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OPERATION SHEET

OP	PART	OPERATION	TOOL	CRITICAL
10	Hub	Turn Ø44 × 26 from Ø50 bar	CNMG turning	—
20	Hub	Bore + tap M10 central, THROUGH	Ø8.5 drill, M10 tap	on axis 0.05
30	Hub	Mill 4 × vane slots 0.6 wide × 8 deep	Ø0.6 slitting saw	90° ±0.05°
40	Hub	MILL HUB MOUNT FACE OFFSET 5.0	Ø10 end mill	OFFSET 5.0 ±0.3
50	Vanes	Shear 4 × 110 × 22 from 0.5 shim	Guillotine	no crease
60	Vanes	Drill 2 × Ø3.2 tube fixing per vane	Ø3.2 drill	—
70	Board	Face 120 × 120 × 14	Face mill	—
80	Board	Mill concave seat R125 across face	Ø16 ball nose	MUST NOT ROCK
90	Board	Bore Ø61 drawtube clearance	Ø12 helical ramp	SQUARE 0.1°
100	Board	Drill 4 × Ø5.3 on Ø92 PCD	Ø5.3 drill	—
110	Board	Inspection: squareness sweep	DTI on drawtube	GATE G5

CRITICAL NOTES

1. OP 40 IS THE SECONDARY OFFSET. IT IS A MACHINED FEATURE, NOT A SHIM.
OMITTING IT PRODUCES PERMANENT ONE-SIDED COMA.
2. OP 80: THE CONCAVE SEAT MUST MATCH THE TUBE OD. A BOARD THAT ROCKS PUTS
A TILT INTO THE FOCUSER AXIS THAT COLLIMATION CANNOT REMOVE.
3. OP 90 SQUARENESS 0.1° IS THE SINGLE TIGHTEST ANGULAR TOLERANCE IN THE BUILD.
SWEEP A DTI ON THE FITTED DRAWTUBE. DO NOT ACCEPT ON THE BORE ALONE.
4. VANE SLOTS 0.6 FOR A 0.5 VANE = 0.1 CLEARANCE. BOND WITH THIN CA, DO NOT
RELY ON FRICTION. VANES MUST END UP COPLANAR AND EQUALLY TENSIONED.

REVISION HISTORY

REV	DESCRIPTION	DATE
A	First issue for manufacture	2026-08-16

FLOWMATIC · ASTROGRAPH PROGRAMME
200 mm f/4 NEWTONIAN ASTROGRAPH · CANBERRA ACT 35.28°S

MACHINING OPERATIONS — SPIDER AND FOCUSER BOARD

DRAWING NUMBER FM-AST-P03	REVISION A	SHEET 3 OF 6
SCALE NTS	MATERIAL ALU 6061-T6 HUB / 5052-H32 VANES	MASS 0.33 kg
PROJECTION FIRST ANGLE (ISO 128)	FINISH BLACK ANODISE	UNITS MILLIMETRES
GENERAL TOL ISO 2768-mK UNLESS STATED · DO NOT SCALE DRAWN NaXief's Claude · CHECKED SELF-CHECK + VISUAL JUDGE, SEE SHEET 6 QA GATES DATE 2026-08-16 · STATUS ISSUED FOR MANUFACTURE		

