1/8...7 1/4.

5. Only now lift vertically clear of the arms and pan rim, then transfer to a separate tray.

Received corridor: X 9 1/4...14 3/4, Y 4 1/2...12 1/2. Check the actual highest floor F throughout it.

A 1/4 in stem-only shift frees the notches but does NOT clear the broad float.

Dashed = operating float; shaded = forward service pose.

Operating LOW: complete lower heads >=1/8 above floor. HIGH: full root >=1/8 below lower arm.

Flag >=1/4 above upper arm; >=1/8 from fixed blade/clamp. Requalify after every rebuild.

Original B/W measured drawing - not a full-scale template - unbuilt / untested