CCITT SG XV
Working Party XV/1 — Document AVC-230
Experts Group for ATM Video Coding — 17 March 1992

SOURCE: Japan
TITLE: Jitter performance of an adaptive clock method
PURPOSE: Information

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1 Introduction

In ATM network, source clock frequency recovery is required when source clock is not locked to the network clock and destination clock should be locked to source clock. Three methods of source clock frequency recovery are recommended by SG XVIII; adaptive clock method, SRTS (Synchronous Residual Time Stump) method and synchronized pattern method.

For video signals transmission system, the clock jitter performance is significant for the received picture quality. For example, in EIA(Electronic Industries Association), line frequency and chrominance subcarrier frequency are standardized. So, reducing the recovered clock jitter to the level that is sufficient for video signals transmission should be discussed.

This contribution shows the jitter performance of the clock recovered with an adaptive clock method. Experimental results will be presented also by a D-I tape.

2 EIA STANDARD RS-170A

The following is RS-170A standard.

Chrominance subcarrier frequency	$fsc = 3579545 \pm 10$ (Hz)
Line frequency	$f_H = fsc \times 2/455$ (Hz)
	(15734.264) (Hz)

This requires that the jitter performance of the recovered clock is less than 191 ps at 15.73 KHz.

3 Adaptive clock method

Fig.1 shows a block diagram of adaptive clock method. Received video data are written into the FIFO at network clock rate and read out at the rate of voltage controlled crystal oscillator (VCXO) clock. The Half-full Flag (HF) of the FIFO is used to control the frequency of the VCXO through the low pass filter (LPF). Thus, the fill level of the FIFO is controlled toward half occupancy. In this method, the cut off frequency (fc) of the LPF is an important factor to reduce the jitter of recovered video clock.

4 Jitter measurements and results

Fig.2 shows experimental system configuration. The video signals were transformed in PCM. The jitter performance of recovered video clock were measured and decoded picture quality were evaluated in this system. The

jitter performance is shown in Fig.3 (the fc is 0.387, 1.82 ,18.2 Hz and non LPF). It shows that the jitter of recovered video clock depends on the cut off frequency of the LPF; the fc should be low to reduce the recovered video clock jitter. When the fc was 18.2 Hz or without the LPF, the decoded picture was degraded by recovered clock jitter. However, when the fc was 0.387 Hz or 1.82 Hz, no noticeable degradation was recognized.

5 Conclusion

The picture quality is influenced by the jitter of recovered clock. Therefore, in source clock recovery, jitter performance of recovered clock is significant. The jitter of recovered clock should be reduced to such level as EIA RS-170A standard requires.

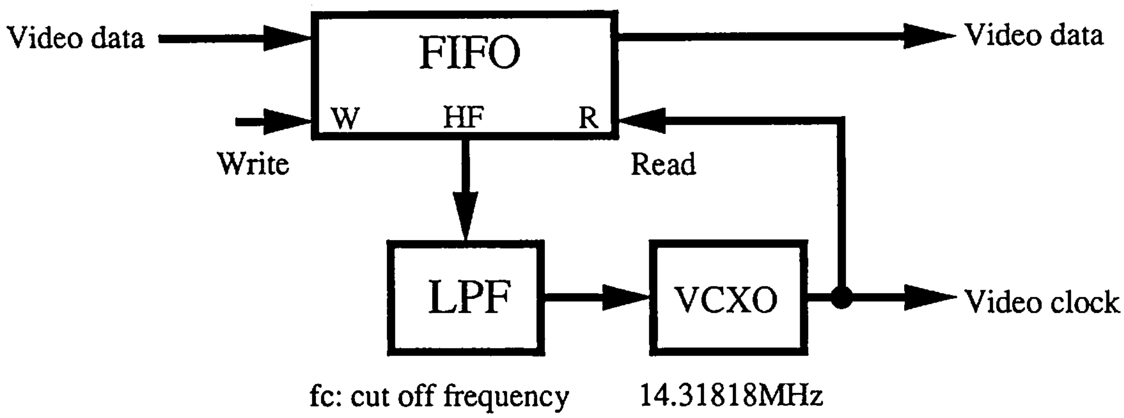

Fig.1 A block diagram of adaptive clock method

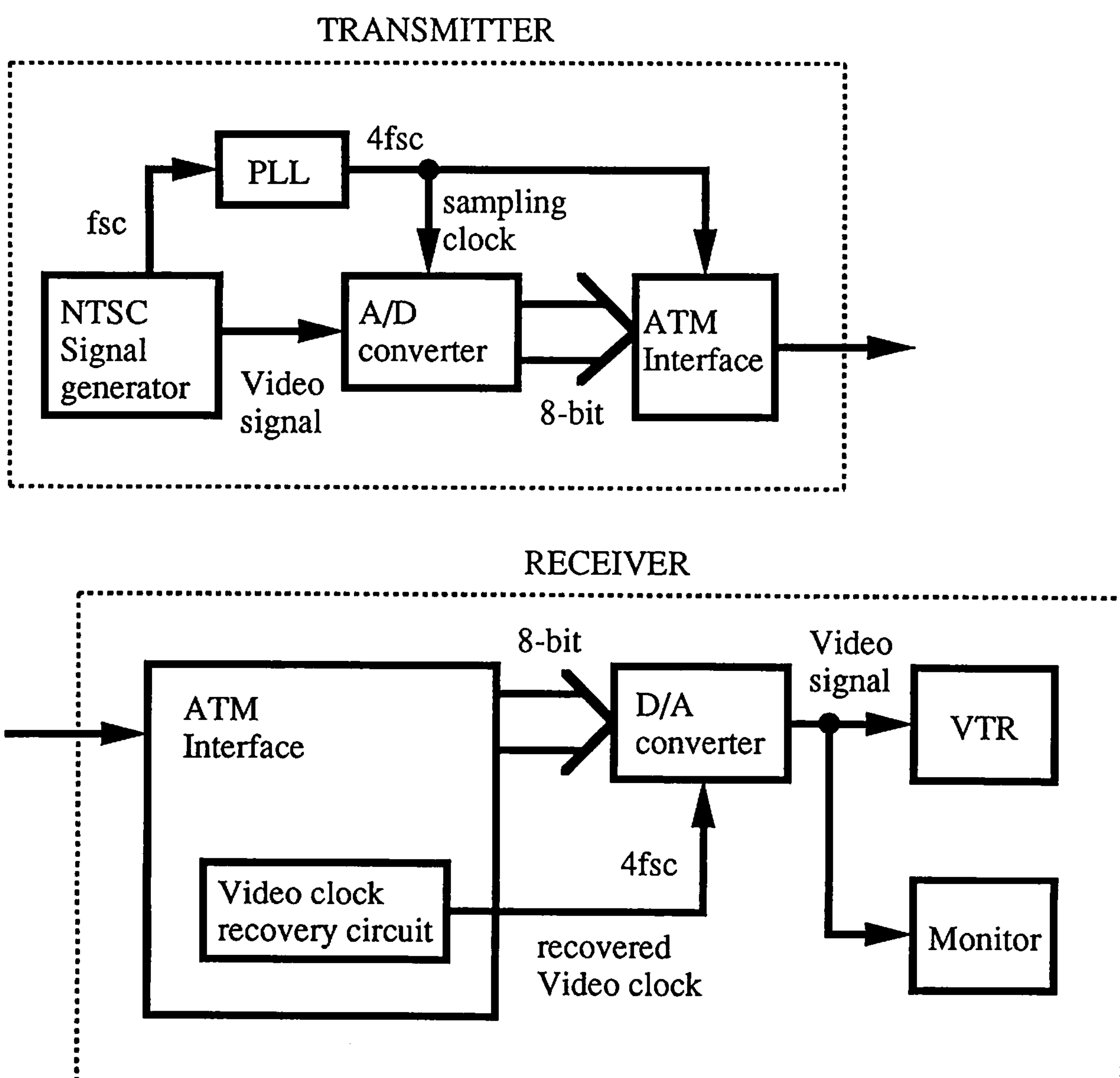

Fig.2 Experimental system configuration

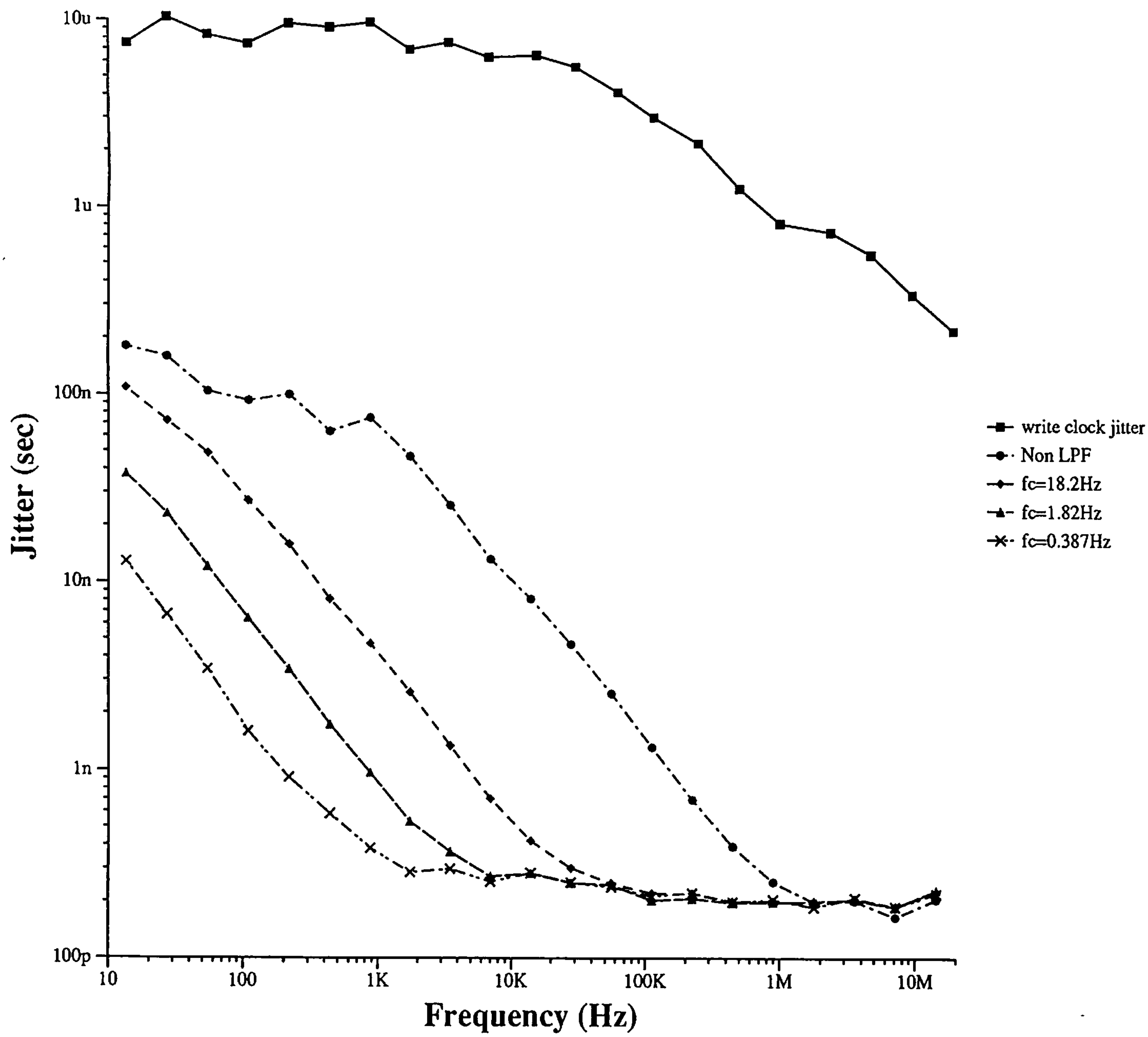

Fig.3 Jitter performance