Component Details — 5-Gang Instrument Tuning Machines

All dimensions in **mm** | Tolerances in brackets where critical

Config: c13-10

Overview

One tuner set = 1 RH (right-hand) + 1 LH (left-hand) assembly. Each assembly has **5 tuning stations**. LH is a mirror of RH.

Parts per assembly

Part	Qty	Material	Identical LH/RH?
Frame	1	Brass (CZ121)	No — mirrored
String post	5	Brass (CZ121)	Yes — same part
Peg head + worm	5	Brass (CZ121)	thread direction L & R
Worm wheel	5	Phosphor bronze (PB102)	helix direction L & R
M2 x 4mm pan head screw	10	Stainless steel	Yes
M2.5 washer (5.5mm OD)	5	Stainless steel	Yes
M2 washer (~5mm OD)	5	Stainless steel	Yes

Hardware (buy, not manufactured)

Item	Size	Qty per assembly
Pan head screw	M2 x 4mm	10 (5 peg + 5 post)
Washer (peg retention)	M2.5 (ID 2.7, OD 5.5, t=0.5)	5
Washer (post retention)	M2 (ID ~2.2, OD ~5.0, t=0.5)	5
Mounting bolt	M3 mushroom head	6

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1. Frame

Square brass tube with machined openings. 5 rigid box sections connected by a flat mounting plate (top wall).

Dimensions

Parameter	Value
Cross-section (outer)	10.0 x 10.0
Wall thickness	1.0
Internal cavity	8.0 x 8.0
Total length	145.0
Housing length	16.2 (each box section)
End length	10.0 (solid ends, each side)
Tuner pitch	27.2 (centre-to-centre)
Number of housings	5

Holes (5 of each, one per housing)

Hole	Face	Diameter	Tolerance
Post bearing	Top	5.05	H7 (reamed)
Wheel inlet	Bottom	5.1	+0.1
Worm entry	Right side (RH)	7.05	+0.1
Peg bearing	Left side (RH)	4.55	H7 (reamed)
Mounting	Bottom plate	3.0	+0.1

Mounting holes: 6 total, in gaps between housings and at ends.

LH frame: Worm entry and peg bearing holes swap sides.

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2. String Post

Turned brass part. Multi-diameter shaft with cap on top. **Same part for RH and LH.**

Sections (top to bottom)

Section	Diameter	Length	Notes
Cap	7.5	1.0	Fillet 0.25R top+bottom, 0.3 chamfer
Visible post	6.0	5.5	String hole here
Frame bearing	5.0 (h7)	1.1	Passes through top wall
DD section	3.5 / AF 2.5	7.2	Wheel interface
Total		**14.8**	

Section	Diameter	Length	Notes

Features

Feature	Detail
String hole	1.5 dia, cross-drilled, 2.75 from bearing shoulder
DD flats	2 flats, 0.5 deep, across-flats = 2.5
M2 tap hole	Bottom of DD, 1.6 drill, 4.0 deep
Cap grooves	3 concentric V-grooves, 0.33 wide x 0.33 deep, outer at 6.0 dia

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3. Peg Head + Worm

Decorative ring with integral worm shaft. **RH and LH have opposite thread direction.**

Key dimensions

Feature	Dimension
Ring outer diameter	12.5
Ring bore	9.8 (offset 0.25 from centre)
Cap diameter	8.5
Cap length	1.0
Shoulder diameter	7.0
Shaft diameter	4.5 (h7)

Worm thread

Parameter	Value
Module	0.5
Type	Cylindrical
Starts	1
Pitch diameter	6.0
Tip diameter	7.0
Root diameter	4.75

Parameter	Value
Lead (axial advance per rev)	1.571
Lead angle	4.76 deg
Worm length	7.7
Pressure angle	20 deg

Shaft sections (from ring outward)

Section	Diameter	Length	Notes
Worm	7.0 tip / 4.75 root	7.7	Threaded
Bearing	4.5 (h7)	1.2	Passes through frame wall
Total shaft		**8.9**	

Features

Feature	Detail
M2 tap hole	End of shaft, 1.6 drill, 3.0 deep
Pip (decorative)	2.1 dia x 1.2 long, on ring face
Edge chamfer	0.3 all edges

4. Worm Wheel

Gear with DD bore. **RH and LH have opposite helix direction.**

Dimensions

Parameter	Value
Module	0.5
Number of teeth	13
Pitch diameter	6.5
Tip diameter	7.6
Root diameter	5.55
Face width	7.7
Profile shift	+0.3
Pressure angle	20 deg

Tip reduction (0.2): Tooth tips shortened 0.2mm to prevent interference with worm root. Already applied — the 7.6 tip diameter includes this reduction.

Bore (DD cut)

Parameter	Value
Bore diameter	3.5
Across flats	2.5
Flat depth	0.5 (each side)

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5. Assembly — Gear Mesh

Parameter	Value
Centre distance	6.25
Gear ratio	13:1
Worm axis to wheel axis	90 deg, offset 6.25
Worm Z position (in frame)	-5.0 (below frame top)

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7. Critical Tolerances

Feature	Tolerance	Why
Post bearing dia (5.0)	h7 (-0 / -0.012)	Must rotate freely in frame
Peg shaft dia (4.5)	h7 (-0 / -0.012)	Must rotate freely in frame
Frame bearing holes	H7 (+0.012 / +0)	Match shaft tolerances
DD flats (post + wheel)	+/- 0.02	Anti-rotation fit
Housing pitch (27.2)	+/- 0.05	Alignment across 5 stations
Worm pitch diameter (6.0)	+/- 0.02	Gear mesh quality

Feature	Tolerance	Why
Centre distance (6.25)	+/- 0.02	Gear mesh quality

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8. File List

File	Description
`frame_rh_5gang.step`	Right-hand frame
`frame_lh_5gang.step`	Left-hand frame
`string_post.step`	String post (same for both hands)
`peg_head_rh.step`	Peg head + worm, right-hand thread
`peg_head_lh.step`	Peg head + worm, left-hand thread
`wheel_rh.step`	Worm wheel, right-hand helix
`wheel_lh.step`	Worm wheel, left-hand helix

STL versions also available (same names, `.stl` extension).