Technical Information Sheet

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Subject
This document describes the reason and amount of offset between each of the pens in the 392 circular chart recorder and the time difference of each pen due to the mechanical offset.

The fact that all four of the 392 pen arms use the same pivot point, means that each must be a different length so the pens will not interfere with each other. This difference in length shall be referred to as the mechanical offset. Corresponding to each mechanical offset, there is an associated timing offset.

The mechanical offset is set by an alignment tool that sets the spread of the pens and furthermore aligns pen 2 with the zero time mark on the 392 platen. Pen 2 is used as the zero point to minimize the overall offset between the four pens. The mechanical offset is 4 mm between any two adjacent pens or 8 mm between any two non-adjacent pens.

To calculate the timing offset, it is only necessary to find the percentage of the chart circumference that the mechanical offset represents. In other words, by dividing the 4 mm mechanical offset by the circumference of the chart and then multiplying it by the time (in minutes) for one full revolution, will result in the offset between two adjacent pens (in minutes).

The diameter of the charts is 238 mm which makes the radius 119 mm. Using the formula: circumference = 2 x pi x radius. Thus the circumference is 2 x pi x 119mm =747.7mm of the chart. Divide 4mm by 747.7mm and the result is .00535 or .535% of the circumference.

As an example: a 24 hr/rev chart where one revolution is 1440 minutes. Multiplying 1440 times .00535 results in 7.704 minutes of offset between any two adjacent pens. For a 7 day/rev chart, the number of minutes is 10,080, multiplied by .00535 results in 53.928 minutes, of offset between any two adjacent pens.

PEN	OFFSET 24 HR	OFFSET 7DAY
1	-7.704 min	-53.928 min
2	0 min	0 min
3	7.704 min	53.928 min
4	15.408 min	107.856 min