

# **Oscillograms**

## **A Collection of Examples**

### **Introduction**

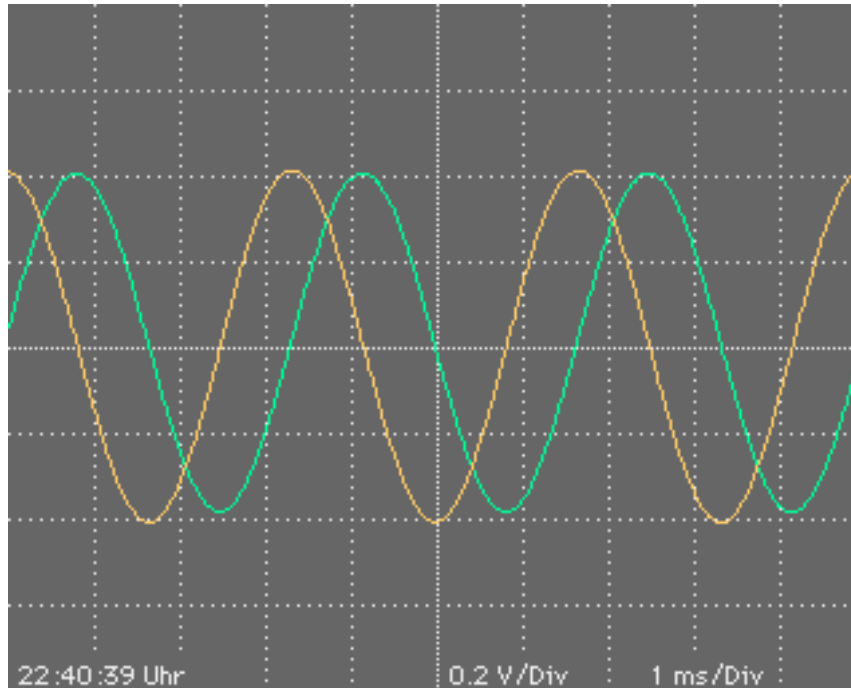
The intention of this document is to show some typical applications of Digital Oscilloscope. It is no way a complete discussion on this subject. Send any comments, ideas, and suggestions to the author:

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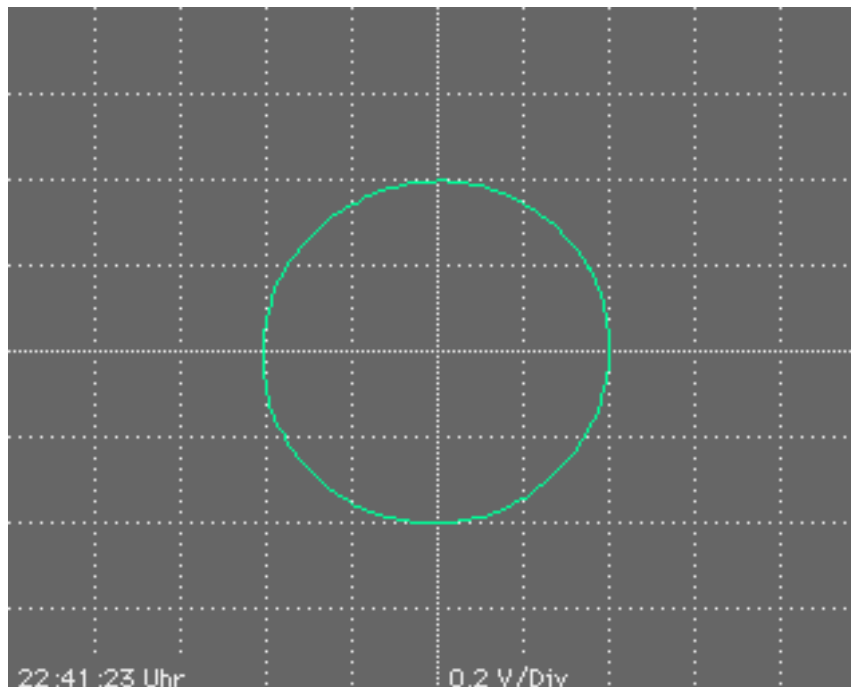
E-Mail: [hbaer@p.igp.ethz.ch](mailto:hbaer@p.igp.ethz.ch)

## Examples

Figures 1 to 4 present the signals from a sine wave generator. Phase shift is achieved a resistor-capacitor network. Figures 1 and 3 show the amplitude over time, figures 2 and 4 show the plot of the two channels' amplitude (Lissajous figures).

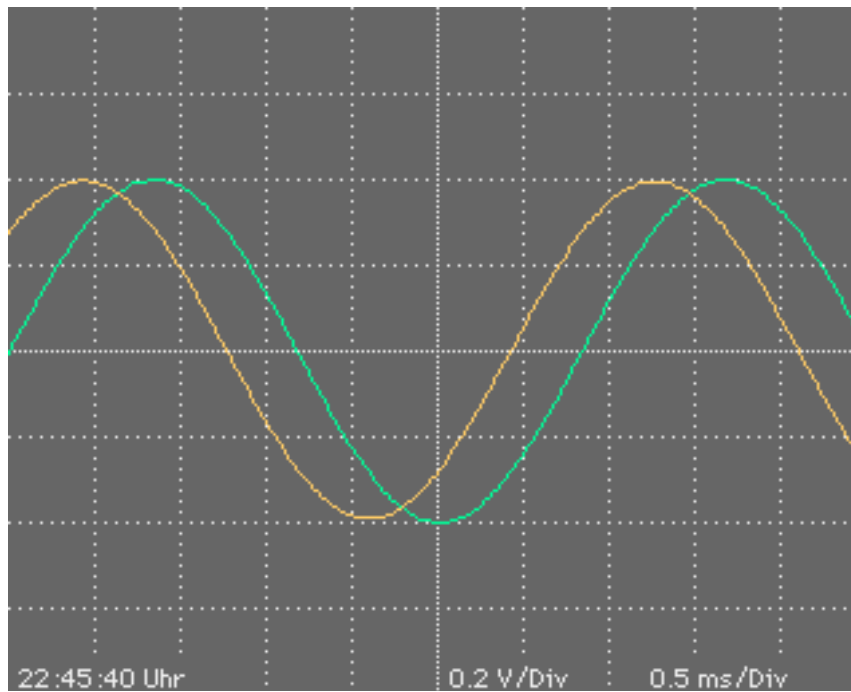


**Figure 1** Sine waves with phase shift of 90 degrees

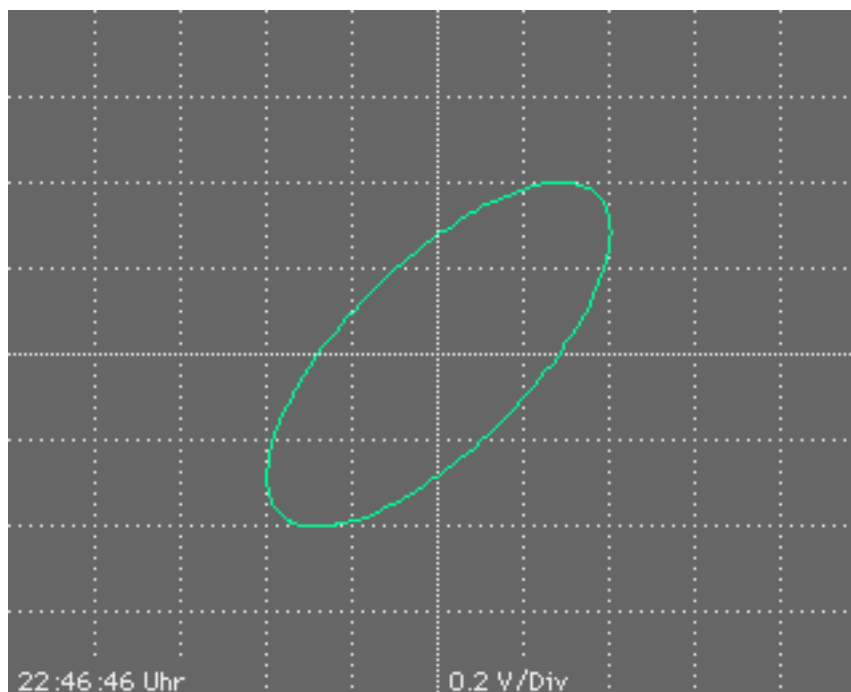


**Figure 2** X-Y plot from the sine waves in figure 1

3

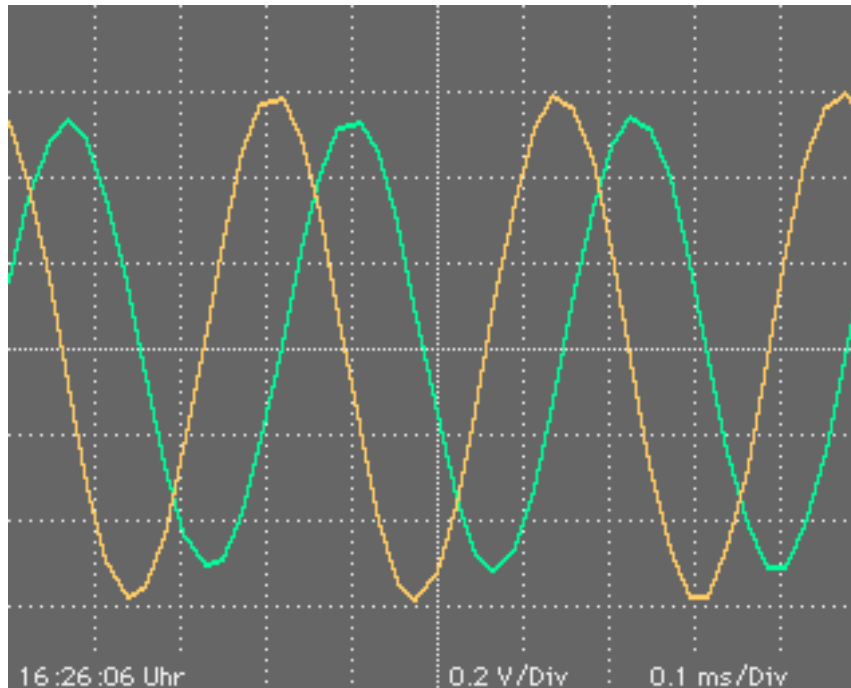


**Figure 3** Sine waves with phase shift of 45 degrees

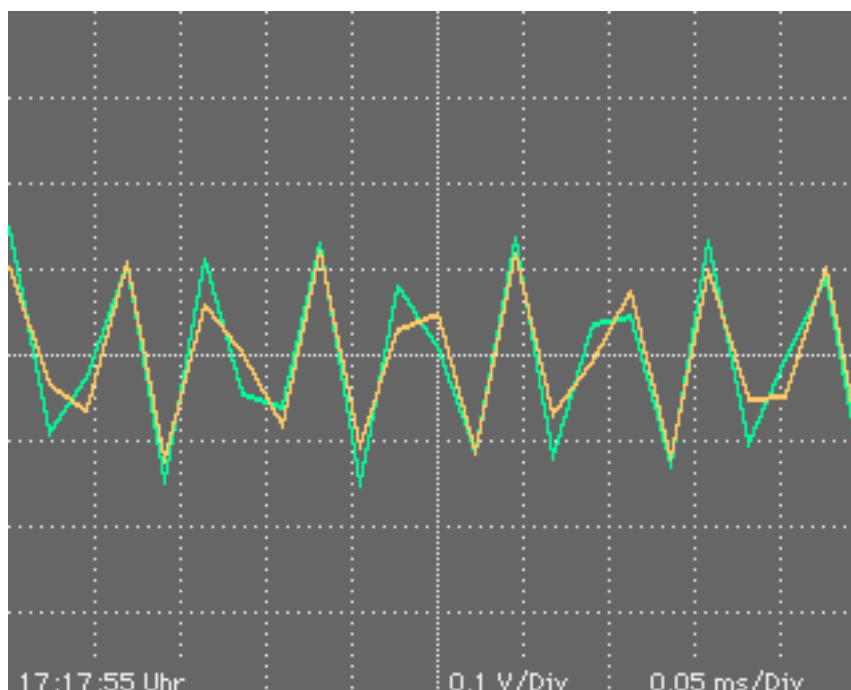


**Figure 4** X-Y plot from the sine waves in figure 1

Figure 5 and 6 show the signals from a stereo tape recorder. The improperly adjusted playback head causes a phase shift between left and right channel (figure 6). Figure 7 shows that the 18 kHz signal cannot be resolved sufficiently due to the given sampling rate of 44.1 kHz.

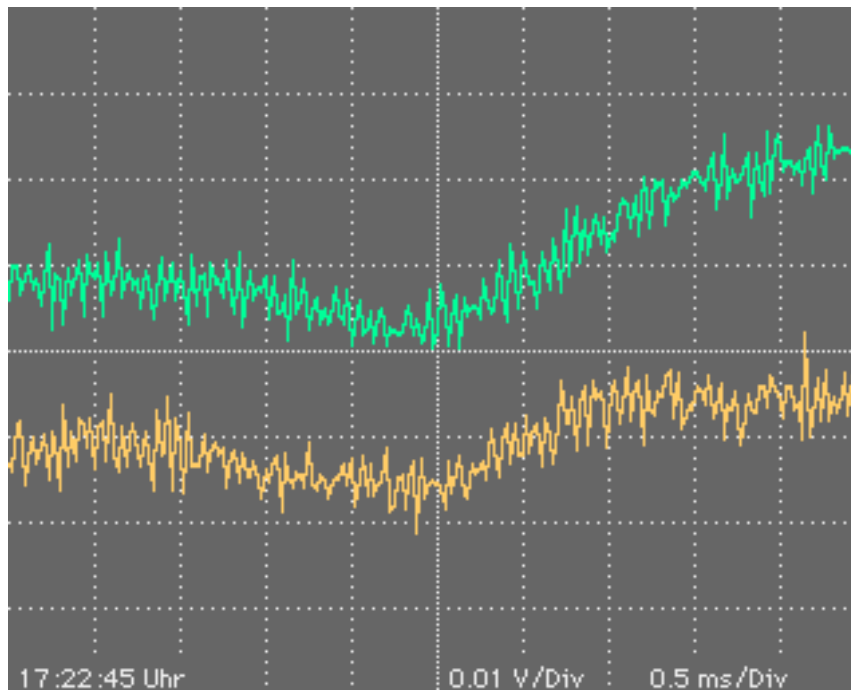


**Figure 5** Phase shift caused by an improperly adjusted playback head



**Figure 6** Tape recorder playing an 18 kHz sine wave

Increasing the amplification tape noise can be made visible (figure 8).



**Figure 7** Tape noise

The output from the frequency meter can be used to control tape speed. The reference signal is 3,150 Hz.

Index	Time	Frequency	Level
1	0.5	2879.098	77
2	2.0	3142.927	77
3	3.4	3143.570	78
4	4.8	3143.570	78
5	6.3	3142.999	77
6	7.7	3143.284	76
7	9.2	3142.785	76
8	10.6	3141.570	76
9	12.1	3142.070	76
10	13.5	3142.570	78
11	14.9	3142.641	77
12	16.4	3143.428	78
13	17.8	3144.427	77
14	19.3	3144.499	77
15	20.7	3144.713	77
16	22.1	3144.928	77
17	23.6	3143.999	77
18	25.0	3143.213	77
19	26.5	3142.427	77
20	27.9	3142.356	77
21	29.4	3141.927	78
22	30.8	3142.641	77
23	32.2	3143.856	77
24	33.7	3144.999	77
25	35.2	3145.071	77
26	36.6	3144.642	78
27	38.0	3144.571	78
28	39.5	3143.999	78
29	40.9	3142.927	78
30	42.4	3143.141	78
31	43.8	3143.213	79
32	45.3	3143.428	79
33	46.7	3144.143	78
34	48.2	3144.643	79
35	49.6	0.000	0
36	51.0	0.000	0

**Table 1** Tape speed control