

deck height

Port map of Kawasaki H1b 1972 right cylinder  
cylinders bored to 61 mm  
stroke 58.8 mm  
con-rod 110 mm  
piston height 65,2 mm  
deck height -1,3 mm

transfers total  
corrected area (piston  
covers 3 mm) 711 mm<sup>2</sup>  
transfers total mean  
time area 522 mm<sup>2</sup>

area 124 mm<sup>2</sup>  
mean time  
area 71 mm<sup>2</sup>

area 323 mm<sup>2</sup>  
mean time  
area 190 mm<sup>2</sup>

Calculated  
mean time

area 1000 mm<sup>2</sup>  
corrected area (piston  
covers 3 mm) 920 mm<sup>2</sup>  
mean time  
area 705 mm<sup>2</sup>  
Calculated mean time

piston at BDC

max. height  
27,1 mm

Calculated mean time

area 968 mm<sup>2</sup>  
mean time area  
749 mm<sup>2</sup>

deck height

Port map of Kawasaki H1 cylinder with the older bridged intake

transfers total  
corrected area (piston  
covers 3 mm) 711 mm<sup>2</sup>

transfers total mean  
time area 522 mm<sup>2</sup>

area 124 mm<sup>2</sup>  
mean time  
area 71 mm<sup>2</sup>

area 323 mm<sup>2</sup>  
mean time  
area 190 mm<sup>2</sup>

area 1000 mm<sup>2</sup>  
corrected area (piston  
covers 3 mm) 920 mm<sup>2</sup>  
mean time  
area 705 mm<sup>2</sup>

piston at BDC

max. height  
26,6 mm

Calculated mean time

area 529 mm<sup>2</sup>

mean time area  
369 mm<sup>2</sup>

total intake area 1058 mm<sup>2</sup>  
total intake mean time area 738 mm<sup>2</sup>

Exhaust	
max height	28,53 mm
total area	999,6893 mm <sup>2</sup>
corrected area (piston covers 3mm)	919,75851 mm <sup>2</sup>
mean time area 135.9°, 52.4 mm ATDC	704,79067 mm <sup>2</sup>

Transfer 1	
max height	15,3 mm
total area	323,45417 mm <sup>2</sup>
corrected area (piston covers 3mm)	256,66258 mm <sup>2</sup>
mean time area 150.1°, 55.9 mm ATDC	190,17418 mm <sup>2</sup>

Transfer 2	
max height	14,24 mm
total area	124,0042 mm <sup>2</sup>
corrected area (piston covers 3mm)	98,980459 mm <sup>2</sup>
mean time area 150.1°, 55.9 mm ATDC	70,70296 mm <sup>2</sup>

Total transfer port area ((transfer 1 + transfer 2)*2)	711,28609 mm <sup>2</sup>
total transfer mean area	521,75429 mm <sup>2</sup>

Intake (non-bridged intake)	
max height	27,1 mm
total area	967,52087 mm <sup>2</sup>
total mean time area	748,57009 mm <sup>2</sup>

Intake (older bridged intake)		
one port	max height	26,14 mm
the other port	max height	26,6 mm
total area both ports		1058,0855 mm <sup>2</sup>
total mean time area		737,55314 mm <sup>2</sup>

<b>Summary</b>		
	<u>total area</u>	<u>mean time area</u>
Exhaust	919,8 mm <sup>2</sup>	704,8 mm <sup>2</sup>
Transfer	711,3 mm <sup>2</sup>	521,8 mm <sup>2</sup>
Intake	967,5 mm <sup>2</sup>	748,6 mm <sup>2</sup>
brid.intake	1058 mm <sup>2</sup>	737,6 mm <sup>2</sup>

<b>Duration</b>	
Exhaust	176,5 degrees
Transfer	119,6 degrees
Intake	155,2 degrees

<b>Port Time open at 7500 rpm</b>	
Exhaust	0,0039222 s
Transfer	0,0026578 s
Intake	0,0034489 s

Conclusion of the bridged intake: The area is larger than the non-bridged, but the larger area resides mainly at the TDC of the stroke, meaning that it has only a little impact on the flow, which also is seen on the mean time area.

<b>Time area</b>			1973 Jennings suggestions	Blair's suggestions
Exhaust	0,0001611	s*cm <sup>2</sup> /cm <sup>3</sup>	0.00014 - 0.00015 s*cm <sup>2</sup> /cm <sup>3</sup>	0.000124 s*cm <sup>2</sup> /cm <sup>3</sup>
Transfer	0,0000808	s*cm <sup>2</sup> /cm <sup>3</sup>	0.00008 - 0.00010 s*cm <sup>2</sup> /cm <sup>3</sup>	0.000069 - 0.000117
Intake	0,0001505	s*cm <sup>2</sup> /cm <sup>3</sup>	0.00014 - 0.00016 s*cm <sup>2</sup> /cm <sup>3</sup>	0.00011 s*cm <sup>2</sup> /cm <sup>3</sup>

<b>Angle area</b>			1973 Jennings suggestions
Exhaust	7,2509865	α*cm <sup>2</sup> /cm <sup>3</sup>	this works best at 8000 rpm
Transfer	3,637657	α*cm <sup>2</sup> /cm <sup>3</sup>	this works best at 7000 rpm
Intake	6,7721728	α*cm <sup>2</sup> /cm <sup>3</sup>	this works best at 7500 rpm

RPM	<b>port time open</b>			<b>time areas</b>		
	exhaust	transfer	intake	exhaust	transfer	intake
500	0,058833	0,039867	0,051733	0,0024170	0,0012126	0,0022574
1000	0,029417	0,019933	0,025867	0,0012085	0,0006063	0,0011287
1500	0,019611	0,013289	0,017244	0,0008057	0,0004042	0,0007525
2000	0,014708	0,009967	0,012933	0,0006042	0,0003031	0,0005643
2500	0,011767	0,007973	0,010347	0,0004834	0,0002425	0,0004515
3000	0,009806	0,006644	0,008622	0,0004028	0,0002021	0,0003762
3500	0,008405	0,005695	0,007390	0,0003453	0,0001732	0,0003225
4000	0,007354	0,004983	0,006467	0,0003021	0,0001516	0,0002822
4500	0,006537	0,004430	0,005748	0,0002686	0,0001347	0,0002508
5000	0,005883	0,003987	0,005173	0,0002417	0,0001213	0,0002257
5500	0,005348	0,003624	0,004703	0,0002197	<b>0,0001102</b>	0,0002052
<b>6000</b>	0,004903	0,003322	0,004311	0,0002014	<b>0,0001010</b>	0,0001881
<b>6500</b>	0,004526	0,003067	0,003979	0,0001859	<b>0,0000933</b>	0,0001736
<b>7000</b>	0,004202	0,002848	0,003695	0,0001726	<b>0,0000866</b>	<b>0,0001612</b>
<b>7500</b>	0,003922	0,002658	0,003449	<b>0,0001611</b>	<b>0,0000808</b>	<b>0,0001505</b>
<b>8000</b>	0,003677	0,002492	0,003233	<b>0,0001511</b>	<b>0,0000758</b>	<b>0,0001411</b>
<b>8500</b>	0,003461	0,002345	0,003043	<b>0,0001422</b>	<b>0,0000713</b>	<b>0,0001328</b>
9000	0,003269	0,002215	0,002874	<b>0,0001343</b>	0,0000674	<b>0,0001254</b>
9500	0,003096	0,002098	0,002723	<b>0,0001272</b>	0,0000638	<b>0,0001188</b>
10000	0,002942	0,001993	0,002587	0,0001208	0,0000606	<b>0,0001129</b>

black = Jennings's suggestions  
 blue = Kawasaki H1B 1972  
 red = Blair's suggestions

SWEPT VOLUME	BORE	STROKE	CON-ROD	PISTON-AREA
cm3	mm	mm	mm	mm2
171.8	61.0	58.8	110.0	2922.5

This table shows the height from TDC or BDC at a certain crank-angle. Also the swept volume at the angle is shown.

CRANK-ANGLE	HTDC	HBDC	VTDC	VBDC
deg.atdc	mm	mm	cm3	cm3
70.0	22.9	35.9	66.8	105.0
70.2	23.0	35.8	67.1	104.7
70.4	23.1	35.7	67.5	104.4
70.6	23.2	35.6	67.8	104.1
70.8	23.3	35.5	68.1	103.8
71.0	23.4	35.4	68.4	103.5
71.2	23.5	35.3	68.7	103.1
71.4	23.6	35.2	69.0	102.8
71.6	23.7	35.1	69.3	102.5
71.8	23.8	35.0	69.6	102.2
72.0	23.9	34.9	69.9	101.9
72.2	24.0	34.8	70.2	101.6
72.4	24.1	34.7	70.5	101.3
72.6	24.2	34.6	70.9	101.0
72.8	24.4	34.4	71.2	100.7
73.0	24.5	34.3	71.5	100.4
73.2	24.6	34.2	71.8	100.1
73.4	24.7	34.1	72.1	99.7
73.6	24.8	34.0	72.4	99.4
73.8	24.9	33.9	72.7	99.1
74.0	25.0	33.8	73.0	98.8
74.2	25.1	33.7	73.3	98.5
74.4	25.2	33.6	73.6	98.2
74.6	25.3	33.5	74.0	97.9
74.8	25.4	33.4	74.3	97.6
75.0	25.5	33.3	74.6	97.3
75.2	25.6	33.2	74.9	97.0
75.4	25.7	33.1	75.2	96.6
75.6	25.8	33.0	75.5	96.3
75.8	25.9	32.9	75.8	96.0
76.0	26.1	32.7	76.1	95.7
76.2	26.2	32.6	76.4	95.4
76.4	26.3	32.5	76.8	95.1
76.6	26.4	32.4	77.1	94.8
76.8	26.5	32.3	77.4	94.5
77.0	26.6	32.2	77.7	94.2
77.2	26.7	32.1	78.0	93.8
77.4	26.8	32.0	78.3	93.5
77.6	26.9	31.9	78.6	93.2
77.8	27.0	31.8	78.9	92.9
78.0	27.1	31.7	79.2	92.6

CRANK-ANGLE deg.atdc	HTDC mm	HBDC mm	VTDC cm3	VBDC cm3
78.2	27.2	31.6	79.5	92.3
78.4	27.3	31.5	79.9	92.0
78.6	27.4	31.4	80.2	91.7
78.8	27.5	31.3	80.5	91.4
79.0	27.6	31.2	80.8	91.1
79.2	27.7	31.1	81.1	90.7
79.4	27.9	30.9	81.4	90.4
79.6	28.0	30.8	81.7	90.1
79.8	28.1	30.7	82.0	89.8
80.0	28.2	30.6	82.3	89.5
80.2	28.3	30.5	82.6	89.2
80.4	28.4	30.4	83.0	88.9
80.6	28.5	30.3	83.3	88.6
80.8	28.6	30.2	83.6	88.3
81.0	28.7	30.1	83.9	88.0
81.2	28.8	30.0	84.2	87.6
81.4	28.9	29.9	84.5	87.3
81.6	29.0	29.8	84.8	87.0
81.8	29.1	29.7	85.1	86.7
82.0	29.2	29.6	85.4	86.4
82.2	29.3	29.5	85.7	86.1
82.4	29.4	29.4	86.0	85.8
82.6	29.5	29.3	86.4	85.5
82.8	29.7	29.1	86.7	85.2
83.0	29.8	29.0	87.0	84.9
83.2	29.9	28.9	87.3	84.6
83.4	30.0	28.8	87.6	84.3
83.6	30.1	28.7	87.9	84.0
83.8	30.2	28.6	88.2	83.6
84.0	30.3	28.5	88.5	83.3
84.2	30.4	28.4	88.8	83.0
84.4	30.5	28.3	89.1	82.7
84.6	30.6	28.2	89.4	82.4
84.8	30.7	28.1	89.7	82.1
85.0	30.8	28.0	90.0	81.8
85.2	30.9	27.9	90.3	81.5
85.4	31.0	27.8	90.6	81.2
85.6	31.1	27.7	91.0	80.9
85.8	31.2	27.6	91.3	80.6
86.0	31.3	27.5	91.6	80.3
86.2	31.4	27.4	91.9	80.0
86.4	31.5	27.3	92.2	79.7
86.6	31.6	27.2	92.5	79.4
86.8	31.7	27.1	92.8	79.1
87.0	31.9	26.9	93.1	78.8
87.2	32.0	26.8	93.4	78.5
87.4	32.1	26.7	93.7	78.1
87.6	32.2	26.6	94.0	77.8
87.8	32.3	26.5	94.3	77.5
88.0	32.4	26.4	94.6	77.2

CRANK-ANGLE deg.atdc	HTDC mm	HBDC mm	VTDC cm3	VBDC cm3
88.2	32.5	26.3	94.9	76.9
88.4	32.6	26.2	95.2	76.6
88.6	32.7	26.1	95.5	76.3
88.8	32.8	26.0	95.8	76.0
89.0	32.9	25.9	96.1	75.7
89.2	33.0	25.8	96.4	75.4
89.4	33.1	25.7	96.7	75.1
89.6	33.2	25.6	97.0	74.8
89.8	33.3	25.5	97.3	74.5
90.0	33.4	25.4	97.6	74.2
90.2	33.5	25.3	97.9	73.9
90.4	33.6	25.2	98.2	73.6
90.6	33.7	25.1	98.5	73.3
90.8	33.8	25.0	98.8	73.0
91.0	33.9	24.9	99.1	72.7
91.2	34.0	24.8	99.4	72.4
91.4	34.1	24.7	99.7	72.1
91.6	34.2	24.6	100.0	71.8
91.8	34.3	24.5	100.3	71.5
92.0	34.4	24.4	100.6	71.2
92.2	34.5	24.3	100.9	70.9
92.4	34.6	24.2	101.2	70.6
92.6	34.7	24.1	101.5	70.4
92.8	34.8	24.0	101.8	70.1
93.0	34.9	23.9	102.1	69.8
93.2	35.0	23.8	102.4	69.5
93.4	35.1	23.7	102.7	69.2
93.6	35.2	23.6	103.0	68.9
93.8	35.3	23.5	103.3	68.6
94.0	35.4	23.4	103.6	68.3
94.2	35.5	23.3	103.8	68.0
94.4	35.6	23.2	104.1	67.7
94.6	35.7	23.1	104.4	67.4
94.8	35.8	23.0	104.7	67.1
95.0	35.9	22.9	105.0	66.8
95.2	36.0	22.8	105.3	66.5
95.4	36.1	22.7	105.6	66.2
95.6	36.2	22.6	105.9	66.0
95.8	36.3	22.5	106.2	65.7
96.0	36.4	22.4	106.5	65.4
96.2	36.5	22.3	106.8	65.1
96.4	36.6	22.2	107.0	64.8
96.6	36.7	22.1	107.3	64.5
96.8	36.8	22.0	107.6	64.2
97.0	36.9	21.9	107.9	63.9
97.2	37.0	21.8	108.2	63.6
97.4	37.1	21.7	108.5	63.4
97.6	37.2	21.6	108.8	63.1
97.8	37.3	21.5	109.1	62.8
98.0	37.4	21.4	109.3	62.5

CRANK-ANGLE deg.atdc	HTDC mm	HBDC mm	VTDC cm3	VBDC cm3
98.2	37.5	21.3	109.6	62.2
98.4	37.6	21.2	109.9	61.9
98.6	37.7	21.1	110.2	61.6
98.8	37.8	21.0	110.5	61.4
99.0	37.9	20.9	110.8	61.1
99.2	38.0	20.8	111.0	60.8
99.4	38.1	20.7	111.3	60.5
99.6	38.2	20.6	111.6	60.2
99.8	38.3	20.5	111.9	59.9
100.0	38.4	20.4	112.2	59.7
100.2	38.5	20.3	112.5	59.4
100.4	38.6	20.2	112.7	59.1
100.6	38.7	20.1	113.0	58.8
100.8	38.8	20.0	113.3	58.5
101.0	38.9	19.9	113.6	58.3
101.2	39.0	19.8	113.9	58.0
101.4	39.1	19.7	114.1	57.7
101.6	39.1	19.7	114.4	57.4
101.8	39.2	19.6	114.7	57.2
102.0	39.3	19.5	115.0	56.9
102.2	39.4	19.4	115.2	56.6
102.4	39.5	19.3	115.5	56.3
102.6	39.6	19.2	115.8	56.0
102.8	39.7	19.1	116.1	55.8
103.0	39.8	19.0	116.3	55.5
103.2	39.9	18.9	116.6	55.2
103.4	40.0	18.8	116.9	55.0
103.6	40.1	18.7	117.2	54.7
103.8	40.2	18.6	117.4	54.4
104.0	40.3	18.5	117.7	54.1
104.2	40.4	18.4	118.0	53.9
104.4	40.5	18.3	118.2	53.6
104.6	40.6	18.2	118.5	53.3
104.8	40.6	18.2	118.8	53.1
105.0	40.7	18.1	119.1	52.8
105.2	40.8	18.0	119.3	52.5
105.4	40.9	17.9	119.6	52.2
105.6	41.0	17.8	119.9	52.0
105.8	41.1	17.7	120.1	51.7
106.0	41.2	17.6	120.4	51.4
106.2	41.3	17.5	120.7	51.2
106.4	41.4	17.4	120.9	50.9
106.6	41.5	17.3	121.2	50.7
106.8	41.6	17.2	121.5	50.4
107.0	41.6	17.2	121.7	50.1
107.2	41.7	17.1	122.0	49.9
107.4	41.8	17.0	122.2	49.6
107.6	41.9	16.9	122.5	49.3
107.8	42.0	16.8	122.8	49.1
108.0	42.1	16.7	123.0	48.8

CRANK-ANGLE deg.atdc	HTDC mm	HBDC mm	VTDC cm3	VBDC cm3
108.2	42.2	16.6	123.3	48.6
108.4	42.3	16.5	123.6	48.3
108.6	42.4	16.4	123.8	48.0
108.8	42.5	16.3	124.1	47.8
109.0	42.5	16.3	124.3	47.5
109.2	42.6	16.2	124.6	47.3
109.4	42.7	16.1	124.8	47.0
109.6	42.8	16.0	125.1	46.7
109.8	42.9	15.9	125.4	46.5
110.0	43.0	15.8	125.6	46.2
110.2	43.1	15.7	125.9	46.0
110.4	43.2	15.6	126.1	45.7
110.6	43.2	15.6	126.4	45.5
110.8	43.3	15.5	126.6	45.2
111.0	43.4	15.4	126.9	45.0
111.2	43.5	15.3	127.1	44.7
111.4	43.6	15.2	127.4	44.5
111.6	43.7	15.1	127.6	44.2
111.8	43.8	15.0	127.9	44.0
112.0	43.8	15.0	128.1	43.7
112.2	43.9	14.9	128.4	43.5
112.4	44.0	14.8	128.6	43.2
112.6	44.1	14.7	128.9	43.0
112.8	44.2	14.6	129.1	42.7
113.0	44.3	14.5	129.4	42.5
113.2	44.4	14.4	129.6	42.2
113.4	44.4	14.4	129.9	42.0
113.6	44.5	14.3	130.1	41.7
113.8	44.6	14.2	130.4	41.5
114.0	44.7	14.1	130.6	41.2
114.2	44.8	14.0	130.8	41.0
114.4	44.9	13.9	131.1	40.8
114.6	44.9	13.9	131.3	40.5
114.8	45.0	13.8	131.6	40.3
115.0	45.1	13.7	131.8	40.0
115.2	45.2	13.6	132.0	39.8
115.4	45.3	13.5	132.3	39.6
115.6	45.3	13.5	132.5	39.3
115.8	45.4	13.4	132.8	39.1
116.0	45.5	13.3	133.0	38.8
116.2	45.6	13.2	133.2	38.6
116.4	45.7	13.1	133.5	38.4
116.6	45.8	13.0	133.7	38.1
116.8	45.8	13.0	133.9	37.9
117.0	45.9	12.9	134.2	37.7
117.2	46.0	12.8	134.4	37.4
117.4	46.1	12.7	134.6	37.2
117.6	46.2	12.6	134.9	37.0
117.8	46.2	12.6	135.1	36.7
118.0	46.3	12.5	135.3	36.5



CRANK-ANGLE deg.atdc	HTDC mm	HBDC mm	VTDC cm3	VBDC cm3
118.2	46.4	12.4	135.6	36.3
118.4	46.5	12.3	135.8	36.0
118.6	46.5	12.3	136.0	35.8
118.8	46.6	12.2	136.3	35.6
119.0	46.7	12.1	136.5	35.4
119.2	46.8	12.0	136.7	35.1
119.4	46.9	11.9	136.9	34.9
119.6	46.9	11.9	137.2	34.7
119.8	47.0	11.8	137.4	34.5
120.0	47.1	11.7	137.6	34.2