SOURCE : NTT, KDD, NEC and FUJITSU

TITLE   : FILTER USED IN NTSC-CIF CONVERSION

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1. Introduction

We implemented the filter hardware based on Document #55, and noticed aliasing noise in NTSC sequences recomposed from CIF in case of rapid change, scene-cut in particular (see Figure 1). This type of noise is annoying in some control method. Aiming at the noise reduction, we have done a preliminary experiment on the hardware, and this contribution describes the first result.

2. Filter coefficients

We compared two kinds of filter coefficient set as below :
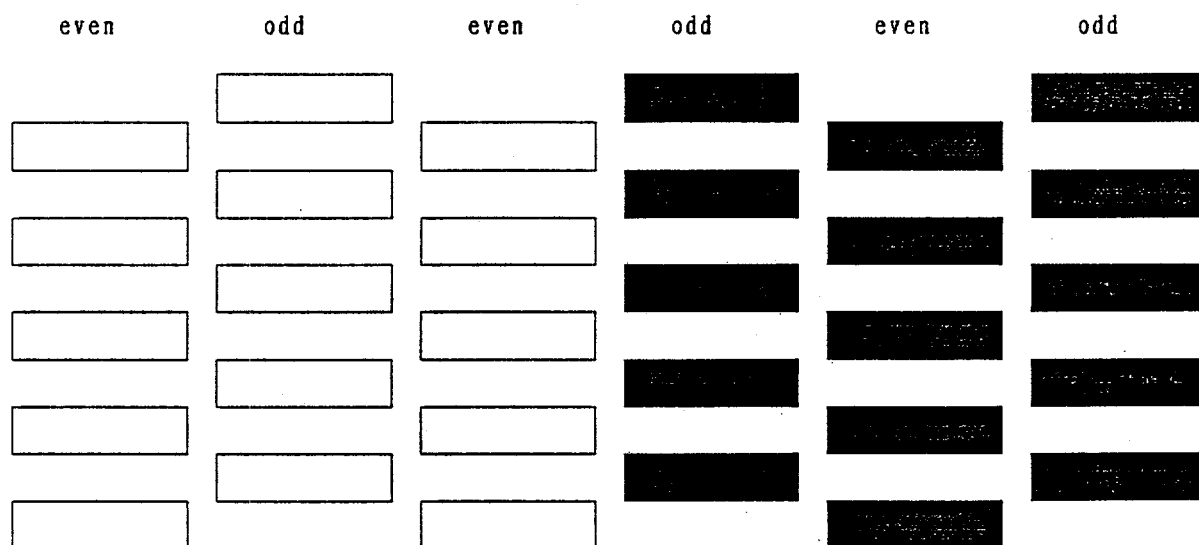
   (a) coefficient set in Document #55 , and
   (b) modified coefficient set (see Annex 1) .

Frequency characteristics of (a) and (b) are described in Annex 2. Pictures processed by the hardware will be demonstrated at the meeting. The pictures with coefficient set of (b) shows some reduction of the aliasing noise as compared with (a).

3. Conclusion

The result of this document indicates a possibility of the aliasing noise reduction in the conversion between NTSC and CIF, by the modification of coefficient set of the filter.

· 240 line , 2:1 interlace

even   odd   even   odd   even   odd

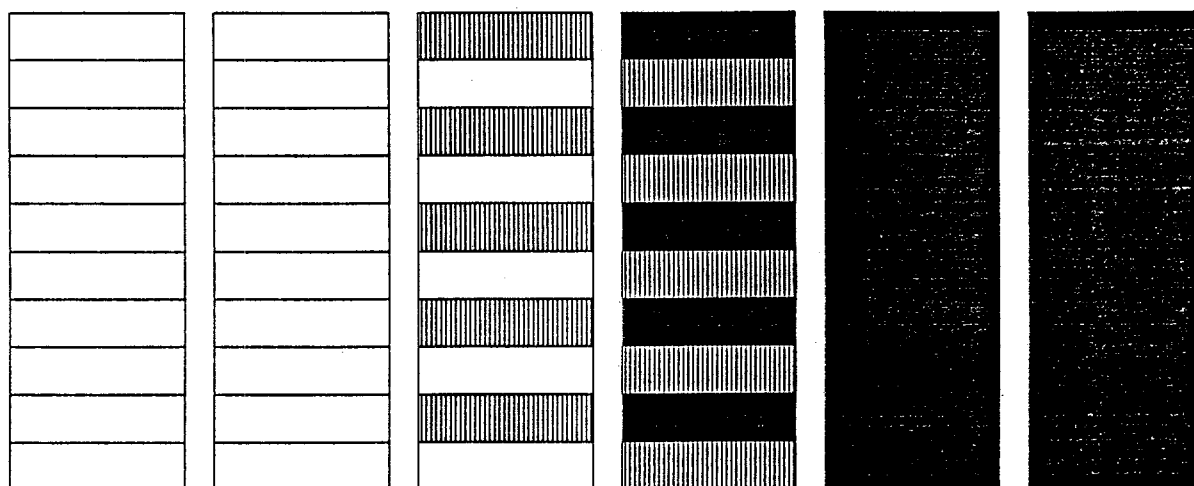· 480 line , non-interlace

Fig. 1 Aliasing noise generation in a scene-cut.

Annex.1   filter coefficient set

(a) coefficient set in Document #55

NTSC to CIF

filter set	C-2	C-1	C0	C1	C2
F1	0	113	140	35	-32
F2	-24	76	152	76	-24
F3	-32	35	140	113	0

CIF to NTSC

filter set	C-2	C-1	C0	C1	C2
F1	-49	131	197	-56	33
F2	-27	60	241	-40	22
F3	0	0	256	0	0
F4	22	-40	241	60	-27
F5	33	-56	197	131	-49

(b) modified coefficient set

NTSC to CIF

filter set	C-2	C-1	C0	C1	C2
F1	22	94	108	47	-15
F2	0	72	112	72	0
F3	-15	47	108	94	22

CIF to NTSC

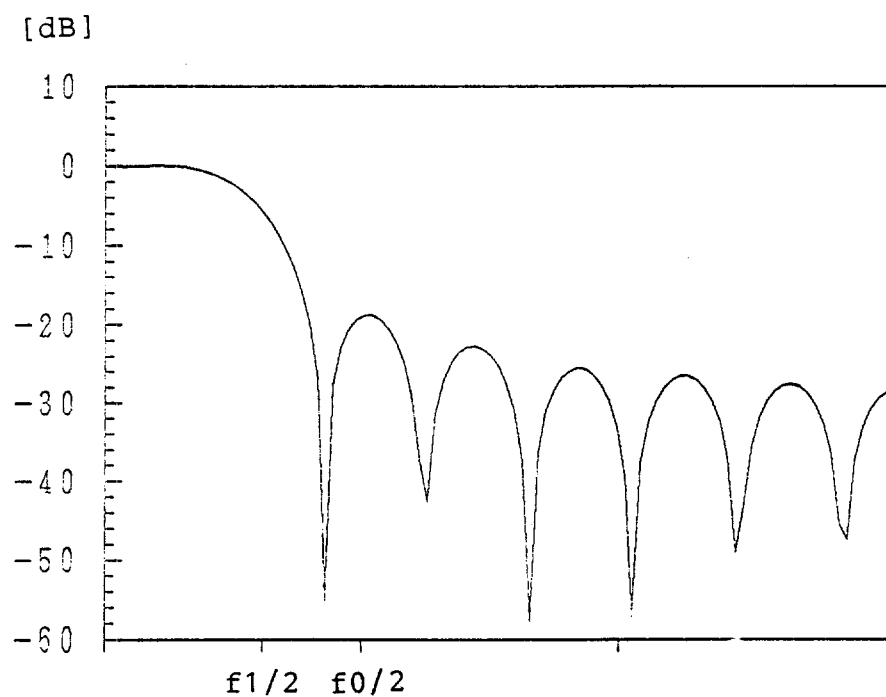| filter set	C-2	C-1	C0	C1	C2
F1	-48	146	189	31	0
F2	-51	99	229	0	-21
F3	-40	46	244	46	-40
F4	-21	0	229	99	-51
F5	0	-31	189	146	-48

Annex.2   frequency characteristics of filter coefficients
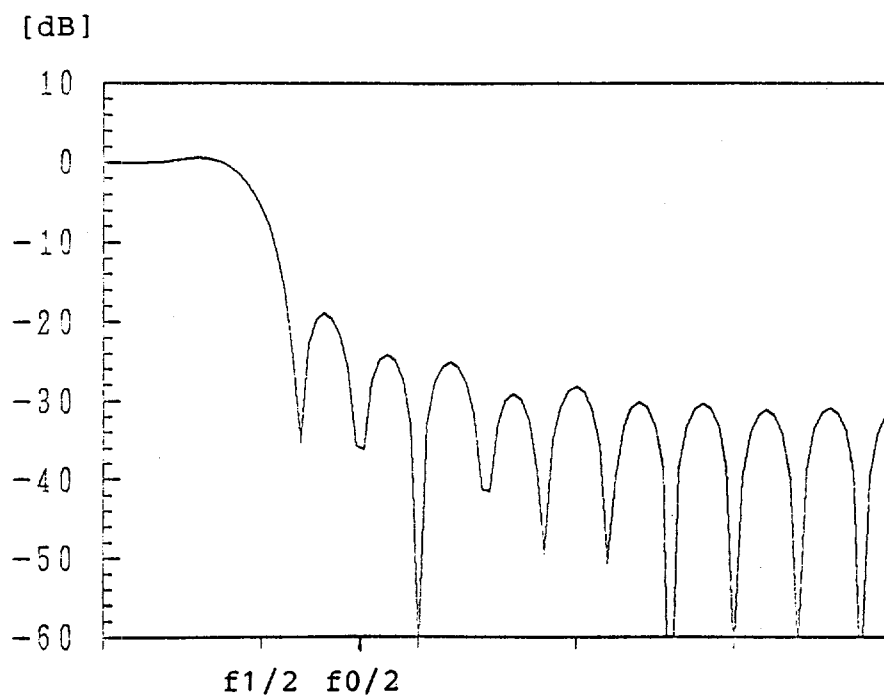
   f0 : sampling frequency of NTSC (vertical)

   f1 : sampling frequency of CIF (vertical)
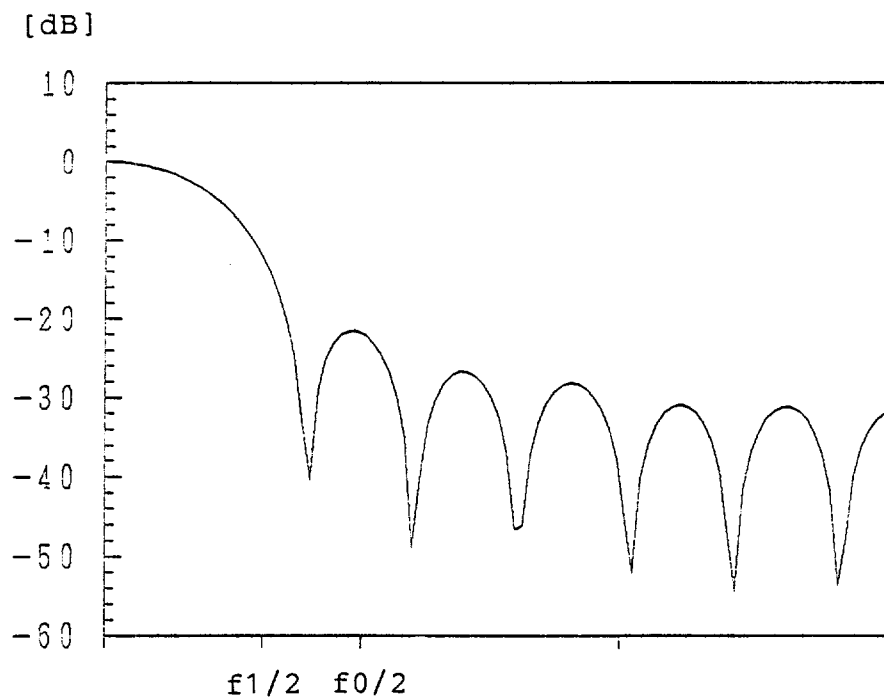
(a) coefficient set in Document #55

 NTSC to CIF

 [dB]

f1/2 f0/2

 CIF to NTSC

 [dB]

f1/2 f0/2

(b) modified coefficient set (see Annex 1)

NTSC to CIF

[dB]

f1/2 f0/2

CIF to NTSC

[dB]

f1/2 f0/2